Demographic Transition Theory

John C. Caldwell

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by

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PREFACE

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INTRODUCTION

CHAPTER 1

THE ANALYTICAL APPROACH

The papers collected in this volume are focused on human reproduction and survival over the full span of mankind's existence. The decline in the last two centuries of fertility and mortality from moderately high, and often very high, to lower levels is called the "demographic transition." This book examines the determinants of fertility and mortality levels and their balance, from the time when the world's people were solely hunters and gatherers to when an increasing number live in cities undertaking work far removed from producing food. Although the focus is on reproduction, the search for explanations crisscrosses the work of others whose central concern is production.

The background for the ideas expressed here is almost half a century of experience and research in sub-Saharan Africa, South and Southeast Asia, and Australia. Early experience with fertility attitudes and behaviour in rural West Africa convinced me that, in the circumstances of the population there, uncontrolled reproduction was just as logical as was highly controlled reproduction in industrial society. The reason clearly lay in the economic system, which for the great majority of West Africans was family farming. Nevertheless, it was work in South Asia (rural South India and Bangladesh) from the late 1970s that demonstrated the inner workings of family farming. The progressive expansion of my concept of modes of production can be found in Caldwell (1976), "Towards a restatement of high fertility. . . ," (1977) "The economic rationality of high fertility. . . ," and (1982), *Theory of Fertility Decline*; Caldwell, Reddy and Caldwell (1982) "The causes of demographic change in rural South India" and (1988), *The Causes of Demographic Change: Experimental Research in South India*; Caldwell and Caldwell (1992), "Family systems: their viability and vulnerability. A study of intergenerational interactions and their demographic implications;" and Caldwell (2004), "Demographic theory: A long view."

Much of what I learnt can be summarized from the work on the South Indian farming family at the beginning of the 1980s, supplemented by a study of individual labour inputs in rural Bangladesh (Caldwell et al. 1984). Land tenure was freehold held by the older male farmer. There was not really a free market in land, because, although it could be sold in a crisis, most family farmers regarded land tenure as being descended from ancestors and as needing broad agreement from relatives before the land could be sold. Indeed, when the land was divided between married sons, it was not only relatives but also members of the broader

community who judged where the boundary lines should be placed. Food was stored after the harvest and most of what the family ate during the following year was from this store.

The main purpose of the family was to work hard on the farm, to maximize the amount of food that could be produced, and, if possible, to acquire more land. The most efficient way of doing this was found to be direction by the head of the family (usually male) and a detailed division of work as appropriate to the age and sex of the person. In each sphere the work was immediately directed by an older person of the same sex: the farmer in the field, and his wife in the house and also in the field when female household members were weeding. The working group consisted of the patriarch, his wife, his unmarried and married sons (the latter until such time as the land should be divided), daughters-in-law and unmarried daughters.

Work efficiency was maintained by sons respecting their father as an ancestor and as the owner of the land and the decision-maker on inheritance. Daughters were kept in line by the knowledge that only the family could arrange their marriage and raise sufficient dowry to get good husbands. The weakest point in the system was the position of the daughters-in-law who provided the major input into household work. They were strangers, and were treated as such, with a deep suspicion that they did not fully identify with the family and its traditions. This distance between the farmer's wife and daughters-in-law served the former well in maintaining discipline and demanding backbreaking work. The daughter-in-law, knowing that she would eventually be a mother-in-law, sought to strengthen her position by emphasizing to her husband the importance of the marital bond and his duties to his own children. The family countered this danger by ensuring that the son acquired a much younger wife whom he would treat almost as a child, and by ensuring that he and his wife demonstrated little overt affection and had limited possibilities for dalliance or sexual relations, that the son spent most of his time with his brothers and showed great parental respect, and that much of the decision-making about children was done by the grandparents. Sons' wives understood that they were primarily daughters-in-law, and only secondarily wives.

Little of this control was exercised by brute force. Rather it was achieved by setting everything into a moral framework. The young had a duty, enshrined by religion and community precept, to honour, respect and obey the old. Sexuality was suspect and so was affection, except between the generations. Daughters should be married into families with at least as much property, and this should be ensured by holding premarital virginity to be blessed and to execrate any change in that condition. Those in control saw the advantages of all these requirements but they also believed that religion and culture held that they were to be venerated.

These conditions were changing even as we undertook research, but most of the old system was largely intact, and the older people had been immersed in it and could testify to the way it worked. Nevertheless, money and the market

were eroding behavioural patterns and the culture that had modelled them. Jobs were becoming increasingly available outside agriculture. Schooling was reducing children's labour and threatening to make them sceptical of the wisdom of the old. The national family planning program was preaching a message at odds with the age-old, high-fertility reproductive morality. Of course, there had always been people who were not in land-owning families. There were the agricultural labourers who, without the promise of inheritance, had less control over their children and daughters-in-law, and who still paid bridewealth or practised no marital payments. There were also shopkeepers and traders. But all these groups were adherents of ancient religions which enshrined the farmers' values. In any case, those religions were of value in keeping their own families in order and ensuring that their children worked hard and regarded their individual earnings as family property.

The economic and cultural system of the peasants of South Asia differed marginally but not fundamentally from that of the West African shifting cultivators that we had studied in the 1960s and 1970s. In West Africa, land was communally owned (usually by clans) and inheritance could not be a major source of the older generation's power. Marriage was by bridewealth, often modest, in contrast to the situation among livestock-raising and livestock-giving people of much of the African savannah. Indeed, female premarital virginity while prized, and often desired, did not take such a central place in culture and religion (Caldwell and Caldwell 1987; Caldwell, Caldwell and Quiggin 1989). In these circumstances even greater emphasis than in Asia was placed on the cultural and religious centrality of kinship, lineage and ancestry. The dead patriarchs became ancestral spirits who could witness and interfere with earthly life. The live patriarchs were close to achieving this position, and, in any case, the spirits or high gods were likely to punish those young men who failed to honour and work for their fathers. The arrangement of marriage had been in the fathers' hands and in an earlier almost entirely subsistence society only the old had the control over livestock and other produce to be able to put together bridewealth. Furthermore, the elders were responsible for maintaining one aspect of sexual activity, long female postpartum sexual abstinence that maximized the survival chances of the newborn (Saucier 1972). They also controlled reproduction by honouring women with many children and excoriating the sterile, the subfertile, and those held responsible for high child mortality.

This system proved fragile when colonization and the modern world intruded. Wage-earning meant that young men could themselves pay the bridewealth, and urbanization meant areas where the wages could be earned. Schooling reduced the value of children's labour and threatened to make them doubtful about the wisdom of the old. The towns provided a context in which high fertility led to children being more costly. Yet in rural areas children's labour was still so valuable, and everywhere children's gifts of money, goods and labour to the venerated elders were still so great that the establishment of family planning programs was retarded and their success outside the cities (and Southern Africa) limited.

THE SEARCH FOR A THEORETICAL FRAMEWORK

All our African and Asian work suggested that the type of economy determined the culture, its religion, and its demographic behaviour. Clearly, this is akin to Karl Marx's use of "mode of production," a term which will also be used here. Although this concept is central to Marx's materialist interpretation of history, references to it in his works are fleeting and concentrate on the collapse of capitalism. The Preface to *A Contribution to the Critique of Political Economy* provides a longer view: "At a certain stage of their development, the material productive forces of society come into conflict with the existing relations of production. . . . Then comes the period of social revolution. With the change of the *economic foundation* [earlier referred to as "the mode of production of material life"], the entire immense *superstructure* is more or less rapidly transformed" (Marx 1904 [1859]:12).

There are complexities. Donham (2001:9924–9927) points out that Marx used the term *Produktionweise* which has traditionally been translated into English as "mode of production" although it can be just as correctly rendered as "way of production" or "way of producing." The productive forces (or technology) determine the relations of production or the underlying power relations, and together these produce the superstructure or the *de facto* distribution of power. The superstructure is the culture, that is the beliefs, customs, laws, religion, art, and attitudes etc. which justify the relations of production and stabilize the whole system. To most people within the system the superstructure appears to be rational, natural, and the truth about the world and existence. In most agricultural communities the power of the patriarch, and even his power when dead, the need to defend and extend the lineage, and the gender and age segmentation of productive activities seem to be an eternal truth, heaven-sent. To fit our interpretation certain problems must be discussed.

First, Marx (1904 [1859]: Introduction) gave as examples of modes of production "primitive communist, ancient, Asiatic, feudal, capitalist, socialist and communist." Indeed, Cohen (1978:79–80) claims that Marx used the term in three different ways. In none was "mode or production" identical with economic (or, presumably, technological) system. He interpreted it as a way of producing or even just the power relations and hence the way of distributing the product. Cohen (1978:80) wrote: "There is a change in the material mode of production when enclosed fields replace strip farming, when power looms replace hand looms, or when the quill is ousted by the typewriter." Neither Marx's nor Cohen's examples define how we wish to use the term "mode of production." Most of Marx's lists were not modes of production but modes of administration or distribution. We will address the three major modes: hunting and gathering, farming, and capitalist/industrial. Admittedly, a case could be made for treating both shifting cultivation and nomadic pastoralism as separate modes.

Second, Marx wrote of the economic foundation and the immense superstructure being rapidly transformed. This may have been the expectation for the

future revolution but was hardly a satisfactory description of the historical past. In the changes discussed here, the modes overlapped for long periods, while the elements of the superstructure did so for even longer times. Even the transient mixed superstructure was at every stage a stabilizing force.

Various attempts have been made to use, in modified forms, the concept of the mode of production. Alexander Chayanov (1966 [1925]) drew on his study of the Russian peasant in the early years of the twentieth century to produce *The Theory of Peasant Economy.* Here he proposed that peasant, largely subsistence production had its own mode, aiming at maximizing production rather than profit which is the driving force of capitalist farming. The workforce is the family and work inputs vary as the life cycle of the family changes its age composition. Marshall Sahlins (1972) in *Stone Age Economics* identified a precapitalist, subsistence mode of production, and contrasted hunters and gatherers, having limited wants and much leisure, so enjoying "stone age affluence," with hard-working peasant farmers driven by needs. Whether he regarded these two types of subsistence peoples as employing two modes of production is not completely clear. He did not stress the different superstructures. The contrast between the two lifestyles, driven by two differing ways of getting food, had already been made by Ester Boserup (1965) although she did not adopt a mode-of-production approach.

Among the neo-Marxists of the 1960s and 1970s the one who came closest to meeting our analytical needs—possibly because he had also worked in West Africa—was Claude Meillassoux (1960, 1972, 1975). He stressed that hunter-gatherer society contrasted with farming society in that hunting did not depend for production on the family but on the band that varied in composition over time and could contain distant relatives or even non-relatives. He equated farming with cereal production, probably because he was familiar with the West African savannah, but his conclusions hold for the farmers of the forests further south growing plantains, yams and cassava, as well as maize. He identified farming as determining the production unit, and primary social unit as the family—not usually the nuclear family—enshrined in culture (or superstructure) by a strong belief in the importance of kinship. This brought with it an emphasis on the importance of reproduction (see on sub-Saharan Africa, Caldwell and Caldwell 1987). Meillassoux placed an emphasis on demography by proposing that so important was the labour force that the elders regarded the control of reproduction as more important than production.

These were not theoretical explanations that we sought for guidance in our research—indeed, much of this material had not been published in the early years of our work. Rather we were increasingly convinced that the whole culture was shaped in such a way as to maximize the efficiency of each mode of production and that there were demographic outcomes. At first we identified two modes of production: pre-industrial and industrial. But, as research on the economy of hunter-gatherers, and on their work inputs by sex and age, mounted (see Chapter 5), it became clear that their labour needs differed so much from those of farmers that they must be regarded as adopting a different mode of production. As much less work was

demanded of children, they might well be characterized by a different demographic regime from that of farmers.

Thus, we ended with three demographic regimes: hunting and gathering (collecting the fruits of nature); farming (cultivating and harnessing the fruits of nature); and capitalism where the main labour market was external to the family and where delayed consumption, in the form of investment in machinery and other production goods, as well as the use of inanimate sources of energy, multiplied human production and eventually led to great rises in living standards (this industrial category also includes socialist countries). A fourth mode has been proposed, preceding hunting and gathering, namely *scavenging* at the dawn of human existence when mankind lived as their primate ancestors had done, and, having not yet invented tools and weapons, ate fruits and other parts of plants and competed with animals to eat carcases. But, lacking evidence and contemporary examples, attention will now be concentrated on the first three modes.

We have observed hunter-gatherers but have undertaken no systematic research on them and so will depend on others. We will follow the argument in *Theory of Fertility Decline* (Caldwell 1982) in assuming that children have economic value in that they work productively when young, and, when mature, they help their parents with the production of consumption goods, as well as providing protection and physical assistance. In accord with the empirical findings and theoretical arguments of Boserup (1965) and Sahlins (1972), most recent anthropological field research has found that hunter-gatherers do less work than farmers, and their children do far less work than do farmers' children. This finding is not completely secure as it is based on studies of contemporary hunters and gatherers who have mostly been pacified and assisted by governments and mission stations. It is, however, secure enough to lead us to define a separate mode of production for hunting and gathering. This decision is strengthened by a situation where hunters and gatherers—especially hunters—do their work in bands often with diverse composition rather than going forth as a family. Accordingly, the attempt has been made to show that hunters and gatherers have always had less need for children than farmers and actually reared fewer. It has also been argued that most infectious diseases were unknown among Palaeolithic populations and that accordingly their mortality must have been lower than that of closely settled farmers, let alone that of early peoples practising irrigation or living in towns. Most of the arguments for Palaeolithic population control rest on the practice of infanticide, but, as will be seen in Chapter 2, the evidence is far from solid (see Wood 1998). It is likely that the premodern man just accepted as natural, or what the gods determined, the flow of births and accompanying high infant and child mortality rather than actively intervening to try to change the situation. After all, that was the situation in England for most of Queen Victoria's reign.

Farmers certainly needed children to assist in working the land and to inherit it. Their emphasis on kinship and ancestry meant also giving importance to descendants and the survival of the lineage, especially where there was no right to family land, and where, as in West Africa, all pressure for high fertility had to take

the form of exalting continued reproduction and abhorring childlessness. Where, as in parts of Asia, there was the need for land inheritance and land was scarce and valuable because of dense settlement, the parents of many sons might resort to infanticide or abortion. Where there was a need for high dowry, the parents of many daughters might do likewise (see Chapters 6 and 7). There is clear historical evidence that during famines in China babies, especially daughters, were drowned, not in an attempt to control family size but in an effort to minimize the immediate demand for food. But most farming fertility was uncontrolled and welcomed, and contraception, abortion and infanticide were regarded as evil, at odds with the culture, and forbidden by religion.

The great cultural and demographic change came with that advance in science, technology, the massive use of inanimate sources of power, the proportional reduction of the agricultural sector of the economy and employment, and the rise in individual productivity and incomes that we call the Industrial Revolution. Children were increasingly educated for most of their years instead of being productive. Eventually old age needs were protected by the state or private investment institutions and there was less reliance on children. With some delay, contraception was regarded more favourably, and, with more delay, adequate contraception was invented (see Chapters 9 and 11). More recently, women have joined the workforce in numbers beginning to compete with men, and children are no longer merely an expense but a rival for women's time against the time demanded by the employers. New ideologies justify low fertility and even childlessness, and the religions' old attitudes to fertility are forgotten or reinterpreted.

Several additional points need to be addressed.

First, the existence of uncontrolled fertility did not mean maximum fertility in any society. Even where children were in strong demand, the need for a stable, organized society had precedence. Most societies attempted to restrict childbearing to marriage, especially in the case of socially stratified landed societies where parents feared that poor adventurers would seduce their daughters and demand marriage and inheritance. The lifestyle and social class of descendants could be maintained only if daughters married men with property expectations equal to the holdings of the daughters' family; or if sons married brides with adequate dowries. Many societies discouraged the remarriage of even young widows or the keeping of all women in marriage by means of polygyny. In this way, inheritance and lineage problems were avoided. Birth intervals were kept long by prolonged breastfeeding both because it was known that early weaning made it more likely that the child would die, and because milk was regarded as a free food that should not be rejected. Many societies practised postpartum female sexual abstinence with the aim of avoiding a premature new pregnancy, and thus of maximizing the child's chance of living. Even in societies regarding high fertility as showing great virtue and the approval of the gods, women could be killed for conceiving outside marriage.

The second point is that there is no clear-cut division between one mode of production and the next. Economies overlap, even in the one family or individual,

and superstructures not only persist but are put to use stabilizing successor societies. Hunting and gathering persist in many West African societies that have been increasingly practising agriculture for more than two millennia. The domestic production of household goods and services still survives in industrialized societies, and only recently has the industrial system shown that it can compete efficiently with the household in the preparation of food, the making of clothes, and child rearing; and can provide employment for all the displaced housewives. Non-agricultural employment has been available in some measure at least since the first cities came into existence five thousand years ago and probably to some extent in earlier villages up to ten thousand years ago. These non-agriculturalists did not develop a complete new cultural superstructure partly because they constituted only a small minority of the population and partly because most businesses were family businesses run like farms, employing all the family and usually placing only relatives in positions of trust, and having a single budget. This is how Florentine Renaissance banks were run, and resembles much of the service sector in today's Italy. There was no reason to limit fertility, although by the eighteenth century at the dawn of the modern world the Protestant bourgeoisie of Geneva had found reasons to do so. The modes of production were stabilized by the cultural superstructure, mainly by justifying and so stabilizing the relations of production. The superstructure consisted of customs, beliefs, taboos, laws and religion. In premodern societies the boundary lines between theses elements were blurred. Religion was the ultimate sanction: that is, religion in its broadest sense explaining to us the world, existence, the sacred, and the proper way of doing things, as well as revealing the misfortunes and punishments that befall transgressors.

Australian Aborigines, like most hunter-gatherers, focused their religion on explanations of nature, and on sacred objects and sites, together with the spirits that inhabited them. Accordingly, there was little resentment or tension among wives or other counterparts in production relations if men spent much of their time visiting sacred sites in order to gain other-worldly protection for themselves, their families or clans; or seeking out distant relatives who might help in the hunt or warfare or grant rights to hunting on their land. Old men were in a difficult situation in hunting societies once their speed and prowess began to desert them but they were usually protected from senicide by a general respect for the aged, and, amongst peoples such as the Aborigines, by their being the repository of recondite knowledge that could not be revealed to the young.

Some of these elements are still found among West African farmers and in South Indian villages. But farming, especially that with *de facto* ownership of land, brought with it a class system (determined by the fact and extent of land ownership), a concern about inheritance, and a determination that children's marriages would be to those with at least equal access to land or wealth, often transferred in the form of marriage payments (see Goody 1976). This meant parental arrangement of marriage and a determination that poor adventurers would not seduce the family's daughters. In India this led to the caste system with endogamous marriage, and to child marriage. Everywhere it led to the cult of virginity until marriage and

subsequently to sexual relations being exclusively within marriage. With settled agriculture the world religions began to develop, sometimes starting with the scriptures being transmitted orally, but, with the invention of writing, made concrete in written texts. They absorbed the cult of virginity to a point where their adherents equated "immorality" with female sexual relations before or outside marriage; they often concluded that strong males should prevent transgressions by weaker females. These emphases encouraged patriarchy, husbands older than wives, and the separation of the sexes. Such separation gave older women considerable power, since it was they who directed the younger females undertaking work in the house and sometimes in the field as well. The core of this younger female workforce was constituted by the daughters-in-law. It was important that they should owe primary allegiance to the household, especially to their mothers-in-law, rather than to their own husbands and children. The likelihood of their doing so was an important consideration in arranging a son's marriage. Nevertheless, it was inevitable that the younger woman would use her emotional tie, based partly on sexual relations, to try to get her husband to commit himself to her and their children. The older couple countered such attempts by trying to minimize close relationships between the younger couple and to extend the cult of virginity to imply that young wives too emotionally bound to their husbands and too responsive to sexual relations were improper or even immoral (see Caldwell, Reddy and Caldwell 1988).

In farming societies, especially those adhering to the world religions, ancestor worship is less pronounced, or absent. This weakness in the control system is overcome by customs and laws enshrining property rights that give the patriarch indisputable control of the land, family employment, and ultimately inheritance. The world religions, with the exception of Christianity, tend to treat the family as the basic worshipping unit and to hallow its existence. Agriculture is often seen as a natural or even holy calling. In traditional societies young adults who broke with their families found it hard to find friends, a place in the community, or employment.

Demographic behaviour in agricultural societies is characterized by unconstrained marital fertility, and attitudes to large families ranging from respect in Asia to the identification of them with divine and ancestral blessing in sub-Saharan Africa. Nevertheless, other cultural priorities may well stop fertility from being maximized. While sub-Saharan Africa favours quick widow remarriage and high levels of polygyny to allow all women of reproductive years to bear children, Hindu India, with its private ownership of land and focus on inheritance, regards widow remarriage as discouraged by religion and as raising complications with regard to both social duties and inheritance. An older Europe frowned on such successive marriages, known as "digamy," if only because they threatened problems in the next life after resurrection. In much of extremely-high-mortality sub-Saharan Africa mothers were expected to practise long periods of postpartum sexual abstinence to increase the infant's chance of survival because the ultimate aim was maximizing the number of living children, not the number of births. Meillassoux (1972) argued that West African agriculture, built primarily about

the nuclear family and employing it as the workforce, was always in danger of subfecundity or capriciously high child mortality, or being in the part of the life cycle where all children were either very young or married. He saw the last two dangers as being overcome by fostering children, usually from relatives who had a surplus of children of working age. In addition, the first wife's sterility could, of course, be remedied by polygynous marriage.

The final mode of production is probably capitalism (industrial society, labour-market society), where workers are employed outside their homes by non-relatives. Productive relations depend ultimately on force: unemployment, sacking, laws, police and trade union action. Nevertheless, these instruments are hidden, softened or made needless by the cultural encouragement of the good worker, the good employer, social responsibility, the common effort, nationalism, and the good of the nation or economy. If this is insufficient, then labour laws can be rolled back to free the labour market and can be justified on the grounds of more production for all. Much industrial peace can be credited not to the superstructure built up by the new industrial society but to that persisting from the agriculture mode of production: family values, hardworking and obedient young, and doing one's best in one's job and for the father-like figure who leads the enterprise. These values are also drawn from the world religions that emerged with agriculture and sanctified it. Their continuation into the industrial era is encouraged by employers and political leaders.

Labour-market society does not need the family or the fostering of family values except as a social pacifier. Nor does it need marriage or reproduction except to bolster the size of the workforce or market. In fact, colonial firms were happy to pay a man a living wage suited to supporting one person while his family supported themselves back on the farm. Modern economies prefer to have both husband and wife working while factories produce the prepared foods and clothes once made at home. While such production took place at home, family morality inherited from the agricultural period helped to keep domestic peace. Ultimately, the industrial system does not need marriage, families, virginity, legitimate births or even reproduction. If the birth rate falls too low then immigrants can replace the native-born. The industrial system increasingly needed educated workers, and, when the women's movement impelled societies to educate daughters as much as sons, it was no longer necessary to pay each parent a family wage. The fact that women as well as men could now earn a salary sufficient to support themselves meant that marriage dissolution was no longer a financial tragedy. Better contraception separated sexual activity from conception. The tendency to discard the farming family system and its ethics increased greatly as incomes grew in the second half of the twentieth century, multiplying by four in Western Europe and by three in English-speaking countries of overseas European settlement (Maddison 2003:262). Higher incomes could more easily support split families, single adults in their own apartments, and single mothers.

As sexual and reproductive behaviour found that the old limits no longer held, life philosophies changed. This was largely affected in most industrialized

countries by secularization, and in the United States by separating sexual and reproductive behaviour from church attendance. Fertility in industrialized countries fell steeply to below replacement level nearly everywhere. It seemed unlikely that firms would demand higher birth rates. They could profit by employing more capital-intensive labour. The nation states might feel threatened by diminishing populations. If so, they might be able to raise fertility levels again by greater government involvement—thus flying in the face of liberal economics—possibly by using a market solution; that is, by equating reproduction with production and paying a competitive market wage for women undertaking births and caring for young children.

In Europe demographers tended to see the behavioural changes wrought by the changes in the relations of production as autonomous, as the new enlightenment, and as a victory for rational thought over tradition and superstition, thus constituting the "second demographic transition." Many hardly mentioned the economic revolution, and most regarded analyses of the changes in terms of a superstructure altering to meet the demands of a new mode of production and new relations of production as being old fashioned and as treating modern man as less than a fully rational being.

Meanwhile, the market system and its culture were being exported all over the world in a process of economic and social globalization. In Asia, but less so in sub-Saharan Africa, peasant farms were selling more of their produce, and money transactions were becoming more universal. Farmers increasingly encouraged their children to enter paid employment in the growing cities, and often sought part-time, off-farm paid employment for themselves and their children. This tendency, and encouragement by international agencies (themselves evidence of globalization), meant ever more children being educated, which cost money and reduced their immediate labour value. In Asia, sexual mores changed only slowly, but female age at marriage rose. More significantly, the movements towards a labour market and a more comprehensive consumption market, together with children's increasing educational costs, undermined the belief in large families. The cultural superstructure moved to justify lower fertility, a process that was hastened by beliefs exported from the West condemning population explosion. Faster economic growth was promised if fertility was controlled (Coale and Hoover 1958), and international agencies offered assistance to Third World governments setting up national family planning programs. Between 1965 and 2000 the fertility (as measured by the total fertility rate) of both the developing world and the whole world nearly halved, so that by the end of that period around one-third of the populations of both Asia and the world lived in countries with below-replacement-level fertility.

The future is unknown. All that is certain is that even in the industrialized countries the superstructure has not yet fully adapted to the change in the mode of production and that mode is very far from its fully developed form. Future populations will undoubtedly look upon the marital, sexual and reproductive patterns of the early Third Millennium as being less than fully rational or liberated. Therein lie my worries about some of the explanations of the Second Demographic Transition.

ISSUES OF EARLY TRANSITION

The literature of anthropology and anthropological demography of the 1960s and 1970s rather surprisingly suggested a Palaeolithic demographic transition, later to be reversed and hidden by demographic changes brought about by the Neolithic Revolution (see Chapters 2 and 3). The argument was that hunter-gatherers deliberately controlled their fertility so as to raise their standard of living, lower mortality, and reduce pressure on resources, so preventing the deterioration of the environment and hence the food supply. This had been suggested as early as 1922 by Alexander Carr-Saunders in his *The Population Problem: A Study in Human Evolution.* It seems an unlikely proposition given that it is difficult to envisage whole groups concluding that over generations the environment would deteriorate and that mortality levels would ultimately be lowered if they took demographic action first. Carr-Saunders (1922) suggested the means of population control as including primitive abortion and contraception, but more recent anthropologists have realized that the only practicable means would have been limiting surviving family size by infanticide. Raymond Firth (1936), in *We, the Tikopia*, produced somewhat ambiguous evidence that Polynesians had once controlled their numbers.

The concept of an early demographic transition had several sources. One was the enthusiasm of the 1960s–1980s for controlling the "population explosion" by encouraging high-fertility countries in the developing world to use contraception to achieve small families. Many involved were loth to admit to themselves that they were foisting foreign cultures on developing countries, and preferred to believe that, on the contrary, they were making amends for the destruction of an older population control system at the hands of missionaries and colonial administrators. Anthropological studies of contemporary hunter-gatherers such as the !Kung appeared to show relatively low birth rates, but this finding may have been derived from incomplete reporting of vital rates, social structures such as rare widow remarriage because of the foraging way of life, or recent infection by sterilizing sexually transmitted disease. Evidence of infanticide in some recent hunting and gathering groups was assiduously collected and the case for its regular practice was almost certainly overstated. Many anthropologists had always been given to resenting any suggestion that the people they studied were any less rational than modern industrial populations, and too readily assumed that the context of their lives was similar. Sahlins (1974) wrote of the "Original Affluent Society," and, even though he made it clear that this title was meant to be provocative and referred only to plentiful leisure, others took it to mean demographic affluence in the form of low death and birth rates. Indeed, during aeons of near-zero population growth, birth and death rates must have been over the long run approximately equal. So, if it was argued that Palaeolithic mortality had been low, then so must fertility have been. This is exactly what medical scientists and epidemiologists began to argue, based on the belief that the great killer, infectious disease, was almost wholly a product of closer settlement after the Neolithic Revolution. The

idea that mankind was almost immortal in earlier times flies in the face of reason. If we hypothesize that at least some societies did not practise wholesale infanticide even though they were characterized by low mortality, then we have to draw the improbable conclusion that they expanded indefinitely and came up against Malthusian resource constraints, and so died of starvation or other ailments caused by physical weakening. They lived, after all, in very different conditions from contemporary hunter-gatherers. The alternative is that the apparent mortality gap was actually filled by high mortality levels from warfare and other violence, and that accidents were often followed by tetanus or septicaemia (Chapter 3).

The demography of their mode of production is relevant. In fact, evidence that children were relatively unproductive finally led to the conclusion that their productive system was indeed a separate mode (see Chapter 5). Ronald Lee (2002), drawing on Hillard Kaplan's data, shows that, at least in some contemporary groups of hunter-gatherers, children's work is relatively unimportant. Coupled with the fact that the hunting band rather than the nuclear family gathers meat, why would it not have been sensible for Palaeolithic man to have restricted family size? The answer probably is high mortality, the fear of extinction of the band or clan, and the bringing into existence of new hunters and warriors while the parental generation was still alive.

Chapters 5 and 6 address the question of whether some highly developed agricultural societies practised birth control or infanticide in order to limit family size and thus raise living standards. The best known candidate is Ancient Rome because of its institution of child exposure. The evidence is that the practice was probably confined to a small elite among whom patrimony was irreplaceable and its division among several sons would reduce them and their descendants to a lower socio-economic class. Children appear to have been valued for their work by the great majority of the population, farmers and artisans, an interpretation supported by the failure of population aggregates to show any structural signs of population control. In the densely settled populations of Asia, infanticide was practised to overcome inheritance or marriage payment problems or in times of famine, but not because children's work failed to largely defray the cost of their upbringing.

THE MODERN DEMOGRAPHIC TRANSITION

The second half of this book argues that the fully developed industrial-capitalist-market mode of production is the only mode that places no pressure, even long-term pressure, on individuals to reproduce at all. Once domestic production had reached a low level and education universality, children's production was nearly zero. Once financial institutions and pension arrangements, whether private or government, had reached a high level of development, children's value for providing security in old age tended to disappear. There remained, of course, social and psychological reasons for wanting children, grandchildren and a network of relations. But their value depended on the extent that their existence

was compatible—especially for women—with alternative desirable life courses, and the extent to which the new system could offer alternative or compensating pleasures.

The new mode of production depended on scientific and technical advances that led to an enormous increase in the use of inanimate sources of energy, and so hugely multiplied the output per person. The new forces of production were organized in an extra-domestic factory system which largely excluded family participation once the putting out of some of the production as piecework to families disappeared. In spite of the early growth of industrial slums, with staggering death rates, the new system produced huge increases in wealth and ultimately unprecedentedly low birth and death rates. Compared with the income levels in 1820, Western Europe's real per capita income more than doubled by 1870 and multiplied by 16 by the end of the twentieth century (Maddison 2003). That of the Western Offshorts (Maddison's term for the English-speaking countries of overseas European settlement: USA, Canada, Australia and New Zealand) doubled and multiplied by 22 respectively. It was this huge increase in wealth, allowing new science to be done and its findings to be applied, that was the major factor in increasing life expectancy. The new relations of production were foremost in explaining the decline in fertility, but science produced better contraception, and the new industrial system yielded a great expansion in the number of attractive service-sector jobs. The Industrial Revolution industrialized agriculture, so that a very small proportion of the workforce was in primary production; and it is proceeding to do the same with secondary production. The tertiary sector, with equal numbers of male and female workers, may eventually employ 90 percent or more of the workforce.

My main message is that, just as a hunter-gatherer element remained as a complementary way of producing food (in many agricultural societies for ten millennia), domestic production, especially of household goods, has persisted in industrial societies, although dwindling, until the present day. This partly explains the slow change in the superstructure with religious precepts and moral attitudes suited better to the family relations of production. It is not the only reason: parents controlling children, governments ruling countries, and employers handling their relations with employees have found their tasks easier if they appealed to the values of family production. Often (see Chapter 7), the opposition to changing values was trenchant and well organized; usually it was based on religious texts fixed for millennia.

Every time culture adjusts to the new relations of production, a revolution in ideas and outlooks is correctly discerned, but, at the same time, there is a danger that the revolution will be regarded as mainly one of ideas rather than being propelled by fundamental economic change. Thus, decline in marriage, the spread of cohabitation, the increase in divorce and extramarital childbirth, and the massive entrance of women into the paid workforce, as well as the Second Demographic Transition decline in fertility, often seem to be taken as fundamental signs of ideational reorientation or awakening rather than the surface froth of

economic change plus certain domino effects, like the incompatibility between women's work and rearing many children. Increasing wealth certainly allowed some of these behavioural changes to occur less painfully (see Chapter 13). The Industrial Revolution, its new mode of production, and the rise in incomes are very far from having run their course and new types of apparent enlightenment and new demographic behaviour will certainly come and their forms are largely unforeseeable. Logically, they will lead to near-zero fertility, but this is far from certain or even probable, for an increasingly rich society may experience ideological shifts favouring children as essential consumption items or necessary for the survival of the state or national culture. Women will certainly not return to the home, but ways may be found and funded to reduce the friction between being a mother and working outside the home.

The most sensitive issue is the role of the new industrial system in reducing mortality, partly because social scientists and many epidemiologists have an understandable preference for social rather than economic explanations. Social change has certainly resulted in mortality decline. I have played a role in demonstrating this. The higher one's level of education, the longer one is likely to live or even to survive a specific ailment. The more the mother's education increases, the lower her children's mortality is likely to be. This is truer in the developing than the developed world (Preston and Haines 1991), probably because schooling teaches a belief in the efficiency of modern medicine and a determination to use it properly. Indeed, low mortality has been achieved in much of the developing world without substantial industrial production. This can be regarded as scientific, technological and cultural transfer from developed countries, analogous to earlier transfer from the urban to rural areas of those countries. This was supported by, and is also partly the achievement of, education and a transition to a market economy. These changes are necessary for the use of vaccines, insecticides, antibiotics, and other medicines and procedures, which were, in their countries of origin, the product of the new industrial system with its ability to invest money in new technologies. Certainly the scientific revolution has earlier origins; indeed it was a necessary precursor to the Industrial Revolution. Certainly, education and lifestyles played an important role but mass education was originally the product of a rich industrial society which had increasingly less need for child labour and an increasingly greater need for an educated workforce and sophisticated consumers. Chapter 7 argues that the change in mode of production was so necessary to the movement towards very low mortality that the real question is why steep decline waited even in England, the workshop of the world, until nearly the end of the nineteenth century (the exact decade or exact movement in life expectancy is not important). Mortality decline, especially among infants and children, was almost certainly necessary for fertility decline, but, in industrial societies, fertility is eventually independent of mortality. At low mortality and fertility levels, movements in either are unlikely to affect the other.

What follows is examination of a series of issues, all fitting into the framework set out here but not exhausting it.

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PART I

ISSUES OF EARLY TRANSITION

CHAPTER 2

PRETRANSITIONAL POPULATION CONTROL AND EQUILIBRIUM[1]

Co-Authored by BRUCE K. CALDWELL

PRETRANSITIONAL POPULATION CONTROL AND EQUILIBRIUM

On the issue of the cultural control of family size before the fertility transition, most demographers appear to disagree with many of those cultural anthropologists with whose work they are most likely to be familiar. Typifying the demographer's stance, van de Walle (1968b, p. 489) wrote: "Control of marital fertility by contraception, as we know it today in Western countries, is without doubt a fairly recent development." He went on to conclude that the typical pattern for most of the world's population had for aeons been one of early marriage followed by uncontrolled fertility. A similar conclusion was drawn by Knodel (1977, p. 242), who decided that birth control must have been adopted by the vast majority of mankind only fairly recently and that its practice was innovative.

Some anthropologists and anthropological demographers have sounded a different note, louder in the late 1960s and 1970s than currently, but still influential. Thus Handwerker (1983, p. 5) reported that most anthropologists assume that birth and death rates were low throughout most of human history, and Polgar (1971b, p. 3) argued that "There are several lines of evidence indicating that the voluntary regulation of family size may well have been one of the earliest features of human culture." In a similar vein, Greenhalgh (1995b, p. 15) wrote: "people without access to modern contraception take steps to limit family size," and Bledsoe and Camara (1997), emphasizing that Gambian women ensured that too many pregnancies, births, and children did not weaken them, implied that there must have been ancient ways of avoiding an excessively large family.

This review will attempt to show how it was possible that such contrasting conclusions could have been reached from the same human experience, and will search for a resolution. Although some theoretical anthropological ecologists and biologists assert that this debate is now history (see Maynard Smith 1964, 1976; Wood 1998), prominent field anthropologists often disagree. For example, to counter Wood's (1998) claim that belief in premodern fertility control was now

extinct, Cowgill (1998, p. 122) cited Bledsoe and Camara (1997), and the contributors to Greenhalgh (1995a) and Kertzer and Fricke (1997).

There are some obvious reasons for the different conclusions, but they are far from the whole story. Anthropologists tend to focus on the limitation of population and family size, which includes abortion as well as contraception, and infanticide as well as fertility control, while demographers, if they could obtain the data, would count infanticide on both sides of the vital-events ledger, as births contributing to fertility and as deaths contributing to mortality. In addition, as Weiss (1976, p. 351) charged, demographers are usually not interested in small societies.

Anthropologists concerned with long-term fertility patterns focus on hunter-gatherers. They now make up an insignificant proportion of the world's population, but in 10,000 BC they constituted the whole of it, although there were only about 10 million of them altogether (Lee and DeVore 1968, p. 5 and frontispiece). The present-day survivors are used to provide evidence about how their distant ancestors behaved, an approach with significant dangers.

In contrast to the way they differ over the cultural control of fertility, anthropologists and demographers are in agreement that, for most of human history, populations have been very close to being stationary or in a condition of equilibrium and that birth rates and death rates have been almost identical. In fact there is little room for disagreement because the mathematics of exponential growth show that any persistent margin of birth rates over death rates would have resulted in far greater population growth than has actually occurred. Most demographers assume that this balance of births and deaths was Malthusian, with mortality holding down fertility's potential for population growth. Most anthropologists rarely mention Thomas Robert Malthus (1766–1834) except to claim that premodern man was sufficiently resourceful to bypass his constraints.

The anthropologists' neglect of Malthus when focusing on premodern populations is unfortunate, because in the first edition of his *Essay*, in 1798, he analysed the nature of this age-old equilibrium. Postulating a constant passion between the sexes, he argued that it normally led to so many births that population would have grown had it not been constrained by mortality driven by a shortage of food, the production of which had grown slowly, if at all, for most of human history.

Since the beginning of the anthropological analysis of population stasis, essentially starting with the biologist, Carr-Saunders (1922), that view has often been taken to mean that a population in Malthusian equilibrium was constantly on the verge of starvation, weakening both the people and their society. But in fact much of the mortality constraint on premodern hunter-gatherers took the form of violent deaths, mostly in warfare, and possibly accounting for as much as 30 percent of the mortality of males (Coleman 1986, p. 29). Indeed, that deaths unconnected with starvation may protect the rest of the society by helping to maintain its resources is conceded by those anthropologists with a focus on infanticide. It was not Malthus's view that the mortality arising from insufficient food usually took the form of starvation, except in famine crises, nor what his type of equilibrium

would imply. In his view, the lower the average nourishment, the more likely were people to die of infection, especially during epidemics. This is an argument that McKeown (1976) has applied to England into the twentieth century and that Fogel (1997) is beginning to use for even later dates. It is only in recent times that we have been in a position to control infection without raising nutritional levels. Also, Malthus believed that much of the high mortality needed to constrain growth was normally borne by specific, and not very visible, sections of the population without affecting the rest of society. He pointed to two groups. One was the lowest class, which he regarded as less worthy, often unemployable, and given to such reprehensible demographic behaviour as marrying early and threatening to have large families. Indeed, he felt that any help to this class would lead the constraint of high mortality to impinge on the class next above it, consisting of worthy artisans and skilled workmen. The other section of society which felt the full ravages of the constraining mortality consisted of young children, on whom we might suppose the impact paralleled that of contraception or infanticide. Rose (1968) has described such a society as late as 1941 in Groote Eylandt off Australia's northern coast, with slow population growth and adults appearing fairly robust and healthy while a large proportion of the young children was wiped out by very high mortality. Malthus (1959, p. 15) maintained that conditions in such societies prevented "any but the most robust infants growing to maturity," and cautioned that "we must not fix our eyes only on the warrior in the prime of life." In the later modifications of the *First Essay* he pointed increasingly to the benefits of Western Europe's postponement or forgoing of marriage, especially among women, as allowing its population to escape the miseries of societies in the rest of the world, such as the early marrying Chinese. Clearly, he was not saying that Europeans had escaped the constraints of a slowly growing food supply, but rather that they had achieved an equilibrium between population and food at a more comfortable and demographically less oppressive level of living.

Recent research has thrown light on different levels of the Malthusian equilibrium, especially the construction of stable population tables. Here are some examples of how a stationary population can be achieved with different combinations of fertility and mortality: an average of 6–7 births per woman, an expectation of life at birth of 20 years, around 50 percent of births resulting in deaths by 5 years of age, and 50 percent of all deaths in the society being to those under 5 years of age; or 4–5 births per woman, a life expectancy of 30 years, and 40 percent dying by age 5; or just under 4 births, an expectancy of 40 years, and 30 percent dying by age 5. These results can be compared with the contemporary developed world, where a stationary population is achieved with a life expectancy of almost 80 years, just over two children per woman, and only 1 percent of these births succumbing to death in their first 5 years (Coale and Demeny 1966, West tables). It is not suggested that premodern populations could attain a life expectancy of 80 years by restricting family size to two children, but they might have achieved 30 years while averaging fewer than five births, or possibly 40 years with under four births. This is exactly the mortality level that many anthropologists believe

most premodern hunter–gatherers achieved by limiting, if not their births, then the number of children who escaped infanticide to an average of around four per woman.

Modern research has led scholars to agree that, for centuries, Western Europe's fertility was limited by women postponing or forgoing marriage. Hajnal (1965, p. 132) toyed with the idea that the emergence of modern Europe and capitalism resulted from the European marriage pattern, a view with which Malthus seems to have concurred. Goldstone (1986) used evidence on England from Wrigley and Schofield (1981) to show that the major influence on fertility was lifelong spinsterhood. Over more than three centuries, 1551–1875, marital fertility levels scarcely changed, with overall fertility being determined solely by fluctuations in marriage (Wilson and Woods 1991, pp. 403–4). There is little in the way of a long series of premodern demographic measures but the reconstitution by Wrigley and Schofield (1981) does provide a test for England. Between 1650 and 1750 the population was close to stationary, growing by less than 10 percent over 100 years, with the crude birth rate averaging only one point per 1,000 population above the death rate. This was achieved with an average total fertility (i.e., the average number of births per woman over a lifetime if demographic rates change little) of 4.6 and life expectancy at birth of 37 years (Wrigley and Schofield 1981, p. 230).

The conditions in England and Wales between 1650 and 1750 were different from those experienced by hunters and gatherers: society was more organized and sporadic killing much less common, but closer settlement, especially in the towns, meant a greater burden of infection. Nevertheless, the Wrigley and Schofield figures do demonstrate that an average of fewer than five births per woman (a crude birth rate in the 30s) is compatible with a life expectancy of nearly 40 years and indeed would probably be a major reason why that expectancy was so high. This is evidence of the effects of more food per head and less pressure on resources, though it is probably still the availability of food which determines the society's level of resistance to mortal illness. It is a moot point whether, if fertility had fallen any lower, life expectancy could have climbed further, thus preventing population decline. It might be noted, however, that by 1787 Denmark was recording a total fertility of around four and a life expectancy of 43 years (Coale 1986, p. 6, Figure 1.2).

We will now examine the differing experiences and traditions of those demographers and anthropologists who have considered these issues and which led them to widely separate understandings of the nature of pretransitional population control and population equilibrium.

THE DEMOGRAPHERS' EXPERIENCE

Twentieth-century demographers were at first far from sure that mass contraception was a relatively recent innovation. Many were influenced by Himes's (1936) *Medical History of Contraception*, which documented the use of *coitus interruptus*, sponges, douching, suppositories, and herbs over the millennia, and condoms, quinine, vinegar, and alum over recent centuries. In his introduction,

Himes drew mainly on Carr-Saunders (1922) but also on Sumner et al. (1927), stating: "Man's attempts to control the increase in his numbers reach so far back into the dim past that it is impossible to discern their real origin. Some forms of limitation on the rate of increase are undoubtedly as old as the history of man" (Himes 1936, p. 3). But later in the book, after having to search vast quantities of literature for relatively rare references to contraception, he seemed less certain of a demographic impact and did not refer again to any significant effect on society's numbers. Instead, he more cautiously concluded: "The desire to control conception is a well-nigh universal culture-trait, universal, that is, in time and space. The *desire*, often unconscious, is much more universal and general than the *practice*" (Himes 1936, p. 421, his emphases).

One channel of Himes's influence on demographers was through Frank Notestein, head of Princeton University's Office of Population Research (OPR). In his key writings, which usually drew largely upon OPR sources, Himes was one of Notestein's two most frequently cited outside sources (Caldwell 2001, p. 10,750). Notestein was strengthened in his belief that *coitus interruptus* had long been known and available to the human race by his questioning of immigrant Europeans at a New York birth control clinic about contraceptive methods they had earlier known and used in Europe (Stix and Notestein 1940, p. 150).

Over the last 50 years demographers' scepticism about the idea that pretransitional fertility control had been of sufficient magnitude to lower societal fertility has been driven by evidence from four main sources: large-scale demographic surveys such as those carried out in sub-Saharan Africa by French statistical and technical aid agencies from the mid-1950s; the KAP (Knowledge, Attitudes and Practices towards Family Planning) surveys from the 1960s; the World Fertility Surveys (WFS) from the 1970s; and the Demographic and Health Surveys (DHS) from the 1980s. Where these surveys were able to obtain data on completely pretransitional populations, mostly in sub-Saharan Africa, fertility levels were usually found to be very high and reported knowledge or practice of contraception very low. In one of the earliest surveys, that in Guinea in 1954–55, the demographic levels for the little-developed Forest *Département* were crude birth and death rates of 45 and 42, respectively, almost balancing, and an infant mortality rate over 250, with almost half of all births followed by deaths within the first 5 years. The implied life expectancy was around 27 years. In Upper Guinea total fertility was 6.2 with birth and death rates of 50 and 42 (Coale and Lorimer 1968, p. 157). As the surveys of sub-Saharan Africa continued, the recording of total fertility levels in the range 6–7 became typical.

Scepticism about the existence of universal population control was increased by Henry's 1961 paper with its concept of "natural fertility," and by later publications on the same subject (see Leridon and Menken 1979). Henry argued that natural fertility was not always at the same level because of differing durations of postpartum lactation and sexual abstinence, but that any conscious limitation of family size would inevitably be detected by a steeper fall in fertility in the late reproductive period as families grew in size than where there was no such control.

He drew on pretransitional records from Europe, Asia, and Quebec, as well as more recent information from Guinea (Fouta-Djallon) and the non-contracepting American Hutterites, to show age-specific fertility curves of the same shape, and concluded: "For non-European populations there is often strong evidence to suggest virtually complete absence of birth control . . . " (Henry 1961, p. 81). This demonstration was reinforced by the development of similar families of curves for age patterns of marriage (Coale 1971) and model fertility schedules (Coale and Trussell 1974, 1978). Particular attention was given to the non-contracepting Hutterite religious community in the USA, first by Eaton and Mayer (1954), and then by Coale (1973) when designing the basic measures underlying the Princeton European Fertility Project. The Hutterites exhibited very high fertility because they were well nourished and had shortened the duration of their breastfeeding period. Furthermore, Coale showed that theoretically their fertility could be higher still if they did not breastfeed at all. Mistakenly, Abernethy (1979, p. 12) and other anthropologists have taken the fact that the fertility of other pretransitional populations is lower than that of the Hutterites to argue that all these other societies must therefore be consciously limiting fertility.

Most demographers were even more convinced of pretransitional natural fertility by the application of a statistical measure, "*m*," by Coale and Trussell (1974) that measured the distortion of the natural fertility curve caused by birth control. Knodel (1977) employed both this measure and the shape of age-specific fertility curves to conclude that, at the onset of the fertility transition, birth control must have been innovative for the vast majority of the population involved. He maintained that his approach disproved Carlsson's (1966) conclusion that there had been pre-existing knowledge of contraceptive methods (Knodel 1977, pp. 240–7).

Finally, demographers working in the anthropological demography tradition—usually combining anthropological approaches with small-scale surveys—persistently failed to find evidence of fertility control in sub-Saharan Africa and South and South-east Asia before the advent of modern family planning movements. This was the case in sub-Saharan Africa (Caldwell and Igun 1970; Orubuloye 1981; Caldwell and Caldwell 2000a, 2000b), South India (Caldwell and Caldwell 1984), Bangladesh (Duza and Nag 1993), and Thailand (Knodel et al. 1987). All reported that the first generation of contraceptors testified that they would neither have thought of the possibility of controlling fertility nor have attempted to do so but for their contact with family planners and family planning programmes. They also said that it was the absence of contraceptive provision that explained why their parents had not practised birth control.

The only study of hunter–gatherers with longitudinal demographic data was Howell's (1979) study of the Dobe !Kung in the Kalahari Desert in Botswana, close to the Namibia border. As affluent-society anthropologists might have predicted, the !Kung exhibited only moderate fertility: a total fertility of 4.7, a Princeton marital fertility index (I_g) of 0.4, and a total fertility index (I_f) of 0.33. One-third of the fertility difference between the !Kung and the Hutterites was

caused by sterility (Howell 1979, p. 166), probably with sexually transmitted disease being a factor. Howell (1986) reported having found no contraception or abortion among the !Kung, but suspected that there might have been a low level of undetectable infanticide, a supposition based mainly on the arguments of those anthropologists insisting on its universality among such people (p. 182).

AN OPPOSING ANTHROPOLOGICAL TRADITION

The opposing anthropological tradition emerged almost fully formed in a 1922 book by the English biologist, demographer, social scientist, and educator, Alexander Carr-Saunders. That book, *The Population Problem: A Study in Human Evolution*, was the main source of the theory of age-old population control as well as that of hunter-gatherer affluence (see Sahlins 1974). He recognized as his specific predecessors the optimum population theorists, especially Edwin Cannan, the British economist who, in *Wealth* (1914), developed the theory of "optimum population," which argued that there was one level of population density that maximized human income per head.

Himes (1936) described Carr-Saunders's book as an excellent study and drew on it almost exclusively in the conceptual section of his *Medical History of Contraception* (1936, p. 3). Wynne-Edwards (1962, pp. 21–2), who first described social homeostasis, warmly praised Carr-Saunders as the pioneer in the field and regretted only that he had not discovered the 1922 work until he had finished the first draft of his own book.

Referring to people very different from those described by Herbert Spencer as pitiful populations restricted by mortality and always near starvation (Spencer 1899 [1864], Vol. II, p. 15), Carr-Saunders's starting point was that of the fit hunter and his adequately fed relatives (1922, pp. 230ff.). He cited descriptions of the Australian Aborigines by field researchers, especially Spencer and Gillen (1938 [1899]) and Schürmann (1997, first written in 1846 and published in 1879), and others' descriptions of the Bushmen of Southern Africa, Amerindians, and forest peoples of South-east Asia. He maintained that their families were small (pp. 135ff.) and that man is intelligent and has always been able to keep fertility below fecundity (p. 52), so that "some approach to the optimum [living standard] is everywhere attained" (p. 231). Overpopulation and misery had to be avoided because they led to social disorganization (p. 213). The restriction of population was the result of the conscious regulation of numbers (pp. 197ff.), achieved by postpartum sexual abstinence, prolonged breastfeeding, warfare, neglect of children, abortion, and infanticide (pp. 213ff.). The supporting evidence was not easily obtained because, with the coming of Europeans, mortality became so high that the hunter-gatherers abandoned sexual abstinence by females, abortion, and infanticide; another reason for abandoning the latter two was that missionaries and colonial law were against them. The "historical races" (i.e., the agricultural societies), being more densely settled, were characterized by higher mortality and hence had less need of fertility control, although there was some contraception

and perhaps more abortion and infanticide (pp. 243–63). These arguments were supported with references to nearly 1,000 publications of very varying quality.

The arguments that were to be put forward repeatedly over the next eight decades were all in Carr-Saunders's book. In his own 1934 book, *Primitive Society and Its Vital Statistics*, Krzywicki, the Polish anthropologist, took them for granted. A belief in the equality of cultures and the notion that human beings had always been in control of their fate were appealing to many anthropologists. The demonstration that the evidence was likely to disappear before its would-be chroniclers could record it made the case almost irrefutable. Nevertheless, the pursuit of evidence was to follow, especially among those who had experienced least contact with the West—Eskimos and Australian Aborigines. This led to a major modification in prevailing views about the means of population control: as researchers discovered little mass use of effective contraception and found that abortion was difficult and dangerous in premodern societies, the means of population control was increasingly identified as infanticide, child abandonment, child neglect, and, in some groups, suicide among the elderly. Infanticide and child neglect were difficult to prove in high-mortality populations except where they were sex-selective and hence where there was evidence of much greater mortality among female than male children. Attention remained concentrated on hunter-gatherers, and little note was paid to agrarian Japan, China, or parts of North India where there was ample evidence that infanticide was often practised, at least during famines, producing much the same effect as that of deferred marriage in Europe.

Weyer (1962), in a book on the North American Eskimos first published in 1932, drew on his own findings during a 1928 expedition, and many other sources, to write a chapter on population control (Weyer 1962, pp. 131–71) in which he specifically acknowledged Carr-Saunders's theoretical guidance. He reported little abortion or contraception, but significant levels of infanticide, supplemented by some killing of the aged and infirm. He supported his contention that infanticide was widely practised with data showing 46–92 percent as many girls as boys in 13 Canadian Eskimo groups, but pointed also to an excess of adult females caused, he claimed, by the very high mortality of men when hunting. He did not consider the possibility of sex differentials in age misstatement. Significantly, he denied group pressure or direction (except in the sense that infanticide was tolerated), or any aim of optimizing population levels. In his view, responsibility for the killings was attributable to individual families faced by specific crises such as famine in a harsh environment or the problems that arose when the need for mobility was frustrated by a mother bearing a second child while the first could not travel without help.

Firth (1936) included a chapter on "Modern population problems" (pp. 408–18) in a book resulting from fieldwork in the early 1930s on Tikopia, an isolated Polynesian island in the Western Pacific without any European residents. His work was the closest to fitting fully Carr-Saunders's (1922) model, although Carr-Saunders was not referenced even though he was Director of The London School of Economics where Firth worked. Firth claimed that the islanders were prosperous and that their health was remarkable (p. 411) and he attributed their

well-being to population control achieved by infanticide and assisted by the occasional high mortality from warfare and sea voyaging. He believed that there had probably also been some use of abortion and *coitus interruptus.* Knowledge of these practices, and ready proof that they had been employed, had largely disappeared because of the colonial government (of the Solomon Islands) and Christian missions. Nevertheless, Firth concluded that there was much to be regretted in the passing of the old ways: "A celibacy in which chastity was not enforced, and a discreet infanticide, would serve to maintain the population in equilibrium, and would be in accord with the feeling of the people themselves" (Firth 1936, p. 417).

Balikci (1967, 1970) reported on the Canadian Eskimos, drawing on his own fieldwork in the 1960s and, for the earlier precontact period, on the relatively inaccessible reports of Knud Rasmussen (1931) and data from the beginning of the twentieth century assembled by Weyer (1962) on sex ratios among children. Balikci (1967, p. 622) concluded that "Female infanticide is a vital part of the society's long range 'family' population policy." Infanticide was based on ad hoc decisions within the family, there being no fixed rules, and no community involvement other than that the practice was accepted. Later he concluded that the reasons were food shortages and, in the case of female infanticide, the need to balance the numbers of the sexes in the adult marriage market, depleted by the high mortality of males during hunting (Balikci 1970, pp. 150–3). In the last 30 years Balikci has become the most frequently cited authority on Eskimo population control although nearly all his data on the subject are drawn from earlier sources.

Langer (1974a, 1974b) drew together two millennia of references to infanticide in Europe, but without numbers, and with his references to hunters and gatherers restricted to Balikci's 1970 work (Langer 1974a, pp. 353–4). Others, like Hassan (1981), argued that we would always have difficulty glimpsing mankind's long history of fertility control because, with the advent of agriculture, that control weakened and fertility rose as a response to an increase in mortality because infectious disease spread more easily through dense populations.

THE EVOLUTIONISTS APPEAR

The perspectives of some researchers changed from 1962 when Wynne-Edwards published his *Animal Dispersion in Relation to Social Behaviour.* In this book, the author altered the interpretation of fertility limitation from the social to the biological sphere, seeing it as the inevitable and largely involuntary outcome of evolution, and replaced the individual by the community and species. He praised Carr-Saunders as the pioneer (Wynne-Edwards 1962, pp. 21–2), but chided him for beginning with organized human groups or communities in the Lower Palaeolithic period instead of going back to protozoan behaviour in the Lower Cambrian (p. 21). Such praise sits awkwardly with Carr-Saunders's (1922, p. 52) insistence that the far-sighted innovation of population limitation demonstrated the high level of human intelligence and rational thinking. Wynne-Edwards (1962) invented the concept of "homeostasis" in populations, "the general hypothesis of

the self-limitation of animals" (p. 9). "Homeostasis," in a physiological sense, is a term coined by Cannon (1939) in 1932 to describe the stabilizing regulatory mechanisms of the body (Kunitz 2002, pp. 724, 728). Wynne-Edwards (1962, pp. 21–2) approvingly echoed Carr-Saunders (1922, pp. 200, 213): "every population has an optimum number, or an optimum density, that enables the greatest income per head to be earned; and above this density returns diminish." This was Wynne-Edwards's interpretation:

> Judging by appearances, chronic over-exploitation and mass poverty intrude themselves on a mutually-balanced and thriving natural world only as a kind of adventitious disease, almost certain to be swiftly suppressed by natural selection . . . if each species maintains an optimum population-density on its own account, not only will it be providing the most favourable conditions for its own survival, but it will automatically offer the best possible living to species higher up the chain that depend on it for food . . . it must be highly advantageous to survival, and thus strongly favoured by selection, for animal species (1) to control their own population densities, and (2) to keep them as near as possible to the optimum level for each habitat they occupy. (Wynne-Edwards 1962, p. 9)

Nowhere in his large volume does he mention Malthus. Wynne-Edwards's work has been savaged by mathematical geneticists and population biology theorists with a similar bent on the ground that his concept of "group selection" is theoretically untenable, in contrast to evolutionary "individual selection" or possibly "kin selection" (Maynard Smith 1964, 1976; Wood 1998).

In spite of the fact that Wynne-Edwards largely dispensed with human thought and decision making in favour of the biological hidden hand, and downplayed the community and society, many anthropologists took readily to his approach. Some liked the fact that he placed greater emphasis than Carr-Saunders had on the preservation of resources or what came later to be called "sustainable development." Probably the most influential endorsement of the approach came from Mary Douglas (1966), who drew heavily on both Carr-Saunders and Wynne-Edwards. She interpreted Wynne-Edwards as positing "that in primitive groups social conventions operate homeostatic controls on population" (Douglas 1966, p. 273). "There appears to be density-dependent brakes which impose a ceiling on natural increase. It is important to the argument that the relevant ceiling is *not* imposed by starvation or by predators or natural hazards. Rather it is imposed by otherwise inexplicable aspects of social behaviour" (p. 264, her emphasis). She criticized both Wynne-Edwards and Carr-Saunders for assuming that all populations live in optimal conditions and for excluding underpopulation even though many societies studied by anthropologists appeared to be underpopulated (p. 265). She then proposed her own thesis modifying what she took to be agreement between Carr-Saunders and Wynne-Edwards: "I am going to argue that it is the demand for oysters and champagne, not for the basic bread and butter, that trigger off social conventions which hold human populations down. . . . My

argument is that human groups do make attempts to control their populations, often (but not always) successful attempts. But they are more often inspired by concern for scarce social resources, for objects giving status and prestige, than by concern for dwindling basic resources" (Douglas 1966, pp. 267–8). She said that Firth missed the central point: that the people of Tikopia or at least their elites, were not merely trying to eat well but were aiming at maximizing their control of the valuable coconut cream which played a central role in festivals (Douglas 1966, pp. 209–70).

Douglas's endorsement of the theories of both Carr-Saunders and Wynne-Edwards has been influential. Her own modification has been much less so. It poses at least three problems. The first is that it is difficult to see how the optimum population for maximizing food consumption should not also be that for acquiring coconut cream. The second problem is that she appears to be suggesting that the society as a whole, and certainly the poor, are living below optimum standards, with resulting higher death rates, than need be the case, just so that the powerful can acquire more luxuries. This is probably an accurate description of socially stratified agricultural societies, and possibly of Tikopia, but can it possibly be true of hunter-gatherers? The third problem is that in non-stratified societies, such as those found until recently in sub-Saharan Africa, large families appear to be able to put pressure on small families and consequently to achieve greater economic success (Imoagene 1976; Mendonsa 1977; Caldwell 1981, pp. 6–7).

A much cited work in the same vein (but not referring to Carr-Saunders, Wynne-Edwards, or Douglas) was Joseph Birdsell's (1968) book chapter "Some predictions for the Pleistocene based on equilibrium systems among recent hunter-gatherers," which drew on his own research among Australian Aborigines and on his construction of models. He concluded: "Among even the simplest of peoples, social factors seem to operate to stabilize population numbers below the absolute level of saturation . . . the expanding population may begin to bud off when values from 60 to 70 per cent of carrying capacity are realized" (Birdsell 1968, p. 230). This was achieved by "Systematic infanticide [which] has been a necessary procedure for spacing human children, presumably beginning after man's entry into the niche of bipedalism, and lasting until the development of advanced agriculture. It involved between 15 and 50 per cent of the total number of births. Among recent hunters it tends to be preferentially female in character and probably was in the Pleistocene" (p. 239).

Neel (1970), a geneticist who analysed anthropologists' research among the Yanomamo of the Venezuela–Brazil border country, found that the Yanomamo had a survival rate to 55 years of age similar to that of the people of India in 1901, because the former experienced high adult mortality in warfare, thus reducing them to agrarian mortality levels. He introduced the idea of humane, voluntary, and adaptive infanticide in contrast to what might be termed "Malthusian" infanticide: "The relationship between rapid reproduction and high infant mortality has been apparent for centuries. During this time we have condoned in ourselves

a reproductive pattern which (through weanling diarrhoea and malnutrition) has contributed, for large numbers of children, to a more agonizing 'natural' demise than that resulting from infanticide. Moreover, this reproductive pattern has condemned many of the surviving children to a marginal diet inconsistent with full physical and mental development" (Neel 1970, p. 817). He named Firth (1936) as his inspiration.

Dickerman (1975) in a review paper argued that infanticide was mostly practised by hunter-gatherers, horticulturalists, and stratified societies both to raise living standards and to maintain the social structure. The awkward issue of the near-absence of infanticide among the unstratified shifting cultivators of sub-Saharan Africa was thus avoided. A decade later, the same author (Dickerman 1984) argued that infanticide was not well defined and should include neglect extending far beyond infancy. It should be noted that if this is done the distinction between the concept of Malthusian mechanisms and homeostatic equilibria is greatly blurred.

Another influential and quotable contributor to the debate was Virginia Abernethy with *Population Pressure and Cultural Adjustment* (1979). This was largely a synthesis of previous theses, especially those of Carr-Saunders (1922) and Wynne-Edwards (1962). In addition she cited Hutterite fertility to argue that fertility in nearly all other communities was constrained (Abernethy 1979, p. 12), and put forward the view that the main trigger for fertility control was the fear of sharing limited resources within a large family (pp. 25–6).

Many anthropologists, demographers, and others who had associated themselves with the new national family planning programmes established increasingly from the 1960s were keen to show that these programmes were not foisting upon the peoples of less developed countries the practices of the West, but were offering a means of pursuing ancient behavioural patterns temporarily disrupted by Western intrusion. The high-water mark of this movement was probably *Culture and Population* edited by Polgar (1971a) and with 21 well-known contributors, mainly anthropologists. In the introduction he drew on Birdsell (1968), Devereux, Firth, and his own work to state: "voluntary reduction of family size seems a cultural pattern of very great antiquity, and the high population growth rates in developing countries today do not simply result from encrusted 'motivations' for high natality. They are instead partly derived from direct or indirect birth-promoting effects of Western expansion and colonialism during the last 400 years" (Polgar 1971b, p. 6). He justified the last argument from Geertz's (1963) evidence in *Agricultural Involution* on rising birth rates among the nineteenth-century Javanese sugar plantation workers (Polgar 1971b, p. 4). Polgar argued that the older tradition of birth control could be used by modern family planning programmes seeking to curb fertility (pp. 6–7). Later, Polgar (1977, p. 356) wrote that premodern "Cultures that did not moderate reproduction sooner or later became extinct, leaving the field to those who did regulate their populations." In short, the claim here is that all surviving cultures had controlled fertility until Christian missionaries and European colonial governments destroyed the system or even encouraged higher fertility as in Java (Polgar 1977, pp. 357–8).

In an influential book, Boserup (1965) argued that population growth was not a continuing potential disaster for premodern man but the mechanism whereby more successful methods of intensifying subsistence production came into use. She displayed little regard for either population control or Malthusian limits: "the low rates of population growth found (until recently) in pre-industrial communities cannot be explained as the result of insufficient food supplies due to overpopulation, and we must leave more room for other factors in the explanation of demographic trends . . . , medical, biological, political etc." (Boserup 1965, p. 14). This stance undermined her own approach because the explanation for the almost exact population equilibrium is insufficient. Nevertheless, it is quite possible to argue that Malthusian bonds usually prevailed but that occasionally, at times of population pressure, an innovation in food production was adopted on a sufficient scale to ensure survival and ultimately to help change the world (Caldwell 1986; Lee 1986).

Another influential synthesizer was Sahlins (1974), who, in *Stone Age Economics* (first published in 1972) and especially in his first chapter, "The original affluent society" (first published in a shorter form in French in 1968), echoes both Carr-Saunders (1922) and Boserup (1965) although he cited neither of them. He argued that hunters and gatherers had relatively low fertility and mortality rates and enjoyed affluence both because their risk of sickness and death was lessened and because the necessity for short hours of work meant that they had ample leisure. They needed to limit population growth so that their group would not become so large that it had to divide and thus produce two undesirable consequences—the social instability caused by the division, and the resulting long and possibly hazardous journey undertaken by a least one of the resulting splinters. The limitation was carried out by killing or deserting infants, the old, the disabled, and the sick. This action had two desirable outcomes: it maintained social coherence by postponing or eliminating the need to divide the group, and it ensured that, if a long trek had to be made, those undertaking it would not need assistance in moving. Sahlins drew heavily on reports of the Australian Aborigines and Lee and DeVore's (1968) *Man the Hunter*, but even more basic to his argument was the work of William Allan (1949, 1965) on land carrying capacity in Africa.

Thirteen years after Wynne-Edwards (1962) began to lead anthropologists into biological evolutionary theory, E. O. Wilson's *Sociobiology: The New Synthesis* (1975) tempted many to go further. This was particularly the case in a book edited by Hausfater and Hrdy, *Infanticide: Comparative and Evolutionary Perspectives* (1984). There the editors wrote (pp. xi, xxx): "in many populations infanticide is a normal and individually adaptive behaviour," for "an infant may be eliminated if the parent or step-parent thereby enhances overall reproductive prospects." In the same book Daly and Wilson (1984) wrote: "Human infanticide is widespread and a sociobiological model of the human psyche helps to make it intelligible" (p. 502), but cautioned that "Parentally instigated infanticide that does not make reproductive sense . . . will nowhere be described as normal or typical" (p. 489).

HOW GOOD IS THE EVIDENCE?

Demographic Data

The demographic data available for the study of pretransition fertility control are relatively good, but subject to severe restrictions. First, they are restricted in time because most demographers became interested in the fertility of less developed countries only when their rapid post-Second World War population growth became apparent. The first Francophone demographic surveys extend back only to 1954–55 and the first World Fertility Survey to 1975. It is generally agreed among anthropologists that, by this time, precontact groups uninhibitedly practising infanticide had largely disappeared. The only earlier surveys were the Indian Census starting in the early 1870s and the Buck survey of rural China around 1930 (see Notestein 1938). The unbalanced sex ratios evident in these two sources indicated either female-selective infanticide or relative neglect of daughters among some groups at certain times (Visaria 1967; Pakrasi 1970; Miller 1981; Lavely et al. 1990).

The second restriction on the data available is that demographic surveys provide a thin cover (typically 5,000 female respondents) of large national populations, so that small hunter-gatherer populations were insufficiently represented when they were not excluded altogether. The third restriction is that the surveys did not ask questions about infanticide which, by this time, the law in nearly every country regarded as tantamount to murder. The fourth restriction is their lack of anthropological fieldwork of the kind that might yield rumours of infanticide or stumble on actual evidence. Nevertheless, the wide prevalence of high birth rates, the frequency of distributions of births indicative of natural fertility, and the often attested lack of knowledge of any method for controlling family size provided fairly credible evidence that the new family planning programmes were not merely replacing older methods of control.

Anthropological Evidence

The anthropological testimony is copious but is dependent on a remarkably small, and probably insecure, base. Much is mainly theoretical and drawn from others' ethnographic work: Weyer (1962) on Eskimos from Boas (1907), Stefansson (1914), and Jenness (1922) as well as his own work; Douglas (1966) from Rasmussen (1931) and Balikci (1967) on Eskimos, Firth (1936) on Tikopia, and Yalman (1963) on the Nambudiris of Kerala; Balikci (1967) from Weyer (1962) and Balikci (1970) from Rasmussen (1931, 1932) on Eskimos; Polgar (1971b) from Firth (1936), Devereux (1955), and Birdsell (1968); Abernethy (1979) from Lindenbaum (1972) on the Papua New Guinea Highlands and Freeman (1971) on Eskimos; and Scrimshaw (1983) from Divale and Harris (1976).

The basic research is of two types: fieldwork and global surveys of data. Fieldwork is dominated by that on Eskimos, and the belief in age-old population

control depends to a very considerable extent on the evidence obtained on Eskimos, particularly the original data reported by Smith (1902), Boas (1907), Jenness (1922), Birket-Smith (1929), and Rasmussen (1931, 1932). These data were not based on longitudinal vital registration but on counts made during visits, not always by the author reporting on them. The most detailed are by Jenness (1922) from the 1914–16 Canadian Arctic Expedition and by Birket-Smith (1929) and Rasmussen (1931, 1932) from the 1921–24 Fifth Thule Expedition.

The quantitative demonstration of the practice of infanticide comes almost wholly from age-specific sex ratios that demographers have found (in Africa, Indonesia, and anywhere where women marry young and knowledge of exact age is culturally unimportant) tend to be artificially male-dominated in adolescence because survey- or census-takers have assumed teenage mothers to be at least 20 years of age (see van de Walle 1968a, pp. 44–52). Thus the population under age 20 may appear to be male-dominated compared with the population over that age.

Schrire and Steiger (1974) carried out a detailed analysis of primary data on the Eskimos and concluded that the statistical information would not support the conclusion that female infanticide was practised on a significant scale. The only direct evidence they could find of infanticide in over 30 key publications, including all those ever cited, was a single case described by Jenness (1922, p. 166) as occurring in 1915 (Schrire and Steiger 1974, p. 164). Their simulation models of these early twentieth-century Eskimo populations showed that any level of female infanticide above 8 percent would have led not to a better distribution of resources, but to the extinction of the population (Schrire and Steiger 1974, pp. 170ff.). Their 1974 paper, highly significant until and unless it can be refuted, and available in the easily accessed journal *Man*, was published before much of the recent theoretical discourse but has rarely been referenced and never seriously discussed. Krupnik (1993, p. 224), in his book on Eskimo adaption to life in Northern Asia and Europe, concluded that among these people infanticide appears to have been occasionally resorted to in an unusual crisis but not on such a scale that it had any demographic impact.

The second most important ethnographic source has been the Australian Aborigines (Spencer and Gillen 1938; Birdsell 1968; Rose 1968). Spencer and Gillen (1938 [1899]) have been much quoted because they were reporting on the largely precontact Aborigines of Central Australia in the late nineteenth century. They reported that when infanticide was practised it usually merely forestalled an inevitable death: "Infanticide is undoubtedly practised, but, except on rare occasions, the child is killed immediately on birth, and then only when the mother is, or thinks she is, unable to rear it owing to there being a young child whom she is still feeding, and with them suckling is continued for it may be several years" (p. 51). The third most frequently cited source is Firth (1936) on the Tikopia, but his approach was so impressionistic that little can be said about the incidence of infanticide in an older Tikopia. He thought it had occurred during famines or in the case of illegitimacy (p. 415).

Central to the recent discussion of infanticide is the evidence in Lee and DeVore's 1968 landmark volume, *Man the Hunter.* The most quoted chapter on infanticide is that by Birdsell (1968). This short piece of work is difficult to assess, partly because the empirical report is embedded in models and theoretical discussion, and partly because that report refers for its factual content to three manuscripts held by the University of California at Los Angeles. In the same volume Rose (1968) reported on the largely precontact Aboriginal population of Groote Eylandt (in northern Australia's Gulf of Carpentaria) in 1941. He reported that the population was adequately fed, with food collection requiring only 3 or 4 hours per day, but that, nevertheless, because of extremely high under-5 mortality, the population was stationary, and there was a preoccupation with fertility rites (as Notestein 1945 would have predicted). There was no contraception and little infanticide, and birth and death rates were both very high and approximately equal (Rose 1968, p. 203).

Several other sources have also been important. Neel (1970) a geneticist, very conscious of the importance of the lessons from the past for late twentieth-century population control, reported on a multidisciplinary study of three ethnic groups in northern Brazil and southern Venezuela: "An accurate estimate of the frequency of infanticide still eludes us, but, from the sex-ratio imbalance [of the population believed to be under 15 years of age] plus other fragmentary information, we calculate that it involves perhaps 15–20 percent of all live births" (Neel 1970, p. 816). Schiefenhövel (1984) reported on infanticide among a precontact population in the Highlands of Irian Jaya (the western half of the island of New Guinea). His wife was one of the few outside observers anywhere in the world to witness an act of infanticide (p. 170). He relied on two sources: sex ratios, especially of the population supposedly under 20 years, and informants who recalled infanticide in 10 percent of all live births (pp. 175–6, 181). For two periods, he calculated levels of infanticide of 19 and 43 percent, nevertheless reporting a stationary rather than a declining population (p. 181).

The large-scale surveys of abortion in premodern societies tended to confirm for anthropologists that it had not been an important mechanism for pretransitional fertility control. The most comprehensive study, Devereux's (1955) study of abortion in 400 societies, concluded that "Statistical data on abortion in primitive society are mostly either unreliable or else both unreliable and skimpy" (p. 25). Nag (1968, p. 187) decided from his survey of factors affecting fertility in non-industrial societies that the level of abortion in such societies appeared to be much lower than in industrial ones, partly because of the great danger to the women. Similarly, Noonan (1970) summarized the historical volume on abortion he edited by stating that it proved that abortion had been known since before classical times but that there was little certain information on its incidence.

Divale and Harris (1976, pp. 533–5) came closest to a quantitative report when they divided 112 societies in the Yale Human Relations Area Files (which originated in the work of Murdock 1967) into 41 percent with no information on infanticide, 9 percent where it was not practised, 2 percent where it was not

common, 12 percent where it was practised occasionally, and 36 percent where it was common. Most of the reports in the Files are drawn from general ethnographic accounts in which the classification of any specific behaviour in a society can be based on a few passing sentences, often impressionistic.

Scrimshaw (1983) drew on Divale and Harris's (1976) work but concluded that the impact of infanticide was unknown except perhaps in the differential mortality of daughters (Scrimshaw 1983, p. 257). Piers's *Infanticide* (1978) contributes practically no quantitative information. Williamson's influential 1978 article, "Infanticide: an anthropological analysis," was quite definite in the conclusions about infanticide: "Rather than being an exception, then, it is the rule" (p. 61); it is obvious in the classical world, in Imperial China, and among Eskimos and Australian Aborigines (p. 62); "During the Palaeolithic period, which comprises almost 99 per cent of human history, infanticide was probably universal . . . estimated at 15–50 per cent of all births" (p. 66); and even in Europe little attempt was made to control infanticide until the late nineteenth century (p. 69). Williamson's sources for these conclusions were Firth (1936), Birdsell (1968), Neel (1970), and Langer (1974a). The 15–50 percent range is derived from Birdsell's (1968, p. 239) conclusion, and there it is unclear how closely it is related to his references to other studies or to his models.

DISCUSSION

Most cultural anthropologists who have made known their views on premodern population control have concluded that it was sufficiently great to reduce fertility and mortality significantly (assuming we do not count each incident as a birth and a death), to increase life expectancy beyond infancy, and to raise standards of living, at least in terms of nutrition, health, and leisure. There has been far more theory than evidence, although a great deal of cross-referencing has given the impression of a substantial edifice on strong foundations. The core of the theory has been provided by Carr-Saunders (1922) and Wynne-Edwards (1962), and for a minority by Wilson (1975). There is a danger for social scientists in proceeding to incorporate Wynne-Edwards, for he includes man with all other animals, which he believes achieve homeostasis by such unconscious means as varying the quota of breeders or the number of eggs released, reabsorbing embryos, and limited survival of the newborn (Wynne-Edwards 1962, p. 9). It can easily be argued that the parallel in human beings is that they have long been endowed with such characteristics in the form of singleton births, postpartum amenorrhoea, even longer amenorrhoea when suckling persists, and high infant mortality.

There are even dangers in following Carr-Saunders (1922) too far because he includes Africans in his races of splendid physique (pp. 234–5) although it is now agreed that infanticide is rare south of the Sahara, and that significant numbers of Africans are not protected by long periods of postpartum sexual abstinence and may never have been (see Schoenmaeckers et al. 1981). And Rose's (1968) usually well-fed and comfortably living population of Groote Eylandt did not normally practise population control. There is an irony in posing "intelligent,

well-thought-out infanticide" against "miserable, unplanned, natural high infant mortality." Both are forms of mortality, neither reduces the number of pregnancies and births, and both have the same effect in reducing the pressure on resources. Indeed infanticide is often practised against sick babies, those born soon after the previous sibling, and exnuptial births, precisely those likely to die in any case. Thus it is debatable just how much infanticide actually raises infant mortality.

There are several reasons for not accepting too easily the thesis of universal hunter-gatherer infanticide at levels high enough to limit population growth. The first is that the evidential base is too insecure. It has had to rely on debatable Eskimo data of the early twentieth century to far too great an extent, and almost absurdly on data on the Netsilik Eskimos, a small group living dangerously in an area that has to be evacuated in winter and that provides a diet largely from sea mammals. And models such as those of Birdsell (1968) collapse when confronted with the impossibility of distinguishing between the impacts of infanticide and natural infant mortality. Finally, the apparent evidential structure has been built up from accounts that reference the accounts of others, many of which are themselves based on further referencing or argument based on the little field evidence available.

More importantly, none of these approaches show how long-term population equilibrium is achieved other than ultimately by Malthusian limits where mortality is the final arbiter. It appears likely that, for any given set of stable ecological conditions, there is a range of fertility-mortality equilibrium points. These extend, if we extrapolate from Coale and Demeny (1966, West Model), from a total fertility of 7.5 with a life expectancy of 18 years—approximately the levels found in the Mopti district of Mali in 1957–58 (Coale and Lorimer 1968, p. 157)—to a total fertility of 4 and a life expectancy of about 33 years, approximately the levels found in England during the century 1650–1750 when growth was almost stationary (Wrigley and Schofield 1981, p. 530). The differences between the two stationary populations were mostly in child mortality: 60 percent dying by 5 years of age where total fertility was 7.5, and 35 percent where total fertility was 4. But, on average, those who reached 20 years of age lived to 48 years in the former and 55 years in the latter. It was the high-fertility, high-mortality regime that produced the physically splendid Ashanti warriors of a highly organized state, who in the nineteenth century repeatedly drove the British down to the coast of what is now Ghana. Their young children died at horrific rates but the adults did not starve and their state did not disintegrate. The span of Malthusian equilibria just noted is probably the full range. Where natural fertility prevails, total fertility goes little above 7.5 because of lactational amenorrhoea and other factors. At the other end of the range, the constraint was the inability of life expectancy in England to rise to 40 years until the mid-nineteenth century and to 45 years until around 1890 (Keyfitz and Flieger 1968, pp. 36–9) when public health interventions were advancing and real average income was three times what it had been two centuries earlier (Maddison 2001, pp. 185, 264).

The Western European marriage pattern, with marriage of females late or forgone, and relatively little sexual activity and few births outside marriage, was

not developed to reduce societal mortality levels. Its persuasive morality was based on the conviction that men and women did not have a right to marry until they had sufficient means to bring up a family in some comfort. Certainly they knew that this comfort included a greater chance of child survival. It was this lower limit to family misery, and the fact that the poorest often did not marry at all, that reduced child mortality within the family and in aggregate within the society. It was late marriage of females and the spinsterhood of many that reduced the societal fertility level without restriction on marital fertility or an aim at such restriction. The Western European population was just as stationary as the Indian population, but the refusal to countenance very low living standards probably meant less pressure to obtain every morsel of food from the land or to bring into production very marginal land, so that there probably was less desperate pressure on resources.

This demonstration does not mean that there was no infanticide. Clearly, among both hunter-gatherers and some of the agrarian populations of Asia it did occur, especially during subsistence crises and among families with disproportionate numbers of daughters. However, it is not clear that it was on a scale large enough to control population growth significantly. Certainly, populations were generally stationary, but the Malthusian constraints can satisfactorily explain why. Indeed the constraints are needed to explain the population equilibrium even if infanticide is practised on a huge scale or if Boserupian populations occasionally burst through food production barriers.

The evidence from contemporary hunter-gatherers and other peoples of infanticide on a sufficient scale to be the major control on population growth is not good enough. Infanticide theorists, given a strong lead by Carr-Saunders (1922) and Firth (1936), attributed the absence of control to the collapse of the old system as a result of Christian penetration and colonial administration, but the proof is not there. The failure of many of the great agricultural populations, such as the failure in most of India, to show large-scale infanticide is attributed to a hypothesized rise in mortality and a necessary rise in matching fertility. The rise in mortality is ascribed to a greater post-Neolithic-Revolution density of settlement with a concomitant increase in infectious disease, but little is said about the probably lower mortality resulting from the end of the violence that characterized hunter-gatherer populations or about the fact that infanticide was arguably still a viable means of reducing adult mortality. The lack of infanticide in sub-Saharan African populations, by far the largest non-sedentary agricultural populations with which we have been in contact, is not explained at all. The strongest evidence for massive infanticide comes, in recent centuries, from three sedentary societies—Japan (Eng and Smith 1976; Saito 1992), China (Lavely et al. 1990; Lee and Campbell 1994), and parts of North India (Pakrasi 1970)—but even here neither its scale nor its concentration in crisis periods is certain.

Finally, it should be noted that not all demographers have ignored the views of what has been the cultural anthropological mainstream. Wrigley (1978, p. 135) wrote of "unconscious rationality," a concept similar to that of Adam Smith's "hidden hand," in the control of fertility (but excluding infanticide).

Lesthaeghe (1980) criticized that view on the ground that reproductive restriction must be consciously socially enforced (pp. 529–30), and argued that, if there is "homeostasis" in human populations, it must be achieved by the force of mortality (p. 528). Coale (1986), in the first pages of Coale and Watkins's (1986) *The Decline of Fertility in Europe*, tried hard to bridge the gap but failed to take into account just how centred on infanticide was the cultural anthropological thesis. Very recently Wilson and Airey (1999) have urged demographers to persist with the effort to derive explanations from the homeostatic approach. This may prove worthwhile provided that there remains scepticism of the thesis of conscious Palaeolithic population control.

ENDNOTES

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CHAPTER 3

WAS THERE A NEOLITHIC MORTALITY CRISIS?[1]

Co-Authored by BRUCE K. CALDWELL

The proposition that the Neolithic Revolution, characterized by the beginning of agriculture or irrigation or urbanization, was associated with a significant rise in mortality has been widely discussed and mostly supported over the last half-century. The case is found in the medical or epidemiological literature, especially that in the ecological tradition, and in works on anthropology and palaeodemography. This paper examines how these ideas developed and questions whether this near-consensus could prove to be fallible.

The most certain demographic postulate for prehistoric populations is that over long periods, averaging out sudden spurts of population growth or decline and their reversal, the increase in human numbers was close to zero. Anything greater would have resulted in vastly higher human populations than now exist. Coale (1974:43) estimated population growth for the million-year period of hunting and gathering to have averaged 0.0015 percent per annum, and for the first eight millennia of agriculture (8000 BC–AD 1) to have been 0.036 percent or 24 times as fast. This calculation excited many in the debate as being proof that fertility had risen substantially compared with mortality, and that family building after the Neolithic Revolution must be seen in quite a different context. Actually, it implies either a drop in the crude death rate of one-third of a point per thousand (one-sixth of a year in life expectancy) or a rise in the birth rate of the same amount (one extra birth annually to one in every 150 mothers): demographic movements imperceptible to the populations concerned and most unlikely to be planned. The most common hypothesis put forward in anthropological writings cited in this paper was that both fertility and mortality had increased significantly with the advent of agriculture, with only a slight margin between the two rises. This was a necessary conclusion to maintain the widely held view that hunters and gatherers had consciously controlled population numbers and that this control was relaxed or abandoned when they became settled farmers. The complementary argument was that the more crowded post-Neolithic world must inevitably be characterized by higher mortality, because it sustained epidemic diseases and other ailments that could not exist among more sparsely settled and mobile hunter-gatherers, and

hence fertility must also have risen to prevent extinction. There has been substantial interaction in developing these ideas between epidemiologists and anthropologists, with an increasing use of evidence contributed by palaeodemographers. The most extreme views were probably those of Dumond (1975:713) whose article in *Science* began: "The demographic transition of modern times is a return to a pattern familiar to our hunting ancestors," and Black (1980:52): "it seems as if modern advances can do no more than return us to the state of health that mankind enjoyed 10,000 years ago."

Wood (1998:100) claimed that social scientists had abandoned the idea of Palaeolithic population control and the necessitated relatively low mortality, because of the onslaught on this position by theoretical population biologists, Maynard Smith (1976) and Wade (1978), both in the *Quarterly Review of Biology*, and Uyenoyama and Feldman (1980) in *Theoretical Population Biology.* In reality, very few field social scientists have ever cited these sources and most had probably never heard of them before Wood's (1994) *Dynamics of Human Reproduction* or more likely his 1998 paper in *Current Anthropology.* Judging by current textbooks, neither the majority of epidemiologists nor most anthropologists have changed their stance. The decline in research articles on the subject by anthropologists can probably be explained by a falling off in interest in contemporary fertility control as global birth rates have declined. The debate on the related topic of the "Stone Age affluent society" (Sahlins's usage) had also run its course. The authors of the present paper were drawn to the topic by two experiences. The first was the examination of the works of the early explorers and anthropologists used as sources for Sahlins's (1972) *Stone Age Economics*, where we concluded that a full assessment of their accounts would not support the thesis of low Palaeolithic mortality (Caldwell, Caldwell and Caldwell 1987:31–33). The second experience was a study of the evidence for the belief in fertility control among hunter-gatherers, which we felt had not been proved (Caldwell and Caldwell 2003). These conclusions then led to the problem: if the fertility of both hunter-gatherers and early farmers was uncontrolled and equal to their mortality, was it possible, unless "natural fertility" was lower among the hunter-gatherers, that the formidable, multidisciplinary case put forward for a rise in human mortality at the Neolithic transition was flawed? Accordingly, this paper examines how that thesis was constructed in the second half of the twentieth century and its possible weaknesses. But, first the forerunners will be noted.

