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Author(s): Christian Leipert

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International Correspondent's Report

A Critical Appraisal of Gross National Product: The Measurement of Net National Welfare and Environmental Accounting

Impressions and Reflections in the Wake of Discussions Conducted During a Visit to the United States in May 1985.

On the basis of my observations I would venture to assert that there is in the United States, to all intents and purposes, no discussion of the need to develop fundamental innovations in the area of economic, social, and ecological information systems. By this I mean research aimed at discovering a substitute for gross national product (GNP) as the key indicator of growth and welfare in the industrial countries: or initiatives whose purpose is the systematic—related to economic cause and effect—reconciliation of available energy and raw material resources and environmental conditions and their change over time (rates of extraction, consumption, recycling, and changes in environmental indicators in all relevant areas).

The main reason for this seems to be a perception of the problem differing markedly from the political debate underway in Western Europe. In the United States, the debate over economic policy is still conducted with exclusively economic arguments and indicators. The higher the annual GNP growth rate, the better it is for the individual, the nation, and the entire world. There is, of course, discussion of environmental issues, but these discussions are conducted not by economists, as a necessary factor in and result of economic development or of a particular (in this case environmentally blind) economic perspective, but by policy-makers, scientists, and citizens concerned with the environment. Those who do discuss environmental issues treat them as the special problem of a highly developed industrialized society, and

as one that can be solved in the context of specially developed policies and regulatory bodies. In other words, there has been no diminution of the legitimacy of the traditional economic model, in which economic and social progress is marked by GNP growth. Today's environmental and resource problems are not (yet) viewed as evidence of the need to discard this model. They are seen as irritating phenomena accompanying economic development, deserving of at best sporadic attention, that can be controlled by the traditional methods of taxes and levies and economic cost-benefit analysis.

There is virtually no contact between the parties involved in the scientific discussion regarding a revision of national accounts (including input-output accounts) and the creation of statistics on the environment and natural resources. This is revealed with particular clarity by a glance at the "Progress Report on the Revision of the System of National Accounts," published in late 1984 by the United Nations Statistical Commission [United Nations, Economic and Social Council, Statistical Commission 1984]. The report outlines current intentions and work in progress for the planned revision of the system of national accounts—with a 1990 target date—during the second half of the 1980s. The system is of crucial importance for the structure of economic reporting in all industrial and developing countries. This declaration of intent for the organization of national accounts, which, if past experience is any guide, will be binding well into the next millenium, contains not a single word on the consequences arising from the demands made by the economic process on the natural environment. There is but one passing mention (on page 22) of the intention of the U.N. Statistical Division to draft and circulate to member countries a discussion paper regarding the definition and measurement of the depletion of raw materials and their possible inclusion in the national accounts. The widespread criticism of the exclusion of the interrelationship between the economic process and the natural environment from the calculation of GNP, heard in scientific circles for the past fifteen years, has had no impact whatsoever on the statistical organizations responsible at the international level.

Inquiries at the U.N. Statistical Division in New York revealed that including the demands made by the economic process on the natural environment and the consequences thereof was regarded as too large and complicated an exercise. Furthermore, international organizations, burdened by requirements for concertation between the statistical offices and the relevant ministries in their member countries, are reduced to the lowest common denominator. This normally translates to retaining the traditional general accounting framework and focusing the work of revision on problems of detail.

If we are today already aware of the problematic nature of the orientation of economic policy, with all its crucial importance for the overall development of society, around the GNP growth rate as an indicator of success for the conditions of mankind's long-term ecological survival, we can regard this process of revision for the future only with the deepest skepticism. In view of the accumulated environmental damage, we can only assume that the environmental and resource situation will only deteriorate further, especially in the Third World.

Richard Ruggles of Yale University, one of the pioneers in the area of national accounts, and Wassily Leontief of New York University made me aware of one important factor responsible for the current dearth of major research projects in the area of the development and expansion of economic information systems. Under the Reagan Administration it is virtually impossible to obtain substantial research grants for projects involving the further development of economic reporting.