The favourite scapegoats of the affluent-society adherents were those writers who had followed the seventeenth-century British savant, Thomas Hobbes, in describing the lives of hunter-gatherers as brutish and short. They included Herbert Spencer (1899, Vol. I:15) who held that the hunter-gatherers' condition always bordered on starvation and that life was accordingly brief, as well as one of the fathers of modern anthropology and coiner of the term "Neolithic Revolution," Gordon Childe (1936:74–117) who, in his revealingly titled book, *Man Makes Himself*, maintained that the Neolithic Revolution was a forward step both generally but also with regard to diet and health. There were now readily available stored grain and root crops which were supplemented by meat, eggs and milk from the newly

domesticated animals and also meat from hunting which continued alongside farming for millennia.

Others viewed this picture as simplistic, driven by a philosophy of continuing progress. Already in 1798, Malthus (1960) in his *First Essay* had noted that, although the lives of early people had been characterized by war and violent diseases (p. 41), urbanization was no panacea, because "large towns are known to be unfavourable to health, particularly the health of young children" (p. 43). The biologist Carr-Saunders (1922:157) drew on both Davidson's (1892) *Geographic Pathology*, and the experience of Amerindians and the peoples of the Pacific when first infected with European diseases, to argue that non-urbanized peoples had been free of smallpox, scarlet fever, measles, cholera, yellow fever, whooping cough, diphtheria, syphilis and leprosy, most of the ailments leading to premature death. Zinsser's (1935) *Rats, Lice and History*, with its emphasis on social and time dimensions, inspired many to take a more ecological view of disease causation.

The first research advances in the field, and still the least challenged, were those made by the medical and epidemiological ecologists. Their work was encouraged by research in the 1920s and 1930s on the minimum populations of cities or islands needed to sustain epidemic diseases without their periodic disappearance. Most work had been done on measles, a disease which confers a high level of immunity, has no lasting sequelae that can prove infectious (such as shingles persisting long after chickenpox infection), and is specific to human beings. The first work was done by Panum on the Faeroe Islands in 1846, followed by Soper (1929), culminating later in such research as that of Bartlett (1957, 1960) which determined that in Britain, the United States and Canada cities had to have populations of at least 250–300,000 for measles not to disappear after epidemics. Black's (1966) work suggested the figure could be as high as half a million on Pacific islands. Here we shall deal with epidemiologists and social scientists alternately even though after 1960 they interacted in that each group cited the other to support its case.

THE EPIDEMIOLOGICAL CASE

Macfarlane Burnet, who championed the ecological approach (which subsequently gained him a Nobel Prize), published in 1940 *Biological Aspects of Infectious Disease*, in which he indicted cities for their relatively high levels of mortality, caused by filth and crowding, and stated: "The nomadic life is the healthy life, and the children of nomads [with whom he apparently included hunter-gatherers] survived until their numbers were too great for the steppes to support them" (Burnet 1953:15). Bates (1955) cited Zinsser (1935) as an inspiration, and, drawing on reports of the devastation caused to Amerindian populations by smallpox and Pacific Islanders by measles and mumps, was led to "wonder whether these contagious diseases may not largely be a post-Neolithic development" (Bates 1955:161). He also argued that famine decimated agricultural people in a way that was unknown to hunter-gatherers. These views were echoed by Dubos (1959) in his *Mirage*

of Health: Utopias, Progress and Biological Change. Not everyone at this stage believed that mortality and fertility had risen with the coming of agriculture and urbanization. Bates suspected that epidemic-disease mortality had replaced that which had previously been caused by "anthropoktony," which included murder, homicide, suicide and war (Bates 1955:124). Haldane (1956:328–329) argued that the epidemics replaced "vertebrate predation."

By the 1960s the debate about the impact of the Neolithic Revolution was centring on two matters. The first was what diseases could infect only settled populations and not hunter-gatherers. Indeed, it sometimes seemed that so little could attack the latter that they might be almost immortal. The second was whether the greatest danger had been imposed by sedentarism with its pollution of water sources and build-up of human faeces, irrigation with its spread of waterborne disease, or urbanization with cities appearing and passing in population size various thresholds (such as 250–300,000 for measles). These issues have often been treated in a fairly slipshod way with a tendency to blur together the changes even though five thousand years (8000–3000 BC) separated the first agricultural villages from the first cities. Armelagos and Dewey (1970) were an exception.

Aidan Cockburn (1963, 1967a, 1967b, 1971) identified the Neolithic Revolution as being associated with sedentarism, with faecal contamination multiplying hookworms and ascarids; with niches for rats, mice, ticks, fleas and mosquitoes; with the domestication of animals providing homes for ticks and lice, and the threat of cross-species leaps in infection; with dense populations that supported rubella, cholera, smallpox, mumps, measles and chickenpox (the last probably wrongly); and with irrigation to spread disease and its vectors. But he conceded that with agriculture, "for the first time, not only was there food for all, but it was the kind that could be stored for periods of shortages" (Cockburn 1967b:86). Fenner (1970:51–56, 1980:14–15) added salmonellosis, yellow fever, typhoid and poliomyelitis, and argued, following Carl Sauer's 1952 thesis on the origins of agriculture that Malaysian fishing villages with their garden plots of yams, taro, bananas and coconuts constituted the first farming regime, that such settlements probably made mosquito-borne malaria a scourge even before crop growing began in the ancient Middle East. Black's (1975:518) list of urban diseases included influenza, colds and poliomyelitis. McNeill (1976), in his widely read *Plagues and Peoples*, emphasized the Neolithic species transfer of disease as probably having occurred from poultry, rats, mice, horses, pigs, sheep, goats, cattle and dogs, with measles (related to rinderpest and distemper) and smallpox (related to cowpox) coming from cattle, and influenza from pigs.

But what could infect hunter-gatherers? Pavlovsky (1966), in research first published in Russian in 1939, focused on *zoonoses* (infections transmitted to humans by wild animals or their parasites) and answered rabies, tuberculosis, brucellosis, plague, tularaemia, leptospirosis, Chaga's disease, yellow fever and encephalitis. Armelagos (1967:79) suggested that hunter-gatherers had probably domesticated the dog, which, together with its parasites, would have been a source of disease. Fenner (1980:14–15) listed as possible hunter-gatherer infections those

from animal reservoirs such as rickettsiosis, rabies and salmonellosis, such latent or chronic infections as chickenpox, herpes, tuberculosis, leprosy and treponematosis, as well as staphylococcal and streptococcal infections. But he ruled out the following diseases that awaited farming and urbanization: human viral infections such as influenza, colds, pneumonia, enteric diseases, measles, smallpox and rubella; and human bacterial infections like shigellosis, cholera and typhoid.

Mark Nathan Cohen who had earlier addressed the origins of agriculture (Cohen 1977) and, with Armelagos, the changing Neolithic environment (Cohen and Armelagos 1984b), became from the late 1980s a major contributor to the health debate (Cohen 1989, 1994). In *Health and the Rise of Civilization* (Cohen 1989:160fnl) he acknowledged as his predecessors Haldane (1932), Polgar (1964), Fenner (1970), Burnet and White (1972), Cockburn (1967a, 1971) and Black (1975, 1980). Cohen added to the list of diseases that could kill hunter-gatherers: through zoonoses, haemorrhagic fever, brucellosis and anthrax; through anaerobic bacteria, gangrene, botulism and tetanus; encephalitis from mosquitoes, trypanosomiasis (sleeping sickness) from the tsetse fly and viral diseases from ticks; as well as such chronic complaints as yaws and herpes. He, like others, also based his case for health deterioration at the beginning of the Neolithic period quite heavily on the evidence from palaeodemography which became more plentiful in the 1970s, although papers estimating mortality levels from skeletons appeared as early as 1960 (Vallois 1960; Howells 1960).

Those working with an epidemiological approach first became interested in the evidence from ancient skeletons when in 1970 the Hungarian palaeodemographers Acsádi and Nemeskéri published their *History of Human Life Span and Mortality.* Rather courageously they presented 13 life tables constructed from mostly Hungarian skeletal remains with life expectancy at birth rising (with the exception of a few aberrant peaks) from around 21 years in the Palaeolithic period to 25 years in the early Neolithic period, to 28 years in the Roman Empire and 29 years in the early Middle Ages. They had no evidence of a Neolithic mortality crisis. Angel (1975) drew on Acsádi and Nemeskéri (1970) and his own observations of 2,200 skeletons and mummies from the Eastern Mediterranean to argue that mortality had risen at the end of the Palaeolithic period as hunter-gatherers multiplied and large mammals declined; that it rose further with the advent of agriculture, then fell, but stabilized after 2000 BC, with health improving as swamp draining defeated malaria, and children became more resistant to urban epidemic disease.

The greatest impact on the debate was achieved by a 1982 conference in Plattsburgh, New York State, of palaeopathologists with preset agenda questions. Although, contrary to the intent of the organizers, there was a heavy concentration on American evidence in a situation where the timing and extent of the Neolithic Revolution was often blurred, the papers were subsequently published as *Paleopathology at the Origins of Agriculture* (Cohen and Armelagos 1984a). In their summary of the conference, the editors argued that the skeletal evidence showed farmers to have had higher levels of infection and a lower mean age at death

than hunter-gatherers. In her conference conclusions, Roosevelt (1984) agreed, and added that, although Palaeolithic skeletons bore evidence of seasonal and periodic malnutrition, they did not show the signs of infectious disease (especially in infancy), the teeth destroyed by a carbohydrate diet, and the stunting found in Neolithic skeletons. The case seemed to be closed.

THE ANTHROPOLOGICAL CASE

Anthropologists discovered the advantages of the hunter-gatherer way of life only in the mid-1960s, influenced by Carr-Saunders (1922), the growing epidemiological and palaeodemographic literature, Boserup (1965) and the Harvard study of Dobe !Kung of Botswana in 1963–5 (see Lee 1968; Howell 1979). Cohen (1997:243) said that all this work led him to a new perspective, namely that technological advances, and especially the Neolithic Revolution, did not necessarily lead to improved "nutrition, health, well-being and leisure time," although he subsequently was convinced by sceptics that the !Kung were unlikely to reflect the situation in any ancient foraging society (Cohen 1997:249–250). Boserup did not actually discuss relative mortality levels, but, in arguing that it was population pressure that forced mankind to find more intensive means for food production, she proposed that shifts from hunter-gathering to shifting cultivation and on to sedentary cultivation had at each step meant less leisure and more hours of work. The further back in the chain of change, the greater the leisure and, in this sense, "affluence." A year earlier, Polgar (1964), in a revealingly entitled paper, "Evolution and the ills of mankind," brought the health disadvantages of sedentary agriculture into the social sciences by drawing on most of the contributions of health ecologists (Zinsser 1935; Burnet 1940; Bates 1955; Haldane 1956; Dubos 1959; Cockburn 1963). William Allan (1965), in *The African Husbandman*, made more widely available ideas he had first published in 1949, arguing that for every food system there was a critical population density beyond which food production and, by implication, health suffered. Gluckman (1965:vii), in his introduction to Allan (1965), said that "his theory and applications were a revelation to my social anthropological colleagues as they had been to me."

The study of the !Kung Bushmen of Botswana, especially the Dobe !Kung of Northwest Botswana near the Namibian border, was to become a major driving force in picturing the golden age of "Palaeolithic man." By the 1960s the !Kung and most, if not all, other surviving hunter-gatherer populations were by no means isolated from external influences. As early as 1961 Marshall had pictured their happy community with its meat-sharing and gift-giving, claiming that "if there is hunger it is commonly shared" (Marshall 1961:236). The work on the !Kung provoked a much wider conference in 1966 on *Man the Hunter* and resulted in an influential book with that title (Lee and DeVore 1968). The !Kung research later also yielded a book of central importance to the debate on the hunter-gatherer mortality-fertility balance, Howell's (1979) *Demography of the Dobe !Kung.* Lee and DeVore, in the introduction to *Man the Hunter*, refer to the importance of

chapters by Lee (1968) and Birdsell (1968), as well as a discussion note by Sahlins (1968a). Lee stressed leisure (but only apparently of men), with only one-third of their working hours spent in hunting, one-third in entertaining visitors from other camps, and one-third visiting other camps to be entertained, with work spread out evenly throughout the year (Lee 1968:31–34). He stressed their low mortality by estimating that 10 percent were over 60 years of age, "a proportion that compares favourably to industrialized countries" (p. 35). Leaving to one side the question of age accuracy, 10 percent of the society being over 60 years is likely to characterize a stationary population with a life expectancy of around 35 years, or one growing at the slow rate determined by Howell (1979:215) of 38 years (Coale and Demeny 1966, West Model). Howell's (1979:98) own estimate of Dobe !Kung life expectancy at birth was 50 years, a figure which she appreciated was partly the product of international health measures. Admittedly in the 1960s the proportion over 60 years of age in industrialized countries was only about 13 percent, the product of annual population growth rates averaging over one percent in the previous two decades (United Nations 2001). Birdsell's (1968) chapter on Australian Aborigines is too mired in modelling for us to be able to discern through it the real situation of hunter-gatherers or their likely mortality levels.

The 1966 conference, as recorded in Lee and DeVore (1968), saw the emergence of probably the most influential proponent of the fortunate and, by implication, healthy and long-lived hunter-gatherer, Marshall Sahlins. At the conference he said that it was so difficult to correct the traditional view that hunter-gatherers lived a miserable life, that "perhaps, then, we should phrase the necessary revisions in the most shocking terms possible . . . the original affluent society" (Sahlins 1968a:85). He emphasized their leisure; their sufficiency in food, quoting Marshall (1961:243) on the !Kung having "a kind of material plenty;" and their peace of mind, citing Spencer and Gillen (1899:53) describing the Australian Aborigines as having "not the slightest thought of, or care for, what the morrow may bring forth." Sahlins expanded these views in late 1968 in an article published in French, "La première société d'abondance" (Sahlins 1968b) and further in 1972 in *Stone Age Economics* where in the first chapter, "The original affluent society," he concluded: "The world's most primitive people have few possessions, *but they are not poor*" (Sahlins 1972:37, his italics). Although he disputed the notion that hunter-gatherers were frequently ill or starving, he said little about their levels of mortality or demographic equilibrium and nothing about causes of death.

The foregoing near-consensus was built on by the major contributor to the debate, Cohen (1977, 1984, 1989, 1994; Cohen and Armelagos 1984a, 1984b). In *The Food Crisis in Prehistory*, he argued, citing Boserup (1965) as his inspiration, that for most of history hunter-gatherers had been well fed and healthy because they had a wide variety of food, both plant and animal, and because their plant food did not disappear during drought, being local varieties selected by evolution to survive in such conditions (Cohen 1977:29–30). Although they controlled fertility (pp. 42–47), ultimately they filled the planet, pressing on resources with mortality probably rising, and thus necessitating in Boserup's theory the move to agriculture

which occurred over a wide area at much the same time. But agriculture was no solution to rising mortality because diets became less varied and agricultural people relaxed their control of fertility (pp. 279ff.). In 1984, in his introduction to *Paleopathology at the Origins of Agriculture*, deriving from the 1982 Plattsburgh conference, Cohen reported that the anthropologists were building their ideas of healthy hunter-gatherers and unhealthy farmers on Boserup (1965), Woodburn (1968), Binford (1968), Flannery (1969), Meyers (1971), Sahlins (1972), Cohen (1977) and Hassan (1981), while epidemiological arguments rested on Polgar (1964) and Fenner (1970), with contributions on nutrition from Barnicot (1969) and Yudkin (1969). Cohen admitted that skeletons of hunter-gatherers are rare and that some so-identified may even come from small sedentary or quasi-sedentary populations (Cohen 1984:7). In 1989 Cohen published his major work, *Health and the Rise of Civilization*, in which he placed great emphasis on the dangerous health environment after the Neolithic Revolution, citing Haldane (1932), Polgar (1964), Fenner (1970), Burnet and White (1972), Cockburn (1967a, 1971) and Black (1975, 1980). He argued that sedentarism had certain health benefits: the ability to become resistant to local parasites, to look after the sick in permanent buildings, and to get milk from domesticated animals. Nevertheless, these advantages were outweighed by denser settlement inviting epidemic disease, the growth of commerce with its spread of infection, tuberculosis from milk, cross-species infection from domesticated animals, and the build-up of refuse and faeces, while permanent housing provided a habitat for vermin thereby transmitting disease (Cohen 1989:38ff.). Furthermore, in spite of the growing of some legumes and continued hunting, resistance to disease was undermined by more work and a more limited diet (pp. 38ff., 55ff.). In 1994, while admitting that skeletal data were far from satisfactory, Cohen (1994:629–630) maintained that the 1982 Plattsburgh conference had established from skeletons and mummies that (1) chronic infection was greater among Neolithic farmers, (2) they suffered more from yaws and tuberculosis, (3) they had more intestinal infections and parasites, (4) they experienced more anaemia and malnutrition, (5) they were more often stunted, and (6) dental evidence suggested they were under greater stress.

Another major contributor was Marvin Harris. His most controversial paper, and one with seemingly few followers, was "Population, warfare and the male supremacy complex," written with William Divale (Divale and Harris 1976). It uses data from Murdock (1967) to argue that "band and village" societies achieved low population pressure (and by implication low mortality) by emphasizing male supremacy. This was expressed chiefly through warfare which was most easily brought about in patrilineal, patrilocal and polygynous societies, especially those with the institution of men's houses. More surprisingly, the warfare limited population not by the deaths arising directly from it, but from the resulting *machismo* and suppression of women that made the latter unprotestingly kill many of their daughters. Two years later, Harris in *Cannibals and Kings* joined the main cultural anthropological current with its focus on the relatively low mortality of hunter-gatherers, arguing that their epidemic deaths must have been not only fewer than

those of Neolithic people but also "considerably less significant . . . than they are today" (Harris 1978:13–14). He postulated that the better diet and "general body vigour" of hunter-gatherers gave them a greater chance of recovery from illness, and that this advantage was reinforced by their living in dry areas away from the swamps, streams or clearings in wet forests needed for agriculture. In due course Neolithic man was to face the even greater danger of living in "state-level societies," where the crowding experienced in urban life, especially among the poor in insanitary slums, was the first theatre for the great epidemics. He drew on Angel (1975) for evidence that anthropometric measurements proved the greater healthiness of Palaeolithic man.

Hayden (1972) agreed on the importance of male supremacy, and argued from sources on Australian Aborigines that Palaeolithic men were the only ones to enjoy the Stone Age affluent society and that women had a hard-working, debilitating life. Nevertheless, he did not maintain that this led to significant levels of infanticide.[1] Howell's (1979) final conclusion about Dobe !Kung women was that their fertility was surprisingly low, explained partly by the long duration of breastfeeding and partly by sexually transmitted disease, but also by malnutrition from eating only a limited amount of badly prepared and unappetizing food and by much physical activity either in moving to new sites or while gathering food. Those Dobe !Kung women who had settled at cattle posts were fatter and more fertile. Handwerker (1983) put these two sources together to argue that hunter-gatherer women normally experienced low fecundity and generally did not need to practise infanticide. With low fertility being the usual condition, there was no need to explain the balancing low mortality. Citing Caldwell (1982) on the value of children in agricultural societies, he argued that farming families both wanted extra children and needed to have them to keep up with rising child mortality. Neither Hayden nor Handwerker resorted to the solution that seemed to be the way that Hayden was originally going, namely that pre-contact Aboriginal women, or perhaps all hunter-gatherer women, prematurely aged so rapidly that both the women and their partners terminated the women's sexual life, or very active sexual life, at an early age.

The epidemiological and anthropological cases seem almost unchallengeable, especially the former. But, if the argument that Palaeolithic population growth was controlled by infanticide is not proven, and if the Dobe !Kung low fertility situation was not universal, then, given almost stationary populations, there must be flaws. There have been increasing attempts to locate those weaknesses which we will now attempt to probe and supplement.

HOW GOOD IS THE CASE FOR A NEOLITHIC MORTALITY CRISIS?

The term "Neolithic Revolution" has coloured the debate by suggesting a sudden cut-off point, instead of what actually was a long, merged process (Flannery 1969; Hassan 1973:535). In better naturally endowed areas many hunter-gatherers had a kind of base camp, with many of the health dangers of

small farming settlements. This is observed in some of the medical literature such as Burnet (1953) and Burnet and White (1972), but with a confusion between hunter-gatherers and nomads, the latter being a post-Neolithic phenomenon with symbiotic relations with agriculturalists. The diet of farming, but not city, people was supplemented by the products of hunting and gathering for millennia, as they still are quite widely in tropical Africa. Further, each new farming area did not necessarily have to build up new bodily resistances to epidemic diseases, if Renfrew (1987) is correct, because the farmers moved with the farming frontier.

Nor, in spite of the apparent solidity of the ecological argument, was Neolithic health necessarily worse. Acsádi and Nemeskéri's (1970:263ff) unique series of life tables derived from Palaeolithic evidence show rising life expectancies with the advent of farming, as Childe (1936) would have expected. Hassan (1973:535; 1981:211) was not surprised, because he attributed an improvement in child survival and a reduction in the age of menarche to sedentarism, more regular food, and a mixed diet provided by stored food and continuing meat, milk and eggs from domesticated animals. In addition, the pre-existing ease of hunter-gatherer life has probably been wildly overstated (Caldwell et al. 1987: 31–33).

Fierce debate has clouded the evidence from ancient skeletons. Howells (1960:166ff) and Vallois (1960:204) both emphasized that there was marked age-selection bias in the skeletons found in ancient cemeteries, with infants the most likely to be missing. Indeed, Howells (1960:171) believed that the evidence would allow construction of life tables only from 20 years of age, or at the extreme, 15 years. This presents a problem because such life tables omit about 60 percent of deaths in high-mortality populations (Coale and Demeny 1966, West model) and probably an even higher proportion of those caused by the new Neolithic epidemics. Given Cohen's (1984:7) admission that skeletons of hunter-gatherers were rare and that some were of questionable identification, even if we agree on high mortality levels in early farming or urbanized populations, we have no satisfactory Palaeolithic evidence to allow a proper comparison.

Attacks were made on the interpretation of skeletal evidence in the two major books with which Cohen was associated (Cohen and Armelagos 1984a; Cohen 1989). Harpending (1990:799–800) argued that stress marks on skeletons, rather than being indicators of death, were more likely to be signs of past survival of such stress. Furthermore, the age distribution of deaths was influenced by the age distribution of the population and, if fertility had risen with the Neolithic Revolution, there would therefore have been more deaths at very early ages (the qualification here with regard to a fertility rise is one which we believe is unproved). Harpending interpreted the skeletal evidence as showing that the Neolithic Revolution had resulted in declining mortality and rising fertility; this is, of course, incompatible with long-term near-equilibrium in population numbers. He was a co-author of a subsequent major attack on Cohen's and his colleagues' work, now called "The osteological paradox" (Wood et al. 1992), which maintained that there

were huge problems in determining states of health from skeletons and that the evidence presented to the 1982 conference (Cohen and Armelagos 1984a) could just as easily be interpreted as showing a Neolithic fall in mortality as a rise. Wood et al. (1992) repeated the argument that the bone lesions could perhaps better show survival of illness than be evidence of death, and that the fall in the mean age of young children's death could be evidence of greater survival at weaning because of more satisfactory weaning foods allowing safer weaning and at an earlier time. Wood and Milner (1994:632) argued that skeletons are "life's failures at any particular age" and can provide no evidence about the health of those continuing to live. Wood (1998) disputed evidence for any provable differences between Palaeolithic and Neolithic fertility or mortality levels and argued that "All pre-industrial economies . . . are capable of generating misery and will do so given enough time" (p. 121) as they reach demographic saturation. The population is regulated by "density-dependent vital rates" (p. 103), that is, they are in Malthusian equilibrium. Pennington (1996:265) pointed out that only some diseases produce skeletal lesions, and argued that, as with the !Kung, sedentarization probably usually resulted in steep drops in infant and toddler mortality because a greater volume and more certain supply of breastmilk (apparently because of securer maternal nutrition).

Pennington (1992) had previously argued that there was no great mystery about Dobe !Kung low fertility, citing Coale (1968), Caldwell and Caldwell (1983) and Frank (1983), as showing that sexually transmitted infections (STIs) reduced fertility in some neighbouring sub-Saharan African populations to even lower levels. The adjacent Herero pastoral people had earlier very low fertility, ascribable, as subsequent effective treatment showed, to STIs, and probably had infected the !Kung to a sufficient degree to explain fully their fertility level.

What caused Palaeolithic deaths? Bates (1955:112) had argued for the central importance of violent deaths, including those due to war, homicide and suicide, although little evidence of the last was reported. Influenced by the contemporary Vietnam War, Fried, Harris and Murphy (1968) edited a collection on the anthropology of war, in which Chagnon (1968:112) wrote of the South American Yanomamö: "a militant ideology and the warfare it entails function to preserve the sovereignty of independent villages," with the result that 24 percent of adult males die in warfare (p. 140). Such warfare is not related to the capture of territory but to cementing alliances and stealing women. Such a way of life means that violence also spills over into village and family disputes. Coleman (1986:29) was to put the range of prehistoric adult male deaths ascribable to violence at 14–25 percent, noting that contemporary Papua New Guinea fell into the upper end of this range. Hayden (1972:216) used nineteenth-century sources on Australian Aborigines to argue that the hunter-gatherer way of life promoted aggressiveness and the survival of the fittest. Ember (1978:443–444) drew on studies of 50 societies from Murdock (1967) to argue that warfare characterized up to 90 percent of these societies. It was the !Kung who were different.

IS IT POSSIBLE THAT THERE WAS NO NEOLITHIC MORTALITY SURGE?

Curiously, the answer to this question centres not on mortality but on fertility. Over the long run, and until very recently, population growth rates were close to zero, except among European overseas settlers over the last half-millennium, and in Europe and parts of Asia over the last two or three centuries. There is no reason to suppose that hunter-gatherer fertility was not high. The evidence for deliberate fertility control or population control is very insecure. The explanation for the low fertility of the contemporary Dobe !Kung is probably recent sterility arising from STIs.

All authorities agree that some societies were relatively unaggressive, and there must have been some that were peaceful, not given to practising infanticide, and not subfecund. It is clear that even in these societies growth was ultimately constrained by Malthusian bounds. Because of their peacefulness they were the least likely to swamp their neighbours. Firth (1936) claimed that this was the idyllic situation of the Tikopia in the Southwest Pacific (except that they probably had in the past practised infanticide). When ultimately faced by excessive population pressure the answer was self-inflicted violence constituted by young men setting off in boats for certain death. The evidence presented by Firth for such suicide was, however, not strong. There is also the problem of how increasing population pressure was perceived. Was it through increasing hunger and a rising death rate? If so, what were the immediate causes of these deaths? As Malthus recognized, except in severe famines, most undernourished people die of some other immediate cause. If these causes were not the great post-Neolithic or post-urbanization epidemics, what were they?

The answer is almost certainly to be found in the list of ailments and disasters that could attack Palaeolithic populations. Staphylococcal and streptococcal diseases may have been major killers. The way of life may have meant more frequent gangrene and tetanus. It is beyond the scope of this paper to go deeply into this question, but ecological epidemiologists should tackle it even if they are not fully convinced by the thesis of high hunter-gatherer mortality.

For many groups, violence probably played an equal or more important role. Hunting is a violent activity made possible only by weapons that are inherently dangerous and involving skills that are akin to the skills needed for warfare. Furthermore, the mobility of hunter-gatherers made warfare easier. Divale and Harris (1976) were almost certainly correct about "warfare and the male supremacist complex." They were on less certain ground, such that damaging attacks by Hirschfeld, Howe and Levin (1978) and Lancaster and Lancaster (1978) were possible, only on whether this led to their wives being bullied into infanticide. It can be argued that death from fighting and violence probably characterized the denser populations in naturally well endowed regions while death from starvation and its sequelae were more common among sparsely settled populations in hot or cold deserts or savannas.

There are other aspects of the situation that are less frequently explored. Hunters and warriors depend for their survival on being able to trust the skills and courage of their "brothers" who battle beside them. In such societies, men may place greater emphasis on relationships with other men than on those with spouses and children who from the modern point of view, tend to be neglected. The cult of violence can easily extend to the family and result in not only men but also women and children being killed. Women were not the major beneficiaries of the Stone-Age affluent society and may have been as burdened as they were in the picture drawn by Hayden (1972) of nineteenth-century Australian Aboriginal society. Given their circumstances and frequent physical activity they might well have suffered from high levels of miscarriage, stillbirths, and infant and maternal mortality.

Sedentarization was a long, slow transition, not an overnight occurrence. So probably was the development of epidemic diseases as average settlement size grew and as species-crossover disease occurred. Deaths from violence almost certainly fell and those from emergency long-distance movement of the whole group disappeared. It is likely that birth and death rates remained little changed and approximately equal. The vision of ancient low birth- and death-rate hunter-gatherer societies arose partly from the interest of medical ecologists in the impact of the rise of epidemic disease and partly from romantic visions of a Stone-Age affluent society articulated during the 1960s and 1970s when there was great stress on the need for fertility control and the hope that it had a long tradition.

The present research need is for better epidemiological models showing how those diseases that probably existed among Palaeolithic hunters and gatherers could, in the absence of many post-Neolithic epidemic diseases and with the assistance of violence have maintained mortality at a level that balanced uncontrolled fertility. That they did do so is certain. It is our modern knowledge of disease, and the limits on its spread imposed by scattered population, assisted by palaeodemo-graphic findings, that should illuminate the way forward.

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ENDNOTES

1. This article first appeared in the *Journal of Population Research* 20 (2) (November 2003), pp. 153–168.
2. Later, Hayden et al. (1986), using Murdock's (1967) and other material, argued that the strongest forces reducing the relative status of women among hunter-gatherers were, in descending order of importance, frequent and severe resource stress (starvation, malnutrition); the level of warfare and violence; and the importance of hunting. They felt that the feminist revolution in the West after 1960 had led anthropologists to see more gender equality in Palaeolithic society than was actually the case (Hayden et al. 1986:449).

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CHAPTER 4

POPULATION INTENSIFICATION THEORY

JOHN C. CALDWELL

"Population intensification" means increasing the density of population on a fixed area of land, and is restricted in this paper to natural increase, thus excluding migration or conquest. There has been a recent tendency to treat the topic as if there were on offer only two theories of intensification, those of Thomas Robert Malthus (1766–1834), especially as set out initially in 1798 in *An Essay on the Principle of Population as it Affects the Future Improvement of Society, with Remarks of the Speculations of Mr Godwin, M. Condorcet, and other Writers* (henceforth *The First Essay*), and Ester Boserup (1910–1999), as set out in 1965 in *The Conditions of Agricultural Growth: The Economics of Agrarian Change Under Population Pressure* and amplified in later works (1970, 1975, 1976, 1981, 1985, 1999). This paper examines the cases put forward by these two writers, and then argues that their theories do not exhaust the possible explanations for population intensification. Malthus is briefly summarized, because, although most social scientists are well aware of his postulates (*cf.* Dupâquier, Fauve-Chamoux and Grebenik 1983; Wrigley 1986) certain points will be taken up later in the paper, and additionally his writings were the model against which Boserup reacted.

Population intensification is related to, but should not be equated with, either local or global population growth. The latter has been the subject of much speculation and attempted estimation. The most widely cited estimates, perhaps because they were both published in *Scientific American*, were those of Edward Deevey (1960) who suggested that human numbers grew from one-eighth of a million around one million years ago, to one million around 300,000 years ago, to five million around 10,000 years ago, and to three billion in 1960; and of Ansley Coale (1974) who largely accepted these figures to argue that they implied very slow average annual growth rates, 0.0015 percent over the first million years, and 0.036 percent from the Neolithic revolution until AD 1. The earliest growth consisted of both population intensification and forward movements into unoccupied land, but subsequently population intensification dominated. Nevertheless, more technologically advanced peoples continued to invade sparsely settled areas, at first, according to Carl Sauer (1956:45ff.), because of their superior command of

speech, tools and fire; and ultimately, as argued by Renfrew (1987), because of their command of agriculture, a point to which we will return. Gordon Childe (1936) coined the terms for the great forward leaps in technology and population-carrying capacity, the "Neolithic Revolution," the "Urban Revolution," and the "Revolution in Human Knowledge," the first two terms remaining in currency. Clearly, each step involved further population intensification.

Neither Malthus nor Boserup gave equal attention to all parts of this great span of history. The periods they concentrated upon and their reasons for doing so shaped their theories and limited their universality. Malthus announced in the title of his *First Essay* that his work was a reaction to the ideas of the Marquis de Condorcet (1743–1794) and William Godwin (1756–1836), and in its Preface that an essay by Godwin was the immediate provocation. Both these writers were Utopians, Condorcet believing that mass education ensured a bountiful future and Godwin that human virtue and perfectibility would mean reaching the same end. Malthus assumed, reasonably enough on the evidence of past human fertility and agricultural growth, that human numbers pressed upon the means of subsistence. It is important to note that this was not his only anti-Utopian assumption, for, whatever is said about his scientific outlook, his approach also conflicted with those of Condorcet and Godwin in taking for granted an unchanging class system. He went further and not only recognized social differentials in mortality, but took the view that society would be best served by the lowest and most worthless class bearing the greatest brunt of mortality. The socialist suspicion of Malthus was not all emotional error.

Boserup (1999:17–22) makes it clear that her driving force was "anti-Malthusian" in the Continental sense that equates Malthusianism with the modern family-planning movement. She and her husband, the economist Mogens Boserup, had collaborated from 1957 to 1960 in India with Gunnar Myrdal, the Swedish economist who was working on his *Asian Drama*, finally published in 1968 without any reference to the Boserups' work. They broke with Myrdal over his stress on the need to control India's population growth; they decided that modern European agricultural economic theory with its emphasis on "zero marginal productivity and agrarian surplus population" was for "developing countries an unrealistic theoretical construction" (Boserup 1999:17). Ester Boserup based her anti-Malthusian and anti-Myrdal theory on what she had seen in India of "long-fallow systems and tribal tenure" (p. 17.), and what she was later to observe in tropical Africa, even though most of Indian agricultural production does not come from such systems. Accordingly, the central argument in the *Economics of Agrarian Change* . . . is based not on contemporary India but on ancient Europe (treated at greater length below).

Nowadays, both Malthus and Boserup are most often used to discuss historic and especially prehistoric population growth. This is the reason for concentration on Malthus's *First Essay* which is free from the complications of succeeding editions arising from changes induced by the Industrial Revolution. The same approach is adopted here, although sometimes, for clarification, reference is made

to his 1830 work, *A Summary View of the Principle of Population* (Malthus 1960) abridged from his 1824 *Encyclopaedia Britannica* supplement. For Boserup, too, the concentration will be on her 1965 *Conditions of Agricultural Change*, which is free from the modifications in her later writings. Both writers achieved shock and recognition for their first major works with their straightforward relatively unqualified statements. Neither would have made the same impact if these publications had included all the later qualifications, sensible as these amendments were.

MALTHUS AND BOSERUP ON INTENSIFICATION

Malthus ascribed the tendency of populations to grow and hence become more intense to "the passion between the sexes." He was quite clear that population intensification could be curbed so that it was equal to or less than the increase in food supply by deliberately frustrating the sexual passion by late marriage preceded by sexual abstinence. He was also aware that "vice" could permit passion to lead to sexual intercourse without reproduction, but believed that this was an immoral course and that it was in his time only a minor curb on population increase. By "vice" he certainly meant infanticide and almost certainly contraception (which was in his time limited, primitive, uncertain and sometimes dangerous), and probably also fornication and prostitution leading to sterilizing sexually transmitted disease with few live births or surviving children relative to the scale of sexual intercourse.

The slow but measured increase in agricultural production was achieved by more intense farming, but was limited by diminishing returns from poorer land as the farming frontier spread into land previously regarded as not worth cultivating. This is clearer in his 1824 *Encyclopaedia Britannica* supplement (Malthus 1960:15, 29) written four years after the publication of his *Principles of Political Economy* (1989 [1820]) and seven years after Ricardo's *Political Economy* (1817).

Most mortality was not caused by malnutrition, but by infections, disease, warfare, violence and other excesses, as well as cold. Often such causes kept populations from pressing on the means of subsistence. In theory, one would suppose, some small populations might become extinct, but this appeared to be rare, for "populations invariably increase where there are means of subsistence" (Malthus 1959:13). But nearly all populations repeatedly draw near the upper limit imposed by the available food, and their growth is then increasingly constrained by starvation or more often by rising disease mortality among the most malnourished population. In advanced societies, stratified by class, especially high mortality occurs among the lowest class of wastrels, criminals and the unemployable. Indeed, any attempt to provide additional support for this class merely made them marry earlier and breed more prolifically, thus endangering the nutrition and health of the class above them, that of hardworking honest tradesmen. Such arguments assisted in the repeal of the Poor Laws, probably delayed assistance in the Irish famine of

the 1820s, and did likewise in some nineteenth-century Indian famines (Caldwell 1998). Population, thus, was over the long run controlled by food supplies; although numbers could temporarily overshoot that constraint, severe distress would inevitably follow.

The First Essay tells us that this was not entirely a bad thing, but a way to the future, for then there was hunger and need among the poor leading to their acceptance of lower wages. In these circumstances,

> the cheapness of labour, the plenty of labourers, and the necessity of an increased labour among them, encourages cultivators to employ more labour on their land, to turn up fresh soil, and to manure and improve what is already in tillage, till ultimately the means of subsistence become in the same proportion to the population as at the period from which we set out. The situation of the labourer being again tolerably comfortable, the restraints to population are in some degree loosened, and the same retrograde and progressive movements with respect to happiness are repeated (Malthus 1959:10–11).

But a virtuous, God-fearing population, practising prudential and other restraint, can produce improvements without the whiplash of starvation and low wages since "The reason that the greater part of Europe is more populous now than it was in former times is the industry of the inhabitants has made these countries produce a greater quantity of human subsistence" (Malthus 1959:19). By 1824 Malthus was placing even greater emphasis on civic and individual virtue stressing that food production could be augmented by good government, a better distribution of property and improved personal habits (Malthus 1960:36). The last clearly included the timing and circumstances of marriage and probably the number of children reared, for prudential restraint leads to "an improvement in the modes of subsistence, and the conveniences and comforts enjoyed" (Malthus 1960:40).

In spite of his interests spanning the whole world, Malthus's advice on how more food could be grown and hence population increased was largely confined to eighteenth-century England, before the repeal of the Corn Laws, the manufacture of artificial fertilizers, and the revolutions in railways and shipping which would bring wheat from the lands of overseas European settlement. Latter-day researchers interested in the role of invention and innovation could grasp the reference to "manuring" and law and order but little else.

Boserup's opposition to Malthusianism was that it led to a negative rather than a positive interpretation of the role of population in development, and ultimately to the imposition by the state of family planning programs. Anglo-Saxons have usually defended him from this accusation on the grounds that he regarded all contraception as vice, in contrast to the subsequent neo-Malthusian movement. But in the 1824 supplement he wrote of "unnatural passions and improper arts to prevent the consequences of irregular connections." These evidently come under the head of "vice" (Malthus 1960:38). Clearly one could argue that he was not referring to the use of contraception in regular or marital intercourse.

Malthus's ideas led to the conclusion that population was bounded by an upper ceiling established by the slowly growing food supply. For most of human history both the food supply and population had grown very slowly indeed and could be said to be in equilibrium. Nevertheless, Malthus was sufficiently imbued with the concept of progress to believe that both tended upward in the long run, and he had little to say about decline or extinction, although he appears to have believed that the situation in China was stagnation. Population sometimes exceeded food supply, and famine and soaring death rates followed. More commonly mortality from epidemics or violence reduced the population below the barrier presented by the food supply with the result that good years usually followed with population growing again towards that barrier. Deaths from violence or even many epidemics were not heightened by malnutrition but sufficient additional mortality resulted from suboptimal feeding to provide the mechanism that related population numbers to the level of the food supply. The fertility level was not a factor in determining whether equilibrium was attained or not, but low fertility, induced by prudential restraint with marriage late or forgone, could ensure a low-fertility–low-mortality equilibrium with better nutrition and less destitution.

Ester Boserup's advocacy of population growth as a good thing and the stimulus of development was timely and forced social scientists to recognize that the role of population growth was complex. But her determination to show that Malthus and Myrdal were wrong in all respects led her into difficulties that make it even harder to recognize her argument as having universality than had been the situation with Malthus's propositions.

Her first difficulty was the role of mortality which she felt had to be spurned as the determinant of population size or its growth rate. Mostly she merely ignored this factor which had dominated the Malthusian model. Briefly, and almost as an aside, in *The Conditions of Agricultural Growth*, she commented: "the low rates of population growth found . . . in pre-industrial communities cannot be explained as the result of insufficient food due to population . . . ; other factors—medical, biological, political etc.— . . . may help to explain why the rate of population growth in primitive communities was what it was" (Boserup 1965:14). She had already postulated that "population growth is best regarded as the independent variable," and had argued that its autonomy was shown by the steep fall in mortality and rise in natural increase in developing countries after World War II (p. 11).

This argument is unsustainable. If mortality in times past had no relation to the food supply or the fertility level then populations could have grown far faster and to much greater numbers than has been the case, or declined to extinction. She does not even suggest that there could have been a "medical" link through denser population leading to a rise in infectious disease. Certainly mortality in India of the late 1950s had been reduced by methods other than boosting the food supply (although food production largely kept up with population growth), but a rate of population growth well above two percent per year could not persist indefinitely. The Boserup answer was apparently that such growth could be sustained for decades and would most likely speed development to a point where birth rates

would begin to fall. Indeed, the extra labour supplied by population growth could be employed to intensify farming (Boserup 1965:26), and development or rising living standards had historically been shown to lead eventually to declining fertility (Boserup 1985:383).

Boserup was then faced by the problem that past populations had grown and nearly everywhere intensification had taken place. She was, nevertheless, determined to maintain the autonomy of population growth and hence not to follow Malthus in his view that cultivators usually tried to improve food supply for either their own comfort or a higher income and this allowed population growth. Her solution was to claim that sooner or later population numbers capriciously bumped against the upper limit ordained by the food supply, apparently because of autonomous change in the medical, biological or governing environment. The reference to good governance was not followed up. It was too close to Malthus's ideas and might even be seen as a conscious mechanism for increasing population numbers. This uncomfortable increase in population was solved by changing to a more intense form of agriculture. Clearly, this lack of comfort was a rise in mortality because of reduced per capita food supply, but to say so would be a fundamental concession to Malthus.

This explanation also presented other theoretical dangers. It could be argued that populations desired to change agricultural methods in order to supply more food, enjoy a better and more bountiful life, and experience greater development. It could be argued that innovations came first and had allowed a great leap forward. In other words, it had not been the accidental jump in population numbers that had propelled the change. These problems were countered in various ways.

The first was to choose a succession of agricultural changes that could be said to have been forced by population growth. The obvious choice would have been contemporary India growing by ten million people a year and researched by the Boserups for three years. Instead the choice fell on Europe thousands of years ago and on a type of agricultural change rarely researched, namely the changes in the form of tillage as pure forest gave way to settled farming. Boserup has largely been able to dictate the terms of this debate even though change in the type of tillage (with the exception of a late stage, the adoption of irrigation) has not been a major issue in India. She posited a succession of enforced changes in tillage to accommodate increasingly dense population: (1) forest fallow, (2) bush fallow, (3) short fallow, with successively shorter periods out of cultivation followed by (4) annual cropping, and later, perhaps, multiple cropping (usually with irrigation).

Boserup's theoretically most complete system of agricultural changes was created as follows:

> Archaeological research has given indication of the existence of a system of agriculture based on forest fallow in the neolithic period in Europe. By combining the results of archaeological research we get the picture of a successive change in Europe from neolithic forest fallow to systems of shifting cultivation on bush

> and grassland followed first by short-fallow systems and in recent centuries by annual cropping. Our knowledge of agrarian history is much more fragmentary for other parts of the world than for Europe (Boserup 1965:17).

Her evidence for Europe was three chapters in Thomas (1956) supplemented by another paper published in Denmark in 1949 (Iverson 1949). Extraordinarily, the three chapters (Stewart 1956; Narr 1956; Darby 1956) discuss only forest clearing. They do not divide it into types or posit a succession of types. What they do highlight is the importance of innovations such as fire, hoes, axes and ploughs. They also give importance to climate, soils and vegetation as determining the type of forest clearance and subsequent tillage. Iversen (1949) employed pollen analysis to distinguish two phases in the establishment of Danish farming. The first farmers were people who made forest clearing with fire, cultivated crops until soil fertility declined and then did the same elsewhere. Then, much later when the iron axe became available, the forest was destroyed, yielding an "open landscape" (p. 18). The problem then is that these writings do nothing to establish the succession from one tillage system to the next, let alone movement driven by increasing population pressure through the whole set of systems. Their construction, undertaken by Boserup, was a logical model and provides far too little evidence to support the Boserupian thesis. In West Africa the first three systems are common and the fourth rarer. My own attempts to check with experienced specialists and farmers there suggest that the type of tillage is usually not governed by a stage in a succession but by the kind of vegetation, soil and rainfall, or by historic external intervention. Deep forest clearings often came last as Europeans brought suitable new crops, usually from the Americas: corn, manioc, new types of yam, and rice. Annual cropping is now emerging with the advent of chemical fertilizers and some land is even ploughed. Hopkins (1973:34), one of Boserup's strongest supporters in *An Economic History of West Africa*, nevertheless argues that different systems of cultivation are found in that region with the same population densities. Boserup addressed these points in a sentence which seems to suggest little more than that circumstances or conditions rarely stay constant over the longer haul: "The discovery of the earlier existence of long-fallow systems in regions which are now either deserted or cultivated in intensive systems of land use, has discredited the idea that the different fallow systems can be seen to be adaptions to particular types of soil or climate" (Boserup 1965:19–20).

Boserup gave primacy to the push of population growth, and not the pull of attempts to achieve development or higher standards of living, by defining the living standard as primarily measured by leisure and hence least hours spent at work. Furthermore, she needed to show that the farming populations themselves felt the same way. One argument (Boserup 1965:62) was that land was left out of use or that a simpler method of tillage was chosen after such crises as the Black Death (1347–1351) or the Thirty Years' War (1618–1648). In reality these outcomes had multiple causes among which land tenure or ownership problems were important. She also was attracted by the idea that the successive "advances" in agriculture

were so undesirable in terms of additional work inputs that the breakthroughs in Africa and perhaps elsewhere were made by directing slave labour (Boserup 1965:90).

A related issue was that of inventions or innovations. If these were determinants of agricultural change, then the major force for change might not be population pressure. Here the enemy was not Malthus since, with his focus on eighteenth-century England, there was little to report in terms of agricultural advance. The advent of potatoes was further back, the enclosures were not aimed at furthering agriculture, and he ignored Charles Townshend's experiments in the early part of the century except for the emphasis on manuring.

Boserup (1965:37–39) attempted to overcome the problem of innovations, and of their allowing both agricultural and population intensification, by conceding that new types of cultivation required different tools or methods but arguing that their invention had normally occurred long before but had not been taken up on any significant scale until the need arose when population pressure forced a change in cultivation. Then, presumably simultaneously rather than successively, they were taken up. This argument has both strengths and weaknesses. It is only too likely that digging sticks, hoes, grindstones and primitive ploughs were invented here and there with little spread and perhaps little use even when they were first invented. Probably at first their designs were faulty, the construction poor, and communication about their advantages almost zero. More seriously, they threatened to upset traditional ways comfortably accepted, and fixed family age and sex roles. The better devices or approaches probably were slowly accepted, with increasing rapidity as their design improved and society was reorganized around their use. The real issue is whether this occurred in an evolutionary fashion and with gradually increasing food production or whether it happened only when population pressure was already forcing a new method of cultivation. The problem is that there is no evidence as to what tillage technique preceded what. Perhaps even contemporaries did not know, as some production came from the new forms of cultivation using new tools. Faced by the lack of evidence, Boserup forsook fallow rotation and turned to modernizing Europe and its adoption of leguminous plants, crop rotation, annual cropping and root fodder crops, presenting evidence that such practices were known in the Ancient World or in other parts of Europe.

> These few facts suggest that the transition in Europe from short fallow to annual cropping was not the result of contemporary inventions; it could more plausibly be described as the spread of various methods of intensive cultivation most of which, although known since antiquity, was little used in Europe until the increase in urban population raised the demand for food and the increase of rural population provided the additional labour needed for a more intensive cultivation of the land in the most densely population regions of the continent (Boserup 1965:38).

The bridge from the Ancient World to urbanizing Europe was either from household gardens where they had persisted or "more densely populated parts of

the world," being taken up first in the Po Valley and later jumping to Flanders on the way to England and France. There remain questions as to what caused the prior population growth and whether one can really chronologically separate out the spurt of population from the use of the new agricultural methods. The issue was not clarified when Boserup (1981:ix) startlingly stated in her preface: "Because I wanted to exclude non-agricultural technologies from my earlier book, I had to abstain from analysis of the effects of technological change on population change. I therefore discussed only the effects of population change, not its causes."

Both Malthus and Boserup essentially described situations of stationary or slow-growing populations moving either very gradually or by successive steps to denser population. Neither intended this to be their main message. Mathus's central message to the Utopians in *The First Essay* was that England in at least the mid-term future would still be beset by food shortages and that an age of plenty, at least for the lowest class, could not be envisaged. Indeed the message is that planned interventions might be pointless and could cause discord in society. Boserup's central message to late-twentieth-century advocates of population control in developing countries was that their programs would not of themselves succeed, that strong population growth was more likely to propel needed agricultural change, and that such development would of itself ultimately reduce fertility and thereby the rate of natural increase. These were the ideas each wished to propagate although it is true that Malthus took an increasing interest in the non-European world mostly to show how the European model could advantageously be followed, and both he and Boserup drew heavily on often ancient evidence to support their arguments. Ironically, neither was accepted as a guide to the contemporary or future situations; the demographic, agricultural and economic situations were moving too rapidly and not in the ways they had proposed. Instead they have provided a major input into the thinking of demographic theorists, anthropologists, agriculturalists and historians interested in premodern populations as well as isolated communities.

TOWARD A COMPREHENSIVE INTENSIFICATION THEORY

The need now is to move toward a comprehensive population intensification theory. We shall first continue to concentrate on the first books by Malthus and Boserup, the 1798 *Essay* and the 1965 *Conditions of Agricultural Growth* as they focus on premodern populations. Both were essentially essays, full of ideas, and not overly tied down by data. The succeeding works of each author lost the clarity of the first books by attempting to fit in with changing contemporary events and to meet specific criticisms.

Malthus's greatest achievement was his postulate that human numbers are ultimately controlled by nutrition even though few may die of actual starvation. Over and above those killed by violence, populations are trimmed to the available food supplies by the most malnourished, usually the poor and often infants, dying prematurely of disease because of a suboptimal diet. Of course, some populations might be wiped out by violence or violence plus a troubled food supply, but most

larger populations, and nearly always the global population, slowly expanded. This process was governed by food availability which tended to increase gradually. Usually the population was below the upper limit, knocked back by epidemics or war, but recovering and tending again toward the limit (see Lee 1986). Occasionally it could temporarily exceed the limit for a reasonably comfortable population, thus causing famine and resultant disease. This postulate, the truth of which for most of human history was difficult to deny, provided the concepts of population being ultimately controlled by food through mortality and of a stable-equilibrium population. The latter concept was a long-term one, for, in the short term, population numbers were marked by peaks and troughs. In the very long term population numbers sloped slowly upwards, although for most of human history at an almost imperceptible rate.

Boserup, in contrast, insisted on mortality being autonomous. If it had been so, human numbers would have moved long ago toward zero or infinity. They could easily have far exceeded food supplies if there had been no food-mortality link. If it had not been for her trenchant anti-Malthusianism, Boserup could easily have moved to a more acceptable thesis, namely that population often reaches the limit imposed by the food supply only to be knocked back on most occasions. Usually it is less likely to take up innovations during a time of famine and misery than in better times. But occasionally an innovation capable of raising food supply has spread slowly but sufficiently far during the fat years to be used to overcome the famine by raising food production permanently if its use became general. Any other approach, namely that every time population approached food limits a new level of agricultural technology came into play, suggests vast increases in population over a few millennia or even centuries instead of very slow population growth over hundreds of millennia. Boserup argued that such limits could not normally be in operation because primitive agricultural or hunter-gatherer populations usually appeared happy, healthy and even robust. Malthus had already provided an answer to that argument: that robust warrior populations draw attention away from the sickly young, old or women. Mortality, he insisted, fostered by malnutrition always has class, age and sex differentials.

The more important issue is how innovations are adopted to raise agricultural productivity. Here Boserup's choice of a succession of types of fallow farming is a hindrance rather than a help, since anyone practising one type can easily deduce that the others exist. This is not the case with most other inventions or innovations that have raised the productivity of agriculture: grindstones, hoes, axes, ploughs, manuring, or field rotation. Nor is it the case with hunting and gathering inventions (for Boserup is often cited in Palaeolithic studies): spears, bows and arrows, fishing nets, fish hooks or harpoons. None of these technologies could be taken up in a single famine. They would be more likely to diffuse slowly in better times, gradually raising production levels. It might again be noted that Malthus also believed that times of crisis could raise productivity, but, applying this process to his own times, he was hard put to suggest possible innovations beyond harder work and greater efficiency.

Perhaps Boserup's most significant contribution to the debate was ironically a negative one. It is striking how hard she found it to find examples of a retreat from a more intensive to a less intensive system of farming even though in her thesis most people would desire this as providing a less onerous way of life with more leisure time. Her few examples are of crisis situations such as that of the Black Death in Europe when in a few scattered places there was a retreat from more intensified agriculture. The real explanation was probably an insufficient labour force or chaos in the recognition of land tenure. A parallel might well be the migration after the American Civil War of some former slaves to the swampy areas in the lower Mississippi where they began farming in the forest clearings they made. What becomes ever-clearer from the paucity or unusual circumstances of reversions to less intensive cultivation is that there is nearly always—as Malthus believed—an opposition to such reversion. Our quest is to find out why this has been the usual situation; why, indeed, did agriculture spread so quickly in a few millennia? Boserup's later answer was that the wild foods available to each person were diminishing either because of the overharvesting of animals and plant food or because of rising population (Boserup 1981:40). But surely in near-equilibrium population conditions a compensating slow rise in mortality would solve the problem and would hardly be noticed (see also Bronson 1975:69ff).

Boserup's measure of human failure was that labour input, measured both in hours and intensity of exertion, increased as populations moved to more advanced farming. Her statistics have been questioned (Bronson 1972:191ff.) but, if they are wrong, that merely strengthens the case put forward here.

THE SECURITY RATCHET

The fundamental issue is why the leaps forward into greater intensification of food production and hence population density are far more common than movements in the opposite direction. Why has the human race grown from a few million to billions? The answer seems to lie in some kind of ratchet effect. It is almost impossible to retreat from a denser to a less dense situation. The writer has examined the sedentary/hunter-gatherer interface in Asia and Africa for almost half a century. These interfaces are most often found, as in Southeast Asia or Africa, where easily cultivable plains meet less easily farmed mountains, but on the Atlantic coast of Middle Africa they are also found where solid ground gives way to coastal marshes. They are not the only interfaces between denser and less dense populations but they are the most obvious and some of their lessons are probably general. There are several obvious differences between the two types of lifestyle permitted by the different ways of acquiring food.

The most obvious contrast is in security. Even small agricultural villages have available a greater number of more easily assembled men for warfare than do the neighbouring hunter-gatherers. In their houses and other buildings the villagers possess the equivalent of defensive ramparts. They also possess the facilities for far more storage, both of grains to allow a suspension of food production while

fighting and of more weapons than nomadic people can carry. Village political organization is usually stronger. If not a class structure, there is a gradient of power culminating in the old or in a chief and elders. Young men may well be trained as warriors. Everywhere the hunter-gatherers either keep away from the farming communities or make sure to keep good relations when bartering goods or visiting the market. In rare circumstances hunter-gatherers may raid villages or more commonly steal or kill domesticated animals, but to do so is to court danger. Similarly, sedentary farmers, living in densely settled areas, could, if needed or desired, send armies into areas thinly occupied by shifting cultivators.

The extreme of this process is the advance, often a few miles per generation, of farming populations into areas occupied by hunter-gatherers or less intensive farmers. The Bantu, with iron weapons and farming tools (made by the same technology), took several thousand years to carry their superior (or denser) farming methods from the corner of the Gulf of Guinea to East and Southern Africa, sweeping the earlier populations into lands little suited to farming. The Polynesians did likewise as they progressed from Taiwan to the Moluccas and on to the Pacific. Renfrew (1987) claims the same for the early Indo-European farmers moving from Anatolia to occupy a great arc from Europe to India. In every case the advanced farmers won out in methods of food production, language, and probably genes. Dixon (1997), putting forth a "Punctuated Equilibrium Model," regarded this forward movement, with the eventual victory of languages, traditions and laws, as being the usual pattern around the world with the periods of equilibrium being much longer than those of aggressive disequilibrium. Cohen (1977:60ff.) argued that the potential threat from a more agriculturally advanced, more densely settled society to their neighbors is sufficient for the latter to adopt the new farming techniques, with the result of a "domino effect in the march of advanced farming."

The security ratchet may not be the only ratchet. Bronson (1977:32–33) argued that sedentary in preference to nomadic lifestyles and probably more advanced compared with less advanced agriculture, are equated with not only greater security, but more prestige and comfort. Certainly, agricultural populations scorn the lack of possessions, including housing, of peoples with no fixed place of residence. There is little sign that they would change places in order to shorten their hours of work, and much the same emotion is evoked from annual-cropping farmers faced by shifting cultivators.

DISCUSSION

Both Malthus and Boserup were trapped by their initial aims. Malthus, as is perfectly clear from the Preface to his 1798 *Essay*, wanted lessons for the present and immediate future. He set out to warn those who might radically upset the careful but precarious balance of society that Utopia was not part of the shape of things to come. His argument was dominated by the present and its extension into the immediate future. Given that his chosen restricting force was the food

supply, he saw improvement only to the extent that eighteenth-century agricultural change was known to him: law and order, hard work, greater efficiency, and the making of marginal land more productive. Malthus knew surprisingly little about long-term agricultural change, even that which occurred in the eighteenth century, but, in his defence, the *Essay* was written a quarter of a century before the first artificial fertilizer became available, and half a century before the repeal of the British Corn Laws and the related spread of railways from the ports of North American and Australia to the huge inland areas suited to growing wheat.

Boserup, as is clear from her short 1999 "professional" autobiography and her 1965 *Conditions of Agricultural Growth*, wanted to battle those who regarded family planning programs to be an important part of development policy in poor, crowded countries, and to show that population growth was a positive element in development. Her most prominent successor was Julian Simon in *The Ultimate Resource* (1981). Surprisingly her chief concern was Indian development policy in the early 1960s, when that country's population was growing at 2.3 percent yearly, its highest rate ever, and adding over ten million people a year, and when the national family planning program was small and ineffective. Nevertheless, her prime example of successive agricultural change was the little known and largely theoretical succession of types of cropping in prehistoric and preliterate Europe, together with references to sub-Saharan Africa but not to observed successions there. Why was India with its wealth of statistical data not chosen? Perhaps it was too complex, perhaps little was known or observable about recent and contemporary successions still underway, or perhaps she desired to avoid further confrontation with Myrdal.

Malthus and Boserup were not as far apart as the latter believed. Indeed, Ronald Lee (1986) has produced a convincing synthesis. Both addressed the food supply. Malthus saw it as the factor limiting population growth, but certainly agreed that population growth kept on the heels of agricultural growth and was the reason that increased food production was felt worthwhile by farmers and hence why both the food supply and population kept growing. Boserup certainly did not argue that the push of population was so effective that both it and the food supply could race each other upward, not even in contemporary India and certainly not over the human race's long history. Admittedly she tried to avoid difficulty by arguing that the race rarely occurred because adequately nourished populations were kept in check by an autonomous force of mortality which obligingly rarely allowed populations to grow fast enough to test their impact on agriculture. Ironically, it was Malthus who believed that population pressure was almost continuous. Neither of them wished to advocate large-scale contraceptive use in poor countries. Boserup wrongly equated Malthus's ideas with the modern family planning movement and bluffed her readers by saying she was going to refute them (Boserup 1965:10–12; Boserup 1999:17–22).

There are two questions of central importance which neither Malthus nor Boserup answered adequately. First, why have both population and agriculture either stagnated or grown upward? Why has regression not been nearly as common

as intensification? Boserup attempted to argue that regression was, if anything, more likely than intensification because the less intense methods required less labour and provided the extra leisure primarily desired. Darity (1980:138) and Bronson (1972:191ff.) believed that her data on labour inputs per unit of food were, at least over the long run, simply flawed. Darity conceded that, when the innovation was first adopted, there might well have been a transient rise in the workload until the most efficient ways of using the new method were worked out. An alternative—or supplementary—explanation is that the rewards flowing from intensification were just too good to be forgone. Apart from additional security and potential for aggression, sedentarism itself was probably viewed by most as a gain. It allowed the construction of permanent dwellings and the accumulation of possessions, many of them too heavy for easy transport. It made the storage of food possible. All this is true even on the battleground chosen by Boserup, the supposed movement from one type of cultivation to the next. It is far truer of the great majority of innovations which were more efficient and at the same time labour-saving: fire, fish-hooks, fishing nets, better spearheads especially metal ones, metal hoes and spades, water wheels—and the list is endless.

The second question of central importance is, historically, how did innovation spread? This discussion ignores organized and directed innovation spread such as that promoted by the Cistercian monks in the late Middle Ages, the agricultural extension programs of the New Deal, or the Green Revolution in India and elsewhere. Some innovations were taken up rapidly, especially those yielding more food for a given input of work such as the introduction of sweet potatoes to the New Guinea Highlands or potatoes to Ireland. But most seemed to have spread fairly slowly, perhaps being jogged by memories of famine, although rarely during or immediately after the crisis. Most—whether flint spearheads, bows or food storage jars—appear to have been adopted cautiously. One reason was the impact on the family and society. Traditionally family members have been allocated types of work and the use of appropriate technology according to sex, age and status in the family. All this must be painfully adjusted when an innovation revolutionizes the work regime. Being a pioneer with a new method is a brave act in most traditional societies, especially for those lower in the social hierarchy. Usually what is needed is not only someone who uses the new techniques, but craftsmen willing and able to make the new equipment. Metal spearpoints required metal workers, better furnaces, and a trading system to supply the metals or their ores. Ploughs required metal workers, wood workers, horse breeders and harness workers. Innovations have stayed long at African ethnic boundaries without crossing them, be it the use of fishing boats or smoking ovens preparing fish for trading. Often one innovation follows another change: hunting weapons change as the type of hunted animal changes, often as a result of the overhunting of the prey previously eaten.

There must have been somewhere an initial invention, but even then it was probably the cumulative product of many smaller inventions or adjustments, sometimes over aeons. One initial inventor or introducer of innovation is probably

a Promethean myth. Innovations were taken up slowly and in this sense they were known, but for long periods not widely used. They were certainly not taken up because of a single subsistence crisis. Over a long period their adoption may have borne some relation to increasing population, but it is just as tenable to argue that the population increased because of the continuing growth in the use of a new hunting or agricultural technique. That technique was adopted, as historians have always assumed, because it was a good idea. It made work easier or more productive. Often it was reluctantly employed, with the new users forced to adopt the innovation because ever more of their neighbours had already done so and were proving to be more productive and more numerous than the laggards, and potentially more dangerous.

Malthus placed too little emphasis on agricultural innovation. Boserup placed too much emphasis on innovations being taken up chiefly at times of crisis. Both probably placed too much emphasis on famine-driven agricultural improvement.

A more satisfactory explanation for the increase in agricultural productivity and population would take into account that they increase together. No one is likely to contest Malthus's proposition that population growth cannot outstrip, except for short periods, food production. But that does not mean that we have to accept food production levels as being autonomous without having a cause. Nor do we have to accept that the primary cause is subsistence crises as Boserup postulates. A more realistic explanation would, in direct opposition to the Boserupian position, take note of how rarely hunters or agriculturists have given up more intensive for less intensive food production methods which made population density lower and even nomadic. There is a ratchet effect which ultimately created the modern world. It is suggested here that the security element in that growth ratchet is of fundamental importance and I have used the term "security ratchet." But there are other gains too in increasing the intensity of food production and population and perhaps "intensity ratchet" would be a better term.

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CHAPTER 5

ON NET INTERGENERATIONAL WEALTH FLOWS: AN UPDATE[1]

JOHN C. CALDWELL

NEARLY 30 YEARS ago in an essay, "Toward a restatement of demographic transition theory," I advanced what has come to be known as "wealth flows theory." Much relevant research has since been carried out, and accordingly an update of the original essay is necessary.

The essay attracted attention because of its rather bald statement that, before the onset of fertility decline in a society, uncontrolled fertility is an economically rational choice for a number of reasons, including the value of children's work (minus their consumption) and their insurance value in times of danger, disaster, and parents' old age. Subsequent research seems to have produced conflicting evidence on the value of children's work and to have offered more theoretical argument than empirical findings with regard to insurance. I argue here, however, that the conflict in findings on children's work is more apparent than real, and I point to a resolution of this issue. I also propose that a better understanding of the insurance issue leads to an explanation of the reversal of the wealth flow and the speed of subsequent fertility decline.

I first explain the context of the 1976 essay and correct some misconceptions about it that have appeared in the subsequent literature. I then demonstrate that contradictory findings over the past 30 years about children's work and consumption can be reconciled and shown to be consistent with the wealth flows hypothesis.

MY FINDINGS ON WEALTH FLOWS

The scholarly emphasis in the 1970s was on the onset of fertility transition, on what kind of society was resistant to fertility control, and on the circumstances of change. During the first two decades after World War II the family planning movement had met with almost total failure in lowering fertility levels in the developing world, but by the mid-1970s, outside sub-Saharan Africa and southwest

Asia, fertility decline had become almost universal. Immediately before transition most societies were predominantly agricultural, and somewhat loosely I grouped all pretransitional societies together over space and time as "traditional" societies. Some of the recent research discussed below has been on preagricultural (hunter-gatherer) societies, and more has been on predominantly agricultural societies beginning to experience change with the arrival of schools, shops, nonagricultural employment, central government, and other features of a globalizing economy and society. The societies that, as I came to know them, first shook my belief in the universal burden of children were in the remote parts of Ghana and Nigeria. There, no indigenous person understood what I meant when suggesting that the largest families might be the worst off and might have been happier and richer had childbearing been more restrained. Children had few needs other than food, for there was no formal education and few clothes. After infancy, children, growing up in small villages where everyone kept an eye on them, required only limited care. Conflicts over inheritance and farm subdivision were unknown because land ownership was communal. Such conditions were beginning to disappear from the world, but they had predominated for most of the time since the Neolithic revolution and had shaped most societies in the developing world. One could have argued that matters would have been different had contraception been explained and offered, but now that this is more widely done there is still little fertility decline in rural sub-Saharan Africa except in Southern Africa and such highly commercialized areas as Kenya's Central Province. An intensive experimental family planning project in northern Ghana reduced the total fertility rate (TFR) between 1994 and 1997 by only 0.5 births (Bawah et al. 1999; Binka et al. 1999).

My 1976 essay did not claim that children's work alone paid for their existence. Indeed, it sometimes seems from reactions to the essay that it may have been confused with an article by Cain (1977) that did make such a claim for a Bangladeshi village. The wealth flows essay argued that farming children contributed a substantial and increasing amount of work as they grew. I also argued that children performed work adults preferred not to, such as carrying messages, collecting firewood, and herding the family's animals. I included in wealth flows the insurance potential provided by children's existence, taking that potential to be the equivalent of current payments for an insurance policy to be redeemed at a future date. Ronald Lee (2000) treats wealth flows as meaning only children's labor and consumption, and discusses their insurance function as something apart. In contrast to most subsequent researchers, I placed no upper age limit on children's work. This was because my research was carried out in rural West Africa where men often do not access their own share of land until they marry, currently near age 30 years (Lesthaeghe, Kaufman and Meekers 1989), and until a century ago nearer age 40 years (Peel 1983). By the time a son had completed his duties as a dependent, he had to begin helping his aged parents.

Most articles on the burden of children are influenced by the theories or ideologies of their time. The first part of my 1976 essay recapitulates the dominant ideology of the three decades following World War II, which argued that fertility

would probably fall when family planning programs explained the benefits of, and provided access to, contraception. My essay, like numerous subsequent articles by others, warned that there were rational reasons for not adopting contraception.

Much of my own subsequent research was catalyzed by a series of reviews and critiques of wealth flow theory: Thadani (1978), Cain (1982), Willis (1982), Schultz (1983), Rosenzweig (1988) and Kaplan and Bock (2001). Before analyzing the contributions of others to this debate, I summarize the directions of my research on the subject.

The concepts of different modes of production and of relations of production, usually intergenerational in pretransitional societies, became an increasingly important research tool in the work. I first described a threefold division in the 1976 essay: the Primitive Society, the Traditional Society, and the Transitional Society. The first two were characterized by familial production, and the last, the beginning of capitalist production, by a labor market open to all (although for long including an important household familial production subsystem). In fact, misled by work on stateless societies, I placed the division between the first two modes in the wrong place, between stateless and state societies, thus dividing both shifting cultivators and sedentary farmers between the two. The real division, recognized in Caldwell (2004a), is between hunter-gatherers on one hand and all agriculturalists on the other. In the real world the situation is blurred, with often minimal differences between hunter-gatherers who have been at least partly sedentarized (often by missions), getting some of their food from horticulture, and shifting cultivators, especially those practicing slash-and-burn agriculture.

A theme of increasing salience has been the role of education. In Ghana, as early as 1965 I recorded the assistance, usually in the form of money, that university graduates had to keep providing to relatives partly as repayment for help during their long years of education and partly as an expected leveling process whereby the better-off helped the rest of their relatives (Caldwell 1965). In the early 1960s I studied the modern urban elite at a time when the older children had often received little formal education while their younger siblings had benefited from the great expansion of schooling over the previous decade. What struck me was how much more was spent on the educated children and how much less work was required from them (Caldwell 1968). Caldwell (1976:344) noted that parental payment for their children's education was an investment but had other motives as well, namely, parental pride, family honor, and raising the children's value in the marriage market. Caldwell (1980) drew attention to the new coincidence in timing between countries' attainment of mass education and their onset of fertility decline. Colleagues and I carried out research on this theme in rural South India in the early 1980s and reported the findings in three papers (Caldwell, Reddy and Caldwell 1982, 1985, 1986). The main finding was the importance of the diversification of family income as a means to provide a hedge against bad times, especially drought. Education helped in getting jobs in town, where employment was not linked to the drought cycle, or in getting local government off-farm employment. Incomes from such employment could assist parents who were farmers when their output was

low or agricultural laborers when they faced diminishing employment. Educated children could provide invigorating links to the new life of the towns and assistance in coping with the bureaucracy and obtaining what it was able to provide. While having many educated adult children would be advantageous, the path to such an end was for most nearly impossible. To support children as far as their abilities would take them in the educational system meant having few children, spaced well apart. Research in rural Bangladesh showed that the threat of land division was forcing parents to prepare at least some children for urban life by educating them (Caldwell et al. 1999).

Our research in the early 1980s in rural South India found that all older women believed their current standard of living owed much or everything to the fact that they had surviving children, although they exhibited less certainty about a lifetime net gain from children, even if they were educated (Caldwell and Caldwell 1988). Thus the insurance role was more important than the investment role. The only really destitute women were those with no surviving sons. The research in India also strongly indicated that access to sterilization and other methods of fertility control ensured that the onset of fertility decline followed more closely than it might otherwise have done on the decline in relative value of the large family (Caldwell and Caldwell 1984), and this observation has since been generalized over space and time (Caldwell 2001).

Most wealth flows field research done by others over the last 30 years has focused on the work and consumption of children. The findings at first sight appear to be contradictory, but if the research is divided by mode of production, whether farming or hunting-gathering, the contradictions largely disappear.

THE VALUE OF CHILDREN AMONG FARMERS

All research on this topic has necessarily been carried out in transitional circumstances where farming is no longer entirely subsistence and where consumption demands for at least some clothing and even schooling have already begun their long rise. In these circumstances the near consensus in the research is that children's work compensates for most but not all of their consumption. This leaves open the question whether children fully compensated for their consumption over most of the span of time since the Neolithic revolution. Even so, the gap between production and consumption at the time of our research was, in most cases, sufficiently small to be easily covered by other services contributed by children, especially those related to insurance.

Mueller (1976) published a comprehensive survey of the limited field research evidence then available on the economic value of children in peasant agriculture. Most of this evidence was restricted to market-type work, very largely food production. Her main conclusions were, first, that "in peasant societies children—from birth to the time of their own marriages—tend to produce less than they consume" (p. 148); second, that "many peasants may not be aware of reasonably safe opportunities to earn interest on savings, so that the decision not to discount future

returns may be reasonably consistent with the realities of peasant life" (p. 103); and that "peasants need a method to safeguard surpluses until they are needed in old age or emergencies" (p. 150). Neither Mueller nor I see any major differences between her conclusions and mine as set out in Caldwell (1976), especially if her work is adjusted to include children's services. My findings from early Ghana showed that children who did not go to school produced enough to compensate for their own consumption at age 14–15 years in central and southern Ghana but at age 10 years in the less developed north (Caldwell 1967:227). Mueller (1976:129, fn 16) cited our unpublished Nigerian Value of Children Survey data to show that unschooled sons and daughters were producing more than they consumed before age 15 years, while compensating returns for children who had been in school were delayed by two or three years.

The strongest statement about children's value came from Cain (1977), who, in his study of a farming village in Bangladesh, measured work inputs, modeled consumption, and calculated that males at age 12 years are net producers, by age 15 years they have produced enough to compensate for all their past accumulated consumption, and at age 22 have paid for themselves and one sister. Boys' main activities (in descending order of hours worked) were carrying messages, water, younger siblings, and firewood, as well as marketing. Girls' tasks were carrying younger siblings, water, messages, and firewood, as well as sweeping, washing dishes, and preparing food for cooking. It is not clear why, if the girls were so hardworking, their brothers' work had to compensate for their limitations. Even more surprising was that Cain subsequently disavowed this work, disconcerted by what he said was the accumulating evidence that child labor does not compensate for children's costs, and arguing that he must have erred by failing to take into account that girls do little work and that, in merely counting consumption against later work, he was wrong in not using a discounting factor (Cain 1982:164).

In my opinion the original work is more convincing than its dismissal. In 1978 we measured labor inputs in a not dissimilar part of Bangladesh, having everyone followed and recorded by persons of the same sex for 17 hours per day over a full week (Caldwell et al. 1984). Males 5–14 years of age worked on average for 5.0 hours per day compared with 4.7 hours for females of the same age; adult males and females worked for 9.4 and 10.9 hours respectively. The reason why in a *purdah* society females can work as many hours as men is that everything that can possibly be done in or around the house is carried out by women and their daughters: all post-harvest tasks are performed by females in the courtyard after males haul the cut crops there. And the society is not completely *purdah,* at least in regard to moving around the small settlement or *bari* mostly inhabited by relatives. Females do nearly all the gathering of fuel and water, run most of the errands, and carry out almost as much tending of the animals as men. Meanwhile, men dominate in marketing. A reasonable summary of the studies by Cain and by Caldwell et al. is probably that children do a lot of work, perhaps not quite enough to compensate for consumption, and females put as much time into work

as males of the same age. Cain was probably overly influenced, when rejecting his own work, by the Bangladeshi male view of women's work and by economists' arguing that discounting was relevant in such a village. His later work shows that alternative investments to children were usually not available (Cain 1980, 1981). The solution to the puzzle is more likely to be his use of a model that did not take non-food consumption into account rather than any considerable error in assessing work inputs.

Most other research on farming populations supports the picture of hard-working children who by late adolescence are working adult hours unless they go to school. Nag and colleagues (1977, 1978) showed children's hours of work reaching 50 percent of adults' hours by age 12–14 years in Java and age 9–11 in Nepal. Children's major activities were childcare at age 9–11 years, collecting firewood at 9–14, and animal care at 12–14. De Tray (1983), analyzing the 1976 Malaysian Family Life Survey, found children contributing almost a full working day by their mid to late teens. A similar situation was found in 1988 in Rwanda (Clay and Vander Haar 1993). Dow and Werner (1983), analyzing the 1981 Kenyan National Sampling Survey, found the wealth flows hypothesis broadly supported and appeared to accept that significant inputs of child labor constituted part of that support.

A study that appeared to conflict with this evidence was Stecklov's (1997, 1999) analysis of the 1986 Côte d'Ivoire Living Standards Measurement Study (LSMS). Stecklov (1999:2) finds, over a lifetime, that "the economic return on childbearing is estimated at between –6.0 and –10.7 percent per year. The economic return on children is not only negative, it is strongly negative." The problem lies not with Stecklov's analysis but with the construction of the survey by the World Bank, similar in orientation to the construction of national accounts, where work in and around the home is ignored. The LSMS did not completely leave out domestic work but it omitted from the record cooking, cleaning, and gathering firewood, and apparently also food production, the collection of water, and the running of messages. Thus, much of the work that children have been reported as dominating in Ghana, Nigeria, Bangladesh, Indonesia, and Nepal is omitted. Stecklov (1997:529, fn 4) says that his information was that these tasks were done mostly by adults, but this viewpoint is at odds with nearly all other African and Asian research. Even with these omissions from the data collection, Stecklov found that child labor inputs recorded among the rural population were equal to half of consumption by age 10–14 years and all of it by age 15–19, and accounted for the accumulated deficit by age 35–39 (1997:531). These findings, given the omission of children's services, are not of a different order from findings in other farming studies. Urban and especially metropolitan (Abidjan) populations are different, but so are their attitudes toward children: by the time of the 1998–99 Demographic and Health Survey their total fertility rates were no longer the 7.5 of the 1977 World Fertility Survey but 4.0 and 3.4 respectively.

Lee and Kramer (2002) observed time spent in various activities and measured the consumption of 112 individuals in Mayan subsistence farming

households. The community was isolated, five hours' walk from the nearest road, and modern institutions were vestigial. Nevertheless, the population achieved a life expectancy at birth of 70 years, averaged seven children per woman, and presumably were rapidly increasing their numbers. Sons produce as much as they consume by age 17 years and fully compensate for their lifetime consumption by age 30 years; equivalent figures for daughters are 15 and 31 years. Nevertheless, sons and daughters leave home at ages 22 and 19, respectively, when only 82 and 76 percent of this consumption debt has been paid off. Why, then, are these farmers apparently satisfied with an average fertility of seven live births little eroded by mortality? Presumably, leaving home means marrying and setting up a separate household. If so, it is possible, given the isolation and small size of the community, that sons provide some productive help to their parents even after they leave home. Perhaps their wives also do so, with daughters-in-law substituting for daughters and reproduction being regarded as a community achievement. By employing a Chayanov (1966 [1925]) family-life-cycle approach, Lee and Kramer show that in the first 15 years of marriage, when the husband and wife are young and vigorous, the parents shoulder most of the workload (or investment in children), but over the next 15 years (until the wife reaches menopause, when there are no more reproductive choices to be made) the older children account for the better part of the family's production. This activity, which includes care for young siblings, allows family formation to continue without an undue burden on the parents. Given that subsistence farm parents are unlikely to consciously plan the births of the first three or four children, there is, from a rational economic viewpoint, little pressure to curb further family growth. The question, then, is what value does a large number of descendants provide to aging couples in such a community.

THE VALUE OF CHILDREN AMONG HUNTER-GATHERERS

Thirty years ago demographers were little interested in the demography of one small population type, the hunter-gatherers, even though they had constituted all of mankind for most of history. But changes were underway that would have implications for wealth flows theory. Richard Lee (1968) published a paper presented first at a 1966 conference, "What hunters do for a living," and noted earlier work by Meggitt (1964) on Australia and by Service (1966) more widely. Lee's thesis, influenced by his research among the !Kung of the Kalahari Desert of Southern Africa, was that hunter-gatherers find sufficient food fairly easily, mostly by gathering. The result is that adults work no more than 12–19 hours a week and that there is little call on children, even adolescents, to do much at all. There are many days off and one of the activities is dancing. Among Australian Aborigines free time has been spent, at least by men, on corroborees (traditional dancing and singing ceremonies), paying homage to sacred sites, and visiting distant relatives. Lee noted that many of the other papers in *Man the Hunter* (Lee and DeVore 1968) presented evidence that supported his thesis.

Sahlins (1968), a discussant at the 1966 conference, asserted that the idea of Paleolithic ease of life was so opposed to traditional anthropological thinking that he coined a "shocking" term, "the original affluent society" (a play on the title of Galbraith's best-known book), and then used the same title in a paper in French and as the first chapter of *Stone Age Economics* (Sahlins 1972). He argued that hunter-gatherers had wants that were easily satisfied, that they desired little, and had adopted a "Zen strategy" (1968:85). His contribution was examined by 11 anthropologists in a discussion entitled "Does hunting bring happiness?" (Lee and DeVore 1968:89–92). After considering whether hunters were happy, happy-go-lucky, or fatalistic, the weight of opinion among the anthropologists suggested that they were fatalistic and constrained by their circumstances. Sahlins maintained that the hunter did not have unlimited wants (1968:85) and was an "uneconomic man" (1972:13). He argued that "the amount of work per capita increases with the evolution of culture and the amount of leisure decreases" (1968:86). This, of course, is an argument set forth by Boserup (1965), but Sahlins never mentions her. Sahlins (1972) drew on a wide range of anthropological work to demonstrate the limited hours worked by hunter-gatherers. Perhaps significantly, he did not separate out children's work.

Children's work became a topic of demographic interest when Hillard Kaplan (1994) began to analyze his South American Indian data in a framework of wealth flows and "the logic of evolutionary biology," and subsequently when Ronald Lee (2000, 2002) analyzed Kaplan's data with an economist's interest in the direction of wealth flows through a range of societies. These data were from three groups that were the subject of fieldwork in the 1980s: the northern Ache of eastern Paraguay, the Diamante (mostly Pire) of southeastern Peru, and the Yaminato (all Machiguenga) of southeastern Peru. Like most of the populations reported by Sahlins (1972), they were no longer pure hunters and gatherers but had experienced contact with the outside world, some sedentarization, some practice of agriculture, and even some use of money. Nevertheless, both Sahlins and Kaplan assume, fairly enough, that these changes have been so recent that such basic cultural features as attitudes toward the relative workloads of children and adults have not been altered. Those traditional societies, when growing slowly at an earlier time, would have been characterized by around one-eighth of the population being over 60 years of age (Coale and Demeny 1966, West model, levels 5–10, life expectancies 29–40 years). Richard Lee (1968:36) found among the !Kung one-tenth over that age. Kaplan's Indian populations exhibited a much smaller proportion of aged, leading Ronald Lee to conclude that "old age was rarely achieved in the past," so that there was no substantial problem of old-age dependency and presumably little worry among young adults about what would happen to them in old age. This is almost certainly incorrect, not only because the models show around one-eighth of newborn babies reaching 60 years of age but because they also show half of 30-year-old reproductive decisionmakers reaching age 60. Kaplan's surprising old-age data may owe something to age misstatement, but probably more to the recent impact of disease brought by contact with the outside world and perhaps

something to a rise in fertility (all groups had TFRs over 8). It is illuminating that after the northern Ache of Paraguay made contact with the outside world from 1970 onward, almost half of them died of newly introduced diseases during the next eight years (Kaplan 1994:756).

From my point of view and also that of Kaplan and Ronald Lee, the important point is the hours worked: 3–4 hours per day at age 15, 5.5 hours at age 25, 6.5 hours at 40, 5 hours at 60, and 4 hours at 65. Even for adults, this is not an exhausting schedule; it is within the range of hours reported by Sahlins (1968:85ff) that he calls a Zen strategy, where few are overworked. Indeed, the work that is done fills up the time, and, in the case of hunters, even old ones, allows prowess to be shown. The alternative was chatting, gossiping, resting, and sleeping (Sahlins 1972). Clearly, among nomadic people the reason for such affluence in spare time is that they do not need to work harder for food, and they cannot accumulate more than a minimum of easily carried possessions. If they wanted to accumulate possessions, they would have to settle permanently and become farmers. They do not do this, according to Sahlins (1968, 1972), because hunting and gathering provides a better life style. According to Boserup (1965) they would change to this new way of life only under the whiplash of excessive population pressure, which can be alleviated solely by the more continuous and more intensive work possible in agriculture. Boserup (1965) believed that, if it were possible, cultivators would willingly change places with those enjoying more leisure. But the evidence is that, where settled farmers and hunter-gatherers share an ecological niche, the former scorn the latter as having few possessions and no ability to put down roots and accumulate wealth (Caldwell 2005). Hunter-gatherers still hunt and gather because cultures change very slowly and because they are often found in areas where farming is difficult (as in deserts) or where their tools cannot clear enough land (as in wet forests).

Hunters do not need assistance from their young children, but they would expect their sons to play at hunting and progressively take up a kind of apprenticeship in using weapons. A middle-aged man, let alone an older one, needs a young adult son beside him in the hunt in case of sudden danger or accident, and this is even more the case in warfare. Kaplan's Native Americans may now be pacified in national parks or on mission stations, but remoter South American hunter-gatherer groups give evidence of almost continuous fighting (Chagnon 1968). Coleman's (1986:29) review of the literature on hunter-gatherers concluded that 14–25 percent of male adult deaths could be attributed to violence.

INSURANCE

There is less debate among scholars about the value in premodern society, whether among hunter-gatherers or farmers, of children as insurance against disaster in midlife or feebleness in old age. From theoretical standpoints and after analyzing field data, economists have largely agreed that whatever the net deficit in children's labor over their consumption, in the absence of other investments raising children is a rational response to risk (Kuznets 1979:253–254; Stark 1981; Datta

and Nugent 1984; Hammer 1986; Rosenzweig 1988). Ronald Lee (2000:47), after analyzing Kaplan's data, commented: "In the absence of institutions that provide various kinds of insurance and permit the reallocation through savings of resources to old age, children may still be the best deal around, although the extent to which such assets as land or livestock fulfill the same functions in agricultural society is unclear."

Certainly, hunter-gatherers had none of these alternative assets. The West African agriculturalists we studied in the 1960s and 1970s farmed communal land with control vested in larger groups, usually the clan. Neither the individual nor the clan could approach banks to offer the land as security against a loan. Their houses were ancestral property to hand on to succeeding sons. Where there was livestock, as in the savannah of much of sub-Saharan Africa, they represented a kind of revolving fund, received as bridewealth at the marriage of a daughter and outlaid at the marriage of sons. And ragged, semiliterate farmers were not likely to be received by financial institutions with anything but scorn. I expected the situation to be different in India, but for the great majority of the rural population it was not so. The largest village we studied had a bank, but its customers were few and were confined to government officials and those large landholders with some education. The most common sudden need for money was to pay for the dowry and wedding costs of a daughter. The amount was partly raised by agreement on how much should be contributed by each relative, but usually a loan was also needed. Sometimes villagers used government money intended for agricultural improvement, but the usual source was personal loans: from fellow caste members among the better-off farmers, from employers among employees, and, among the hard-pressed, from money lenders. The main other need for money was during drought.