In view of its confidence in the functioning of market forces, the Reagan Administration sees no need to develop new data or indicators.¹ Once freed of excessive burdens of taxation and government regulation, the markets will determine the proper allocation of economic resources and the optimal reconciliation of production and consumer demand. There is thus no need for the accumulation of more data that might, moreover, be used for more rigorous central planning of the economic framework or of long-term industrial policy—purposes that, from the predominantly neo-conservative perspective of the administration, run counter to the true path of market-oriented policies. The Reagan Administration rejects the whole thrust of the work of Leontief on the application of input-output analysis in formulating economic policy and has not forgotten his advocacy in the 1970s of concepts of central planning of the economic framework, of long-term industrial policy and of a fundamental improvement in the statistical arsenal for analyzing socio-economic development in all politically relevant areas. The environmental crisis, increasingly recognized since the early 1970s, and the growing awareness of the interrelationship between economic development and environmental destruction has nevertheless produced political interest in the United States for cost-benefit analyses. Projects involving the determination of costs and benefits of environmental protection measures are oriented towards a specific sector or a specific planned or existing piece of environmental legislation.

This is true of the work of the Environmental Protection Agency (EPA), which is close to the political arena, with a mandate to meet the federal government's need for scientific advice in the area of environmental protection. Discussions with EPA and Resources for the Future

(RFF) revealed that the government's needs often lie in the area of cost-benefit analysis for limited projects. For all the hundreds of economists, lawyers, and scientists on its staff, the EPA has no one who is concerned with fundamental questions of the systematic balancing—of the overall economy, of changes in environmental conditions in the wake of industrial development, of the integration of environmental and resource changes, or of the social costs of environmental deterioration—in an expanded system of economic and ecological reporting. This institution is concerned exclusively with projects that are local, sectoral, or specifically related to the environmental media; in other words, that have to do with the microsphere of industry, government, and environment. The government requires from the EPA, cost-benefit analyses for concrete legislative proposals involving a specific industry or a limited number of industries, a product or a product group.

The distinguishing feature of cost-benefit analyses is the attempt to quantify and assign a monetary value to all the cost and benefit components. The aim is to homogenize all costs and benefits by means of a monetary criterion, on the basis of which aggregate comparisons of the costs and benefits of the project in question can be established and the size of the surplus costs or benefits estimated, thereby generating the appropriate recommendations to the policy-makers.

There is a sharp scientific debate about cost-benefit analyses in the environmental field in general and specifically regarding the implications of the use of an exclusively monetary criterion.² The problems are of two kinds: first, that a number of (strong) value judgments must be accepted in transforming categories of needs and damage, unrelated to actual market conditions, in monetary figures representing demand, willingness to pay, and loss of income and assets. Second, is that, consciously or unconsciously, the goal of monetarizing all costs and benefits has the effect of reducing their importance. Much (potential) environmental and health damage stemming from specific production or consumption processes has hitherto been inadequately proven from an economic standpoint, and has, moreover, an impact extending far into the future, in addition to concrete effects that depend on the total complex of economic, social, and ecological conditions. The exclusive use of monetary criteria thus limits, and ultimately potentially falsifies, the dimensions of the problem and thereby, in fact, leads to an underestimation of the danger posed to humans and to the environment by economic activity.

The fact that this institution, with its enormous scientific arsenals, is concerned exclusively with projects at the micro-level reflects its integration into the dominant political process, which is limited to politi-

cal intervention for solving acute environmental problems. A macro-observation of the co-evolution of industry and the environment over the past fifteen to twenty years might produce insights into the crisis-producing and, over the long term, untenable nature of prevailing trends in production and consumption. The current administration, however, shows no interest—quite the opposite, with its attempts to expand free enterprise through its policy of deregulation.

As insurance against the eventual need for political reaction to revelations of increasingly severe environmental and health damage caused by widespread air pollution, the political requirement is met by cost-benefit analyses of specific measures, such as the introduction of lead-free gasoline, new, lower limits for toxic substances in emissions, highway speed limits, new fuel-efficient engines and so on. This type of micro-perspective, however, impedes consideration of the transportation system as a whole. This worm's eye view of the status quo prevents the emergence of questions about the future role of individual transportation, possible drastic changes in the structure of the various modes of transportation, a settlement pattern that would reduce obligatory commuting and be in harmony with environmental, health, energy, and raw material considerations.

Journey Into The Past

In the course of my trip I had an opportunity to visit the most important representatives of the first wave (1968–1973) of research into net national welfare accounting, which takes account of the essential elements of the case against the concept of GNP. The forerunner of this whole research direction is, of course, the late Simon Kuznets, winner of the Nobel Prize for Economics in 1971. Interestingly enough, he won the Nobel Prize not for his critical work on national accounts, but for his longitudinal and cross-section studies of economic growth and income distribution in industrial and developing countries.³

In response to the question as to why, in the decisive debate of the 1940s, he remained almost the sole prominent economist to insist on a substantial (and not merely formal) final-product orientation of the concept of GNP, Kuznets replied that his entire career as a research economist had been based on the premise that economic activity must serve the needs of mankind. When applied to the concept of GNP, this meant for him that GNP should be a criterion for the net production of a society, which has a positive value in light of human needs.