Loans based on personal ties are preferred, partly because the known world of most peasants and laborers does not include financial institutions, and partly because relationships are important and imply that delays in repayments might be arranged if necessary. One reason that personal ties are cultivated and not willingly jeopardized is that borrowing may be necessary. Land is sold only in cases of extreme distress, because it is not a normal marketable commodity but something held in trust for the family and descendants. Much of the money given or lent comes from educated children or children-in-law.

Two research programs challenged this picture of rural India. In their study of an Indian village in Maharashtra in 1975–76, Vlassoff and Vlassoff (1980) claimed that most old men worked until close to death (even though they refer to 60 years as the age of withdrawal from work; p. 490), and that in any case the old do not dwell much on the future, receive limited support in old age from sons, and worry less about security if they have large landholdings. Ten years later Vlassoff (1990) expanded on the situation in the Maharashtran village, focusing on what widows expect of sons: "The above findings cast doubt upon the contention that old age security considerations play a central role in fertility motivation, and indicate that cultural factors . . . are at least equally important" (p. 18). It is

noteworthy that by this time security was seen as only half the motivation for fertility. Vlassoff's earlier article was vigorously challenged by Datta and Nugent (1984), who maintained that the data did not support the conclusions. And the later article was strongly criticized by Cain (1991) partly on the grounds that widowhood in India, given the country's large spousal age gap in marriage, should not be equated with old age, as shown by the majority of widows in Vlassoff's study being in their 30s, 40s, or 50s.

Strangely enough, the second research program, which at first sight seemed disconsonant with ours, was advanced by Cain (1981). He wrote that India, in contrast to Bangladesh, had cushioned crisis with such measures as credit provision and public relief employment, thus reducing distress land sales in crisis: "In the Indian villages, children are largely redundant as sources of risk insurance, while in the Bangladesh setting, few alternatives to the security that children provide exist" (p. 467). This analysis admittedly refers only to crisis and not to old age; nevertheless, an important source of assistance consisted of relatives with off-farm employment, and above all permanent urban jobs, providing help in the form of money (Caldwell, Reddy, and Caldwell 1986). Caldwell, Reddy, and Caldwell (1982, 1985), reporting on changes in fertility and education in South India, found that parents were well aware that education led to nonagricultural employment, providing access to jobs with at least some hope of permanence, usually with a reasonable salary, and usually unaffected by drought. Even more strongly than in the case of loans, parents valued the fact that the assistance was one involving a personal relationship and was unlikely therefore to go wrong. They expected help from educated salary-earning children with marriage and funeral costs, in times of need, and in old age. Most knew no other way of meeting these expenditures. They also knew that they could not keep many children at school simultaneously and hence would have to control fertility.

The position was, of course, much more complex than is covered by this basic sketch. Children were removed from school if they were unmotivated or unsuccessful. Educated children were a source of pride, and illiterate ones a cause for shame. A farmer's first son had less chance of prolonged schooling because he was needed on the farm. If there was no land or if there was a danger of its being subdivided for inheritance into uneconomically small shares, then the need to educate some children was greater. This need was found to be especially acute in overcrowded Bangladesh, where the Green Revolution brought more production but no demand for additional labor at specific seasons because the multiple crops are spread across the year (Caldwell et al. 1999).

WEALTH FLOWS UPDATED

Research over the last three decades points to four ways in which wealth flows theory can be updated: (1) a better understanding of the roles of children's labor inputs and consumption in farming communities in the years preceding the onset of fertility transition; (2) a mode-of-production approach that defines the

different cultures of work in the long period often referred to as "traditional" society; (3) more agreement on the insurance role of children; (4) a greater understanding of the conditions of fertility transition.

On the first score, most recent studies of farming populations before the advent of schooling show children's work coming close to compensating for their consumption. A typical pattern is for current work to equal current consumption by age 15–17 years and to compensate for past consumption by perhaps age 25 years. Several qualifications are needed. First, all studied farming populations have been affected by global economic change. In an older West Africa with no schools and scarcely any clothing, it is hard to imagine children's work failing to compensate for their consumption. Second, in societies where men marry late and usually help their fathers even after marriage, as in West Africa or South India, it is probable that sons' work eventually pays for their accumulated consumption. Third, analyses that omit much of domestic production from measurement certainly misrepresent the age-old situation and probably, although to a lesser extent, misrepresent the present post-subsistence situation where unpaid domestic production is still critical. Fourth, daughters, especially those married early, may not work sufficient years to make up for their consumption. This shortfall is at least partly offset by the work of daughters-in-law who replace them in the family, by the role of daughters in strengthening the economic and defense capabilities of the family by marrying out and thus setting up links with other families, and by the bridewealth daughters bring in to the family (except in the Indo-European culture area).

Where a gap existed between the product of children's work and their consumption, this was offset by the children's insurance value, by the advantages that accrued to large families in village affairs and transactions, and by the situational advantage of those, like West African old men, who ultimately controlled fertility decisions. The last two factors were probably of substantial importance in historic tropical Africa, but they have been little researched and have dwindled with modernization. Nevertheless, it might be noted that the Indian family planning workers know that the elderly probably have more to gain from their children's high fertility than do their children, now young adults; accordingly the family planning workers break with tradition by addressing themselves to the young wives and not their parents-in-law (Caldwell and Caldwell 1984:115).

The contradictory findings with regard to children's work inputs can be elucidated by a modes-of-production approach, distinguishing, as different modes, hunting and gathering, farming, and labor-market production where eventually nearly all production and most labor will be outside the family. What distinguishes nomadic or seminomadic hunting-gathering from farming is the former's modest labor inputs and limited possessions. Boserup (1965) correctly characterized the transition to farming as involving more work for all. It is less certain that her identification of population pressure as the determining force was correct; the causes may well be the acceptance of innovations and the realization that sedentary farming would allow more possessions and greater protection from violence. Sahlins (1972) recognized hunting-gathering as a unique way of life, in which anything but

limited work would be meaningless because no more food was needed and most food was of the type that could not be stored. Certainly, Neolithic farmers would not have regarded such a way of life as affluent: they identified affluence with a permanent house and possessions. Sahlins's usage led some anthropologists in the 1960s and 1970s to attribute to hunter-gatherers a different and more "affluent" demographic regime with limited family size (achieved by infanticide) and matching low mortality (Polgar 1964, 1971), but the evidence for this is weak (Caldwell and Caldwell 2003). Indeed, the single most convincing demonstration that children were of net value in premodern societies is the failure to evolve methods for controlling fertility. At the level of the society this is understandable because of the high mortality level. But some families of surviving children would inevitably be large, and if they were a burden this situation would be expected over eons to generate both a fear of very large families and methods for their avoidance. This has not been the case in non-state societies. The Roman elite practiced child abandonment but not on a scale sufficient to change the society's natural fertility regime (Caldwell 2004b). Historically infanticide was practiced among Chinese, Japanese, and some Indian castes to alleviate transient crises such as famine, inheritance problems, and the threat of paying many large dowries (Caldwell and Caldwell 2005a).

Kaplan's Native American populations did not control fertility, for they all recorded total fertility rates over 8. They were relatively recently sedentarized, influenced by missionaries and national park officials, practicing some form of horticulture or farming, and probably pacified. Their situation fitted the framework of Boserup and Sahlins perfectly: adults mixed abundant leisure with a modest amount of work and felt little pressure to make their children work hard. Turke (1989, 1991) and Kaplan (1994) contended that this was a form of evolution-determined altruism whereby parents always did more for their children than children did for adults in accord with a genetically driven determination to safeguard the survival of the children and hence the spread of parents' genes. Turke and Kaplan, apparently, and Ronald Lee (2000) certainly, generalized this behavior to farming populations as well. This evolutionary interpretation fits the demographic evidence, but it is not necessary to explain that evidence. It is equally plausible to explain it in terms of Boserup–Sahlins's leisure-based affluence, and to assert that evolution, failing to foresee the invention of contraception, safeguarded the survival of the genes by giving human beings sexual appetites. Any other explanation fails to explain why very low fertility and voluntary childlessness in the modern world are not accompanied by psychological collapse (see Potts 1997). Indeed it is difficult to explain why leaving children with little work to do ensures the better survival of genes. One would have thought testing children by required labor would have had a certain selective advantage.

There is a near consensus on the premodern insurance value of children. Childless parents, as they grew older, faced almost insurmountable problems in converting surpluses from their young adulthood into support for their old age. Land in West Africa, and probably for most people everywhere over most of

human history, was communal and therefore unsalable. Even in contemporary India farmers face difficulties in selling family land. Financial institutions emerged relatively recently and most ignore the poor and illiterate. Besides, no one in Africa or many other parts of the developing world would expect savings to survive from youth to old age in circumstances in which currencies have not infrequently devalued to one-thousandth of their former worth over a generation, where banks may be suddenly and sometimes disastrously nationalized, and where coups and wars often mean a lack of institutional continuity. The need in such settings was to invest in people, especially children.

Modern schooling exhibits substantial returns to the whole community and much higher returns to individual families because of the extent to which government education systems are subsidized (Mincer 1974; Richards and Leonore 1981; Bigsten 1984; Psacharopoulos 1994; Duraisamy 2000). Schooling expanded tremendously in the era of postcolonial independence, UNESCO, and development plans. In 1950, 1960, and 2000 the percentages of the relevant age groups in secondary schools were in India 8, 18, and 48; in Indonesia 2, 4, and 57; and in South Korea 16, 29, and 54 (Caldwell and Caldwell 2005b). With independence, bureaucratic positions multiplied and appointments were based on educational qualifications. Between 1950 and 2000, per capita gross domestic product in Asia quintupled and that in Africa tripled (Maddison 2003:262), the proportion living in urban areas in both continents more than doubled (United Nations 2004:7), and so did town jobs usually requiring some education. The situation in East Africa was typical: those with more than four years of secondary education averaged six times the wages of the uneducated in Nairobi and 4.5 times their level in Dar-es-Salaam (Hazlewood 1989:280).

In the premodern world investment had always been mostly in people. It was safest to invest in children because children who cheated their parents found other relationships in society closed to them. In South India and doubtless elsewhere, family meetings often decided which children to educate and which to continue investing in as they proved successful in school. The prosperity of the Akamba people in Kenya has been shown to come not from innovational farming, but from the unusually high number of children they educated and sent to Nairobi (van Ginneken 1997).

Motives have always overlapped. In the early years of the education boom in newly independent nations, the main motive was returns to the parents and the rest of the family. But there was also pride in having educated children, both for the children's own sake and to boast to others. Contempt for the illiterate was often very strong (Caldwell 1980). There were good reasons, other than guaranteed wages, for having well-educated children. Such children could cope with the modern world and its bureaucracy and maximize the benefits on offer from governments. They could also provide a link to the modern world of cities, telephones, and cinemas. Gradually, the chief beneficiaries became the children themselves. One can see a parallel here with Ariès's (1962, 1980) stages of educating the child so that successive generations could advance up the social scale and then

to educating the "child king" mostly for his or her own sake. Doubtless, most developing countries will reach a further stage where young adults concentrate the educational investment in themselves, and, by delaying or forgoing childbearing, achieve below-replacement-level fertility.

It is understandable why Bongaarts and Watkins (1996) found the Human Development Index (HDI) to be a good predictor of the onset of fertility decline. Its components are mortality, education, and income levels. It was not merely that morality decline guaranteed the survival of more children, but those children were worth more if well educated, and most families could achieve that situation only by spacing them and so limiting their number. Thus the pressure to have fewer children results principally not from forward-looking educated parents but from forward-looking investing parents. Doubtless, investing in children will increasingly expand to investing in salable land and in financial instruments. Nevertheless, land is not as yet an easily traded commodity in much of Africa and Asia, and millions of the rural poor are still far from being financial investors.

To summarize, it now appears that fertility transition paralleled transition from a farming mode of production where children's labor inputs did much to pay for their existence to a capitalist or labor-market mode of production where this was not the case. In the decades or even generations before the fertility transition, children's net cost grew as early globalization, much of it associated with colonization and missionaries, gradually raised levels of consumption, conspicuously in West Africa through the need for clothing. Fertility transition had also reduced family labor inputs in places where young men could earn money by working outside the family. Earlier, in many farming societies, children's accumulated work inputs may eventually have surpassed their accumulated consumption. However, three decades of research have also made it clear that in some pre-farming, mostly hunter-gatherer cultures, children's work inputs were small, mainly because everybody's inputs were small. The workloads of both adults and children rose as sedentary farming tempted the population into beginning the long chase for possessions. Sahlins (1972) can be reconciled with Boserup (1965), and so can Caldwell (1965) with Kaplan (1994) and Ronald Lee (2000) if we recognize that the pre-farming mode of production had a different labor structure from the farming mode.

Recent research also reinforces the idea that the insurance function of children made uncontrolled fertility worthwhile even where the gap between children's labor input and their consumption was large and negative. Fertility transition began when a series of conditions were met by, in succession, colonial governments preparing for independence and newly independent governments enthusiastically preparing for the future by a huge increase in educational capacity; the replacement of colonial officials by indigenous ones, usually with a significant growth in the bureaucracy; the realization by parents that they could safely invest in the education of children in contrast to simply in their number; a steep decline in infant and child mortality led by international efforts; urbanization providing new jobs in the private sector; a continuing rise in per capita incomes (except recently in sub-Saharan Africa); and independent governments being in a better position

than colonial ones to urge and offer family planning. Cumulatively, these changes finally reversed the wealth flow, and fertility fell.

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ENDNOTE

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CHAPTER 6

FERTILITY CONTROL IN THE CLASSICAL WORLD: WAS THERE AN ANCIENT FERTILITY TRANSITION?[1]

Important questions for demographers are whether the modern fertility transition is unique and whether the Industrial Revolution was required to achieve it. If it is not unique, then its most likely predecessors were probably found in the classical period, especially in Ancient Rome, or in Soong China or Tokugawa Japan (treated separately in Caldwell and Caldwell 2005). The reasons in the Roman Empire include the high level of urbanization, the extent of commercial farming, and the extensive monetization of the economy. The ordinary citizen achieved his ends through the law rather than through the force of family numbers. It was widely believed by contemporaries that Roman population decline was taking place, and the Emperor Augustus's marriage legislation was aimed at increasing the fertility of at least part of the society, the upper classes. Many recent historians and classicists have drawn attention to the use of means which could have limited numbers in both the family and society, and some have implied a fertility decline which may have resulted in moderately low fertility for centuries (see Riddle 1997). This paper mostly concerns Rome, but Greece will not be ignored because of the influence of Greek medicine and ideas on fertility control. Some authorities have posited the population of Europe halving during the first six centuries of the modern era (Russell 1958, 1969; Clark 1967). Nearly everyone agrees that European population levels were similar at the beginning and end of the first millennium but most also believe that a steep decline in human numbers during the Roman Empire was followed by rapid recovery during the Dark Ages (Maddison 2001:231).

This is an appropriate time to reassess the evidence because of the flood of new writings on the subject. The limited literary references to population issues and the testimony provided by funerary inscriptions had long been adequately analysed by Beloch (1886), Russell (1958) and later Hopkins (1966). As early as 1927 Willcox had calculated Roman life expectancy. But from the 1950s demographers greatly intensified their focus on fertility because of rapid global population growth and attempts to control it (see Caldwell 1996). Writings about the nature of the family and efforts to restrict its size, together with new techniques of demographic

analysis, were extensively drawn upon both by those interested in Palaeolithic demography (Caldwell and Caldwell 2003) and those concerned with classical—and especially Roman—demography.

The most salutary shock to the classicists was provided by Philippe Ariès's publication of *Centuries of Childhood* (1962) arguing that the discovery of childhood was the product of the last two or three centuries and with it came the discovery—or perhaps creation—of the family. The argument was that the classical family was not in our sense a family at all, and might have very different internal dynamics with demographic consequences. Then came the flood with broadly similar messages, of which the most cited are deMause's (1974) "The evolution of childhood" with its claim that child sale was probably common in antiquity (p. 32); Shorter's (1976) *The Making of the Modern Family* from something obviously very different from earlier families; Stone (1977), MacFarlane (1978), Flandrin (1979), Dupâquier et al. (1981), Kertzer and Saller (1991) which included Garnsey's (1991) "Child rearing in ancient Italy;" Kertzer and Fricke (1997), and Gillis, Tilly and Levine (1992). Those more quantitatively inclined were strongly influenced by the publications of the Cambridge Group for the Study of Historical Demography, such as Laslett and Wall (1972) and Wrigley and Schofield's (1981) reconstruction of three and a half centuries of English population change; and by those of the Princeton European Fertility Project, especially its summary volume by Coale and Watkins (1986). Other influences were Glass and Eversley (1965), Knodel (1977), MacFarlane (1980) and Engels (1984). Attention has also been paid to the work of palaeodemographers, in particular Acsádi and Nemeskéri (1970) which included life tables for the Roman period constructed from skeletal evidence, and to the many publications of J.L. Angel, physical anthropologist at the Smithsonian Institute. Demographic analysis has drawn extensively on model life tables, such as United Nations (1955, 1982) and especially Coale and Demeny (1966), as well as marriage analysis (Hajnal 1953) and marriage models (Coale 1971), fertility models (Henry 1961; Coale and Trussell 1974, 1978) and analytical texts (United Nations 1983) or demonstrations (Barclay et al. 1976). Fertility determinants or effects are often derived from Boserup (1965), Caldwell (1982) or Chesnais (1990).

What then, was found once this rich flow of analysis impinged on classical studies? To what extent are we at risk of circularity in the arguments in that modern demographic phenomena are shown to have precedents, which are in reality little more than reflections of the findings about those modern phenomena? The author brings the same strengths and weaknesses to the analysis in that he has recorded many demographic beliefs and practices in contemporary Africa which appear to have parallels in the Ancient World, for instance the belief of demographers in the early twentieth century that African populations were declining (disproved by later censuses); the practice of traditional (and often similar) methods of birth control with no measurable impact on societal fertility levels; the last traces of the practice of the debt slavery of children; and the situation where wives were regarded as not having left their families of origin.

CLASSICAL SOCIETY AND THE FAMILY

Roman society shared many characteristics with other ancient Mediterranean societies but other very distinctive forces had also moulded it. The chief of these was its military tradition and the vast areas conquered by its armies during the last two centuries of the Republic and the first century of the Empire. Huge numbers of prisoners were taken and sold as slaves who constituted up to 20 percent of society, thus providing a labour force for large rural estates, affecting the nature of society and the family, and probably accelerating urbanization. Through this period recruits to the army constituted 15–20 percent of young men who joined for a period of 16 years, later extended to 20, during which they could not marry. Only half survived ultimately to do so (Scheidel 1996:93ff). The military period also provided land and other possessions which were jealously guarded as the family's patrimony.

Much of the analysis of the family supports Ariès's (1962) postulate on the lack of resemblance to the modern Western family, although writers also warn that the contrast should not be drawn too starkly, citing the affectionate relationship between the Emperor Augustus and his wife, Livia (Rudd 1981). Nevertheless, marriages were arranged by families with a view to preserving or increasing the patrimony, wives' property was distinguished from that of their husbands, divorce and remarriage for social, family and financial advantage were common, infants were frequently fostered or exposed (left in the market place, often apparently to become slaves), with many children being reared by others than their parents. The patriarchy was severe, and, under the system of *patria potestas*, the oldest male in the family had, in theory at least, the power of life and death over his descendants but not his wife (see Bradley 1987; Rawson 1991; Corbier 1991), and in practice in the case of infanticide or exposure (Shaw 2001:36ff). Men married to have sons to serve as legitimate heirs, to continue the family name, to expand cult membership, and for the worship necessary for the peace of the father's spirit after death (Bradley 1987:35–37), as in Africa today. Although monogamy was enforced for Roman men, who could not even have a concubine parallel to a wife, much male sexual activity was outside marriage, including that with female domestic slaves. Infants were wetnursed in much of the society (Veyne 1987:14ff). The children of the better-off families were educated, girls as well as boys. Nevertheless, Dixon (1988) is probably right in arguing that parent–child relationships were often so formal that disposing of infants or even older children was usually not emotionally difficult. This was at least partly the product of residential families that were neither nuclear nor extended but were enlarged by slaves and other relatives and non-relatives.

Our interest must centre on whether the nature of the family meant that families suffered or gained by uncontrolled marital fertility. The earlier view was that they suffered. Harris (1982:116) noted "Plutarch's exaggerated but still very important statement that 'the poor do not bring up children'." Hopkins (1983:74) argued that the strongest pressure against large families was probably felt by

"Italian landed families [who had] failed to secure an increase in income which matched the dramatic rise in living standards of the Roman elite." Among that elite, children, especially sons, could be out of hand and their spendthrift ways could be a serious drain on family finances (Eyben 1991:125ff). Frier (1994:330, fn 46) argued that ancient sources made an obvious point that the poor found it difficult to raise a large family.

By the mid-1980s many classicists became aware of the interest developing in the modern world in persistent high fertility resulting from the value of children and upward intergenerational wealth flows. Bradley (1985a:311ff) conceded that upper-class children were often expensive, but noted that lower-class children were put to work around ten years of age, working from dawn to sunset and placing their earnings in the common family budget. The earnings of both boys and girls could be enhanced by first placing them in apprenticeships such as nailmaking, copperwork, shorthand, woolcarding, linen and mat weaving, and building. Bradley (1985b:513) argued that the evidence showed that slave children too were worth rearing because of their economic value. Rawson (1986:41ff) pointed out that obedient, hardworking children were the product of a society which taught respect for age, authority, the family name and the ways of one's ancestors, and which decorated the house with busts and death masks of those ancestors (*cf.* on contemporary West Africa, Caldwell 1982:83ff). Treggiari (1991:11) summarized a range of classical authors as maintaining that "Children protect parents' old age, are a staff for the aged, act as a reinforcement, prop up the house or form its foundations, or are a pole to which the vines must cling". Dixon (1991:99) concluded that the evidence showed that children were widely regarded as a source of labour and as contributing to the continuing of the family line and old-age support.

The direction of the wealth flow, and at what level in society it was reversed, are still contentious topics. What is not contentious is that the upper classes were deeply concerned that the family patrimony should not be disbursed among a large number of surviving children. Once both parents were dead the inheritance had to be shared equally among children of both sexes (Hopkins 1983:76). The patrimony had usually been handed down from earlier times when it had been acquired through warfare or high military or public office during that warfare. Wealth made it possible for family members to obtain high public office, usually not legally remunerated, and to augment their wealth by successful marriage strategies. There was little sympathy for poverty: men were expelled from the Senate for debt or impoverishment (Hopkins 1983:74–75). It is clear that wealthier Romans had good reason for wanting to minimize family size and were well aware of the situation. It is not equally clear how they attempted to limit family size, how successful they were, and what proportion of the total population believed themselves to be in a situation where fertility control was needed.

These details are not easy to clarify. We would be closer to their resolution if we could be certain about a decline in Roman (and earlier Greek) numbers, as were most classical writers. Burn (1953:17) stated the traditional view: "It is well known that a conspicuous feature of the decline of the Empire was a fall in

population over wide areas;" and sustained it by reference to Augustus's marriage legislation, which targeted a small elite, letters of Pliny and Juvenal, who had no access to relevant statistics, and reports that by the third century AD towns were shrinking in size. Russell (1958:73) supported the last point by noting that in the later years of the Empire new town walls were built within the older walls. In 1969 Russell linked the population decline to increasing Germanic attacks and placed it just before AD 500 (p. 20), long after the early Empire when population control seems most likely to have been at its maximum. In 1985, Russell, citing his 1958 work, concluded that the whole of Europe declined in population by over half between AD 1 and 650, without positing a date for the onset of the decline, and that full recovery had been achieved by AD 1000 (Russell 1985:36, Table 6). He maintained that the population decline had occurred in North Africa "despite the evident good health and long life span of the inhabitants . . . people must have chosen to control their numbers" largely because of the increasing worship of money throughout the Empire (Russell 1985:163–164). Alston (2001:167ff) thought that the evidence was that Roman Egypt's urban population began to decline in the second century AD but that it may have recovered by the fourth century. Weaver (1991) argued that a slave society was likely to be characterized by problems of marriage and sexual relations with the result that neither slave nor free population reproduced themselves. The Greeks also believed their population was declining, as early as 150 BC according to Polybius (McLaren 1990:12).

Inevitably the reaction came. Den Boer (1973:30) had emphasized that all classical population estimates were very suspect. Frier (1994:329) claimed that there was no acceptable evidence that Roman population declined, and cited the population estimates of McEvedy and Jones (1978) as showing continuing growth even though the latter (p. 354) admitted that they had, in the absence of any other evidence, merely drawn an exponential curve between population estimates for the beginning and end of the first millennium. Scheidel (2001d:64–72), when estimating that the population of the Empire was probably between 60 and 100 million, was stronger still in denying that there was any real evidence for population decline.

Why, then, have we drawn upon classical authors over generations to conclude that the population of the Empire was declining? The main answer is probably that critics of the decadence of their times, as was the case with many of the classical authors, took falling population to be proof of degeneration and conversely assumed that degeneracy must be paralleled by downward population numbers. Later Christian attitudes to the pre-Constantine Empire reinforced this belief as did the title of Edward Gibbon's *Decline and Fall of the Roman Empire.* Certainly many upper-class families died out (Rawson 1986:10) but this may be no more than evidence of the high-risk situation of a high-mortality/high-fertility near-equilibrium. Conversely it may be evidence that this group did control family size to the point where they risked extinction. In the late Imperial times urban populations may have declined but this may show little more than that the early Empire was

in a long-term sense over-urbanized, with its large town populations supported by conquest, a slave system, and a large administrative class. It is difficult, therefore, to use evidence of a population decline to demonstrate mass control of fertility.

What, then, is the direct evidence for population control? Most of it comes from references in the classical literature and almost always refers to the upper classes. Russell (1958) assumed Roman population control but said little about how it was achieved. By 1985, after the publication by Wilson (1975) of *Sociobiology: The New Synthesis*, Russell felt more strongly:

> The control of population, to judge from the methods used, was one of the strongest drives in the ancient and medieval worlds . . . The desire to pass a comfortable living to the next generation was so strong that one might even suggest sociobiologically that it was handed on as part of the inheritance of the genes . . . Such thinking mimicked wolves . . . A sex ratio of 140 means that two of each five females somehow did not live (Russell 1985:229).

There are problems: the sex ratio evidence was not secure (Hopkins 1966:260–261), and there is little evidence that the survival of girls was more threatening than that of boys. Rousselle (1988:45) firmed up the argument but applied it only to the elite:

> male asceticism, arranged marriage with the aim of producing between one and three legitimate children as the law required, error as to the fertile period in the menstrual cycle, contraception, and the opportunity for a man to avoid touching his wife and yet have sexual relations without fear of legal risk—combined to limit the number of births among the Roman aristocracy.

Two comments are required: first, in conditions of very high mortality, the required number of births to guarantee between one and three surviving children might be quite high; second, the extramarital pregnancies caused by the men's philandering outside their social class might tend to sustain the general birth rate.

A central issue is the number of legitimate births to the upper classes and hence the role of marriage. Roman girls, even in the upper classes, married in adolescence, but their fertile period was restricted in duration by early widowhood induced by having much older husbands or by divorce (which was frequent) without remarriage. Aristocratic men postponed marriage or did not marry at all. The most famous demonstration of this was Augustus's division at the forum of those *equites* (knights) present into two groups, bachelors and married men, so demonstrating that the former were in the majority (Corbier 1991:177). The seeming proof of this state of affairs was Augustus's two marriage laws (and one on adultery) spanning the years 18 BC to AD 9 which, among the upper classes, penalized the unmarried and childless, and rewarded the prolific (Gardner 1998). These enactments do not appear to have been very successful (Dixon 1988:93) and may have been aimed

more at establishing a stable class of married persons than at raising fertility (Glass 1967:86–88). This view is partly supported by the laws restricting the range of the elite men's wives by, for the first time, forbidding their marriage to freed slave-women. It is extraordinary that, in spite of much evidence that men married late or were long denied marriage or killed by incessant warfare, no classical writer ever raised the question of a surplus of women who could not marry, even among the elite. Female marriage was said to be universal.

Treggiari's (1991) study of the extant references in literature to marriage from the time of Cicero to Ulpian (first century BC to the early third century AD), necessarily restricted to the upper classes, convinced her that "Sexual activity within marriage was natural, necessary and chaste. Women were expected to accept it. Conversely, respectable women were expected to abstain from extra-marital sexual relations" (p. 12). What was most expected of them was that they would not demur about their husbands' extramarital sexual relations. Such chaste relationships do not seem to be the kind to facilitate the easy use of contraception. The case may have been different in adulterous relations and especially with prostitutes who were found in brothels, taverns, inns and bath-houses (Flemming 1999), but the same determination to avoid pregnancy may not have characterized relations with domestic slaves. One limitation on extramarital sexual activity was the belief, as among Hindus today, that sexual excess is bad for the health (McLaren 1990:56).

The scale on which effective contraception was used has been strongly debated. There was certainly the use, as until recently in Africa, of armlets and bracelets, spells and charms, evidence in perhaps both cases that effective contraception was not accessible. Noonan (1965:28–29) was hardly convincing that it was accessible: "The absence of reference to the subject in Roman classical literature is perhaps best understood as a general calm acceptance of contraceptive practices," and "from the circumstantial and comparatively slight data, the inference may be drawn that contraception was a social phenomenon in the Roman Empire of which the Christians could not have been ignorant." Similarly, Veyne (1987:12) said that Saint Augustine's condemnation of birth control in the fifth century AD showed that the practice must have existed. Riddle (1991, 1992, 1997) has been the strongest proponent of the view that contraception was widely practised in antiquity and must have reduced the birth rate. This was most clearly articulated in his 1997 work, *Eve's Herbs*, in which he placed much emphasis on the contraceptive use of plant materials. This emphasis, and the impression he gave that the evidence he provided supported the probability of a substantial fertility transition, have been savagely attacked by those working more in the demographic tradition (e.g., Frier 1994:318, 328ff; Harris 1994:14; Scheidel 2001d:38–39).

Turning to the evidence on specific limitations of fertility, McLaren (1990:56) and Frier (2001:153) place an emphasis on the strict practice of lactational sexual abstinence, but this could hardly have been important in the case of the upper-class women and other better-off persons who widely had babies wetnursed. Himes (1970:100) had concluded that contraception was known in the

classical world but was used so little or was so ineffective that it could not have caused a societal fertility decline. The general conclusion is that condoms and withdrawal were little used or known, that douching and rhythm were somewhat better known but the latter was wrongly used, and that suppositories were used by some women but were rarely likely to have been effective (Himes 1970:100; Hopkins 1965b:134ff; Eyben 1980:7ff; McLaren 1990:57–59; Riddle 1992:4ff). Greek medicine supplied the sources for knowledge of reproductive physiology and vegetable products used in suppositories and douches, which were rarely likely to be effective (Hopkins 1965b:128ff; Blayney 1986; McLaren 1990:47). Parkin (1992:127) concluded: "The main factor against the demographic significance of contraception in the ancient world was not its unacceptability but its ineffectiveness, combined perhaps with a general lack of male interest."

Abortion was probably practised on a somewhat greater scale, but was limited in its use by the dangers of physically induced abortion and in its effectiveness by the fact that much of the attempt was made with oral preparations (Noonan 1970:6–7). Hopkins (1965b:136ff) pointed out that reports often appear to confuse abortion and contraception. Nardi (1971:631–632) provided a list of reasons given for abortion, but doubt was cast by Dickison (1973:163) who described them as "negative and trifling." Rousselle (1988:45) reported that the most common reason was the physical immaturity of the mother. Abortion was always legal provided that the father gave his permission (Louiselle and Noonan 1970:235).

Infanticide, with parents doing the killing or ordering it, was probably not common. Dickeman (1975), widely drawn upon by classicists studying the family, argued that it was common, but she did this over a wider span of history, and based her arguments on hunter-gatherer infanticide theory, then in its heyday (see Caldwell and Caldwell 2003). By 1984 she had retreated from her belief in group selection (Dickeman 1984:437). Most classicists believe there is little evidence for a significant level of infanticide (Engels 1984:393; Riddle 1991:31), but it undoubtedly occurred in the case of deformed infants.

What was relatively common, and probably rendered other means of fertility control unnecessary, was infant exposure. Well known cases of ancient exposure are provided by Moses and Oedipus, the latter, with his club foot, being deformed. "Exposure" did not mean that the child was exposed to the elements so that death was certain. Rather it meant exposed for possible acquisition in a recognized public place, often near a market, not dissimilar to later practices of leaving foundlings at the church door. Nevertheless, it was the willingness of many parents to do this that has led many modern commentators to conclude that the Roman family and its internal relationships were alien and perhaps incomprehensible. There is continuing debate on the scale of exposure, whether its practice was largely confined to the upper classes who feared additional heirs, and whether the exposed infants usually died. If they usually survived, or if exposure was mostly restricted to the upper classes, then the demographic impact would be slight. Harris (1994, 1999) remains unconvinced that death from exposure was on a large scale, largely because the infants could be rescued to become slaves.

Some level of exposure existed in Greece from early times (Pomeroy 1983; Golden 1988). In the city of Rome and probably elsewhere in Italy child disposal was chiefly by exposure, but in the Eastern Provinces of the Empire fostering by relatives was more common (Veyne 1987:10). Few exposed children survived according to the classical source "pseudo-Quintilian" (Veyne 1987:11), but others argue that the demand for slaves, especially as the expansion of the Empire slowed down, was so high that the great majority of exposed children were probably soon seized for that purpose (Engels 1984:391). If that were the case, the easy availability of wetnurses might well have made their survival rate almost as high as that of non-exposed children put out to wetnurses. Patterson (1985:103–104) and Parkin (1992:95) argue that the literary sources on the subject will yield little more and that they will never reveal the extent of exposure or the fate of exposed children. Exposure was condemned by Jews, more influentially by the Stoics, and later by Christians (McLaren 1990:63–64; Eyben 1991:123; Harris 1994:1,19–20). The first Christian emperor, Constantine, made exposure less likely by legalizing the sale of children, but the first legislation against exposure waited until AD 364 and even then was not very effective.

THE DEMOGRAPHIC APPROACH

In the last few decades, alternative means of determining classical demography have become available, drawing on methodologies emerging since the 1960s, very largely those developed at Princeton University's Office of Population Research, for clarifying the demographic situation in developing countries with incomplete population data. These methodologies have been used with quantitative data drawn from three non-literary sources.

The first source is tombstone inscriptions which usually in the western half of the Empire, but not in its east, show age at death and sometimes list children; much of the twentieth century was spent listing and copying this resource. The second source is buried skeletons increasingly subject to palaeodemographic analysis, and capable only of providing evidence, often debatable, about disease, age at death, and perhaps children borne. Both these sources are distorted to an unknown extent by strong selection for formal burial or the provision of inscriptions by social class, age at death, and sex. The third source is provided by censuses, but the only one seeming to have survived consists of fragments from Roman Egypt recording from different counts during the first to third centuries AD about 1,100 persons on 300 returns, and now being subjected to more examination than perhaps the data can stand. These censuses were conducted in the administrative language for the Egyptian province, Greek. The basic work on these fragments was that of Hombert and Préaux (1952) and the first demographic analysis was by Hopkins (1966). Recently whole books of analysis have appeared providing exhaustive findings (Bagnall and Frier 1994; Scheidel 1996, 2001b) and the demography chapter of *The Cambridge Ancient History* volume on the Roman Empire, AD 70–192, draws largely on the same material (Frier 2000).

Bagnall and Frier (1994) and Frier (2000) have believed the Roman Egyptian census data to be sufficiently strong to support all the transformations required by modern demographic analysis. Scheidel disagrees, although he trumpeted the arrival of modern demography with its capacity to analyse Roman data (Scheidel 2001d:vii) and published analyses of the Egyptian census returns. Nevertheless, he insists that Bagnall and Frier underestimated the flaws in the material, and charges that many of their findings were probably "just in the eye of the beholder" (Scheidel 2001e:178). There is also the question of the extent to which Egypt can be regarded as representing the Roman Empire. Bearing these doubts in mind, this paper will proceed to findings. It will look at both mortality and fertility parameters in the context of a near-stationary population such as appears to have been the case in the early Empire; it will begin with mortality estimates.

As early as 1896, Harkness had used inscriptions from the early Roman Empire to posit a stationary population with life expectancy at birth around 18 years. McDonnell (1913) used a fuller coverage of inscriptions to raise life expectancies in Rome to 22 years for males and 21 for females, in the Iberian Peninsula to 39 and 34 years respectively and in Africa (not including Egypt) to 48 and 46 years (African inscriptions have continued to give anomalous results). He concluded that these results supported literary testimony to the extremely dangerous health environment of the city of Rome (McDonnell 1913:375). Burn (1953) protested that "Roman hygiene was not to be despised; civilized Romans were notably clean people" (p. 18) but the odds were against them in a very large ancient city. He calculated an infant mortality rate of 250 per thousand births, and constructed survival curves which he claimed were similar to those in India in the first decade of the twentieth century, implying a life expectancy of around 25 years. Durand (1960) used apparent age structures together with the newly available model life tables to derive a life expectancy for the whole Roman Empire of 25–30 years and for the urban areas of the western Empire of 15–25 years. Hopkins (1966) commented on the impossible age structure but used the United Nations (1955) model life tables to deduce for the Empire an expectancy of 20–30 years, while discarding the African data as being quite strange. In his 1983 book he concluded that from the first century BC the Roman elite did not reproduce itself (Hopkins 1983:69ff).

From the 1990s the full panoply of modern analytical techniques was employed. Parkin (1992:93) calculated an infant mortality rate for the early Empire around 300 per thousand births, but doubted that data on 100 council members in the city of Canusium in southern Italy was usable (pp. 136–137) even though Duncan-Jones (1990:93–96) had used this source to argue for a life expectancy among the provincial elite of over 30 years. Frier (1983) compared his previous work on a fragment of Roman analysis, the Ulpian life table (Frier 1982), with skeletal evidence from western Hungary reported by Acsádi and Neméskeri (1970) to deduce a life expectancy in the early twenties. Bagnall and Frier (1994) derived from the Egyptian censuses a male life expectancy of 22–25 years and a female one of 20–25 years (pp. 75–110). Frier (2000) decided upon male and female life

expectancies of 23 and 25 years respectively and infant mortality rates of 351 and 306. Scheidel (2001a:25) summarized by saying that no real advance had been made on Hopkins's (1966) estimate of a life expectancy between 20 and 30 years. Grmek (1989), drawing amongst other sources on 20 publications spanning 1942–1982 by J.L. Angel on skeletal evidence argued that such high mortality could be supported by the evidence of high levels of violence and such diseases as malaria, tuberculosis, leprosy and blood infections.

Fertility depended also on the proportions of Roman females marrying, their age at first marriage, and the duration of all marriages. There seems to be little dispute that somehow practically all Roman females married. Harkness (1896:50–51) calculated from inscriptions the average age at first marriage of women to be 18 years and of men 26 years, and Hopkins (1965a) supported these conclusions. Shaw (1987) concluded that most Roman females married in their late teens and males in their late twenties. Frier (2000:798–799) used the Egyptian census data to decide that female marriage was close to universal, starting at 12 or 13 years of age with 80 percent married by 20 years. Wives were 7–10 years younger than their husbands, and only 35–40 percent still had husbands at 50 years of age, evidence of male mortality and frequent divorce (Frier 2001:154). The poor may have married earlier, according to Rawson (1986:22) at 12–18 for females and 18–22 for males. Den Boer (1973:36) was not convinced of a class differential in marriage ages but the copious testimony to the reluctance of the male elite to marry must be counted against his view. Harris (1982:115) suspected that universal female marriage was made possible by differential female infanticide, but the age data that exist do not support this interpretation.

Direct testimony to female fertility is scarce. Hopkins (1983) thought the evidence suggested a total fertility rate (TFR) near six, with the fertility of the elite being much lower. Rawson (1991:10) supported the latter contention: "The wealthy childless are prominent in Imperial literature, but it is by no means clear whether such childlessness was intended or involuntary." Riddle (1992:14ff) interpreted the female skeletal pelvic lesion evidence for the Empire to show a TFR as low as 3.3, but this interpretation of pelvic lesions has been trenchantly attacked. Bagnall and Frier (1994:150–151), after heroic transformations of the original data, derived for Egypt a TFR of 6.0, an I_g of 0.7 and an I_f of 0.485, suggesting little room for fertility control within marriage.[2] This was in spite of the fact that Frier (2001:150) believed that the fertility of slave women must have been lower than that of free women, but Scheidel (2001d:35–36) disagreed. Bagnall and Frier also found no greater decline in older-age fertility than Henry (1961) would have expected from natural fertility.

Are these populations in fact natural fertility populations? Bagnall and Frier (1994) believed the Egyptian population was. They argued that, given that the time spent by females in marriage was shortened by divorce and the deaths of their much older husbands, and that for those who did breastfeed postpartum lactation and abstinence durations were lengthy, a TFR around six was evidence of no other control. Frier (2000:787) claims that the Empire's demographic parameters were

close to those of Mediterranean Europe almost two millennia later, just before the early twentieth-century fertility decline, significantly in countries where there was no suspicion of much infanticide, child exposure or effective contraception. Scheidel (2001d:44) concluded: "In sum, there is no good reason to believe that in the Roman period, the population of the empire in general practised forms of family limitation that led to demographic contraction." The situation among the elite may well have been different, as maintained by the literary sources focused almost entirely on the upper classes. Drawing mostly on this testimony, Parkin (1992:133) summarized the situation:

> Some strata of Roman society appear to have failed to reproduce themselves . . . a gradual demographic decline set in, a decline that was in part perceived at the time and against which measures were taken, albeit unsuccessfully. Precise causes for the decline in fertility are not readily apparent, but a general mentality advocating the advantages of bachelorhood and childlessness seems to underlie it, a mentality that was put into effect consciously through practices of abortion and exposure, and to some extent of contraception.

This portrayal is accurate if intended to describe only the urban upper classes, perhaps especially in the city of Rome, but there is no evidence of this situation in the larger population. The demographic proof is weak: Scheidel (1999) thought the only satisfactory data were those on Imperial families, who were much scrutinized and recorded, and even they, faced by ravaging mortality, only just managed to reproduce themselves even with apparently uncontrolled fertility.

WAS THERE A ROMAN FERTILITY TRANSITION?

Two points stand out from the recent explosion of demographic analysis of the classical world, particularly that associated with Frier and Scheidel. The first is that much of classical demography, originally deduced from literary sources and burial inscriptions, remains essentially unchanged. Mortality levels, marriage ages, and the age gap between spouses calculated 40 and even 100 years ago remain largely unchallenged, and certainly within the bounds set by recent scholarship. The second point is that, by drawing on new demographic techniques developed for use in the developing world or in analysing the modern Western demographic transition, researchers have been able to adduce limited but important findings tending to show that the Roman population was probably a near-stationary, near-natural-fertility regime. There was probably no decline and fall of the Roman Empire's population. Although urbanization certainly declined from the later centuries of the Empire to the Dark Ages towards the end of the first millennium, total population may not have followed a similar path. It may have remained stationary for a thousand years or followed the gentle upward exponential growth curve that McEvedy and Jones (1978) alone posited, with subsequent agreement by Maddison (2001). Certainly, it was periodically subject to mortality crises, such as resulted from the

Antonine plague of the late second century, probably measles (Scheidel 2002), and the Justinian plague of the sixth century, almost certainly bubonic.

Where the literary evidence is strongest is that there was a significant restriction of legitimate fertility in upper-class society. That there was such a phenomenon is given greater strength by agreement, both ancient and modern, on why it should have taken place, namely fear of dividing the family patrimony among the heirs, so inevitably demoting them and their children down the social and economic ladders. This would have meant one section of the society exhibiting long term but probably stable lower fertility. This may not have been a rare phenomenon in history. It may well have been the situation among the Genevese *bourgeoisie* in the eighteenth century (see Henry 1956). It may have been the situation in France that resulted from the equal inheritance promoted by the revolutionary army and the statutes of the *Code Napoléon*, a phenomenon possibly misinterpreted because the French fertility decline was caught up by the emerging global fertility transition induced by the Industrial Revolution. It is important to note that the Roman sectional fertility decline did not spread to other classes where children were assets rather than a frightening risk. In this sense the analysis supports Carlsson's (1966) interpretation of the nineteenth-century Swedish transition: it was the material situation rather than the diffusion of ideas that mattered.

Whether this was indeed the situation will probably never be proved by the new demographic methodologies. The data required to do so are simply not available and probably never will be. The problem of data availability besets the new classical demography more broadly. Scheidel (2001c:vii) announced the new dawn of real classical demography, but what he and Frier have already produced may be its zenith, for sophisticated methods and models can take us only so far without being fed new and more comprehensive population data, and the chances of that happening for the classical world seem remote. Certainly, more family and social analysis will help clothe the indistinct demographic findings (e.g., Rawson and Weaver 1997; Dixon 2001) and may make some more probable, but not certain.

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ENDNOTES

1. This article first appeared in the *Journal of Population Research* 21 (1) (May 2004) pp. 1–17.
2. I_g and I_f are indices of marital fertility and total fertility respectively developed by Ansley J. Coale at Princeton University's Office of Population Research. They are based on a comparison with the highest fertility recorded, that of the religious sect, the Hutterites, living in the United States in the 1920s, who are assigned in each case an index of 1.0. They are age-standardized and the 5-year age groups are fertility-weighted.

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CHAPTER 7

FAMILY SIZE CONTROL BY INFANTICIDE IN THE GREAT AGRARIAN SOCIETIES OF ASIA[1]

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INTRODUCTION

An important issue in demography is whether there is evidence for premodern population control, especially control of family size. In an earlier paper we have argued that there is insufficient evidence to conclude that Palaeolithic society consciously practised population control; its approximate long-term population equilibrium is probably adequately explained by non-infanticidal mortality balancing fertility (Caldwell and Caldwell 2003a). Certainly babies were often killed when deformed or in times of crisis but not on a scale to constitute a demographically significant impact.

This was not necessarily the case in the preindustrial agrarian societies of Asia where we have copious references to infanticide in governmental, legal, religious and literary texts (House of Commons 1824; Hanley and Yamamura 1977:233; Ho 1959:58). Some demographers have identified a parallel between preindustrial Western European societies, where deferred or forgone marriage allowed a balance of fertility and mortality at moderate levels, and the situation in Japan, China and probably Korea where supposedly massive infanticide lowered the effective level of reproduction ensuring reduced death rates for those older than infancy, and less population pressure on the environment (Macfarlane 1976:309ff; Wrigley 1978:135–136; Das Gupta 1995:486ff.). Wrigley argued that this could be the result of "unconscious rationality" which particularly characterized the period immediately before industrialization (called by others "proto-industrialization" and roughly describing the situation in East Asia in the nineteenth and early twentieth centuries). We aim to explore recent research to see if it supports these descriptions. But first we must document why the West reacted so strongly to Asian infanticide and was so keen to detect and record its existence.

The reasons that infanticide was likely to be practised were that it did not endanger the mother's life as did premodern abortion, it allowed selection for sex unlike contraception and premodern abortion, it was effective unlike premodern contraception, and its performance required neither special skills nor esoteric

knowledge (see Skinner 1993:251). These were not arguments in favour in Europe, nor those now increasingly accepted by officialdom anywhere in the world, a situation explained by colonization, social and economic globalization, and the domination of contemporary international agencies by Western ethics. This is an area perhaps best explained by the unusual evolution of the West. There is a parallel here with the proposition, encountered later in this paper and put forward by Cornell (1984:338), that there is no need to explain the absence of spinsters in historic Japan, but, on the contrary, any explanation must be in terms of the peculiar Western situation where spinsters were common. This is an analysis of Western attitudes rather than practices, although it seems that the West practised abandonment much more often than direct infanticide (Boswell 1988:44–45).

The peculiar attitude to infanticide of the West, or rather of the People of the Book—Jews, Christians and Muslims—lies in their common religious evolution, its origin being in Judaism. That the Jews did not always abhor infanticide is brought out by the need felt by their prophets to oppose it. They "bitterly denounced the heathenish Israelite practice of child sacrifice [and] therefore opposed a religious custom which was in strict accordance with the deeply ingrained social tenets of all the powerful and ancient civilizations surrounding the lands of Israel and Judah" (Patai 1959:129–130). The condemnation of infanticide was solidified by the Jewish thinkers of the diaspora, especially in Alexandria where Philo early in the first century AD opposed it, together with abortion and exposure, on two grounds, first that it was murder and second that it showed that sexual intercourse had taken place solely for pleasure (Noonan 1970:6). "In a generally uncomplimentary account of the Jews, Tacitus finds it remarkable that they do not kill the children who are born after the father has made his will, that is, children born when the parents no longer want offspring as heirs (Histories 5.5)" (Noonan 1965:85). In Imperial Rome three groups emerged as opposed to infanticide: Jews, Christians and Stoics (Caldwell and Caldwell 2003b). The Christian opposition became stronger from the second to the fourth centuries AD in the writings of St Justin, Tertullian and Lactantius, and in the Epistle of Barnabus (Noonan 1965:87). Christian Roman emperors, aware of long-standing practice, moved only slowly against infanticide with effective legislation waiting until nearly the end of the fifth century. The opposition of Stoicism to infanticide showed that philosophies outside the Judaic tradition could condemn the practice. Indeed, Stoicism as well as Judaism helped mould the Christian condemnation of infanticide. In addition, Chinese and Japanese thinkers and authorities were to rail against infanticide but without producing anything like a received opposition to it. It is the Western opposition that provides our main source of documentary evidence on the matter. The Buddhist emphasis on life placed it theoretically against infanticide but this rarely manifested itself in official action, partly because there was no structural equivalent of the Western Christian Church. The result of this evolution of Western attitudes to infanticide was that when Europeans encountered Asian infanticide they reacted with horror as if one of the eternal verities had been desecrated (see Langer 1974:130). Although it was legally persecuted, there had, of course, been infanticide in the West, but it had been most common among

unmarried mothers (see Rose 1986:1–2). What shocked Europeans most was that Asian infanticide was carried out by married couples.

Nevertheless, the West has legally restricted the charge of infanticide to an action taken by a parent, while the killing of infants by others is homicide, usually with higher penalties (Catholic University of America 1967:500). The Catholic Church now equates abortion with infanticide and both with murder. This has not been a consensus view in the West, although, rather surprisingly, the new edition of the International Encyclopedia of the Social and Behavioral Sciences (Smelser and Baltes 2001) devotes a single entry to "Infanticide and induced abortion" (Klerman 2001:7419–7422). Western attitudes, laws and punishments have, even when opposed to all these practices, recognized an upward gradient in heinousness from contraception to abortion to exposure or abandonment, to infanticide, and finally murder. Not only has abortion been defined varyingly as occurring after either conception or the quickening or the taking on of a human shape by the foetus, but infanticide has been legally graded as occurring only to the newborn in France and during the first two or three years of life in Britain (Klerman 2001:7420; Encyclopaedia Judaica 1971, Vol. 2:99; Catholic Encyclopedia 2003 "infanticide").

This, then, was the mindset with which Europeans reported on Asian infanticide. They were surprised that infanticide occurred not only within marriage but among the rich as well as the poor. Misunderstanding the essentially sacerdotal functions of Confucian and Brahmin priests, they were surprised that the priests did not preach against infanticide (Fei 1946:105). Although they knew that there had never been an authoritative selection of Hindu scriptures to constitute an agreed hallowed text such as the Bible, orientalists within the East India Company tried to convince Indians that certain texts in the Shastras showed infanticide to be outlawed by religion (Vishwanath 1998:1106 ff.). Their failure was recognized by the Governor of Bombay, Elphinstone, who wrote in 1821: "No effectual check can be imposed on this atrocious practice so long as it is so completely congenial to the feelings of the people" (Vishwanath 1998:1109). There was Asian opposition to infanticide but it took a philosophical and ethical rather than a religious form. Ho (1959:58) noted of imperial China: "Local histories, particularly of southern provinces, have preserved various official exhortations prohibiting it and songs composed by local magistrates and scholars depicting its inhumanity." There was also no organized church which could bring pressure on governments for laws to be enacted and enforced to impose its morality.

Long after the first European strong reaction against Asian infanticide, secular Western thought began to soften towards infanticide although none of the proponents seemed to apply their statements to their own societies. These new interpretations were motivated by a desire to avoid Eurocentric attitudes and increasingly by the view that the world was threatened by overpopulation. Carr-Saunders (1922:216) wrote in a book which has continued to be influential: "Abortion and infanticide arise owing to the difficulty of providing for more than one child at a time . . . these customs are practised as normal features of social life and in such a manner as to keep the number of children at a fairly constant average figure . . . the practices are enforced by social pressure." In a book first published in 1936, Firth

(1963:374–376) claimed of the Polynesian population of Tikopia that infanticide was used to balance population with resources and to reduce social tension, noting that "European contact causes a unique problem," namely that "Abortion and infanticide are frowned upon . . . by the mission . . . the result is the former equilibrium is being upset." By the 1960s evolutionary biology was to the fore. Wynne-Edwards (1962:486–492, 542–544), a biologist who provided a beacon for many social scientists by proposing a kind of biological inevitability, explained that population balance was achieved among humans and other animals by "social mortality" which included infanticide. Dickemann (1975:107–108), in another much-cited paper, wrote that infanticide is common in both the plant and animal kingdoms, and that "It is normative, culturally sanctioned behaviour." Hausfater and Hrdy (1984) editing Infanticide: Comparative and Evolutionary Perspectives, in which only four of 25 chapters were devoted to human beings, summarized the findings in their introduction as showing that among humans infanticide was an age-old method of population control, that it was carried out with a minimum of violence, and that it was performed if the transfer of resources to another sibling could enhance reproductive prospects (Hausfater and Hrdy 1984:xxviii–xxx). However, they did note that human infanticide was different in that it was usually done by the parents, in contrast to most other species, especially the primates, where it is usually carried out by a jealous male suitor (p. xxix), thereby much more clearly enhancing his competitive reproductive prospects.

This is the background of the recent interest in historical Asian infanticide. Indian infanticide has been intermittently described over the last two centuries, and hence is addressed first here even though it has historically differed in its context and purposes from infanticide in East Asia. Apart from Taeuber's (1958) path-breaking work, most international journal articles on infanticide in Japan have dated only from the 1980s and in China from the 1990s, with East Asian comparisons from the beginning of the twenty-first century.

This paper does not test each research report but aims at identifying commonalities in the findings that throw light on agrarian population control outside the boundaries of Christendom. The Christian realm experienced an unusual history in that it inherited much of its Bible, had it further moulded by classical philosophy, long ago had its religious precepts turned into law by the huge, centralized Roman Empire, and subsequently had its religious tenets and state law overseen by a tight religious structure owing its existence, form, and claims of universality to the same empire.

The research on which this paper draws is not based on firm data. Infanticide, even when not proscribed, usually had an element of secrecy, partly because attitudes to killing have always been subject to doubt, and partly because birth and the subsequent fate of the newborn in Asia were enveloped in the privacy, and even seclusion, of women. There is also confusion about whether infanticide can be addressed as an event quite distinct from the subsequent treatment of children, especially girls. This paper tries to concentrate on the former but is beset by the problem that much of the evidence depends on sex ratios which clearly also incorporate the latter. One study that is important to this paper is that of Muhuri and

Preston (1991), who sought to avoid this problem by carrying out a sex-parity-specific analysis of child mortality in contemporary, rural Bangladesh (part of India for most of the history discussed here). They concluded that mortality rates showed a preference for a family consisting of two sons and one daughter. Even this analysis could not separate differential postnatal treatment from differential infanticide[2] and the growing pressure on the family's resources (and hence on higher-parity infants) exerted by increasing family size. Finally, the studies are all of densely settled populations, leaving open the possibility of a different situation in sparser agricultural situations.

This paper examines the studies of infanticide in India, Japan and China in an attempt to discover the following. Why was infanticide practised? Were there specific circumstances or periods of higher levels of practice? Was it almost exclusively female infanticide? Was it carried out on a scale to have a measurable demographic impact? Did the practice mean less pressure on resources? Has infanticide declined, and, if so, what were the determinants of decline? Indeed, has it now largely disappeared? For each country we examine the historical evidence, the best-fit model, and the demographic evidence.

INDIA

The first detailed accounts of infanticide, almost entirely of girls, came from East India Company officials resident in northwest and north India (from Gujarat to what is now Uttar Pradesh, part of the former United Provinces) in the late eighteenth and early nineteenth centuries. In 1824 the House of Commons in London published two volumes of East India Company correspondence and reports, 1789–1820, on infanticide, suttee and thuggee. Much of the later analysis of these subjects draws heavily on these reports. These three offences (but not abortion) were regarded as horrifying crimes reprehensible to all moral codes and necessitating eradication. They were all seen as collective crimes, and mothers were never punished for infanticide (Sen 2002:61). But, while suttee and thuggee were public offences, infanticide was private, carried out in secluded women's quarters and very difficult to detect, let alone observe. The British officials discovered while collecting taxes that there were in some groups and areas very few girls, and the existence of infanticide was confirmed by informants. Clark (1979:199) believed that the decision by the British administration to take action was based not only on moral grounds but on the belief that it was part of a dowry system which economically destabilized the population, leading to indebtedness and a reduction in tax revenue. The first legislation proscribing infanticide came in 1795 from Bengal (which then included much of what is now Bihar and Uttar Pradesh), and successive legislation followed, culminating after the Mutiny in the new colonial government's Female Infanticide Act of 1870. Increasingly the evidence on infanticide came from legal proceedings. Indirect information came from high sex ratios in censuses from 1871 but this information was dominated by the impact on girls of differential care and feeding (Visaria 1967, 1968; Desai 1967; Miller 1981).

East India Company officials noted with surprise that infanticide in India was practised not by the poor but by the rich (Kaye 1853:546). Some of the characteristics of Indian infanticide were distinctly different from practices in East Asia and make it difficult to generalize across Asia. The following model draws on nineteenth-century reports (House of Commons 1824; Peggs 1830; Kaye 1853), on modern analysis of the Kanbi or Patidar[3] of Gujarat by Pocock (1957, 1972) and Nath/Vishwanath (1973, 1998), and the Bedees and Chouans of the Punjab (Das 1956), and on more general treatments (Pakrasi 1970; Panigrahi 1976; Guha 2001).

The groups most involved were Rajputs (warrior castes), Jats (dominant peasant castes of North India) and Sikhs (in the Punjab). The conditioning factors were the existence of castes, with the higher and more warlike castes having "towering pride in superior family descent and nobility of lineage" (Pakrasi 1970:11) or "insane pride" (Das 1956:262); caste endogamy but in stratified or fractured castes with subcaste hypergamy; the payment on marriage of dowry, frequently huge, by the bride's family; arranged marriage; the inferior status of women; and little shock at the death of young children. Family pride was, and is, strongly associated with the ability to pay cripplingly high dowries, not to ease the way for the daughter, but to demonstrate the worth of the family and to increase the regard in which it is held. Anciently dowry was paid only for royalty but it spread to the northern upper castes and in recent decades to the northern lower castes and to South India (Caldwell et al. 1988:238–239). Hypergamy is the system whereby daughters marry up the social scale, from lower to higher subcastes (e.g., from Kanbi to Patidar), made possible only by the payment of dowries commensurate with the rise achieved. All this is propelled by a process that Srinivas (1952, 1956) termed "Sanskritization," the aim of subcastes to be seen to behave as higher subcastes, or castes to behave like higher castes and to draw closer to the pattern of Brahmins. Hypergamy was practised in the stratified castes, and led to the lower ranks of those castes paying huge dowries. In the top rungs of these castes the daughters could not marry higher and so the only way to avoid the degrading shame of having a postpubertal unmarried daughter in the family was to kill her at birth. The East India Company's reports recorded such subclans as claiming that no daughter had been raised for generations. In the lower rungs of these castes a daughter was valuable because her hypergamous marriage would bring pride to the family in a way that no other act could, but the marriage of several daughters might well bring the family to penury, and the sale of land would reduce the sons' inheritance. Women counted for so little that the higher families were not shamed by lower daughters-in-law, and might be tempted by riches into agreeing to receive a bride from an unusually rich family many rungs down the social ladder. The sons from families in the lowest subcaste had to remain unmarried or (although it is often denied in India) marry into a lower caste (Pocock 1957:21–22). Death seems, at least to the outside observer discussing the frequent suicides in India and Sri Lanka, to be taken rather lightly, perhaps because of the belief in reincarnation, and this is particularly so for the new-born. Female infanticide was most likely in

hypergamous castes, with the practice being found among the higher or dominant subcastes. Such castes were found across northern India (Clark 1983:14–15). The result, according to Miller (1981:65), was that the 1872 census revealed that in the western United Provinces one quarter of the population killed half their female offspring, an estimate which Dyson (1997:110) believes is probably too high.

Female infanticide was, then, one of the traditions of India. The British believed that they had stamped out the practice in the last decades of the nineteenth century and had convinced the urban middle class that they were right to do so, but no one knew how the rural population regarded the matter (Panigrahi 1976:xi). Suppression was achieved by concentrating on the hypergamous castes which were officially called the "Proclaimed Clans" (Guha 2001a:75). From census to census India continued to exhibit the world's highest masculinity, leading Visaria (1968:108–09) to suspect that some infanticide survived. He pointed out that the areas with the highest ratios of males to females were precisely those that were earlier reported to experience the most infanticide. Of course, they might be the places where females were least valued and accordingly most neglected, but the border between infanticide and infant neglect has always been statistically, legally, and morally blurred. In fact, the excess female mortality was distributed right through the age range (Visaria 1968:219), evidence in the reproductive age range of the awful risks of childbearing but probably evidence too of relative neglect at every age. There was no evidence of male infanticide, and none of female infanticide arising from poverty or any other cause but the payment of exorbitant dowries. But the poor, especially the rural poor, tended to be relatively invisible and poverty-induced infanticide would be less likely to be noticed, especially if it were not restricted to one sex. Das Gupta (1995:489–490) believes that in the Punjab, in a system of partible inheritance among married sons, female infanticide limited the number of available brides and therefore of sons who could marry, and so reduced the subdivision of farmland.

Evidence has begun to accumulate for significant levels of recent infanticide; ADATHI (a Bihar-based NGO) has recorded its practice in Bihar (Sudha and Irudaya Rajan 1999:594–596). But the strongest proof and highest reported incidence is from parts of rural Tamil Nadu (especially Salem and Madurai Districts) in the South (George et al. 1992, 1998; Chunkath 1997). The local health centres record "infant death due to social causes" (Chunkath 1997:23). The main driving force is once again Sanskritization, with dowry payment now extending down to the lowest castes in the North and to the main peasant castes in the South. In Tamil Nadu the highest rate of infanticide is among the dominant and prosperous peasant caste, the Gounders. Significantly, the Harijans (or Dalits), the last to accept dowry, and also the group in which girls earn their keep as agricultural labourers, apparently do not practise infanticide (George et al. 1998). Infanticide increases with higher birth orders and among females, suggesting that there may be a move towards the two-surviving-sons, one-surviving-daughter family that Muhuri and Preston (1991) found preferred in Bangladesh and we found desired in India in rural Karnataka (Caldwell et al. 1988:254). As has probably widely and for countless

years been the case in India, infanticide was the fate of defective babies. The move towards dowries probably reflects greater prosperity and a broader knowledge of what happens elsewhere in India. The shaping of the smaller family is largely a reaction to a richer society with consumption choices and better prospects of educating children (Caldwell et al. 1988:44ff., 161ff.).

What, then, has been the demographic impact of infanticide? It was largely confined to the middle and upper classes with the exception of Brahmins (Miller 1981:55), who shared with Buddhists and Jains religious concepts of the inviolability of life. The concentration of infanticide on female babies certainly had a greater impact on potential growth than would have been the case if the practice had been less sex-specific. In the population about which we have nineteenth-century evidence of almost absolute female infanticide, for instance by some of the Rajput clans of Kathiawad (now Saurashtra) in Gujarat's Kutch Peninsula, all Rajput clans made up about 5.5 percent of the population, and infanticidal ones only part of that number (Viswanath 1998:1105). The impact of their infanticide on the total population would be a diminution of the female population by perhaps three percent. George's (1997:3) research in the areas of contemporary Tamil Nadu apparently most given to infanticide found half of 12 villages killing 10 percent of all newborn females or 5 percent in total (and no more perhaps than 1–2 percent in the entire state). The rate of infanticide was as low as this because 80–90 percent was concentrated among female birth orders above two, where it was almost absolute. More significantly, the research showed that the sex ratios were similar in the villages practising and not practising female infanticide, testimony perhaps to greater female neglect in the latter. Guha (2001b:54–55), partly drawing on Das Gupta's (1995) evidence on the Punjab, concluded that there probably have been regions where female infanticide was practised on a scale sufficient to make a significant demographic impact.

Infanticide is not completely female, but is very largely so. In contemporary rural Tamil Nadu, Chunkath (1997:25) found 1 percent of male babies being killed in contrast to 18 percent of female babies. The total demographic impact is probably small and much less than the loss of females due to comparative neglect. Where we worked in rural South India, this tended to take the form of devoting more resources to sons' survival: parents claimed that they were the weaker sex, and were shocked by the prospect of having no surviving sons. Jeffery et al. (1984:1208–1209) doubted the practice of infanticide in their research area in Uttar Pradesh and expressed scepticism of Miller's (1981) claim that folk memories could revive infanticide. Now it appears either that Miller was right or, more likely, that the globalization of the religious and moral conviction that infanticide constitutes one of the ultimate evils is not as complete as has often been assumed. Even more surprisingly, infanticide has resurfaced in a country with legalized abortion, and in a state with an efficient family planning program. The answer to this conundrum is probably that women fear female sterilization ("the operation") more than infanticide and that attending government hospitals for an abortion is a very public matter far removed from the village.

JAPAN

Most research on Japanese infanticide has concentrated on the Tokugawa period (1603–1868), partly because it immediately preceded the modernization of Japan after the Meiji Restoration, and partly because population barely grew between reports on Japanese numbers to the Shogun of 1726 and 1852 in spite of earlier and later significant growth. Deliberate population control was suspected, mainly infanticide supplemented by abortion, the latter especially in the cities. Unlike the situation in India, indigenous written reports on infanticide for this period are plentiful, and the term *mabiki*, the thinning out of seedlings, is frequently used (Hanley and Yamamura 1977; Eng and Smith 1976:423–424, 443; Smith 1977:63).

There were village and temple registration systems but reports were made annually and the recorders were not interested in those who had both been born and died during the previous year, thus omitting 80–90 percent of infant mortality. A study of temple registration in a central Japanese village showed for the last quarter of the eighteenth century and throughout the nineteenth century infant mortality rates between 225 and 250 per thousand births and under-five mortality between 350 and 440, the former equivalent to rates in England, France, and Sweden before 1750 and the latter higher still (Jannetta and Preston 1991). The last great mortality crisis, the Tenpō famine of the 1830s, quadrupled death rates, reducing the population by 10 percent, a loss that took 20 years to overcome. Jannetta (1992:442) concluded from these data that "we should be careful about assigning a major role to abortion and infanticide as a means of family limitation." The child mortality level is one that would characterize a population with a life expectancy around 30 years (Coale and Demeny 1966, West tables), but other village studies yielded higher estimates: around 40 years (Smith 1977:55) or higher still (Hanley and Yamamura 1977:222). In a stationary population, which Tokugawa Japan approximated, Jannetta and Preston's mortality level would imply a TFR of 4.4 and a CBR of 33 while Smith's suggests 3.4 and 25. In fact, both sets of levels have been found, with Mosk's (1979:19–20) estimates being compatible with Jannetta and Preston's findings. It may all depend on how many dead infants were never recorded and whether their deaths were natural or contrived.

In either set of figures fertility levels are quite low as are completed marital fertility levels. However, there is no easy answer. The Princeton "*M*" measure of the level of fertility shows that it is within the bounds of natural fertility experience elsewhere but near the minimum bound, the age-specific birth rate curve is moderately convex, and the Princeton "*m*" is around 0.2 (Mosk 1979:23). It seems unlikely that infanticide would not select for higher parities, thus yielding an "*m*" above 0.2. Hanley and Yamamura (1977) found in four villages which they studied that female marriage averaged around 22 years and was rarely preceded by births but not infrequently by conceptions, and the average age of the mother at first birth was 23.6 years, late by non-Western standards. The average age at last birth was 34 years; the sex ratio at first birth was 1.24 and at last birth was

1.40. The last three findings suggest modest levels of infanticide without either the births or deaths being reported. Feeney and Hamano (1990:29) argued that it is necessary to look beyond infanticide and abortion to explain the low levels of marital fertility because they would have to be at implausibly high levels to be the major determinant. The sex ratios do not suggest great discrimination against females. Infanticide may have been much more frequent in mortality crises of earlier years. Hanley and Yamamura (1977:233) report that "infanticide in the Tohoku region during the Temmei famine of the 1780s is legendary" and that children's bodies rolled in mats floated down the river. Nevertheless, some of these bodies may have been the product of death by starvation, girls were not specifically mentioned, and the occurrence was sufficiently shocking and unusual for many local authorities to require thereafter the registration of pregnancy. There is no evidence of contraception (Hanley 1974:134).

Why, then, may Tokugawa society have been characterized by some infanticide, directed perhaps more at girls but not overwhelmingly so? There is general agreement that Tokugawa Japan experienced increasing prosperity in a period of proto-industrialization (Smith 1959; Eng and Smith 1976; Saito 1983). Farming became more market-oriented and competitive as co-operative clan farming gave way to individual family farming, agricultural productivity rose, rural industry increased particularly strongly in cotton, silk and weaving, and internal trade flourished. Families became better fed (Mosk 1978:271). They also became aware of the possibilities of economic advancement particularly if they were not too large (Kalland and Pedersen 1984:32). When people succeeded in prospering they turned economic advance into social advance by donating to respected social causes and seeking election to village posts of status and power. Hanley (1991:704) coined a term for this process, "the Samurization of Japanese society," paralleling the Indian concept of "Sanskritization." This interpretation is supported by analyses which appear to show that infanticide was practised by all classes and in good times as well as bad, and that apparent fertility, unlike marriage, was not affected by changes in the price of rice (Eng and Smith 1976:443; Cornell 1996:25).

Inheritance requirements exerted some pressure on parents to determine the shape of the family. Unless the available land was large it was inherited by a single son, usually the eldest, mandated by tradition in the Tokugawa period and law under the Meiji (Smith 1972:441; Hanley 1985:197). Hayami (1983) agreed that this was the general situation, while cataloguing different geographical emphases, even though he titled his paper "The myth of primogeniture and impartible inheritance in Tokugawa Japan." Although there was great emphasis on the continuation of the property and the associated rites for the ancestors, Japanese inheritance was more flexible than elsewhere in East Asia and, because an adopted son or a son-in-law could be substituted for a son if none survived, there was little worry about small families or surviving daughters only endangering the lineage. If a man died prematurely his widow could assume control until a son married. On the other hand the right of the father to expel a rebellious son from the village reduced the risk implicit in big families. Unless the man died at an earlier age, he handed over

his property to a son as he grew old. In theory this happened at 60 years of age, and, in practice, the great majority of transfers occurred when the father was 57–63 years and the inheriting son 23–37 years (Cornell 1983:61). Often this followed the marriage of the eldest son, and at this stage his siblings began to leave the household to seek the employment which was increasingly plentiful in rural areas.

Unlike the situation among the higher and richer castes of India who were assisted by agricultural labourers and servants, most Japanese farming families depended on the field work of sons and the housework of daughters (Skinner 1993:252). The latter were important to the farmer's wife who was unlikely to be joined by a daughter-in-law until the inheriting son married, and whose daughters did not leave the household until they married at 22–24 years of age, in contrast to Indian daughters who left at puberty or earlier (Mosk 1983:143, 263; Hanley 1985:197). Daughters in poor Japanese households were even more valuable than in rich ones because they married later (Eng and Smith 1976:434). So families were shaped in the hope of having at least one surviving son and daughter, and infanticide could occur if successive births were of the same sex. Skinner's (1993:252–259) data show significant levels of infanticide among the firstborn with equal emphasis on the survivors being girls, with the aim of acquiring a child-carer for younger siblings as soon as possible.

Tokugawa near-stationary population was achieved with lower marital fertility but higher marriage levels than in England at the same time (Tomobe 2001:144–145). Lower marital fertility was partly attained by infanticide, although this was probably practised mostly in families with above-average fertility or below-average child mortality. It probably ensured a lower level of difficulty over land inheritance and fewer other siblings seeking work off the family farm and outside agriculture. On the other hand, societal fertility was maximized by creating a shortage of females and so ensuring that nearly all of them could marry: in contrast, among males Smith's (1977:92) study of the village of Nakahara showed 12 percent never-married at 50. Low marital fertility may be partly explained by low coital frequency early in marriage and towards the end of the reproductive span: Rindfuss and Morgan (1983) showed a striking recent increase in early conceptions in East Asian marriages caused by earlier and more frequent sexual intercourse which they attributed to a decline in arranged marriage but which may have had more complex relations with modernization. Saito (2000:21) agreed, arguing that continuing low fertility in 1913 (with an I_g of .57), when infanticide was probably negligible and contraception little used, downgraded the probable earlier importance of infanticide.

CHINA

It is by no means clear that China experienced a period of near-stationary population growth, although its increase was apparently relatively slow during the first half of the twentieth century. Lavely et al. (1990:816–817) claim near-consensus on growth from around 150 million in the late seventeenth century to

500 million around 1900, 600 million in 1950 and 1.1 billion in 1990. The earlier growth depended partly on the spread of irrigation and migration to South China. Nevertheless, there are numerous references in historical literature to infanticide and among modern writers near-unanimity on its ancient practice (Fei 1946; Lang 1946; Ho 1959; Lee 1981; Wang et al. 1995; Lee and Wang 1999). Fei (1946:33–34), from his field work on the lower Yangtze in 1936, spoke of infanticide being common at that time especially when small landholders were faced with the problem of land division: "The usual solution is infanticide or abortion. The people do not attempt to justify these practices and admit that they are bad. But there is no alternative except poverty and 'crime'." One suspects that they meant "bad" by Fei's morality, that of educated largely urban people. "Organized religion plays no role, as at the temple the priest never preaches any doctrine to the people except possibly the dead. Even then he preaches in a language alien to the people" (Fei 1946:105). This is the stance taken in summarizing the situation by Ho (1959:60). Wolf (2001) remains the chief sceptic and even he seems now to restrict his denial to the existence at any time of male infanticide (p. 134) and infanticide for any reason other than birth spacing which he describes as a form of mortality control (Wolf 2001:143). Indeed, the difficult issue is whether infanticide was or was not almost entirely confined to females. If it was so confined, then the reason for its existence was largely the current poverty and subsistence problems of the family; if not, then the subdivision of the land through inheritance was probably also a concern.

The sources for demographic reconstruction are even weaker than in Japan. There are some lineage genealogies (which almost invariably omit dead infants), the records from the Qing Office of Imperial Lineage, 1652–1911, which have been mined by Lee and colleagues (which is atypical in that it is of a foreign ruling, urban, bureaucratic class, but which does include vital statistics), an agricultural survey carried out in the 1930s by Buck (Barclay et al. 1976), and recent retrospective survey data used by Zhao (1997), which are detailed but which do not include mortality information and which, even for the oldest respondents, go back only to the second decade of the twentieth century.

Barclay et al.'s (1976) reassessment of Buck's (1937) data estimated for parts of rural China in the early twentieth century an expectation of life at birth of 24 years, an infant mortality rate of 300 per thousand births, and a total fertility rate of 5.5. The latter rate is not below that of some historical European "natural fertility" populations, but, given universal female marriage in China, yields strikingly low marital fertility rates. Of course, some births followed by deaths, whether natural or infanticide, may have been omitted, and Coale (1984:479) agreed that, if the real infant mortality rate had been 350 per thousand, then the total fertility rate would have been higher at almost 5.8. Lee and Campbell (1977:62) reported for the late eighteenth and nineteenth centuries a life expectancy of 36 for males and 29 for females in rural Liaoning (southern Manchuria). Lavely and Wong (1998) showed that most analyses of historical data have decided that life expectancy has been over 30 years for the last 250 years or longer (pp. 720–724), and concluded

from their review that in eighteenth and nineteenth-century China mortality rates (excluding apparently infanticide) were probably not greater than in preindustrial Europe, nutrition was not poorer, and the main restraint on reproduction was probably infanticide, in contrast to delayed or forgone marriage in Europe (Lavely and Wong 1998:737–738). Zhao (1997) drew his data from the huge one-in-a thousand 1982 fertility survey, focusing on the 30,000 rural women born between 1914 and 1930 (40–56 years old in 1970 when contraception became more easily available and the fertility decline began, and 52–68 when surveyed) still in their first marriage. Only five percent were literate. He found that they averaged 18.6 years at first marriage; 21.8 years at first birth, an interval between these two events of over three years and long by European historical comparisons; 38.2 years at last birth, early for a non-contracepting population; 5.9 live births, low for completed marital fertility but infants killed at birth were probably not reported; while only 3.5 percent were childless in a population where nearly all women married. Zhao's data allowed him to establish what some earlier analysts had deduced, namely that the sex and number of living children determined how soon women moved towards another birth and how early they stopped bearing children (Zhao 1997:738–749). In other words Chinese families were probably shaped mostly by infanticide supplemented by sexual abstinence and low coital frequencies. Sons of higher birth orders were not exempt from infanticide although less likely to be killed than daughters, and families wished for a least one surviving daughter. Princeton "*m*" and "*M*" values were both low but may not be good measures in a regime of selective infanticide (Zhao 1997:754ff.). Nor may they be appropriate measures of very low coital frequencies throughout marriage. Lee and Wang (1999:82–90), while accepting a significant role of infanticide in limiting family size, argued that the chief control was low natural fertility, explained by low coital frequencies with marital coital restraint being part of a long tradition of carnal restraint which was seen as morally good, improving the health, and increasing life expectancy.

The evidence is clear that the main fear in having too many sons was the division of the land in a male partible inheritance system to the point where the sons cannot grow enough food for their families' needs. There was no cushion of the type the Japanese experienced in the nineteenth century with the rapid growth of rural non-farming industries. In contrast, rich farmers had more children (Lavely et al. 1990:818). Fei (1946:33–34) made it clear that on the lower Yangtze in 1936 many farms were already at a critically minimum size for one family: nine *mow* or 1.3 acres. Nevertheless, it was essential that at least one son, and in due course, one son's son, should survive to use incense and fire (which transfers food and clothing) in rituals for the ancestors (Fei 1946:30–31). Adoption was a possible, but not preferred, alternative. Girls were less desired and female infants were more likely to be killed (Ho, 1959:60). But the first surviving daughter was not likely to be harmed (Fei 1946:33–34) because she helped her mother with domestic work and cared for her brothers. Similarly, the sons provided labour for the farm, but this became less essential as farms became smaller as a result of division

(Fei 1946:32–33). Nevertheless, the sons' labour outlasted that of daughters in that the latter left the household on marriage, usually in their late teens.

Much hinges on whether Wolf (2001) is right in arguing that sons were never killed or whether his adversaries—those he labels revisionists—Wang, Lee, Campbell and Zhao are right interpreting the situation as one in which, although families much more often killed girls so as to limit the number of children they fed, some had so many male births that they had to limit them too. Wolf (2001:148) agrees that sons beyond the second were so disadvantageous that they were often given away; this seems to allow the possibility of some male infanticide. Zhao (2002:756), replying to Wolf, points out that scholars and officials, especially in the Soong Dynasty, often argued that raising only two sons, or even one, was prudent. Whether sons were just less likely to be killed, or, on the contrary, most unlikely to meet this fate, is a question which cannot be solved by sex ratios.

Higher fertility among the rich did not mean that they did not also have motives for limiting and shaping the family. Marriage payments are complex in this basically "bridewealth" system. Certainly, the groom's family starts the process of marriage payments, but the bride's parents return these to the young couple together with presents of at least equal and usually greater value. It is essentially a "premortem" inheritance system with the parents of girls assuming the greater load (see Goody and Tambiah 1973).

In premodern China, low natural fertility together with high infant and child mortality were probably the main restraints on family size and population growth. Nevertheless, it was infanticide and greater neglect of children of higher birth orders, especially girls, that shaped the family when demographic forces had not already sufficiently done so.

Modern China differs from historic China, Japan and India in that it is not resources but the state that imposes an upper limit to family size. Female excess deaths have probably never reached zero. Coale and Banister (1994:459) claimed that "The incidence of excess early female deaths (probably infanticide) declined precipitously in the Communist period, but not to zero. The recent escalation in the proportion of young females missing in China has been caused largely by rapidly escalating sex-selective abortion" (see also Zeng et al. 1993). To which one should probably add stopping family building after the birth of a son, which has its most marked effect at very low levels of fertility. Coale and Banister also calculated the excess female deaths in the first year of life to have fallen from 15 percent in 1936 to 4 percent in 1950, and then oscillated to 7 percent in 1954, 2 percent in 1960–72, and 5 percent in 1984. Seemingly, sons have not lost all relative value, always having potential worth for old-age support, and in recent years, as much of the land became *de facto* privatized, for family agricultural labour. Evidence comes from sex ratios at birth, which rose between parity one and parity four births at the 1990 census from 105 to 132 and at the 2000 census from 105 to 161 (Coale and Banister 1994:459). Infant abandonment also appears to have become more often practised (Johnson et al. 1998).

SYNTHESIS

The populations of the great Asian agrarian societies typify much of the non-Judaeo-Christian-Muslim world. They have traditionally seen little difference between foeticide and infanticide during the first months of life. That is also the dogmatic position of the contemporary Catholic Church, but it is at odds with the attitudes of most of its adherents and the central Western tradition which regarded the great crime as being against visible life, namely after the birth had taken place. Even then, legal punishment for a mother committing infanticide was usually less than if she had killed her child at four or five years of age, but that may have been mostly a recognition of the psychological state of the woman—usually unmarried—immediately after giving birth. Nevertheless, the expanding West with its denial of the right to kill a child was deeply shocked on encountering large-scale infanticide.

Other traditions could also arrive at a condemnation of infanticide as an attack on life itself. Opposition to infanticide could be derived from tenets of Buddhism, Confucianism or Brahmanism, as well as Greek philosophy as occurred in the Classical world. Indeed much of what we know about the widespread existence, but not the scale, of East Asian infanticide was from condemnation of it by officials, magistrates, philosophers and the literati. What is absent is condemnation by organized religion. Hindu and Confucian priests carried out ceremonies and kept their adherents to the proper rituals rather than keeping them to strict moral rules of behaviour in keeping with a given code of life. The West took the latter route shaped by the rabbinical approach, the influence of Greek philosophy on the early Christian Councils, the subsequent interpretations in the writings of the Church Fathers, and the establishment of a politically powerful Catholic Church.

There is little doubt that infanticide will largely disappear. Part of the process has been the spread of the West with both religious and secular thought strongly opposed to infanticide. The missionary impact of Western attitudes came not only from missionaries themselves, but also from colonial governments, legal systems, and formal educational systems. The convincing of the literate middle classes about the evils of infanticide was so quick and complete that it has been possible to overlook the fact that victory has often not been absolute among the illiterate, socially silent peasant masses. Even so, the near-elimination of infanticide is inevitable. This is so because of rising incomes, increasingly invasive communication systems, universal education, and "modernizing" governments. It is also so because Western morality has captured the agenda of international agencies where arguments for the acceptability of infanticide would not be tolerated. But, more importantly, it is so because the invention, legitimation, and spread of good contraception and safe abortion services will very largely eliminate its need. The remaining need felt in much of Asia is that of shaping the sex composition of the family, a need which until recently could be met only by infanticide, but even that motive for infanticide is being overcome by amniocentesis and ultrasound directing sex-selective abortion. As fertility falls ever lower, preferences will

probably change from families of two boys and one girl to one of each sex, then to one son.

What, then, can be concluded from the comparative study of East and South Asia? Certainly, that infanticide was known and in East Asia practised on a considerable scale. We do not know the exact scale because births followed by infant deaths were rarely recorded whether natural or contrived. Nor are sex ratios at various ages a sure guide, because of sex-specific patterns of age misstatement, because not all infanticide was practised on females, because of sex-specific omission from the counts, but mostly because female infanticide cannot be distinguished from relative female neglect. Finally, the scale cannot be calculated because of the impossibility of distinguishing natural infant mortality from infanticide. Indeed most couples' needs for small families were probably met, or more than met, by natural mortality, leaving only some with capriciously high child survival rates to practise infanticide. For curtailing family or community population growth, natural infant mortality is more efficient than infanticide in that many infants die later than at birth, thus leading to a longer interbirth interval and consequent lower fertility.

The comparison of the three countries shows little difference in the methods of infanticide. They include drowning (often in a jar of water), smothering, poisonous liquids given orally or placed on the mother's teats, just withholding breast milk (where the border with neglect becomes blurred), or abandoning and exposing. The decision to kill is usually made by the father, most often with the agreement of the mother because both perceive the same problem. Nevertheless, recent research in Tamil Nadu, India, has revealed that the women are more likely to reveal what happens, partly because many are aggrieved. The act is nearly always carried out by women: mothers, midwives, nurses or female servants. The women are largely powerless in the decision-making, but some (as well as husbands) have now been jailed for the crime in India (Kumar 2003).

The core question is why infanticide was decided upon. Taeuber (1958:33) was probably on the right track about half a century ago: "The pressure of numbers on subsistence and the misery of poverty do not explain the control of fertility in the industrial society; they do not explain the abortion and the infanticide of the agrarian society." There is usually a desire to improve one's situation or that of the family or to ensure that one's descendants are not poorer. Female infanticide was greatest among the richest in eighteenth-century and nineteenth-century India; it is reviving now in parts of India among the dominant landed groups as the temptations of consumer society are beginning to be felt. Times of slowly growing prosperity certainly underlay infanticide in Tokugawa Japan and possibly in late Imperial China. The determination that in subsequent generations the family property will remain undivided or even prosperous is not solely an altruistic regard for one's descendants. On the contrary, it remains a memorial for oneself, and the chief evidence of one's existence and life achievements.

The dominant motive in India and Japan, and probably a significant but possibly secondary motive in China, was not present pressure on the family's resources, or on natural resources, but the problems of inheritance, the survival intact of the family estate, and the problems of the non-inheriting children. The

situation was identical among the middle class in ancient Rome (Caldwell and Caldwell 2003b) and probably among the late eighteenth-century and nineteenth-century French peasantry (although the latter employed a different balance of methods for shaping the family). The lowest subcastes in India's hypergamous castes could not afford dowry for the marriages of more than one daughter no matter how much their prestige was raised. In Japan the inheritance by a single son meant that the other siblings would be jealous, sometimes to the point of fratricide, and that all other siblings might face hardships. In China partible inheritance meant that all but the largest landholdings would be divided over successive generations to the point where they were not viable. Indeed, to a large extent this happened. Urbanization and the decline in the relative importance of the agricultural sector of the economy in providing jobs count increasingly against the importance of both inheritance and infanticide.

What makes Asia different from sub-Saharan Africa in the value of children is the existence of freehold land tenure in Asia, and hence the domination of the significance of inheritance issues over upward wealth flows in a way that does not occur in Africa. The result is that few references are made in academic literature on Asia to the value of children. But where it is mentioned it is positive. There was no demand for zero fertility. A farmer had to balance the value of sons' agricultural labour against ultimate inheritance problems, with the former likely to win out (at least in China) on larger properties. Daughters helped their mothers with domestic work and childcare, and this had to be weighed against the costs of their marriage: in India a greater problem historically in the north, but increasingly now all over the country.

In that infanticide slowed or halted land division, there must have been more food for the family's descendants and hence lower non-infant mortality than would otherwise have been the case. Perhaps the effect was first felt by the spared infants. Not too much should be made of this point as infanticide increased with family size, and families that practised infanticide probably spared few high-order births. Nor should we stress the impact of infanticide too strongly because everywhere it was practised most against weak or defective babies who may well have otherwise died in infancy. It was also practised when births were too close together thus possibly saving the other sibling of the pair. Nevertheless, in that the aim was fewer persons in the succeeding generation and in that most who did commit infanticide probably achieved this aim, there must have been less pressure on the soil and slower population growth. The alternative scenario is that the higher living standards permitted in smaller families acted to ensure that pressure on the environment did not diminish. Perhaps the belief that infanticide in Tokugawa Japan was a significant factor in the explanation of over a century's stationary population was correct. The fact that the Princeton "*m*" did not record significant values for any of these Asian societies, suggests that infanticide must have been on a modest scale, even if the index is imperfect in these conditions.

Infanticide, and other methods such as restricted sexual relations, could be employed to keep the family to what might seem a dangerously small size at significant risk of having no male descendant to inherit. Although direct descendants

were much preferred as inheritors, the failure to rear one surviving son was not as feared as the survival of several sons. The fall-back solution was to restrict family size but, if necessary, to permit the adoption of a son or inheritance by a son-in-law.

Communication has been important. The anti-infanticide message has penetrated to every government and elite in the world. Yet it is not a one-way movement. Since half the villages in the studied parts of rural Tamil Nadu practised infanticide while the other half did not, and assuming that the practice has not a continuing and hitherto unnoticed history in these villages (a point which seems to be agreed upon), there has been leadership, at least by example, in the practising villages, as well as communication within these villages and probably between villages.

Finally, did sex-specific infanticide—or all infanticide and relative female neglect—improve the position of women by rendering them an item of inadequate supply in the marriage market and hence more valuable? Probably not. The whole history of India over the last two centuries shows that it is the initial devaluation of women's worth, the devaluation that led to the infanticide or neglect, that continued to give them a lower status.

ENDNOTES

1. This article first appeared in *The Journal of Comparative Family Studies* 36(2) (2005) pp. 205–226.
2. Muhuri and Preston believe that differential treatment was by far the most important factor, and we agree.
3. The name was changed from Kanbi to Patidar in the 1931 census but the two terms can still be used to describe the lower and higher sections of the caste respectively.

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PART II

THE MODERN TRANSITION

CHAPTER 8

TRANSMUTING THE INDUSTRIAL REVOLUTION INTO MORTALITY DECLINE

After centuries with life expectancy at birth around 40 years and infant mortality rates of 150 per thousand births or higher, mortality in the late nineteenth century began to fall in advanced Western countries so that by the end of the twentieth century life expectancy had doubled to nearly 80 years and infant mortality was around 5–7 per thousand births (see Table 8.1 and also Riley 2001:39). This extraordinary change in the human condition was the product of the Industrial Revolution which led to real average incomes rising from 1820 to the end of the nineteenth century by two to three times and to the end of the following century by 16–18 times (excluding England where incomes were already higher than elsewhere in 1820 and Australia where they were lower). Mortality above two years of age fell fairly generally from about 1870, but that of infants and to a lesser extent one-year-olds waited until the turn of the century before major decline set in. The aim of this essay is threefold: to explore how the Scientific and Industrial Revolutions produced the mortality decline; to explain why the mortality decline began, in England at least, well after industrialization began; and to explain the persistent decline thereafter with little sign of new medical treatments becoming available until after 1935. It will necessarily cover a broad canvas, gathering together the results of detailed investigations. It will also take into consideration earlier scientific breakthroughs during the long process leading up to the Industrial Revolution.

The causes of the change in mortality levels have been extensively researched but most emphasis has been on why the decline began when it did. This essay will raise an equally important issue which has been little researched, namely why the start of the decline was so late. It can hardly be said that the West in 1870, let alone 1900, was scientifically and technologically little changed from the situation in the preceding centuries. Two relatively under-researched areas will be followed up: the tardy invention of high-resolution microscopes, and the origins of the chemicals used in public health efforts.

The focus of the enquiry will be on Western Europe, especially France, Germany and England (which dominated most of the relevant research until the late nineteenth century), with some inputs from Italy, the United States and even Russia. America was not to lead research until the twentieth century when it developed a huge infrastructure of universities, research institutes, drug companies,

Table 8.1. Income and Mortality in Western Countries 1820–2000

Country	Measure	1820	1850	1900	1950	2000
England and Wales	PCI[a]	1,706	2,330	4,492	6,939	19,817
	IMR	150	162	154	30	7
	e°_{0}	39	39	48	71	78
France	PCI	1,135	1,597	2,876	5,271	20,808
	IMR	na	146	160	52	5
	e°_{0}	na	39	46	67	79
Germany	PCI	1,077	1,428	2,985	3,881	18,596
	IMR	na	297	229	60	5
	e°_{0}	na	na	na	67	78
Sweden	PCI	1,198	1,289	2,561	6,739	20,321
	IMR	176	146	99	21	5
	e°_{0}	39	44	53	71	80
USA	PCI	1,257	1,806	4,091	9,561	28,129
	IMR	na	na	na	43	7
	e°_{0}	na	42[b]	52[b]	66	77
Australia	PCI	518	1,975	4,013	7,412	21,540
	IMR	na	na	100	24	5
	e°_{0}	na	45	55	69	80

Notes: [a]Gross domestic income per head in 1990 International Geary-Khamis dollars (equal to 1990 US dollars). [b] Estimates.
Sources: Jacobson 1957; Coale and Zelnik 1963; Keyfitz and Flieger 1968; Wrigley and Schofield 1981; McDonald et al. 1987; Mitchell 1998a, 1998b, 2003; Woods 2000; Maddison 2003.

and scientific funding. Even where American research was in the lead, as in the case of diphtheria, the investigators had usually had experience in Europe, especially in the institutes in Paris and Berlin first directed by Louis Pasteur and Robert Koch respectively.

France, Germany and England are accordingly included in Table 8.1, together with Sweden which probably led the continent's mortality decline and which has excellent historical demographic data. The United States and Australia have been added to the table as more sparsely settled countries of overseas European settlement, richer than continental Europe (but not Britain) through the second half of the nineteenth century, and always comparatively well nourished.

The Industrial Revolution was driven not only by productive investment and changes in the means of production, but, underlying these changes, by enormous advances in scientific and technical knowledge and levels of education. Some

of the scientific breakthroughs occurred earlier in the sixteenth and seventeenth centuries, with Copernicus, Galileo, Newton, and the laying down of the scientific method by Francis Bacon. The nineteenth century up to 1870 had witnessed great advances in chemistry (Avogadro's Law and Mendeleev's Periodic Table) and physics (Clausius's Laws of Thermodynamics), followed in the balance of the century by the Michelson-Morley experiment, X-rays, cathode ray tubes and the principles of radio. By 1900 Einstein's Shorter Theory of Relativity was only five years away. Biology was not backward: Harvey had published on the circulation of the blood as early as 1628 and Darwin on evolution in 1859; nor was the study of anatomy and physiology retarded. What was astonishingly backward was knowledge about the mechanisms of infectious disease transmission, and it was this failure that was central to continuing high mortality. Indeed, so central was it that few anticipated a general lowering of death rates. Such radicals as Paine and Marx agreed with Malthus that the very poor (and especially their children) died more readily and the reformers argued that the level of suffering could be more equally shared (Caldwell 1986:31). It was not until Alfred Marshall (1898) in the late nineteenth century that the possibility and significance of a community-wide mortality decline were recognized, and by that time the decline was clearly under way.

The survey of the literature on which this essay is based was often retrospective, examining how each advance had been made by some earlier breakthrough (not necessarily aimed at that breakthrough). In the process it was found that some interesting and relevant generalizations on the history of medicine could be made. The first concerns the role of doctors, which, at least by social scientists, has been treated rather sceptically. It turns out that most of the advances in medicine were achieved by physicians commonly working in the medical faculties of ancient universities, some founded in the High Middle Ages. They constituted the main body of people interested in the quest, with an adequate knowledge of pathology, with legal access to the bodies of the dead, treating large numbers of the sick with apparently similar symptoms, and with the right, although sometimes dubious, to experiment with the sick. What we are apt to remember are the exceptions: Pasteur, originally a professor of chemistry, who, for that reason, always had to organize medical collaborators when working on human disease; and Koch, a rural general practitioner before he was given his own research institute in Berlin.

Second, adequate research funding and access to facilities were often forthcoming only when commercial interests were at stake. It is no accident that Pasteur's early work was on fermentation in the production of wine, beer and bread, followed by the rescue of the silk industry. Koch, as head of his institute, was at first primarily funded to study such afflictions of the German cattle industry as anthrax and foot and mouth disease. Knowledge of human disease was often a by-product or even an accident.

Third, there were circumstances, often wars, when new therapeutic agents could be tested on mass populations. France's lead in medical research in the first

half of the nineteenth century owed much to the ability of its doctors to work in huge national hospitals formed in the Revolution by the state appropriating and amalgamating hospitals previously run by religious orders. The American Civil War and the Franco-Prussian War of 1870 saw massive use of carbolic acid for sterilization; tetanus antitoxin was first widely used in World War I; and antibiotics and the malaria prophylactics succeeding quinine emerged from World War II.

Fourth, the battle against disease mortality was increasingly guided by statistical and epidemiological methods. The foremost example is that of William Farr at the Register-General's Office in London employing vital statistics and the 1851, 1861 and 1871 censuses to report on differentials in health so as to look for causes of ill-health. These differentials were enormous with some of the new industrial cities and the poorer parts of London recording life expectancies half those of the rural areas, sometimes less than half.

Fifth, linked to the fourth point, is the importance in stirring medical research of the high death rates in the cities of the early Industrial Revolution. These cities housed an increasing proportion of the population including the influential citizens of the capitals. Their exceptionally high mortality obscured at first any decline in non-city mortality. Their condition demanded measurement, research and public health intervention. In the longer run the reaction to their existence almost certainly hastened rather than retarded the mortality transition of the twentieth century.

Sixth, doctors were forced by their ignorance of the mechanics of disease transmission to practise holistic medicine and to treat the patient as a whole in an attempt to obtain a return to good health. Elements of Galenic medicine from the second century AD with its humoral balance survived into the nineteenth century. The attitudes of these doctors to sickness have often been admired in the late twentieth century as a reaction to extreme specialization concentrating on the disease rather than the patient. Nevertheless, for the late nineteenth-century medical revolution to succeed it was important that the adherents of the specificity, or the unique nature, of each disease, should win out.

Seventh, although the transmission of disease by invisible agents or organisms had been suggested long before the later nineteenth century, the fact that this theory was right, rather than competing explanations of infection, could not be proved. These early suggestions have in later times been identified as an historical curiosity and as not being important, in the sense that the proof of microbial infection in the last decades of the century was to be important, in suggesting effective interventions, further lines of research and changes in behaviour. To most earlier investigators it would have appeared most unlikely that large human beings could be sickened and killed by the activities of living beings so small as to be invisible but living all around us like an alternative universe.

Finally, if we have identified the cause of the mortality decline, we have probably also identified the cause of the fertility decline and hence of the whole demographic transition. The fathers of demographic transition theory (Thompson 1929; Notestein 1945) assumed this automatic succession and the case has been

convincingly argued by present-day researchers (Woods 2000; Cleland 2001). Admittedly, the early twenty-first century has experienced overshooting fertility decline, resulting in below-replacement-level fertility in most industrialized countries. This may be an inevitable eventual effect (without massive state intervention) of a change in the mode of production from agriculture to secondary industry (Caldwell 2004). But this has occurred at an advanced stage of the industrial economy and society when scientific progress has ensured that most infectious disease has been conquered.

SOCIO-ECONOMIC EXPLANATIONS FOR MORTALITY DECLINE

Socio-economic explanations for the mortality decline abound and each is partly right, but even in total they are unlikely to explain more than part of that decline. We shall concentrate on those changes which were manifest in the nineteenth century to see whether the Industrial Revolution acted on mortality chiefly through their medium. Undoubtedly, rising real income was a fundamental cause and probably continues to be, as Pritchett and Summers (1996) argued in a paper appropriately titled "Wealthier is Healthier". It is not a tight relationship, as Table 8.1 shows, for in 1850 England's real income, almost 50 percent above France's, brought no additional health benefits. Nevertheless, England could afford public health interventions in the mid-nineteenth century that would have been impossible one hundred years earlier, and continuing medical research had relied on the economic gains and technological breakthroughs of the Industrial Revolution. In contrast, the steep decline in mortality in most developing countries following World War II had little to do with rising living standards.

The most dogged protagonist of the economic thesis was Thomas McKeown in a series of papers with collaborators published from 1955 in *Population Studies* and in two books (1976, 1979). He put forward a number of postulates (McKeown 1976:152–154) of which the most extreme were that modern medicine, either immunization or therapy, had not played a role in reducing mortality until after 1935, and that the prior decline could be mostly attributed to better nutrition. These arguments appealed strongly to many social scientists and public health physicians who believed that the arrogance of the medical profession and medical research downplayed all causal factors other than the role of medicine. The 1935 dating was breathtaking in its suggestion that neither preventive nor therapeutic medicine had played any part in any of the mortality decline that, between 1800 and 1935 in England (and paralleled elsewhere), had completed almost 60 percent of the rise in the life expectancy and 65 percent of the decline in infant mortality between 1800 and 2000. McKeown received some support from those researching the decline of tuberculosis (Cronjé 1984; Smith 1988; Puranem 1991). His strongest support in terms of increasing height has come from Fogel who did not mention McKeown in 1992 but was to do so in 1993 (Fogel 1992:278, 1993); and from Horrell and Oxley (1999) who documented the hard choices that British

industrial workers had to make about expenditure on food in the 1880s. There have, however, been damaging attacks on his method (Szreter 1988:10ff; Woods 2000:344–359) and on his claim about improving nutrition in nineteenth-century Britain (Schofield 1977; Woodward 1984:68; Floud et al. 1990:325). It has been pointed out that not only may good health be a sign of adequate nutrition, but malnutrition and poor anthropometric measures result from diarrhoea and other gastro-intestinal infections that were common in nineteenth-century cities (Mata 1978; Lunn 1991:145). It is also noteworthy that the mortality declines in the United States and Australia, both countries with ample food throughout the century, paralleled those of Europe, but at a slightly lower mortality level (see Alter 1977:104–105).

Another argument, linked loosely to economic growth and more firmly to social change, is that of human capital formation or health transition. The thesis is that various changes in society made people more resistant to the finality of death and determined to intervene in the cases of their children, themselves, their spouses and others to avoid its occurrence (Simons 1989; Caldwell et al. 1990). Elias (1978:54ff) documented that, over a thousand years in Europe, concepts of gentility, often over small things like cleanliness or the washing of eating vessels and implements, have been developed among the social elites and have filtered down the social scale. Razzell (1974) argued that refinements in manners and behaviour in the eighteenth and nineteenth centuries led to greater use of soap which bore directly on the reduction of morbidity and mortality. Select groups with highly ordered lives experienced lower mortality: Vann and Eversley (1992) showed that British Quakers had attained by 1850 a life expectancy of 60 years (as England as a whole did in 1930) everywhere except in London. From the beginning of the nineteenth century increasing levels of education, culminating in the last decades of the century in universal schooling, taught upper-middle-class manners and direct messages on health behaviour to the whole society. There is a large literature demonstrating for developing countries ever-greater chances of child survival with higher levels of parental, especially maternal, education (Caldwell and McDonald 1982; Hobcraft et al. 1984; Cleland and van Ginneken 1988). Preston and Haines (1991a:201–202) found in America that late-nineteenth-century literate mothers experienced little more than two-thirds as much child mortality as illiterate mothers. The authors had expected a greater differential, but the one that they found was sufficient to show that education was a significant factor in the mortality decline of those critical years. Another, but related, concept emerges from Simon's (1989) argument that mortality decline was possible when people believed that they could influence the outcome of sickness and it was their duty to ensure that the end was not death; this argument has the further implication that the secularization of society played a demographic role. Certainly, in the contemporary Third World, many societies still believe either that death occurs because it is part of a divine plan or that it is controlled by forces against which human beings are impotent. Tomes (1990), studying American women's letters, diaries and publications, was convinced that eighteenth-century American women's belief in God's purpose led

to their taking infant and child illness as something about which they could do little. Significantly, this attitude was increasingly eroded during the nineteenth century.

Finally, it can be argued that, although a complete fertility transition could not have happened without a major fall in infant and child mortality, this did not preclude interaction between the two, with a similar downward path, a fall in one affecting the other. In the contemporary developing world, parents who have restricted the size of their family are often much more concerned to ensure the survival of their children, especially if the method of fertility limitation was sterilization (Caldwell et al. 1988:59). Certainly, it is true that the two declines were so intertwined in the West's demographic transition that it is difficult to allocate causation. In England and Wales between 1870 and 1910 both the infant mortality rate and the crude birth rate fell gradually over the whole period, the former by 34 percent and the latter by 27 percent (Mitchell 2003).

The problem of the timing of the onset of mortality decline remains unsolved, and indeed more challenging. Literacy and schooling levels in English-speaking countries rose throughout the whole nineteenth century and so presumably did sensitivity. So did secularization in the sense of believing not only that human intervention can be effective but that it is not a divine transgression. Real incomes per head rose substantially in the first half of the nineteenth century but not as steeply as in the second half. It is necessary then to see if advances, or failures to advance, in the field of biomedical science can offer a solution.

SCIENTIFIC ADVANCE

Medical advances and technological breakthroughs in the health field did not wait for the last decades of the nineteenth century, although there was not until then a significant fall in mortality. Smallpox was being tamed, first by the introduction into the West from Turkey (with a possible origin in China) of variolation (smearing pus from a smallpox patient's sores into scratches in another person's skin) in the early decades of the eighteenth century, and then by Jenner's vaccination with cowpox at the very end of that century. Furthermore, the introduction of variolation into England was carried out in a modern way with a report in 1714 to the Royal Society on the evidence for the procedure's safety and effectiveness followed by trials (Silverstein 1989:331ff.). In 1816 the stethoscope was invented in France, although it was not until 1852 in the United States that the modern type was produced. Between 1818 and 1860 in France and Germany many drugs were identified or purified: morphine, strychnine, quinine, caffeine, nicotine, codeine, atropine, hyoscyamine, cocaine, and others. Medical school teaching and research were revolutionized in Germany and greatly improved in Paris and in the London teaching hospitals (Porter 1997:308–327). At the same time diagnosis advanced, a necessary step for establishing the specificity of diseases. But none of these improvements did anything to show how infectious diseases were transmitted, and such knowledge was needed for their conquest. Nevertheless, the basis for that

breakthrough was being laid. In the 1830s the first microscope capable of observing a number of unicellular micro-organisms was invented and this allowed the Italian, Agostino Bassi, to show that a specific fungus caused muscarine, a disease of silkworms, and Johan Schoenlein to establish that human ringworm was also caused by a fungus. By 1840 Jacob Henli, who taught Robert Koch, was able to speculate that infectious diseases were caused by invisible micro-organisms (Foster 1970:7–9). Nevertheless, there was no proof or majority agreement for decades, and the next major advance was to be made on a different—and false—premise.

This advance, provoked by the conditions of the urban poor in industrializing England, was Edwin Chadwick's report on *The Sanitary Condition of the Labouring Population of Great Britain*, presented to both Houses of Parliament from the Poor Law Commissioners in July 1842. The report drew heavily on four surveys of the health of the poor conducted by crusading young physicians. Its stated scientific basis was the theory that contagion was carried by "miasma" (Greek for "pollution" and a word in currency in English for at least the previous two centuries), defined by the Oxford dictionary as "infectious or noxious exhalations from putrescent organic matter." Chadwick (1965:371) did not attempt to come to medical conclusions but drew on accepted knowledge since "there is no one point on which medical men are so clearly agreed, as the connexion of exposure of persons to the miasma from sewers, and of fever as a consequence." The theory was not completely misleading and its application was generally beneficial. The human senses evolved as they did because that which smells or tastes bad is often dangerous. Certainly this was the route to preventing contamination by faecal matter. Chadwick (1965:412) reported that "the labouring classes" became sick or died because of "decomposing animal and vegetable substances, . . . damp and filth, and close and overcrowded dwellings." What was needed was "drainage, proper cleansing, better ventilation . . . ." A public health program based on this advice could not go far wrong, and, after a further inquiry, it was embedded in the 1848 *Public Health Act.* The drawback was the failure to identify waterborne disease and hence to indict untreated water and milk. That omission was corrected by John Snow, an anaesthetist who, in an 1849 publication, pointed to infected drinking water as the source of cholera and in 1854 successfully demonstrated his point by having closed a standpipe providing cholera-infected water, after which the incidence of cholera in the area was reduced. Chadwick was sacked for wanting to impose from the central government a top-down, bureaucratic program, but was vindicated by local government taking up his proposals (Szreter 1988). The whole process was helped by William Farr (trained in medicine in Paris) at the Registrar-General's Office, reporting in 1843 on water and sewerage services and bringing out mortality reports that compared the relative success of local governments in reducing the death rate. "Between 1853 and 1862 fully one-quarter of papers read at the Statistical Society of London were on public health and vital statistics" (Wohl 1983:145). The Anglican nursing orders in London translated the advice to hospital practice, emphasizing "cleanliness, scrubbing and much else" (Smith

1982:155), a message taken to the Crimea by Florence Nightingale in 1854–56 and taught in 1859 in her *Notes on Nursing* to carers in the home.

In spite of the effectiveness of this approach it had its limits, and further advances in medical science had to be based on the correct knowledge of disease transmission. The trouble was that the transmitters could not be seen or detected. That detection was denied by the slow development of adequate microscopes which, for their improvement, required a number of different industrial developments. For the interpretation of observations already made, there was also a need for a doctrine of "specificity" maintaining that there were specific diseases caused by specific agents so that a specific disease always (within limits) exhibited the same symptoms (Kunitz 1991:253). That was a very different concept from earlier ones of bodily imbalances or general dysfunctioning. The new concept was furthered by the advances made during the nineteenth century by medical researchers and physicians in diagnosis, especially when there were vast numbers of sick people as in the huge Paris hospitals. Diagnosis alone did little to cure, but it increased the reputation of physicians and laid the basis for research advances. The idea of disease seeds (or germs—from the Latin *germen* or sprout) was considered by Galen in the second century AD. But it was Linnaeus's classification of the plant kingdom, published in 1836, that firmly established the concept of specificity, at least for visible plants. From about 1880 Robert Koch and his students (including Paul Ehrlich) made the concept of specificity the core of their work (Mazumdar 1995:5–9).

But the real lag was in proving the existence of normally invisible agents of disease by magnifying them, and the failure to do this was the single most important reason for the backwardness of biomedical explanations. The history of that lag is highly revealing (see Bulloch 1938; Paine 1953; Bradbury 1967, 1982; Foster 1970; Chase 1982; Charleston 1982; Porter 1997; Macfarlane and Martin 2002). There was a similar series of time-consuming technological steps in the development of all other biomedical equipment. Indeed, the history below is a bare-bones one, and the major advances noted were really based on many intermediate steps by a host of people.

The history of optical magnification is the history of glass. Glass-making in Egypt and Mesopotamia goes back to at least the first half of the third millennium BC and is closely related to the emergence of the first cities and urban elites. Subsequently, it was carried out on a much larger scale in the Roman Empire where both glass blowing and glass grinding were developed. The trade survived the fall of Rome in northern Italy and flourished in Venice in the early Renaissance. Around 1400 the first lenses were ground and spectacles came into use, creating the first large-scale demand for lenses. Spectacle making became a Dutch industry and around 1600 Dutch optometrists invented the compound (i.e., with more than one lens) microscope. Yet the first real microscopist, Anthony van Leeuwenhoek, a draper of Delft in the Netherlands, subsequently discovered bacteria with one of his own superbly made instruments with a single lens—essentially a magnifying glass. These were unusually large bacteria, and Leeuwenhoek described them but

not their function in 1683 in the first of many letters and papers to Britain's Royal Society. There was to be little more advance in the field of bacteriology for over 150 years.

The problem was that there was no great demand for the microscope until the second half of the nineteenth century. Leeuwenhoek's *animalculae* were just curiosities with no known role. The first industrial use of the microscope was found only around 1840. Even telescopes had a greater demand, largely because of the needs of navigation and war, and the obviously greater interest of the heavens than of invisible and unknown life in a drop of water. But there was a tremendous demand for glass as the balance of its uses changed from food and drink containers to windows with an emphasis on the need for clearer glass. This demand was so great that the English government, forced by deforestation to find a new fuel for the glass furnaces, in 1615 legislated that coal only must be employed. Inadvertently this led to higher furnace-operating temperatures, thus making possible the discovery 60 years later of the first radically new type of glass since the discovery of crown (or Venetian) glass over four millennia earlier. The new lead (or flint) glass had been designed for English conditions, using locally available potash (instead of soda ash), lead oxide and calcined flints. More importantly, its refractive index was different from that of crown glass. Both telescopes and microscopes suffered from the problem that the sides of lenses acted like prisms and broke white light up into its components, thus producing a blurring, rainbow effect which prevented clear images from being seen.

This problem was to be overcome by the use of compound lenses, each being formed by a crown-glass lens and a lead-glass one with their different refractive indices causing a cancellation of refraction. The theoretical principles were outlined in an 1830 publication by a London wine-merchant, Joseph Jackson Lister (inventor also of the photographer's tripod and father of the physician, Joseph Lister), who later arranged for an optical instrument-maker to make a microscope with each pair of lead and crown glass lenses to be cemented with Canadian balsam. This doubled the magnification possible in pre-existing lenses. Joseph Lister Senior produced the microscope used by Louis Pasteur, and it was Pasteur's discoveries that so influenced Joseph Lister Junior that he developed antiseptics.

There was a continuing history of further developments in continental Europe, especially in Jena, Germany, where Carl Zeiss had established his lens-making workshop in 1846 and where he was joined by Ernst Abbe and Otto Schott. By the second half of the nineteenth century the Industrial Revolution was producing the necessary equipment for detecting microbial life and was reacting to consumer demand. The demand for lenses was to be driven by the new photography industry. The demand for microscopes had been weakly driven for centuries chiefly by the demand from amateur naturalists. By the late nineteenth century there was a rapidly growing demand from biologists and medical scientists working in universities and research centres. But this itself was the product of better microscopes leading to mid-century breakthroughs in histology and bacteriology.

Identifying specific bacteria was not the end of the quest, for, either in water or in the sick person, there were multitudes of other bacteria which were not responsible for the illness being investigated or usually for any illness.

Staying briefly with the problem of seeing microbes, and thus jumping ahead of medical history, we might note that viruses could not be "seen" until the mid-twentieth century and then with the aid of the electron microscope employing photographic plates or fluorescent screens. The discovery of bacteria in the nineteenth century had led to better water filters, especially those with porcelain filter "candles" introduced in 1884. Indeed bacteria were defined as not being able to pass this barrier. Then in 1886 it was discovered that the tobacco mosaic virus could do so, and later that this was also true in the case of the agents of yellow fever and poliomyelitis. Ingeniously, the very problem was made an advantage, and viruses' sizes were measured by making very fine filters with grids of varying sizes to determine the size of grid that the pathogens (known as "filterable viruses" for decades) could just pass through (Burnet 1953; van Kammen 1999).

Microbiological research had been most lavishly funded in the nineteenth century by governments and producers directing research to the tobacco virus and foot and mouth disease (Koch) or silkworm, vineyard and brewing problems (Pasteur). Microscopy was greatly furthered by a by-product of the new German coal-tar industry, aniline dyes, which allowed the effective staining of the organic material that was to be examined (Schmiedebach 1998). The purpose of the research changed even before the end of the century, and in the twentieth century a massive human-health industry developed which was quite capable, with the increasing help of governments, of funding medical research and the development of appropriate technology. In contrast, microscope development was not funded adequately up to the mid-nineteenth century because no one guessed where its development would lead.

The identification of specific agents of disease transmission was to lead to two major advances against infectious disease mortality. First, it focused attention on the nature of each disease's transmission among both medical researchers and the general public. Second, it led to what seemed an unlikely outcome: the discovery that people could be made immune to many diseases without having first to suffer their full fury. The public health armoury was becoming ever-stronger.

WHAT COULD MEDICINE DO?

In the attack on infectious disease, one success preceded the nineteenth-century successes and was not dependent on the identification of its agent. That was inoculation against smallpox. Variolation, the rubbing of pus from the smallpox of one person into scratches made on another in order to produce a mild attack rendering the second person immune, was apparently known in ancient China and was learnt in Europe from the Ottoman Empire. Such treatment was given to the grandchildren of Britain's royal family in 1722, to the American Revolutionary Army on Washington's orders, and to Edward Jenner when he was at school.

The Gloucestershire peasantry practised cowpox vaccination and Jenner learnt from them (Chase 1982:42–45). But it was Jenner who, in 1796 in the gathering movement toward modern science, tested the procedure more rigorously, and subsequently showed how to store the vaccine and publicized its efficiency.

It was with the new microscopes of the 1830s that the conquest of infectious disease really began. In 1835 the Italian, Agostino Bassi, showed that the grape disease muscardine was caused by a microscopic fungus, and in 1838 he published his proposition that most infectious disease had microbial causes (Chase 1982:115ff). In 1840 he advanced the view that all infectious diseases are caused by living organisms, and in the same year Farr (who later visited Bassi), in his *2nd Report* noted the growing belief that disease was caused by "minute insects." In 1854 John Snow showed that drinking water contaminated by a cesspool could lead to cholera, and Filippo Pacini in Florence found that the intestines of cholera victims always contained a living, reproducing substance that he called "*vibrio cholera*."

The fruition of the advance in the methodical use of scientific methods and the firm establishment of modern medicine came with the two giants of bacteriology, Louis Pasteur (1822–1895) and Robert Koch (1843–1910). In 1857 Pasteur showed that fermentation was caused by minute organisms, and demonstrated during the following decade that these were a reproducing form of life found also in the air. In 1868 he isolated two distinct bacilli causing different diseases in silkworms and showed how to combat them. From 1880 to 1885 he laid the basis of modern vaccination by attenuating the pathogens of chicken cholera, anthrax and rabies and revealing that the injection of these vaccines produced immunity. Koch's greatest contribution was his success in creating pure bacterial cultures (Burnet 1953:236), which allowed him to produce an anthrax vaccine in 1883. His greatest contribution to the battle against the major killers of the time was his identification of the tuberculosis bacillus in 1882, and his greatest mistake was to insist that the vaccine he produced, tuberculin, prevented infection by the disease. These two scientists were typical of the industrial age: in both cases governments set up and funded research institutes for them to direct, and these institutions carried out research typical of the new era with a rigorous and methodical approach.

In the second half of the nineteenth century it was becoming clearer that many diseases could be overcome, and, as science became more organized and Western societies became richer, the applied spin-offs came faster. Most of the agents used to advance public health measures were unknown before industrialization. One stream of spin-offs comprised antibacterial procedures and agents. It had been known since 1831 that water when boiled was no longer a danger to health and could be used to sterilize instruments, and in 1883–84 Koch showed that *cholera vibrio* could be destroyed either by boiling or adding carbolic acid to the water (Bourdelais 1991:122). He also advocated sand filtration for improving the purity of water supplies (Woods 1991:237). Chlorine had been discovered in 1774 as a by-product of the rapidly growing caustic soda industry (a step in the making of soap) but it was not until the late 1820s that Ignaz Philip Semmelweiss

in Vienna made his obstetric doctors and nurses wash their hands in chlorinated water to reduce the level of puerperal fever (Chase 1982:148 ff.). Chlorine had been produced industrially in the form of bleaching powder for the textile industry since 1798, and hence was available, together with filtering sands, for water treatment from the mid-nineteenth century when it was shown that cholera was a water-borne disease. Carbolic acid (phenol) was identified by the German coal tar industry in 1834 as part of a program to distinguish and find uses for the fractionated products of the tar. Its purification took years to work out, but commercial production began in 1865. The same year the professor of surgery in Glasgow, Joseph Lister, saw carbolic acid being used on sewage in Carlisle (in keeping with beliefs in miasma) and, knowing both Semmelweiss's work and Pasteur's early proof that there were pathogens in the air, introduced it into the hospital to produce antiseptic surgery by sterilizing instruments, dressings and wounds, as well as spraying the air. In 1870, in the Franco-Prussian War both sides had adopted Lister's approach, calling it "Listerism" (Chase 1982:148ff.). By this time surgery was less painful because of the use of anaesthetics, starting in the 1840s with nitrous oxide, discovered in 1809 by the British chemist Humphrey Davy who noted its potential for anaesthesia.

By the end of the century typhoid, diphtheria, and tetanus vaccines were also available, and the last was to play a major role in World War I. Six of the first ten Nobel Prizes in medicine were given for research in immunology (Kass 1987:749). In the late nineteenth century money became more readily available for medical science research centres. In 1878 the Bavarian government set up a microbiological research institute in Munich, and six years later Andrew Carnegie did the same for Bellevue Medical College, New York. Ill-health was beginning to become big business first in Germany and then on a larger scale in the United States: Squibb set up business in 1858, Parke Davis in 1867 (with their own research institute from 1902), Eli Lilly from 1876 and Merck from 1891. German research on chemotherapy led by Paul Ehrlich (1854–1915) produced atoxyl for use against sleeping sickness in 1891 and salvarsan for syphilis in 1910, but there were side-effects including blindness.

By the end of the nineteenth century the first challenge, high mortality in the industrial cities, was joined in the colonial powers by a second challenge, that of fighting tropical diseases. The latter demanded public health approaches because, although individual treatment could be afforded for the administrators, it could not for the millions they ruled. Tropical disease research centres in metropolitan countries became important medical resources.

Public health work followed closely on biomedical research discoveries or beliefs. Cheney (1984:585) holds that in the United States this was achieved, when it was felt to be affordable, by city boards of health consisting mainly of the kinds of physicians who were interested in the implications of the new discoveries. Szreter (1988) convincingly spelled out the British experience from the first Public Health Act in 1848, through subsequent legislation controlling working hours and safety, sewerage and water systems, building standards and ventilation, and

quarantining the sick (with tubercular persons going to sanatoria, less for their own good than for that of those left behind). Centralized health control, advocated by Chadwick, had been resisted, but, following the Royal Sanitary Commission of 1869–71 and three subsequent Local Government Acts, local government public health interventions were effective, and were based on and given impetus by the new bacterial knowledge, unavailable in the 1840s. Szreter (1988:11) classified the late-nineteenth-century reductions in mortality as being two-sevenths attributable to reduction of tuberculosis, and one-seventh each to that of smallpox, diphtheria, typhoid fever, cholera, diarrhoea, scarlet fever, and convulsions (childhood diseases). All but the reductions in mortality from the first and the last two were probably largely attributable to public health measures based on biomedical research.

Doubtless, standards of living also played an important role, although one often nudged by the new scientific knowledge. For instance, diarrhoea has continued to resist biomedical intervention and its pathogens have been elusive. This is why infant mortality, and indeed one-year-old mortality, did not fall until almost the end of the nineteenth century. It was 1899 before the first diarrhoeal agent, *E. Coli*, was identified, the second half of the twentieth century for the rotavirus, and the search continues. The only defence was seeing that infection did not take place, and the first line of that defence was ensuring a pure cow's milk supply (Beaver 1973; Meckel 1990), or boiling both milk and water before giving them to babies. Milk was increasingly rendered safe both by inspection systems and by pasteurization. From 1872 in Britain legislation provided for the inspection of a wide range of foods to ensure freshness and the absence of adulteration (Burnett 1959).

Cleanliness had been associated with refined manners for at least a millennium. Erasmus in the early sixteenth century had warned against touching food with one's fingers, and had castigated spitting partly on the grounds that the saliva contained purulent or corrupting matter (Douglas 1966; Elias 1978). Through the eighteenth and nineteenth centuries washing with soap became increasingly frequent, with the balance shifting from aesthetic to health reasons (Razzell 1974). The rapid rise of production for consumers in the second half of the nineteenth century meant that advertising added pressure to buy items that would protect family health: disinfectants from the 1860s, water closets in the 1870s and 1880s; and water filters from the 1880s (Tomes 1990:530–535). The reduction of infant summer diarrhoea was partly a by-product of the invention of the ice chest and domestic refrigerator, developed in the nineteenth century but coming into mass use for food preservation and cooling only in the twentieth century.

The fiercest pressure was on mothers once it was realized that germs lurked in households and food. Typical was the book *Infant Mortality: A Social Problem* (1906) by George Newman, the Medical Officer for the London borough of Finsbury: high infant mortality is "a social problem concerning maternity" and "it is the ignorance and carelessness of mothers which directly causes a large proportion of . . . infant mortality" (Newman 1906:221). As fertility fell, the pressure

on mothers from experts and organized mother-and-child societies became intense (Dye and Smith 1986; Smith 1988; Morel 1991). Even without these pressures, mothers of modern small families would doubtless have tried their hardest to stop those small families being eroded by mortality, as is true of sterilized women in contemporary India (Caldwell et al. 1988:59). As it was, they were accused in the British Empire's "white Dominions" of threatening the future of the Empire if their children became ill or died (Smith 1988:26–27). Smith (1991) believed that the dating of the infant mortality decline suggests that the mother and child movement was not a major explanation for the infant mortality decline in Australia and New Zealand but there can be little doubt that it was a prominent part of the process whereby people looked after themselves and their families more carefully.

What, then, explains the continuing mortality decline between 1900 and McKeown's date of 1935 when the modern weapons against disease began to be found? First, the reductions in mortality during this period were dominated by lives saved among children (Schofield and Reher 1991:6). But the main point is probably that the bacteriological discoveries of the late nineteenth century had a greater impact on mortality in the first third of the twentieth century than the last third of the nineteenth. Woods (1991:233) pointed out that only since World War I have safe water supplies, adequate sewerage systems, food purity and street cleanliness all been achieved. Indeed, the European Union is still regulating to attain all these objects in Europe, and ever-bigger earth-moving equipment makes public health initiatives more affordable now than in the past.

Some new medical weapons were developed during or at the beginning of this period. At the end of the nineteenth century vaccines for diphtheria, typhoid fever, and tetanus became available; their use increased through the twentieth century, and a whooping cough vaccine was in use from 1934. Insulin became available in 1922. Kass (1987:747) identified four major causes of mortality in Britain which fell consistently from at least 1850 until 1960 with their downward mortality paths being little affected by the dates of new medical discoveries: tuberculosis, diphtheria, whooping cough and (after 1910) rheumatic fever. The driving force would seem to be rising standards of living and care. Nevertheless, this conclusion may underestimate the contribution at the individual level of the medical profession in two ways: first as expert (and, often, commonsensical) advisers to parents about their children's health and their own; second, intervening with advice or medication in conditions that were initially not life-threatening but could become so. One example is the use of antiseptic agents, many of which were long known, to prevent infected cuts becoming something more serious, or recommending sensible early treatment for mild respiratory complaints. This is an area that has been inadequately explored.

For the period after the mid-1930s there seems to be little debate about the major cause of mortality decline. First the sulpha drugs (derived in the first place from the German coal industry), then penicillin (with production hastened by the needs of World War II), and subsequently a stream of antibiotics became available. Le Fanu (1999:xvii) discerned, between 1935 and 1998, 36 medical

breakthroughs, of which twelve were major and eight life-saving. By the 1970s even mortality of the aged was declining as fast as or faster than that at other ages. The fact that the new drugs and insecticides, together with greater use of the old vaccines, brought down Third World mortality immediately after World War II, in a period too short for significant changes in lifestyles or economic well-being, seemed to prove the point. Yet there must remain some doubt about this chronology of causes. Life expectancies rose in the West at about the same pace between 1900 and 1935 as between 1935 and 2000. It may be that the capacity for mortality reduction from public health efforts was almost exhausted by 1935 or that most of the gains to total mortality reduction from that of young children had largely run their course. Alternatively, it may be that the new medical weaponry was only partly the cause of continuing mortality decline.

CONCLUSION

Fundamentally, it was the Industrial Revolution, assisted by preceding scientific discoveries, that brought down mortality rates. That revolution was a complex of rising individual and government incomes, scientific and technical advance, and huge increases in educational levels. Nevertheless, by 1870 in most advanced Western countries there had been little mortality decline, and none among infants. This was in spite of a doubling of real national income since 1820 in France, an almost threefold increase in Britain and Germany, and a greater multiplication still in the English-speaking countries of overseas European settlement. Real average incomes had doubled in England, France and the United States, and increased by 70 percent in Germany (Maddison 2003). This was poverty compared with what would happen in the following 130 years, but was paralleled by rises in most fields of scientific knowledge.

The postponement of the mortality transition (and hence the fertility transition) was the result of the failure to find convincing evidence of how infectious diseases were transmitted. It may seem almost incomprehensible now that the truth was not discovered but it was far from obvious that the agents of transmission were tiny, invisible, living organisms; it was perhaps more likely that either liquid or gaseous poisons were involved. The proof of the germ theory came only when high-powered microscopes were available, and, even then, there were great problems in separating the responsible microbes from others. When proof did come, governments, institutions, physicians and individuals moved toward using the new knowledge to reduce infection and consequently mortality. If the proof of the germ theory had earlier seemed probable, more resources would then have been thrown into the struggle to improve microscopes. As it was, they had little industrial use and unproven medical research potential. Single lenses certainly were needed for spectacles, but a major demand for new and better lenses came only with widespread use of the camera late in the nineteenth century. The reality was that, up until about 1870, the demand for better microscopes was largely driven by the limited needs of amateur naturalists.

The case for the mortality decline being very largely determined by better nutrition has been widely and effectively attacked. Additional evidence for its refutation can be found in the way the American and Australian mortality trends mirrored advanced European ones even though both countries had ample cheap food throughout the nineteenth century. The refutation also receives support from the rapid mortality declines over a few post-World-War-II years in the developing world even though diets hardly changed. The fact that Asia now has a life expectancy of 67 years (seven years behind Europe) and Africa 52 years (equivalent to Western Europe a hundred years ago) is not evidence of greatly improved diets or of local medical research but of knowledge and technology transfer as globalization intensifies. Carr-Saunders (1936:291) had noted that death rates had fallen in colonies and that "this was the consequence of the establishment of order and security, of the development of communications, and of the end of local wars . . . European sanitation and medicine will spread in those countries, and will tend further to reduce the death rate." Guha (1993) demonstrated that by 1900 the British Indian army had learnt the lesson of germs and carried out programs, and preached cleanliness, so that soldiers' death rates were significantly lowered.

The discovery of microbes and the proof that there were specific agents for each malady created modern bacteriology and biomedical science. There was a search for antiseptics and vaccines, chemical medication, and ultimately antibiotics. The discovery also gave public health authorities a clearer focus on what they were doing and should do. In addition it moulded behaviour and taught individuals and parents what was cleaner and healthy and what behaviour was pointless ritual. It was assisted in this by the continuing rise in educational levels which not only allowed people to interpret the health messages correctly, but gave them the self-confidence to act quickly in accordance with that interpretation. Preston and Haines (1991:240–241) were surprised that even educated, professional parents at the end of the nineteenth century appeared not to care for their children as effectively in accord with contemporary knowledge of germs as they might have done. The reason is doubtless that new patterns of childcare take time to be accepted and that to many people germs still seemed to be a hypothesis. After all, Bernard Shaw was still sceptical of it—and influencing others—when his play, *The Doctor's Dilemma*, was first performed in 1906 and even when his introduction to it was published in 1911. Preston and Haines (1991:240–241) later agreed that such beliefs in improved childcare and germ theory did become over time more internalized, and better health-seeking behaviour followed, so much indeed that they wrote that this was probably the main reason for continuing child mortality decline from 1900 to 1930. Worboys (2000:278) has argued that in the last decades of the nineteenth century the acceptance of all the implications was uneven and incomplete in the various sectors of the medical profession.

The first 35 years of the twentieth century cannot be passed over lightly. Life expectancy in the West increased during this time by around 15 years at over 0.4 years per elapsed year. It was never to exceed this rate. Preston and Haines (1991), as noted above, attributed the gain to public health measures together

with such changes as higher education among the people who lived in this healthier environment and could make better use of the health advantages it afforded. McKeown (1976:152–154) argued that the mortality decline owed nothing to medical science, seeming to rule out the public health component as well. The interaction of more knowledgeable people and better public health services as explaining the entire gain against mortality is far from being implausible. There was in 1900 a huge potential for implementing all the possible public health advances suggested by the germ theory. Yet there are extraordinary implications. The argument suggests that, apart from providing leadership for the public health movement, the huge expenditures on medical schools, biomedical research institutes and hospitals over these decades were fruitless, at least in terms of warding off mortality. This was certainly not the way the governments or electorates saw the situation, but they could have been wrong. Kunitz's (1991) solution to the problem is that doctors in their one-to-one relations with patients probably reduced morbidity but not mortality. The commonsense view, which may be wrong, is that the lessening of acute morbidity might well reduce the chances of death. It is still an open question, partly because, although there are good cause-specific mortality figures for this period, there are no convincing analyses of the contribution of physicians to this reduction in mortality. There are elements of disciplinary warfare in the insistence by social and public health scientists that physicians did not play a significant role in the battle against death. Most physicians assume the importance of the profession in reducing the death rate during the period but they produce few satisfactory analyses to prove the point. It may be that their role was indeed insignificant; or the issue may be too complex to disentangle the various forces reducing mortality; or there may be an arrogance which regards documented proof as unnecessary.

Perhaps without the Industrial Revolution there would have been no further mortality reduction than that already achieved in Western Europe by a cautious population raising living standards by postponing or forgoing marriage so that life expectancies around 40 years were achieved. To reduce mortality further, there was a need for richer societies than those that agriculture alone can create. These new wealthier industrial societies had been the products of huge, related growth in science and technology and, in turn, their wealth and production needs spurred more scientific advance. This alone has made life expectancies of 80 years possible. Strangely, the new investment capital, science, and more educated, urbanized, and secular populations proved incapable of reducing mortality until the late nineteenth century from the level it had sustained for centuries. The reason was that investment in science works only if there is a concrete goal to pursue, and in the case of infection that goal was not clear. If there had been agreement that the agents of transmission were forms of life invisible to the unaided eye then the evolution of high-powered microscopes would have been adequately funded. Certainly, in the late twentieth and early twenty-first centuries both individuals and governments are only too willing to move resources on which there are other claims to enrich the health sector.

We do not yet know what role curative medicine played in reducing mortality up to 1935. What is clear is that the medical schools, many of them ancient, and the doctors they produced, provided most of the leadership in the biomedical research advances and in promoting and organizing public health initiatives. They did this partly because medicine was their chosen field but also because they had access to the sick, the right to experiment on them, and often the only legal right to study the bodies of the dead.

What was coming into existence in the West of the nineteenth century was a new richer, non-agricultural society, urbanized, centralized and hence in a position for people to make their needs known, and mass-educated. The original public health movement was constructed by a desire less to increase the population's longevity than to return it in the cities to what it had been. It became increasingly clear from the work of William Farr that the mortality levels in the new industrial cities were higher than Englishmen had come to see as their due; in the first half of the nineteenth century life expectancy in Liverpool was probably lower than in ancient Rome. Such factors as the acceptance of the miasma theory retarded biomedical research but the state of the new cities accelerated it.

The mortality decline allowed the demographic transition to proceed, but it did not do so in quite the manner that classical transition diagrams showed with mortality decline taking the lead. Between 1870 and 1900 in England and Wales the crude birth rate fell 17 per cent even though infant mortality declined by only four per cent. This was because the new urban population did not really need children (Caldwell 2004), although, doubtless, if the infant and child mortality rates had ceased their decline the birth rate decline would have decelerated too. Persistent below-replacement fertility was still a century away.

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CHAPTER 9

THE DELAYED WESTERN FERTILITY DECLINE: AN EXAMINATION OF ENGLISH-SPEAKING COUNTRIES[1]

THE WESTERN FERTILITY decline was inevitable, given that child mortality was persistently falling and the economic value of children was progressively undermined by urbanization, compulsory schooling, legislation restricting the exploitation of minors, and the kind of employment available in an advanced industrial system. Indeed, by 1800 French marital fertility (as measured by the index I_g) had fallen 10 percent (the criterion for transition employed by the Princeton European Fertility Project)[2] (Weir 1994:330–331). It is inconceivable that such a fall occurred in conflict with family economic needs, and thus it is evidence that French children were not of net economic value to their parents by the end of the eighteenth century.

My concern here is not the reasons for the French fertility decline, which lie in the moral and religious reassessments that occurred in the tumultuous years of the Revolution, and possibly in an inheritance system, requiring partition among all children, perpetuated in the Napoleonic code. The paradox this essay explores is that while children were no more economically advantageous during the first three-quarters of the nineteenth century in English-speaking countries than in France, fertility did not begin to decline in these countries until the last quarter of the nineteenth century. These English-speaking countries were further along the road to economic development than was France. Maddison's (1995:194ff) attempt to compare historical national incomes in terms of 1990 American dollars[3] is shown in Table 9.1.

These estimates are a heroic attempt, but they are unlikely to be so far from reality as to place the French ahead in the nineteenth century (although backward projection suggests that the French may well have been the richest in the eighteenth century). The only other countries in the same economic league in the nineteenth century were the Netherlands, Belgium, Canada, and, in the second half of the century, New Zealand. Yet national marital fertility declines occurred nowhere else until more than 80 years after the decline in France, the fall of 10 percent being achieved in England and Wales, Scotland, Australia, New Zealand, Belgium, Germany, Hungary, Sweden, and probably the United States between 1882 and 1894 (Caldwell and Caldwell 1998, drawing upon Coale and Treadway

Table 9.1. Per capita incomes in constant dollars, France, Britain, United States, and Australia, 1820–80

Date	France	Britain	United States	Australia
1820	1,218	1,756	1,287	1,528
1850	1,669	2,362	1,819	3,070
1880	2,100	3,556	3,193	4,590

Note: These estimates are for per capita gross domestic product (GDP) and are in 1990 Geary–Khamis dollars (see note 3). The series begins at 1820.
Source: Maddison 1995:194–196.

1986:80–152; Weir 1994:330–331; Knodel and van de Walle 1979; Jones 1971; Ruzicka and Caldwell 1977).

This essay is largely restricted to Britain, Australia, and the United States, countries for which I have had access to more pertinent sources, although the argument probably applies equally to English-speaking Canada and New Zealand. My thesis is that children were an increasing net burden throughout the nineteenth century but that the burden did not become overwhelming until the final decades of the century with the introduction of compulsory schooling and the spread of legislation protective of children. The reason that family economics had not led to greater fertility restriction earlier was not conservatism but the fact that there were counterbalancing losses to be considered. The chief of these was possible damage to the new and still fragile system of spousal relationships that formed the core of the Victorian family and that had been constructed to meet the needs of the new richer and more urbanized society where middle-class women's work was focused on domesticity and childrearing. This family construct drew upon aspects of upper-middle-class eighteenth-century relationships and spread during the nineteenth century, with strong church approval, through the middle class and increasingly the working class. It preached that men should confine their coarser manners to the world outside the home, and it protected the conjugal relationship with a degree of prudery that made it difficult to use the kinds of fertility control then available and difficult to improve them. The final subject of the essay is how this vicious circle was broken. The story is clearer and simpler for Britain and Australia than the United States, partly because the demographic data for America are less certain.

There are two reasons for suggesting that fertility decline in the English-speaking countries began later than socioeconomic conditions would have predicted. The first is that French fertility fell so much earlier. If we accept Tilly's (1978b:350) proposition that the demographic transition was fundamentally the globalization of capitalism, then it seems unlikely that France was further advanced in economic development than the English-speaking countries or alternatively that

French couples were restricting family size in opposition to their own material interests.

The second reason for positing a delay is that the onset of fertility decline in English-speaking countries occurred at higher levels of economic development than has been the experience of most contemporary developing countries. By 1890, when marital fertility had declined by 10 percent in the English-speaking countries, Maddison's estimates of their per capita incomes range from $3,396 to $4,775. In contrast, Maddison's per capita income estimates for the dates when contemporary fertility declines reached the 10 percent level are $600 for Bangladesh, $850 for India, $875 for Egypt, $975 for Kenya, and $1,000 for China. Levels between $1,000 and $2,000 typify 10 percent fertility declines in much of Asia and Africa, and levels between $2,000 and $3,000 characterize such declines in Latin America.

Caution is needed, especially with regard to whether real per capita income is an adequate measure of development. The United Nations Development Programme's Human Development Index(HDI), which also takes health and education into account, was employed by Bongaarts and Watkins (1996) in tracking developing-world fertility declines. Crafts (1997), employing the Maddison per capita income estimates to calculate HDI for a number of Western countries in 1860, found levels of 0.461 for Britain and 0.413 for the United States. If these levels had risen to the 0.60–0.65 range by 1890, as seems plausible, they would have been above the levels attained by most developing countries at the beginning of their fertility transitions, except the leaders, Hong Kong (0.67), Singapore (0.65), Sri Lanka (0.62), Thailand (0.60), and South Korea (0.58) in Asia, Botswana (0.61) in sub-Saharan Africa, and a number of Latin American countries. This seems to suggest that the delayed timing of the English-speaking countries' fertility decline needs no explanation beyond low levels of education and high levels of child mortality.

Nevertheless, there almost certainly is something to explain. Crafts's calculations for 1860 show an HDI for France of only 0.342, or 26 percent below Britain and 17 percent below the United States. Other socioeconomic indexes show change in nineteenth-century Britain well ahead of much of the contemporary developingFrance world. By 1871, 37 percent of the population of England and Wales lived in conurbations with populations over one million people, and only 20 percent of the male workforce was employed in farming or fishing (Mitchell and Deane 1962:19, 60–61). Even now in the developing world, the former figure is exceeded only by city-states, South Korea, Uruguay, and Argentina, and the latter figure is lower in only ten countries.

Returning to the comparison between England and France, French marital fertility fell consistently from the 1780s: by the early 1870s it was only 61 percent of its level in 1780 and 72 percent of the level of England and Wales at that time (Teitelbaum 1984:115–117; Weir 1994:330–331). Pretransitional marital fertility in France was perhaps 20 percent higher than that of the English, and did not fall below the latter until 1820. Even though at only a moderate level, English marital fertility appears to have been stable until the 1870s and exhibits "no convincing

evidence, in the aggregate, for family limitation" (Wilson 1984:239–240). That fertility control in Britain was so modest as to have had an almost negligible impact on marital fertility is the conclusion reached by Knodel (1977:224ff), Wilson (1984:239–240), Teitelbaum (1984:114ff), and Friedlander and Okun (1995). A similar conclusion was reached for the United States by Osterud and Fulton (1976) and Smith (1987:77); and for Australia by Jones (1971) and Ruzicka and Caldwell (1977:90ff). In the early 1870s the British index of marital fertility (I_g) was still almost 0.70, that of the United States probably a little lower, Australia 0.75, and New Zealand 0.80 (Jones 1971; Ruzicka and Caldwell 1977:92; Teitelbaum 1984:115).

The evidence suggests that methods of contraception until the 1870s were known to some but not widely used (on Britain, Peel 1963:113–115; Fletcher 1966:115; Seccombe 1992:70; on the US, Brodie 1994:41; on Australia, Hicks 1978:22; Caldwell 1982:251–252). In Britain both abortion and infanticide were practiced, but infrequently (Sauer 1978), while the role of sexual abstinence may have been more important (Szreter 1996:398ff). In France recourse to withdrawal was much more common (Santow 1995; van de Walle and Muhsam 1995:276).

The timing of the marital fertility transition is clear in the case of Britain and Australia, where by 1860 adequate vital registration systems were in place; but the timing is much less clear for the United States. Indeed, the claim has been made that there were two early marital fertility transitions, those of France and the United States (Smith 1987).

Marital fertility, as measured by I_g, was slowly rising in both Britain and Australia to peak, as related to decennial censuses, in Britain in 1871 at 0.68 and in Australia in 1881 at 0.74 (Jones 1971). It had fallen by 10 percent in both countries by 1891. The first national figure for the United States is for 1890 when it was 0.60 compared with 0.63 in Britain and 0.68 in Australia at that date. The lower level of marital fertility in the United States is not proof that decline started earlier there than in Britain or Australia or from a lower level. America, even when it had comparable fertility with other Western countries, achieved it by the product of higher levels of female marriage (the result of younger marriage) and lower levels of marital fertility. The case for an earlier marital fertility decline in the United States depends on two sources of evidence.

The first is the evidence, derived mainly from child–woman ratios at the censuses, that overall fertility was much higher in the early nineteenth century. That this does not mean marital fertility was higher at that time is best illustrated from the experience of Australia, which closely paralleled the situation in America with regard to both overall and marital fertility from 1890/91 onward when we can calculate Princeton indexes for both countries. Given rather similar frontier conditions, the same was probably true earlier, and, in any case, the Australian example shows falling child–woman ratios and overall fertility with stable marital fertility. Child–woman ratios were very high in early-nineteenth-century Australia because of the shortage of women in frontier conditions, leading to early and almost universal female marriage. When we can first calculate I_f (overall fertility)

in Australia in 1861, it appeared to be falling steeply from much higher levels, and continued to decline by a further 24 percent between 1861 and 1881 (0.49 to 0.37), a period for which Coale and Zelnik (1963:36) calculated a decline in American overall fertility of only 19 percent. The reason for Australia's steep decline in overall fertility was entirely a decline in the proportions married (I_m fell by 26 percent from 0.70 to 0.52 in those 20 years). Yet, not only was Australia's marital fertility stable but it was actually slowly rising up to 1881: I_g rose by 5 percent from 0.691 to 0.724 between 1861 and 1881.

Both countries were moving away from frontier conditions in which women were relatively scarce with consequent high marriage rates. Coale and Zelnik (1963:27–31) justified their American fertility calculations by comparing the rates to the registered Australian rates from 1860 to 1960, concluding that "The similarity is startling" (p. 27) and showing that the only significant deviations occurred when US rates were somewhat lower during the Civil War years, and during the 1880s when Australia had a major economic boom with the result that marriage rates stayed up. Given the extraordinary fertility parallels after 1860, there is no reason to expect that the only major deviations between the levels occurred before that date. Yasuba (1962:36) showed a decline in the American "refined birth ratio" (white children 0–9 years per 1,000 white women 16–44 years) of 29 percent between 1800 and 1860, but did not take marriage levels into account. Australia may not have been very different: nearly all women married in the first half of the nineteenth century, and the completed family size among women who had ever married remained above seven children as late as the cohorts of women born in the 1840s (Ruzicka and Caldwell 1977:132).

The second source of evidence for an earlier marital fertility decline in the United States comes from a series of local demographic studies that show declining fertility, including declining marital fertility prior to 1880. Examples are Byers (1982) on Nantucket, Massachusetts with fertility decline from the late seventeenth century (although the numbers were small); Osterud and Fulton (1976) on Sturbridge, Massachusetts in 1730–1850; Temkin-Greener and Swedlund (1978) on the Connecticut Valley in 1740–1850; Stern (1983) on Erie County, New York in 1855; and Haines (1978, 1980) on the Pennsylvania anthracite region and Philadelphia. The evidence is impressive, but perhaps reflects the passing of frontier conditions. Also, nearly all the samples are urban and in the Northeast. Again it is possible to make comparisons with Australia. Australia does not have real frontier states (colonies prior to 1901), because each state has an old settled coastal area around the capital and a sparsely settled hinterland. Nevertheless, in 1881, when marital fertility was highest, the I_g index had a range of 11 percent from 0.703 in Victoria to 0.777 in Queensland and I_f a range of 47 percent from 0.348 in Victoria to 0.512 in Queensland. In 1871 urban marital fertility (I_g) was 17 percent below that of rural areas; in 1921, well into the marital fertility transition, it was only 13 percent lower. There were certainly pretransitional differentials.

The timing of the American marital fertility transition remains obscure. Some populations certainly began their fertility decline earlier than did others. But,

in terms of national comparisons, marital fertility in 1891 in the United States was about 4 percent lower than in Britain and four years ahead in the decline; and about 12 percent lower than Australia and eight years ahead. Marital fertility was falling steeply in the three countries, in a way that was, at least at the national level, almost certainly unprecedented before the last quarter of the nineteenth century. Thus, in this essay, we can justifiably contrast for the three countries mid-nineteenth and late-nineteenth-century attitudes toward the discussion of contraception and its use in marriage.

RELEVANT THEORY

Most theory has focused on explaining the fertility decline when it eventually came rather than considering why it did not occur earlier. Demographic theorists of the marital fertility decline—although not social historians interested in the Victorian family—have concentrated more on the works of those who favored the spread of contraception than those who opposed it. One advantage of investigating Britain, America, and Australia is that, apart from France, they were participants in the first fertility decline, so issues of the diffusion of fertility-control practices from outside the English-speaking bloc are not of great importance, although ideas of the nature of the family or of spousal behavior may earlier have diffused between them. Nevertheless, in the late nineteenth century the example of France and the impact of its ideas, especially in novels, were widely blamed in English-speaking countries for fomenting extramarital liaisons and, by implication, the use of contraception. Nevertheless, a century's delay, in contrast to the rapid subsequent spread of birth control, has to be explained.

The distinction between theorists of the decline and theorists of the delay is not clear, because most of the former posit the necessary social and ideational changes, which seem to imply a catching-up with economic reality. Indeed, purely economic or other materialist explanations for the transition are rare, although most analysts probably assume that high fertility was once advantageous. One exception is Cleland and Wilson (1987), who take the view that natural fertility persisted solely because most families had few surviving children rather than because children in Western Europe were ever an economic asset. One materialist explanation contrasting France with English-speaking countries was popular in France in the late nineteenth century and is embodied in the works of Frédéric Le Play, Jacques Bertillon, and Alexander Brandt, namely that partible inheritance, especially of land, in France, in contrast to primogeniture in England, meant land fragmentation unless the number of children, all of whom were potential heirs, was limited. The system had largely developed before the French Revolution but became universal only with the promulgation of the Civil Code following the Revolution. Some analysts have been skeptical of the impact of such inheritance provisions on national fertility either in France (Berkner and Mendels 1978: 209–222) or anywhere (Davis 1963:353–354). A fully economic thesis, at least for the working classes, has been put forward by Schellekens (1993), who sought

to show that the poor needed their children's support, at least in old age, until real wages rose in the last quarter of the nineteenth century.

Woods (1987:309) concluded from a thorough analysis of the British fertility decline that it was catalyzed by an increase in educational levels, especially among females, and by the secularization of the society, and was promoted by "the substantial change in public opinion towards family planning as being legitimate, and personally acceptable. The change happened very rapidly and was encouraged by a flood of family planning propaganda during the 1870s, 1880s and 1890s." The problem with this explanation is that it is addressed to the last quarter of the century and does not explain the earlier failure to adopt birth control. The detailed studies by Banks (1954, 1981) also address the late-nineteenth-century fertility decline, the earlier work emphasizing economic fears rather than economic reversals among the middle classes. In Australia, the New South Wales Statist (that is chief statistician), Timothy Coghlan, published a book in 1903 on the fertility decline, concluding (p. 68): "The existing facts are compatible with only one explanation, viz., that in the years following 1880 the art of applying artificial checks to conception was successfully learnt and has continued in operation to this day. Nor are there any present signs that the lessons learnt are likely to be forgotten." The Royal Commission on the Decline of the Birth-Rate in New South Wales, 1903–4, provoked partly by Coghlan's book and other activities of its author, heard evidence that the underlying cause of this movement was (1) "the decline of religion, as exemplified in a weakening of the sanctity of marriage," and (2) "growing selfishness in ideas about the purpose of marriage" (Hicks 1978:55ff).

Some writers have directly addressed the delay in the marital fertility decline. Teitelbaum (1984:220–222) concluded his study of British fertility trends with a section on the "Lateness of fertility decline," where he judged that, in light of the level of economic development, the persistence of unchecked marital fertility was puzzling. His explanations were all materialistic rather than ideational: backwardness compared with many other Western countries in literacy and education; the mid-Victorian economic boom from the 1850s to the 1870s; the possibility of emigrating (see also Friedlander 1970); cheap sources of domestic labor for the middle classes (see Banks 1954:70–85); economic reasons for high fertility in the coal mining areas; and, somewhat surprisingly, a link via early weaning to higher fertility and infant mortality. Woods (1987:309–310) was unconvinced by Teitelbaum's reliance on classical demographic transition theory, considering these reasons to be unduly influenced by the supposed need for the extensive development of an "urban-industrial" complex (the phrase of Frank Notestein). Wrigley and Schofield (1981:435–438), at the end of their massive study of English population trends, suggest that the society had been so well served for centuries by the marriage mechanism for controlling fertility that it took time in the nineteenth century, as marriage delayed or forgone proved inadequate for controlling population growth, to find an alternative mechanism for achieving it.

Notestein (1945:39) expected such delays in fertility decline because of a series of "props" to high fertility surviving from earlier times when communities,

faced by high mortality, struggled to replace themselves. He included "moral codes" and "religious doctrines." The problem in applying this explanation to England is that marriage restraint, as Malthus proudly pointed out, had been employed for centuries to reduce fertility. Most lag theories posit the time needed for social or psychological adjustment. McLaren (1978) believed families took time to realize that the demand for child labor was disappearing. Lesthaeghe (1983:411–412) held that the Western fertility declines occurred because "the demographic regulatory mechanisms, upheld by the accompanying communal or family authority and exchange patterns, give way to the principle of individual freedom of choice, thereby allowing an extension of the domain of economic rationality to the phenomenon of reproduction . . . . [W]ithout the more general secularization tendency inspired by earlier humanistic philosophies and contemporaneous materialist ones, fertility would have remained largely in the domain of the sacred instead of that of individual freedom of choice." This is close to Notestein's (1953:15–18) position. Caldwell and Ruzicka (1978:84–86) argued from Australian research that the lag occurred partly because, although conditions had altered, they had not changed hugely: in mid-century children were no longer a net asset, but a predominantly Protestant social climate allowed even the middle classes to bring them up "for their own good" in a sufficiently austere way not to put punishing pressure on the family budget. Stone (1977:666) wrote of a similar moral climate in Britain and implied that stasis was needed in family conditions to maintain the newly strengthened patriarchy. Watkins (1986:435), summarizing the Princeton European fertility study, blamed social inertia, commenting that even when the fertility transition at last began, it "was a revolution accomplished with primitive technology and without generals."

Most researchers believe that religion played a role in that inertia. Simons (1981:135ff) wrote that modern secular writers failed to realize what a revolutionary assault was being made, for "meaning systems generally accord sacred status to procreation." McLeod (1977:73) saw the situation in a less atavistic light, but concluded that not until almost the end of the nineteenth century did the association between religion and respectability begin to erode. Trudgill (1976:26ff), too, emphasized not only the extent to which religion was regarded as the guardian of morality but that morality was in turn the guardian of social stability. Hollingsworth (1916:25), in America and with the Victorian period only just behind her, attested: "Orthodox women . . . regard family limitation as a sin, punishable in the hereafter." Trudgill (1976:26–27) testified that a middle-class loss of faith led to a stronger adherence to Christian morality, especially sexual purity; and Olive Banks (1981:74–75) reported a similar reaction when women were converted to feminism, for they became convinced that "birth control allowed men to indulge their sensuality unchecked both inside and outside marriage." It was widely feared that a knowledge of birth control would result in increased male resort to prostitution, which flourished in the new industrial cities (Houghton 1957:366).

Some theorists see other issues behind the opposition to birth control. One argument is that continually bearing and rearing children kept women from

demanding other roles and competing with men in the outside world (Smith-Rosenberg and Rosenberg 1973:350; Stone 1977:667–668; Gay 1993:290ff). Beisel (1997) in *Imperiled Innocents* argued that, in America, Anthony Comstock's crusade against contraception was largely supported not to keep wives in their place—not a single Congressman raised the issue in the debates on the Comstock laws (Beisel 1997:38ff)—but to increase the chances of their children's upward social mobility: "At the heart of moral reform politics . . . is family reproduction. . . . Moral crusades address a crucial issue for parents: whether their children will equal or better their parents' place in the social world. . . . Parents . . . attempt to teach children values and habits that will lead to success" (Beisel 1997:4–5). There was a fear of children embracing lifestyles that would repel others and that were not compatible with worldly success. In America there was also a fear that birth control would lead to "race suicide" and that alien immigrants would outbreed the native stock (Smith-Rosenberg and Rosenberg 1973:351ff). In Australia, with its smaller population and more recent settlement by Europeans, the argument was more often stated in terms of national survival: on a "satisfactory solution [of the problem of a low birth rate] will depend whether this country is ever to take a place amongst the great nations of the world" (Coghlan 1903:69).

In the nineteenth century Britain, America, and Australia evinced different social structures but a common social and religious inheritance. They shared the same language, and newspapers and magazines in Britain and America commented extensively on each other and reprinted articles from each other. Australia reported events, ideas, social changes, and fashions from both England and America. All this accelerated with the instantaneous receipt of reports by the use of the new cable services from the 1860s, the move to universal education and literacy in the 1870s and 1880s, and the subsequent development of mass-circulation newspapers. In the mid-nineteenth century both America and Australia took the view that British history was their history to a much greater degree than is the case today. The closeness of America and Australia to each other is shown by the almost simultaneous paths of marital fertility decline during the period for which we have statistics for both countries. Indeed, American and Australian fertility levels were to move together subsequently for around 80 years (Coale and Zelnick 1963:27–31; Jones 1971).

Considerable segments of each society regarded large families as an economic burden from the beginning of the nineteenth century and probably earlier. This seems to be the reason that Malthus's arguments in England were quickly accepted, at least by the middle class (Bonar 1924:363; Keynes 1951:100–101; Hollingsworth 1983:213–215). There is evidence from the northeastern United States that early in the nineteenth century "Yankee" mothers did not favor large families (Smith 1994:8–9). Kane (1995:152–153) found that in Britain this stance was widely taken in fictional literature, and Carey (1992) reported strong Malthusian views among the British literary elite in the last decades of the century. Such views were not shared by all segments of the society, certainly not by those where families needed children's incomes or labor such as the British coal mining families

(Teitelbaum 1984:219) or Australian small farmers (Caldwell and Ruzicka 1978:86). But children were viewed as an economic burden among a sufficiently large proportion of the population to have brought about the onset of a fertility transition early in the nineteenth century had there not been other intervening factors.

It is doubtful even in Britain whether that intervening factor was Lesthaeghe's communal cohesiveness and control, at least as it focused on maintaining high fertility. Such was certainly not the case in America or Australia, mobile immigrant societies without an established church; this was what Shorter (1976:242) meant by saying that America was born modern. Caldwell and Ruzicka (1978:85), writing on nineteenth-century Australia, assessed the situation similarly: "Australia was a land of immigrants who had come to make their fortunes and who had a strong sense of economic advantage about all their concerns. The modern reader of the preserved letters of a century or more ago often flinches at the careful cost-accounting attitude and the sense of getting ahead."

Cleland and Wilson (1987:29) may have come closer to the truth when they saw the impediment to contraception within marriage being overcome by the achievement of the "moral acceptability of the principle of [fertility] control; and the acceptability of particular methods." The view I put forward here differs in two ways. First, Cleland and Wilson have little use for economic arguments, while this essay contends that children were almost certainly of economic value to their parents before the late eighteenth century, while large families were a burden to much of the community by the late nineteenth century. Second, I contend that the central issue was not the principle of fertility control, certainly not that of the advantages of moderately sized families, and that only in a special sense was the issue the acceptability of particular fertility-control methods.

The argument of this essay draws more on the nineteenth-century movement against contraception than on those advocating birth control. After all, the former were victorious until late in the century, and their words were more widely reported and heeded throughout the century. It is also an argument that rejects the temptation of some feminist historians to see relations between the sexes in marriage as oscillating, with greater equality in the eighteenth century and patriarchal dominance in the nineteenth. Rather, it regards the eighteenth century as representing the denouement of the traditional family (as we have studied it in India; e.g., Caldwell, Reddy, and Caldwell 1988), one where men and women had different spheres and where middle-class British men felt more at home with other men at the coffee house than at their own dining table. Already this construct was threatened by what Stone (1977) called "affective sentiment," and Shorter (1976:xiv) "romantic love, family domesticity, and maternal tenderness." The nineteenth-century family—earlier in the middle class and increasingly in the working class—was a new and somewhat fragile construct. It was fashioned by the industrial revolution, rising incomes, an increasingly urban way of life, higher levels of education, and the Evangelical Movement that grew out of the predominant Protestant societies of all three countries. Husbands and wives treated each other as different, but

relationships were close and increasingly the home was the center of emotional life. But the system was new and was still being invented. To some degree spouses acted out their roles and defined themselves by their separate but complementary roles.

Because the system was being consciously invented and because of the piety of the evangelical revolution, there was a certain caution about spousal relations and especially about forbidden or difficult areas of discussion. This was not necessarily the case with regard to all matters concerning sexual relations, but there were difficulties in discussing sexual organs and especially doing unusual or "abnormal" things with them such as inserting vaginal suppositories or wearing condoms. Historical family research includes a growing literature on difficult parent-child communication on sexual matters, but much of the nineteenth century records no spousal discussions on these intimate matters. It has been suggested that the eighteenth century was different, but whether this is true or not is hardly relevant here as there was less pressure then toward fertility decline.

The central argument here is that from the beginning of the nineteenth century or earlier until at least the 1870s, the sanctity of marriage and the respect that spouses gave to each other would have been jeopardized by the discussion needed to use the then available means of contraception. Such discussion was "dirty," in the sense that Douglas (1966:2–3, 104, 162) uses the term in opposition to "purity" in her *Purity and Danger: An Analysis of Concepts of Pollution and Taboo.* Sexual relations, as she emphasizes, have always been in the realm of taboo and present danger to social order and the received religion. The burden of children was not heavy enough before the era of compulsory schooling that the potential gains from limiting family size would offset the potential danger to family stability and spousal respect inherent in discussing such matters. There is a double bind here: better packaged and marketed contraceptives were unlikely to become available until there was a mass demand for them, and that demand was unlikely to develop until spouses could discuss contraception, a process that was hindered by primitive means of contraception, obtainable only in fairly sordid places.

Strong support for this argument comes from the fact that, a century or more after this "purity" system was dismantled, most people still find it difficult to openly discuss aspects of sexual physiology except in ways that in print have pretensions to being scientific and use a Latinized vocabulary. In the English-speaking countries the debate on the population explosion starting in the 1950s brought such terms as "contraceptives" into public or polite discussion or publication, and the AIDS epidemic of the 1980s did the same for condoms. In Australia, a survey carried out as recently as 1971 showed that Catholic women, whose church still embodied more of the nineteenth-century attitude to contraceptives than did the belief systems of Protestants and the nonreligious, were only one-fifth as likely as non-Catholics to be using the genitally related diaphragm but almost as likely to be swallowing oral contraceptives (Caldwell and Ware 1973:23–24).

The mid-nineteenth-century opposition to contraception was based largely on the grounds of purity and religious expectation, supplemented by the

argument that contraception might be dangerous to one's health. The latter argument is not as hypocritical as it is now often painted. We still regard contraceptives with caution and test them rigorously. In the nineteenth century there was little accumulated knowledge and no systematic testing of the effects of such procedures as the persistent introduction into the vagina of quinine mixtures of varying composition or of douching with aloes or other substances or of leaving sponges in place. That smaller families enable women to assume roles other than motherhood went unremarked. The emphasis was unremittingly, for the married at least, on female and spousal purity, and religion was involved as an interpreter of purity rather than as a source of commandments against contraceptives and in favor of multiplying.

Two comparative social questions need to be addressed. The first is why the French were different. One possible answer is the cauldron of the Revolution and the muted voice of the Church in moral matters for decades subsequently (McLaren 1983:34). This may not be a sufficient answer because the French fertility decline was apparently achieved largely by employing withdrawal, which may require little discussion between couples. English-speaking medical advisers and even the majority of the neo-Malthusian propagandists regarded withdrawal as unnatural, undesirable, and probably dangerous. There is a persistent strain in English-language theology and philosophy of the natural law and in popular attitudes of what is natural or unnatural. The second problem is why the contemporary developing world is so different. The answer is that it probably is not. We have found no evidence in India or Bangladesh that couples could cope with discussions of how to obtain, mix, and insert spermicides. External help has been given and family planning clinic workers talk to wives while husbands are absent. No one need use any stronger term than the innocuous "family planning." In India, most men say no more about sterilization than to permit "the operation." The World Fertility Surveys and the Demographic and Health Surveys ask little more about conjugal communications than whether family size or family planning has ever been discussed, the latter usually implying only whether the wife should discuss matters with the family planning worker. These are not the challenges that faced mid-nineteenth-century couples, because there was no facilitating family planning program or national health service or even packaged and standardized contraception available from the pharmacist.

In the end the knot was cut, but in a peculiar fashion. During the first three-quarters of the nineteenth century the way was prepared. Society became more educated and more sophisticated about the new urban life, thus slowly producing a sexual revolution or at least an apprehension that the morality enjoined by religions was not solely centered on the regulation of female sexuality. But the major factor was the enormously greater economic burden on the family as ever more education and other expenditure on children was demanded by society. The Bradlaugh–Besant trial in England in 1877 over their republication of a family planning manual, the rather similar 1888 trial presided over by Justice Windeyer in Australia, and other parallel events had catalytic impact. Yet without Charles Bradlaugh and

Annie Besant, others would have had the same influence before long. The mass press and mass readership had evolved by this time, and the newspapers, in contrast to the situation ten or twenty years earlier, were willing to report the evidence presented at the trial in detail and great length throughout the English-speaking world. Large numbers of wives and husbands read both the evidence and the books to which it referred. My argument is not so much that couples were thereby instructed, but that they found these subjects could be discussed. Appearance in print in mainstream media legitimized conjugal discussion and shielded the partner who raised the subject from being thought crude and even abnormal. A parallel is the claim that Alfred Kinsey, by assuming a certain degree of oral-genital sexual practices and accordingly asking relevant questions and publishing the results (Kinsey, Pomeroy, and Martin 1948:576–577; Kinsey et al. 1998 [1953]:361), significantly raised the level of awareness, discussion, and practice of such activity. With regard to the late-nineteenth-century onset of fertility decline, the private discussion that followed the public one almost immediately raised demand for contraceptives and produced a reciprocal increase in supply, not only in volume but in quality and availability. By the late years of the century, English women could buy Rendell's pessaries, a cocoa-butter-based quinine product, from their local chemists, almost like any other pharmaceutical product (Peel 1963:116–117). It was obviously standardized and mass-produced, and hence was presumed safe.

I now turn to the evidence.

THE NINETEENTH-CENTURY CASE AGAINST CONTRACEPTION

In both Britain and the United States the nineteenth century witnessed a remarkable outpouring of books on the purity of the family, and especially the desirability of adults forgoing contraception and sons masturbation and the temptation of prostitutes. These works were concentrated in the period 1854 to 1876, although Anthony Comstock in the United States was active after this period. These authors were by and large moral propagandists who did not accurately reflect contemporary society. Nevertheless, the thrust of their arguments probably was similar to those misgivings that couples felt in turning to birth control. The dates of these publications, mostly in the third quarter of the nineteenth century, probably show that neo-Malthusian ideas were not reaching a wide public in the first half of the century, and that by the final quarter of the century the Victorian family was under threat from the increasing burden imposed by numerous children and from the secular and even sexual revolutions that industrialization was beginning to spawn. Doctors, rather than theologians, were most numerous among these moral crusaders.

Their ideas were not new. Saint Augustine had ruled that Christians could not have sexual relations for pleasure alone. William Cobbett, the English journalist, a radical but with a nostalgia for a disappearing rural society, had denounced Francis Place and Richard Carlile in 1826 in his *Weekly Register* for "openly and avowedly teaching young women to be prostitutes before they are married, and in

a way so as not to prevent their future marriage . . . the instructions being conveyed in terms so filthy, so disgusting, so beastly, as to shock the mind of even the lewdest of men and women," describing them in *The Bull Dog* in the same year as a "gang of persons determinately and brutally bent on the destruction of all loyal, religious, and moral feelings, in the lower and middle classes of this our great and happy land" (Fryer 1965:80, 82). Except for the later medical warnings about the dangers of contraception to health, the rest of the argument is all here: contraception is a subject so lewd as not to be discussable by normal people, it threatens the family and society, and it promotes sex outside marriage. These are the same arguments that Banks and Banks (1955:27–29) found in the editorials of English newspapers commenting on the Bradlaugh–Besant trials a half-century later.

The pure wife, who would turn away from a lewd husband who dared to discuss vaginal insertions, the use of condoms, or even contraceptive douching, was central to the concept of the Victorian home. Coventry Patmore, the English pre-Raphaelite poet, described such a wife in his poems, *The Angel in the House* in 1854 and *The Espousals* in 1856, which sold enormously for the rest of the century. Trudgill (1976:78ff) emphasizes the extent to which many Victorian writers identified the supposed purity of their wives with that of their mothers, and also regarded their wives as the pure mothers of their children, attitudes akin to the Madonna and Child cult. In America, Comstock acknowledged that the image of his mother, who died when he was ten years old, was his chief stimulus in his crusade against birth control (Broun and Leech 1928:39). An English gynecologist, William Acton, published in 1857 a book drawing largely on his practice; in spite of a rather turgid style, it ran to six editions over the next half-century. He pictured the ideal "English wife . . . so pure-hearted as to be utterly ignorant of and averse to any sexual indulgence" (Acton 1865:114), in contrast to the case of a wife with "strong animal instincts" who consequently proved unfaithful to her husband (Acton 1903:141). As late as 1918, Marie Stopes (1920:103) was writing: "The unmarried woman, unless she be in love with some particular man, has no definite stimulus for her sex desires beyond the natural upswelling of the creative force."

The role of women was to be wives and mothers, not because they would otherwise compete with men, but, as the American doctor Horatio Storer explained in a book addressed to "every woman," which was awarded the American Medical Association's 1865 Gold Medal, because "This . . . is the end for which they are physiologically constituted and for which they are destined by nature" (Storer 1868a:75–76). In a companion volume for men he maintained that: "it is an insult to the sex when men treat women . . . as though they were as sexually minded as themselves" (Storer 1868b:141), and approvingly quoted the seventeenth-century English divine, Jeremy Taylor: "he is an ill husband who uses his wife as a man treats a harlot, having no other end but pleasure" (p. 146). Eight years later another American doctor, writing anonymously as "A Physician" but in fact Nicholas Cooke, identified the nature of birth control in the title of his book *Satan in Society*: "All other methods of prevention of offspring [except continence and possibly

rhythm] are disgusting, beastly, positively wrongful, as well as unnatural, and physically injurious. Some of them are so revolting that it is impossible to imagine how persons with the least pretensions of decency can adopt them. . . . A husband, who could lay his plans with reference to future performances of this character, is guilty of practicing the seducer's art in relation to his own marriage bed . . . " ("A Physician" 1876:151–152).

Even if husbands and wives in reality were not so delicate, the near-unanimity of the general tenor in advice reinforced the difficulties in discussing a subject that did not otherwise appear in usual reading matter. The English Solicitor-General argued in 1877 in the Bradlaugh–Besant case: "this is a dirty, filthy book, and the test of it is that no human being would allow that book to lie on his table; no decently educated English husband would allow even his wife to have it . . . " (quoted in Fryer 1965:163). As late as 1876, "A Physician" (p. 138) maintained that in America "The extraordinary delicacy of this subject is such as to have hitherto absolutely prevented its discussion. . . . " Almost three decades later in Australia the Commissioners in the 1903–4 Royal Commission on the Decline of the Birth-Rate stated that the effect of contraception was "to lower the standard of right-living and right-thinking in the community, create laxity of morals, debase character, and ignore the sanctity of human life" (quoted in Hicks 1978:25).

Curiously, or perhaps a sign that society was already well on the way to secularization, doctors played a more prominent role than religious leaders in rejecting even the consideration and discussion of contraception between spouses. This was not solely because of the medical issues, for moral arguments suffused the physicians' pages. For about a hundred years from the mid-nineteenth to the mid-twentieth century they were to be the chief family advisers, at least to the middle class. In Britain the standard-bearer of medical science and major influence on family doctors, *The Lancet*, mixed moral and medical views well into the twentieth century, editorializing in 1869 that the use of contraception in marriage meant that the wife acquired the condition of mind of a prostitute as well as risking physical harm, and that the husband was in effect practicing masturbation (Nead 1988:21). Many, no doubt, believed that they did not know enough about procedures that might be dangerous, but none seems to have advocated their scientific investigation. Foucault (1981:53–55) argues that the medical profession faced a predicament because of its claim to have knowledge while in fact its "learned discourse on sex . . . was imbued with age-old delusions [and] also with systematic blindness."

Even though religious leaders did not take on the main burden of opposing contraception, the argument was carried out within the context of Christian teaching with, in English-speaking countries, strong overtones of Protestantism and of the Evangelical Movement, at its height in the late eighteenth and early nineteenth centuries. The Christian moral leadership was provided by lay societies, such as, in England, the Society for the Suppression of Vice, the Social Purity Movement, and the Moral Reform Movement (D'Arcy 1977:436). In providing a chronology for when contraception proved a threat, it is instructive to note that the Society for the Suppression of Vice, when founded in Britain in 1801, was concerned

with general issues of Christian family life, only identifying birth control as the major threat toward mid-century and probably initiating the Bradlaugh–Besant prosecution of 1877. In contrast, the New York Society for the Prevention of Vice, founded in 1874 as a transformation of the slightly earlier New York YMCA (Young Men's Christian Association) Committee for the Suppression of Vice, made abortion and the publicizing of contraception their chief targets from the outset. Looking back on the nineteenth century, the often elderly clergy who gave evidence to the New South Wales Royal Commission on the Decline of the Birth-Rate saw the growing practice of contraception as having been caused by "the decline of religion, as exemplified in a weakening of the sanctity of marriage" and the "growing selfishness in ideas about the purpose of marriage" (Hicks 1978:55ff). They clearly regarded the organized church as the bulwark against the practice and probably the contemplated practice of contraception within marriage. Nor was feminism a counterweight to the churches. Olive Banks (1981:74–75) concluded: "It is now generally agreed that neither in the United States nor in Britain was the feminist movement prepared to countenance contraception. . . . Far from seeing artificial birth control as a step towards their emancipation, they perceived it as yet another instance of their subordination to man's sexual desires. . . . [T]he feminists tended to see the propagation of birth control techniques as leading to an inevitable degradation of morals."

A caution must be added to this picture with regard to the United States. Brodie (1994:180–203) describes a "boom in self-help [contraceptive] literature after 1850," although she also quotes Alcott in 1866 (1972:182–183) as blaming the possession of the new knowledge on a book [Knowlton 1832 and subsequent editions] "clandestinely circulated" (p. 87). Anthony Comstock certainly believed that by the 1870s such literature was being widely distributed. But he also saw this distribution as clandestine, being about matters that did not appear in the mainstream press and that should not be discussed between spouses. Brodie (1994:282) concluded that "The Comstock laws had a particularly dramatic impact on the dissemination of advice literature. The last two decades of the nineteenth century saw a decline both in its number and its quality." She describes the post-Comstock situation as one of confusion rather than silence: "At least three editions of Besant's *The Law of Population* were published in the United States in the 1870s and 1880s and all contained her original discussion of preventives. . . . In his 1886 *The Radical Remedy in Social Science*, Edward Bond Foote commended Besant's work as 'undoubtedly the best writing on the subject now extant in England or America . . . '" (p. 283). In any case Comstockery came too late to prevent marital fertility decline: The I_g index, which earlier in the century might have been over 0.70, as it was in Australia, was down to 0.60 in 1890 and 0.51 in 1900. America may have had greater access than Britain or Australia to contraceptive literature in the 1850s and 1860s, and it may have had some legitimizing force in the urban Northeast, but the application of this knowledge within marriage, as measured by national marital fertility, was largely a phenomenon of the last quarter of the century.

The concept of the mid-Victorians being worried by sexual relations and tongue-tied on the subject was formulated well before the nineteenth century came to an end, and was part of the more general reaction against Victorianism of the early twentieth century that is associated with writers like Samuel Butler and Lytton Strachey. The writings of Victorian sexual moralists discussed above—William Acton in England, and, in America, Anthony Comstock, Nicholas Cooke, Augustus Gardner, John Kellogg, and Horatio Storer, as well as those writing more generally on the family, such as Thomas Arnold and John Ruskin in England—have been mined in the last half-century by family historians and sociologists. The aim has been to reconstruct the Victorian family, and a major focus has been on its sexuality. Most have claimed that sexuality presented Victorian couples, especially middle-class ones, with formidable problems. Beales (1949:344–350) described the Victorian family as a refuge, later to be endangered by family planning, and Houghton (1957:359) described it as a product of the Evangelical revival and a reaction against the license of the Regency aristocracy. Cominos (1963:25) wrote of a society where "Physical desire in women was practically non-existent, in men strong, but always suspect" and where "Contraception both aggravated and gratified 'physical desire' and at the same time frustrated the parental instinct."

Such historical analysis has been at flood tide since the 1970s. Marcus (1974), describing Acton as a "rather gifted social observer" (p. 7), built from this evidence a picture of great sexual repression (pp. 2–33). A major influence was Trudgill's (1976) *Madonnas and Magdalens: The Origins and Development of Victorian Sexual Attitudes*, which explained that "For many Victorians . . . a liberal view of sex was quite impossible. Apart from the ascetic dictates of religion, apart from the genteel requirements of social propriety, apart from the psychic constraints of a crisis of faith, there was a nagging political fear which made sex an insidious, subtle danger to society" (pp. 34–35). Another was Stone's book published the following year: "Together with these authoritarian tendencies within the family went a general hostility towards sexuality. The [late] eighteenth-century drive for moral reform slowly evolved not only into patriarchy and sentimentality but also into paranoid prudery and sexual repression" (Stone 1977:673). Gay, in his three volumes on *The Bourgeois Experience: Victoria to Freud* (1984, 1986, 1993), strengthened this picture, describing a society that wished to polarize the sexes.

The most recent analyses are typified by Davidoff (1990:84), writing in *The Cambridge Social History of Britain, 1750–1950*: "The feminine ideal was to be dependent, young, weak and childlike, encouraged by the widening age gap between spouses, for by mid-century, in the upper-middle class, husbands were on average six years older than their wives." She observed that in earlier centuries a common picture of women was their having voracious sexual appetites but this was reversed in the nineteenth century, certainly in description and probably in practice (Davidoff 1990:84). Gay (1993:293ff) pictured a society where the chief role of a woman was to teach her children, husband, and society to be virtuous. Porter and Hall (1995:126ff) have summarized the influences creating this situation

as evangelicism, the growing bourgeois demand for respectability paralleled by movements in the working class to idealize the family and suppress all that was bawdy, and Malthus's reverence for self-restraint. The result was that sexuality, especially female sexuality, became ever more suspect.

Critics charge that these writers have mistaken the propaganda of the Victorian moralists for descriptions of a society that in reality was not so different, at least sexually, from modern-day society. In 1974 Degler argued that the accepted picture of Victorian sexuality had been built upon the works of authors like William Acton and John Kellogg who had an ideology, but not facts (p. 1479). Degler's own facts were not fully convincing, at least as a portrait of the mid-Victorian marriage. They were taken from the records of Dr. Clelia Duel Mosher, a physician first at the University of Wisconsin and then at Stanford University, of 45 women, 17 before 1900 and 28 later, most being college graduates. They are an interesting record of attitudes and problems half a century or more later than this essay's focus of interest, and present the situation in the early decades of the fertility transition. Only 24 of the 45 thought sex was a pleasurable experience for both sexes (Degler 1974:1486). Degler renewed his attack in 1980, adding Frederick Marryat's 1839 publication, *A Diary in America*, to his list of untrustworthy sources. Likewise, Smith (1974) attacked the picture of Victorian prudery saying that William Acton's contemporaries and reviews of his book in medical journals of the time were skeptical of his work. He cited, in opposition to the large sales of the works of the sexual moralists, substantial sales of birth control guides—but the large sales all dated from the Bradlaugh–Besant trial in the late 1870s as fertility decline began. And Kern (1974) attacked the accepted interpretation of the Victorian family, but his description, entitled "Explosive intimacy . . . ," says little about conjugal ease in handling sexual matters, and sometimes gives the opposite impression, such as when he describes the family as being fortified against the outside world in a way that "often stifled more than it protected and comforted" (Kern 1974:438).

Douglas (1977), in her book, *The Feminization of American Culture*, argued that Victorian conjugal relations were fairly "equalitarian," but she offered little evidence on sexual relations except to quote Richard Carlile's *Every Woman's Book; or What Is Love*?, published in 1826 in London and asserting what conjugal love should be rather than answering his own question. Seccombe (1992) addressed the same issues, but went no further than concluding that perhaps a majority of women were apprehensive of conjugal sexual relations, largely because they feared pregnancy, but that many women did enjoy such relations (pp. 73ff). By 1994 Mason was able to argue that in historical and global terms it is the sexual attitudes of the modern West that have to be explained, not those of the Victorians (pp. 3ff).

Stearns and Stearns (1985), in their review article on the debate, conclude that although the revisionists scored some telling points in their attack on the received opinion of Victorian conjugal sexual morality, they only slightly eroded the whole edifice and failed to prove that a relaxed intimacy was typical of Victorian marital sexuality. It is difficult to disagree with this conclusion.

For the argument of this essay, two points stand out. The first is that none of the revisionists has suggested that sexual matters could easily be discussed between Victorian spouses. At the most they argue that we have no evidence that the usual conjugal sexual activities could not be easily and joyfully performed in most marriages; they do not argue that such activities could easily be discussed, analyzed, or changed. Stone (1977:676) quotes a Victorian marriage manual that advised for sexual relations "tranquility, silence and secrecy." The second point is the extraordinary extent to which both Victorian writers and modern commentators regard the English-speaking world as a single entity. American and Australian writers draw on English experience and sources without even bothering to mention that they are changing continents, and English nineteenth-century sexual moralists or birth controllers drew on American experience with almost as much facility.

The Victorian family was a new and somewhat fragile creation. It evolved, as had been noted by contemporary observers (e.g., Mill 1970 [1869]:540) and much later ones (e.g., Houghton 1957:341–342), from a more traditional society in which males associated primarily with males and females with females (e.g., Caldwell and Caldwell 1992:48–49), to one in which husbands spent most of their nonworking time at home and where the relationship between spouses was more intimate than ever before and consequently fraught with new emotional dangers and surrounded by new rules of conduct. These rules were both religious and ethical in nature. Briggs (1959:463) says that the concepts of religion and ethics are difficult to separate in mid-Victorian England. This family was the product of rising living standards, the new industrial occupational structure, an increasing tendency to commute to a distant workplace, and the Evangelical Movement. The middle classes increasingly saw themselves as "the guardians of the Protestant conscience" (Briggs 1959:467). The transition had its prophets and bards: John Ruskin, Thomas Arnold, Alfred Tennyson, and others.

The home was seen as a refuge from a rough outside world where men worked, and also from the new industrial cities thronged with prostitutes and other temptations. It was a place where children had to be protected and raised and where men could seek solace, described somewhat grandiloquently by Ruskin (1905 [1865]:122) as "a sacred place, a vestal temple," with its connotation of female chastity and purity. The roles of the sexes were still strongly differentiated. Inequality was not always in one direction. In order to soften men and indeed to mother them, as well as to raise children and to exhibit laudatory moral standards, leadership in religion, morals, and purity was attributed to the wife/mother. Kellogg (1888:175) expressed his own opinion when he reported: "A writer says . . . that 'women comprise about all the real virtue there is in the world.'" Such a position can be one of great power as Douglas (1977) has noted in America and as Caldwell and Caldwell (1992:52–53) have recorded in contemporary India. It did, however, accentuate the age-old tendency in the Old World religions to equate morality with female sexual purity, and it resulted in a high level of prudery in terms of sexuality, bodily functions, and human anatomy.

A desire to discuss matters in these areas with a spouse and to sort out one's ideas could jeopardize a relationship. This was clearly the chief thrust of the attack on the early family planning manuals, not that there was a divine prohibition on such publications. Nor did books or newspapers suggest that such discussions could or did take place. The first Christian leaders in England to assert that birthcontrol could be considered and discussed did not do so until late in the century and after the Bradlaugh–Besant trial: Moncure Conway, a radical clergyman, did so in 1878 and Stewart Headlam, a Christian socialist, in 1885 (Campbell 1960:133).

There is a growing literature on Victorian parent–child communications on difficult topics (e.g., deMause 1976). The absence of anything equivalent with regard to spouses provides significant evidence of the rarity of such communication. Research for this article over a number of years has revealingly uncovered practically nothing. It was not only sexual activities that Victorian couples found hard to discuss; the forbidden subjects ranged over all parts of the body connected with the reproductive or excretory organs and to such processes as menstruation, defecation, and even childbirth and breastfeeding (see Mason 1994:127). After a comprehensive examination of bibliographies on the Victorian era, O. R. McGregor (1955:59) wrote: "the Victorian bedroom is firmly shut in the investigator's face . . . to no subject does this apply more firmly than to menstruation" (cited in Showalter and Showalter 1972:38). Wives were taught not to venture into conversational areas that they did not understand, and there was growing formality in spousal relationships both in real life and in novels (Stone 1977:667–668), the latter both reporting life and guiding it. Seccombe (1992) explored a wide range of sources before concluding, "it was extremely difficult for many women to communicate their most basic wishes to their husbands. Many did not even try" (p. 75).

The extent to which birth control and its relationship to sexuality were regarded as revoltingly lewd has been well captured by Banks and Banks (1955:27) in their quotations from British newspaper editorials at the time of the Bradlaugh–Besant trial. The *Daily Telegraph* wrote of "vice of a character so abandoned, revolting and unnatural . . . [as to threaten] the downfall of this nation . . . [which] would, if allowed to go unchecked . . . destroy body and soul alike." *The Manchester Examiner and Times* said that there is "something even more valuable than life—the moral purity and the elevation of sentiment which chiefly distinguishes us from the lower animals, and it would be better to lose our life than to save it by measures which would rob it of all worth and dignity." In 1869, *The Lancet* editorialized about family planning: "We do not think that the practices to which we have already been compelled to refer . . . would be tolerated even as subjects for discussion by more than a very small number of medical men" (cited in Peel 1964:135). The charge laid against Bradlaugh and Besant was that they had published "a certain indecent, lewd, filthy, bawdy, and obscene book called 'Fruits of Philosophy'" (cited in Banks and Banks 1955:23). These attitudes toward birth control and its discussion were not the monopoly of the establishment, for Seccombe (1992:71) reports that the English working class, late in the nineteenth century, "regarded contraceptives as

'repulsive and unnatural.' Condoms had an unsavory reputation, being associated with prostitution, extramarital liaisons and the prevention of venereal disease. . . . " Davidoff (1990:117) reported that the difficulty the nineteenth-century British working class encountered in moving toward birth control was their "belief that any discussion of sex was dirty and shameful."

Stearns and Stearns (1985:627–628) point out that Victorian literature stresses the weakness of the female sexual drive, hence women who showed interest in determining an aspect of sexual activity, such as the practice of contraception, may have been regarded as deviant. Sir James Paget (1879) maintained that "Ignorance about sexual affairs seems to be a notable characteristic of the more civilized part of the human race" (cited in Cominos 1963:34–35). Gay (1984:257) reports on an enlightened 1876 American correspondence between two middle-class women which, when touching on contraception, notes that it was "a delicate matter" and that the devices were "unpalatable." McLaren (1978:93) reports that "Prior to 1877 the belief that the birth control propagandists were seeking to undermine the existing family structure was sufficiently potent a charge that few members of society dared defend the practice publicly." And it may well have taken equal courage for women, and even for men, to raise or defend the practice within their marriages.

Foucault (1981:17) has argued that "calling sex by its name" was easier before the beginning of bourgeois society in the seventeenth century; "thereafter [it] became more difficult and more costly." The problem may have begun much earlier: we have found it a difficult subject to discuss in Asian traditional agrarian societies. Nevertheless, there does appear to have been change as the nineteenth century proceeded: William Cobbett wrote in 1829, "farmers' wives, daughters and maids cannot now allude to, or hear named without blushing, those affairs of the homestead which they, within my memory, used to talk about as freely as of milking or of spinning" (cited in Stone 1977:675). This conditioning worked: Houghton (1957:353) found that "In the Victorian home sex was a secret . . . no-one mentioned it . . . [and] at the bottom it sprang from a feeling of personal revulsion."

THE CONDITIONS OF CHANGE

The issue now is why, and how, the stability of the mid-Victorian family, neither controlling births nor discussing the subject, changed. Change was inevitable and the only questions are its timing and what triggered it. The size of the British economy nearly trebled between 1820 and 1870 while the multiplication in the United States and Australia was much greater. In all three countries per capita incomes doubled during that period, and in America and Australia increased by a further 20–25 percent between 1870 and 1880. By the latter date, the three countries, together with New Zealand and the Netherlands, had the highest per capita incomes in the world (Maddison 1995:180ff; see also Church 1975:24). In Britain the proportion of the workforce in white-collar employment rose from 5 percent in 1841 to 8 percent in 1881 (and to 11 percent in 1901) (Mitchell and Deane 1962:60–61). By mid-century, nearly all middle-class girls were in school,

ensuring within a decade or two that all younger middle-class wives had been educated. One result was the rise of the mass-circulation press in the last third of the century. In Britain, newspapers reached an ever wider audience as the twopenny newspapers were challenged by the new halfpenny ones. In America the populist and less staid "New Journalism" emerged during the 1870s (*Encyclopaedia Britannica* 1953: Vol. 16, pp. 337–345). By the 1880s even working-class children in the three countries were in school as new universal education laws came into effect. The consumption economy in Australia intensified from about 1880 as department stores came into existence, with a marked increase in the sale of such items as children's toys (Caldwell and Ruzicka 1978:90).

Forces that were noneconomic but were nevertheless strongly related to rising standards of living and educational levels also played a role. Secularization was important; even the deeply religious allocated broader areas of life to the nonreligious sphere. Women's movements exerted influences far beyond the circle of feminist activists. In Australia the first feminist movement was active in the last decades of the century, only to become quiescent when women's suffrage was achieved nationwide in 1901. It had strong connections with the trade union movement, which had been gathering strength since the 1850s.

The central difficulty in achieving mass fertility decline lay in a rather ironic interrelationship. As long as the sexual organs and the maneuvers needed to stop them playing a role in fertilization could not be mentioned by either spouse without causing a loss of respect by the other, then contraceptives remained primitive with sales outlets that were limited and thought disreputable. Better-packaged contraceptives sold through pharmacies awaited the legitimization of contraception. Legitimization could be achieved only by a level of public discussion that convinced women and men that their spouses would not regard them as deviant if they raised such matters.

Such legitimization seems to have been provided to this increasingly literate population by the issue of birth control appearing widely in print. The Bradlaugh–Besant trial may not have been the only catalyst but it seems to have played a key role, as claimed by Elderton (1914:233ff), Himes (1970 [1936]:240), and others (Banks and Banks 1955:22; Teitelbaum 1984:206ff). Most of the press commentary was adverse, but for days the subject appeared in print, and a vocabulary, even if often circumlocutory, was learned for discussions on the reports themselves or for a later time. Not even the defendants were completely emancipated: Annie Besant (1893:207–208) later wrote that she had to go ahead with publishing *The Fruits of Philosophy* and the subsequent trial because of the plight of the poor, even though she knew her reputation would be ruined and realized "the odious imputations on honour and purity that would follow." The 1903–4 Royal Commission on the Decline of the Birth-Rate in New South Wales blamed a sharp fall in the birth rate in 1889 on the publicity given the previous year to a trial when an unsuccessful attempt was made to prohibit the sale of Besant's *The Law of Population* (Hicks 1978:23; see *Mr Justice Windeyer on the Population Question*. . . , London 1891). The Commission also blamed the reading of French

novels (Hicks 1978:62–63), a source of danger also reported in Britain (Houghton 1957:359).

The impact of the Bradlaugh–Besant trial was spectacular. Banks and Banks (1955:22) record the huge daily newspaper coverage of the event. Fryer (1965:162) notes that "For four decades, *Fruits of Philosophy* [a birth control guide first published by the American Charles Knowlton in 1832] had been selling about seven hundred copies a year. In the three months between the arrest of Bradlaugh and Mrs Besant [for republishing it] and their trial, no fewer than 125,000 copies of the new edition were sold." To this must be added Besant's (1877) *The Law of Population*, written immediately after the trial and subsequently selling 175,000 copies (Fryer 1965:165). This may not have been the very beginning of legitimization, or its final achievement, but it was the first quantum jump. Peel (1963:115–117) records that shortly afterward the middle-class demand for contraceptives began to rise with a consequent improvement in the quality, rather than the range, of contraceptives and in their accessibility. There were better rubber condoms and diaphragms and better pessaries and douching equipment. By the end of the century the Rendell pessary was sold in nearly all pharmacies. David and Sanderson (1987:30), writing about America, posited a "connection between the sharper delineation of the two-child norm among urban birth-controllers and the rapid spread of knowledge within that stratum of society about the array of new and more reliable contraceptive methods that had been introduced in the United States and Europe during the late 1870s and the 1880s."

In a report written in 1910 and 1911 for the Eugenics League in Britain, Elderton (1914:233–235) came to conclusions that have been echoed ever since. She employed fertility trend data to identify the Bradlaugh-Besant trial as triggering the fertility decline in a period when children had become much more expensive. She noted: "The Compulsory Education Act of 1876, the Factory and Workshop Act of 1878, and the Bradlaugh–Besant trial of 1877 are not unrelated movements; they are connected with the lowered economic value of the child, and with the corresponding desire to do without it." She concluded that the trial "legitimized the teaching of practical methods for the limitation of the family, and within thirty years that teaching has revolutionized the sexual habits of the English people."

What was legitimated was the discussion and practice of birth control, something broader than the use of contraceptives. Woods (1987:310) says that the new information's "most important function was to raise consciousness, to break those unquestioned assumptions that automatically lead to patterns of natural fertility." He also surmised that the rise in sales of contraceptives was too small to account for most of the decline in fertility in the last years of the century, and concluded that the rise in consciousness mostly propelled an increase in sexual abstinence, withdrawal, abortion, and possibly anal intercourse (Woods 1987:291). Seccombe (1992:67) came to a similar conclusion for much of the early European fertility decline. In Australia, the index of fertility control (the Princeton *m*) doubled between 1871 and 1901, and almost doubled again by 1921 (Caldwell

1982:233). By the 1890s one-quarter of couples were probably practicing birth control, with withdrawal predominating, followed by sexual abstinence, douching, and abortion (Caldwell 1982:252). Only 22 percent of birth controllers were employing contraceptives, apart from douching, and a majority did not use contraceptives until the 1940s. Patterns were probably not very dissimilar in Britain and America, although the latter long exhibited an unusually high level of douching (Fletcher 1966:115; David and Sanderson 1986:324–325). Szreter (1996:398ff) believes that, at least before 1940, the role of sexual abstinence in Britain—and, by implication, America and Australia—has been underestimated. Britain exhibited a marked differential during the late nineteenth century in birth control between the middle and working classes (Fletcher 1966:115; Davidoff 1990:117), but the contrast may have been less in America and Australia. In the latter the classes were separated by only about five years, in terms of passing through the same fertility levels during the early stages of the decline (Caldwell and Ruzicka 1978:87).

Shorter (1976:248) concluded that Western conjugal life became eroticized between 1850 and 1914 but he did not decide whether this led to the ability to practice birth control or whether it was the other way around. By the 1890s sexual scientific publications began to appear (Porter and Hall 1995:155).

A RESTATEMENT

England had ceased to be a predominantly farming society well before the main burst of industrialization in the mid to late nineteenth century. By 1841 only 28 percent of the male labor force was in agriculture and this fell to 17 percent by 1881 (Mitchell and Deane 1962:60–61). As urban society developed, first the middle class and then the working class sent their children to school as more occupations demanded a literate workforce and as members of a richer society increasingly judged their neighbors by the way they schooled their children. For much of the society, children had probably been a net economic burden throughout the century. Change in America and Australia was, by these indexes, somewhat slower, but their agriculture was more fully commercialized. By the 1861 census, 40 percent of Australia's population was in urban areas, half in state capitals, and after 1881 most lived in towns or cities (Caldwell 1987:41).

The new wealth and the new way of living necessitated a new kind of family, at first among the economically better off, a process described by Foucault (1981:17) as the *embourgeoisement* of the family. There was a continuing move toward a household based on the nuclear family, and, as John Stuart Mill (1970 [1869]:342) observed, men spent more of their time at home concerned with family matters. Stone (1977:666) summarized: "The next stage in the evolution of the family was marked by a strong revival of moral reform, paternal authority and sexual repression, which was gathering strength among the middle classes from about 1770." This can be put another way. The intensely self-centered modern family was being constructed, one that would eventually devote so much of its

resources to its children that their numbers would have to be reduced. In spite of the patriarchy, spouses were probably emotionally closer to each other than they had ever been, and it was expected that moral and ethical standards would be set by the wife and that the husband's standards would eventually converge with these higher ones. The moral sources drawn on to achieve this were Protestant, even Puritan. Among parts of British society these values had probably survived from the seventeenth century (Stone 1977:678), as they had done more strongly in America. The new middle-class Evangelical piety in Britain self-consciously opposed not only the situation among the working class but also that of the aristocracy. In Britain, as the Evangelical Movement penetrated society more deeply, working-class family life followed the middle-class model (Davidoff 1990:117), and the gap between the two was always narrower in America and Australia.

The first point of central importance in this argument is that this new family was regarded as fragile, with strong moral pressures needed to restrain the underlying animal instincts of men and the potential waywardness of children. Danger was averted—as it is in many modern firms and other institutions—by a plethora of rules and a high degree of formality. The second point is that until three-quarters of the way through the nineteenth century the increasing economic burden of a large family was still tolerable, and the gains from practicing birth control were small when compared with the risk to marital relationships that would have arisen from a spouse appearing to reveal his or her coarseness and lewdness by raising the subject. The third point is that not only had society to experience decades of social and educational change before such interspousal communication was possible in most marriages, but even in the 1870s the topic had to be seen to be discussable by appearing in the press and in the now rapidly selling birth control manuals. It was the written rather than the spoken word that allowed the onset of fertility decline. Where the difficulties imposed by large numbers of children became intense earlier, as among the married women who constituted a large part of the workforce of textile manufacturing areas, fertility decline came sooner (Elderton 1914:236; Davidoff 1990:117), and in such instances communication on the subject may initially have been from woman to woman.

Evidence supporting the central role of the printed word in causing the onset of marital fertility decline is provided by the near-simultaneity of the onset throughout the English-speaking world. There had always been a strong flow of reprinted newspaper and magazine articles between countries, accelerated by the laying of transoceanic cables. As a conspicuous example of the export of the printed word, Charles Bradlaugh and Annie Besant were tried for republishing *The Fruits of Philosophy*, a book by an American physician, Charles Knowlton, who, in contrast to Bradlaugh and Besant, went to jail for publishing it. Another example is that Anthony Comstock's anti-birth control activities evoked so much interest in Britain that the term "Comstockery" was coined in England by Bernard Shaw.

Modern communications also produced near-simultaneous reactions to the early fertility decline. Hicks (1978:1–4) provides one example. In March 1903

Theodore Roosevelt expressed worries about the American population structure that the fertility decline would produce, a statement that was widely publicized in Australia. At the same time, the New South Wales chief statistician, Timothy Coghlan, was writing a book lamenting the fertility decline in New South Wales, which he published in June 1903. The two events led to the government announcing in August 1903 the establishment of a royal commission to investigate the situation.

Finally, mention should again be made of the rival theories to explain the delay in the adoption of birth control and the decline in the birth rate in the English-speaking world. The first is the need felt by men to keep women in their place and out of the workforce. The Victorian moralists and the proponents of the Victorian family certainly believed that women were biologically and psychologically best suited to being mothers and wives, but in thousands of pages of writings there is barely a mention that less fertile wives, especially middle-class wives, would be tempted to join the workforce. Large-scale white-collar employment did not become available for women until late in the century when it was propelled by the rapid rise in the demand for school teachers. Poor women worked even when they had large families, their children often contributing by outwork in such industries as textiles and shoemaking. In England at any one time in the nineteenth century about 30 percent of women, constituting around one-third of the workforce, were employed, about four-fifths of them either as domestic servants or in the textile industry (Mitchell and Deane 1962:60–61). Those in service were mostly young and unmarried, while the married textile workers pioneered the working-class fertility decline.

The other argument is Beisel's (1997), based on her study of Anthony Comstock, that the chief concern was to prevent unmarried children from learning of contraception and becoming wastrels, unmarriageable because no longer virgins, or prostitutes, thus earning social disapprobation and ruining their chances of upward social and economic mobility. With regard to Comstock and his wealthy supporters, she largely proved her case. The problem is that Comstock was not mid-Victorian and his activities were not carried out during the period when the fertility decline was blocked, but in the subsequent period of contraceptive and fertility revolution. The married were already lost, but at least they were carrying out their vile practices within marriage; the young might still be saved from contamination. Comstock's major books were all first published in the 1880s, although the Comstock Law was enacted in 1873 and his period as special agent for the US Post Office spanned the years 1873–1915. There was always some concern for the young in England and Australia and opposition to "obscene" advertising literature, especially toward the end of the century. There was some basis for this concern as is shown by birth registrations in Australia, which were published by months before or after marriage and which reveal that, in the decade 1891–1900, of all first births in New South Wales one-quarter were illegitimate and a further quarter conceived before marriage (Coghlan 1903:7). This may be evidence of the lag between middle-class and working-class change. Nevertheless, the focus of the earlier American books was on married couples, although Ryan

(1981:121–122) shows that the bands of female reformers in Oneida County, New York, in mid-century concentrated disproportionately on the young.

These problems have not arisen in contemporary developing-country family planning programs for a number of reasons. Legitimization both in print and orally from family planning workers has been provided early, often before most people have thought of restricting family size. Most contraception either is separated from the genital area as in the case of the pill or implants, or occurs only once and not at home but with legitimating medical assistance as in the case of IUD insertion or sterilization. Conversation between spouses on the mechanics of family limitation is usually minimal, the husband just letting it be known that this is a matter between his wife and the family planning worker (Caldwell, Reddy and Caldwell 1988). Damage may be done to the family, but, as in India (Caldwell, Reddy and Caldwell 1988:71), the damage is more likely to be to the decisionmaking rights of the wife's parents-in-law, and this is regarded by officials as being in the direction of inevitable—and even desired—social change.

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ENDNOTES

1. This article first appeared in *Population and Development Review* 25 (3) (September 1999), pp. 479–512).
2. Fertility, marriage, and the level of fertility control in this essay are measured by the Princeton indexes (Coale and Treadway 1986, Appendix B:153–162). Overall fertility, I_f, and marital fertility, I_g, are the ratios that the births of all women and of married women respectively constitute of what is taken to be the maximum possible number of births, calculated by applying the Hutterite age-specific fertility schedule to the women being studied. This schedule was derived from the births in the period 1921–30 of a migrant group of this Anabaptist sect in rural America. Partly because they forbade fertility control, the Hutterites had very high marital fertility ($I_g = 1.0$). It was also very high because a high-protein diet and a shortening of the period of breastfeeding meant a relatively short period of postpartum amenorrhea. In the pretransitional European populations listed by Coale and Treadway (1986:80–152), I_g generally ranges between 0.6 and 0.9. The Princeton measure of the proportions married, I_m, is a summation of the proportions married in each age group weighted by Hutterite age-specific fertility schedules so as to measure the contribution of marriage to fertility. In pretransitional European populations it was usually in the range 0.4 to 0.8. Where all fertility occurs within marriage, I_g and I_m multiply to yield I_f. The I_f range in pretransitional Europe was nearly always between 0.3 and 0.6, indicating that the fertility level was 30 to 60 percent of what it could have been had all females married at puberty and then followed Hutterite fertility patterns throughout their reproductive span. Princeton indexes were devised to

meet situations where, for at least some populations in some of the historical period, there were census data on fertility and marriage but no data from vital registration systems. The indexes for England and Wales were in 1851: $I_m = 0.48$, $I_g = 0.68$, $I_f = 0.35$ (the discrepancy is because of illegitimate births), and in 1961: $I_m = 0.70$, $I_g = 0.29$, $I_f = 0.21$. This essay focuses on movements in marital fertility, I_g. An index of fertility control, m, devised by Coale and Trussell (1974), is also employed. This is a measure of the extent that actual fertility declines faster than natural (or uncontrolled) fertility with age, and ranges from 0.0 to 1.0 (or even higher) with pretransitional values being very low (conventionally taken as under 0.2).

3. Actually in 1990 Geary–Khamis dollars, which in the contemporary world reduce the range of incomes between countries. Comparisons between the English-speaking countries or between them and France at the same date in the nineteenth century are likely to be valid. The following are 1990 per capita incomes (World Bank 1992) with incomes for the same year in Geary–Khamis dollars in parentheses: United States $21,790 (GK $21,866); United Kingdom $16,100 (GK $16,302); Australia $17,000 (GK $ 16,417).

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CHAPTER 10

REGIONAL PATHS TO FERTILITY TRANSITION[1]

Co-Authored by PAT CALDWELL

In recent years there has been an enormous increase in our ability to undertake a meaningful analysis on a global scale of regional paths to fertility transition. Generalizations can be made not only because most countries in the world are now participating in the transition, but also because enough sub-Saharan African countries have at last joined the transition to allow us to hazard hypotheses about the conditions of onset of fertility decline there too.

This paper will draw upon analyses and data compilations which have become available in recent years to seek patterns in the timing and speed of fertility declines. The units will be regions which appear to have some homogeneity both in cultural terms and in their fertility control histories. The overall aim will be to discover whether the global fertility transition has been a continuous progress—almost a contagion—or whether societies have individually begun to control fertility when they have reached a certain level of socio-economic development. To do this, continuities and discontinuities in fertility decline both between and within regions will be examined. The paper is essentially about data. It is an effort to discern form in emerging data, generally in contiguous areas, and cannot examine in any detail the causes of fertility decline, but it will point to some of the major socio-economic parameters of that decline. The regional approach clearly suggests both the possibility of cultural groupings and the possibility that diffusion across relatively small distances may offset cultural differences. We believe that cultural and causal analyses must begin with the basic analyses of the regional experience, but space limits further analysis here.

The effort is assisted by the biennial publication of the revisions of World Population Prospects by the United Nations Population Division. This contains not only current measures of fertility and other demographic behaviour for 228 countries but also estimates of these measures back to 1950 which cover the onset of over two-thirds of all national fertility transitions. The majority of earlier transitions occurred in Europe and our knowledge of them was vastly increased

by the Princeton European Fertility Project, with both its summary volume, *The Decline of Fertility in Europe* (Coale and Watkins 1986) and its component national studies which began appearing in the late 1960s. Evidence from the project was employed as early as 1967 to attempt both intra-European and interregional comparisons in search of socio-economic explanations (van de Walle and Knodel 1967; Knodel and van de Walle 1979). A related Princeton study was that of Jones (1971) who used European Fertility Project methodology to examine the fertility transition in Australia and New Zealand and to derive comparative indices for the United States and England. Recently, Bongaarts and colleagues have been publishing important comparative regional studies of the onset of fertility decline (Bongaarts and Watkins 1996; Bongaarts and Amin 1997). The US National Academy of Science has mounted regional demographic studies, most recently on sub-Saharan Africa (National Research Council 1993). The World Bank has resumed the search for socio-economic thresholds of fertility decline (Bulatao et al. 1993). This may be assisted by recent attempts to compile standardized historic indices. The major contribution, which doubtless will be subjected to many revisions, has been Maddison's (1995) attempt to determine real national and per capita income figures for the period 1820–1992, with most developed countries covered for the whole period, and other countries for shorter periods. Employing these and other data, Crafts (1997) has begun the task of compiling historical series of the Human Development Index (HDI).

In addition, attempts at explanation are being made. The IUSSP's Scientific Committees have held workshops aimed at producing books on the fertility transitions in Asia (Leete and Alam 1993), Latin America (Guzman et al. 1996) and sub-Saharan Africa (Locoh and Hertrich 1994), as well as the value changes associated with fertility decline (Leete 1999). The European transition has been repeatedly probed (e.g., Lesthaeghe 1983; Gillis, Tilly and Levine 1992). Investigatory papers have appeared on South Korea (Kwon 1993) and sub-Saharan Africa (Caldwell and Caldwell 1987; Lesthaeghe 1989; Caldwell, Orubuloye and Caldwell 1992). Qualitative field studies have attempted to explain the transition with the help of the participants: in India (Caldwell, Reddy and Caldwell 1982), Thailand (Knodel, Chamratrithirong and Debavalya 1987) and Bangladesh (Duza and Nag 1993).

THE ONSET OF FERTILITY DECLINE: STATISTICAL PROBLEMS

An attempt has been made in Table 10.1 to provide a date for the onset of fertility transition for most countries of the world.[2] The main sources have been *The Decline of Fertility in Europe* (Coale and Watkins 1986) for that continent (especially Coale and Treadway 1986) and elsewhere the *1994 Revision of World Population Prospects* (United Nations 1995) which was also used by Bongaarts and Watkins (1996). For comparison purposes, the important columns are those showing I_f values, because of the more complete data for overall fertility than for marital fertility. In addition the 1997 total fertility rate is provided partly to test whether the dating of the onset of decline determines current fertility levels and

Table 10.1. The Timing of the Onset of Fertility Transition and Its Subsequent Pace

Region/ Country	Date When Stated Decline Recorded: 10% (onset) Marital Fertility (I_g)	10% (onset) Total Fertility (I_f)	25% (I_f)	40% (I_f)	Years From 10 To 40% Decline (I_f)	Income Per Capita at 10% Decline (1990 Geary-Khamis $)[a]	TFR 1997
Europe Overseas (English Speaking)							
Australia	1892	1881	1891	1901	20	4.999	1.8
New Zealand	1882	1881	1886	1891	10	3,620	2.0
United States	1880	<1880	1891	1901	>31	3,471	2.0
Europe							
France	1795	1800	1836	1894	94	1,000[b]	1.7
Iceland	—	1870	1920	1926	56	—	2.1
Belgium	1882	1890	1910	1920	30	3,355	1.5
England and Wales	1892	1891	1901	1921	30	4,065[c]	1.7
Scotland	1894	1891	1911	1931	40	4,065[c]	1.7
Ireland	1929	1891	1936	1985–90	—	2,270	1.9
Netherlands	1897	1899	1920	1930	31	3,703	1.5
Germany	1890	1900	1910	1933	33	3,134	1.3
Austria	1908	1910	—	—	—	3,312	1.4
Finland	1910	1910	1920	1930	20	1,852	1.8
Hungary	1890	1910	—	—	—	2,049	1.5
Spain	1918	1930	1930	1940	10	4,068	1.2
Sweden	1892	1910	1915	1925	15	2,980	1.6
Switzerland	1895	1910	1910	1920	10	3,710	1.5
Denmark	1900	1911	1921	1930	19	2,407	1.7
Italy	1911	1911	1931	1951	40	2,309	1.2
Norway	1904	1920	1920	1930	10	2,529	1.6
Israel	—	<1950	—	—	—	2,452	2.9
Bulgaria[d]	1912	—	—	1934	—	2,800	1.2
Greece	—	1928	1928	1951	23	1,823	1.4
Poland	—	1931	1931	—	—	1,434	1.6
Portugal	—	1920	1940	—	—	1,219	1.4
Rumania	—	1930	1930	1956	26	1,400	1.3
Russia	—	1926	1940	1940	24	1,273	1.3
Yugoslavia	—	1931	1931	1960	29	1,273	1.8
Albania	—	1965–70	—	—	—	—	2.8
Europe Overseas (Temporate Zone, Spanish Speaking)							
Uruguay	—	1905–10	1910–15	1930–34	25	—	2.3
Argentina	—	1910–15	1910–15	1930–34	20	3,533	2.8
Chile	1966	1965–70[e]	1970–75	1975–80	10	5,060	2.4
Early Industrial Asia							
Japan	—	1930–35	1945–50	1945–50	15	1,910	1.5
Ex-USSR, Asia							
Armenia	—	Decline Started Before 1950			—	—	1.6
Georgia	—	Decline Started Before 1950			—	—	1.3

(*continued*)

Table 10.1. (*continued*)

Region/ Country	Date When Stated Decline Recorded: 10% (onset) Marital Fertility (I_g)	10% (onset) Total Fertility (I_f)	25% (I_f)	40% (I_f)	Years From 10 To 40% Decline (I_f)	Income Per Capita at 10% Decline (1990 Geary-Khamis $)[a]	TFR 1997
Kazakhstan	—	Decline Started Before 1950			—	—	2.0
Kyrgyzstan	—	Decline Started Before 1950			—	—	3.0
Azerbaijan	—	1965–70	1975–80	1980–85	15	—	2.1
Turkmenistan	—	1975–80	1980–85	1990–95	15	—	3.4
Tajikistan	—	1975–80	1990–95	—	—	—	3.7
Uzbekistan	—	1975–80	1980–95	1990–95	15	—	3.3
Caribbean							
Bahamas	—	Decline Probably Started Before 1950			—	9,400	1.9
Barbados	—	Decline Probably Started Before 1950			—	2,250	1.5
Cuba	—	Decline Probably Started Before 1950			—	—	1.5
Netherlands Antilles	—	Decline Probably Started Before 1950			—	2,400	2.1
Puerto Rico	—	Decline Probably Started Before 1950			—	2,200	2.1
Martinique	—	1965–70	1970–75	1975–80	10	3,000	2.0
Trinidad & Tobago	—	1965–70	1970–75	1985–90	20	6,500	2.0
Dominican Rep.	1968	1970–75	1975–80	1980–85	10	1,850	3.2
Guadeloupe	—	1970–75	1975–80	1975–80	5	3,600	2.2
Jamaica	1971	1970–75[f]	1975–80	1985–90	15	2,210	2.6
Haiti	1974	1975–80	—	—	—	1,000	4.8
Other Oceanic							
Fiji	—	1960–65	1965–70	1975–80	15	3,450	3.0
New Caledonia	—	1960–65	1970–75	1975–80	15	2,000	2.6
Mauritius	1963	1965–70	1965–70	1970–75	5	4,100	2.1
Reunion	—	1965–70	1970–75	1975–80	10	3,500	2.5
Guam	—	1965–70	1970–75	1975–80	10	1,825	3.3
French Polynesia	—	1970–75	1975–80	1980–90	10	1,550	3.1
Micronesia	—	1970–75	1980–85	—	—	1,720	4.6
Samoa	—	1970–75	1980–85	1985–90	15	1,650	4.8
Cape Verde	—	1980–85	1985–90	—	—	1,300	3.8
Solomon Is	—	1980–85	—	—	—	1,420	5.7
Papua New Guinea	1981	1990–95	—	—	—	1,162	4.7
South America							
Brazil	1966	1965–70	1970–75	1975–80	10	2,764	2.5
Venezuela	—	1965–70	1970–75	1980–85	15	10,357	3.1
Colombia	1968	1970–75	1970–75	1980–85	10	3,389	3.0

Table 10.1. (*Continued*)

Region/ Country	Date When Stated Decline Recorded: 10% (onset) Marital Fertility (I_g)	10% (onset) Total Fertility (I_f)	25% (I_f)	40% (I_f)	Years From 10 To 40% Decline (I_f)	Income Per Capita at 10% Decline (1990 Geary-Khamis $)[a]	TFR 1997
Ecuador	1971	1970–75	1980–85	1985–90	15	3,200	3.6
Guyana	—	1970–75	1970–75	1975–80	5	1,100	2.6
Paraguay	1969	1970–75	1970–75	—	—	2,000	4.5
Peru	1971	1970–75	1980–85	1985–90	15	4,016	3.5
Surinam	—	1970–75	1975–80	1980–85	10	2,000	2.7
Bolivia	1978	1975–80	1885–90	—	—	1,800	4.8
Central America							
Costa Rica	1965	1965–70	1970–75	1975–80	10	2,620	2.8
El Salvador	1972	1970–75	1980–85	1990–95	20	1,750	3.9
Panama	1970	1970–75	1975–80	1980–85	10	1,775	2.8
Honduras	1977	1975–80	1985–90	—	—	1,300	5.2
Mexico	1974	1975–80	1975–80	1985–90	10	4,831	3.9
Nicaragua	1974	1975–80	1985–90	—	—	1,650	4.6
Belize	—	1980–85	1985–90	—	—	3,450	4.5
Guatemala	1978	1980–85	1990–95	—	—	2,300	5.1
Mainstream Asia							
Sri Lanka	1962	1960–65	1970–75	1980–85	20	1,575	2.3
South Korea	1962	1960–65	1965–70	1975–80	15	1,440	1.7
Singapore	1959	1960–65	1965–70	1965–70	5	6,000	1.7
Brunei	—	1965-70	1975–80	1980–85	15	1,900	3.4
Hong Kong	1960	1965–70	1970–75	1970–75	5	6,700	1.3
Malaysia	1966	1965–70	1970–75	1975–80	10	2,400	3.3
Philippines	1963	1965–70	1975–80	1985–90	20	1,698	4.1
Turkey	1962	1960–65	1970–75	1980–85	20	1,905	2.7
China	1969	1970–75	1975–80	1975–80	5	1,171	1.8
North Korea	—	1970–75	1975–80	1975–80	5	1,550	2.4
Cambodia	—	1970–75	1975–80	1985–90	15	700	4.1
Indonesia	1972	1970–75	1980–85	1985–90	15	1,385	2.9
Thailand	1968	1970–75	1975–80	1980–85	10	1.733	1.9
India	1973	1970–75	1980–85	—	—	919	3.5
Iran	—	1975–80	1990–95	—	—	3,100	4.7
Myanmar	1976	1975–80	1985–90	—	—	687	4.0
Bangladesh	1981	1980–85	1985–90	—	—	599	3.6
Mongolia	—	1980–85	1990–95	1990–95	10	1,900	3.6
Vietnam	—	1980–85	1985–90	—	—	880	3.1
Nepal	1988	1990–95	—	—	—	1,200	4.6
Pakistan	1989	1990–95	—	—	—	1,650	5.6
Afghanistan	—	>1990–95	Decline Not Yet Begun		—	—	6.9
Bhutan	—	>1990–95	Decline Not Yet Begun		—	—	5.6
Laos	—	>1990–95	Decline Not Yet Begun		—	—	6.1
Maldives	—	>1990–95	Decline Not Yet Begun		—	—	6.2

(*continued*)

Table 10.1. (*Continued*)

Region/ Country	Date When Stated Decline Recorded: 10% (onset) Marital Fertility (I_g)	10% (onset) Total Fertility (I_f)	25% (I_f)	40% (I_f)	Years From 10 To 40% Decline (I_f)	Income Per Capita at 10% Decline (1990 Geary-Khamis $)[a]	TFR 1997
North Africa							
Egypt	1968	1970–75	1975–80	1990–95	20	1,015	3.6
Tunisia	1970	1970–75	1980–85	1985–90	15	2,300	3.3
Morocco	1975	1975–80	1980–85	1990–95	15	1,962	3.3
Algeria	—	1980–85	1985–90	1990–95	10	2,550	4.4
Sudan	—	1990–95	—	—	—	1,130	5.0
Libya	—	1990–95	—	—	—	—	6.4
Bahrain	—	1970–75	1975–80	1985–90	15	8,250	3.0
Lebanon	—	1970-75	1975–80	1990–95	20	2,275	3.2
Kuwait	—	1975–80	1980–85	1985–90	10	15,000	3.1
Qatar	—	1975–80	1985–90	—	—	22,000	4.3
UAE	—	1975–80	1980–85	—	—	18,000	3.8
Iraq	—	1980–85	—	—	—	1,700	5.7
Jordan	—	1980–85	1990–95	—	—	1,900	5.6
Syria	1985	1985–90	—	—	—	4,650	4.7
Oman	—	>1990–95	Decline Not Yet Begun		—	—	6.2
Saudia Arabia	—	1990–95	—	—	—	—	6.4
Palestine	—	>1990–95	Decline Not Yet Begun		—	—	7.0
Yemen	—	>1990–95	Decline Not Yet Begun		—	—	7.2
Sub-Saharan Africa							
South Africa	—	1970–75	1980–85	1990–95	20	3,828	3.2
Zimbabwe	1976	1975–80	1985–90	—	—	1,400	4.4
Botswana	1984	1980–85	1990–95	—	—	3,500	4.6
Djibouti	—	1985–90	—	—	—	1,175	5.8
Kenya	1984	1985–90	—	—	—	1,030	5.4
Rwanda	—	1985–90	—	—	—	630	6.2
Mauritania	—	1985–90	—	—	—	910	5.4
Swaziland	—	1985–90	—	—	—	1,960	4.9
Ghana	—	1990–95	—	—	—	1,007	5.5
Lesotho	1985	1990–95	—	—	—	1,075	5.2
Senegal	—	1990–95	—	—	—	1,280	6.0
All other	—	>1990–95	—	—	—	—	—

Notes: [a]1990 Geary-Khamis US dollars. The approach employs purchasing power parities and an averaging of international commodity prices (see Maddison 1995:163). Interpolation employed for some income per capita estimates. [b]Reverse projection from 1820 when income per capita was $1,218. [c]Estimate for United Kingdom. [d]Estimate for 1930. [e]Possibly early 20th century. [f]Possibly before 1950. *Sources:* Coale and Treadway 1986:80–152; Weir 1994:330–331; Knodel and van de Walle 1979; Jones 1971; Keyfitz and Flieger 1968; Maddison 1995; Ruzicka and Caldwell 1977:10–11; Pantelides 1996:346–348; Tomobe 1996: Table 1; United Nations 1995; Bongaarts and Watkins 1996; Bongaarts and Amin 1997; Population Reference Bureau 1997. The United States figures are based on back-projections of Jones 1971, cover graph, assuming a peak I_g of 0.7. Intercensal estimates have been made from Jones 1971, Tables 1–4 for Australia and New Zealand.

partly, for more recent transitions, to throw additional light on the proposed date for transition. A number of problems are associated with the approach.

The first problem is the availability and quality of the data. For Europe much depends on when the series begins. The early Iceland figure, which is not commented upon in Coale and Watkins (1986), is obtained solely because Paul Matthiessen's work allowed the series to start there in 1850. An earlier series starting date for Ireland than 1871 would almost certainly have yielded an earlier onset date, because it is clear that at that time I_m, and hence I_f, indices were declining steeply. While the series for Mediterranean Europe start in 1864 for Italy and Portugal, those for Spain and Greece start only in 1887 and 1900 respectively. The series for Eastern Europe (Poland, Russia, Romania, Serbia and Bulgaria) start at various dates from 1897 to 1905. These problems probably have little effect on the marital fertility (I_g) onsets, but, given that marriage rates were probably far from stable during the nineteenth century, at least in Northwest and Central Europe, they may well distort our understanding of the onset of overall fertility (I_f) declines. Even an 1831 starting date for France does not help us with either measure for that country, and accordingly Weir's (1994) work has been employed to provide estimates. Finally, the American series begins only in 1891 in contrast to 1861 in England and Australia and 1874 in New Zealand.

The *World Population Prospects* (United Nations 1995) series for the rest of the world are deceptive in their apparent completeness and reliability, but, in fact, embody many assumptions and a great deal of smoothing. The extreme example is sub-Saharan Africa. This region has no usable national vital registration statistics. Censuses are not regular and provide only limited information on fertility. The retrospective trend figures derived from a single survey are often completely unreliable, and, as in Ghana, a second survey often shows that the fertility decline apparently demonstrated by the first survey did not in fact occur. Demographic and Health Surveys have not been carried out in 44 percent of the nations and territories south of the Sahara, and 71 percent have had either no survey or only one. Admittedly, many of the omitted countries are small, but Zaire has had no survey, the only South African survey has yet to release its full findings, and Nigeria has published only one survey (although there was an earlier World Fertility Survey). Between them, these three countries contain one-third of the region's population. Of the twelve sub-Saharan countries where the *World Population Prospects* records a fertility decline, half have had no survey and only four have had more than one. Indeed, in countries like Eritrea and Rwanda it is difficult to see how any series could have been constructed. The situation is probably less precarious elsewhere, although there are doubtless problems in considerable parts of South Asia, Southeast Asia and Central America.

Both this paper and Bongaarts and Watkins (1996) adhere to the now conventional criterion for the dating of the onset of fertility decline employed in the Princeton European Fertility Project, namely a fertility reduction of 10 percent. Both studies drew upon the *1994 Revision* of the *World Population Prospects*, although the present study retains the UN Population Division's quinquennial

structure. Bongaarts and Watkins presumably imputed annual estimates by interpolation between these figures in order to identify a single year for the onset.

There are theoretical and practical problems in applying the Princeton approach. The theoretical problem is that the transition has already completed 10 percent of its course and had taken varying periods of years from the actual beginning of the decline to reach this date of "onset." Even with the smoothed United Nations figures the practical problems are often worrying. The time lag between the end of the apparent previous plateau and the 10 percent decline date can be very long. In Central America, it was at least 30 years in Belize and Guatemala: the inability to put a limit on the period is explained by the fact that fertility was already falling in the first quinquennium after 1950, the date at which the United Nations series begins. The time lag was 25 years in Nicaragua, 20 years in Honduras and 15 years in Mexico. Such lengthy lags raise real questions about identifying the period to be examined for causal factors. Another problem is whether the pretransition fertility level should be taken to be that of a pretransitional fertility plateau or the highest point of fertility immediately before decline. Pretransitional fertility rises are shown for most sub-Saharan African series, but whether this is based on actual figures or theory is a moot point. The theory is sound enough: female postpartum sexual abstinence is likely to be shortened as contraceptives become available (Caldwell and Caldwell 1981:182–186), but, at first, contraception is likely to prove less effective in controlling fertility than did abstinence. In this sense, the fertility rise is the initial part of the fertility transition. Therefore, it may not be proper to measure the 10 percent decline from the pretransitional peak, although in this paper we have done so because of doubt about pre-rise fertility levels and the problem of posited long slow rises. In Africa and elsewhere there may also be a pretransitional shortening of the duration of breastfeeding with a resulting diminution of the non-susceptible period.

These problems multiply if the approach is applied to Western Europe where marriage, and hence fertility, rates changed with economic circumstances. In England the gross reproduction rate was 2.87 in 1541 and by 1556 had fallen 20 percent, never again to rise to 90 percent of the 1541 level (Wrigley and Schofield 1981:230). In France, overall fertility (I_f) fell by 11 percent from 1756 to 1762, never to return to the earlier level. But it declined more rapidly after 1786 (used as the starting date in this paper), and did not rise to 90 percent of that level from 1800. Marital fertility also declined by 11 percent between 1756 and 1762, and did not reach the 1756 level again, but it did not fall consistently below 90 percent of the 1756 level until 1789, or consistently below 90 percent of the later high level in 1786 (5 percent below 1756) until 1795.

Our estimates of the onset of fertility decline outside Europe, or, at least, its attainment of 10 percent decline, not surprisingly are in fairly close agreement with Bongaarts and Watkins (1996). They intentionally omitted the onsets of fertility transitions which did not begin between 1959 and 1988 (the Pakistan estimate is from Bongaarts and Amin 1997). We differ on Hong Kong, which, according to the United Nations, reached its post-1950 fertility peak in 1960–65, and Lesotho, for which they must have had a source other than *World Population Prospects.*

The Population Reference Bureau's 1997 total fertility rate for Cambodia was 5.8, throwing some doubt on the dating of the Cambodian fertility transition, although it should be noted that ESCAP (United Nations 1997) estimates the country's 1997 TFR as 5.2 and the World Bank (1997) provides a 1995 estimate of 4.7. However, data from a new national survey place the 1995–98 level at 4.1 and this has been used in Table 10.1 (Ministry of Health, Cambodia 1999).

THE ONSET OF FERTILITY DECLINE: PATTERNS IN THE STATISTICS

An attempt has been made to divide the world into 13 regions which are meaningful in terms of geography, culture, and the history of fertility transition. Anglophone and temperate hispanophone areas of overseas settlement have been separately distinguished. The former are not contiguous but rapid communication in a common language had much the same effect (Caldwell 1999). The Caribbean, with its variety of languages and colonial traditions, has been separated from Latin America because of its resemblance to other oceanic areas and because part of it experienced an earlier fertility transition. Similarly, Central America, with its somewhat later transition than South America, is a separate region. Ex-USSR Asia clearly had a different experience from the rest of Asia, and the Middle East differs both from the rest of Asia and from North Africa. The distinct oceanic experience in the Pacific, Indian and Atlantic oceans builds on earlier work on their demographic experience (Caldwell, Harrison and Quiggin 1980); indeed, their grouping with the Caribbean would have been justified and this has been done in the later discussion. More contentious is probably the grouping together of most of Asia (i.e., omitting Japan, ex-USSR Asia, and the Middle East) but, in terms of politico-cultural traditions, contemporary international influences, and their history of national family planning programs, this can be justified (see Leete and Alam 1993; Caldwell 1993). More contentious still, in view of analyses and predictions of one-third of a century ago (Caldwell 1966), is the grouping as a single unit of English-speaking sub-Saharan Africa with the rest of that region, especially as the transition to date has been very largely confined to the former. The reason for the failure to partition was that it would have resulted in a large non-anglophone group with no history of transition. Finally, Turkey's political, family-planning-program and demographic experiences have had more in common with mainstream Asia than with the Arab Middle East, and post-1948 Israel is understood better by inclusion in Europe.

We will use Tables 10.1 to 10.3 to examine five questions which have proved to be basic to our understanding of the fertility transition. (1) To what extent has it been a continuous transition? (2) Has the speed of transition accelerated? (3) Has the transition in each region moved progressively from the most developed to the least developed countries? (4) Has diffusion been cultural rather than geographic? (5) What has been the relative contribution of the level of development versus other factors to the timing of the onset of fertility transition? Table 10.2 shows that there has been a major problem of data truncation in the contemporary Third World because the fertility transition is far from complete.

Table 10.2. Regional Analysis of Total Fertility Decline: Median and Interquartile Range of Onset Date, Average Period from 10 to 40 Percent Decline, and Percentage of Countries Omitted by Reason for Omission

Region	Onset of Decline (10% Decline)		Average Period from 10 to 40% Decline (Years)	Percentage of Countries Omitted by Reason			
	Median Date	Interquartile Range (Years)		Insufficient Data	Onset Not Established	Insufficient Decline	All Reasons
Europe Overseas (English-Speaking)	1878	Perhaps 6	20	0	0	0	0
Europe	1910	29	26	21	0	4	25
Europe Overseas (Temperate Zone, Spanish-Speaking)	—	Perhaps 5	22.5	33	0	0	33
Early Industrial Asia	1930–35	—	15	0	0	0	0
Ex-USSR Asia	1950–70	>22.5	15	0	50	12	62
Caribbean	1965–70	>22.5	12	0	45	9	54
Other Oceanic	1970–75	15	11	0	0	36	36
South America	1970–75	5	12	0	0	22	22
Central America	1975–80	7.5	12.5	0	0	50	50
Mainstream Asia	1975–80	25	12	0	0	44	44
North Africa	1980	20	15	0	0	33	33
Middle East	1980–85	25	15	0	0	75	75
Sub-Saharan Africa	>1990–95	Yet to be Determined	20	0	0	98	98

Table 10.3. Human Development Index Shortly Before Fertility Decline, Selected Countries of the West in 1860 and the Contemporary Third World in 1960

Western Countries	HDI in 1860	Contemporary Third World Countries	HDI in 1960
Britain	0.46	Singapore	0.66
Netherlands	0.42	Sri Lanka	0.60
USA	0.41	Philippines	0.56
Denmark	0.39	South Korea	0.55
Belgium	0.38	Thailand	0.50
Germany	0.34	China	0.38
Sweden	0.35	India	0.28
France	0.34	Bangladesh	0.22
Austria	0.22	Nepal	0.17
Norway	0.29	Jamaica	0.73
Italy	0.14	Mexico	0.61
Spain	0.19	Colombia	0.60
		Brazil	0.51
		Peru	0.51
		Turkey	0.42
		Egypt	0.29
		Morocco	0.27
		Zimbabwe	0.40
		Ghana	0.30
		Botswana	0.25
		Kenya	0.24

Sources: Bongaarts and Watkins 1996; Crafts 1997.

This has caused us to be careful in drawing conclusions. The problem is probably not serious except for sub-Saharan Africa and the Middle East where little more than speculation is justified.

Certain qualifications should be made at this point. The first is that we do not disagree with the classic formulation of demographic transition, namely that it would never have occurred if mortality, especially child mortality, had not fallen. We originally planned to use Table 10.3 to show not only per capita incomes at the time of transition but also infant mortality. This could not be done because too many nineteenth and early twentieth-century European mortality statistics were unreliable or nonexistent. However, the attempt, as is explained below, shows that the relationship is not linear.

This paper uses the terms "globalization" and "diffusion." Economic globalization means the move towards bringing the whole world into a single market economy, with the disappearance of subsistence production and with all countries

competing in international trade. The process is far advanced. We also use the term to mean "social globalization." This means a movement towards knowing what others in the world are doing, and sharing experiences and outlooks. Ultimately it rests on economic globalization, and owes much to the demands of changing economies, but it has been promoted by colonization, the spread of Western schooling, global media networks from newspaper cable services to satellite television, and travel. It does meet with resistances, as argued in a study of changing adolescence (Caldwell et al. 1998), and the resistance of historic cultures should not be underestimated. "Diffusion" here means the spread of ideas and concepts through single cultures or the world. In this paper our chief concern has been the diffusion of ideas about limiting family size and knowledge and acceptance of contraception. This has been achieved through the media and organized family planning activities, as well as students going overseas for population training, or more general travel. We do not try to measure any of these forces. Even the efficiency of a family planning program is difficult to measure, and there are basic questions about the role of demand as well as supply.

The Continuity of Transition

There are two major gaps in continuity, that between the onset of fertility decline in France and elsewhere in Europe, and that between the developed and the developing countries. France's initial decline took place in unusual circumstances in the late eighteenth century. It should be noted here that France was not un-European in its behaviour for it later participated in the more general northwestern European transition (Caldwell 1981:18; Wrigley 1985), with its marital fertility falling 54 percent from 1872 to 1900 and first falling more than 10 percent below the 1872 level in 1887 (Weir 1994:330–331). Brittany and parts of southern and southeastern France participated only in the second or general transition. Nevertheless, it is true that most of France had experienced the onset of fertility transition by 1830, and it was not until the 1850s that parts of the Hungarian Plain followed, and the 1870s before parts of Wallonia, Switzerland and Germany did so (Coale and Watkins 1986: map 2.1).

The second gap is between the 1920s, when national fertility decline had been recorded in nearly all European countries (although provinces of northern Spain, southern Italy, Ireland and Russia waited until the 1930s), and the early 1960s when the Asian transition began. The English-speaking countries of overseas European settlement experienced fertility decline at the same time as Britain, around 1890, and two Spanish-speaking countries of overseas European settlement, Uruguay and Argentina, about the same time as Spain in the second decade of the twentieth century. The gap is not absolute, for Japan was in transition by 1930. But the only other exceptions before the end of the 1950s were parts of Asian USSR (perhaps Russia "overland") and some Caribbean islands.

The nature of the anomalous cases will be discussed later, but these anomalies should not obscure the fact that there were two major gaps in fertility

transition, in the first half of the nineteenth century and from the end of the 1920s until the Third World transition began in the 1960s. In view of the long gap before the 1960s and the advent of national family planning programs after mid-century, it would seem probable that the latter were needed to begin the process earlier than would otherwise have been the case. There are, however, reasons for not jumping too quickly to this conclusion. First, most Asian and African countries gained their independence only after the Second World War, some not until the 1960s. The transition theorists at Princeton's Office of Population Research made the point that fertility control was unlikely to be advocated or organized during anticolonial struggles (Caldwell and Caldwell 1986:20); something like this may explain the continuing very high fertility in Gaza and the West Bank. Second, the delay may reflect little more than the gap in economic growth. Third World Asia did not approach the real per capita income levels of even the poorest countries of Europe in the 1920s until the end of the 1950s or later. Third, even by the mid-1960s national family planning programs were a feature only of Asia and two North African countries (Berelson et al. 1966), and elsewhere cannot explain the onset of fertility transition, although perhaps the worldwide discussion of fertility restriction and the availability of contraception provide at least part of the explanation.

The Acceleration of the Transition

Kirk (1971), Bongaarts and Watkins (1996:653) and others have concluded that the pace of fertility transition has accelerated, in that the onsets of fertility transition in a region occur over a more limited time and that each fertility decline following the onset is more rapid. On the other hand, Watkins (1986:432–433), summarizing the Princeton European Fertility Project, emphasized just how rapid the European fertility decline had been after 1870 (i.e., excluding France).

Table 10.2 casts considerable doubt on the first of these two theses. In the spread of the onset of fertility decline through regions as measured by the interquartile range (which removes the impact of outliers such as France and Albania in Europe, Libya in North Africa, and, if South America is taken as a unit, Uruguay and Argentina), there is only a moderate difference between the European decline and that of most other regions of the world, especially if the English-speaking and temperate-zone Spanish-speaking countries of overseas European settlement are folded into Europe. The distinctive area, for which an explanation will be offered later, is Latin America, especially South America.

The question of the speed of individual declines is also examined in Tables 10.1 and 10.2. The overall fertility measure (I_f) is employed in order to allow comparison with the contemporary Third World. The measure used is the speed of the fertility decline from the point where fertility has fallen 10 percent (which identifies the existence of a decline) to where it has fallen 40 percent. Original plans to follow the fall through to 50 and even 75 percent were abandoned when it was found that a large number of countries would have to be dropped. Indeed, the cutoff point of a 40 percent decline means omitting all but one sub-Saharan

African country, 75 percent of the Middle East, 50 percent of Central America and even 44 percent of Mainstream Asia. Clearly there is a risk of being misled in this approach by a censoring effect. Table 10.2 shows that in half of all regions fewer than 50 percent of countries have achieved a 40 percent fertility decline. If in each region there is a movement towards successive fertility declines being either more or less rapid then this approach might prove impossible. But an analysis of those countries within each region that have reached the 40 percent mark shows that only in Europe was there such a trend. There the time taken to proceed from 10 percent to 40 percent fell persistently among countries that had completed that process by 1930. In no other region is such a trend clearly found, and the conclusions reached from Tables 10.1 and 10.2 are unlikely to change significantly as transitions proceed and as more data become available. This conclusion is not merely a justification for Tables 10.1 and 10.2 but an important finding in itself, namely that, unlike the older European experience, in contemporary transitions the laggard countries do not speed up relative to the front runners.

The earlier declines were slower, with the average time taken to move from a 10 to a 40 percent decline being 26 years in Europe (or 24 years excluding France), 22.5 years in temperate-zone areas of overseas Spanish-speaking settlement, 20 years in overseas English-speaking settlement areas and 15 years in both Japan and ex-USSR Asia. This is longer than has been found in the post-1950 transitions, assisted by new contraceptives, a new climate of ideas and often national family planning programs. The gap is not always huge: parts of sub-Saharan Africa may exhibit periods as long as Europe (although prediction here is premature), and North Africa and the Middle East each took 15 years. The regions which moved at more than twice the pace of the European transition were South America, Central America, the Caribbean, Mainstream Asia, and Other Oceanic. Latin America and Mainstream Asia were the principal focus of Bongaarts and Watkins (1996). It will be suggested later in this paper that different forces were at work in each of these rapid transitions. Within mainstream Asia one subregion, East Asia, moved particularly rapidly, taking only eight years.

Progression of Onset from More to Less Developed Countries

The description of the onset of fertility decline in each region as ocurring first in the most socio-economically developed countries and last in the least developed is broadly true for Europe (although France again remains the exception), Mainstream Asia (although Iran is an exception), and, with qualifications, sub-Saharan Africa (although transition is more likely in English-speaking countries and those that are part of the South African economic system). The short period over which onsets occurred makes it a rather inappropriate concept in the case of South America, although Bolivia's poverty undoubtedly delayed its start, and Central America, although Costa Rica's early start is probably explained by its high level of human development. The Caribbean, ex-USSR Asia, the Middle East and Other Oceanic are largely explained by other factors. In the Caribbean and

Other Oceanic small size and easy penetration from the coast probably hastened the onset; Papua New Guinea, almost as large as Spain or France, part of an island larger than Turkey, and so mountainous that there is no nationwide network of roads, is the opposite extreme. In ex-USSR Asia, the proportion of Muslims is apparently decisive, while in the Middle East political and geographical explanations can be offered, although Yemen's poverty probably explains its delay.

Diffusion and Culture

The best examples of the greater importance of cultural, or at least linguistic, diffusion than geographic spread are probably the long failure of the French fertility decline to spread into Brittany, and the near-simultaneity of the onsets in Britain, United States, Australia and New Zealand around 1890 and in Spain, Uruguay and Argentina just before the First World War. The Caribbean and Other Oceanic groups evidence cultural spread and sub-Saharan Africa that of administrative language and culture. Certainly, in sub-Saharan Africa geographic propinquity has not played a large role, except possibly in Southern Africa where the causal mechanism is probably the effect of the South African economy. That economy, with convertible currency in the Southern African region, has stabilized swings in the value of savings; it has also allowed temporary migration which has enhanced savings. There is delay in the onset of the fertility transition with movement from Northwestern and Central Europe to the South and East; also in Russia as one moves outward from St Petersburg (Coale, Anderson and Härm 1979) and in Bengali-speaking South Asia with distance from Calcutta (Caldwell et al. 1999). These changes, however, probably also reflected gradients in development and in the penetration of the market economy, analogous to urban-rural differentials and possibly also gradients in secularism (see Lesthaeghe 1977).

Socio-Economic Determination of Fertility Decline

Until recently, it has not been possible to attempt a comparison of the socio-economic conditions of the nineteenth and early twentieth-century fertility declines with those of contemporary declines. The position has begun to change because of the publication by Angus Maddison in 1995 of national gross domestic product and per capita income estimates for most countries of the world from 1820 to 1992, and the use of these estimates and other historical data by N.F.R. Crafts in 1997 to estimate Human Development Indices (HDIs) for 1860 for eleven European countries and the United States. Maddison's (1995:163) income estimates use the Geary-Khamis approach, developed by R.S. Geary in 1958 and by S.H. Khamis from 1970. These are based on the concepts of purchasing power parity and the international average price of commodities. They are more realistic in terms of the level of consumption allowed by incomes and have the effect of reducing the spread between nations of per capita incomes. Thus, compared with orthodox per capita income figures for 1990 (World Bank 1992:218–219), their use multiplies

per capita incomes relative to that of the United States by seven in the case of China, around three for much of the rest of Asia and sub-Saharan Africa, and two for Latin America. They probably have a similar effect when comparing the historical and contemporary situation within a country, but they probably allow satisfactory comparisons between countries in the same region at the same time, and might provide better comparisons of the historic West with the contemporary Third World than do more orthodox income figures. Crafts's Human Development Indices are constructed, as are those of Bongaarts and Watkins (1996), along the lines developed in the 1990 *Human Development Report* (UNDP 1990). Maddison (1995) is the source of the second-last column in Table 10.1 and Crafts (1997), together with Bongaarts and Watkins (1996), is the source of Table 10.3. The latter use standard per capita income figures. The HDI is undoubtedly a deficient index (see Castles 1998) but its use here allows comparison with the work of both Crafts (1997) and Bongaarts and Watkins (1996) and is probably not too misleading for our purpose.

Table 10.3 in conjunction with Table 10.1 shows that the Bongaarts-Watkins thesis, that in the same region the onset of fertility decline begins successively over time at ever-lower development-threshold levels (as measured by HDIs), was broadly true of Europe as measured by Geary-Khamis per capita income figures. France remains the exception, but United States, Australia, New Zealand and Argentina fit neatly into the European sequence. So, it appears, does Japan (not shown in the Table 10.3). A similar sequence, with a few more exceptions, can be found in Mainstream Asia, Other Oceanic and the small number of countries that have begun the fertility transition in sub-Saharan Africa. Neither Latin America nor the Caribbean, with onsets varying over a short range of time, fits the pattern, and this is true also of the Middle East and North Africa. In the Arab world, political attitudes to family planning have probably been paramount.

This pattern is not clearly visible in the movement of the fertility transition from region to region. The similarity of the levels of income at the onset of fertility declines suggests that economic determination played a major role in the timing of the transition. The major exception is Mainstream Asia, especially after 1970. With the exception of two sub-Saharan African countries for which some doubt must remain about their transition status (Mauritania and Rwanda), Mainstream Asia alone records countries where fertility decline began at below 1000 1990 Geary-Khamis dollars (below 600 in the case of Bangladesh). Indeed, in contrast to every other region, almost half began below 1500 dollars and did so predominantly in countries with strong national family planning programs, almost certainly demonstrating their effect.

The comparison is disadvantageous to the West because the HDIs are given for dates (excluding France) 30–60 years before a 10 percent fertility decline was achieved. The 1960 Third World tends to have higher HDIs than the 1860 West because it benefits from lower infant mortality and higher educational figures, patterns typical of the developing global culture of the second half of the twentieth century. Thus, comparing median figures for the West in 1860 with the Third

World at the time of 10 percent fertility decline, we find infant mortality rates of 180 and 90 respectively, life expectancies of 41 and 56 years, and literacy levels of 55 and 66 percent (Bongaarts and Watkins 1996:648–649; Crafts 1997:628). The West probably closed the literacy gap by the time 10 percent fertility decline was achieved, but not the mortality gap. Nevertheless, the West probably recorded HDIs in the range 40–60 by that time, similar to much of the Third World at the onset of fertility decline. The exceptions are China, India, Bangladesh and Nepal in Asia, and, surprisingly, both North and sub-Saharan African countries. By this measure, Africa is further ahead with the transition than might be otherwise expected.

It was originally intended in this paper to include infant mortality estimates at the onset of fertility decline, but it was found to be impossible to put together a comprehensive set for the European decline. It may be noted that those estimates that are fairly firm indicate that fertility decline reached 10 percent in France with an infant mortality rate close to 250 per thousand births. The level in Germany was around 200, in England 160, and in the later declines around 100. In contrast the Latin American fertility decline typically began with rates 80–100 and sub-Saharan Africa with rates somewhat lower. Early Mainstream Asian declines took place with rates around 80 or lower, but later declines in South Asia were in the 100–140 range, as were the declines in North Africa. The more easily achieved Third World declines occurred at lower infant mortality levels than Europe, but for those countries that resisted instituting organized family planning programs for years, the declines occurred at infant mortality levels close to those obtaining in the European fertility decline.

IN SEARCH OF EXPLANATIONS: AN INTERREGIONAL COMPARISON

Most explanations for the onset of fertility transition, both in interregional and intraregional terms, emphasize socio-economic development. Knodel and van de Walle (1979; see also van de Walle and Knodel 1967), examining the Princeton European Fertility Project data, failed to find significant predictors of early fertility decline in pretransitional fertility control (usually almost nonexistent), marriage and fertility levels, and little of significance in levels of infant mortality and urbanization. The countries with earlier onsets of fertility decline were likely to have a somewhat lower proportion of their male labour force in agriculture. The only real contrasts were between the subregions of Europe: the transition began earlier in Northwestern and Central Europe than in Eastern and Southern Europe. The former regions were more economically developed and market-oriented; their people were more literate and subscribed in larger numbers to newspapers and periodicals, and more urbanized with smaller proportions working in agriculture. They were also more Protestant and probably more secular. But, in that these subregional contrasts are not good predictors of early national onset within each subregion, the evidence supports diffusion theories as well as those of economic development. There was, as can be seen in Table 10.1, a significant income gradient

Table 10.4. 1995 Socio-Economic and Demographic Indices by Region and Date of Fertility Decline

Region	Median Date of Onset	Income Per Capita (1995 US$)	IMR	e(0)	% Urban	% Using Contraceptives	TFR
Europe Overseas (English Speaking)	1878	26,000	8	77	76	71	2.0
Europe	1910	13,000	10	69	72	68	1.4
Europe Overseas (Temperate Zone, Spanish-Speaking)	1914	7,000	18	72	86	—	2.7
Early Industrial Asia	1930	40,000	34	77	78	64	1.5
Ex-USSR Asia	1950–70	750	25	69	46	44	2.7
Caribbean	1965–70	3,000	32	69	61	55	2.7
Other Oceanic	1970–75	1,750	44	61	26	—	4.4
South America	1970–75	3,600	40	68	75	72	2.8
Central America	1975–80	2,600	37	71	65	60	3.4
Mainstream Asia	1975–80	850	55	65	30	60	2.9
North Africa	1980	1,100	60	63	46	42	4.0
Middle East	1980–85	3,750	70	65	65	25	5.3
Sub-Saharan Africa	Future	500	93	51	26	18	6.0

Note: All indices are averages weighted by population size.
Sources: As for Table 10.1;World Bank 1997; United Nations 1997, 1999.

between the early and late starters in Europe. This gradient is roughly visible even in contemporary income figures, seen in Table 10.4, which presents contemporary socio-economic and demographic indices by the regional median date of onset of the fertility transition. In terms of per capita income in the early years of the twentieth century, the pre-World War II transitions were less anomalous than they appear in Table 10.4, because incomes in Argentina and Uruguay compared at that time with those in Europe, and Japan was relatively poor.

In the extension of the fertility transition to Third World countries over the last few decades, several points are clear from Table 10.4. There are, in income terms, two groups of regions: the moderately poor, comprising Latin America, the Caribbean, the Middle East and Other Oceanic; and the really poor, comprising ex-USSR Asia, Mainstream Asia, North Africa and sub-Saharan Africa. The moderately poor group might, in terms of economic causation, be expected to have experienced fertility decline. Most regions in this group are probably as rich as much of Europe at the beginning of the twentieth century. The anomaly is the Middle East where the political situation and the position of women, together possibly with Islamic precepts about the future being provided for (but see

Rashad 2000), has meant an absence of, or lateness in, establishing family planning programs. Only three of twelve countries in the Middle East have experienced a 40 percent fertility decline (Table 10.1), and the regional fertility level remains almost as high as that of sub-Saharan Africa. Among the other, mostly poorer, regions, fertility transition is well under way in ex-USSR Asia and Mainstream Asia, less so in Other Oceanic and North Africa, and hardly at all in sub-Saharan Africa. The problem in Other Oceanic is more apparent than real, at least as measured by individual countries, and results from population-weighting in circumstances of late transitions among the most populous and poorer member countries. In Other Oceanic seven out of eleven countries now have total fertility rates under four, but the balance includes Melanesia's Papua New Guinea and Solomon Islands with low per capita incomes and 55 percent of the total population.

In terms of the full range of indices shown in Table 10.4, sub-Saharan Africa's late fertility transition is reflected in every index, even when compared with Mainstream Asia. The latter point has been made by the World Bank (1986, 1989) but it has also been pointed out that these indices were comparable between the two regions during the first decade of the Asian fertility decline (Caldwell and Caldwell 1988); other explanations are needed to differentiate between Asia and sub-Saharan Africa.

Where the transitions started after 1950 none of the demographic or socio-economic indices are good predictors. The real message of Table 10.4 is the extent of fertility decline in two very poor regions: Mainstream Asia and ex-USSR Asia. It will be argued that Mainstream Asia's success can be understood only in terms of the relationship between governments and the governed, and especially in how that relationship produced effective family planning programs. The first International Conference on Family Planning Programs, held in Geneva in 1965, reported that there were twelve national family planning programs or large NGO programs with substantial government support in existence; ten of these were in Mainstream Asia and the other two were in North Africa (Berelson et al. 1966). Ex-USSR Asia must be understood in relation to the political and social structure of the USSR, which had, in the decades after World War II, relatively low mortality, especially child mortality, and in relation to the income levels of its Asian countries, good access to free health services and, in some, abortion.

One other feature should be noted. With the exception of France, the European countries waited until mass education was established before beginning fertility decline (Caldwell 1980; Woods 1987:297). This occurred in Northwestern and Central Europe in the late nineteenth century, in Southern Europe in the early twentieth century and in Eastern Europe after the First World War. This may be because schooling intensified the economic burden of children (Caldwell 1980), or it may be that the convincing family planning message came in the printed word, desirably so because discussion could be both difficult and not very instructive (Caldwell 1997, 1999), and because the printed word carried more legitimizing authority. In nearly every world region, fertility decline began as primary schooling became almost universal and secondary schooling substantial.

A fundamental problem in assessing the nature of the fertility transition is the distinction between overall and marital fertility. In this paper the comparative measure is overall fertility because we lack adequate series of marital fertility rates for the Third World. The Princeton European Fertility Project used mainly marital fertility rates in their discussions for two reasons. First, change in the age of marriage probably occurs most frequently for reasons other than the attempt to restrict fertility and may indeed move in the opposite direction to marital fertility. Second, even very late age at female marriage and a considerable level of permanent spinsterhood will not on its own achieve fertility decline. Ireland reached an I_m of 0.324 in 1901, with lack of marriage restricting potential fertility by two-thirds, but its overall fertility was still 15 percent above that of England and Wales where marital fertility had been falling for 30 years (Coale and Treadway 1986). For the first two-thirds of the seventeenth century, one-quarter of English women did not marry at all and of these the great majority bore no children, yet births remained well above deaths (until the death rate rose steeply in the years of plague after 1655) and the restriction of marriage did not presage the beginning of fertility transition (Wrigley and Schofield 1981). Yet Davis (1963) has argued convincingly that the need for fertility restriction can evoke a multiphasic response including females marrying late or not marrying at all. Ireland's restriction of marriage after the 1840s led to one of Europe's first fertility transitions (probably earlier than the 1891 date given in Table 10.1 because both I_m and I_f were already falling in 1871, when the Princeton series starts), a transition that was sustained once marital fertility began to fall in the 1920s. The same is true of Iceland and also of the United States, Australia and New Zealand as female age at marriage rose during the middle decades of the nineteenth century with the passing of frontier conditions. In the contemporary Third World, Sri Lankan fertility fell after the early 1950s but it was to be 20 years before marital fertility decline was a causal factor (Alam and Cleland 1981). In much of Mainstream Asia female marriage began to be postponed immediately before or concurrently with marital fertility decline (Rele and Alam 1993:23–26) and was one, albeit the minor, component in overall fertility decline.

Another issue is the role of contraception and family planning programs, at least in speeding up the fertility transition. Most couples restricting fertility in much of poor, rural Mainstream Asia, especially, perhaps, South Asia, believe that they could not have done so without the provision of contraception by the national family planning program. We found this to be the case in South India (Caldwell and Caldwell 1984) and more recently in Bangladesh (Caldwell et al. 1997). There is a real question of how successful some of these programs would have been without the new forms of fertility control. Oral contraception, IUDs and suction abortion only became available for mass-scale, Third World use from the early to mid-1960s, and it may be no accident that the Asian and Latin American transitions started in that period. The new contraceptives dominated the post-World War II fertility declines, although abortion was important in Latin America and China and dominant in ex-USSR Asia.

CHARACTERISTICS OF REGIONAL FERTILITY TRANSITIONS

Europe, Europe Overseas and Early Industrial Asia

The early transitions occurred in spite of considerable religious and governmental opposition which almost certainly delayed their onset. This bursting of the dam probably explains the rapidity of subsequent fertility declines which provide evidence that there was a pent-up demand for fertility control, "unmet demand" in contemporary parlance, although it might have been closer to an unmet need not demanded because it was not legitimized. The rapid spread supports the thesis that legitimization played a role, although it is possible that the supply of contraceptives also did so.

The Princeton Fertility Project drew attention to the geographical spread of the transition and its stopping at linguistic borders such as those of France or within Spain. In fact, the best example of an almost instantaneous spread is that which occurred within the English-speaking world. This evidence and the dating of the transitions suggests that the written word may have been more important than the spoken word, partly perhaps because what was needed was not merely ideas and information but also legitimization. This view is supported by the enormous sale of publications on contraception brought out by Charles Bradlaugh and Annie Besant in the late 1870s, which roughly coincided with the beginning of fertility decline in England (although over a decade earlier than the date of a 10 percent decline).

The fact that the opposition to family planning was based very largely on religious and sexual morality suggests that the late eighteenth-century French fall in fertility occurred because of the strength of the attack on the religious, social and political establishment of that time. The seventeenth-century English revolution had produced a vast upwelling of new spoken and written ideas and of innovational behaviour (see Woodhouse 1938) but contraception was not part of this panoply of ideas because children apparently presented no great economic problem at that time. In this regard, Western Europe had changed by the time of the French Revolution, but that change was limited as is shown by the fact that marital fertility fell only 16 percent between 1788 and 1800 when it temporarily stabilized; in contrast, and paralleling other European changes, it dropped 24 percent between 1876 and 1900 (Weir 1994:330–331). The latter decline had been preceded by a slower rate of fall in the previous quarter of a century, but not apparently by the plateau that van de Walle (1974) had discerned.

Ex-USSR Asia, Caribbean and Other Oceania

The ex-USSR Asia, Caribbean and Other Oceanic regions were all in some ways extensions of Europe either overland in the case of the Tsarist and USSR Asian lands or overseas in the case of the Caribbean and Other Oceanic islands. In the case of the USSR, much can be attributed to the fact that the same

institutions spread throughout the Soviet Empire, such as those that provided health care and over large areas permitted abortion. Russians also spread, and formed a significant proportion of the population of those areas which began their fertility transitions before 1950. In fact, it is possible that most of the fertility transition occurred among the European population of Russian, Ukrainian, German and other ethnic stock, an interpretation increasingly supported by the DHS program.

European influence had for centuries spread mostly by the world's sea lanes, and this position persisted until the middle of the twentieth century. Island communities were more susceptible to change from European influences than were any others. Many had their ethnicity changed and most had their religions and languages changed. Demographically they behave quite differently from the peoples of the nearest continental land masses, often in a way that links the Caribbean, Cape Verde, Mauritius, Reunion and the smaller Pacific Islands (Caldwell et al. 1980). It is no accident that five Caribbean islands began their fertility transitions before 1950 and two Pacific and probably two Indian Ocean territories had achieved 10 percent fertility declines before 1965.

Latin America

The Latin American fertility transition most closely resembles that of Europe. By 1960, socio-economic indices compared with those of Europe at the end of the nineteenth century. The countries were largely Catholic and the Church's influence had outlawed abortion and restricted the establishment of national family planning programs. In this sense the transition was largely brought about by socio-economic change, but the situation differed from that of earlier Europe in that there was a global movement towards the legitimization of family planning, a great deal of discussion of these matters in the media, and new, more user-friendly contraceptives had come into existence. There is evidence that the adoption of family planning in remote areas was accelerated not by their direct advocacy but by soap operas on television teaching the metropolitan way of life (Faria and Potter 1999). The Latin American fertility transition provided good evidence that fertility decline would inevitably become global.

Mainstream Asia

Mainstream Asia's fertility transition was very different except for some richer populations of East and Southeast Asia. There is, for instance, clear evidence that contraception was being practised and fertility decline had begun in Taiwan before there was any organized family planning activity (Freedman et al. 1963:219–224). The per capita income of Mainstream Asia is currently below US$1,000. It is the only part of the world where marked fertility decline has occurred in countries with per capita incomes under US$350 (India) or even US$250 (Bangladesh and Vietnam). This has been achieved everywhere with the assistance of national family planning programs which were first developed in the region and characterize it.

Mainstream Asia has an old tradition—Confucianism or Brahmanism—of moral leadership being provided by the state or social and religious elites. There has been no opposition to family planning from Confucianism, Hinduism or Buddhism. Fertility control has been preached by national family planning programs without causing significant protest. There has been a diffusion of ideas but the most effective in the lead-up to transition have been those directed at elites through the world's media or meetings of international organizations (Khuda et al. 1996). In China, India and elsewhere there has been no organized opposition to abortion. There seems to be little doubt that the fertility decline in Mainland Asia has been accelerated by the family planning programs. This has affected the global situation because two-fifths of the world's population live in the region.

Yet the decline has almost certainly not been simply the product of these programs, although one recent report comes close to making this claim (Cleland et al. 1994). The whole region has been subject over the last five decades to massive social and economic change. Many countries have had great rises in per capita income. Even where incomes have climbed more slowly, children have mostly been put into school, farming production has become much more market-oriented, and urban populations have increased disproportionately. Four grass-roots studies, one in South India (Caldwell et al. 1982), two in Bangladesh (Duza and Nag 1993; Caldwell et al. 1997), and one in Thailand (Knodel et al. 1987) have come to very similar conclusions.

Parents hope that their children, and perhaps they themselves, will gain from the new schooling opportunities and will acquire non-farming employment. These outlooks have developed as schooling opportunities have increased, the towns have grown and the economy has been largely converted to money transactions. Schooling children is expensive but frequently ultimately worthwhile, and can be afforded for only a limited number of children. Families are tempted to limit the number of their children and are likely to do so sooner when the government says that it is morally the proper thing to do, and provides assistance for family planning.

North Africa and the Middle East

North Africa and the Middle East are regions in which Islamic misgivings about family planning, or more commonly about doubting the future and about wives working outside the home, have led to some of the richest Third World populations retaining high fertility. In the Middle East political policies, some influenced by the continuing political crisis, have probably also militated against family planning. Thus, very high fertility is still found both in poor Yemen and rich Saudi Arabia, as well as in crisis-torn Palestine and Iraq. In contrast, fertility has declined to below four where there have been national family planning programs as in Morocco, Tunisia and Egypt, the latter being more surprising in that it is both Muslim and poor, with average per capita income still below US$1,000. A demonstration of the fact that government attitudes can help or hinder a fertility

transition is the fact that Libya, which is several times richer than Egypt, had until recently a total fertility rate over six.

Sub-Saharan Africa

Sub-Saharan Africa still has a regional total fertility rate of at least six, and only one-quarter of its countries give any indication of fertility decline even beginning. This is partly explained by poverty and relatively low schooling levels. This is not the whole explanation, as is shown by the fact that in the crucial years of the 1960s there was little difference in socio-economic measures between much of Sub-Saharan Africa and much of Mainstream Asia (Caldwell and Caldwell 1988). In both regions, family planning programs had begun to be set up. The African programs did not have strong governmental support except in South Africa and more recently in Kenya and some parts of Southern Africa. Nor was there much demand for their services. The nations were new and there was no tradition of governments providing moral leadership. This was particularly the case in the area of fertility because traditional religions had strongly favoured high fertility. Communal land tenure in most areas meant that people did not think in terms of retaining an inheritance for the next generation. In any case, widespread child fostering weakened the link between biological parenthood and the burden of raising children. Female age at first marriage was slowly rising but the fact that many children were born out of wedlock meant that this change did not necessarily restrain fertility. Frequent political crises and wars meant that the future was uncertain. There was a demand for contraception, not for family limitation but to limit premarital pregnancy and to allow sexual relations during the postpartum period and when women had become grandmothers (Caldwell and Caldwell 1976; Page and Lesthaeghe 1981; Caldwell et al. 1992).

By the early 1990s it was realized that fertility had in some places begun to decline. This occurred first in South Africa, which had developed the only family planning program in the region which was comparable to the Asian ones (Caldwell and Caldwell 1993). South Africa also had a more diversified and a more stable economy. Either the South African example or the greater economic certainty provided by South Africa's relatively strong economy has led to fertility declines in all the adjacent English-speaking countries: Zimbabwe, Botswana, Swaziland, Lesotho and Namibia. Changes have not occurred in neighbouring Mozambique and Angola but this is probably explained by years of warfare rather than diffusion hitting a linguistic barrier. Further north, fertility is definitely falling in Kenya and Ghana and probably in Senegal and southern Nigeria. An exhaustive study of Senegal concluded that a fertility decline of over 10 percent had occurred there but that it was entirely attributable to marriage deferment (Pison et al. 1995). Fertility is definitely declining only in countries where most children are in primary school and at least 20 percent of girls in secondary school, and where fewer than 11 percent of children die before their fifth birthday (Caldwell et al. 1992; Caldwell and Caldwell 1993). Much of sub-Saharan Africa will not reach this situation for

at least two decades. One explanation for the recent decline is probably a stronger cost-accounting attitude among parents which has been induced by economic crisis and structural adjustment programs.

The African fertility transition will differ from that in Asia or Europe. The strongest demand for contraceptives has been to prevent births outside marriage, especially among the young, and to substitute for traditional periods of female sexual abstinence after births or after becoming grandmothers. This substitution means that increases in the level of contraception do not at first necessarily result in falling fertility. Because significant fertility control can be effected by providing contraception to the unmarried, the Asian type of family planning clinic program may not be well-suited to Africa. Because much of the demand for contraception is not for halting family building, the fertility declines have contrasted with those elsewhere by having similar proportional declines at every female age with the actual number of births averted in each country greatest among the younger women (Caldwell et al. 1992; Brass and Jolly 1993:75–76). The sub-Saharan Africa fertility decline may depend largely on injectables and oral contraceptives: what has brought down black South African fertility is that 50 percent of couples are contracepting, a level achieved by 80 percent dependence among contraceptors on injectables and the pill, compared with 30 percent among white contraceptors (Caldwell and Caldwell 1993:248). It is possible, but not certain, that female sterilization will prove to be acceptable, and that the widespread provision of condoms to prevent AIDS means that they will also become more acceptable as contraceptives. This appears to be happening in Southwest Nigeria (Caldwell et al. 1992).

The AIDS epidemic may slow population growth in East Africa and bring it to a halt in Southern Africa; the reasons are that death rates in some areas are double what they would have been without the epidemic and new evidence suggests that being seropositive reduces, for biological reasons, women's fertility by 30–50 percent (Awusabo-Asare, Boerma and Zaba 1997). This may lead to declining population in South Africa, Zimbabwe and Botswana within a decade, partly because there has also been a contraceptive-induced fertility decline there. But AIDS is unlikely to reduce the whole of the sub-Saharan region's rate of population growth by more than 0.5 percent.

CONCLUSION

For most of the last 130 years real per capita income or indices including both that measure and others of education and mortality have been fairly good predictors of the timing of the onset of fertility transition. They offer an adequate explanation for the gap between the last of the onsets of fertility decline in the West in the 1920s and the start of widespread Third World fertility declines in the late 1960s. They do not explain the very early onset in France in the late eighteenth century or the apparently premature onsets in Mainstream Asia over the last third of a century. In the former case the explanation probably lies in the massive social unrest and susceptibility to new ideas in France of that time eroding resistances

to behavioural change. In the latter case national family planning programs were probably the major cause.

The pace of fertility transition in individual countries has quickened, perhaps because the rates of change in income, education, mortality decline and urbanization have increased. But better contraception, the organization of family planning programs, and government advocacy of contraceptive use have also played a role. In contrast, and rather surprisingly, the diffusion of the onset of fertility transition within regions has not been a simple pattern of increasing acceleration. It was rapid even in late nineteenth and early twentieth century Europe. In the case of diffusion through regions, onsets occurred at progressively lower developmental levels, partly because attitudes to fertility control strengthened over time and partly because of the transmission of ideas and experience from neighbours.

The whole process has been a globalization of fertility decline. Part of that globalization was probably the inevitability of the low-fertility West demanding the control of fertility in the high-growth-rate Third World in the second half of the twentieth century, and consequently developing economic-demographic theories justifying such a course and better contraceptives to make it possible.

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ENDNOTES

1. This article first appeared in the *Journal of Population Research* 18 (2) (November 2001) pp. 91–117.
2. Here and elsewhere Princeton fertility indices are employed. I_f is the index of overall fertility; I_g of marital fertility; and I_m of proportions married. These are expressed as decimal fractions of what is theoretically the highest attainable level (see Coale and Treadway 1986, Appendix B: 153–162).

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CHAPTER 11

THE GLOBALIZATION OF FERTILITY BEHAVIOR[1]

BETWEEN THE LATE 1950s and the late 1970s fertility began a persistent major decline in countries containing almost four-fifths of the world's population. The exceptions that did not follow within a further decade were nearly all found in three regions: sub-Saharan Africa, Arab Southwest Asia, and Melanesia. The range of populations involved in the decline was unpredicted and unprecedented. Few developing countries had ever before had a sustained fertility decline, while the West had immediately beforehand been experiencing either stable fertility levels or, because of the postwar "baby boom," rising levels.

It seems likely that such near-simultaneity was the product of the same forces everywhere. Yet this has rarely been suggested. Instead, one set of theories has been developed to explain the Western experience, and a different set has been produced for developing countries. There is very little overlap.

This chapter will focus on this short period of around two decades when decisive fertility decline began or resumed in three types of society: in industrialized or high-income countries, in most of the developing world, and, very significantly but also unnoted in the larger context, in the indigenous minorities in English-speaking, overseas, European-settlement societies. That the decline was significant is shown by the fact that within one-third of a century fertility had fallen by 40 to 60 percent in most of the world's regions and by 40 percent in the world as a whole, almost certainly the first major global decline in history (United Nations 1999).

My central thesis here is that any adequate theory of the onset of fertility decline must address this simultaneity. Any all-embracing theory must take socioeconomic change to be fundamental over long periods, but, for the timing of the onset of periods of fertility decline and the tempo of that decline, theory must also take into account ideologies, attitudes, and the mechanisms of fertility control. I also propose that available methods of fertility control can influence not only fertility but other behavior and attitudes. The argument takes off from that advanced in Caldwell (1999), where the interaction between socioeconomic change, ideologies, and means of fertility control was discussed for the historical

West. It also addresses the three propositions put forward by Coale in 1973 (p. 65): for fertility decline to occur, (1) fertility must be within the calculus of conscious choice; (2) reduced fertility must be advantageous; and (3) effective techniques of fertility reduction must be available.

THE GLOBAL FERTILITY DECLINE

Table 11.1 shows that during most of the 1950s there was little evidence of the coming fertility decline. The major exception was East Asia, where Japan resumed an earlier fertility decline interrupted by militarist pronatalist policies in the 1930s and during World War II, and where China's fertility in the late 1950s was temporarily depressed by the famine at the end of the Great Leap Forward. There were lesser declines in Western Asia as Turkey began to retreat from very high levels of fertility and in Eastern Europe as the new satellite countries of the Soviet Union reacted to the changed political situation (as they were to do again 40 years later) and gained access to legalized abortion. Offsetting these fertility declines were rises in Australasia (Australia and New Zealand), North America, Northern Europe, and Western Europe as the baby boom peaked, and smaller rises

Table 11.1. Regional Fertility Declines in the Second Half of the Twentieth Century

	Total Fertility Rate			First Quinquennium in Which TFR is At Specified Level Compared With 1955–59		Decline in TFR from 1955–60 to 1990–95
Region	1950–55	1955–60	1990–95	5+% Below	10+% Below	(Percent)
Eastern Europe	2.69	2.62	1.61	1960–65	1965–70	49
Northern America	3.47	3.72	2.02	1960–65	1965–70	46
Australasia	3.25	3.51	1.91	1965–70	1965–70	46
Northern Europe	2.32	2.53	1.81	1965–70	1970–75	28
Latin America and Caribbean	5.89	5.94	2.97	1965–70	1970–75	50
Western Asia	6.38	6.25	4.05	1965–70	1970–75	35
Western Europe	2.39	2.50	1.50	1970–75	1970–75	40
Eastern Asia	5.71	5.12	1.88	1970–75	1970–75	63
South-Eastern Asia	6.03	6.07	3.05	1970–75	1970–75	50
Southern Europe	2.65	2.65	1.41	1970–75	1975–80	47
South-Central Asia	6.08	6.06	3.79	1970–75	1975–80	37
Pacific Islands	6.45	6.54	4.59	1965–70	1975–80	30
North Africa	6.82	7.01	3.97	1970–75	1975–80	43
Sub-Saharan Africa	6.52	6.59	5.90	1985–90	1990–95	10

Source: United Nations 1999.

Table 11.2. Fertility Declines Among Indigenous Minorities in Developed Countries

	Estimated Date of		
Indigenous Minority	Onset of Decline	5+% decline	10+% decline
American Indians	1960	1961	1962
Canadian Indians	1962	1964	1966
New Zealand Maoris	1963	1964	1966
Australian Aborigines	1971	1972	1973

Sources: Jaffe 1992:154–156; Snipp 1996:26–31; Romaniuc 1987:72; Kunitz 1994:135; Khawaja 1985:164; Australian Bureau of Statistics 1999:78; Caldwell 2001.

with changes attributable to modernization (e.g., shorter breastfeeding intervals, less widowhood) in Africa, Latin America, the Pacific Islands, and parts of Asia.

By 1960–65 fertility was falling in Northern America (in the United States annual rates fell after 1957) as well as Eastern Europe and Western Asia, to be joined in 1965–70 by Australasia (in Australia from 1961), Northern Europe (from 1964), and Latin America and the Caribbean and the Pacific Islands, and in 1970–75 by Western and Southern Europe, the remaining regions of Asia, and North Africa. There was no clear pattern of developed countries being the first to move and being followed by developing countries.

An even more surprising and little-noted change took place during this period, as is revealed in Table 11.2. The indigenous minority populations of the United States, Canada, New Zealand, and Australia suddenly began steep fertility declines that were soon to halve their birth rates. This was a revealing phenomenon for these were peoples who had failed to adopt the demographic behavior of their co-nationals, the immigrant settler populations, for the better part of a century. One could hardly argue that they had no small-family models or no access to contraception. It could perhaps be argued that fertility control would not be rewarded by the same upward social mobility that rewarded the majority populations, but it would be hard to show that circumstances changed greatly in the 1960s or early 1970s.

The demographic statistics for those countries listed in Table 11.2 are far from satisfactory but nothing equivalent exists for indigenous minorities in Asia or Latin America. We do know that fertility decline began among the indigenous majority during the 1960s in another settler country of the old British Empire, South Africa (Caldwell and Caldwell 1993:231). If we take the new Asian states formed from the former Soviet Union as earlier representing indigenous minorities within that country, then it might be noted that such states in Western Asia (Armenia, Azerbaijan, and Georgia) all began their fertility transitions in the 1960s, while in the Central Asian states, with the exception of Kazakhstan (where fertility

decline began in 1960–65, possibly because Kazakhs were outnumbered by people of European ancestry), fertility decline was postponed until after 1975.

EXPLANATIONS FOR THE FERTILITY DECLINES

The theories seeking to explain the onset of fertility declines in the 1960s and early 1970s are usually embedded in underlying socioeconomic change. These forces probably are fundamental, but the theories mostly share two characteristics that warrant concern. First, they do not address the global nature of the fertility decline. Second, they are often unconvincing as to why fertility fell hardly anywhere in the years immediately before 1960 but fell widely soon afterward.

In the historically broadest approach, Davis (1986:58–59) repeated a message he had proclaimed half a century earlier (Davis 1937): "there is an incompatibility, or tension, between the family on the one hand and the industrial economy on the other. The fundamental principle of the family is ascription of status . . . . The principle of industrial society is the opposite . . . . [I]ndustrial societies . . . inherently discourage procreation." Particularly interesting is the lack of reference to economic imperatives. Westoff (1983:100) held essentially the same view when he wrote that the long-term Western fertility decline was to be expected, but what had been inadequately explained was the pause in that trend from the 1930s to the 1950s and especially the baby boom, rather than the subsequent resumption of the decline.

Ariès (1980) also saw change in terms of family sociology, but he came closer to explaining why change occurred in the 1960s. His two motivations for the declining birth rate in the West saw late-nineteenth-century parents already in their early adulthood as having little chance of further upward socioeconomic mobility but as being able to aspire to lineage mobility by restricting fertility so as to provide their small families with the education needed for economic and social advancement. As society became richer, parents could achieve this aim on a larger scale by relaxing their strict fertility control, thus causing the baby boom. In the new affluent society that gradually developed after World War II, the possibilities of educational, occupational, and social improvement were widely available to young adults and hence they could place their hopes in themselves rather than in their children, especially if they could remain unmarried or childless or restrict themselves to a very small delayed family. These conditions fell into place with the contraceptive revolution of the 1960s when, according to Ariès, the "child-king" was dethroned. This was essentially also the position of van de Kaa (1987:5): "The first transition to low fertility was dominated by concerns for family and offspring, but the second emphasizes the rights and self-fulfillment of individuals."

The major economic theorists in the debate, the new household economists originating at the University of Chicago, were closer to these views than is often realized. From the 1960s they built on Becker's theories on the economics of the family. Becker (1991:155ff) argued that parents in industrialized societies were altruistic toward their children and were willing to spend on their

smaller families in order to secure "quality"—read "educated"—children partly for dynastic reasons, which is presumably the upward socioeconomic mobility of the family in the form of their descendants. Willis (1973) expanded Becker's earlier arguments by concentrating on young women and young wives—on "king adults" and not "king children." He wrote of the value of women's time and emphasized that the value of time spent on rearing children instead of working became an ever-greater economic sacrifice as women's real wages rose or as they rose relative to men's wages. In the decades after World War II more wives and more mothers entered the work force. It is difficult to posit that 1960 marked a major fault line, although Schultz (1986:96) argues that in most industrialized countries the participation of women in the work force rose steeply between 1960 and 1980, as male and female participation rates converged—a result, he maintains, of convergence in educational levels (p. 103). The dating of the rise in women's labor force participation seems a little late to provide the whole explanation for the fertility decline, although one might counter that the rise was weak in Ireland and nonexistent in Greece, where fertility decline began in the late 1970s and early 1980s respectively.

A distinction should be made between explanations of fertility limitation based on women's time (and ultimately on family income) and those that posit the conflict arising from simultaneously being a mother of young children and holding down a full-time job. Wulf (1982:63) summarized the papers reporting on field investigations of low fertility to the 1981 Manila General Conference of the IUSSP by stating that most saw the fertility decline in the West as arising from a change in the role and expectations of women, especially participation in the labor market: "As more and more women anticipate that work outside the home will be a permanent feature of their adult lives, they are forced to make serious and far-reaching decisions about whether and how to combine wage-earning with childrearing. The dilemma that this conflict poses for both men and women is not easily resolved, and we need no more persuasive evidence of its intractable nature than the fact that more and more couples are deciding to forgo child-bearing altogether or to limit their family size to two or fewer children." This stance, as will be reported below, receives strong support from a series of investigations carried out in Australia.

Clearly, the economic and social theses can be welded together. Lesthaeghe (1983) argued that economic change was fundamental but that the impact of accompanying ideational changes, increasingly individualistic and secular, should not be underestimated. There was more to the story than the economic balance between costs and benefits of children (p. 412). Easterlin (1973) added a demographic thread. If times are good and jobs are plentiful, as they are likely to be for persons born at times of unusually low fertility such as the 1930s, then there will be early marriages and a readiness to have children. If one has to compete with members of a large cohort such as those born during the baby boom, then marriage rates and fertility levels will fall. It is true that American fertility rates rose to replacement level in the 1990s, but the recovery was modest and has been explained

by making up for previously deferred births (Bongaarts and Feeney 1998). The recovery was also less obvious in other countries that had experienced the baby boom.

What is interesting is the modest emphasis placed on contraceptive change even though this was a subject area in which many of the theorists worked. Ryder and Westoff (1967:3) wrote: "It is our hunch that what has been happening to fertility in the 1960s would have happened in direction if not in degree even if the oral contraceptive had not appeared on the scene, although the tempo of decline most recently can probably be attributed in part to the availability of this highly efficient and apparently highly acceptable method of fertility regulation." But they also noted that "pill use is more likely than not to be a replacement for the condom or the diaphragm, both highly effective contraceptives." In 1971 they pointed out that the fertility decline had started well in advance of the advent of the pill (actually two years earlier) but that much of the tempo of decline could probably be attributed to its use (Ryder and Westoff 1971:152–153). By the mid-1970s they appear to have moved closer to regarding the American fertility revolution as a contraceptive one, citing the influence of the pill, IUD, and sterilization (Westoff 1975; Westoff and Ryder 1977). Easterlin (1973:187ff) believed that the pill might have been an important means of allowing young married baby boomers to keep their families small, and Ariès (1980:649–650) held that effective contraception and abortion permitted couples to place greater emphasis on their own development than on that of their children.

Theories explaining fertility decline in developing countries usually place greater emphasis on contraception but give little more attention to the timing of the decline than do explanations of fertility decline in developed countries. The most comprehensive theory is that of Easterlin (1978), who identifies the demand for children as being determined by tastes, income, and prices within a broader context of the potential supply (actual reproduction—that is, natural fertility eroded by child mortality) and the cost of fertility regulation (both market costs and those of a personal and psychological nature). The timing of fertility decline is presumably determined by the society's economic development and its tastes (which may encompass social change, including change in the costs of fertility regulation). Elsewhere I have hypothesized that in sub-Saharan Africa in the 1970s there was little demand for fertility control and a significant demand for children because the *net* intergenerational wealth flow was upward (Caldwell 1976, 1977, 1982). Subsequent studies of India (Caldwell, Reddy, and Caldwell 1982, 1988) and Bangladesh (Caldwell et al. 1999), where fertility was falling and national family planning programs were operative, concluded that economic and social changes were the underlying factors in inducing fertility decline, with the education of children being an important element, but that family planning programs almost certainly hastened the process. Freedman and Berelson (1976) reached a similar conclusion after a survey of family planning programs.

Some studies have argued that "the additional effect of contraceptive availability or family planning programs on fertility is quantitatively small and

explains very little cross-country variation" (Pritchett 1994:247; see also Demeny 1979). Others have assigned contraception and organized family planning programs a major causal role in the timing and pace of fertility decline (Tsui and Bogue 1978; Chowdhury 1985; Cleland and Wilson 1987; Robey, Rutstein, and Morris 1993; Carty, Yinger, and Rosov 1993; Cleland et al. 1994; Potts 1997). Still others have attributed the tempo, and sometimes the timing, of fertility decline to family planning provision while seeing the decline as part of massive economic development and social change (Mauldin and Berelson 1978; Cutright 1983; Kelly, Poston, and Cutright 1983; Sherris 1985; Guzmán 1994; Bongaarts and Watkins 1996).

None of these studies relates the onset of fertility decline in developing countries to the contemporaneous renewal of fertility decline in industrialized countries. Robey, Rutstein, and Morris (1993:60), drawing on international demographic and contraceptive surveys, concluded that "recent evidence suggests that birth rates in the developing world have fallen even in the absence of improved living conditions . . . . Developing countries appear to have benefited from the growing influence and scope of family-planning programs, from new contraceptive technologies and from the educational power of the mass media." They buttress this with the observations that "differences in contraceptive prevalence explain about 90 percent of the variation in fertility rates" and that now more-efficient contraceptives are being used (p. 62). In fact, no one denies that contraception is the mechanism for most fertility reduction; rather, the question is why it is employed. Cleland and Wilson (1987:28) argued that "the distinction between groups with unchanging fertility and those experiencing transition is the propensity to translate desires into appropriate behaviour." Again, the question is what determines that propensity. Guzmán (1994) concluded that mass fertility control in Latin America in the 1960s was triggered by renewed economic adversity and a simultaneous increase in organized family planning activity.

Explanations for the decline in fertility and its timing among indigenous minorities are even more meager. Jaffe (1992:155–157) argues that the decline of fertility of the American Indians was achieved by a greater mixing of the minority and majority populations as the former streamed in larger numbers to the cities, enabled to do so by increasing education levels and by the economic boom conditions of the 1950s and 1960s. This is also one of the explanations put forward in Canada, Australia, and New Zealand. In New Zealand, Sceats and Pool (1985:191) argue that the Maori fertility decline took place in the 1960s because of the new availability of the pill, sterilization, and injectables. More light is thrown on the situation among indigenous minorities by the Australian experience. In 1967 a federal referendum recognized Aborigines as full Australian citizens. Thereafter the Australian Government increased allocations for health services for the Aborigines both under the conservative Liberal/Country Party coalition and from 1973 under the Whitlam Labor Government. Gray (1983:312–316) concluded that it was very difficult to place the Aboriginal fertility transition within demographic transition theory. Rather he noted that in the first half of the 1970s enthusiastic young white

doctors who were determined to raise living standards and improve the position of Aboriginal women worked in Aboriginal health services. The memoirs of six of these doctors revealed that they made the new contraceptive technology available, and that such contraception was acceptable to Aboriginal women, especially older women who had met social obligations by having at least two surviving children. Female-controlled contraception was important in their family situations. In the early 1970s Aboriginal fertility began a steep decline.

TOWARD AN EXPLANATION OF THE GLOBAL FERTILITY DECLINE

The near-simultaneity of the onset of fertility transition among most of the world's populations is evidence of the globalization of the fertility transition, a situation with major implications for the present and the future. Explaining what happened provides a key to understanding contemporary demographic transition. Any fertility transition theory that fails to address declines in both developing and developed countries and to explain their parallel occurrence is deficient.

What happened, I suggest, is the following. (1) Before the 1950s fertility had consistently declined only in the West and Japan; the Western decline occurred throughout Europe, Northern America, Australasia, and Argentina and Uruguay—usually, together with Japan, referred to as the industrialized countries even though at very different levels of manufacturing. This decline had been achieved over generations, often with methods such as withdrawal that had to be learned and that required cooperative conjugal relationships which were far from universal. (2) During the 1950s and 1960s concern in the West about "population explosion" in the developing world spread from specialists to the public. This in turn had two effects. It undermined the legitimacy of large families in the West as well, and it encouraged the development of new and more efficient contraception to meet developing-world needs—methods that would turn out to meet needs in the West as well. (3) Because children had not been an economic burden in developing countries before the great socioeconomic changes in the decades after World War II, and were still only marginally so in many parts of the world, the methods the West had slowly learned to use for restricting fertility were not—at least in the short term—available. (4) New, easier-to-use forms of fertility regulation became available around 1960 and were instrumental in the fertility transition in developing countries. (5) They were also more effective and more egalitarian than the methods hitherto employed in industrialized countries, and were employed in these countries at just the same time as in developing countries and in places even earlier. (6) The developing countries did not experience the mass concern about population explosion felt in the West, and many countries still do not, but the elites came increasingly to advocate limiting population growth, a perspective that was of key importance in establishing effective national family planning programs. (7) All these changes could not have occurred without unprecedented economic growth and social change both in developed and developing countries. This global socioeconomic revolution would have eventually brought fertility decline even

without the new contraception, but not so rapidly. (8) Certain populations did not participate in the fertility declines of the 1960s and early 1970s because of insufficient socioeconomic change or because either the elites or broader communities were not convinced of the need for fertility control. (9) The fertility decline and the means used to achieve it were new material conditions in both the developed and developing world and brought about further socioeconomic changes. (10) The globalization of fertility attitudes and behavior has major implications for future demographic trends and population policies.

These points will now be consolidated. The discussion of change in the West will focus on the Australian experience because of a series of relevant studies and of in-depth investigations linked to surveys (Caldwell et al. 1973; Caldwell et al. 1976; Ruzicka and Caldwell 1977).

Before 1960, persistent fertility decline was almost unknown in the developing world. Small declines occurred in the late 1950s in a few atypical places. One was Sri Lanka, which had long been relatively rich by regional standards, was highly educated, had been a European colony for almost 300 years, and had a significant Christian minority. Even there, the early fertility decline was mostly achieved by delayed marriage (Fernando 1975; Alam and Cleland 1981; Caldwell et al. 1989; B. Caldwell 1999), assisted by rhythm and withdrawal (Caldwell et al. 1987). Sri Lanka appears to have experienced some fertility decline in the economic depression of the 1930s (Sarkar 1957:95). Fertility decline had already begun in Singapore, an educated city with an active family planning association; in Mauritius, where some of the same conditions applied; in India, where a national family planning program was employing male sterilization; and in Turkey, mostly in Istanbul and the large towns of the west coast.

In the industrialized countries fertility was controlled by a mixture of older and more recent contraceptive methods. In the United States and Australia the majority of couples were using rhythm, withdrawal, and the diaphragm (Caldwell et al. 1973:59); in Europe the first two and condoms. The European fertility decline had probably been originally achieved employing withdrawal (Santow 1993), although van de Walle and Muhsam (1995) believe that the French probably limited fertility by sexual practices not involving intercourse, and Szreter (1996:367–439) asserts that in Britain long periods of sexual abstinence were important. Delayed female marriage and spinsterhood were also factors. Even in the English-speaking West the use of contraception was long limited by a suspicion and apprehension of it, which in turn meant that contraceptives were primitive, possibly unsafe, and difficult to obtain (Caldwell 1999).

It is intriguing to remember how pronatalist were public statements in the West of the late 1940s, how limited was public discussion about contraception, and often how difficult it was for individuals to obtain adequate assistance with contraception. The most powerful force in changing this situation was the growing belief, rapidly becoming an ideology, that the deliberate control of fertility in poor, high-growth countries was desirable, even the path of virtue. In September 1948 the *New York Times* published an editorial echoing the sentiments in an FAO

report saying so. In 1959 the World Council of Churches endorsed family planning; General William Draper presented a report to the United States Congress recommending that the US offer birth control assistance to developing countries; and the American Public Health Association announced that family planning services should be an integral part of health services. The last had partly been provoked by the successful 1958 battle to allow New York public hospitals to provide contraceptive services (Guttmacher 1966:461–462). In the 1960s concern over rapid population growth in the developing world intensified in the West, fueled, among other things, by Paul Ehrlich's many television appearances in the United States, Australia, and elsewhere, and by his publication of *The Population Bomb* in 1968.

In Australia a 1971 survey of Melbourne found that 68 percent of women believed that the world was overpopulated, 62 percent believed that governments should take action to prevent the situation from deteriorating further, and 52 percent believed that they would now respond—if they were in a position to do so—to government requests for everyone to limit family size to two children (Australian Family Formation Project 1972: Questions 111–170). A majority believed that "The pill has brought more benefit to women than any other modern invention." The proportion of contraceptive users among married women who believed themselves to be at risk of conceiving rose from 64 percent in 1945–49 to 92 percent in 1970–71 (Caldwell and Ware 1973:13).

For 40 years we have been asking, in surveys and in one-on-one anthropological investigations in sub-Saharan Africa, rural South India, and rural Bangladesh, both of contraceptive users and of nonusers, whether their parents used contraception or worried about their inability to control family size. The answers have been the same. Their parents had not practiced birth control because they had no access to services. They had never contemplated restricting family size because, without the methods for doing so, it was unimaginable (see Caldwell and Caldwell 1984). Abortion was rare and was not used to limit family size. Again, Sri Lanka was the exception.

This was not our experience alone; it was also that of persons who contributed significantly to the crusade against high fertility in the developing world. In 1948 Frank Notestein, Marshall Balfour, Irene Taeuber, and Roger Evans in a mission to East Asia visited a rural area in north China, where family size had long been controlled through infanticide, and where the mayor and his associates wanted to introduce family planning in their densely populated and land-hungry area. No circumstances could have been more conducive to family planning success. But the group members "knew that there was no method of contraception really suitable to the needs of . . . [this] community" (Balfour et al. 1950:83). They concluded: "The main difficulty is that there is no single contraceptive method that is likely to prove of any substantial importance to the peasant population of Asia's mainland. Any such method must be very cheap, simple, safe and effective. So far as we know such a method neither exists nor is on the horizon" (pp. 119–120).

This situation changed around 1960, largely because of altered attitudes in the West. Gregory Pincus requested funding for research on the development of the pill in the 1950s on the grounds that such a contraceptive was needed in the developing world. The pill became available in many developed countries at the beginning of 1960 but was at first too expensive for mass use in developing countries. The Lippes Loop, an intrauterine contraceptive device, was promoted in a number of developing-country settings from 1962 and was a regular part of South Korea's family planning program from 1964 (Kim and Kim 1966:426). Such older methods as sterilization and abortion became more widely available. In the early 1960s American doctors were permitted to perform sterilization for family planning reasons (Guttmacher 1966:455), and in Australia the journal of the Australian Medical Association ceased warning doctors that they might be prosecuted if they carried out such operations. Legal abortion became readily accessible in Eastern Europe in the mid-1950s, in Britain in 1967, in South Australia in 1969, in India in 1972, and in the United States in 1973. From about 1965 suction abortion made the operation simpler and safer. All these developments were hastened by socioeconomic changes and growth in secular and civil rights attitudes in the industrialized countries, but there can be little doubt that the growing clamor for the control of population numbers gave birth control methods respectability.

These methods made possible national family planning programs in the developing world. The first successful national programs, in South Korea and Taiwan, were in the early years largely IUD programs; India's was overwhelmingly a sterilization program, first of males and later of females; China employed its own type of IUD (a metal ring) as well as sterilization; Turkey, Thailand, and Indonesia concentrated on the IUD and pill; the South African program was driven by pills and injectables. As late as 1985, sterilization, IUDs, and hormonal contraception accounted for 83 percent of contraception in developing countries, compared with 48 percent in developed societies (Mauldin and Segal 1988:341). In Latin America the pill and sterilization were widespread in the 1960s. Nearly everywhere these methods were backed up by abortion, more often illegal than legal. In 1965 an international conference reported on the experience of national family planning programs in 12 countries (Berelson et al. 1966). Nevertheless, it was in developed countries that pill use first took off. In Australia by 1971 pill use was almost double that of all other methods combined (Lavis 1975:2), and between 1960/63 and 1970/71 current pill and IUD use by married women rose from 14 percent to 46 percent (Caldwell and Ware 1973:17).

The question remains why the new contraceptives were taken up by family planning programs in a way that the older ones were not. In inexperienced or less motivated hands they probably were more certain of preventing conception. However, in these circumstances there were also more complaints of side effects and higher rates of discontinuation. There are other reasons as well. One that is frequently cited is logistic ease. Sterilization needs only one encounter between the program and client in a lifetime; the IUD one encounter every few years. India long believed that its program was only capable of delivering sterilization.

The major and little-explored reasons may well have been two features of the modern methods: they were not coitus-related and they were medicalized. The diaphragm, condom, douching, foams, and jellies all needed action around the time of coitus, involved partner cooperation, and usually required touching the sexual organs. On the last point many Australian Catholics connected the ban on contraceptives with the dubious nature of sex for pleasure and with their repugnance for the sexual organs. The result was that they had until the early 1970s only one-sixth of the level of use the non-Catholics had of the diaphragm, half of douching, but over three-quarters the level of pill use (Caldwell and Ware 1973:24). In the 1950s 39 percent of Australian fertility control was through coitally related contraception; by the early 1970s that was down to 7 percent (Caldwell 1982b:257).

It is hard to overstate the advantage that developing-country family planning programs attained by having a range of methods that required consultation only between a woman and a family planning worker, or only needed the worker to accompany the woman to a clinic or hospital. When international demographic or contraceptive surveys report that spouses have discussed contraception, it usually means little more in rural India than that the husband has suggested or agreed to the "operation" or in rural Bangladesh that his wife can talk to and be influenced by the family planning worker.

The new contraceptives were egalitarian in that they required little effort or social and communication skills. This allowed the gulf in use to narrow not only between developed and developing countries but also between social groups in the West. In the 1950s when use of the diaphragm peaked, twice as many women in Australia with upper secondary or tertiary education were using the method as were less-educated women; there were no educational differentials in the early 1970s in either pill or IUD use (Caldwell and Ware 1973:26).

Concern with global population growth and an association between that concern and one's own fertility intentions grew steadily in the West from the 1950s to the 1970s. There were reflections of this concern in Latin America, East Asia, and parts of Southeast Asia, but much less so in South Asia and Africa. The strongest reflection in developing countries was among governments and elites, progressively percolating down the social structure. In India this process began in the nineteenth century (Caldwell 1998), but elsewhere it was a characteristic of the second half of the twentieth century (Caldwell 1993; Khuda et al. 1996). Davis (1944) had argued that this process could not begin until postcolonial times because national elites regarded any attempt by colonial governments to introduce family planning as an effort to maintain their own control. Ultimately the diffusion of ideas and attitudes may become a mass movement, at least among women (see Bongaarts and Watkins 1996).

Fertility control has not operated in a vacuum in either the developing or developed world. Vast economic growth, the spread of schooling, urbanization, the changing position of women, and increasing economic and social globalization have been the underlying factors everywhere. So has the movement of women into

the paid work force in all developed and many developing countries. Nevertheless, the dating of the advent of new contraceptives and of the onset or renewal of fertility decline makes it hard to argue that the contraceptive revolution did not accelerate fertility decline and, in many cases, hasten its onset. The continued dependence of developing countries on the new forms of fertility control strengthens the argument.

As can be seen in the Appendix Table, sub-Saharan Africa, much of Arab Southwest Asia, and Melanesia did not participate in the fertility declines of the 1960s and 1970s. Sub-Saharan Africa was at that time poor but no poorer than much of Asia (Caldwell and Caldwell 1988). Its people probably were more pronatalist than elsewhere for religious and cultural reasons (Caldwell and Caldwell 1987). Most of the region was newly independent and had no history of nation-states led by elites. Those who did offer leadership were usually convinced that African fertility culture was different and would remain so. The result was that national family planning programs were established only in Kenya and Ghana, where they received weak government support, and in South Africa where the program was put in place by the minority white government. In the Middle East and North Africa explanations must be sought in Arab Muslim attitudes to interventions in Allah's plans, political tensions, and the position of women. In Melanesia the situation resembled that in sub-Saharan Africa.

The battle to contain global population growth changed the developed world in two ways. First, it provided young couples, especially young women, with a justification for deferring births, having small families, or alternatively having no children or not marrying. Second, more effective contraception, backed up by more accessible abortion and followed by sterilization, provided almost certain fertility control. Ruzicka and Caldwell (1977:334ff.) summarized the 1975–76 Australian studies as showing the following: (i) Most young adults were satisfied that they now had reasonably certain fertility control that they could use as a basis for planning their lives, and marveled that their parents had made do with such high-risk regulation. (ii) Most couples agreed that continuous contraception was the normal way of life; indeed, in most relationships contraception could not be discontinued unless both partners agreed. (iii) Most respondents agreed that pregnancy should not come straight after marriage (or marriage after the beginning of a sexual relationship), but that time was needed for the partners to mature and to have such experiences as travel, and for each (but especially the wife) to have completed education or training and for the wife to have gained enough work experience and promotion to be able to be re-employed after a birth or a period looking after a young child. Cosford et al. (1976:109) reported that the same study had shown "just how deeply the tenets of the Women's Movement have spread in the society. There is no longer a significant body of young women, even in the working-class or amongst the Australian-Irish, who do not wonder about problems of identity and role." The 1986 study, held at a time when Australian fertility had fallen well below the long-term replacement level, found that most young couples intended

to have at least two children when they married, but successive postponements led many couples into thinking that this was no longer desirable (Caldwell et al. 1988:123).

These changes occurred within a framework provided by economic growth, more women entering the work force, greater emphasis on the individual, the unrest of the Vietnam War years, the rise of the women's movement, a further sexual revolution, and an increase in nonmarital cohabitation. But the new, safer contraception also provided a basis for this social change, and many aspects of society would have been different without the contraceptive revolution of the early 1960s.

Support for fertility control, which a few decades ago was confined to developed countries and the governing elites of developing countries, is becoming a mass phenomenon in an increasing segment of the developing world. Most sub-Saharan African elites have now joined the consensus, as has the majority of the population in East Asia. This, in a world of ever more comprehensive communications, is likely to lead to an extraordinary degree of globalization of fertility behavior.

SYNTHESIS

The revolution of the early 1960s in attitudes toward population growth, family size, the virtues of reproducing, and the type of contraception used met all three of Coale's (1973) prerequisites, and fertility fell further in developed countries and began to fall in developing ones. Fertility came increasingly within the calculus of conscious choice. There were real or supposed economic advantages in reducing fertility in developing countries and, in the West, major social advantages for women. More effective techniques of fertility reduction became available—with the advantage, particularly in developing countries, that lower levels both of spousal communication and of sustained will were needed to make them effective.

The Appendix Table illustrates an innovational wave of new fertility attitudes and practices that began to gain momentum in the 1960s. Eastern Europe, which had still not become part of the global culture of reproductive attitudes because of communication barriers, was an outlier with fertility behavior influenced mostly by the availability of abortion and the shortages of housing and consumer goods. Similarly, somewhat isolated Malta and Cyprus can be seen as belatedly moving toward the lower fertility levels of the rest of Mediterranean Europe.

In the West the timing of fertility decline was predictable. First came the United States, where the new contraceptives had been invented and where the debates about both population explosion and women's roles had been loudest. Then followed those countries most closely bound up with the United States through the influences of media and communication: other English-speaking countries of overseas European settlement, Scandinavia, and the Netherlands. The rest of

continental Europe lagged further (as they also did in the use of the new contraception). Finally, Mediterranean Europe hardly changed, evidence perhaps of the different position of women. This is particularly ironic given the extremely low fertility that Spain, Italy, Greece, and Portugal were to attain at the close of the twentieth century.

In Asia, again excluding the Soviet Union, change came first to free-market city-states. The larger countries with national family planning programs did not, with the exception of South Korea, achieve 10 percent fertility declines until the 1970s. The same was true of North Africa. In sub-Saharan Africa, only in South Africa with its ruling white minority can the family planning association and government program provision of the new contraceptives be compared with the situation in Asia, and there the onset of the fertility decline occurred in the 1960s. Finally, the fertility of the indigenous minorities fell at much the same time as did that of the majorities in the English-speaking settlement countries, in complete contrast to the situation during the preceding three-quarters of a century, evidence that the first of Coale's three stipulations had been met.

The global fertility decline between 1960 and 1980 is summarized in Table 11.3, a condensation of the information provided in the Appendix Table 11.A.1. The decline began in countries with almost 80 percent of the world's population. Three-quarters of them lived in countries that had never previously experienced a fertility transition.

Table 11.3. Number of Countries in Various Regions and Number of Indigenous Minorities Whose Fertility Had First Fallen by 10 Percent, by Quinquennium

Region	1960–65	1965–70	1970–75	1975–80	Later or not at all
"West"	2 (8%)	8 (31%)	9 (35%)	4 (15%)	3 (11%)
Eastern Europe	5 (25%)	8 (40%)	1 (5%)	0 (0%)	6 (30%)
Asia	1 (3%)	12 (33%)	5 (14%)	6 (17%)	12 (33%)
Arab Southwest Asia and North Africa	0 (0%)	0 (0%)	4 (27%)	4 (27%)	7 (46%)
Latin America and Caribbean	1 (3%)	8 (26%)	10 (32%)	8 (26%)	4 (13%)
Sub-Saharan Africa	0 (0%)	1 (2%)	0 (0%)	1 (2%)	44 (96%)
Pacific islands	2 (25%)	1 (13%)	3 (37%)	0 (0%)	2 (25%)
Indigenous minorities[a]	1 (25%)	2 (50%)	1 (25%)	0 (0%)	0 (0%)

[a] See Table 2.

Note: Figures in parentheses indicate percent of countries in region in each quinquennium and in column "Later or not at all."

Source: See Appendix Table 11.A.1.

Appendix Table 11.A.1. Quinquennium in Which a Country First Recorded a Total Fertility Rate 10 Percent Below its TFR in 1955–59

Region	1960–65	1965–70	1970–75	1975–80	Later or not at all
"West"	Malta United States	Australia Canada Cyprus Denmark Finland Iceland Netherlands New Zealand	Austria Belgium France Germany[a] Luxembourg Norway Sweden Switzerland United Kingdom	Israel Italy Japan Portugal	Greece Ireland Spain
Eastern Europe	Bosnia and Herzegovina Macedonia Poland Slovakia	Albania Belarus Czech Rep. Lithuania Moldava Russia Ukraine Yugoslavia[a]	Croatia		Bulgaria Estonia Hungary Latvia Romania Slovenia
Asia	Singapore	Armenia Brunel Georgia Hong Kong Kazakhstan Korea (South) Macau Malaysia Philippines Sri Lanka Turkey Turkmenistan	Azerbaijan Cambodia China Indonesia Thailand	East Timor India Korea (North) Kyrgyzstan Myanmar Uzbekistan	Afghanistan Bangladesh Bhutan Iran Iraq Laos Maldives Mongolia Nepal Pakistan Tajikistan Vietnam
Arab Southwest Asia and North Africa			Bahrain Egypt Lebanon Tunisia	Kuwait Morocco Qatar U.A.R.	Algeria Gaza Strip Jordan Oman Saudi Arabia Syria Western Sahara Yemen
Latin America and Caribbean	Netherlands Antilles	Bahamas Barbados Brazil Chile	Colombia Dominican Rep. Ecuador El Salvador	Bolivia Cuba Haiti Honduras	Argentina Belize Guatemala Uruguay

Appendix Table 11.A.1. (Continued)

Region	1960–65	1965–70	1970–75	1975–80	Later or not at all
		Costa Rica Martinique Puerto Rico Trinidad and Tobago	Guadeloupe Guyana Panama Paraguay Suriname Venezuela	Jamaica Mexico Nicaragua Peru	
Sub-Saharan Africa		South Africa		Zimbabwe	All other 44 sub-Saharan African countries
Pacific islands	Fiji New Caledonia	Guam	French Polynesia Samoa Vanuatu		Papua New Guinea Solomon Islands
Indigenous minorities	American Indians	Canadian Indians New Zealand Maoris	Australian Aborigines		

[a] Territory as of 1998.

Source: United Nations 1999.

Four points of importance should be reiterated.

First, the post–World War II struggle to contain population growth affected the industrialized countries as strongly as the developing countries. In the richer countries low fertility was legitimized as never before. New contraceptives, developed primarily for the poor world, had their earliest impact on the rich world. The development of a near-certainty in fertility control allowed the development of new ways of life, new roles for women, and new types of union. The movement of women into the work force accelerated. The legitimation of low or zero fertility and of the new contraceptives almost certainly quickened changes that would otherwise, driven by economic change, have happened more slowly. Indeed, fertility in the United States first fell in 1958, two years before the advent of the pill, but it would probably not have fallen so soon without the legitimation of low fertility.

Second, the onset of fertility decline among indigenous minorities, after generations of ignoring demographic trends in the majority populations, must owe a good deal to the new contraceptives. None of these minority populations would be disconcerted if their proportions of the total populations rose.

Third, the demographic events of the 1960s and 1970s were at least partly the result of the globalization of fertility attitudes and behavior. The attitudes of the West converted developing-world elites. That and the availability after 1960 of the new contraception began the conversion of the populations at large. Globalization has proceeded apace since 1960. It is partly an awareness of this that has prevented Western countries with below-replacement fertility levels (or even declining

population numbers as in parts of Europe) from following the precedents of the 1930s and adopting policies aimed at raising fertility levels. Certainly, any future adoption of such policies is likely to influence the attitudes of developing-country governments.

Fourth, the population activism in the developed world over the last half-century has had as strong a demographic impact on developed as developing countries. The developed countries' crusade was directed outward but they could hardly be insulated from it. Furthermore, the first countries to experience the fertility decline were those that had been most active in its promotion: the United States, the other English-speaking countries of overseas European settlement, Scandinavia, and the Netherlands.

Finally, the central proposition of this chapter is that the simultaneity of the developed- and developing-country fertility transitions after 1960 is so striking that adequate demographic theory must cover both and find reasons for change at that time that cover the experience of both types of societies. It is hard to overlook for inclusion in such theory the new egalitarian contraceptives and the legitimization of small family size and limits to national numbers.

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ENDNOTE

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CHAPTER 12

SOCIAL UPHEAVAL AND FERTILITY DECLINE[1]

A significant theme in fertility transition theory is that family size tends to be larger than child mortality levels and material conditions would necessitate. This is explained by the persistence of cultural supports or "props" fashioned in an earlier era and implies that fertility is likely to decline if there is a major social upheaval such as is constituted by a revolution or defeat in a total war. The proposition has recently been put forward with regard to the French and American Revolutions. This article examines thirteen major upheavals, most in Europe, and finds support for the thesis that they are accompanied by unusual fertility declines. Less support is found for the proposition that the explanation is the weakening of now outdated cultural forces. Rather, the demographic change seems to involve a transition from fertility levels appropriate to earlier material conditions to ones suited to the new situation. The one factor that is common to all upheavals is an uncertainty about the future and a desire to postpone irreversible demographic decisions until the situation is clearer. Among those countries already undergoing a fertility transition, fertility levels do not return to precrisis levels, although the subsequent rate of decline is usually slower than during the crisis.

INTRODUCTION

An important, but little researched, theme in demographic transition theory is that of transition, especially fertility transition, lagging for cultural reasons behind changes in material circumstances. A subtheme is that of the lag time being shortened by social upheaval challenging the cultural retardants and thus causing demographic behavior to catch up with economic and demographic reality. This article examines the apparent demographic impact of deeply traumatic events in societies nearing or experiencing fertility transition to determine whether there is a close relationship. It does not aim at showing that the causes of all steep fertility declines are such events.

The cultural support for high fertility, even if not wholly or any longer economically rational, was central to Notestein's theory. Some of his followers were to speak of cultural "props." Notestein,[2] in a key passage in his seminal paper "Population—The Long View," wrote, "Any society having to face the heavy mortality characteristic of the premodern era must have high fertility to survive. Their religious doctrines, moral codes, laws, education, community customs, marriage

habits, and family organizations are all focused toward maintaining high fertility. These change only gradually and in response to the strongest stimulation." He described a population evincing fertility decline as one "increasingly freed from older taboos and increasingly willing to solve its problems rather than accept them."[3] At a 1952 conference, he argued that "these arrangements [i.e., the cultural props] . . . are strongly supported by popular beliefs, formalized in religious doctrine, and enforced by community sanctions. They are deeply woven into the social fabric and are slow to change."[4] Clearly, however, some circumstances were likely to be more propitious than others in hastening change.

Caldwell,[5] examining what he regarded as the surprisingly late fertility decline in Victorian England, concluded that the advent of the decline had been postponed both by an inability of partners to discuss contraception and by the related failure to invent and market suitable contraceptives, a situation brought about by an adherence to what was perceived as Christian family morality. Admittedly, doctors' warnings based on inadequate science played a role, but this was merely another cultural prop and, in most cases, arose from the same religious stance. Eberstadt,[6] in his paper on "Demographic Shocks after Communism," wrote, in explanation of steeply declining birth and marriage rates (and some rising death rates) during Eastern Europe's withdrawal from communism in the 1990s, "the transition to a liberal market order might be expected to entail far-reaching, often traumatic adjustments." Standing[7] charged that this had been the international agencies' deliberate policy in that they fostered "shock therapy" for previously "overprotected populations." In contrast, Victorian England had suffered no traumatic experience.

Marwick[8] concentrated on the social and demographic change resulting from wars and their often accompanying revolutions, focusing on the impact of two world wars on Britain, France, Germany, and Russia. He argued that "total war" rapidly changed societies because of its destruction, economic stresses, and challenges; the subjection of individuals to new social experiences; and the psychological impact of being caught up in such an enormous social convulsion.[9] He reported that such wars were for many, especially those in refugee streams, traumatic.[10] He had argued earlier that, as a result of the First World War, "The world, and women, had changed,"[11] and that war had altered British sexual and reproductive morality. There was a new understanding of premarital sex when the male partner was headed for the front.[12] The government agreed, and by late 1914, it was prepared to recognize for the purposes of allowances to combatants' dependants, not only wives and legitimate children, but unmarried female partners and their children by the combatants if a home had been kept. The result was that "in various ways the war marked a loosening of the standards of conventional morality. In February 1918 the National Council for the Unmarried Mother and Her Child was founded. After the war, Marie Stopes and her disciples set up [Britain's] first birth control clinic."[13]

The ideas of props and lags underlie some of the central themes of contemporary family planning demographic theory with its resort to concepts of "the crystallization of contraceptive demand" and the related "unmet need."

The issue has been brought back into the limelight by a recent article in *Population* by Rudolph Binion,[14] which claims to be able to show scientifically that the world's first two fertility transitions were initiated by the dissolution of materially irrational supports for high fertility in the furnaces of the French and American Revolutions. Binion's article provides the mainspring of this article, and it and the French Revolution are discussed below in some detail. This is the starting point for an investigation of a wider range of social upheavals to find their relations to demographic change. Two points might be noted. The first is that both Binion[15] and Marwick[16] charge that social historians and demographers are so committed to showing that demographic change is driven by long-term, especially economic, movements that they recoil from suggestions that short-term human experience could play a significant, even a triggering, role. It is said that the historians and demographers seek to show that their disciplines are scientific, with interpretations unmarred by capricious change and unforeseeable events. The second point is that the focus is on secular fertility decline and ignores the impact of social crisis on low-fertility societies in changing factors that may ultimately raise fertility: such as the argument that the First World War produced younger marriages in Britain[17] and that in the West, particularly in English-speaking countries, the Second World War fostered, especially in its aftermath, younger and more universal marriages that made a major contribution to the "baby boom."[18]

To select the appropriate cases of social upheaval, we used standard global and European histories, as well as the works of "upheaval" political scientists, especially Zimmerman,[19] who described these periods as being "crises of legitimacy," and Goldstone,[20] who uses the term "state breakdown." Goldstone has strong demographic interests, but his approach (like that of Boserup[21]) is of "independent movements of mortality" leading to increased population growth and population pressure on resources that in turn produce both social upheaval and greater fertility control.[22] From these sources and from agreements in choice between lists drawn up independently by four different persons, we selected for study (1) England, 1642–66 (civil war, republican Commonwealth, and early Restoration); (2) France, 1789–1804 (revolution and early Napoleonic period); (3) Russia, 1914–22 (war, revolution, civil war, and external intervention); (4) Germany, 1914–24 (war, revolutionary circumstances, and early Weimar Republic); (5) Austria, 1914–24 (war and dissolution of the Austro-Hungarian Empire); (6) Spain, 1936–42 (civil war and dictatorship); (7) Germany, 1939–50 (war and occupation); (8) Japan, 1939–54 (war and occupation); (9) Chile, 1973–78 (military coup and dictatorship); (10) Portugal, 1974–85 (revolution and aftermath); (11) Spain, 1977–85 (Franco's death and move to democracy); and (12) Eastern Europe from the late 1980s (from communism to a market economy). We omitted the American Revolution, 1775–83, because of lack of fertility data and skepticism about the validity for it of the Binion thesis of social revolution there. However, new data and analysis[23] have allowed us to supplement the previous work by adding (13), the American Civil War. The least agreement was on the inclusion of Portugal and especially Spain, with their relatively mild experiences, but these experiences

occurred at a time when fertility was probably sensitive to relatively mild social shocks.

BINION AND THE FRENCH AND AMERICAN REVOLUTIONS

The French fertility experience over the past 220 years is of central importance to fertility transition theory, and accordingly a great deal of effort has been put into its reconstruction, even though fully published vital registration data are available only from 1806 and nationally standardized censuses only from 1831. Bourgeois-Pichat[24] used these data and less certain earlier census and registration statistics to construct a national estimate starting from 1770. The analysis of parish registers in research at INED[25] (the French Institut National d'Études Démographiques) centering on Louis Henry[26] allowed reconstruction to begin at 1740. Van de Walle[27] reconstructed the female population from census data at the *département* level from 1831. This was done as part of the Princeton University Office of Population Research's European Fertility Project (his estimates form the French segment of the final statistical compilation[28]) and allowed the Princeton indices, overall fertility (I_f), marital fertility (I_g), and proportions married (I_m) to be calculated every five years from 1831 until 1901. Thus, for the first time, there was a whole series attempting to separate the different components of fertility: age-specific female fertility levels and the proportions of females married at each age. Weir[29] drew on INED[30] data and the lessons learnt from "the flurry of methodological discussion that followed the publication of the *Population History of England*"[31] to produce a series of all Princeton indices from 1740 to 1911. Bonneuil[32] reconstructed overall fertility, placing a different stress on mortality data and assumptions, to produce an I_f series from 1806 to 1911.

The Weir series provide the only comprehensive picture of the components of fertility from the high and fairly stable fertility of the mid-eighteenth century to the low fertility of the early twentieth century and accordingly were eagerly seized on for interpretation by Binion[33] and others. Before we examine Binion's interpretation, we should add some cautionary notes about the extent to which the figures represent underlying reality and about the patterns observed in them.

For 1831, the date when overall fertility can first be compared between van de Walle, Weir, and Bonneuil, Bonneuil estimates I_f as .369, Weir as .318 or 14 percent lower, and van de Walle as .297 or 20 percent lower. Not surprisingly, the three series diverge more as one moves earlier in time. These differences are not insignificant, given that Weir's I_f falls only 16 percent in the first twenty years after the Revolution and little more over the first forty years. When we turn to marital fertility (taken by the Princeton project to be the real measure of fertility transition), we are in greater difficulties because of the quality of the marriage data, and accordingly, even from 1831, there are only two series to compare. For that year, Weir's I_m (.471) is 8 percent below that of van de Walle (.514), and his I_g (.627) is 17 percent higher than van de Walle's (.537).

When van de Walle's book[34] was published, it appeared to show that the French had experienced not one fertility decline but two, with marital fertility in 1841 ($I_g = .526$) level with that of 1886 ($I_g = .527$); between was a dip and a recovery, the latter so prominent in parts of France as to be described as a "ski jump."[35] Using this analysis, Caldwell[36] wrote that what had happened between the late eighteenth and nineteenth centuries "was probably distinct from what was to occur towards the end of the century, when France fully participated . . . in the general fertility transition." Wrigley[37] exhaustively and elegantly argued that the French fertility transition was best treated as two distinct declines (as opposed, he noted, to the conclusions of Knodel and van de Walle[38]), that "nuptiality and fertility must have been sensitive . . . to each other's trends, and jointly sensitive to mortality change," and that higher numbers of surviving children must have encouraged stopping behavior, and possibly spacing.[39]

The picture presented by Bourgeois-Pichat[40] was of high pretransitional fertility (a total fertility rate above five), falling consistently from around 1770 to 1910 with a steeper decline only during the 1790s and a somewhat slower fall between 1850 and 1875. Weir's[41] I_g series remained constant between 1744 and 1788, fell rapidly between 1788 and 1801 (19 percent at an annual linear rate of 1.5 percent), fell more slowly between 1801 and 1872 (24 percent at 0.3 percent per annum), and then fell more rapidly between 1872 and 1911 (38 percent at 1.3 percent per annum). His I_f trends were closer to Bourgeois-Pichat's because of marriage changes, but this did not affect the picture of marital fertility transition. The new interpretation appeared to show that the start of the marital fertility decline began no earlier than the Revolution and that, in the period between the first and second steep declines, there was a slower but continuing decline.

A possible interpretation is that high fertility was a modest problem in the late eighteenth century and was brought more into line with economic reality by the challenge, during the revolutionary years, to old customs and especially to institutional religion; that the subsequent slower decline showed that the French had learnt the lesson of controlling family size to conform with modest socioeconomic change; and that France, like other Western countries, felt the full force of more rapid change, especially the move toward universal schooling, from the 1870s. Certainly France fully participated in the general Western fertility decline, with its I_g falling 33 percent between 1881 and 1911 compared with 31 percent in England during those years. The ability of France to sustain such continuing fertility declines is partly explained by its prerevolutionary levels when its I_g at over 0.8 was 20 percent higher than England's at around 0.675, the latter stable back from 1881 to 1851 and presumably about the same level in the eighteenth century.[42] Indeed, France's level of marital fertility did not fall below that of England until after 1820, well after the end of the revolutionary decline. There were, then, suitable data here for Binion[43] to grasp.

But is the same true for the United States? It could easily be argued that there was a war of independence rather than a revolution and that the social revolutionary experience was largely confined to New England in the 1770s. Certainly,

Christianity and other moral foundations were not attacked. The more serious argument is that we simply do not know the levels and trends of American marital fertility in the late eighteenth and early nineteenth centuries. Binion relies on a single source, Coale and Zelnik,[44] who attempted a total fertility rate estimation of the white population from 1800 onward, without an explanation of how the estimates earlier than 1855 were obtained (except that they were close to those of Thompson and Whelpton,[45] which were based on the reverse survival of zero- to four-year-olds in the censuses), and no estimate at all of marital fertility, for which good national data were not available until the twentieth century. Smith,[46] an important source for the thesis of an early American marital fertility decline, and an important influence on Binion, also drew his evidence solely from Coale and Zelnik,[47] although he referred to "the consensus among demographers and family historians" on this issue.[48] While in Europe there was a close connection in the movement between overall fertility and marital fertility, this was not true in English-speaking countries of overseas European settlement as frontier conditions, with very high proportions of women married, passed into history. Coale and Zelnik,[49] Jones,[50] and Caldwell[51] have all drawn attention to the extraordinary similarity between various fertility measures for the United States and Australia where data exist for both countries. For earlier years, Australia's I_g was stable up to 1881, in spite of steeply failing I_f and I_m indices and a substantial urban-rural I_g differential. This suggests that we had no evidence for declining American marital fertility in the late eighteenth and much of the nineteenth century and that studies of the demography of nineteenth-century northeastern American urban areas did not provide an adequate picture of national fertility trends.

The major problem is, however, Binion's analytical method, which cannot be justified. Having decided that the French and American marital fertility declines were the only two early national fertility transitions, he found that they had only one element in common and hence that it must be the sole causal factor:

> Two almost identical and simultaneous historical trajectories, two radical changes to behavioural norms in the two revolutionary countries of the period, countries which saw themselves as belonging to a community of enlightened minds and sharing a belief in mankind's ability to cast off the servitude of the past and recreate a world in which to live in happiness: those twin developments, expressions of the same transforming impulse, were at the bottom one and the same.[52]

This goes further than Shorter's[53] claim that North American fertility control can be explained because its societies were "born free." In the case of France, Dupâquier[54] much more carefully supported the argument: the Revolution "apparently contributed to accelerate (or even perhaps ignite) what is called, with some exaggeration, the demographic revolution."

Can this be the whole story for France once we have relaxed the condition that causal factors must exist in common with the United States?

One possible additional factor is the mortality rate: France's life expectancy at birth was five years less than that of England and Sweden in the 1780s but had caught up by 1820; similarly, infant and child mortality were much higher in France before the Revolution than in Sweden or England, but the gap had largely closed by the mid-nineteenth century.[55] The problem is that mortality and fertility fell together, and it is hard to determine which was the driving force and which was most closely related causally to the experience of Revolution. Dupâquier[56] concluded that the fall in child mortality could be explained by neither medical nor economic progress but that "everything shows that attitudes of adults toward children were changing: children were more welcome and subject to better care. These attitudes did not, however, exclude the beginning of the voluntary restriction of births—quite the contrary." He cited Ariès[57] as having the key to the mystery with his explanation that the family turned in on itself and became more interested in its children and the children's progress. This was a process that could easily be accelerated by revolutionary times. Alternatively, in perilous times, parents may merely have become more cautious and careful,[58] although the Revolution made marriage easier[59] and I_m increased by 5 percent over a decade.[60] The result of countervailing movements in mortality, nuptiality, and marital fertility was an extraordinary stability in the net reproduction rate.[61] The balance of opinion is that the Enlightenment had encouraged better spousal and parental relations and that the Revolution had hastened the process without, however, gaining for women a more recognized place in the outside world.[62] There is consensus that the demographic change was not the product of fast economic growth or early industrialization, neither of which was apparent.[63]

There remains the question of legal and institutional factors. One of the principal dicta of the Princeton European Fertility Project was that the communication of fertility control ideas, and consequently practice, halt on linguistic borders,[64] and yet the project's maps show that the French fertility decline occurred within its political boundaries, not even penetrating the Belgian border where there was no linguistic difference with Wallonia.[65] Nor was Wallonia poorer, for its industrial revolution preceded that of France.[66] The widely suggested answer is the enforcement within France, but not Wallonia, of partible inheritance laws threatening the patrimony, whether agricultural or urban businesses, with division, diminishing the worth of single properties and even causing their disappearance. Outside Europe this threat, in the great agrarian societies of Asia, is the only force that has substantially reduced family size, albeit in a way that yields a stability and not a continuing progression to ever-smaller family sizes.[67] The move to universal partible inheritance in France was legislated in 1790 and 1793, to be largely sustained, although in a modified form, in Napoleon's civil code of 1804.[68] The problem with this analysis is, according to Flandrin[69] and Goody,[70] that by 1789, partible inheritance existed only in southern France where the written or Roman Law prevailed, while fertility decline was to be just as conspicuous in the north. This objection is not necessarily insuperable because it may overstate the homogeneity of inheritance customs in the north. Howell[71] described unigeniture

(the endowment of one son, not necessarily the elder) as having been most common there in open-field lands where a manorial system had developed, and Ladurie,[72] drawing on Yver,[73] described northern and central France as consisting of a patchwork of customary inheritance law, with most societies allowing, but not mandating, unigeniture. Wallonia had long practiced primogeniture, and that institution seems to have survived the French annexation of Belgium, 1794–1814.[74]

Whatever the institutional changes, Binion is probably right that the social changes wrought by the Revolution were so great that they made sufficient sexual and reproductive change possible as to accommodate marital fertility to both material change and new laws and institutions. Just how marital fertility was controlled is still debatable. Sauvy[75] thought that methods worked out among a licentious aristocracy around the premier court in Europe subsequently played a role in the larger community, although it is not clear what those methods were. Coitus interruptus is usually assumed to be the main method. Even van de Walle and Muhsam[76] favor it as the main strategy within marriage, while believing other sexual practices probably predominated outside marriage. Sexual abstinence, especially terminal abstinence, was probably also used: this is suggested by the facts that between 1740–90 and 1790–1820, women's age at last birth declined by 2.6 years to 36.7 years (a decline paralleled in England at the same time), and that the average period from marriage to last birth declined to 10 years, a reduction of 3.3 years, compared with only 1.2 years in England.[77]

We will now turn to the listed social convulsions involving successful revolutions, civil wars, or defeat in war and national dismemberment. No other was quite as tumultuous as the French Revolution, and only the Russian Revolution involved a similar attack on religious belief and organization. We will look for parallels to the French demographic experience, although none has been so intensively researched.

FERTILITY AND THE GREAT SOCIAL UPHEAVALS

Table 12.1 examines trends in fertility for thirteen major social upheavals for the period of greatest social disruption or change. Then, for periods of the same duration before and after that of upheaval, the fertility trend is calculated. The broadest comparison can be made only by resort to crude birth rates, most of which are available in the work of Mitchell.[78] Over the short periods examined, this overall fertility measure is not greatly affected by changes in the age structure but is sensitive to marriage change, the latter being almost inevitable in times of social upheaval. The selection of Eastern European countries for recent years is almost random, since all of them show similar fertility movements.

The most striking feature of Table 12.1 is that all periods of upheaval were associated with substantial drops in the birth rate, ranging before the 1990s from 12 to 37 percent. The tumultuous political and social changes in Eastern Europe at the end of the twentieth century were responsible for greater fertility declines still, up to 50 percent and even higher. A second feature is that the upheaval

Table 12.1. *The Fertility Experience of Countries Experiencing Major Social Upheavals*

Country	Upheaval	Period[b]	Crude Birth Rates (CBR)		Change in CBR (%)[a]			Annual Linear Decline during Period (%)
			Start of Period	End of Period	Before Period	During Period	After Period	
England	Civil War, Commonwealth, and Early Restoration	1641–66	32.4	26.8	−1.0	−17.3	+6.0	−1.2
France	Revolution	1787–1804	40.4	31.3	+2.9	−22.5	−0.3	−1.3
USA[c]	American Civil War	1860–70	46	40	−2.9	−12.8	−4.9	−1.3
Russia	WWI and Revolution	1913–21	43.1	32.6	−4.2	−24.4	+35.9	−3.1
Germany	War, Revolution, Defeat, Inflation	1913–24	27.5	20.6	−21.7	−26.1	−8.3	−2.4
Austria	War, Defeat, Empire Dismembered	1913–24	29.7	21.7	−19.3	−26.9	−39.6	−2.4
Spain	Civil War and Dictatorship	1935–42	25.7	20.2	−11.7	−21.4	+6.4	−3.1
Germany	War, Defeat, Occupation	1938–50	19.7	16.3	+0.5	−17.3	+9.2	−1.4
Japan	War, Defeat, Occupation	1940–55	29.4	19.4	−15.8	−34.0	−2.6	−2.3
Chile	Military Coup and Dictatorship	1972–78	27.4	21.3	−11.3	−22.3	+4.2	−3.7
Portugal	Revolution	1973–85	19.2	12.8	−21.6	−33.3	−10.9	−2.8
Spain	Dictatorship to Democracy	1976–85	18.8	11.8	−8.7	−37.2	−17.8	−4.1
Eastern Europe	Communism to Capitalism	1986–98						
	Russia[d]		20.0	8.8	+11.1	−56.0	—	−4.7
	Poland[d]		17.0	10.2	−7.7	−40.0	—	−3.3
	Czechoslovakia (Czech Republic)[d]		14.2	8.8	−28.6	−38.0	—	−3.2

Source: L. Henry and Y. Blayo, "La population de la France de 1740 à 1860," in *Démographie Historique*, supplement to *Population* 30 (1975): 71–122; B. R. Mitchell, *International Historical Statistics: Africa, Asia and Oceania, 1750–1993* (London: Macmillan, 1998); B. R. Mitchell, *International Historical Statistics: Europe, 1750–2000*, 5th ed. (Basingstoke, UK: Palgrave Macmillan, 2003); E. A. Wrigley and R. S. Schofield, *The Population History of England, 1541–1871* (London: Edward Arnold, 1981); J. D. Hacker, "Rethinking the 'Early' Decline of Marital Fertility in the United States," *Demography* 40 (2003): 605–20.

[a] Over same number of years as the duration of the upheaval.

[b] Beginning one year before upheaval.

[c] CBR read off graph. Rates are for white population only.

[d] Selected cases but typical of the region.

fertility declines were greater in every case than declines in equal periods before the crises and in all but one case after them. Indeed, in some cases, there were in these comparable periods rises in fertility, which in the case of Russia in the 1920s completely offset the impact of war and revolution. Certainly, in all cases the fertility decline was substantial and often, but not always, involved changes in levels of both marriage and marital fertility. The exceptions are the two earliest upheavals: the seventeenth-century English fertility decline is explicable almost entirely by delayed or forgone marriage, in contrast with the French revolutionary period for which marital fertility decline supplies almost the whole explanation.

Other social upheavals were examined but then excluded, mostly on the grounds of inadequate data. This was the case in Asia with India and Pakistan in 1947 (partition), Korea in 1950 to 1953 (war), Indonesia 1965 (military coup) and 1998 onward (economic collapse and fall of dictatorship), and Bangladesh 1970 (war and separation from Pakistan). For the Asian countries, the evidence is that there was no significant fertility decline immediately around the time of the crisis. That was to come later with the establishment of national family planning programs, their existence usually owing something to the earlier upheavals. In Europe, France had no significant fertility decline attributable to either world war, and Britain had none associated with the Second World War. However, the crude birth rate in England did fall during and after the First World War, although less steeply than in Germany and Austria. More significantly, the fertility decline during this period was hardly distinguishable from England's general fertility transition, with the birth rate falling in three successive nine-year periods by 16 percent in 1904 to 1913, 22 percent in 1913 to 1924, and 23 percent in 1924 to 1933.

Table 12.2 allows the comparison of revolutionary France with the first German social upheaval as well as allowing separate measures of movements in marriage and marital fertility. It was originally intended to include Russia as well, but the only index calculations available for it before the revolution are twenty years earlier. It is now possible to include for the United States during the Civil War the all-important marital fertility rate.

In France, between 1788 and 1804, marriage showed little variation, although it did change later. Thus, the I_g changes are similar to the I_f changes, and both can be compared with the movements in the crude birth rate shown in Table 12.1. By these measures, the fertility impact of the French Revolution is less than most of those induced by the social upheavals: perhaps more evidence that fundamental family changes, those relating to the cost of children, were not yet under way in France. This contrasts with the situation during and after World War I in Germany, where marriage change was substantial, although still not comparable with that of marital fertility, in engineering the fertility decline.

We can now proceed by briefly examining individual countries, with the exception of revolutionary France, which has already been treated.

Table 12.2. Fertility Experience of Two Countries Experiencing Major Social Upheavals (Princeton Indices)

		I_f Change (%)			I_g Change (%)			I_m Change (%)		
Country	Period	Before Period[a]	During Period[a]	After Period[a]	Before Period	During Period	After Period	Before Period	During Period	After Period
France	1788–04	−1.4	−17.7	−0.7	+3.9	−19.1	0.0	−1.5	−0.4	−2.9
USA	1857/59–1867/69				−3.7	−12.4	−2.6			
Germany	1913–25[b]	−16.4	−40.9	−15.1	−16.4	−38.5	−21.0	+2.1	−6.5	+9.0

Source: D. R. Weir, "Two Approaches to the Fertility Transition in France, 1740–1911," in *Old and New Methods in Historical Demography*, ed. D. S. Reher and R. Schofield (Oxford: Clarendon, 1993), 145–58; A. J. Coale and R. Treadway, "A Summary of the Changing Distribution of Overall Fertility, Marital Fertility and the Proportions Married in the Provinces of Europe," in *The Decline of Fertility in Europe*, ed. A. J. Coale and S. C. Watkins (Princeton, NJ: Princeton University Press, 1986), 31–181; J. D. Hacker, "Rethinking the 'Early' Decline of Marital Fertility in the United States," *Demography* 40 (2003): 605–20.

[a] Identical periods.

[b] As close periods to those in Table 12.1 as possible.

NOTES ON INDIVIDUAL COUNTRY EXPERIENCES

England, 1642–66

The crude birth rate declined by 17.3 percent, double the fall found in Sweden, Norway, and Finland (the only other countries with fertility data) during the same years. Reconstitution studies show a decline in cumulative marital fertility of only 1.6 percent between the first and second halves of the seventeenth century,[79] while the average age at last birth fell about 1 percent.[80] The average age at first female marriage remained almost constant around twenty-six years from 1600 to 1750.[81] The decline in the birth rate in the 1640s and 1650s is almost entirely explained by a drop in the proportion of females ever marrying from around 78.6 percent in 1636 to 1640 to 75.9 percent in 1666 to 1671, although with a short-lived upswing in the early 1650s.[82] This was the last of the identified upheavals in which marital fertility remained unchanged. Wrigley and Schofield[83] noted that the preventive check continued to work "but in a different way." They were surprised that marriage was restricted and births fell while real wages were slowly rising. The answer may be that social upheaval changed attitudes, if not to fertility then to marriage and the proper standard of living, as well as increasing the feeling of insecurity.

The English Civil War did not attack Christianity itself, but almost all its separate tenets were challenged by some group or other. Hill[84] called his account of radical ideas of the time *The World Turned Upside Down.* In a series of debates, 1647–49, the Roundhead army camped around London debated the new world order, bringing up almost every political issue of the coming centuries, and religious and political sects went further still.[85] The only significant subjects not mentioned were the problems of large families and the need to control their size. This may well have been because in an era when children were subject to high mortality with the survivors being put out to work early, they presented no burden. Nor, with primogeniture operating, did they represent a threat to the patrimony. The situation was not one of stationary population; indeed, there had been a doubling over the previous 120 years, a situation Stone[86] took to be the critical causative factor of social and political upheaval at the time. And the situation was not one where the family was unchanging. Bridenbaugh,[87] in *Vexed and Troubled Englishmen, 1590–1642*, stressed the changing nature of the family, propelled by the Protestant and Puritan emphasis on its being "a church." Hill[88] attested that the concepts of the family being a spousal partnership, the abhorrence of chastity, and the attack on the sexual double standard all grew out of Puritanism.

Women, women's issues, and sexuality were not major concerns of the period and are barely mentioned in such histories of the time as Woolrych's *Britain in Revolution.*[89] Nevertheless, such groups as the Ranters and the Quakers debated the questions of women's freedom, even their sexual freedom.[90] There were advocates of sexual freedom, but this "tended to be freedom for men only so long as there was no effective birth control. This was the practical moral basis to the

puritan emphasis on monogamy."[91] Even these more sexually liberated groups did not raise the issue of marital fertility control, good evidence that there was little demand for it and little fear of large families even among the minority of parents who had an exceptional number of surviving children.

United States of America, 1860–70

The civil war in the United States raged from 1861 to 1865. Like all civil wars, it was a deeply scarring event, compounded in America's case by the high number of combatant deaths, proportionately greater than the country's combined loss in the two world wars of the twentieth century. America's proportions married almost certainly declined throughout the nineteenth century, and one might expect a steepening decline during the civil war to be the major factor in a marked fertility decline. That this was not the case is shown by a comparison between Tables 12.1 and 12.2. The decline in marital fertility approximately equaled that of overall fertility (as measured by the crude birth rate), implying little change in marriage between 1860 and 1870. Hacker[92] concludes that the beginning of "the decline in marital fertility should perhaps be dated to the 1865–76 period." Certainly, the total marital fertility, close to 8.0 in the late 1850s, was never to be as high again.[93] Two points might be made. The first is that there seems to be no reason for assigning the beginning of the decline to the late 1860s rather than to the war period itself. The second is that American marital fertility decline probably started a few years before that of England. Given that the American cultural change may have required the challenge to accepted concepts arising from a massive internal war, it is astonishing that the British decline began so shortly afterwards and, if conventional wisdom is right, requiring only the spur of the 1876 Bradlaugh-Besant trial.

Russia, 1914–22

The Russian crude birth rate was fairly stable in the mid- to upper 40s before 1914. Then it progressively fell to near 30 in 1920, almost recovered its earlier levels by 1925, then moved downward in the 1930s.[94] Coale et al.[95] showed that by 1897, marital fertility had begun to decline in the urban population, while by 1926, this was also true of many rural populations. Nevertheless, for our specific period, they believed it purposeless to search for the determinants of this fertility decline because "it would be a study of pathological instances of reduced fertility rather than of the normal conditions under which fertility falls. There is the possibility, which we can only mention without judging its probability, that these prolonged traumata strongly influenced subsequent trends."[96] This perhaps also applies to the fertility decline in other cases examined in this article.

Nevertheless, the revolution was, at least in its early years, one of ideas and innovations that were not easily reversed. Marriage, sexual activity, and birth control were all matters for a flow of views during the hectic years of revolution,

civil war, and intervention. On the establishment of the Soviet Union in 1922, abortion was legalized, and provision for it was made in all hospitals and public medical clinics. Contraception was stressed in educational campaigns.[97] In Moscow, the number of abortions was only 21 percent of the number of births in 1922 but by 1934 had risen to almost three times that of births as the city's crude birth rate fell to 15 per thousand[98]. As Europe drifted toward war, the legal rights to abortion and easy divorce were cut drastically in 1936, and legal abortion fell by 93 percent. The result was a rise in the country's birth rate from 30.1 in 1935 to a peak of 38.7 in 1937, still only two-thirds of the 1913 level.

Thus, the 1914 to 1922 crisis came at a time when the fertility transition was in its earliest stage. Births were reduced during the upheaval. This experience of a demand for fertility control probably merged with revolutionary beliefs to bring about legalized abortion and an impressive fertility decline over the next dozen years. The massive resort to abortion both accustomed people to small families and ensured that there was little experience with any form of birth control other than abortion. The result, foreshadowing the Romanian experience of the 1960s,[99] was that, when access to abortion was suddenly cut off, the birth rate rose, only to be followed by a decline as a population accustomed to being able to control its fertility resorted to new methods of control.

Germany, 1914–24

Germany participated in total war from 1914 to 1918, followed by defeat, an insurrectionary period, the establishment of the Weimar Republic, and, in 1923, government-induced inflation[100] on an unprecedented scale, putting renewed pressure on many families. The 1924 birth rate at 20.6 per thousand was 25 percent below that of 1913, a linear fall over the period of 0.6 points per year. This should, however, be put in perspective: the annual linear fall during the fertility transition over the previous four decades had been 0.4 points, as Germany industrialized and infant mortality fell,[101] and it would be 0.7 points over the next decade, as Germany slipped into the Depression, which was characterized by unemployment higher than in any of the other industrialized countries.

Wilke and Wagner[102] presented evidence to show that in agricultural Germany, children worked hard and probably imposed no net economic burden until World War I, as mechanization of agriculture hardly began before the 1920s. The war brought women into the workforce in greater numbers and gave them the vote in the insurrectionary period at the very end of 1918.[103] The whole period of upheaval proletarianized and radicalized much of the middle class, especially the white-collar workers.[104] It was also characterized after the war by many unmarried young women, many young widows, and others forming a surplus in a male-deficient marriage market. Up to World War I, the government of Germany, holding a "bourgeois idea of motherhood" and concerned with defense, "sought by the suppression of knowledge and access to birth control methods, and by the active encouragement of mother and infant welfare measures, to reverse the rapid decline

in the birth rate."[105] There was a degree of sexual puritanism. This was reversed under the Weimar Republic, which was the great era of German sexual research. Indeed, the subsequent Nazi government was to charge that "unbridled sexuality" had led to a falling birth rate and a weakening of the country's moral fiber and manpower.[106]

Austria, 1914–24

Austria was hard hit by the war. The Austro-Hungarian Empire was dismembered so that post-Versailles Austria was reduced to a small core area of eighty-four thousand square kilometers with a population of little more than 6 million, of whom almost one-third lived in the now disproportionately large capital, Vienna. Defeat in the war and the loss of most of the empire were not only psychologically shattering but materially disastrous. As Austria was cut off from most of its previous food supplies, famine set in as early as 1917; unemployment, especially in Vienna, was very high because there was no longer an empire to service; there was inflation and a chaotic economy.[107] There were widespread strikes but neither revolution as in Hungary nor threatened revolution as in Germany.

Between 1913 and 1924 the birth rate fell 28 percent from 31.1 to 22.5, with an annual linear rate of decline of 0.8 points, four times that of the previous four decades and somewhat higher than in the next depression-affected thirteen years. Unlike the case of Germany, the government did not intervene to raise the birth rate during the 1930s, and no revival came until 1939 following the *Anschluss* of the previous year.

Spain, 1936–42

Spain's birth rate fell slowly but consistently for the first thirty-five years of the twentieth century from around 35 to 26 per thousand. The Republican Government of the mid-1930s was not pronatalist and did not proscribe contraception. The birth rate fell during the war as much it had during the previous three and a half decades. With victory in the civil war, the Franco government, backed by the Spanish Catholic Church leadership, passed two laws in 1941, the first banning the provision of information about contraception as well as the distribution and sale of contraceptives, and the second promoting higher fertility by assisting large families.[108] The birth rate then stabilized around 20 per thousand for the remaining thirty-six years of the regime at a similar level for most of that time to the levels found in Portugal and the Netherlands but above the fertility rate of Italy, Greece, and Western Europe generally.

Germany, 1939–50

Germany's birth rate fell only moderately as a result of World War II, exhibiting a decline of 20 percent from 20.4 in 1939 to 16.4 in 1950, back to

where it had already been in the early 1930s. Thereafter, for the next fifteen years, it changed little in either West or East Germany. During this time Germany, like other non-English-speaking developed countries, did not have a baby boom. In 1960, the crude birth rate was 17 per thousand (17.4 in West Germany and 17.0 in East Germany), a little lower than in France and the Netherlands, similar to that of Belgium, and higher than in Sweden and Austria.

Roseman's[109] explanation for the smaller impact of the Second than the First World War on Germany's demography and society is that the Nazi government deliberately shielded the German population from social stress. The leaders were reluctant to test the society, recruiting only 46 percent of women into the workforce, compared with 66 percent in Britain. They succeeded in doing so by substituting slave labor from Eastern Europe and the Balkans. Roseman[110] claimed that this achievement made it "evident that 'total war' is not an independent cause of social change." The immediate postwar period differed also from that after World War I in that military occupation held potentially disruptive forces in check, while the Marshall Plan from 1948, in the shadow of the cold war, helped rebuild the economy and achieve close to full employment.

Japan, 1939–54

Japan's demographic history is one of a delayed reaction to the war and its aftermath. The birth rate was little lower in 1940 than in 1930, 29.4 compared with 32.5, and it then remained almost unchanged during the war and for five years after it. There was a parallel in the 1930s with the demographic behavior of Japan and Germany when military-oriented governments intervened to keep the birth rate up, again during the war when the home front was shielded as much as possible, and after the war when occupation prevented social disruption and encouraged economic reconstruction. Nevertheless, social and psychological readjustment was not so easy. Although the birth rate fell by just over 1 point, namely by 4 percent in ten years from 1940 to 1950, in the next five years it was to decline by 31 percent, giving for the first time a hint that Japan might later be a leader in the new low-fertility world that lay ahead.

The Japanese fertility decline of the early 1950s was not primarily a reaction to economic growth. As measured by 1990 U.S. dollars, Japan's per capita income was around $1,700 in 1920 (half that of France, one-third that of the United States), $2,900 in 1940, $1,555 in 1946 (one-quarter of Britain's and one-third of the United States's), and not again surpassing its 1940 level until 1956.[111] The demographic reaction may rather have been one to poverty. The huge economic growth came later, taking its per capita income by the end of the century past Western Europe but still below the United States. A more relevant factor is probably mortality decline. Japan's infant mortality rate more than halved from 1940 to 1955 from ninety to forty deaths per thousand births. Its expectation of life at birth climbed from forty-nine years in 1940, and probably no higher in

1946, to sixty-one years in 1950 and sixty-five years in 1954, catching up to the West in the 1960s.

After World War II, the government believed the country's population was contracting. Then in 1949 statistics were published showing rapid population growth with projected populations becoming ever greater.[112] In 1948 the 1940 Eugenics Protection Law was revised, encouraging family planning and permitting abortion for health reasons and sterilization in the case of large families.[113] Then, in 1949, as public debate questioned whether Japan had already exceeded its carrying capacity, the law was amended permitting abortions on economic grounds, and again in 1952 allowing a single doctor to make the decision. The government made no reference to any of these measures reflecting population policies, but their enactment led to steeply falling birth rates after 1950, almost halving in the following decades. Between 1949 and 1950, the annual number of conceptions remained fairly constant at just under 3 million, but the proportion aborted climbed from 8 to 41 percent.[114] The ready acceptance of abortion by the population was doubtless facilitated by an earlier history of abortion (and infanticide) with little popular disapproval.[115] The willingness to abort was doubtless enhanced by a halving of the infant mortality rate between 1947 and 1955. Then the birth rate leveled off for twenty years before joining the global trend to much lower fertility.

Chile 1973 and Aftermath

Chile, unlike Argentina and Uruguay, experienced no marked fertility transition at the beginning of the twentieth century, but its birth rate slowly declined from around 45 per thousand at the beginning of the century to 40 in the early 1930s and 30 in the mid-1960s.[116] Thereafter, its fertility control policies differed markedly from the history of Southern and Central Europe, where hostility to antinatal policies came from the extreme right (and often Catholic) end of the political spectrum while laissez-faire policies or the support of organized family planning came from the center or left. Chile experienced three successive periods of presidential rule: that of the Christian Democrat Eduardo Frei, 1964–70; then that of the Marxist Salvador Allende, 1970–73; and then the military dictatorship led by Augusto Pinochet from September 1973 until 1990. The first was associated with widespread family planning activities associated with NGO and international organizations (favored by the Christian Democrats but opposed by the church). These activities were out of favor with the Allende regime both because of their large foreign element and because of the implication that the road to development lay through population control, which was at variance with Marxist thought. In contrast, but perhaps explained by strong American influence, the right-wing Pinochet regime moved early to create a National Commission on Family Planning and Responsible Parenthood and encouraged contraception, although being adamantly opposed to legalized abortion and divorce.[117]

Iberia, 1974–87

Around 1890, Portuguese overall fertility had been below both Spain and Italy because of substantially lower proportions of women married, but by 1960, it was the highest of the three countries, with a convergence in the proportions married.[118] Until the Portuguese revolution of 1974 and Spain's movement toward democracy following Francisco Franco's death the following year, both countries had been isolated for decades from population policy trends in the rest of Western Europe. Catholic dictators had encouraged large families and had banned not only divorce and abortion but the advertisement and sale of contraceptives. In both Portugal and Spain, the birth rates remained above or near 20 per thousand for three decades, even though by 1975, neighboring France and comparable Italy recorded birth rates around 15 per thousand. Explosively after the revolution in Portugal and a little more slowly in Spain, public discourse, especially in the now-freed media, turned to divorce, contraception, and abortion. Even in Spain the sale and use of contraceptives as well as sterilization were legalized in 1978 and abortion in certain circumstances in 1985.[119] Efforts by the left-wing and secular parties did not succeed in liberalizing Spain's abortion law or achieving any rights to abortion in Portugal. Nevertheless, by 1996, Spain recorded fifty-one thousand legal abortions per year and an abortion rate just below those of the Netherlands, Belgium, and Germany although only half those of France and Italy.[120] The demand for fertility control was undoubtedly raised by steep infant mortality declines over the previous decades: Spain's infant mortality fell by half and Portugal's by two-thirds. The need for fertility control was also felt more strongly as a result of rapid economic growth: real per capita income had grown at almost 6 percent per annum in both countries for a quarter of a century, the highest rates in Europe outside Greece;[121] and Reher[122] points to steep rises in female education and workforce participation in the 1970s.

Eastern Europe from the Late 1980s

Political change began in Eastern Europe in the late 1980s, and the Soviet Union was dissolved toward the end of 1991. From the late 1980s to the late 1990s, birth rates halved in all the ex-communist states of Europe (except in Hungary, where the fall had begun earlier) and the ex-Soviet Union's trans-Caucasian republics. In contrast, only a modest fall occurred in Yugoslavia with its different political history. By 2003, total fertility rates everywhere (except Albania) were in the range 1.1 to 1.3, among the lowest in the world, with the extent of decline in unemployment or per capita income bearing little relation to the extent of fertility decline or its ultimate level. This sudden decline was not explained by a steep fall in infant and child mortality, which had achieved their major declines by 1970. Nor was the cause a new access to birth control, as nearly everywhere access to abortion remained unchanged, as did its role as the chief means of fertility control. What had happened was a steep increase in the age of first marriage toward Western European levels and in the control of marital births, especially after the first.

Eberstadt[123] points to "traumatic adjustments," but it can easily be argued that what occurred was not an irrational reaction to fear but a rational reaction to huge changes in material circumstances,[124] although it must be emphasized that fertility reached the same low level irrespective of whether real per capita income fell or not or whether unemployment levels were modest or huge. What did occur was a loss of guaranteed lifelong employment, of subsidized purchases, and of social welfare benefits. Free medical and education services were replaced by relatively expensive medical services and education that could incur substantial costs. Sobotka et al.[125] argued that at least in the Czech Republic, material change was no more important than social, psychological, and behavioral changes of the type that had propelled the West's "second demographic transition" two decades earlier with such phenomena as increases in cohabitation, nonmarital childbearing, and the social acceptance of both homosexuality and childlessness. Even in East Germany, apparently protected by the now pan-Germanic economic and social welfare systems, analysts are unsure of the balance of responsibility as causal factors between "crisis and adaption."[126]

There was a universal surging feeling of insecurity and of not knowing what the future held. This is, of course, a standard reaction to liberal economics with its attack on continuing secure employment, but this was compounded in Eastern Europe by a profound distrust of the abilities of the new economies to grow. Certainly, much of the population is waiting to see what the future holds. Much of this waiting is demographic in that marriage is being deferred, as is childbearing within marriage. This may come to a halt if the economies begin to grow faster and to absorb more of the unemployed or if the populations become accustomed to insecure employment, short-term jobs, and other aspects of liberal economics. Alternatively, they may become accustomed to marrying and then having only one child, even if employment becomes more certain.

CONCLUSION

There are obvious omissions in our coverage: the American Revolution because of the lack of demographic data; the 1949 Chinese Revolution because there was not provable fertility change (except for the transient demographic reaction to the famine of 1959 to 1961) until the 1970s; and the Asian economic crisis at the end of the twentieth century, when Indonesia was especially hard hit, because neither the economic fallout nor the demographic effect is yet clear. The Chinese experience is, nevertheless, instructive: one of the most marked political, economic, and social changes in modern history occurred from 1949, but in spite of this and an accompanying steep decline in infant and child mortality, a pronatalist policy and a lack of access to means of birth control maintained prerevolutionary fertility levels until birth control policy and access changed, with a resultant steep decline in fertility.

The only other fertility falls in the listed countries that compared in any single case with these declines were during the early years of the economic

depression of the 1930s and after the "baby boom" in a few Western countries. No one would deny the trauma associated with the Depression, but it is impossible to cover the large number of countries affected, and in any case, the demonstration is more of the impact of an economic rather than a social crisis. Steep falls after the "baby boom" were mostly confined to English-speaking countries. One can argue that they were the product of radically new contraception or follow the second demographic transition theorists and claim revolutionary cultural change. These points are not particularly important because the aim here has been to show that the great social upheavals were almost always accompanied by the demographic change, not that they were the only cause of demographic change.

What, now, can we conclude from our case studies?

First, every social upheaval mentioned except the Chinese Revolution was accompanied by marked fertility decline over a decade or longer. This was usually in contrast to the periods both before and after the upheaval. There were exceptions to this contrast, where there were preceding marked fertility falls, although none as great as during the crisis period: Germany and Austria before World War I, Japan before World War II, and Portugal before the 1974 revolution. In all these cases, there was a fertility transition already under way but that was accelerated by the upheaval. Austria, Portugal, and Spain also had marked subsequent falls as the fertility transition continued. Only revolutionary Russia, rather surprisingly, had a full subsequent recovery of fertility, perhaps partly a catch-up effect. Indeed, in spite of access to abortion, the renewal of the Russian fertility decline awaited the 1930s and the reconstruction of the Russian economy.

Second, not only are individuals likely to change but so are governments and their legislative programs. In France, the demographic reaction was probably mostly indirect and was probably greatest in reaction to the universalization and enforcement of partible inheritance. But in Russia in the 1920s and Portugal and Spain in the 1970s, liberalizing governments deliberately made access to birth control easier and ceased pronatalist pressures and rhetoric.

Third, society itself changed irreversibly. This was certainly true in the cases of seventeenth-century England, late eighteenth-century France, early twentieth-century Russia, and mid-twentieth century Spain. It has also been true in Iberia of the 1970s and Eastern Europe of the 1990s. Less certain is the impact of the wars on central Europe, although World War II's aftermath left Germany and Austria on the frontier of the cold war and may have produced continuing apprehension.

Fourth, material conditions changed adversely. Certainly, a greater feeling of insecurity was a conspicuous feature of all those crises, except possibly the Iberian ones and nineteenth-century America outside the South. Difficulties with living a normal life, retaining housing, and being adequately fed were conspicuous features of Russia in and after the First World War, Central Europe after that war, and Eastern Europe after the fall of communism.

Fifth, the fertility declines were usually driven or assisted by other demographic changes usually not aimed at reducing fertility. Forgone and deferred

marriages drove the seventeenth-century English fertility decline, and marriage rates were not to recover for decades. Marriage delay (and probably marriage forgone) has also been a major component of the recent Eastern European fertility decline. Preceding infant and child mortality decline was probably important in Iberia, as it was, probably interacting with the fertility decline, in France.

Finally, did mindsets change, and if they did so, did this have a demographic impact? Mindsets certainly changed in the English Civil War, but it is hard to prove that this affected marriage. The convulsions of the French Revolution and the organized attack on the church and Christianity should have had an impact and may have made it easier to adjust fertility to the situation created by inheritance changes. The nature of the family and the treatment of children may have changed sufficiently to reduce child mortality and make high fertility more difficult. In Portugal and Spain of the 1970s, the popular desire to adopt the fertility control and marriage legislation of Western Europe (and that of Italy achieved without revolution) was certainly a factor, coupled with the new governments' ideologies and consequent moves in this direction. Central Europe found the wars less liberating, but neither the Weimar Republic nor the Austrian Republic was in social atmosphere the Germany of Wilhelm II or the Austria of the Habsburgs.

What is common in all cases of upheaval is not the growth of material adversity but an increase in feelings of insecurity. In every case, most of the people involved believed that what lay ahead was unknown and might be better known as time passed. There were excellent reasons for delaying marriage and family formation until it could be seen what the future was going to be like. This reaction cannot be measured by economic indices.

The analysis can be summarized as showing that pretransitional social upheavals depressed fertility for at least a period while post-transitional crises accelerated the decline. That this was partly the result of a weakening of the outdated props to high fertility is less obvious in the case of wars (the Marwick hypothesis) than in the case of revolutions (the Binion hypothesis). It is very clear that change in the individual outlook, philosophy, or worldview does not on its own depress fertility. What is effective is change in legislation or the economic and social systems that provide a different context for individual behavior. Those changes are, in a sense, the result of the sum total of individual actions, but only a minority of the population provides the ideological leadership; perhaps only a minority supports the new social directions. What dominates most situations is a feeling of personal and family insecurity and a fear of being committed to new demographic acts before it is clear what the world will be like when those acts are consummated.

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CHAPTER 13

DEMOGRAPHIC THEORY: A LONG VIEW[1]

DEMOGRAPHIC THEORY has been largely transformed over the last half-century from grand theory to short-term theory, often endowed with such immediacy as to so limit our vision of the future that even population policymaking is made difficult. Demographic theorists lost their nerve as the globalization of declines in mortality and fertility proceeded much more rapidly than they had anticipated and as the "baby boom" in a number of developed countries quelled expectations of continuing fertility decline.[2] There is a parallel here to the undermining of Malthusian theory by dramatic increases in the nineteenth and twentieth centuries in food production, a phenomenon explained by the Industrial Revolution's effects on agricultural and transport technology. Focusing on the leading countries in the demographic transition, this essay will argue that far too little attention has been paid to the nature of the economic and related social revolutions of our age and that our theoretical perspectives pay too little attention to ultimate constraints on population growth.

This essay takes as its starting point an earlier article and a rejoinder to comments on the article (Caldwell and Schindlmayr 2003, 2004). Those two pieces focused on a single but important issue, the explanations being offered for current very low fertility in modern societies, predominately in Europe, and their adequacy. No alternative explanation was offered, as is done here. Both of those articles and this one concentrate on the economically most advanced countries but imply that the rest of the world will probably eventually follow the same economic and demographic path. Although the framework for this analysis is the modes of production, attention is devoted almost entirely to industrialized society in an effort to understand the likely demographic future of such societies and the future of an eventual global industrialized society.

LONG-TERM CHANGE AND ULTIMATE CONSTRAINTS

Three basic modes of production (rather than the curious panoply of modes—Asiatic, slave, feudal, and so on—discerned by Marx) provide the schematic frame for this essay, each of them defining a social system: (1) hunting and gathering, (2) settled agriculture, and (3) industrial production. Intermediate systems such as shifting cultivation are ignored. The change in society from

agricultural to industrial production was a central focus of the first modern sociologists, Emile Durkheim and Max Weber.

The three modes of production can be thought of as (1) living off the fruits of nature, (2) home production whether on the farm or in the house, and (3) extra-domestic or industrial production (whether under free-market or socialist governments). Each produced its own type of society and level of wealth. Hunting and gathering was, in terms of worldly goods, the poorest, in spite of attempts to picture a "stone age affluent society" (Sahlins 1974). In the dangerous activities of hunting and fighting, men depended not on their relatives but on their fellow-hunters, and in the bands or hordes male bonding outside the family was the glue that kept society together and left family ties weak. Religion, in preliterate times, was commonly based on nature and sacred sites or spirits that would help the fortunes of the hunt and did little to strengthen family ties.

In contrast, settled agriculture was based on the family, either nuclear or more complex. Family members worked in the fields or transformed food and made clothing in the house and protected their property against the incursions of neighbors, and it was within their ranks that inheritance took place. Settled agriculture, especially its related commerce, led to the invention of writing and the possibility of written scriptures codifying earlier religious thought and allowing new world religions to emerge. Agriculture inevitably produced its own morality not unlike that of the modern firm—hierarchical, focused on production, and segmented (by age and sex in the case of agriculture; see Caldwell 1982b). To safeguard inheritance, members placed great emphasis on the centrality of the family, on arranged marriage within the same socioeconomic class, and on the suppression of female sexual activity before and outside marriage (Goody 1976). The morality of agriculture became the morality of the world religions to such an extent that the term "immorality" was most often identified with female nonmarital sexuality. For most of its history, agricultural production was predominately subsistence, and the associated immobility of the population tended to cement its moral and religious codes.

Sweeping changes in production based on scientific and technological breakthroughs, some going back centuries, accelerated in the nineteenth century as the Industrial Revolution took hold. Rising incomes and the concentration of capital allowed the development of larger and more complex industries based on commercial activities across the globe. Private and public savings allowed universal education and organized research to hasten further inventions. For lack of a better expression, the term "industrial society" is used here to describe the resulting social arrangements, even though, in contemporary rich populations, the proportion of the employed population working in industrial production has followed that of agriculture to very low levels.

A fully developed industrial society does not need much of the morality system of agricultural society, especially those aspects shaping the family and sexual relations. Nevertheless, there are substantial overlaps in the two societies related to both the changing mode of production and its moral code. Hunting and

gathering persisted long into the agricultural era either in the form of a separate activity or as a part-time additional activity of farmers. Similarly, family farming has persisted into the industrial era, although its economic and moral distinctiveness has been weakened by being drawn into the exchange economy and by the possibility of transferring from one type of production to the other. More importantly, the morality associated with each mode of production is only slowly eroded by the next mode. The existence of male age-grades and bonding rituals in African farming populations cannot be explained by the needs of agriculture, although they may be explained by defense. The maintenance of strong nuclear families (and, in places, extended families) and the control of sexual morality, far into the history of industrial societies, have been based on a need for a stable society, especially by the rich and powerful and their conservative political parties when faced by the many and the poor. The poor themselves have had strong reasons for adhering to the old ways. Anything else—early pregnancies, unmarried mothers, unstable sex-based partnerships, widespread and residentially separate bachelorhood and spinsterhood—is much more expensive and until recently could be afforded only by elites even in the richest countries. Furthermore, the world religions have moved only slowly to accept new sexual mores, partly because any such change would deny much of their traditional message. By offering a stable society and promise of an afterlife, they retained the allegiance of much of the population, even as secularization steadily advanced.

The eventual family and sexual mores of an industralized society depended on controlled fertility, but there was no widespread demand for this until mortality, especially infant and child mortality, fell. Extraordinarily, the brilliant scientific progress of the eighteenth and nineteenth centuries, which made the Industrial Revolution possible, was belated in the fields of biology and biomedicine, with the result that even in the most industrialized societies decisive decline in both overall and infant mortality was delayed until late in the nineteenth century. Consequently, the successful advocacy of mass contraception, of falling family size, and of the promise of a sexual revolution more in keeping with modern social conditions waited until then.

The use of such terms as "postmodern" implies that the great period of economic, social, and demographic change is over. But this is far from true. Even to talk of global demographic transition is to suggest the nearing attainment of closure, with a stationary world population (only 70 years off according to the medium projection of United Nations 2004). Certainly, the likely sevenfold multiplication of the world's numbers between 1875 and 2075, in a move from 1.3 billion to around 9 billion, is a demographic phenomenon that cannot be repeated. But the limits to human growth are hard to discern. Demographers have tended to become agnostic with regard to limits since experience in the late twentieth century put paid to the cataclysmic and unsoundly based forecasts for that period by the brothers William and Paul Paddock (1967), Garrett Hardin (1968), Paul Ehrlich (1974), and Dennis Meadows (1974). (Present concerns about atmospheric pollution and global temperature rise are almost certainly more soundly based even though the

rates of change may be debatable, but their significance for population growth is speculative.)

THE INDUSTRIAL REVOLUTION

We are almost certainly still in the early stages of the Industrial Revolution, both in per capita income growth and in the changes in human behavior made possible by the alteration of the modes of production. The forces that shape reproduction are changing as well and have a potential for vastly more change.

Some idea of what has happened to economic growth over the last 180 years is provided by Table 13.1. The real income figures are derived from comprehensive estimates made by Angus Maddison (2001). Although such estimates are subject to error, this caveat is of little importance here because the estimates used are restricted to the modern period (Maddison's full range extends over 2,000 years) and because the argument does not demand great statistical precision. This modern series begins in 1820, which Maddison (2001:45) regards as the beginning of the Industrial Revolution.

According to Maddison, per capita income in 1820 in Western Europe was considerably less than double its level three centuries earlier, but it nearly tripled by the eve of World War I and multiplied by 15 by the end of the twentieth century. Total production (gross domestic product) in Western Europe grew 42-fold between 1820 and 1998 and that of the world 49-fold. That the Industrial Revolution is continuing is shown by the average annual growth rate of per capita income during the last quarter of the twentieth century of 1.78 percent in Western Europe (a rate implying a doubling every 39 years) and 1.33 percent in the world as a whole (a doubling every 52 years). These rates are below only those of the exceptionally dynamic decades immediately after World War II. The pressure on the world's natural systems is suggested by the 1973–98 average annual rate of GDP growth of more than 3 percent (doubling in 22 years).

The farming population fell steeply, and what remains is only partly family farming. As a proportion of the male labor force, it had declined by the end of the twentieth century to 2.6 percent in England and Wales and 6 to 7 percent in France and Italy. Manufacturing and construction jobs peaked in the 1970s, then declined as machinery needed fewer hands. By that time two-thirds of the workforce were in service industries and the proportion was climbing. In the second half of the twentieth century the female proportion of the workforce in England and France rose from 30 percent to 45 percent and in Italy from 25 to 37 percent (Mitchell 2003). There is no evidence that economic growth is approaching any limit. The decline in manufacturing jobs in no way presages a slowdown in the production of manufactured goods.

By the end of the twentieth century family farming in industrialized European countries had almost disappeared (and peasant, largely subsistence farming had entirely disappeared) and the populations had grown much richer, with real per capita income quadrupling since 1950. However, such trends in

Table 13.1. Real Gross Domestic Product and Per Capita Income, Western Europe and the World, 1820–1998 (Billions of 1990 US Dollars)[a]

	1820	1820–70	1870	1870–1913	1913	1913–50	1950	1950–73	1973	1973–98	1998
GDP ($ billions)											
Western Europe	164		370		906		1,402		4,134		6,961
World	694		1,101		2,705		5,336		16,059		33,726
GDP index (1820 = 100)											
Western Europe	100		226		552		855		2,520		4,245
World	100		159		390		769		2,314		4,860
GDP annual Rate of growth (%)											
Western Europe		1.65		2.10		1.19		4.81		2.11	
World		0.93		2.11		1.85		4.91		3.01	
PCI ($)											
Western Europe	1,232		1,974		3,473		4,594		11,534		17,921
World	667		867		1,510		2,114		4,104		5,709
PCI index (1820 = 100)											
Western Europe	100		160		282		373		936		1,455
World	100		130		226		317		615		856
PCI Annual Rate of growth (%)											
Western Europe		0.95		1.32		0.76		4.08		1.78	
World		0.53		1.30		0.91		2.93		1.33	

[a]1990 Geary–Khamis international dollars (= 1990 US$).
Note: GDP = gross domestic product; PCI = per capita income.
Source: Maddison 2001:261–265.

extra-domestic production obscure the nature of industrial advance as a whole, because change had been much faster outside the household than within it. At the beginning of the twentieth century probably half of all consumption was still of goods produced within the home: made-up clothes, prepared food, child care, and many other products. By the middle of the century industry had made only limited advance against this type of home production, and it was still largely the product of women in the home. During the second half of the century, partly under pressure from women working outside the home, extra-domestic production began to compete successfully with home production in all these areas.

Also, toward the end of the twentieth century societal and family mores began to change, not basically because of the infusion of modern or postmodern ideas but because agricultural morality was no longer needed as much as before. It had been needed when marriage breakdown forced less-educated and work-inexperienced ex-wives belatedly to join the workforce, when there was too little money to support split households, and when single mothers could not afford childcare while they worked. The change was, of course, not total but one of degree, but that degree was substantial. Premarital sexual relations still brought the risk of unmarried and unsupported motherhood. It was not until the 1960s that better contraception reduced that risk. The move from family agriculture to urbanized, industrial life allowed secularism to develop, and new ways of interpreting behavior and new doubts about the divine endorsement of the old ways speeded behavioral change. Indeed, the link between economic change and new forms of behavior was necessarily through the medium of ideas, bringing recognition that the old behavior was no longer sanctioned by need and commonsense.

In the 1930s it was easy to imagine that not only population growth but also economic growth was coming to an end. There were worries about slackening consumer demand and about a shortfall in such new inventions coming onto the market as telephones, motor cars, radios, and refrigerators, all the product of earlier years. Europe was slow in following the United States into mass consumerism with its emblem, the supermarket, and its aim of owning a family car. A vast and apparently unbridgeable economic and demographic gap existed between the West and most of the rest of the world. The West's per capita incomes were at least ten times those of China and India, and individuals in the latter two countries were little better off than they had been centuries earlier (Maddison 2001:264). Life expectancies at birth in the West had reached 65 years, while in China and India they were less than half that level, no higher than they had been in England 400 years earlier (Wrigley and Schofield 1981:528). Schooling and literacy were universal in the West but confined to small elites in Asia.

After the end of World War II, the pace of economic growth in the West has accelerated and, in spite of a stumble in the 1970s, seems capable of being sustained. The electronic revolution has shown that technology may expand indefinitely, continuing to raise living standards and providing single-person households for the first time (through better television, access to films online, higher-fidelity sound systems, and similar innovations) with the possibility of entertainment equal

to that found in large families. A global economy and global society are emerging. By the end of the twentieth century real per capita incomes were six times higher than in the 1930s in China and three times higher in India. In rich countries a near majority of the young had tertiary education, and in poor countries a near majority had secondary education. These economic and social advances, along with insecticides, antibiotics, vaccines, and other health efforts, raised life expectancy in China to 70 years and in India to almost 65 years, the levels of the West only 50 to 70 years earlier. As agriculture required fewer hands, urbanization increased rapidly in poor countries. At the century's end there were more mega-cities in the developing world than in the developed world.

In much of Europe and in the English-speaking countries of overseas settlement, family changes in the last quarter of the twentieth century were enormous. Divorce terminated between one-third and one-half of all marriages; the proportion of single mothers rose; cohabitation without marriage became common, especially among the young; single-person households formed an ever-larger percentage of all households; the proportions ever marrying fell and those who married did so at a later age; and fertility declined. All these changes reflected the fact that post-agricultural society did not need the traditional family. Nevertheless, the changes were not anticipated by the majority of family sociologists, most of whom thought that families remained an emotional refuge from the strains suffered in employment outside the home, often in vast anonymous workplaces, and that the richer post–World War II societies had shown that they wanted and could afford more children. Most theorists of the "second demographic transition" welcomed these changes as evidence that the individual had been freed from imprisonment within traditional social structures. But they often seemed to suggest that the changes were largely finished, rather than concluding that, as incomes continued to rise in increasingly secular societies, there were almost unlimited possibilities of continual social change and family disintegration.

Demographic theory was needed more than ever, but its practitioners became divided and less confident they were on the right path. Often, even theories seeking to interpret or predict short-term changes were confounded by the pace of economic change.

HOW DEMOGRAPHIC THEORY COPED

Warren Thompson (1929) outlined the paths likely to be taken by mortality and fertility during the demographic transition. The filling-out of his work with more data and especially with social explanations can be credited to a group of demographers working at Princeton University's Office of Population Research during the 1940s (Notestein 1943, 1945; Davis 1945; Kirk 1945). They noted the need for prior mortality decline but then gave that decline no additional significance in continuing to drive fertility downward. The cause of fertility decline was the movement of individuals from traditional, and usually rural or small-town societies, in which social ranking was by ascription, to industrial cities where

achievement was what mattered. In urban settings individuals lost the often supposedly irrational ways of thinking that maintained high fertility in traditional society and began to limit their fertility. Eventually the premodern balance of high mortality and high fertility gave way to a modern balance of low mortality and low fertility.

This formulation of demographic transition theory seemed to describe adequately what had happened in most Western countries from the late nineteenth century to the 1930s, and it can still be regarded as a useful overarching concept. But, as formulated, the theory had global implications that were at odds with what happened next to both mortality and fertility, changes that so discouraged its formulators that they never came back to it except in arguing that developing-country fertility would have to be induced to fall so as to contain damagingly high rates of population growth (e.g., Notestein 1953) or in delineating the achieved fall in fertility (e.g., Kirk and Pillet 1998).

The first problem was the baby boom after World War II. This was largely confined to Britain and English-speaking countries of overseas European settlement, although modest booms occurred as well in France, the Benelux countries, and Scandinavia. In the United States fertility in the 1950s rose to a level not seen for almost half a century, and it did not fall below the levels of the 1930s until the 1970s—a phenomenon that could hardly be ignored by American demographers.

The second problem was that mortality fell in developing countries after World War II at an unexpectedly rapid rate and produced calls for interventions to slow rapid population growth. The Princeton group had viewed societies such as China and India as being in a Malthusian trap where mortality would fall only slowly as living conditions improved with industrialization, and fertility would decline with a corresponding lack of haste even as nonfarming populations slowly grew, as cities expanded, and as the country industrialized. When the pace of mortality decline became evident, Frank Notestein (1953), ever the pragmatist, urged organizing family planning interventions. Henceforth he and his colleagues appear to have retained the concept of the demographic transition leading to global attainment of very low mortality and fertility, while limiting their earlier social explanation—with its stress on rational, individualistic fertility being attained in the furnace of the industrial city—solely as a post hoc explanation of the demographic history of the West until the 1930s. They made no attempt to fit the baby boom into demographic transition theory. The times seemed to call for a theory applicable for the short-term rather than grand theory, and in particular for an explanation of the prolonged baby boom.

The major theorist of the baby boom, Richard Easterlin (1961, 1968, 1973, 1976, 1980), began by emphasizing the economic security of the postwar generation, as others were also to do (Caldwell 1982c:255ff; Westoff 1983:100; Hobcraft and Kiernan 1995:24). The period from about 1950 to 1973 was probably the most economically secure in the history of industrial countries. All Western countries enjoyed close to full employment with few barriers facing new entrants

to the labor force. Except in the United States, the new welfare states everywhere were reducing fears of the costs imposed by sickness and unemployment. Government policy gave primacy to full employment in an unprecedented way. In England, Ireland, Australia, and New Zealand even those who had never been in the workforce could obtain unemployment relief. The young adults of that period had grown up during the 1930s Depression and World War II and so had modest immediate consumption goals. The good economic times lasted until the first oil shock in 1973, and subsequently the attempt to rekindle the high rate of economic growth by moving toward an open labor market and a whittling-back of the welfare state eroded the feeling of security, even at higher income levels. It is possible that much of the earlier feeling of great security came not from the welfare state but from the fact of continuing full employment; this would explain why the United States fully participated in the baby boom.

Easterlin at first emphasized all these points and, more controversially, added that the smaller size of the birth cohorts born during the 1930s than that of their parents' generation explained their full employment. Still, this was the explanation of a single event and hence not a theory of long-range applicability. Easterlin then generalized the theory, moving from an emphasis on the prosperity of the years after 1950, stressing the situation in the latter part of a Kuznets cycle (Easterlin 1961:898), to an explanation based largely on the relative sizes of successive generations. By 1980 (pp. 144ff) he was using this model for prediction, foreseeing a new baby boom in the 1990s and a baby bust in the early years of the twenty-first century. History has not been kind to this expanded theory.

It is possible to view the baby boom as a partial detour in the progression from the agricultural to the industrial mode of production (Caldwell 1982c). Part of that progression had been a challenge to both the sexual mores and the fertility-control mores of the agricultural mode. By the end of World War II young adults saw much less reason for postponing sexual debut and strong reasons for having a sexual partner. But both cohabitation and illegitimacy were widely disapproved of in a society that had until then been too poor to support fragmented families and had not erected a welfare system to support unmarried mothers. Such mothers were only too likely to be the product of extramarital relations in an era of imperfect contraception based on methods easier to employ within marriage. The solution was early marriage in economies strengthened by postwar reconstruction and by some resort to Keynesian policies to sustain high employment. Earlier marriage was partly a youth revolt usually accepted by their parents and partly a deference necessarily given to the young, many of whom had fought in World War II. Society was still not ready to encourage young wives, especially mothers of small children, to enter the workforce, and industry was still not capitalized sufficiently to offer employment to all adults of both sexes. A single "breadwinner's wage" usually sufficed to support the family. Nevertheless, the central plank in both Easterlin's and my own arguments was the impact not of high wages but of universal employment and the near-certainty of retaining jobs. This message may be remembered in the future by countries trying to raise fertility levels.

The baby boom began to collapse in the United States in the late 1950s and in the rest of the West in the 1960s or early 1970s. In some ways it sowed the seeds of its own destruction. With marriages at such young ages, the savings that were once made by men and women during their single years to obtain housing following marriage now had to be achieved in the early years of wedlock. Increasingly wives worked after marriage. From the 1960s they were helped in deferring parenthood by new and better contraception, which had been developed to assist the fertility decline in poor countries but which, ironically, found its first significant use in helping working women in richer countries to postpone or limit births. The spread of the "women's liberation movement" owed much to older Western notions of equality and to contemporary social struggles. But it almost certainly also owed something to the fact that more and more women were joining the workforce and were neither paid as much nor promoted as often as men. As women's employment rates and earnings increased, family consumption became ever more dependent on two incomes. There were, however, conflicts in time and energy, especially for women, between employment and such domestic tasks as housework and childcare. The result was declining family size, partly planned and partly the inadvertent result of the prolonged postponement of pregnancies. New moral codes justified what had happened.

The early theorists of this fertility decline were the New Household Economists. Theodore W. Schultz (1960) created a basic analytical tool with his concept of human capital, which Gary Becker (1960) used to develop his economic analysis of the family. Becker later elaborated the concept of the value of people's time rising with their education or capitalization because it could be used to generate higher earnings (Becker 1965). In a special issue of the *Journal of Political Economy* (1973) devoted to the new household economics, T. Paul Schultz argued that time has a monetary value and hence a cost must arise from nonmonetized or nonearning activities such as staying outside the workforce to rear one's children. Later he argued that what was critical in bringing women into the workforce was not only the level of their education and wage-earning potential, but how women's wage rates compared with those of men (Schultz 1986). But like the interpretation of the baby boom this was also a one-off theory designed to explain a specific event, the baby bust, and it is difficult to see that it has much explanatory power once women, like men, spend most of their adult lives in employment. It is unlikely that married women would have continued to stay out of the workforce, given that the economy was expanding and offering more jobs, better contraception had arrived, and ever-more tempting consumer products were appearing, even had there not been a steep rise in women's education or a move toward gender equity in wages. The reality is probably that these movements reinforced each other. The fact that women were entering the workforce in large numbers led to a demand for wage equality with men, and to society and parents agreeing that girls needed more education. This should be understood within the context of a more sophisticated economy demanding workers of both sexes with more education, and a richer society seeing every reason why daughters should receive just

as extensive an education as sons. Thus, the basic story of the collapse of the baby boom was that women were entering the workforce in ever larger numbers, that the economy was capable of absorbing them, that there was a clash between work demands outside and inside the home, and that preventing births by contraception, sterilization, or abortion had become easier. This situation was to be one of some permanence.

Fertility continued to fall in some countries following the baby bust. Fertility began to fall in the United States in the late 1950s, in other English-speaking countries (Canada, Australia, New Zealand) at the beginning of the 1960s, and in most of Western Europe a little later. Everywhere, the declines began before the new contraceptives were in widespread use and accelerated once use had become common. This is evidence that the strains of wives' working would have reduced fertility everywhere without the contraceptive revolution but not as fast and perhaps not as far. In the English-speaking countries and Western Europe the major falls were complete by about 1980, with fertility levels lower than in the late 1940s but mostly higher than in the trough of the 1930s (1980 total fertility rates: Canada 1.6, United States and United Kingdom 1.8, Australia 1.9, and New Zealand 2.0). Thereafter, although fertility in Canada and Australia slowly sank, that of New Zealand stabilized and that of the United States returned to around replacement level. The fertility levels of both New Zealand and the United States can be at least partly explained by ethnic and immigration factors. However, America's current native-born white fertility is above that in all of Europe except Albania, Ireland, and France, a fact that suggests a richer world of the future may be able to maintain replacement-level fertility. Most of Western and Northern Europe experienced similar fertility paths (although with a transitory rise in Sweden) but bottomed out with lower fertility by 2003: total fertility rates were typically in the range of 1.4 to 1.7. In Southern Europe there was no pause in the decline of fertility, which reached in 2003 levels lower than previously experienced by a country anywhere else: total fertility of 1.2 in Italy, Spain, and Greece. Among the questions raised by these trends are whether over the last half-century there are two fertility declines or one to be explained; whether very low fertility needs a different theory than low fertility; and, indeed, whether any explanation other than the problems of working wives is required.

There is also the question of whether the fertility decline between the 1870s and 1930s should be distinguished from that beginning in the 1960s. It is possible to argue that no such distinction should be drawn: that there was a continuing decline with, in the 1930s, a movement downward faster than trend, explicable in terms of the economic, political, and social effects of the Depression, followed by a temporary and equally explicable recovery during World War II and its aftermath. Other global traumas temporarily forcing fertility downward cannot be ruled out in the future. A body of theory has developed, however, that contrasts the two fertility declines and focuses on the causes of the second decline. Not surprisingly, it is called "second demographic transition theory," a term coined (in Dutch) by Ron Lesthaeghe and Dirk van de Kaa (1986) and originating in Philippe

Ariès's (1980) well-known article, "Two successive motivations for the declining birth rate in the West."

Ariès had already published *Centuries of Childhood* (1962), a book that is fascinating on the "discovery" of childhood as a distinct stage of life but also breathtaking in its failure to perceive economic change as a fundamental factor or indeed as a factor at all. In his 1980 article, Ariès said that he saw birth and death rates as signs revealing collective attitudes, at times almost subconscious, toward life and death (p. 645). He argued that collective attitudes in modern Europe had changed so that, while parents had formerly controlled fertility to allow their children upward mobility, thus furthering the interests of the family over successive generations, the renewed fertility decline after 1960 had to be explained by each individual serving his or her own interests, often consumerist in orientation.

In "Europe's second demographic transition," probably the most widely read essay on the subject, van de Kaa (1987) concedes that the underlying cause of the first fertility decline was the change in the mode of production and the reduced utility of children, citing Lesthaeghe and Wilson (1986) and Caldwell (1976), as well as noting the availability of contraception. He then says the indirect (underlying) determinants of the second transition are hard to sum up because "they are strongly related to the functioning of individuals in fast-changing, postindustrial society" (p. 6). Individuals and societies are assessed for their "progressiveness" by measures of attitudes and behavior in such areas as extramarital sexuality, cohabitation, abortion, divorce, and the acceptance of childlessness, homosexuality, mothers working, and euthanasia. The higher the individual or society scores, the lower fertility is likely to be. When Lesthaeghe (1995:22) sought "the roots of recent demographic trends," he argued that "the motivations . . . stem from multiple sources: increased quality-related demands of individuals with respect to adult relationships, individual autonomy, and anti-authoritarian ideology, and advanced consumerism coupled with increased market orientations" (p. 22). He says little more on the final two movements other than to refer to "the new adoration of conspicuous consumption," which is seen as "the material manifestation of pure individualism" (p. 27).

What is most disconcerting about this thesis is the implication that these attitudinal and behavioral changes were the fundamental driving forces behind fertility decline. Scarcely noted is the fact that real per capita income in Western Europe in 1973 (when the second demographic transition began to accelerate) was two-and-a-half times what it had been in 1950 and three times the 1939 level. Very likely it was this huge increase in wealth that allowed young adults—even young married adults—to further their own training and to seek occupational advancement rather than, as in previous times, placing their hopes in their children's futures. This increase in wealth allowed young adults to move into their own apartments rather than live in supervised boarding houses and allowed cohabiting couples to risk having children. Some of the theory's descriptions do not fit the English-speaking countries well at all. In those countries young-adult individualism seemed to reach its height in the 1960s, with corporate conformism strengthening ever since. Many

of the attitudinal changes the theorists of the second demographic transition are describing may have been felt most strongly in largely Catholic countries where the Church and Christian Democratic political parties had previously tried to set the terms of the moral agenda. These theorists also imply that this period was one of unprecedented social change unlikely to be repeated on such a scale. Almost certainly an observer living in the 1890s or the 1920s could have drawn up a similarly impressive list of changes over the previous generation. Just as social scientists in the 1950s hardly anticipated the social system of today, we are no more likely to be able to perceive that of the mid-twenty-first century, although our wisest guide to it would be the identification of those social structures not needed by a post-agricultural society.

What relation did these "postmodern" changes have to the fertility transition? The theory was, after all, formulated in the 1980s to explain a steep fertility decline. Ironically, by the 1990s the Western countries whose family institutions had changed most had higher fertility than the Mediterranean countries, where much less change had occurred in such key indicators as cohabitation and births out of wedlock (Therborn 1995). Women's own explanations suggested that the decline in fertility had almost everything to do with mothers' being unable to cope with both a large family and full-time work, irrespective of whether they were married or not, or were or were not progressive in outlook. In fact, in Italy, Spain, and Greece, where nearly all births occurred within marriage, the birth rates were among the world's lowest. It seemed likely that the underlying changes that had brought most women into the labor market were the same ones that had led to family change, except that the Mediterranean family successfully resisted some trends. Although the traumatic changes from economic security to insecurity in Eastern Europe have seemed to most observers to be sufficient to explain a major, but perhaps transient, steep fertility decline there, Sobotka et al. (2003:270) believe that "the concept of the second demographic transition provides a suitable framework for understanding the profound demographic changes in the Czech Republic," with adherence even to the concept's "broader view, which stressed the importance of underlying ideational change."

The explanations for very low fertility in Mediterranean Europe can be broadened to account for at least part of the fertility decline in many other countries. McDonald (2000) argues that patriarchy in Southern Europe obliges even working wives to undertake nearly all housework and child care with little help from their husbands. Similarly, employers there make little attempt to shape work hours or conditions to ease the situation of working mothers, while governments place no pressure on employers to be flexible, do not fund child care, and administer welfare systems that discriminate against the young, especially young women. Once again the fundamental change has been the determination of young women, even married ones with children, to work. Patriarchy may be an explanation of very low fertility, and the demonstration of its impact may suggest ways of raising fertility everywhere. Other factors, however, should be considered. One is the nature of the Mediterranean family, which, as well as being patriarchal, is a kind

of corporation in which adult children can continue to live at home as a matter of right. A young woman seeking good employment and early promotion might choose to stay in the family home and marry late even if jobs are plentiful. Another factor is that severe youth unemployment, especially as experienced by young women, may be a transient condition, reflecting the difficult economic situation of the European Union in the 1990s and, as Delgado Pérez and Livi-Bacci (1992) argued, exacerbated by the rapid increase in female education levels.

CONCLUSION

We are still in the midst, perhaps in the early stages, of the progression from a society structured for agricultural production to one structured for industrial production. Industrial societies have two outstanding features: they do not need the "traditional" family required by agricultural societies for production, and they are capable of producing immense riches that can facilitate myriad lifestyles. Agricultural families needed to reproduce themselves and so have children to remove the physical load from their aging parents and ultimately to inherit the land. In industrial societies there is no need at the level of individuals or couples to reproduce, although states may consider themselves obligated to make an effort to do so.

Around 1950 the changes to the family and the composition of the workforce that would occur during the next half-century were not foreseen. Indeed the nuclear family was often pictured as a necessary refuge outside work hours for men employed in the anonymous and competitive, if not harsh, workplaces of industrial society. Nor was it foreseen that the egalitarian ethic in Western society, the need for training to prepare for work, the women's movement, and a wealthier society capable of offering ever-increasing employment would drive up female levels of education to the point that by the end of the century they had surpassed male levels among the young in many Western countries. The implication was that women had been prepared for working lives outside the home. This had been facilitated by an industrial society that offered a growing proportion of jobs in the tertiary sector, most of them physically not greatly demanding and often involving part-time work or flexible hours.

This once-and-for-all movement of most adult women to join most adult men in the workforce has been the engine of the fertility decline from the 1960s. The fundamental reason that the mass movement of women into the workforce has been associated with fertility decline is the difficulty encountered by women in combining household work and child care with outside work. It is probably not the only reason. Outside work may not always be fulfilling, but participating in it lessens the need to have children to provide a role and an interest. The more patriarchal societies most often aggravate the clash between childrearing and marketplace employment, but all existing societies are sufficiently patriarchal to produce a strain between employment and replacement fertility; and perhaps even in a society with full gender equity some strain would remain on both parents.

Ironically, in Mediterranean countries job security of older employed workers is now blamed for youth unemployment and consequent low fertility, whereas in the 1950s it was seen as a major force in raising or maintaining fertility.

The continuing Industrial Revolution has brought changes to society, the family, and fertility that were hardly imaginable in 1950. The same will happen in the future as half-century succeeds half-century. Accordingly, we will not try to imagine the changes except to reiterate that at the level of the individual in the industrial society there is no necessity for either families or fertility, a proposition put forward by Kingsley Davis in 1937.

On the other hand, very low fertility (total fertility rates around 1.0) may not persist. Increasingly, wealthy governments will take steps to reduce the conflict women experience between work and children. This move will probably come about in part as a deliberate means to raise fertility, but more out of fairness to women, and mostly out of fairness to children. The measures will include universal subsidized child care, school hours and school care covering most of the working day, flexible working hours for mothers of young children, paid maternity (and perhaps paternity) leave, maternity leave not being penalized in decisions for promotion at work, welfare systems that adequately cover the young unemployed, access to housing for young married couples and especially for those with a child, and so on (see McDonald 2002). These measures will be at odds with recent attempts to weaken the welfare state in industrialized countries. Indeed, they may reduce the rate of economic growth. But such measures are almost certain to be preferred to a demographic path that seems to point to national extinction.

Demographic transition theory, which posits movement from a long-term equilibrium between high mortality and high fertility to low mortality and fertility, not necessarily in equilibrium, remains an adequate theoretical framework provided that two conditions are met. First, humans' perception of their condition and consequent intervention to influence the direction of change are taken to be part of the process. Second, greater attention is paid to the change in the mode of production, to the effects of interactions between economic and sociodemographic change, and to the continuing rise in real per capita incomes.

Human intervention and not just blind economic growth has extended the bounds of behavioral and social change in the new nonagricultural world. In the late nineteenth century such intervention began the sexual revolution, as promoted in the work of Havelock Ellis (1900–1928) and others, and the family planning revolution. In the twentieth century planned intervention was a major component in the developing world's rapid mortality decline after 1945 and in the subsequent campaign to follow this with a fertility decline.

From this perspective, there is no great mystery about the baby boom. It can certainly be included in classical demographic transition theory concerned with successive economic and social changes. Partly because of human intervention, the sexual revolution ran ahead of both the contraceptive revolution and the need for the economic system to dispense with the breadwinner type of employment and to compete with household production of goods and services. By the late 1940s there

was a society in which the young felt the need for early companionate sexual relationships but in which cohabitation and exnuptial births (not to mention abortion) were frowned upon. There were good economic reasons for this. The economy was still not large enough to employ great numbers of abandoned mothers, and many of these women had neither the education nor the work experience to gain easy access to employment. This situation was ultimately changed by the growth of the economy and the move toward equality of women with men in education, employment, and wages.

What, then, of the future? The probability seems to be that global population growth will come near to a halt by 2050, with the Earth having around 9 billion or fewer inhabitants (United Nations 2003, 2004; Lutz et al. 2001). This number may well be thought by that time to be the maximum population that can be supported safely in terms of preventing deterioration of the atmosphere or soils or pressure on water resources. The United Nations' (2004) long-term projections show total fertility rates at modest levels after 2125 with the high-projection average total fertility rate for the world being only 2.35, the level of much of the West around 1970, and the lowprojection rate being 1.85, the level of much of the West sometime between 1975 and 1980. This is an exceedingly narrow range, yet the high projection yields dauntingly large populations, doubling between 2000 and 2075 and then every 125 years, and the low projection shows population halving every 200 years, which is probably in the longer run unacceptable.

The chances are that the sum of national choices, with guidance from international organizations and the opinions of the world community, will not allow much global deviation from replacement fertility. This restrained population change will probably be the result of ideologies aiming at this end, giving strong support to raising fertility by the kinds of measures listed above, almost regardless of cost in an admittedly richer world, or, if lower fertility is needed, by withdrawing or modifying some of these measures. The result could be an oscillating world population, because remedial ideologies and measures would lag in time, perhaps ranging as much as a billion or even 2 billion either way from the long-term trend line. The long-term trend could be level at 8 to 10 billion. Or it could be sloping downward if the upper limit was set not by global population numbers but by global gross real income. Or it could slope gently upward if it were found that remedial measures could control atmospheric and soil degradation or if the threat from these sources was found to be exaggerated. If remedial measures eventually prove unable to compensate for the pressures of population and income, and if global per capita income continues to grow at about 1.5 percent per annum, then either the world population will have to halve every 50 years or there must be a moratorium on economic growth.

The end of demographic transition is thus likely to see oscillation in population sizes and population ideologies with only very modest variations in family size and population age structure. In each of these scenarios the proportion of aged would be high. The average woman may well have, as John Bongaarts (2002) anticipates, two children, but whether she will still be with her first partner or

even have a permanent partner is much less certain. With rising national incomes and the world increasingly becoming a single economic and social system, all parts of the world seem likely eventually to experience most of these demographic changes.

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ENDNOTE

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2. A comment by Norman Ryder.

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CHAPTER 14

POLICY RESPONSES TO LOW FERTILITY AND ITS CONSEQUENCES: A GLOBAL SURVEY[1]

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The consequences of low fertility depend on just how low fertility has fallen and how long it has been at that level. Table 14.1 lists very low fertility countries (total fertility rate (TFR) below 1.5), moderately low fertility countries (TFR 1.5–2.0), and countries at replacement level, together with their TFRs in 2001 and the period that the TFR had been continually below 2.1. The last measure is probably open to question for some countries as it depends on the ability of the United Nations (2001) Population Division to reconstruct past fertility levels. In the West, fertility began to fall widely after 1965, at first because of a reduction in the proportion of high-parity births (Prioux 1990). Japan followed in 1973 (Retherford, Ogawa and Sakimoto 1996). By the 1990s the TFR had fallen below one in several northern Italian provinces and in the area that had previously been East Germany (Cliquet 1991:136; Witte and Wagner 1995:389; Conrad, Lechner and Werner 1996:349).

Very low fertility is still confined to countries that were part of the USSR and its Eastern European satellites, the southern tier of Europe, Germany and Austria, Japan, Canada and city states in Europe and on China's coast. Moderately low and replacement fertility extends further to include nearly all the rest of Europe, the English-speaking countries of overseas European settlement, parts of the Caribbean and, in Asia, Azerbaijan, Singapore, South Korea, Taiwan, Thailand, Kazakhstan and China, although in the last case there is some controversy about whether fertility is as yet quite down to long-term replacement level (cf. Zeng 1996). If China is below that level, then four-ninths of both the world's population and that of Asia live in countries with below long-term replacement level fertility. None of these countries is found in mainland Africa or South and Central America: even Uruguay and Argentina, early trail-blazers in the Latin American fertility decline, now have TFRs of 2.3 and 2.6 respectively.

Table 14.1. The Low-Fertility Countries, 2001

Country	Region	2001 TFR Estimate	Continuous Period up to 2001 with TFR Below 2.1 (Years)[a]
Very Low Fertility Countries (TFR Below 1.5)			
Hong Kong	East Asia	1.0	19
Ukraine	Eastern Europe	1.1	27(34)[b]
Czech Republic	Eastern Europe	1.1	20(34)[b]
Armenia	Western Asia	1.1	8
Latvia	Eastern Europe	1.2	51
Bulgaria	Eastern Europe	1.2	24
Slovenia	Southern Europe	1.2	21
Spain	Southern Europe	1.2	20
Russia	Eastern Europe	1.2	16(36)[b]
Macau	East Asia	1.2	14(24)[b]
Georgia	Western Asia	1.2	9
Andorra	Western Europe	1.2	n.a.
Japan	Eastern Asia	1.3	44
Germany	Western Europe	1.3	32
Austria	Western Europe	1.3	29
Italy	Southern Europe	1.3	26
Belarus	Eastern Europe	1.3	24
Hungary	Eastern Europe	1.3	23(43)[b]
Lithuania	Northern Europe	1.3	23
Estonia	Northern Europe	1.3	19(50)[b]
Greece	Southern Europe	1.3	18
Romania	Eastern Europe	1.3	13(39)[b]
Slovakia	Eastern Europe	1.3	13
San Marino	Southern Europe	1.3	n.a.
Croatia	Southern Europe	1.4	34
Canada	North America	1.4	30
Poland	Eastern Europe	1.4	13
Liechtenstein	Western Europe	1.4	n.a.
Moldova	Eastern Europe	1.4	n.a.
Moderately Low Fertility Countries (TFR 1.5–2.0)			
Sweden	Northern Europe	1.5	33
Switzerland	Western Europe	1.5	28
Portugal	Southern Europe	1.5	18
South Korea	Eastern Asia	1.5	18
Taiwan	Eastern Asia	1.5	15
Belgium	Western Europe	1.6	29
Singapore	Southeastern Asia	1.6	25
Cuba	Caribbean	1.6	23
Barbados	Caribbean	1.6	19
Bosnia & Herzegovina	Southern Europe	1.6	18
Yugoslavia	Southern Europe	1.6	13

Table 14.1. (Continued)

Country	Region	2001 TFR Estimate	Continuous Period up to 2001 with TFR Below 2.1 (Years)[a]
Finland	Northern Europe	1.7	34
Australia	Oceania	1.7	29
Luxembourg	Western Europe	1.7	29
Netherlands	Western Europe	1.7	29
United Kingdom	Northern Europe	1.7	29
Denmark	Northern Europe	1.7	28
Malta	Southern Europe	1.7	28
Trinidad and Tobago	Caribbean	1.7	9
Norway	Northern Europe	1.8	25
Martinique	Caribbean	1.8	18
China	East Asia	1.8	8
Cyprus	Western Asia	1.8	3
Kazakhstan	South–Central Asia	1.8	3
Thailand	Southeast Asia	1.8	3
Dominica	Caribbean	1.8	n.a.
France	Western Europe	1.9	29
Macedonia	Southern Europe	1.9	19
Guadeloupe	Caribbean	1.9	8
Ireland	Northern Europe	1.9	8
Puerto Rico	Caribbean	1.9	0
New Zealand	Indian Ocean	2.0	21
Azerbaijan	Western Asia	2.0	7
Iceland	Northern Europe	2.0	3
Mauritius	Indian Ocean	2.0	3
Seychelles	Indian Ocean	2.0	n.a.
	Countries at Replacement Level (TFR = 2.1)		
Saint Lucia	Caribbean	2.1	0
Sri Lanka	South Central Asia	2.1	0
United States	North America	2.1	0
Netherlands Antilles	Caribbean	2.1	n.a.

[a]Some historical series have been changed between United Nations 1999 and United Nations 2001. Linear interpolation between quinquennial mid-points.

[b] Except for Macau, Eastern European countries which first fell below replacement level in 1950s or 1960s (years before 2001 shown in brackets) but where policy measures raised the TFR above 2.1 during the 1970s: Czech Republic for 10 years peaking at 2.32, Romania for 30 years peaking at 2.96, Hungary for 5 years peaking at 2.1; Estonia and Russia were more complex. For each TFR countries are listed in order of continuous period below replacement fertility.

Sources: Population Reference Bureau (2001) for current estimates, United Nations (2001) for period that TFR has been below 2.1.

THE DEMOGRAPHIC IMPACT OF LOW FERTILITY

Such low fertility has caused surprisingly little reaction outside academic circles which have held a number of conferences on the subject, usually resulting in books (e.g., Berelson 1974; Campbell 1980; Davis, Bernstam and Ricardo-Campbell 1986; Cliquet 1991; Casterline, Lee and Foote 1996; United Nations 1997). One reason for the slow government reactions is population momentum: age structures are still adjusting to the relatively new low fertility levels and in most cases will not fully adjust for decades. Even Germany, which has been below long-term replacement fertility for the unusually long period of 31 years, still has a rate of natural decline of only 0.1 percent per annum, and will probably not reach 0.5 percent for another 20 years, or 1.0 percent for over 50 years (United Nations 2001; Population Reference Bureau 2001). These are time horizons beyond most politicians and their electorates. In some cases very low fertility may not be maintained. Eastern Europe may stabilize at fertility levels above the recent very low levels if the present political, economic and social upheavals prove transient. The first contemporary political reaction, although muted, was the adoption in 1983 by the European Parliament of a French motion expressing the need to be concerned about population trends (Gauthier 1993:149).

If fertility remains low, the ultimate demographic impact will be severe, as is shown in Table 14.2. Column 1 represents the typical European situation around 1960, which was widely felt at the time to represent demographic stability; column 2 represents slightly lower fertility than in the contemporary United States; column 3 slightly higher fertility than in South Korea or Singapore; and column 4 Germany. They are all based on a life expectation at birth of 75 years which should be attained widely in industrialized countries in the near future. An age of 20 years has been taken to represent that of entrance to the workforce in rich, low-fertility, highly educated countries. It should be emphasized that Table 14.2 portrays the stable situation, still decades away in the countries named in columns 2–4. There will be transitional situations before then which will impose severer age burdens where the preceding fertility decline has occurred over a short period.

It has been argued by Bongaarts and Feeney (1998) that low fertility is partly a transient phenomenon arising from women postponing childbirth to later ages, a view contested by Lesthaeghe and Willems (1999). It may be significant that in the revision of this paper, the passage of two years saw fertility rises in eight of the low fertility countries but further decline in 13 of them, and no movement in 43. It should be noted that the two countries which Bongaarts and Feeney analysed were Taiwan and the United States where no movement took place, but it must also be recorded that the latter, uniquely among developed countries, now records a TFR 0.3 above its level two decades ago (United Nations 2001).

Table 14.2 demonstrates the main effects of low fertility. They are the following.

1. The main workforce age range, 20–64, of these affluent, highly trained countries remains remarkably similar at all levels of fertility. In the actual

Table 14.2. Contrasting Stable Populations with Different Fertility Levels

	Fertility Level Approximating			
	Europe 1960 *1*	USA 2001 *2*	South Korea or Singapore 2001 *3*	Germany 2001 *4*
Gross Reproduction Rate	1.25	1.00	0.80	0.65
Total Fertility Rate	2.56	2.05	1.64	1.33
% Population 0–19 Years	30	24	18	14
% population 20–64 Years	52	53	52	50
% Population 65+ Years	18	23	30	36
65+/20−64 Years (%)	35	44	58	74
Retirement Age (Years) Necessary to Make Ratio of Retired to 20–64 the Same as in Column 1 (i.e., 35%)	65	69	72	75
% Population 15–19 Years	7.1	5.9	4.8	3.8
% Population 60–64 Years	4.8	5.7	6.5	7.0
15–19/60–64 (%)[a]	148	97	74	54
Annual Rate of Natural Increase (%)	0.75	−0.02	−0.79	−1.49
Period for Population to Halve (Years)	—	3476	88	46

[a] Entrants to labour force as % of retirees over the next quinquennium.
Source: Coale and Demeny 1966, West Model Life Tables, Level 23.

workforce, the proportion of women working outside the home has not yet reached its maximum (perhaps 80–85 percent) in many low fertility countries. Therefore, there is still a potential for a further rise in income- and tax-generating population. The present situation is that the economies of many of these countries are not keeping even the 20–64 age range in employment: Germany has an average retirement age under 60 years and an unemployment rate of 13 percent. It is possible that this situation could be reversed by a change in economic and social policies (cf. Esping-Andersen 1996).

2. If the young (the first 20 years of life, mostly as students) and the old (65+ years of age) were both equally dependent on the workforce and cost on average the same amount per person, then there would be no macroscopic dependency problem. The real problem is the way politics and societies

are organized. Wage earners are typically taxed by the state to support the old (although families also contribute to supporting the old in retirement homes), while a large proportion of private income is spent by parents on their children. In effect, parents tax themselves continually to support the young by their expenditure on their children, usually not resenting it because of the emotional returns. This was once the position everywhere with regard to the old as well, and remnants of this older system persist in some of the high-income East Asian countries, for example Japan or Taiwan. This may not be a socially stable situation, since the old in contemporary industrialized countries typically prefer to believe that they are rightly being repaid by society for work already done: in contrast to older societies with an upward wealth flow where the old felt that they had the right of support from their dependants in return for the gift of life (cf. Caldwell 1982). It should be noted that the annual total private and public cost of supporting an old person is almost certainly greater than that of supporting a child. Ryder (1997:12) estimates the cost ratio to be 5 to 3.

3. If the support of the old has to depend largely on taxation and hence on the ratio of the tax-paying workforce to the retired, then the situation of Europe around 1960 can be replicated by delaying retirement in countries with TFRs as low as 1.6 to 72 years of age, and with TFRs of 1.3 to 75 years of age. With the vast diminution of heavy agricultural and industrial labour in the occupational structures of the richer countries, and with the extension of disability-free life, a retirement age of 70 years is by no means unattainable provided that there is an adequate demand for labour. The real problems are social and political. The social problem is that of "lifestyle" and an increasing desire by many to spend more flexible years of travelling or just tasting alternative ways of life after the working life is over, and hence to retire earlier rather than later. The solution here may be to offer different levels of pension payment according to the age of retirement and perhaps also to offer different levels of social insurance payments during a person's working years: a form of optional taxation. It may well be that our increasingly efficient economies can provide adequately for the old even with a retirement age of 65 or perhaps 60, the real problem being political competition to offer unrealistically low taxation levels.
4. Stabilizing at 1960 European fertility levels would have meant one-and-a-half times as many people entering the workforce each year as retiring from it. In fact, because of the "baby boom," by the 1970s some Western countries experienced an intake more than double the outflow. In contrast, very low fertility levels can mean the reverse of this, with half as many entering as leaving. This will mean a relatively smaller supply of "new blood" and an older, but more experienced, workforce. The young should have faster promotion during their earlier years because a smaller

proportion of the total workforce is ten or even twenty years older than them. It may be found that structuring a workforce with fewer entrants than persons leaving is no more difficult than it was in the opposite situation a quarter of a century ago, but this will be a matter for experience and experiment.

5. Ultimately, the greatest problem of declining numbers may be just that. National and individual pride may be at stake. Once the issue would have been one of military might, but an increasing reliance on technology, a tendency towards federations of the European-Union type, and the present global politico-military situation, have made this a less significant issue. It is, indeed, remarkable how little soul-searching there has been from Europe since 1950 as its proportion of the world's population has fallen from 22 to 12 percent. The explanation may be that even its population has increased by 180 million or almost one-third (United Nations 2001; Population Reference Bureau 2001). The United Nations medium variant projection shows Europe declining over the next half-century to 6 percent of global population with an absolute reduction of 124 million people (back to its 1960 population). Such a decline could well give rise to a spurt of cultural nationalism especially in the most affected countries like Germany, where population is projected to fall by over 13 percent from 82 million to 71 million. Even here, annual decline is not expected to exceed a quarter of a million people until shortly before the year 2030. That nationalism might be at odds with the perceived need to limit the speed of population decline by raising immigration rates, but it might also yield quite dramatic policies aimed at raising the birth rate.

LESSONS FROM HISTORY

History provides many examples of feared relative or absolute population decline, and, indeed, these examples make the calm acceptance of the present situation surprising. Most of the stratagems for raising fertility or coping with the consequences of low fertility have also been identified and tested.

The ancient Babylonians, Greeks and Romans all attempted to raise fertility by means of laws encouraging marriage and strengthening the family (Glass 1967:86–90). In modern times, the French who, starting in the late eighteenth century, had experienced the first national fertility transition, had pronatalist movements from the late nineteenth century and introduced family allowances in the form of payments to families graduated by the number of children successively into various sectors of society starting from 1900 (Bourgeois-Pichat 1974:548; Gauthier 1993:145ff.)

Elsewhere, although there were pronatalist movements in Britain, France and Germany during World War I (Wall and Winter 1988:372–452), policies to augment fertility did not come into being until the economic depression of the

1930s when TFRs fell below long-term replacement levels in a range of countries in Western and Central Europe. The political reaction in Europe at that time had been conditioned by the Eugenics Movement which, from the end of the nineteenth century, had been deploring the small family size of the better educated, by books in the 1920s such as Spengler's (1926) *The Decline of the West*, and in the 1930s by faulty population projections based on cross-sectional fertility rates, such as Charles's (1934) *The Menace of Under-population.* Nevertheless, cohort fertility was below replacement level in both Sweden and England and Wales for all women born between 1900 and 1920, and subsequently was not to return to these low levels until the cohorts born around 1950 (Bourgeois-Pichat 1986:9).

The Depression policies provide an interesting forerunner to contemporary political reactions. The dictatorships of both right and left identified falling fertility with loss of military manpower and national enfeeblement, and accordingly attempted direct methods to raise the birth rate while Germany alone moved towards "racial hygiene" and selective breeding. There were in Germany, Italy and the USSR exhortation and prizes for large families, and a tightened control of family planning and abortion (Glass 1967:219ff; David, Fleischhacker and Höhn 1988; Ipsen 1996; Quine 1996:129ff). In Italy, as early as 1926 and with shades of the Emperor Augustus, a bachelor's tax had been instituted.

In contrast, the liberal democracies identified low fertility with the difficulties of the family. Indeed, it is difficult to determine whether politicians or even governments were primarily concerned with low fertility or with helping the disadvantaged family, a circumstance which allowed collaboration between right- and left-wing politicians. The ambiguity is compounded by the fact that programs mooted or begun in the 1930s often did not reach fruition until after World War II and then were folded into the fabric of the new welfare states. France had formulated its Family Code by 1939 but this was not fully enacted until 1945. It embodied family allowances, premiums for first births, and assistance with housing and with loans for establishing households (Bougeois-Pichat 1974; Gauthier 1993:145–149). Sweden was stirred in 1935 by the publication of Alva and Gunnar Myrdal's *Crisis in Population Policy.* Here again, it is difficult to distinguish between fertility policy and that directed at family welfare and both were decades later to be intertwined with policies aimed at gender equality (Chesnais 1996:732ff). Two important points should be made about the policies of the democracies. The first is that their lack of proscription did not extend to the practice of contraception and induced abortion; in these matters restrictions which date back to the nineteenth century were tightened in the 1930s, but pronatalism is in this case confounded with issues of sexual and religious morality. The second point is that these family and welfare policies were invoked in Northern and Western Europe and in such overseas settlement countries as Australia and New Zealand; they were almost absent in the United States.

The next phase of population policies is more recent but in conditions that have almost disappeared. They were manifested in the early stages of the present fertility decline in Eastern Europe where very low fertility levels were first reached;

but they are history in the sense that the political regimes that were able to take such actions, and most of the programs they instituted, have now been dismantled. The programs are of interest to us because they probably did raise fertility, at least for a time, by incentive systems that transferred a larger proportion of the national income[2] to this purpose than any democratic government would be likely to achieve. The nearest parallel in the West is the French system and that was finally put in place by an all-party government straight after World War II during a period when the electorate was accustomed to central decisions involving massive resources.

The early Eastern European fertility decline was apparently triggered by the liberalization of abortion laws, first in USSR in 1955 and subsequently in all of Eastern Europe except East Germany and Albania. This occurred in conditions of housing shortages and with a very high proportion of women in the workforce. The measures to increase fertility included most of the positive ones that have ever been suggested:child care allowances, taxation deductions for children, paid maternity leave, shorter working hours for mothers of young children, paid leave to care for sick children, lump sums at birth, large loans for setting up a home with fractions of the loan cancelled with each birth, rent reductions following each birth, subsidized nurseries, free school meals, subsidized school books, paid holidays for families, and, of course, free health services as part of the welfare state. Policies were not aimed at encouraging women to leave the workforce, and, except in Romania, only mild reversals of abortion liberalization occurred. In contrast, Romania outlawed abortion in October 1966 thus doubling the birth rate by the following year. There is unlikely to be much in the way of future fertility incentives that was not attempted in Eastern Europe in the two decades after 1965 (McIntyre 1975; Heitlinger 1976; Berelson 1979; Frejka 1980; McIntosh 1981; Andorka and Vukovich 1985; Höhn 1988; Büttner and Lutz 1990; Monnier 1990; Avdeev and Monnier 1995).

Some Eastern European countries achieved limited success in raising fertility levels above the replacement level. United Nations (2001) reconstructions of demographic trends now credit both the Czech Republic (present borders) and Hungary with rises of the TFR of 0.4 above previous low points to 2.3 and 2.1 respectively. Romania for one quinquennial period after abortion was banned raised its TFR by 0.9 to 3.0. Such rises were achieved by policy ploys unsupported by popular movements. Caldwell (2001) argues that the move to low fertility in the West after 1965 was partly the product of a mass movement hailing the virtues of smaller families and low rates of population growth. It is possible that in parts of a future Europe such popular movements could welcome higher fertility and slower population decline and would be assisted by strong government programs.

THE CONTEMPORARY WORLD

By 1989 many industrialized countries were reporting in answer to United Nations population-policy enquiries that both population growth and fertility were

Table 14.3. Responses by Industrialized Countries to the 1989 United Nations Survey of Attitudes to Demographic Trends (n = 37)

Demographic Factor	Number of Countries with Any Mention of Demographic Factor Being		
	Too Low	Too High	Satisfaction Only Expressed
Fertility	13	2	22
Population Growth	11	3	23
Mortality	0	37	0
Immigration	1	11	25
Emigration	3	9	25

Source: United Nations 1989.

too low (United Nations 1989; Gauthier 1991:4). The responses are summarized in Table 14.3, which is noteworthy for the lack of demographic apprehension expressed by the majority of governments. Countries worried about fertility levels included France, Greece, Luxembourg, Switzerland, Austria, Belgium and Germany. The conspicuous absentees are the English-speaking and Nordic countries, and the Netherlands.

Most Western countries are somewhat apprehensive of very low fertility as indicating, together with lower levels of formal marriage and higher levels of cohabitation, divorce and mothers in the workforce, that something undesirable or pathological is happening to the family and that it occupies an "ever shrinking space in our lives" (Bumpass 1990:493). This has been explained as an inevitable result of the passing of family production and the continuing move toward a more fully capitalist society with all production outside the home and most people living in huge urban complexes (Caldwell and Ruzicka 1978; Caldwell 1981, 1982). Davis (1997:623–624) advanced the view in 1936 that "the family is not indefinitely adaptable to modern society," and that "a new system of reproductive institutions" would need to be invented so that "child-bearing would once again be more motivated."

Lesthaeghe and Meekers (1986) and Lesthaeghe and Surkyn (1988), examining the cultural ideas and social fashions that have swept the West, warned against underrating social factors. Caldwell and colleagues (1988) found evidence for this proposition from a 1986 Australian study which showed that a high proportion of young adults were deferring both marriage and childbearing not for economic reasons but because they wanted by travel and other experience "to find themselves" as individuals. The authors concluded that

> Major issues for the future are whether quality couples can fully achieve their aspirations while having children at all, and whether quality individuals can achieve their aspirations while marrying (Caldwell *et al.* 1988:140).

Ariès (1980) had earlier noted some of these changes. Two qualifications should be made. The first is that all these social changes are driven by the underlying economic ones, interpreted, admittedly, in various ways by different cultures. The second is that the Australian study showed that

> The family size desired at first marriage in Australia has fallen very little over the last 30 years. Desired family size is still closer to three than two, and very few women report wanting fewer than two . . . Whatever the reason, original desired family size exceeds completed fertility and has done so for many years (Bracher and Santow 1991:48).

This remains true in Australia (McDonald 1998) and many other low-fertility countries (van de Kaa 1998:33–34).

Nevertheless, those governments that wish to reverse the fertility decline want to do so for very specific reasons: the extra burden imposed by a rising proportion of old population on, first, the old-age support systems, and, second, the health system where the number and cost of treatments rise with the patients' age, especially after 65 years (Clare and Tulpulé 1994:43). Additionally, governments are concerned about the eventual shortage of new entrants into the labour force (McIntosh 1981:186ff; Gauthier 1991:4). Chesnais (1990) showed that currently the old-age populations of industrialized countries are increasing at a faster rate than total populations ever have. Freedman (1995:23) reported that

> Apart from China . . . governments in the other low-fertility countries of East Asia, as well as some in Southeast Asia, are anxious to raise fertility to at least replacement level . . . they now meet to discuss ways to restore replacement-level fertility because they are concerned about the aging of their populations and the shrinking of their entry-level labour force.

McIntosh (1981:186) reported, after interviewing large numbers of French, German and Swedish policy-makers in the late 1970s, that "the concern that is uppermost in the minds of politicians in all three countries is the effect of age-structure change on the financial bases of social security schemes." In 1982 the first United Nations workshop on aging was held, and many more were to follow.

THE RELATIVE POLICY SILENCE

The most significant aspect of the present period of low fertility is the near-silence on the subject from governments and the public alike. This contrasts

markedly with the situation before World War II. In the first years of the century, France and New South Wales had both held government inquiries about their low birth rates and the need for intervention when their TFRs were 2.9 and 3.5 respectively. The excitement over demographic defeat in the 1930s occurred at a time when the countries involved all had positive population growth. Reasons have been suggested by a number of demographers[3] for the present apparent lack of concern.

The first reason is that few countries have yet experienced declining population. Most that have are in Eastern Europe and are faced at present by more immediate challenges. Even Germany will not experience steep population declines for another 20 years. America's fertility is still at replacement level and the most recent conference publication on its fertility (Casterline et al. 1996) does not even mention population policy. Furthermore, the United States and the other English-speaking overseas European settlement countries, Canada, Australia and New Zealand, will probably be able to maintain their population sizes indefinitely with modest immigration streams that do not exceed rates experienced in the recent past and which do not markedly change their population compositions from the multicultural ones they have already developed. Many societies are not yet convinced that the present low fertility is permanent, remembering the passing of the low fertility of the 1930s and the baby boom of the 1950s. They received support from believers in Easterlin (1968) cycles and from the fact that the United Nations (1995:149) *1994 Revision* medium and "most likely" (p. 143) projection still argued for a return to replacement fertility. The latter buttress has now been removed as the United Nations (2001) *2000 Revision* postulates long-term TFRs of 1.8 for Europe, 1.9 for Eastern Asia, around 1.9 for Australasia, Singapore, Thailand and the three Caucasus countries, and 2.08 for North America.

Some governments feel that it would be inappropriate to argue for higher fertility while the world as a whole is faced with another near-doubling of population and a doubt whether it can easily sustain such numbers. The English-speaking countries, the Nordic ones and the Netherlands all told the United Nations (1989) enquiry that they were not worried about low fertility levels, and they were probably at least partly influenced by the fact that they were all major donors assisting developing countries to reduce their fertility.

Many low-fertility countries are not convinced that low or negative levels of population growth are harmful and note that there are economic analyses that support this view (e.g., Espenshade and Serow 1978; Espenshade 1978). They see the solution to the problem of finding funding to support the aged as political rather than economic or demographic. There is also the argument that low or negative rates of population growth are beneficial in that they protect the environment and ensure long-term environment and resource sustainability. As early as 1974, Berelson (p. 772) listed environmental concerns as militating against actions to raise the birth rate in the United States, Britain, Japan and Australia. In Australia, a country with less than one-hundredth the population density of Japan or one-thirtieth that

of Europe, Betts (1989) expressed a widely held view when she argued that the present population should be regarded as the most desirable because anything higher would place undue pressure on the environment and the quality of urban life.

Many Western societies believe that any attempt to raise fertility would be likely to be intrusive and, in Eisenhower's words, would place the government in the bedroom. Feminism and other movements have made it impossible to curtail contraception and, in most countries, to ban abortion. There is a widespread feeling that it is not the government's role to define the desirable type of family or individual lifestyles, although some governments may come to feel that they should do more to establish conditions which facilitate desires for higher fertility.

In some, but not all, countries there is support for financially assisting families with children, single mothers to raise their children, and mothers of young children to stay in the workforce. Most of the support is, however, on grounds of social and gender equity and fits the aims of social welfare states. In the United States and Japan such assistance is not legally mandated because the welfare state did not fully develop, but in the former many employers provide compensation for such leave through health insurance policies. Some of the strongest supporters of such assistance do not believe it will raise fertility (see Gornick, Meyers and Ross 1998).

Indeed, such assistance runs against one of the strongest forces of our times, economic rationalism with its arguments that taxation should be lower and that economic growth depends on at least the partial reduction of social welfare expenditure. Underlying these specific aims is a philosophy which holds that the market, Adam Smith's invisible hand, is likely, anyhow, to produce the most satisfactory economy and society. This implies that either fertility will rise again as the market answers the problems of working mothers or continuing low fertility is what the people really want. In addition, McIntosh (1981, 1983) has cogently argued that no liberal democracy, not even those most attuned to welfare-statism, would be prepared to spend a fraction of the sums that were allocated under authoritarian Eastern European regimes to raise fertility.

Finally, it might be noted again that the older predominant argument of the need for national military strength is no longer raised or apparently even considered seriously.

Half the people in the world with fertility at or below long-term replacement level are found in China. Here there appears to be little thought of policies aimed at raising the fertility level (Jiang 1997). The reasons appear to be that the population of China is little, if at all, below replacement level; that it has taken a considerable degree of coercion to get that far; and the view that even some population decline would probably not prove harmful. The one sign of a policy reaction to low fertility is experimentation in some areas with a reduction in coercion, but this is rather a reaction to external condemnation than an attempt to reduce the rate of fertility decline.

REASONS ADVANCED FOR VERY LOW FERTILITY

If policies are to be developed to raise fertility or to restrain it from going lower, then it is necessary to be clear about the causes of very low fertility. One point is rarely made, possibly because it is no longer policy-relevant. After 1965, fertility fell widely in the Third World at least partly because there were new and better methods of fertility control available: the pill, IUD and associated copper-coated devices, new methods of female sterilization, suction abortion and increasing access to legalized abortion; and because the "population explosion" debate had increasingly legitimized birth control (Caldwell 2001). In Matlab, Bangladesh, fertility fell to a new level every time a new effective type of contraceptive was introduced (Caldwell and Caldwell 1992). Almost certainly the same factors played a role in the passing of the Western baby boom. They certainly were important in achieving low fertility in Asia.

Some believe that lower fertility is simply a reaction to bad times after the end of the high-employment, rapid-growth period stretching through the 1950s and 1960s. Others would add the insecurity of job tenure, brought about at least partly by the application of economic rationalist theory and the reduction in the coverage provided by the welfare state. There has been a weakening, at least in the real value of benefits, of the pronatalist programs in France (McIntosh 1981:185) and Italy. In the latter, child benefits declined between 1970 and 1992 from 13.3 to 3.9 percent of the social security budget. Hobcraft (1996:523) blames occupational insecurity since the early 1970s for the British fertility decline, while Hoem and Hoem (1996:12–17) attribute the Swedish rise in fertility during the 1980s to massive social security expenditure, and the fall in fertility during the 1990s to economically worse times, as the Swedish economy found itself in trouble and government expenditure was trimmed for entrance into the European Union in 1995, resulting in an unprecedented rise in unemployment and major social welfare cuts. Witte and Wagner (1995) see no need to go beyond economic and child-care explanations when analysing the fall in the East German TFR from 1.6 at Unification in 1990 to 0.7 in 1993, or half the West German level at that date:

> Couples, knowing that unemployment is high, that their labour market value is relatively low, and that there are [now] less generous maternity benefits, perhaps less flexible employers, and far fewer child care alternatives, respond rationally to socio-economic change by limiting fertility (Witte and Wagner 1995:394).

But most explanations for very low fertility centre on the mass employment of married women with children, an explanation that must be tempered by noting that mothers were flooding into the job market in most Western countries well back into the baby boom years of the 1950s and 1960s. Some explanations emphasize that full-time employment, based on preceding lengthy education, gives women an alternative role to that of mother and even wife. The greatest emphasis has been placed on the difficulties encountered by women seeking not only to work

full-time but to give sufficient commitment to the work to gain recognition and promotion while at the same time shouldering the great majority of housework and taking long periods off to give birth and to look after young children.

McDonald (2000) essentially posits a socio-economic change model with some social changes lagging behind others and so causing a fertility crisis of indefinite duration, the length of which will be determined by societal and governmental reaction. Western industrial society has until recently been characterized by major gender differentials in the sphere of work, with the husband as "the breadwinner" working outside the home and bringing home money for purchases while the wife has been responsible for all work within the home including child care. There has, in recent years, been a move toward gender equality in both education and work outside the home. Nevertheless, women are handicapped in their ability to work, obtain continuous employment, and rise in the promotion ladder, by pressures to cease work for childbirth and when the children are young because they still undertake the majority of child care and household work. In this predicament they may choose to have only one or two children or even none. The problems can be mitigated by government intervention to provide free or inexpensive child care facilities and facilitate temporary movements out of the workforce, and by a major participation in domestic tasks by husbands. Both circumstances exist to a greater extent in Nordic countries and Northwest Europe than they do in Mediterranean Europe and Japan with the result that the current TFR in Northern Europe of 1.7 contrasts with levels of 1.3 in more patriarchal Southern Europe and Japan. McDonald draws on Abbasi-Shavazi and McDonald (1997:18–19) to show that Australians of Italian and Greek origin, with a cultural tradition of women doing most household tasks, have lower fertility than other Australians who are predominantly of Northern European descent. The anomaly of the United States, which records both the industrialized world's highest fertility and lowest government support for families, is partly explained by the access of many families to affordable child care (Rindfuss and Brewster 1996:264), arising from the wage structure and probably also by illegal immigrants working (it might also be noted that Hispanic migrants have raised the US TFR by 0.2 points). Rindfuss, Brewster and Kavee (1996) argue that in the United States fertility declined because women changed their attitudes towards working without changing their views on the amount of care children needed. Women also mitigate the problems of working by having a very different work profile from men with consequent impact on their incomes and promotions. Sweden records only 10 percent of women as housewives by listing 30 percent as full-time workers, 40 percent as part-time, and 20 percent as students or in similar activities (Hoem and Hoem 1996:13). The last category is still close to 20 percent at 35 years of age.

POLICIES AVAILABLE AND THOSE PUT INTO PRACTICE

The policies available are divided into attempts to raise fertility (or to substitute immigration), or the acceptance of low fertility and the modification of

institutions so as to meet its challenges. Many countries may do both, although rarely if ever is fertility likely to rise far enough to rule out the need for institutional change. No longer can the state ban contraception, although abortion will probably remain controversial, especially in the United States. The one area which may become more subject to policy direction is that of sex-selective abortion, especially in East and South Asia where compatibility between low fertility and strong son preference may lead to an increasing level of the practice (Park and Cho 1995).

Nearly all the methods likely to be used to raise fertility have been implemented over the last half-century by either France or communist Eastern Europe (Bourgeois-Pichat 1974; McIntosh 1981; Höhn 1988; Heitlinger 1976; Gauthier 1991, 1993, 1996). They include bonus payments for births, family allowances, paid maternity and parental leave, leave to care for sick children, tax relief for parents, care facilities for young children or tax relief for child care, flexible work arrangements for mothers and guarantees of retained promotion rights, labour force re-entry training programs, housing benefits for families with children, and educational supplements for children. Several points should be made. The first is that none of these programs costs at present anything like the expenditure made in Eastern Europe a generation ago, and they are unlikely to do so in the future. The second is that in real terms their value has been falling in recent years, especially as European Union and Single Currency requirements are met. The third is that many of them are indistinguishable from social welfare provision and the latter is the most frequently proclaimed aim. A publication of the Council of Europe (1978:254) stated:

> Population policy cannot be separated from overall social policies. It must be geared to the same objectives . . . for this reason, it is frequently a compromise, which may lessen its effectiveness from the demographic point of view.

Thus, scaling down social policies is likely to lower fertility levels.

The fourth point is that there have evolved different kinds of economic and social policies and attitudes to state intervention. In terms of per capita social welfare cash transfers expressed as a proportion of the average wage there were in the West in 1986 three groups of countries: (1) those countries, referred to somewhat disparagingly by *The Economist* magazine as "Colbertist" after Louis XIV's Minister of Finance, where the transfers are large, 20–24 percent: France, Belgium, Luxembourg; (2) those with medium transfers, 12–14 percent: Norway, Switzerland, Sweden, United Kingdom, Greece, Germany, Finland; and (3) those with low transfers, under 6 percent: Australia, Denmark, New Zealand, Canada, Japan, Ireland, Spain, USA (Gauthier 1991:10). In terms of the proportion of 3–4-year-old children in publicly funded day care, the division is broadly similar, but this time Britain joins the other English-speaking countries in the low-spending group where Thatcherite government policy aimed at reducing all social expenditure (Gauthier 1991:13). It might be noted that the countries categorized as (1) and (2) record slightly lower average fertility than group (3), hardly a measure

of policy success, but this may merely mean there is less pressure on group (3) to implement such policies.

Action to halt fertility decline or to raise fertility may also take the form of exhortation to have children or to abjure contraception. This was the policy of Fascist Italy. In contemporary Europe only France has in any sense adopted this approach. However, Asia may be different. While fertility decline in the West was not characterized by government leadership, both governments and elites urged such decline in Asia, apparently with some success (Caldwell 1993). They may play the opposite role once governments decide fertility is too low. Government exhortation appears to have halted for a time Malay fertility decline in Malaysia (Freedman 1995:15–17), but the Singapore government does not seem to have had the same success. Religious elites may during the 1980s have slowed fertility decline in the Philippines and Iran (Ladier-Fouladi 1997).

An obvious policy for preventing population decline is immigration. This policy probably will be adopted, if low fertility persists, by all the English-speaking countries of overseas European settlement: USA, Canada, Australia and New Zealand. All have experienced immigration-induced growth of half to one percent per annum even when fertility was high (and much higher immigration levels earlier in their histories), sufficient to compensate indefinitely for TFRs as low as 1.6. All are consciously multicultural societies and would probably agree to such intakes to prevent population decline. McIntosh's (1981:187–188) interviews in Europe convinced her that the low-fertility countries of Europe, with a strong sense of their historical, ethnic and cultural identity, would resist immigration on this scale, as doubtless would Japan (see also Gauthier 1993:153; Lesthaeghe and Surkyn 1988). It should be noted that immigration, other than that of male guest workers who are never joined by wives or children, would probably have little long or medium-term effect on the age structure. Young (1990, 1994) has shown this quite clearly in the case of the Australian experience.

All countries with below replacement level fertility will have to modify a range of institutions to meet the needs of a very different age structure from that of the past. There will be a need for fewer schools and smaller universities even before the population stabilizes at its low fertility level. But the greatest need for change will arise from the different age structure, with an unprecedented proportion of old people. The greatest challenge will be to pension systems, old age care systems, and health systems or health insurance. In every one of these areas experimentation has already begun, although for many moderately low fertility countries there is no immediate crisis; the US Council of Economic Advisers (1997:448–449) reported that the American social security system would be in no great difficulty until the third decade of the twenty-first century. A comparison of current pension expenditure compared with the situation two or three generations ago shows huge increases, but these are not solely the result of the changed age structure but also of better and more complete social security for the old.

As we noted earlier, the real problem with old-age pensions is not the ratio of the working age population to the old, insofar as moderate rises in the

retirement age can adjust the situation, but the fact that modern populations are more reluctant to make expenditures on the old than on the young. This is partly because the young live in the same household as the wage-earners and much of the expenditure is subsumed as household costs; but it is also because the notion of the old as dependants has largely been lost, and there are intergenerational resentments when either private or government expenditure on the old rises steeply. In Asian countries, such as Japan, Taiwan and Singapore, where the tradition of support of the old within the home has not been entirely lost, attempts have been made to encourage the retention of this system. Ogawa and Retherford (1997:59ff.) report Japan's efforts to bolster the residence of the old with their children. Of the population aged 65 years or more, 56 percent lived in three-generation households as late as 1972, a far higher proportion than in the West, but, because of changing values and separation caused by the younger generation's rural–urban migration, this proportion had fallen to 33 percent by 1995 (Ogawa and Retherford 1997:76). Japan still has only 2 percent of the aged living in institutions compared with four percent in Germany and nine percent in Sweden (Ogawa and Retherford 1997:70).

For most countries, one answer to the changing age structure is to cut the real value of pensions. This is increasingly politically difficult as the aged, and those nearing that state, become an ever bigger part of the electorate. Indeed, Preston (1984) has argued that in the United States "grey power" has in recent years influenced expenditure to be directed towards the old rather than children. The major solution—a political one—will probably be to give the appearance that the old are supporting themselves. This can be contrived by separating normal taxation from social security payments as in the United States, and steeply increasing only the latter. Or it can be made closer to the truth by having individuals insure themselves by contributing to private pension or superannuation schemes. More commonly, it is made compulsory for both the individual and the person's employer to contribute, thus disguising in each case what is in effect additional taxation. There are gains and problems in taking this route. The money becomes private investment instead of remaining with government but it may grow to huge sums with less than optimal avenues for further investment. There may be a problem of excess saving paralleling the situation in contemporary Japan. The government will probably be forced to guarantee the individual against defaulting firms and to pay the employer's share for the self-employed, itinerant workers and the unemployed. This will, of course, result in different levels of pension, as is already widely the case (but not for government pensions in Britain, Ireland, Australia and New Zealand). Japan is at present considering the option suggested in Table 14.2 of this paper, namely raising the age of retirement or when pension payments begin, and a United States bi-party committee privately convened has made the same suggestion.

There are also problems because of the steeply increasing demands for institutional care of the old. This is not a problem which can easily be addressed by adding the cost to the social security tax because only a minority of the old

need full-time care in old-age or nursing homes or in hospitals. Most low-fertility countries encourage the old to stay in their own homes or with relatives and attempt to facilitate this by visiting services or day care. The services may include providing meals, helping with dressing or bathing, and advising on health. For those old people who are transferring from residences they own to institutions it might seem commonsense to demand the sale of the residence to allow reinvestment in their new home, as has in effect been done in Britain. The Australian government attempted this but withdrew after an electoral backlash at what was regarded as an attack on the old.

The public health systems and health insurance schemes are facing problems because of increasingly expensive technology and because a growing proportion of their members are old, and so need more frequent services and are more likely than the young to require the use of expensive high technology. Adjustments to the systems will be necessary and none will prove to be very palatable to the electorate. Possible adjustments include raising premiums, establishing differential premiums according to the type of health cover the person wants or according to age, limiting available services, refusing to cover certain procedures for persons beyond a given age, restricting purchases of high technology, limiting pathology testing, and putting pressure on doctors and hospitals to keep costs down. The latter may be achieved through the pressure of purchasing agents on hospitals and health suppliers. Experience has been gained in the United States with Health Management Organizations and in the British National Health System with the General Practice Budget Holder model. Japan has enacted a compulsory insurance scheme whereby everyone over 40 years of age from April 2000 has to pay a monthly premium to ensure nursing care for the elderly (JOICFP 1997:1). The United States is in the unique situation of offering fully government paid services only to the old, with a high cost per capita but apparently lower age-specific mortality among the old than would be expected from the experience of the younger population.

THE EFFECTIVENESS OF POLICIES AIMED AT RAISING FERTILITY

The conventional wisdom is that government expenditures aimed at raising fertility achieve little or nothing (Berelson 1974:788; Council of Europe 1978:242–244; Cliquet 1991:137–138; Gauthier 1991:30), and this may be true for most industrialized democracies. Gornick et al. (1998) have computed index values for the benefits given in these countries to help working mothers with children under three years of age, and it can be shown that these indices are not significantly related to fertility levels. They also report that the English-speaking countries, which provide relatively little government support for crèches, record the largest employment drops for women with children under three years (Gornick et al. 1998:16), but here again these are countries with relatively high fertility.

But specific country studies give a somewhat different picture, although only to a minor extent in the liberal democracies. Calot calculated that France's

policies raised the TFR by only 0.2 to 0.3 children, but, if fully implemented, the rise might have been half a child (Höhn 1988:467–468). Sweden's experience is also of interest, although, with regard to the 1930s and 1940s, Hoem and Hoem (1996:4) point out that fertility began to rise before any of Alva and Gunnar Myrdal's program was enacted. Nevertheless, they believe that massive government expenditure probably did contribute to the rise in Swedish fertility in the 1980s (Hoem and Hoem 1996:15–16; Hoem 1990). Gustafsson and Klevmarken (1993:102, 114ff.) record that Swedish child-related transfers rose between 1973 and 1991 from three to six percent of GDP, mostly on public expenditure on the day care of small children, apparently increasing the female labour supply, and probably modestly raising fertility. Olah (1996) analysed the Swedish experience and concluded that the introduction of paid paternal leave increased the chance of families having more than two children.

There is greater certainty over the experience of Eastern Europe during the 1960s and 1970s and nearly every specific study concludes that the massive transfers, amounting to up to 10 percent of the government budget (Frejka 1980:70–71) effected a significant rise in fertility or the cessation of fertility decline (Heitlinger 1976:133; Berelson 1979:221; Frejka 1980:87; Andorka and Vukovich 1985:410; Büttner and Lutz 1990; Monnier 1990:127–132; Avdeev and Monnier 1995:25). The clearest case is that of Romania after 1965 when abortion was made illegal and other restrictive measures on fertility control introduced: the TFR almost doubled from 1.9 in 1966 to 3.7 in 1967 and, at 2.6, was still the highest in Eastern Europe in 1975, an effect which Berelson (1979:205, 221) compared with the earlier American baby boom. Elsewhere, the measures were mostly positive incentives. Avdeev and Monnier (1995:25) calculate that the 1981 Russian measures probably raised the fertility of affected cohorts by 20 percent. The 1976 policy in East Germany resulted in earlier childbirth (Monnier 1990:139–140), and raised fertility generally according to Büttner and Lutz (1990), who however say this was without changing the order-specific mean ages of mothers at childbirth. Most analysts believed that the effect of these measures was dwindling over time, but dramatic political changes have made proof impossible.

Gauthier (1991:8) used 1988 data to examine whether women with one or more children were more likely to remain in the workforce if governments spent more assisting them, and concluded that they were. Furthermore, at that date in Western and Northern Europe they were also more likely to have higher fertility. Rindfuss and Brewster (1996:262), examining 20 OECD countries, also concluded that fertility rises with women's participation in the labour force but would probably take the view that this meant government intervention was not helpful.

Finally, the Malaysian government appears to have stopped Malay fertility decline, admittedly at a TFR of 4.3, "by building on religious and cultural values" (Freedman 1995:15–17), while leaving Chinese and Indian fertility to continue its fall. Govindasamy and DaVanzo (1992) cautiously note that economic policy also differentially affected the races.

THE FUTURE

Very large government expenditures probably could raise fertility levels in the West, especially if they were aimed at allowing the mothers of young children to stay in the workforce (McIntosh 1981). Such large expenditures are unlikely to happen in the years immediately ahead. Gauthier (1996:205ff) gives as the three potent reasons: (1) tight budgets, (2) the growing political power of the old which will shift policies away from those that expensively assist young parents, and (3) the strength of non-interventionist and self-support ideology. Point (3) is what we have referred to as "economic rationalism" and subsumes point (1) as well. Bumpass (1990:493) suggests that there will be ever more debate but little action. Folbre (1997) and McDonald (2000) argue that an ideological attack on the patriarchy, with the aim that husbands should provide wives with much more assistance within the household, would have some effect. It would certainly be cheaper. Such a movement is likely to intensify, mostly for reasons of gender equity, but it could gain greater momentum if linked with overcoming very low fertility. Hobcraft (1996:523) blames low fertility on a specific feature of economic rationalism, job insecurity, as does Chesnais (1997a, 1997b) in two papers reminiscent of older French population concerns. The economic ideological drive that has caused this might be blunted if only because there are stronger reasons for doing so than demographic ones.

For the present, governments have sufficient intellectual support to be able to argue that such expenditures on raising fertility are not only too great but unlikely to prove effective. And, as Teitelbaum and Winter (1985:151–152) argue, there are not likely to be sufficiently spectacular demographic effects in the short run to justify government intervention. If population size declines markedly in any country, then the sentiments of both governments and their electorates may well change. Leeuw (1987:308–313) notes that between the 1977 Netherlands Royal Commission which was sanguine about fertility levels and a 1983 government position statement which said that continued low fertility would necessitate pronatalist steps, surveys of public opinion showed those favouring population decline dropping from 65 to 33 percent. Significantly, no new government initiatives have since been identified. If governments do take action, it is likely to be in Continental Europe. The English-speaking countries are too much given to economic rationalism and against social interventions to participate. Besides, all but Britain are likely to prevent population decline through immigration and the British might accept decline.

Most effort is likely to be directed at changing provisions for the old or their financing. For decades to come, political debate will undoubtedly focus increasingly on modifying pensions and health care schemes, especially for the old, and on providing alternatives to the institutionalizing of the old. Some of what is done will probably be less a changing of the taxation base than the appearance of changing it. The taxation base may be increased by extending the working span. However, this may not come about, because the central irony of this debate is that

modern economies cannot employ all those of working age. To take Germany as an example, only about three-quarters of men 20–64 years are employed, while the rest are either unemployed or prematurely retired. Such early retirement has become a way of life and change will be resisted: in Austria, where the average age of retirement is also early, a recent move to raise the age when the pension for childless women begins from 60 to 65 years, equivalent to men, was strongly attacked and withdrawn. In demographic policy, our politicians will almost certainly feel their way cautiously into the future, and give the impression of being pushed by events rather than leading. If mass population movements towards higher fertility, supported by government policies and expensive programs, come about, then they are likely to be full-blown in parts of Europe by the mid-twenty-first century. Thereafter, they could affect the whole world.

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ENDNOTES

1. This article first appeared in the *Journal of Population Research* 19 (1) (May 2002) pp. 1–24.
2. As much as one-quarter of disposable income (McIntyre 1975:367) or 10 percent of all government expenditure (Frejka 1980:70–71).
3. Easterlin 1968; Berelson 1974; Espenshade 1978; Espenshade and Serow 1978; McIntosh 1981, 1983; Teitelbaum and Winter 1985; Leeuw 1987; Betts 1989; Gauthier 1991, 1993; Chesnais 1996; Conrad et al. 1996; McNicoll 1995; Rindfuss and Brewster 1996; US Council of Economic Advisers 1997.

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CHAPTER 15

EXPLANATIONS OF THE FERTILITY CRISIS IN MODERN SOCIETIES: A SEARCH FOR COMMONALITIES[1]

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Fertility declined in most of the industrialized world from the late nineteenth century until the 1930s when much of Western Europe recorded, for the first time in history, total fertility below two, with net reproduction only three-quarters of replacement levels (Keyfitz and Flieger 1968). At that time some observers forecast that advanced industrial societies would experience a decline in population numbers (see Charles 1934), but this prediction was subsequently discarded as birth rates rose and analysis showed its flaws. It was found that many births had been deferred, and that completed family size had fallen below replacement level for few birth cohorts and by only a modest amount. Furthermore, it had required the dire economic conditions of the World Depression to produce even these modest changes. Consequently, demographic transition theorists gave little thought to the possibility that the end of demographic transition would see shrinking populations.

Nevertheless, the high birth rates after the Second World War were ultimately followed by fertility decline—from the early 1960s in the USA and from the late 1960s in most other Western countries. This decline ceased in the USA in the late 1970s, to be succeeded by a persistent rise to replacement-level fertility. But in much of the West the decline came to a halt only in the late 1980s, to be followed by continued low fertility with some very limited rises. The exception was Germany, where fertility fell during the 1990s largely because it did so steeply in East Germany, as it had elsewhere in Eastern Europe.

The result was the new phenomenon of very low fertility, defined here as a continuing total fertility of under 1.5 until 2002. Table 15.1 shows that, with some overlapping of dates, very low fertility was achieved in Central Europe in the early 1980s, in Southern Europe in the late 1980s, in parts of East Asia in the early 1990s, and in Eastern Europe and ex-USSR Western Asia as the 1990s progressed. By omission, Table 15.1 also throws further valuable light on what was happening in that it excludes some of the leaders in the fertility decline of the 1930s, namely Britain, Sweden, France, and Belgium where total fertilities at

Table 15.1. Countries with Continuing Total Fertility Below 1.5 by Region, Period When it First Fell Below 1.5, and Total Fertility in 2002[a]

Region[b]	1980–85	1985–90	1985–90	1995–2000	2000–2005
Central Europe	Germany (1.3)	Austria (1.3)			Switzerland (1.4)
Southern Europe		Italy (1.3) Spain (1.2)	Greece (1.3)		
Eastern Europe			Bulgaria (1.3) Slovenia (1.3)	Belarus (1.3) Czech R. (1.1) Estonia (1.3) Hungary (1.3) Latvia (1.2) Lithuania (1.3) Poland (1.3) Romania (1.2) Russian Fed. (1.3) Slovakia (1.2) Ukraine (1.1)	Moldova (1.3) Croatia (1.4)
Ex-USSR Asia				Armenia (1.1)	Georgia (1.2)
Other Asia		Hong Kong (0.9)	Japan (1.3)	Macau (0.9)	Singapore (1.4) Taiwan (1.4)

[a] Continuing means the period, no matter how short, that encompasses the time spent up to and including 2002 with the annual total fertility not exceeding 1.5. Total fertility for 2002 shown in parentheses.
[b] Eastern Europe includes all ex-Communist European countries.
Sources: United Nations (2001a), Population Reference Bureau (2002).

the end of the twentieth century were in the range 1.6–1.9. It also excludes what Maddison (2001) calls the "Western Offshoots" (the English-speaking countries of overseas European settlement, USA, Canada, Australia, and New Zealand) where the range was 1.5–2.1.

This paper will explore whether the extreme fertility decline that resulted in very low cross-sectional fertility rates with little likelihood of cohort fertility reaching replacement levels was a single irreversible change and whether current theories are sufficient to explain what happened across the range of affected countries. We are concerned about conclusions reached from what may prove to be the short-term heterogeneity in the fertility levels of these countries, and we stress the need for a long-term perspective on population replacement based on a single explanation for very low fertility. In general terms the paper will address the question of whether rich countries have inherent problems in replacing their population. In specific terms it will try to throw light on such issues as the following: (i) Is the

present explanation of the causes of very low fertility in Italy (or Italy and Spain) suited to a more general treatment of the phenomenon of very low fertility? (ii) Is something being missed by ignoring the situation in Central Europe, given that Germany and Austria were the first societies to attain very low fertility and may well achieve the lowest completed cohort fertility? (3) Are the current emphases on the type of welfare state or kind of family structure appropriate as explanations, or should we be stressing the lifestyles of postmodern societies or family building in a regime of liberal economics? The paper will also try to draw together some of the rapidly expanding literature on the causes of very low fertility.

A significant recent feature of the fertility decline was its bottoming-out and, in the case of the USA, its ending with a rise in fertility. There are echoes here of the 1930s. Bongaarts and Feeney (1998) argued that cross-sectional measures (like total fertility) yielded lower fertility rates when young women were deferring births than would be revealed eventually by completed family size; by choosing the cases of the USA and Taiwan, they appeared to be arguing that catch-up births late in women's reproductive spans would bring most national fertility levels back close to replacement. This was queried in the case of Continental Europe by Lesthaeghe and Willems (1999) and Frejka and Ross (2001), who all argued that below-replacement-level fertility would continue to characterize much of Europe, although probably at more moderate levels than current total fertilities appeared to indicate. Bagavos and Martin (2001, p. 7) showed that the completed cohort fertility of the European Union (i.e., the 15 countries comprising that union at the beginning of the twenty-first century) for women born in 1950 was 2.0 and for those born in 1963 would probably be 1.7. Near-consensus was reached with Bongaarts's (2002) analysis of the European situation: he concluded that "countries in the EU and elsewhere could experience a period of modest rises in fertility . . . [but] it seems unlikely that fertility will climb back to the replacement level" (p. 439). Kohler and Ortega (2002) agreed with this analysis, as did Demeny (2003). Prioux's (2002, p. 721) estimates for the completed fertility of the 1963 Western European birth cohorts showed only Germany, Austria, Italy, and Spain below 1.7, in contrast to Ireland, France, Sweden, and Norway at replacement level. Van Nimwegen et al. (2002, p. 13) arrived at a similar conclusion, but Kohler et al. (2001) calculated somewhat lower completed cohort fertility, with Germany reaching only 1.54, Italy 1.57, Austria 1.60, Spain 1.63, Russia 1.66, and Japan 1.68. The estimates were even lower in Kohler et al. (2002, p. 650). There are problems in comparing the USA with Europe in that its higher fertility is partly a reflection of immigrant Hispanic reproductive behaviour.

The deferment and forgoing of marriages of women (an old practice in Western Europe, see Hajnal 1965) had played a role in the (perhaps) temporary attainment of very low fertility by increasing steeply in all industrialized countries from the 1970s. For many young couples, the impact on fertility of women deferring marriage was partly—but not wholly—offset in Northern Europe and the Western Offshoots by the choice of cohabitation, but this was not the case in Italy, Spain,

and Japan where women's age at first marriage rose just as steeply and moved towards that of Northern Europe.

Later marriage and falling fertility suggested that childlessness was probably increasing and provoked a renewed interest in its historical role. Goldstone (1986) had re-examined Wrigley and Schofield's (1981) English data and concluded that the historical periods of low fertility were explained by the higher proportions of non-marriers, and hence of childless women. Morgan (1991) showed that in early nineteenth-century America childlessness had been around 15 percent, only half of which had been explained by failure to marry; and that by the economic depression of the 1930s, 20–25 percent of women remained childless, less than one-third of them by not marrying. Anderson (1998) demonstrated that childlessness in British marriages rose from 8 percent for those of the 1870s to 16 percent for those of 1925, and that non-replacement fertility (i.e., having no or one child) rose over the same period from 13 to 41 percent. Moreover, very low fertility had been related to deferred marriage: childlessness among women marrying at 30–34 years was around 15 percent up to the mid-nineteenth century and 23 percent by the end of the century, with the percentage of 0–1-child families rising for these women over the same period from under 30 percent to 46 percent. McDonald warns that the emphasis on childlessness can be overdone. "Differences between the average fertility levels across contemporary industrialized countries appear to be due less to the proportions of childless women than to differences in the proportion that have three or more children" (McDonald 2002, p. 423). If this is the case, there is ample room for further fertility declines.

A CHANGING WORLD

Although there is little evidence that total fertilities below 1.5 had been foreseen, there is ample evidence that vast changes that would have demographic repercussions were taking place. In the second half of the twentieth century global population multiplied by 2.4, real global income by over six, and real income per head by 2.7. In the richer countries the multiplication of real income per head was even greater: almost three times in the Western Offshoots, over four times in Western Europe, and ten times in Japan (Maddison 2001). By the century's end, half the population of the world, and three-quarters of the population of developed countries, lived in urban areas. Life expectancy climbed over the half-century from 44 to 66 years and in the developed countries from 65 to 75 years. Education levels rose to the point where, in industrialized countries, most of the population finished secondary education and girls had caught up with boys. Education and urbanization allowed women to spend most of their adult life in the urban labour force; the women's movement provided the justification, and huge growth in the tertiary sector of the economies provided the opportunity. Doing so implied being able to plan one's life, especially its pregnancies, and this became much easier with the new contraceptives of the 1960s and parallel attitudinal and legal changes affecting sterilization and abortion. Murphy (1993) spelt out the impact of the pill

on British fertility, describing the process as "irreversible," but, rather curiously, said little about the changes to society that near-perfect birth control allowed. New demographic justifications for very low fertility reassured the young about the social acceptability of deferring or forgoing births (Caldwell 2001). Such rapid attitudinal changes were assisted by an explosion in communications, creating what Chesnais (2001, p. 258) termed "new mentalities." The new forms of communication, especially television, had the potential for at least partly substituting for children. Consumerism increased and the old relationships enjoyed by homebuilding women collapsed as neighbouring women went to work and as visits to the local shop gave way to weekend car journeys to the distant supermarket (Ruzicka and Caldwell 1977, pp. 38–42). Such changes were facilitated, except perhaps in the USA, by growing secularization and a decline in the influence of organized religion (Lesthaeghe 1980, 1983; Lesthaeghe and Meekers 1986; Simons 1986; Lesthaeghe and Surkyn 1988; van de Kaa 2001). The economic crisis of the mid-1970s helped to instil low-fertility attitudes (Teitelbaum and Winter 1985, p. 115) as did the implementation of new liberal economic policies intended to prevent the recurrence of such crises.

These developments, which were of course part of the continuing changes wrought by the Industrial Revolution, had not been foreseen, except perhaps for the possible inability of society to reproduce itself. Kingsley Davis (1997, p. 623), as early as 1937 and influenced by low fertility in the world economic depression, wrote: "the family is not indefinitely adaptable to modern society, and this explains the declining birth rate." In 1984 he returned to the subject of declining fertility, which he saw as arising from the demise of the "breadwinner system," and driven by the pressures of a sexual egalitarian revolution, which, although not yet complete, was already producing conflict of fundamental demographic importance between women's roles as workers and their roles as bearers and raisers of children (Davis 1984). Davis, with van den Oever (1982, p. 511), had already warned that if "women in industrial societies today are not motivated to achieve replacement fertility . . . the social order that gave rise to it will be replaced by another—either one that supports traditional sex roles or some new order that rewards women adequately for reproduction." Ryder (1979, p. 366) had already concluded: "Perhaps the principal reason for the recent decline in fertility is the possibility now gradually opening for women to derive legitimate rewards in the pursuit of activities other than motherhood . . . our past success at population replacement, throughout all of human history, has been conditioned on the discriminatory treatment of women."

Ariès (1980) placed responsibility for the failure of societies to replace themselves more squarely on both sexes, assuming, as few theorists in this area seem to have done, that young husbands and wives are largely in agreement about their reproductive performance. In his 1962 book, *Centuries of Childhood*, he had explained the development of the small family over the previous century or more as the desire of the married couple to achieve family generational social capillarity (Dumont's 1890 usage) by concentrating their resources on a small

number of children and so preparing them, mainly by extended education, to reach socio-economic levels higher than they themselves had been able to attain. By the time the couple had married they were no longer in a position to raise themselves to a higher social level, but the strategy of enabling their children to rise was a way of making gains in a kind of class war. In his 1980 paper Ariès saw a great change underway that would possibly lead to societies which could not—or would not—replace themselves. The contraceptive revolution of the 1960s meant that young adults could have sexual relations without the need for early marriage, and married couples could postpone or forgo children. They could employ their early adult years to develop as individuals, and, in the increasingly affluent society, gain further education and work experience leading to promotion and safer tenure. Thus the days of the "Child King" were over: "His existence . . . is related to plans for a future in which he is no longer the essential variable . . . his role is changing today . . . It is diminishing" (Ariès 1980, p. 650).

Caldwell (1982), in a chapter entitled "An explanation of the continued fertility decline in the West: stages, succession and crisis," argued that increasing affluence had accelerated the move toward equality embodied in the modern West's commitment to egalitarianism in the generations and the sexes. The early marriages of the "baby boom" period were an example of the former, while the move toward women's work having at least the same priority as childbearing was an example of the latter. He concluded that the battle to erase the "breadwinner" system was far from over, and that there would be a shrinking population in developed countries early in the twenty-first century and more universally by the end of the century (Caldwell 1982, pp. 264–6). Caldwell thought pressure was placed on the family and its size by industrial society erecting a series of achievement ladders: first, a series of educational rungs for children; secondly, an occupational succession for men as white-collar employment spread; and finally a similar series of challenges for women (Caldwell 1982, p. 241). To this we could now add the attempt to secure a companionate partnership while both male and female partners were climbing the occupational ladders and creating a lifestyle to demonstrate their occupational success. According to Demeny (1997), these conclusions still held good. Subsequently Caldwell et al. (2002, pp. 19–20) modified their views by saying that they thought it likely that, in the course of the twenty-first century, governments would increasingly aim at achieving stationary population and might ultimately succeed. McDonald (2002, pp. 431–2) maintained that governments must inevitably realize that there was no market solution to the failure in social reproduction.

Population theorists tended to split into two camps, those whose explanations were largely in terms of the clash between women's work and their childbearing, and those who saw the situation in terms of an escape from traditional occupations, centring on farming, and from religious, parental, and community constraints. Summarizing the papers presented to the 1981 IUSSP General Conference on the subject, Wulf (1982) said all were agreeing that below-replacement fertility was a product of women working. Westoff (1983, p. 103) argued that "The

successful combination of women's working with childbearing and child rearing still has to be achieved, but some institutional solutions will probably emerge." Lesthaeghe (1977, 1980, 1983), Lesthaeghe and Meekers (1986), and Lesthaeghe and Wilson (1986) stressed the changes in outlook and behaviour associated with urbanization, industrialization, the growth of secularism, and "the deinstitutionalization of the family." There are shades here of both Kingsley Davis and Frank Notestein. Van de Kaa (1987, 1997, 2001) emphasized changing values and attitudes as constituting a *second demographic transition* driven by "post-modern fertility preferences" (van de Kaa 2001, p. 290).

This rapid survey summarizes low-fertility theory up to about 1990. Everyone agreed that the fertility decline was basically driven by the Industrial Revolution, much as Notestein (1945, 1953) had described. There was an emphasis on the dissolution of old family structures and on the likelihood that the transition would end with below-replacement fertility. These views were strengthened when the first country to attain very low fertility, in the early 1980s, was West Germany, with its booming economy and high average income. The challenge to existing theory was first felt in the early 1990s when it was realized that equally low fertility was being attained in the Mediterranean countries, Italy, Spain, and Greece. These were not among the earliest countries to industrialize (only Italy exhibited an average income comparable to those of Northern Europe or the Western Offshoots) and all were believed to be societies where women were primarily wives and mothers.

Subsequently, low-fertility theory began to concentrate on South–North differences in Europe. The South was most commonly represented by Italy, probably because of its substantial numbers of social scientists presenting analyses, while the North was most often represented by Scandinavia or Britain and the Western Offshoots. Defining the North in this way was attractive because none of the countries recorded very low fertility (total fertility in the range 1.5–2.1 in 2002), they were comparatively rich (median income per head in 2000 US$26,000 compared with US$19,000 in the South), and, as measured by the levels of cohabitation, divorce, and ex-nuptial births, much further along the road to postmodern values and behaviour. In fact, it appeared to be possible that postmodern values might prove to be a buffer against very low fertility.

There remained problems that were largely ignored. One was that the division was not clear cut: Canada's fertility was the same as Portugal's (total fertility 1.5 in 2002) although the fertility outside Quebec Province would have been higher and Quebec lower (Pollard and Wu 1998); fertility in Britain and Sweden was only a little higher (total fertility 1.6 in 2002). By the beginning of the 1990s Japan's fertility was as low as that found in the Mediterranean countries, which resulted in it often being compared with those countries. By the end of the 1990s Eastern Europe constituted the largest bloc of very-low-fertility countries, but the situation there was usually treated as being a reaction, and possibly a transient one, to sudden political and economic change. Finally, long-term explanations might be being sought for short-term situations. If the focus had been on the lowest fertility

in the late 1970s, the explanations would first have addressed the situation in Germany, Austria, Finland, and the Netherlands (total fertility 1.5–1.6) and then Sweden, Denmark, Britain, and Canada (total fertility 1.7). Indeed, at the 1981 IUSSP conference's session on low fertility in Europe most of the emphasis was on West Germany, with only scant interest in the countries of the Mediterranean (Wulf 1982). In contrast, much of the current debate on causation largely ignores Germany and Austria, where almost as many people live in a very-low-fertility situation as in the Mediterranean (see Kohler et al. 2002).

Underlying the whole debate were two further problems. The first was whether *ideal family size* measures were indicative of the future. Bongaarts (2001, p. 278) believes that the trend of ideal family size "is the most critical determinant of future fertility," that it has nowhere gone significantly below two, and that it is highly likely that desired and actual fertility will converge. The last point is debatable. Australian fertility has for decades been significantly below ideal fertility, and surveys show that this is a stable situation with the gap explained by couples as due to intervening problems or competing desires. Only 20 percent of the gap was attributed to economic difficulties, with the rest being social in nature—the desire to travel or first to enjoy a relationship untrammelled by children, a situation likely to characterize the future world increasingly (Caldwell et al. 1988).

The second problem is whether the forces delaying marriage are the same as those lowering marital fertility, and whether late age at marriage, especially for women, is itself a determinant of the decision to curb family growth early. Anderson (1998, p. 179) has shown that historically in Britain higher age at marriage for women was a powerful determinant of very low fertility. This is an important point because age at marriage has risen in all industrialized countries since the 1970s.

EXPLANATIONS OFFERED

Economic determinism has not disappeared, and some analysts emphasize the economic crisis in the West during the mid-1970s and the subsequent victory of liberal over Keynesian economics. Economic growth resumed but the new world was one with greater job insecurity, especially at the younger and older ends of the labour force. Hobcraft (1996, p. 523) blamed these changes, accompanied by a partial roll-back of the welfare state, high housing prices, inflation, and high interest rates, for the fall in British fertility during the 1970s and for its level remaining moderately low (although not declining further). McDonald (2000b) took this approach further, taking the welfare system into account too:

> In continental Europe, accommodation to the workings of the new market economy has been particularly problematic because of the prior existence of high fixed costs of labor and low labor force participation, both outcomes of the organization of continental European welfare states.
>
> There is a strong tendency among those in mainstream jobs to protect their rights in the welfare system. The result is an insider-outsider labor market in

> which the insiders tend to be middle-aged males and the outsiders are women and younger people. The safest strategy for women and young people is to become an "insider" and to delay or eschew family formation. The system is one of a conservative, family-wage, welfare state still based on the presumption of the male breadwinner model of the family.

In other words, the victory of liberal economics, at least as defined in Anglo-Saxon countries, had only been half achieved.

Demographers had drawn on the debate among economists about the sustainability of the European welfare state, a debate which in its origins and for many of its participants had little to do with the causes of low fertility. Some, like the contributors to Jones (1993), were interested in low fertility not as a consequence of the welfare state, but because of its consequences for age structure and the strain this would throw on the welfare state. The Continental welfare state originated in Germany in the 1880s and quickly spread to Austria and Hungary (see Kaelble 1989). It had been fashioned by Otto Bismarck under the shadow of the Paris Commune to provide assistance in old age and to help those suffering from sickness and accidents, with the aim of stabilizing existing families, and hence the state, rather than helping those most in need. William Beveridge and the British supplied a post-1945 model more egalitarian and more focused on need, which was also to influence the Continent, especially Scandinavia. Therborn (1995, p. 96) classified the British/Scandinavian system as "Universal" and that of the rest of Western Europe (including Ireland) as "Particular," giving rewards in proportion to work and earnings record, thus placing the young in an invidious position. He also divided the European countries by whether their expenditure on welfare was large, medium, or small. Employing this sixfold classification, which demographers do not seem to have used previously, one finds average total fertility in 2002 to vary as follows: 1.7 where welfare systems are Universal, irrespective of whether expenditure is large (Denmark, Sweden) or medium (Finland, Norway, UK); 1.8 with Particular systems and large expenditure (Belgium, France, the Netherlands); and 1.3 for Particular systems both with medium expenditure (Austria, Czechoslovakia, Germany, Hungary, Ireland, Italy) and low expenditure (Greece, Portugal, Spain, Switzerland). The only country that does not fit neatly into this scheme is Ireland with a total fertility of 1.9, which is probably a consequence of religious pronatalism and the discouragement of contraception. "Low expenditure" is a relative term and even the European Mediterranean countries spent a higher proportion of their Gross Domestic Product (GDP) on welfare than did the USA or Japan (Therborn 1995, pp. 88ff.). Although the paradigm works in that it offers an explanation for very low fertility, its structure depends on definitions of social expenditure; according to George (1996, p. 5) Germany's social expenditure as a percentage of GDP is second only to that of the Netherlands, and Italy's expenditure is similar to that of Sweden.

In the same year Esping-Andersen (1996, p. 66, fn. 1) divided Europe into Britain and the Scandinavian countries to be contrasted with "Southern European

states," defined as Germany, France, Italy, Austria, Belgium, Spain, Portugal, and, to a lesser extent, the Netherlands. The latter group, he maintained, had been strongly influenced by the Catholic Church (p. 66). They are generous with cash transfers but their supply of social services is almost non-existent (p. 66). Expecting the mother with children to stay at home as the primary carer, they lack childcare provisions (p. 67). France and Belgium are hybrids because they have developed universal child allowances (p. 68). So the hybrids total the Netherlands, France, and Belgium, and the division equates with that of Therborn. The position is starkest of all in Italy because of the absence of a social insurance unemployment system (p. 67). In all the Southern countries, "The conservative, Catholic imprint affects the policy of crisis and retrenchment . . . The kind of ideologically fuelled partisan battles that are fought in Anglo-Saxon nations, and even in Scandinavia, are conspicuously absent" (p. 66). In the South there is little in the way of transfers between the socio-economic classes (p. 71): "perhaps the most sensitive measure of labor market exclusion, youth unemployment rates, tend to be extremely high in countries like Italy (33 percent), Spain (35 percent), France (22 percent) and Belgium (20 percent)" (p. 79). While good Government day-care facilities look after 50 percent of Swedish pre-school children, this is the case for less than 5 percent of pre-schoolers in the Netherlands, Germany, Italy, and France (p. 79). Esping-Anderson concluded: "If the combination of familism and suboptimum activity rates defines a crucial element of the Continental European welfare state crisis, it is not easy to see a positive-sum solution in the short to medium run. Since a surge of costly social services is an unrealistic prospect, while women's integration into the economy is likely to rise, Europe's low fertility rates are likely to continue" (p. 84).

Myles (1996, p. 118) saw employment conditions rather than the welfare state as being the nub of the Continent's problem: "The high-wages/low-employment model of Continental Europe limits the growth of an American-style underclass but at the price of creating an insider–outsider problem between those with and without jobs." There is a link, however, between the Continental welfare system and employment in that employers contribute to unemployment and redundancy payments which are scaled to wage levels and years of employment so that they are more likely to retain their long-term employees in order to avoid expensive payments. Castles (2002, pp. 13–4) reported from a multivariate analysis of 21 OECD countries that the significant policy variables associated with higher fertility are the provision of formal childcare and employers allowing mothers of young children to work flexible hours.

Gauthier (2002, p. 453) tried to refine this analysis further by dividing the industrialized countries into four groups: 1. Social democratic (universal welfare, good leave conditions for mothers, good childcare); 2. Conservative (support according to employment status, sex differences, limited childcare); 3. Southern European (no guaranteed minimum income, little provision of childcare); and 4. Liberal (support targeted to needy families, little provision of child-care). Group 1 contained only the Scandinavian countries (average total fertility 1.7); Group 2 contained most of the rest of Central and Western Europe (average total fertility 1.7);

Group 3 was Southern Europe (average total fertility 1.3); and Group 4 contained Britain, all the Western Offshoots, Japan, and Switzerland (average total fertility 1.7). This implies that only Southern Europe requires an explanation. However, the fit is not as good as it looks at first sight. The predominantly Germanic countries (Germany, Austria, Switzerland) and Japan, all with very low fertility, are all misfits and challenge the classification. So does Portugal by having higher fertility than the rest of Southern Europe. We will return to these issues but note here that 100 million people in Central Europe cannot be treated just as an anomaly. Chesnais (1996) solved the problem by omitting them from his north/south contrasts. Kohler et al. (2002) found a similar solution by concentrating on "lowest-low" fertility, defined as total fertilities below 1.3, thus just omitting Germany and Austria where total fertilities of 1.3 were to be explained not by higher cohort fertility but by earlier fertility decline.

Advocates of this model, still the predominant one, argue that unnecessarily low fertility is the by-product of industrial policies that militate against the ability of the young to secure employment that offers wages and security comparable with those of older persons, and welfare policies that are inadequate in helping the young to marry early and have children. Other explanations have been put forward to replace or complement the model. Delgado Pérez and Livi-Bacci (1992, p. 171) placed an emphasis on the speed of change in Italy and Spain, with soaring incomes, huge movements out of agriculture, an unusually rapid increase in girls' schooling, and an unprecedented demand for employment by young women. It is true that real income per head multiplied between 1950 and 1998 by about six in Southern and Central Europe and by ten in Japan and Hong Kong, in contrast to the increase in income by a factor of two to three in the previously richer countries, Britain, the Western Offshoots, and Scandinavia (Maddison 2001). Delgado Pérez and Livi-Bacci see the very low fertility as transitory, as Southern Europe's welfare system adjusts to modern times. Others focus very largely on the speed with which women began to enter the workforce in countries where families were conservative in their attitudes to sex equality. Bernhardt (1993, p. 25) states: "From a feminist viewpoint, it may be argued that the incompatibility of work and motherhood is mainly a consequence of existing gender structures in society and ensuing power relations within marriage. Countries with modified gender structures would therefore seem to stand a better chance of achieving a birth rate near replacement level." Hakim (1991, 1998) has attempted to modify this picture by suggesting a typical distribution of women, at the time of her analysis and in the countries she analysed, among three categories: 20 percent in a home-centred category, 20 percent in a work-centred category, and 60 percent in an adaptive category (Hakim 1998, p. 138). Priority is given by the home-centred to raising children, while the work-centred are usually content not to bear them. It is the adaptive group who bend to circumstance and presumably would be more likely to bear children if adequately assisted by husbands and governments. Bagavos and Martin (2001, p. 22) present evidence to show that in Germany and the Netherlands mothers stay in the workforce only if well educated.

The competing theory to that of welfare provision is a theory of family structure that implies that welfare changes in Southern Europe may not raise fertility. Its proponents usually compare Mediterranean Europe with Anglo-Saxon countries and Scandinavia, once again avoiding Central Europe. The recognition that the Mediterranean family is different goes back a long time, and dispute usually centres on whether it is converging with the Northern European family. Peristiany (1965, 1976) maintained that basically similar families existed all around the Mediterranean whether Catholic, Orthodox, or Muslim. The close parallel in fertility between Orthodox Greece and Catholic Italy and Spain provides some support for this contention. Goody (1976) seemed to imply that this distinctiveness went back to the Neolithic Revolution, but his 1983 book dates the divergence of Southern and Northern Europe from the era of the late Roman Empire. By 1996 (pp. 13ff.) he is suspecting that Hajnal (1965, 1982) and the Cambridge Historical Demography group had overstated the differences between the family of Northwest Europe and the families of the rest of the world. Certainly, Banfield (1958) found the Italian family different, and to be disapproved of because it put the interests of its members first and was guilty of "familism." Important recent sources have been Kuijsten (1996) on the family dichotomy in Europe, Reher (1997, 1998) on Spain, and Santow and Bracher (1999) who surveyed both Mediterranean and Balkan literature. Reher (1998, pp. 213–4) regards the North–South division in the European family as having been ancient but reinforced by the Reformation.

The major characteristics of the Mediterranean family have been described often, with much of the material concentrating on Italy, especially its South. Bettio and Villa (1998, p. 138) identify the "Mediterranean path" as "a family-centred welfare system, a family-biased production system, and a family-oriented value system." The family is a kind of corporate body, and unmarried adults have a right of their own to live in the family house rather than merely staying on at their parents' sufferance. Indeed it is difficult for them to leave except for marriage. This prolonged stay at home makes children expensive and makes it more difficult for the mother to work outside the home. The unemployed young cannot get unemployment benefits but, as members of the household, they share whatever state benefits their father receives. The family is often likely to be the means by which the young get employment; indeed the family itself is often a business in the service or tertiary sector where children have the first rights of employment. Thus, there is a very limited supply of jobs to be obtained in the non-family tertiary sector and this situation seriously affects the employment opportunities and economic independence of young women. At least in Italy, young adults have achieved a great deal of freedom in the home, which may include an implicit license to bring partners home for sexual activity if their parents are out. This type of residential structure maintains strong sex divisions because domestic work is undertaken entirely by the mother and daughters, and sometimes the grandmother. As a consequence sons expect to do little in the way of housework or childcare when they marry. Young husbands usually live in the neighbourhood of their fathers and married brothers and they reinforce each others' attitudes to

sexual differentiation in work. The proportion of employed young adults who obtained their job within the family or through family links is 58–69 percent in the four Mediterranean countries compared with 18–21 percent in the Netherlands, Denmark, and Germany (Bettio and Villa 1998, p. 163). Such employment would be unlikely to come the young person's way if he or she had insisted on living alone. This is, however, uncommon: 1 percent of Spaniards under 30 years of age live alone, compared with 15 percent of the French and 20 percent of the Swedes (Bagavos and Martin 2001, p. 9). In Italy the proportion living outside the family has been falling and, by 1995, constituted only 4 percent of 15–24 year olds (Dalla Zuanna 2001, p. 144). Kaelble (1989, pp. 14–5), writing from Germany, regarded the two-generational family where children usually left the family well before marriage as essentially Northwestern European (including Germany), in contrast to Southern and Eastern Europe. But Bagavos and Martin (2001, p. 15) revealed that husbands helped wives in the home in Scandinavia, Britain, and the Netherlands, partly in France, but not in Germany or Southern Europe.

Low fertility has been related to changing social, family, and reproductive values, sometimes termed "post-modern values" (Lesthaeghe 1980, 1983, 1995; Lesthaeghe and Meekers 1986; van de Kaa 1987, 1996, 2001), defined by Lesthaeghe and Meekers (1986, p. 225) as "tolerance of non-conformism in family formation, and the meaning attached to parenthood." The proofs presented for these new values were mainly behavioural and hence measurable: rising divorce levels, high levels of premarital sexual activity, and cohabitation especially among the young, many ex-nuptial births, women employed even when children are still babies, and the postponement of births. By 1990 lone-parent families constituted 18–25 percent of all families in Denmark, Sweden, Britain, and the USA, 10–12 percent in Germany, France, and the Netherlands, and 5–7 percent in Greece, Italy, and Spain (George 1996, p. 12). Those believing that one could feel fulfilled while never parenting a child comprised 51–54 percent by 1997 in Germany and the USA, 40–43 percent in Britain and Spain, and 27 percent in France (Gallup Organization 1997). These measures might help to explain declining fertility in Northern Europe, but could not explain the Continent's fertility divide, unless one wished to argue that once Southern European young women kicked over the traces they would more easily combine work and childbearing and thus raise fertility. Some saw the divide as that between Protestantism turning into secularism on the one hand and Catholicism on the other (Castles 1994; Reher 1998, pp. 213–4). In the USA, Rindfuss et al. (1996) argued that American fertility stayed comparatively high because of a strong movement away from the view that young children suffered from their mothers' absence at work, a change that followed rather than preceded women's greater work involvement.

McDonald (2000a, p. 11) put particular emphasis on one aspect of the family, "gender inequity', which was mirrored also at all levels of society:

> . . . low fertility, as observed in many advanced countries today, is the result of incoherence in the levels of gender equity inherent in social and economic institutions.

> Institutions which deal with women as individuals are more advanced in terms of gender equity than institutions which deal with women as mothers or members of families. There has been considerable advance in gender equity in the institutions of education and market employment. On the other hand, the male breadwinner model often remains paramount in the family itself, in services provision, in tax-transfer systems and in industrial relations. This leaves women with stark choices between children and employment . . .

THE REGIONAL FIT OF VERY-LOW-FERTILITY THEORY

In the theoretical discussion we have so far considered, the arguments have usually been based on a comparison between countries or regions with different fertility levels. The process is usually selective and would gain, though perhaps become less clear cut, by being more comprehensive. Accordingly, we now survey the very-low-fertility populations. In searching for reasons for the lowest fertility recorded, one has to be conscious of the date. In the mid-eighteenth century we would focus on England, in the mid-nineteenth century on France, in the 1950s on Sweden, in the 1960s on Eastern Europe, in the 1970s on such Western European countries as Germany and the UK. Even if we rigidly confine ourselves to total fertilities below 1.5 (as in Table 15.1) there are five different regions: Central Europe, Southern Europe, Eastern Europe, ex-USSR Asia (the Caucasus), and Other Asia (Japan and two special areas) comprising 26 countries. Do the dominant explanations worked out for Southern Europe and specifically Italy and Spain fit these other regions, and indeed do the explanations completely fit all of Southern Europe?

Southern Europe

From the following sources, a clear picture is emerging of the forces that have created current very low fertility in the countries of Southern Europe: for Italy, Pinnelli (1995), Dalla Zuanna et al. (1998), Palomba (2001), Dalla Zuanna and Mencarini (2002); for Spain, Reher (1997), Delgado and Castro Martin (1999), Holdsworth and Dale (1999), Irazoqui (2000), Puy (2001); for Italy and Spain, Delgado Pérez and Livi-Bacci (1992), Billari et al. (2000), Dalla Zuanna (2001); for Greece, Georges (1996), Hondroyiannis and Papapetrou (2001), Symeonidou (2002); for all Southern European countries, sometimes in a general European comparison, Bettio and Villa (1998), Reher (1998), Bagavos and Martin (2001), Pinnelli and De Rose (2001).

All stress the following features: a spectacular rise in incomes and the emergence of a consumer society; rapid rises in educational levels with girls catching up with boys and a consequent increased demand by young women for employment; household work and childcare undertaken almost exclusively by women thus creating a clash with working outside the home; and the young—especially females—finding it hard to gain employment, and ill-supported by employers or the state in taking time off to give birth or care for children, or in returning to

the workplace. On the other hand young adults are welcome, almost forced, to stay with their parents, not only until employed but until married. This situation may be somewhat restrictive but it is much more comfortable than living alone on unemployment relief as is so often the case in English-speaking countries. These circumstances may well encourage some of the young to remain unemployed until a good or secure job is found and an acceptable and (at least in the case of women) an employed spouse is identified. There is evidence that employment hastens a man's marriage but delays that of a woman (Billari et al. 2000). Once married a wife has to undertake nearly all the housework and childcare, as well as providing meals for the families of her husband's brothers and care for the husband's parents, all of whom usually live close by. This makes it hard to work and have a large family, not only when the children are young but also when they continue staying at home as young adults. This is a continuing situation in so far as few marriages end in divorce—10 percent in Italy, Spain, and Greece compared with several times that proportion in Northern Europe (Pinnelli 1995, p. 82). There is little premarital cohabitation and births out of wedlock are rare. Age at first sexual intercourse in Italy, and possibly elsewhere in the Mediterranean but in contrast to Northern Europe, has risen moderately for men but more steeply for women (de Sandre 2000, pp. 23, 32ff.). Unemployment is greater among women than men and among the young than the old, and is greatest among young women. Employers have little compunction about turning down job applications from women who are or appear to be pregnant or have already had a child. The extended family still expects parenthood from young couples but will now settle for only two children or even one. Ahn and Mira (2001) reported that in Spain, with its low premarital fertility rate, deferred marriage wholly explained the fertility decline.

Some qualifications must be made. Portugal, a Southern European but not a Mediterranean country, fits only loosely into the above description (Bettio and Villa 1998, p. 166) and this probably partly explains its total fertility of 1.5. Cohabitation and ex-nuptial pregnancy are more tolerated in Greece provided that birth out of wedlock does not follow (Symeonidou 2002, pp. 26–7). Women marry earlier in Greece and Portugal, the majority before 25 years of age, than in Italy and Spain. In all these countries, the extended family expects to house young adults whether employed or unemployed or still being educated, and older women expect to look after their grandchildren while their daughters or daughters-in-law are working. There appears to be little demand for unemployment relief payments for young adults or for state childcare facilities for the very young, although a high level of Italian 3–5 year olds attend pre-school (Gauthier 1996, p. 181), and there is little evidence that such assistance would raise the birth rate. On the other hand, there is strong evidence that women's birth strike is caused by employer unwillingness to introduce flexible working hours, and to employ or re-employ pregnant women or those who are mothers. Legislation or pressure on employers could probably help here. So should a continued improvement of the economy from the harsh days of the early 1990s, helped by the fact that wages and employee benefits are still among the lowest in the European Union (*Economist* 2002a). There is also

strong evidence that more help from husbands within the home might mitigate the pressure against childbearing, although husbands, after long years of their mothers meeting every domestic need, might well acquiesce instead in settling for a single child. Eventually, social pressure or working grandmothers might lead to change.

Nevertheless, the Mediterranean family will probably continue to be distinctive as it has been for centuries. Indeed, little convergence may at present be taking place as both Billari and Kohler (2000) and Billari et al. (2000) argue. Evidence of its stability is that even in Australia, where Mediterranean immigrants share the same industrial and formal childcare framework as people originating in Northern Europe, convergence has been slow. The rates of in-marriage among Australian Greeks and Italians have consistently been considerably higher than for those of Northern European origin (Price 1994; Penny and Khoo 1996). Australian Greek girls and young women are constantly, and largely successfully, harassed not to take up Northern European sexual mores, and, although there is some resentment, there is also conformity to their own traditions and even pleasure that the family cares for them and will continue to embrace them (Packer et al. 1976). All Southern European families are prepared to have low fertility and, if necessary, to settle for a single successful child (Santow and Bracher 1999), and, by 1987–91, the total fertility of Australian Greeks was 1.5, and of Australian Italians and Yugoslavs 1.6, compared with 1.8 for the native born (Abbasi-Shavazi and McDonald 2002, p. 61).

Eastern Europe

The decline to very low fertility in Eastern Europe and the former USSR began in the early 1990s, and became precipitous in the late 1990s, with laggards after 2000 (see Table 15.1). They now form the majority of very-low-fertility countries both in number and combined population, and, apart from the two cities now termed Chinese Special Administrative Regions, include the three lowest-fertility countries in the world, the Czech Republic, Ukraine, and Armenia, all with total fertility of 1.1. Until now comparatively little attention has been paid to the causes of their fertility decline, and almost none to whether they fit into the Southern European very-low-fertility model. The explanation may have been merely the belief that this was a reaction, perhaps temporary, to a fearful crisis. Sources used here in seeking explanations for fertility change include the following: for East Germany, Eberstadt (1994), Witte and Wagner (1995), and Conrad et al. (1996); for the Czech Republic, Kalibová (2001) and Rychtaříková and Kraus (2001); for Hungary, Kamarás (1999); for Bulgaria, Philipov (2001); for Latvia, Zvidrins et al. (1998); for Poland, Holzer and Kowalska (1997); for Armenia, DHS (2001); and for Eastern Europe as a whole, Standing (1996) and Sobotka (2001).

In one sense, that of changes in real income per head, the Eastern European crisis remains very variable. Maddison (2001, p. 185), employing fixed US dollars on a parity purchasing power basis, showed that between 1990 and 1998, although average income in the old USSR had fallen by 43 percent, that of the rest of

Eastern Europe was at about the same level at the end of the decade as at the beginning. There were exceptional cases in both areas. In the ex-USSR, Georgia's average income had fallen by 64 percent and that of Ukraine and Moldova by 58 percent. In Romania, Bulgaria, and ex-Yugoslavia it had declined by only 15–22 percent, while the Czech Republic and Hungary altered little and Poland's income rose substantially. What is noteworthy is that the extent of average income change had little differentiating association with fertility, for in nearly all cases total fertility plummeted to the 1.1–1.3 range (see Table 15.1). This means that, if economic factors are important, we must look for other changes such as increased job insecurity and unemployment, a changed distribution of incomes, the loss of benefits for those newly married or newly pregnant, and a marked rise in the cost of health and educational services. Eberstadt (1994, p. 150) wrote that "the path back from Communism is *terra incognita*" and that the "transition to a liberal market order might be expected to entail far-reaching, often traumatic adjustments . . . " He supported the argument of trauma in East Germany by attempting to demonstrate steep rises in mortality (p. 146) even though there (alone among Eastern European countries) health services had actually improved because of immediate coverage by West Germany's system (p. 149). Later analysis of more complete data showed that the mortality rise had not occurred (Conrad et al. 1996, p. 332). We shall argue here that the fertility declines in Eastern Europe and the former Soviet Union were a rational adjustment to a new situation and may prove to be partly transient.

Standing (1996, p. 230) reported that the crisis in Eastern Europe had been caused by the removal of the three pillars of the former system: guaranteed employment from the time when full-time education was complete, social protection by stable low prices achieved through government subsidies, and enterprise-based social benefits, mostly in the form of goods and services. The sudden changes were shaped by international financial agencies that, even if they were not trying to traumatize the populations, believed in "shock therapy" for previously "overprotected populations" (Standing 1996, pp. 230–1). The preceding protection included massive assistance, especially after low fertility in the late 1960s and 1970s, to encourage early marriages and childbearing. Sobotka (2001, p. 2) described this as a totally distinct social system characterized by "limited opportunities, uniformity, and a high degree of 'familism.'" The latter had historical roots but it had been furthered by cheap formal childcare, progressive child payments, and housing linked both to childbearing and to marriage (pp. 25ff.). It was this system that kept the average age of women at first birth in Eastern Europe at 23 years during the 1980s while that in the rest of Europe rose from 25 to 28 years (p. 10). As the system was dismantled in the 1990s, ex-nuptial births rose to Northwestern European levels. Non-marital pregnancy levels rose even higher, but those pregnancies that were not aborted were usually followed by marriage, thus limiting the rise in marriage age but placing great stress on not having a second child (pp. 10ff.). Throughout the region there is anxiety over the future, especially about employment prospects for males and females, but also about the health, education, housing, and other costs that children will incur. There appears to be little employment

discrimination against women who are pregnant or have children, and instead a tradition of their returning to the workforce.

We will now fill out this picture, starting with the case of East Germany which, although different in many ways, is the best documented. The East German government, in an at least partly successful attempt to raise the birth rate, provided massive assistance to young married couples, especially if they had children, and even to unmarried women who bore children. By 1989, the state paid around 80 percent of the costs of children, through such direct and indirect measures as childcare, holiday facilities, and many subsidies (Ostner 1997, p. 39). With the birth of a child a young woman could obtain an apartment, and, with comprehensive childcare, enter the labour force or continue her education (Witte and Wagner 1995, p. 393). In contrast to the position in West Germany, the 1949 constitution prohibited discrimination against illegitimate children, and subsequent legislation such as the 1950 *Law for the Protection of Mothers and Children* emphasized non-discrimination as one of its guiding principles. With unification, the generous support for single mothers disappeared, maternity benefits for all declined sharply, the organized childcare system disappeared, employment conditions became less flexible, unemployment levels soared, and workforces were put on shortened hours (Witte and Wagner 1995, p. 394). By 1994 the marriage rate had fallen by 57 percent and total fertility by 51 percent. Eberstadt (1994), Witte and Wagner (1995), and Conrad et al. (1996) tend to regard these changes as a rational reaction to a change in economic regimes. The ages at marriage and first birth moved upward toward those of West Germany. Total fertility fell below that of West Germany, but, given that it had earlier been higher, it is not yet certain that completed cohort fertility will be lower.

The situation in, and explanations for, the rest of Eastern Europe are similar, except that these countries do not have the economic and social guarantees that came automatically to East Germany by its fusion with rich, stable West Germany. The Czech Republic is an interesting case because external investment—mostly German into a neighbouring country with a tradition of good workmanship—meant that incomes actually rose and unemployment was minimal. Nevertheless, there was a fear of greater unemployment and a deep apprehension about the loss of certainty of continued employment. Family benefits were abandoned in 1990 to be partly restored in 1995. Rychtařiková and Kraus (2001, p. xi) explain the fertility decline as being a reaction to "the new phenomenon of unemployment and an appalling—and until quite recently unknown—feeling of uncertainty and insecurity." In Hungary, state help at the start of marriage and childbearing, especially in the form of housing, had produced a "baby boom" for several years from the mid-1970s, but even before 1990 there was some drop in fertility rates and a rise in divorce rates and cohabitation (Carlson and Omori 1998; Kamarás 1999). Thereafter, marriage and fertility rates collapsed. Poland, in spite of its large Catholic population, has followed a similar path, with rapid fertility decline during the 1990s and a rise in ex-nuptial births as marriage prospects became bleaker (Holzer and Kowalska 1997).

The situation was more acute in those countries where income levels had fallen more steeply, but the fall in fertility was similar. Philipov (2001) provides an interesting description of Bulgaria, where in the 1960s and 1970s pronatalism had taken the form not only of help to young married couples but also of an effort to change mindsets. "There were attempts to create intolerance toward couples who had no children or had only one child, as well as toward unmarried persons. These groups were characterized as 'consumerists,' and they had to pay a 'bachelor tax'" (Philipov 2001, p. 17). After 1990 the pronatalist policies collapsed, child allowances were rendered almost worthless by inflation, and charges rose steeply in the previously low-cost nurseries. Armenia experienced a similar collapse in health and care facilities, as well as in employment, and, like the other trans-Caucasian state, Georgia, it experienced a steep fertility decline (DHS 2001, pp. 4, 56).

Zvidrins et al. (1998) present a revealing portrait of Latvia, a country originally predominantly Protestant with substantial Catholic and Orthodox minorities. Before its incorporation into the USSR in 1940, it was characterized by late marriage and substantial birth control; indeed, the Lutheran north and west had achieved a net reproduction rate of one by 1914 (Zvidrins et al. 1998, p. 14). After 1940, with the adoption of Soviet social services, the proportions marrying increased and the age at marriage fell, and pronatalist measures in the 1980s lifted fertility above long-term replacement level. After 1990, average income fell more steeply than anywhere else in Eastern Europe and in 5 years the number of employed persons declined by 18 percent (pp. 3–5). Abortions exceeded births. Zvidrins et al. concluded: "Naturally, in a period of economic crisis, values related to the subjective appreciation of life and most indicators of demographic development have been falling. Marriage and fertility rates have dropped very sharply" (p. x).

The situation in Eastern Europe has some ingredients of socio-economic shock but what has happened is an enormous transformation in the populations' circumstances, a rapid change from a super-welfare state with guaranteed employment to regimes of particularly liberal economics. The reaction has been to halt or postpone marriages and births. Marriage age is moving towards 30 years as in much of the rest of Europe, use of contraception is increasing, and abortion levels remain high. In short, Latvians have moved to marriage ages and proportions that the rest of Europe has found to be required in an age of liberal economics. Because the situation is new there is a greater feeling of insecurity than in the West, even in former Czechoslovakia and Hungary where the economic collapse has been limited and where there are attempts to rebuild some of the welfare state. The ancient familism of Eastern Europe, reinforced by Communism, is splintering. Because of the quick transition from moderate to very low fertility it is not certain how far completed cohort fertility will go below replacement level but it may need faster economic growth and the rebuilding of some of the welfare state to reverse the demographic situation.

The complexity of the situation is revealed by recent micro-economic research on the Russian situation by Kohler and Kohler (2002), which shows that

unemployed women or those in areas of exceptionally high unemployment are the most likely to bear a child. Although the authors appear to think that this is at odds with the insecurity explanation of low fertility, it may merely mean that those with a job are terrified of pregnancy, while those who judge that it will be long before there is an employment opportunity conclude that childbearing should take place before it conflicts with holding down a job.

Central Europe

The greatest test of low-fertility theory is provided by Central Europe: West Germany, Austria, and (and especially the German-speaking majority in) Switzerland. These are among the richest populations in the world, with, in the 1980s, low unemployment and only moderate change towards further liberalizing their economies. That change had been slowly proceeding and there had been no great social and economic jolts since the period after the Second World War, which was characterized by rising fertility with total fertility reaching 2.5 in Germany and 2.8 in Austria in the 1960s. Nevertheless, they were the first populations to attain very low fertility (see Table 15.1), and have been close to that situation since the early 1970s. Germany's cohort fertility is probably the lowest in Europe (Prioux 2002, p. 721). A central question is how their society and welfare systems differ from those of the rest of Northern Europe where moderately low fertility prevailed. Their near omission from theoretical analysis of the causes of very low fertility justifies a disproportionate concentration here.

Reher (1998), drawing partly on Hajnal (1982), concluded that there were individualistic societies in Northwest Europe and familial ones in Southern Europe, and that Germany and France were intermediate between the two (Reher 1998, p. 212). Although holding that some differences went back a millennium or more, he stressed the importance of the Protestant Reformation, with Germany split and France secularizing, and regarded the Industrial Revolution both as a product of the Reformation and as strengthening its effect on socially differentiating Europe into a North and a South (p. 214). Delgado Pérez and Livi-Bacci (1992, p. 162) pointed out that pre-transitional fertility levels in Germany, as well as in Belgium and the Netherlands, had been higher than those not only of Sweden, Denmark, and Britain but also of Italy and Spain. Among European migrants to Australia at the beginning of the twentieth century, the German and Irish arrivals alone were shown by the census to be maintaining high fertility (Coghlan 1903).

The family has long been the cornerstone of German society and the institution of marriage was long considered sacrosanct. Both were enshrined into the 1949 *Grundgesetz* (Basic Law), in the only sections not drafted by the victorious Allies. The Christian Democrats formulated Article 6, which places marriage, motherhood, and the family under state protection. Article 6(5) states that illegitimate children should receive the same opportunities as legitimate children, but does

not offer them equal rights. These articles rest uneasily with the socialist-inspired Article 3(2) giving women equal status with men. This contradiction in the constitution was for long unresolved and implicitly maintained sex differences.

The state stressed conservative family values, a response to the abuse of the family under the Nazis (Lawson 1996, p. 35), and the perception that the family as repository of German values was at risk. Newly found female emancipation, as well as long separations, difficulties of post-war reunions, and a large number of non-returning soldiers fuelled the notion of a "family crisis" (Moeller 1995, p. 150). The state regularly focused its efforts on married women at the expense of unmarried women. Evidence for this mindset is found in a number of pieces of legislation such as the 1950 Housing laws offering housing only to married couples. The large *Frauenüberschuβ* (female surplus) at the end of the Second World War did not condemn a whole cohort of women to be without a husband, for by the early 1960s three-quarters of women born between 1915 and 1925 were married. Heinemann (1999, p. 211), however, contends that the surplus of women had a "dramatic influence on single women's life-style." The Civil Code was brought into line with the Basic Law in 1969 with the introduction of the *Gesetz über die rechtliche Stellung nichtehelicher Kinder* (Illegitimate Children's Act).

Arguably, by addressing social inequalities between various types of families, West Germany's welfare provisions benefited only low and high-income earners, not the middle-class majority (Ostner 1997, p. 41). Kaufmann (1993, p. 151) maintains that this significantly contributed to lower fertility. Family policies were purposively Christian, formulated by Christian Democratic administrations which governed for most of the past half-century (Lawson 1996, p. 32). Successive governments felt it was inappropriate for them to intervene in marriage and family issues. As a result childcare is scarce and expensive, employers do not provide flexible working hours, and the restriction of school hours to mornings only means that childcare problems stretch into school-going ages (see Huinink and Mayer 1995, p. 195). Eligibility rules for *Kindergeld* (child support), for example, changed. When it was first introduced in 1954 only those with three or more children were entitled. In 1961 this was changed to include two children and in 1975 to one (Köhler and Zacher 1981, pp. 147–8). The significant changes were in place before very low fertility was attained. Chesnais (1996, p. 736) described this as "a socio-psychological environment . . . not conducive to childbearing."

There is no parallel to the rise of ex-nuptial births in the rest of Europe north of the Alps, partly because of restricted welfare payments to single mothers. Esping-Andersen (1996, p. 68) described Germany and Italy as the extreme examples of the "Southern Europe [or Catholic] social welfare model" in contrast to the universalistic system of Britain and Scandinavia and the partly universalistic systems (at least in terms of child allowances) that developed in France and Belgium.

Certainly West Germany's fertility was low, with the 1950–54 birth cohorts of females having Europe's highest level of childlessness at 21 percent,

and with 48 percent having 0–1 children compared with 27 percent in Norway, 29 percent in England and France, and 31–34 percent in Sweden, Denmark, and the Netherlands (Bettio and Villa 1998, p. 153). Heilig et al. (1990) described modern Germany's fertility as having a "turbulent past, uncertain future," yet despite their German and Austrian nationalities, they offered no explanation. German cultural practices encourage women to care for children aged under 3, rather than seek employment. This poses problems for those mothers wishing to work and needing care for children under 3 years of age (Ondrich and Spiess 1998), and, in spite of those who draw parallels between Germany and Italy, there is in Germany no equivalent of the Mediterranean extended family expecting and expected to look after young children of working mothers. Childcare for children under 3 has long been in short supply (Schaffer 1981, p. 103; Kreyenfeld and Hank 2000, p. 321), and this remains a reason why women do not have children. Until the 1970s, only a limited number of pre-schoolers attended kindergarten and studies suggested that low-income families used them least. As most kindergartens were non-public institutions they were either too expensive or as cooperatives required the mother to help as a part-time volunteer (Schaffer 1981, p. 103). Since then there have come into being many more places run by local communities, but still not enough of them to meet demand (Kreyenfeld and Hank 2000, p. 334). Nevertheless, in recent years welfare payments have risen, especially those paid to religious and other organizations to provide childcare.

Germany, then, has a welfare and social system that does not make it easy for women to combine work with motherhood. However, there is evidence that the decision to have a second child depends less on the wife's characteristics than on those of the husband, so that it is couples where husbands are more qualified and better providers that go on to have a second child (Kreyenfeld 2002). Bagavos and Martin (2001, p. 22) add that German mothers remain in employment only if highly educated. This suggests that very low fertility in Germany is related to an orientation toward a consumption society with the lifestyle of the married couple being paramount, although there has been a skewed welfare system that offered assistance for educated mothers. It is possible that both Germany and Austria are unique in that their long period of insecurity on the frontier of the cold war led to a "live for the present" mentality. Their marriages are essentially partnerships of the Northern European type that, in a consumerist age, can be regarded as a family even without children. So it is possible that the Germanic pattern may be typical of future very affluent countries.

Northwest Europe and the English-Speaking World

The models explaining very low fertility in Europe depend upon a comparison between very low fertility in Southern, Eastern, and Central Europe and higher fertility in Northwest Europe and the English-speaking European Offshoots. The dividing line is not clear cut: in 2002 total fertility in Canada was 1.5 and in Britain and Sweden 1.6. These are lower levels than in some countries with

intermediate-type families or welfare systems: Belgium and the Netherlands 1.7 and France 1.9 (Population Reference Bureau 2002). There is a clearer comparison with the total fertility of Australia 1.7, New Zealand 2.0, and the USA 2.1, but the latter two incorporate the higher fertility of the indigenous minority and recent Hispanic immigrants, respectively. The explanation given for higher fertility in Scandinavia is support for unmarried mothers, good and cheap childcare services, and the fact that the first pregnancy often occurs outside marriage (see Granström 1997 on Sweden; Cameiro and Knudsen 2001 on Denmark; Frejka and Calot 2001 on Scandinavia). The explanation implied for the English-speaking countries is partly a universalistic welfare system, although that argument is hard to sustain for the USA (Myles 1996). Perhaps more important is the implication that their economies are more liberal both in the changes that occurred over the last three decades and in a tradition stretching back to Adam Smith and David Ricardo. This system at present provides lower unemployment and a greater chance of the young finding jobs. Yet there is an anomaly here because the application of liberal economics has been blamed for causing greater uncertainty and hence lower birth rates everywhere. One could argue that this uncertainty now characterizes English-speaking peoples for a working lifetime in contrast to the relative security of Central and Southern Europe once a secure job is obtained, or that their populations have become inured to being economic and demographic risk-takers. France remains a problem for the model builders. Its labour structure is fairly rigid and current unemployment relatively high, but it has moderately high fertility, perhaps explained by single-parent allowances, means-tested housing assistance, paid maternity leave, and subsidized childcare (Toulemon and de Guibert-Lantoine 1998, pp. 17–8).

Asia

The development of models to explain very low fertility has been further confused by the attainment of such levels in non-Western societies—Japan, Taiwan, Hong Kong, and Macau (with South Korea's total fertility at 1.5). The explanations tend to mirror those for the Mediterranean except that none of these societies has experienced the trauma of high unemployment levels. In contrast, it is the availability of female employment that has provided explanations.

Most of those explanations have concentrated on Japan. Retherford et al. (2001, p. 65) focused on the rising age of marriage: the singulate mean age for the marriage of females (SMAM) was stable for about 20 years before 1975 at around 24.5 years and then rose in the next 20 years by 3.2 years to 27.7 years, while over the same period the SMAM for males climbed from 27.6 to 30.7 years. By 1995 5 percent of women and 9 percent of men were remaining unmarried for at least their reproductive lifetimes and these figures were likely to rise to 10 and 20 percent, respectively, by 2010 (Retherford et al. 2001, pp. 69–70). These changes were driven by huge increases in the proportion of women working before marriage, from 50 to 96 percent between 1955 and 1995, and the proportion

working for pay from perhaps 30 to 90 percent (pp. 79–81). These changes in turn were the product of massive urbanization and a steep increase in education, among females from 7 percent completing either junior college or university in 1965 to 40 percent in 1997. Retherford et al. (1996, p. 25) concluded that "Many of the more important value changes affecting fertility are bound up with major educational and job gains by women, which have led to greater economic independence and increasing emphasis on values of individualism and equality between the sexes." By 2001 Retherford et al. had drawn the conclusion that the rising age of marriage for women in Japan could be attributed to the collapse of arranged marriages, the increasing acceptability of premarital sexual relations for females, and the fact that single women (and men) could continue to live in the parental family home and enjoy a good lifestyle. The increased sexual freedom did not extend to cohabitation and ex-nuptial births (Dalla Zuanna et al. 1998, pp. 187–8).

As in the Mediterranean too, but perhaps even more so, Japanese women receive little help from husbands in household maintenance and childcare, so there are advantages in the postponement of marriage or its non-occurrence (Tsuya and Mason 1995, p. 162).

Japan's social welfare system was originally fashioned after that of Bismarck's Germany and has been sustained by a strong feeling that the multi-generation family should be the main provider of welfare. This is the model now adopted widely in Asia, notably in Japan, Taiwan, South Korea, Hong Kong, and Singapore, where a full welfare state is seen as essentially a Western necessity (Goodman and Peng 1996, pp. 200–4). It is noteworthy that very low fertility was postponed in Singapore and probably avoided in Malaysia by government exhortation and action.

TOWARD A COMPREHENSIVE THEORY OF VERY LOW FERTILITY

As industrialization spreads and incomes rise, the evidence grows that rich, highly urbanized and educated countries with few families working in agriculture may not reproduce themselves. Simply, the family is no longer the production unit. The explanatory models showing why the postmodern values of Northern Europe led to low fertility, and how the high rates of unemployment among Italian and Spanish young adults did the same, are impressive. But Northern Europe is now being used, somewhat dubiously, as an example of relatively high fertility, and the fact is ignored that the huge mid-1990s unemployment differentials between Spain (and, to a lesser extent, Italy) and Northern Europe have largely disappeared (*Economist* 2002b). They may never return, for demographic reasons: in Italy, for example, new entrants to the labour force constituted annually about 2.5 percent of the total in 1960 and 1.5 percent in 2000, compared with a probable 1.0 percent in 2030, while their ratio to retirements for those three dates can be calculated as 2.1,1.0, and 0.9 percent, respectively (United Nations 2001b).

Too many problems arise from using a single model based on welfare systems or family type. Central Europe and Japan do not easily fit the Italian model, and the fertility differential between Northwestern Europe and the rest of Europe is too small to be taken very seriously. Perhaps what needs explanation is the curiously high fertility of the USA, and even that may be largely ascribable to a highly fertile immigration stream from Latin America.

It is clear that rich, well-educated, urbanized countries do not necessarily exhibit replacement level fertility, and many may never do so again. Consumerism, a focus on job satisfaction, increasing need for dual incomes, a perception among many young people that raising children is simply too expensive, and a tendency for partnering rather than parenting to provide the family core are likely to reduce fertility. Better contraception and easier access to sterilization and abortion have provided the means for achieving any level of fertility, no matter how low. The population debate of the second half of the twentieth century provided the young with justification for not replacing themselves. Fertility has not been declining particularly smoothly, but then forces supporting replacement fertility are no longer strong enough to resist sudden crises. All young adults were affected by the contraceptive and attitudinal revolutions of the 1960s. Most were jolted by the economic crisis of the 1970s and have been left insecure by the liberal economic revolution that attempted to answer that crisis. This solution, together with the continuing integration into the European Union, led to widespread unemployment in Southern Europe as did the even more severe economic solutions that provided shock therapy for post-Communist Eastern Europe. Some of these crises may prove to be temporary, but fertility is unlikely to return to the pre-crisis level. One guarantee of that is the probable survival of liberal economics, seemingly necessary to provide the continuing economic growth expected by all societies, and the associated limitations placed on the welfare state and the consequent widespread feeling of insecurity among young adults. And young adults are not more likely to be listened to by politicians, as the fertility decline ensures that they are a diminishing proportion of the electorate. The new economic order is unlikely to divert the proportion of national income that Eastern Europe found necessary to raise its fertility modestly in the 1970s and 1980s. It is possible that the temptations of the consumer society, a sufficiently emotionally fulfilling partnership between husband and wife, and societal insecurity arising from the Second World War with a long subsequent period next to the Iron Curtain are all that is needed to explain Germany's descent into very low fertility.

It would be unwise to overemphasize sexual or generational conflict in the path to overcoming very low fertility. Mediterranean and East Asian husbands are probably more reluctant to undertake housework and childcare or to forgo their wives' earnings than they are to argue for more children. Similarly, parents are often more likely to take pride in their daughters' successful careers than to demand grandchildren.

In the long run Davis and van den Oever (1982, p. 511) may be right in stating that a social order that does not reproduce itself will be replaced by another,

and it may be, as Westoff maintained (1983, p. 103), that some institutional solution will emerge. If the required major institutional change occurs it will probably do so only as the result of promoted national hysteria about the passing of peoples and cultures and the dire consequences for national security, accompanied by fairly lucrative rewards for childbearing. This is not at all certain, since conservationists' claims, with varying degrees of proof, of an overuse of resources or deteriorating lifestyles may provide sufficient offsetting resistance.

At present, there is little public consensus on whether low fertility is a concern and how best to confront it, if at all. A study for the years 1998–99 of 417 newspapers and magazines in 11 countries (USA, UK, Australia, New Zealand, Germany, Austria, Switzerland, France, Spain, Italy, and Japan) showed that as yet there is only limited discussion of low fertility, but more on the impact of women working, changing lifestyles, limited government support for families, and controversy about the move towards liberal economics (Stark and Kohler 2002). People used to living for the here and now may have difficulties appreciating the long-term consequences beyond their immediate horizon.

Furthermore, if the explanations provided by the Mediterranean, largely the Italian model, centred on patriarchy and the breadwinner, are correct, then the tendency to fall below replacement-level fertility as incomes rise will eventually occur throughout much of the rest of the world because patriarchy is widespread throughout Asia and Africa.

More generally, a global economy governed by liberal economics creating a high degree of economic individual insecurity may be incompatible with societal replacement. Cohort fertility levels are quite likely to move to ever-lower plateaux, each transition being governed by some severe shock to the system. The mechanisms may be ever fewer couples planning to have more than two children, some deliberately remaining childless or settling for one child, but more failing to achieve a two-child family because of intervening temptations for education, occupational advance, travel, companionate pleasures, or expensive housing.

There are too many different groups of countries with very low fertility and different specific explanations for their situations for us not to conclude that there must be a common deeper explanation for all their conditions. Over-arching conditions common to all developed countries determine fertility decline, but local and sometimes transient idiosyncrasies shape the timing and tempo (see Watkins 1990). That explanation at its broadest must be the creation of a world economic system where children are of no immediate economic value to their parents. Related integral factors include, among other things, rising educational attainment for women and labour force participation. Yet, differences at the national level in legislation, policies, and the response of the population to these institutional settings, as well as family structures, partner relations, childcare expenses, and attitudes towards children determine the shape of the decline. Certainly at present the situation is aggravated by many peoples feeling the cold blasts of liberal economics to a greater extent than previously, but the acceptance of liberal economic policies is largely the outcome of the decision to award economic growth a higher

priority than demographic growth. It may be a system to which the world will adjust, much as it is claimed the Anglo-Saxon world has.

The broadest explanation would echo the 1937 view of Kingsley Davis (1997) that ultimately the reproduction of the species is not easily compatible with advanced industrial society. This is a consequence of that society's rewards in the form of a career for women outside the home and the almost measureless temptations of the modern consumer society. The example of the richest countries, and the impact of modern advertising in the context of a global economy and a near-global political system, makes people in poorer countries yearn for the same possessions, especially motor cars, often giving the desire for such possessions priority over children. There is an extraordinary simultaneity in the contemporary world. Children do not easily fit in with a great deal of travel, and the entertainment they provide can be replaced by the electronic media and other pleasures. Yet couples will probably continue to regard two children as "ideal," partly because they provide a unique and different kind of fulfilment, and usually admire even parents who make little impression on their peers. There is an awareness too that children will ultimately build up a network of relatives, the only adequate network many people may possess; and that, even in a well-insured welfare state, children may be needed in old age for company as well as physical and financial assistance. These advantages may prove to be sufficient to raise fertility to replacement level or higher in nationalistic states facing declining numbers and with a mandate from their electorate to spend hugely to overcome the difficulties faced by women or couples who want all the modern world can provide but who, if that provision can be maintained, are willing to have children as well. This time may not come for decades but it is likely that prototypes will begin to develop.

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ENDNOTE

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CHAPTER 16

BACK TO THE FUTURE: THE GREAT MORTALITY CRISES

Human history from the Neolithic Revolution until recently has been haunted by great morality crises. They have been the concern of Thomas Robert Malthus (1959) in the *First Essay* (originally published in 1798); of a scientific committee of the International Union for the Scientific Study of Population (IUSSP) which published *The Great Mortalities* (Charbonneau and Larose 1979); and of an influential article (Watkins and Menken 1985); these crises also appeared throughout Wrigley and Schofield's (1981) *Population History of England* and Le Roy Ladurie's (1974) *The Peasants of Languedoc*.

This chapter aims at revisiting the great morality crises, setting time limits to Watkins and Menken's analysis, and giving a critique of their conclusions about Malthus's position. They began by citing Malthus's seemingly clear statement on mortality:

> Famine seems to be the last, the most dreadful resource of nature. The power of population is so superior to the power in the earth to produce subsistence for man, that premature death must in some shape or other visit the human race. The vices of mankind are active and able ministers of depopulation. They are the precursors of a great army of destruction; and often finish the work themselves. But should they fail in this war of extermination, sickly seasons, epidemics, pestilence, and plague advance in terrible array, and sweep off their thousands, and ten thousands. Should success still be incomplete, gigantic inevitable famine stalks in the rear, and with one mighty blow, levels the population with the food of the world (Malthus 1959:49).

What Malthus said is clear enough. (1) Population growth can be limited by "vice" alone. What he had primarily in mind was Asian infanticide. But he apparently included sterilizing sexually transmitted disease (originating with prostitutes), abortion, and contraception. From his late eighteenth-century viewpoint he would have disapproved of the voluntary control of fertility in the modern world but he would have understood that it was one of the possible future prospects for the world. (2) An additional or a sole check on population growth could be provided by epidemic disease. It might well obviate the need for famine. When he spoke of "a strong and constantly operating check on population from the

difficulty of subsistence" (p. 5), the implication was that this did not normally act through great famines but mostly from malnutrition causing high mortality from disease. Among the poorest population this check always acted, apparently from the diseases which constituted the normal, non-epidemic situation, but, if that was insufficient, widespread famine would complete the task of trimming population numbers. He certainly believed that population growth could not for long outstrip the slow increase in agricultural production, but famine was only the last resort.

Certainly, the experience of England, which did most to shape Malthus's views, did not, over the previous centuries, support the concept of a dominant role for famine. The mortality peaks in Wrigley and Schofield's (1981) documentation of the English experience from 1539 to 1871, or alternatively to 1750 after which high mortality peaks disappear, can mostly be explained by epidemics, though there is some relation to periods of hard times as indicated in the end-piece chart. That chart also makes it abundantly clear that even in the sixteenth century mortality crises accounted for only a small proportion of all deaths. Nearly all Wrigley and Schofield's (1981) mortality spikes can be identified from Creighton's (1965a, 1965b) *History of Epidemics in Britain*, and four of them in Appleby's (1978) *Famine in Tudor and Stuart England*.

Watkins and Menken (1985:666) concluded that

> With proper caution, our results are generalizable to the mortality crises brought on by war and disease in the past. Mortality crises of all sorts were, of course, more frequent than those attributable to famine, but were also usually local, and of rather modest intensity. Thus, the results of our simulation lead us to be skeptical about the role that crises in general and famine in particular played in accounting for long-run population stability. What this analysis strongly suggests is that the far more plausible explanation for the long-term slow growth of large populations in the past is the low rate of natural increase set by normal levels of mortality and fertility.

In one sense this statement is incontestable in that it implies that non-crisis mortality accounts for more deaths than excess crisis mortality. But it is certainly contestable if it means that normal mortality is autonomous and is not affected by food availability and hence nutrition levels. It is also contestable if it implies that the great epidemics were more local and less lethal than the great famines.

The major effect of Watkins and Menken (1985) on demographic thought was their demonstration that some of the great mortality crises delayed population growth by no more than a few decades. They examined the Bangladesh famines of the 1970s and the 1959–61 famine in China at the end of the Great Leap Forward. The losses were made up in a few years, aided in both cases by a fairly rapid "normal" rate of population growth, abetted in the Chinese case by a rise in fertility and a lowered level of mortality. Their simulations show that in a population normally growing at 0.5 percent per annum (low by current developing world standards), a two-year crisis with mortality 110 percent above normal will put back growth by eleven years so that 90 years later population size will be seven

years behind what it would have been without the crisis. With a mortality rise of 150 percent over five years, 50 years are needed for recovery, and 90 years later numbers are 24 percent below what they would otherwise have been. Given that both Chinese and Bangladeshi experiences were close to the first example above, the contemporary world is unlikely to see famine-based crises demographically crippling any country. It might be noted that, as Malthus observed, famine deaths could not easily be separated from those of either normal or epidemic deaths. In the Bangladesh famines of the 1970s the rise in deaths was ascribed in the Matlab surveillance area's cause-of-death records as additional cases of diarrhoea, measles and other infections, precisely the causes of most deaths there at any other time.

Such findings are valid for the West in the last few centuries and for the developing world since the middle of the twentieth century. But this relatively benign result has not always been the case, and may not be so in the future. Everything depends on the long-term population growth rate. First, we will look at some of the great mortality crises of history, all of them, it should be noted, being epidemics. However, in three of the five intercensal decades from 1872 to 1921, India's population declined, largely from "Spanish Flu" in the last but famine being important earlier. The Great Bengal famine of 1869–70 may have killed one-third of Bengal's population (Hollingsworth 1979:18).

HISTORIC MORTALITY CRISES: DEMOGRAPHIC AND SOCIAL IMPACT

There are records of only the largest early crises and even in these there is scanty demographic evidence. We know of a plague in Athens at the end of the Peloponnesian War because Thucydides chronicled the war and because Pericles died in the epidemic (Faria 2002:19). We know that Rome lost population from both the Antonine Plague, AD 164–180 and the Aurelian Plague, AD 251–266. Both plagues were possibly smallpox (Bray 1996:12). Between them they have been blamed for the decline of the Western Empire. Ho (1959:227–256), writing of China from 1368, recorded the endless "catastrophic determinants" of slow population growth, most frequently citing famine caused by floods or drought, often aggravated by unrest and warfare. He also wrote of the Taiping Wars, 1850–64, taking 20 million lives, with some localities losing 40–88 percent of their populations (Ho 1959:241). Greater proportions still of indigenous lives were lost, often to smallpox, in the European settlement of the Americas and Australia (see Butlin 1983).

Population estimates become clearer from the Plague of Justinian (AD 541–542) because we have eyewitnesses with access to documented estimates. The principal source for Constantinople and, to a lesser extent, the whole Byzantine world, was the senior administrator and chronicler of the Empire's wars, Procopius, and his record is supplemented for Ephesus and its region by the bishop and church historian, St John of Ephesus. Procopius wrote: "During these times there was a pestilence, by which the human race came near to being annihilated" (Procopius 1916 [sixth century]:451–475). It came from Egypt, spread throughout the Eastern and then the Western Empire, before attacking the Persians and

reportedly killing most of their army. At its height in Constantinople, 10,000 people a day died of it and it continued for 3–4 months (Russell 1968:180). Mainly because of the scarcity of other evidence, there is near-consensus on the plague mortality: that it probably killed around half the population of Constantinople and one-third of the populations of both the Eastern Empire and the whole of Europe (Russell 1968:180; Mango 1980; Treadgold 1997:496ff; Sarris 2002). The plague returned in 546–8 and in successive and lesser waves until the end of the seventh century, by which time the Empire's population may have been reduced to 40–50 percent of its level 150 years earlier (Russell 1968:180), perhaps from 30 to 15 million.

Population and wealth losses, together with the decimation of the army, halted Justinian's plans to reconquer the Western Empire. Sigerist (1943:114) said that it was the end of that Empire, with, in Rome, the Lombards replacing the Ostrogoths in power and German replacing Latin as the administrative language. Even in the Eastern Empire the plague disorganized the economy, accelerated urban decline and brought into existence a more violent society (Mango 1980:68–69). Sigerist (1943:114) and Russell (1968:184) agreed that in the West it was the beginning of the Middle Ages. The plague probably ensured the success of the Moslem armies of the next three centuries and the ultimate defeat of Byzantium.

We should pause at this stage and note the growing disagreement that the infections that caused the Plague of Justinian, the Black Death, the seventeenth-century Plague in England and the Bubonic Plague originating in China in the late eighteenth century were the same disease (see Herlihy 1997; Cohn 1997, 2002, 2003; Johansson 2003). There are differences in the symptoms, the rate of spread, and the role of rats. Cohn (2002:7–24), in a chapter aptly entitled "Scientists square the circle," described how medical scientists, at the end of the nineteenth and beginning of the twentieth century, were so convinced by the existence of large swellings ("buboes") in the groin associated with disease that had broken out in Indochina and Hong Kong that they called it bubonic plague, and, because of these swollen glands, identified it with the previous plagues. Because this new (or Oriental) plague was shown to be transmitted by rat fleas, they exaggerated the presence of rats in the records of the earlier epidemics. Procopius, keen to document every phenomenon associated with Justinan's Plague, does not mention rats. Zinsser (1934:200), in his *Rats, Lice and History*, points out that the carrier of the lethal fleas, the Brown Rat, appeared in Europe only in the eighteenth century. Black pustules on the chest were described by Procopius but are absent in the modern plague, and he testified that those closely associated with victims were in no greater danger than anyone else. Unlike the modern plague, infection led to the survivors (such as Justinian himself) being immune to further attack. All that is certain is that Justinian's Plague continued for at least another 150 years, that the Black Death probably (but not certainly) continued to become the seventeenth century Plague and finally disappeared after the 1771–2 outbreak in Moscow, and that the contemporary bubonic plague is something else again. It is, of course, possible that the pendulum will swing back and some biological relationship will be shown between the organisms causing all these diseases.

The next comparably deadly outbreak was the Black Death, with estimates of the proportions of Europe's population dying ranging between one-quarter and two-thirds (Sigerist 1943:115ff; Herlihy 1997:17, 33; Cohn 2002:2; Cohn 2003). Johansson (2003) says that there is a movement towards accepting one-third. Le Roy Ladurie (1974:13), in his detailed study of Languedoc, says that in towns for which there are reliable figures, half the population died. Subsequently, population growth was zero until 150 years later and did not recover until well into the sixteenth century. The socio-economic impact of the Black Death is being increasingly seen as producing not only the Renaissance but the modern world. We are left to wonder if we have such a fixation on the creation of our own time that any conclusive change that dissolved older institutions is seen as leading to it. Le Roy Ladurie (1974:14) documented economic chaos but change; Herlihy (1997:33) wrote of the crisis of feudalism and the beginning of its end; Sigerist (1943:117) saw it as the way to modern Europe.

The Plague of the 1660s is mentioned here not because it was one of the great mortalities but because it had a similar aetiology to earlier epidemics. In London it caused during the 1660s almost 100,000 additional deaths (Wrigley and Schofield 1981:82). In the whole country the 1661 population was not attained again for over 40 years (Wrigley and Schofield 1981:532–533). Nevertheless, the low point in England's population during the second half of the seventeenth century was only 3.3 percent below its highest point. Subsequently, the same disease killed 48,000 in Messina in 1743 and 100,000 in Moscow in 1771–2 (Cohn 2002:8). Cohn (2002), far from treating the seventeenth and eighteenth-century plague outbreaks as major crises, takes their limited death tolls to show that Europeans now had greater resistance to the disease and would henceforth suffer no great mortalities.

However, in terms of global deaths, if not proportions dying, there were other epidemic calamities coming. The first was the so-called "Spanish flu" of 1918–19 which actually probably originated in China or the United States; or possible the first and relatively benign wave originated from a cross-species human infection from water birds in China, but, after jumping from humans to pigs and back again in the United States Mid-West, mutated to produce the deadly second and third waves. Even though the epidemic occurred in the twentieth century, mortality estimates vary greatly. Taubenberger, Reid and Fanning (2000: 241) put total mortality at perhaps 40 million; Johnson and Mueller (2002:105, 115) raised it to 50 million, and judged that it was not impossible that it was 100 million. Nevertheless, 50 million constituted less than 3 percent of the world's population at that time and set back global population growth by no more that three years. The total deaths were double those of World War I and similar to those of World War II. In some countries the situation was more extreme. The Indian mortality estimates have ranged from the official figure at the time of six million to a recent controversial revision of 17–18 million (Mills 1989). The latter figure is equal to over 5 percent of the Indian population at that time and the deficit was not to be made up for a decade. The extraordinary characteristic of "Spanish" influenza was its

high infectivity, characteristically infecting one-third or more of the population, in contrast to its low case-mortality rate which ranged from 2.5 percent in the United States to 7.5 percent in India.

Until 1980 this seemed to be the end of the story. But in 1981 AIDS was recognized and has since proved itself to be a great mortality, globally in numbers and in Southern and Eastern Africa in proportions dead. By early in the twenty-first century AIDS had globally killed over 20 million people and had infected, and probably doomed to a premature death, another 40 million (Stanecki 2004:7). The total of 60 million constituted only one percent of the world's population or about one year's population growth. Nevertheless, unless a reliable vaccine is found, the global figure could eventually rise to 150 or 200 million, or more. But in some parts of the world, notably currently in Southern Africa, AIDS not only is a major mortality crisis, but has characteristics that may point the way to understanding possible global mortality crises of the future. We shall note the possibility—a not negligible one—that a future epidemic could have a proportionate impact greater on the world than did Justinian's Plague on Byzantium or the Black Death on Europe. Southern Africa's current population is around 65 million, higher than that of the Eastern Empire in the first decades of the sixth century and similar to Western Europe's in the first decades of the fourteenth century.

The situation in Southern Africa is a forecast of what the new world and the new developing world may have to come. If the region is defined to include South Africa, Zimbabwe, Namibia, Lesotho, Botswana and Swaziland, the first two listed constitute 70 and 20 percent respectively of the population. The six countries exhibit fairly similar demographic behaviour and susceptibility to HIV and AIDS. What distinguishes them from the rest of sub-Saharan Africa is that they have largely completed their fertility transitions. The region now has a total fertility rate of 2.9 and is projected to reach replacement level in 20 years (United Nations 2003). Without AIDS the regional life expectancy would be almost 70 years but with the epidemic it is 20 years shorter (Stanecki 2004:20). The reason is an adult HIV level around 25 percent, which translates into a lifetime chance of dying of AIDS of over 50 percent. The United Nations (2003) 2002 medium projection shows the Southern African population declining between 2005 and 2050 by almost six million or nine percent. Even at mid-century the decline is projected to continue. In Botswana the population decline over the next 45 years is projected to be 23 percent.

INSIGHTS

Malthus summed up the situation surprisingly well. "Vice," in the form of abortion and contraception, can completely control population growth. Indeed, it has already brought growth to a halt in much of the industrialized world and is likely to do so for the global population before the end of the twentieth century (United Nations 2004:12). "Misery," in the form of nuclear warfare, could greatly diminish population. Epidemics and "sickly seasons" have limited European population

growth over the last 2,000 years or more and have been abetted to only a small extent by famine. The situation in China and India may have been different but we have insufficient information to decide.

Malthus knew that sickness and mortality were highest among the very poor and most malnourished. Chen and Chowdhury (1977) showed that this remains the case in situations like that of Bangladesh, at least in a subsistence crisis. Such crises might have been expected to ignite the great epidemics. Surprisingly, all the evidence goes the other way. Far from being in subsistence crises, the populations struck by the Plague of Justinian, the Black Death and the seventeenth-century Plague were all reported as prospering at the time when the epidemic began. Epidemic mortality seems to be autonomous as Boserup (1965) argued, but the historic persistent slow growth of population in keeping with subsistence growth suggests that Malthus was right in arguing that famine was the final stage in trimming population.

Watkins and Menken (1985) were right in their assessment of the limited demographic damage arising from famine mortality in the late twentieth-century China and Bangladesh. This holds for any population with moderate population growth: they assumed a modest 0.5 percent per annum in their model. But this growth rate has not characterized human populations for most of their history: neither Europe before 1500 nor much of the developing world before the twentieth century. In these circumstances the scars of a mortality crisis could last for centuries and disorganize society.

Of more immediate concern is that this may well be the future situation too. Europe's annual rate of population growth according to the United Nations 2002 medium projection is already negative and will be almost −0.5 percent by mid-century. The world's population as a whole will also cease growing by the end of the century. This means that any mortality crisis would leave long-lasting, and possibly permanent, scars on the population. Such an event would also give rise to national concern because of increased losses in a population already declining.

We have been warned of worldwide famine (Paddock and Paddock 1967; Ehrlich 1971; Meadows et al., 1972), but the evidence for this is thin and undermined by continuing fertility decline and growing agricultural output. We live in apprehension of global nuclear war but the chances seem to be against its occurrence. This is no longer the case with regard to epidemics. The reason is the AIDS epidemic.

The AIDS epidemic has proved not to be a global mortality crisis. Even if it eventually kills 150 million people, that would retard global population growth by only about 2.5 years and reduce the high point of human numbers in the late twenty-first century by less than two percent. One reason is that for part of the world its occurrence has demonstrated that great mortality crises may still occur. By the time the Ugandan epidemic is over, AIDS deaths will amount to about the same proportion of its initial population (i.e., that of 1980) as the Soviet Union's losses in the Second World War. The second, and most important reason is that it has demonstrated it is quite possible that new infections will emerge that are, like

AIDS to date, incurable, and that, like influenza, are easily spread from person to person even where physical contact has not taken place.

The World Health Organization (2004) warns of new deadly varieties of influenza. Cross-species infections, usually with further mutations, are always possible. Water birds, pigs, or both, may serve as reservoirs of pathogens waiting to cross species boundaries. The growth in populations, its urbanization, and ever-easier transport aggravates the situation. Preston (1977:11–12) showed that even families in developing countries do not replace all dead children. It is only too likely that the high-income, low-fertility, urban populations of the future will not even try to do so.

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