As we know, he was not successful in gaining acceptance for his welfare-oriented approach as a basis for the concept of GNP. This is

one reason—and not the least important—why we have again been embroiled since the late 1960s in a scientific and political debate about the purpose of GNP as a goal and as a success measure of the economic development. Since that time many signs have shown an increasing disparity between GNP and (economic) welfare. Only in the 1950s and 1960s did it prove relatively unproblematic to include in the calculation of GNP, without differentiation, all goods and services to which the market assigns a value, as well as those provided by the government—valued on the basis of their production costs—and to leave out the separate, non-market (household) sector. In light of the specific socio-economic (and also ecological) conditions prevailing at the time—and which disappeared in the transition from the 1960s to the 1970s—growth in GNP became the central indicator of national welfare and success in the industrial countries.

In the debate at that time, Kuznets occupied the minority position. In this context it was interesting to learn from him that he had been a student of Wesley Mitchell, the great business cycle researcher and co-founder of the National Bureau of Economic Research in the 1920s. Mitchell belonged to the institutionalist school, as we all know. Kuznets thus comes from a tradition of critical research, and the decidedly empirical orientation of Kuznets's and Mitchell's research in the 1920s was typical of the generation of critical economists of that time.

Although Kuznets was one of the first to formulate and explore in detail those elements of criticism of GNP that are still considered essential, he never produced an empirical calculation of GNP oriented towards final production (economic welfare) that met his main objections. He never went further than the calculation of partial aspects (such as the negative impact on national welfare of agglomeration costs in industrial countries), and even this was usually in the context of comparisons of economic welfare between industrial and developing countries.⁴ In answer to the question of why, beginning in the early 1950s, he had given up on the topic of revising the calculation of GNP to give it a welfare orientation, he emphasized that he had underestimated the logical and causality-related difficulties inherent in the analysis.

There are, in fact, serious problems in the identification of social costs of the economic process, which, to the extent that they appear as a positive value in GNP, must be subtracted from conventional GNP in the transition to a figure of true net production. The identification of causal relationships, for instance between environmental pollution and damage to health, materials, buildings, and vegetation, encounters difficulties, since negative effects are often caused by a multiplicity of factors.

In the second half of the 1960s, Arthur W. Sametz was the first to tackle the task of developing a net national welfare product from the existing GNP calculations and applying them empirically to the United States. His work could have been done by Kuznets himself; all the basic calculations, subtractions from and additions to GNP in his work belong in Kuznets's critical tradition.

Since the early 1970s Sametz has been working as a financial economist at the New York University Business School. My conversation with him revealed that his work on a macroeconomic welfare indicator was for him an expedition into relatively unknown territory, and one in which he became involved as a result of special circumstances. These circumstances are themselves most interesting in the sociology of knowledge, for they shed light on the iridescent role of net national welfare measurement in economics and statistics.

Sametz came upon the topic through Wilbert Moore at Princeton, who in the 1960s was one of the most important researchers and promoters of research into social indicators, an area then still in its infancy. Moore asked him to join a research group that was short on economists. Presumably the idea for his approach came from the sociologists, whose representatives in the social indicator movement, especially Bertram Gross, liked to vent their criticism of economic indicators that were too narrow and that were qualitatively inadequate for broad social reporting on GNP. Gross talked of a new economic philistinism in connection with the dominant social role of economic indicators, especially the use of GNP as a measurement of national welfare and as an indicator of the success of economic policy. The social indicator movement, or at least its politically aware and critical exponents, assumed a position explicitly thereof [Gross 1966].

Among economists, however, national welfare-oriented criticism of GNP remained the special topic of a few. Within the profession it was not accorded the same theoretical and policy importance it was by many participants in the discussion from the social sciences, business, social, and environmental circles. None of the previous initiatives in measuring net national welfare—I am not entirely certain about the Japanese one—came from the GNP camp, either from practitioners or from theoreticians. Research initiatives were usually generated by political issues. The practitioners of national accounting, however, were always to be found in the front rank of the critics of this type of model calculation, which they regarded as suspect because of its excessive number of “arbitrary” assumptions and estimates.⁵

From this perspective it is perhaps no coincidence that the first draft of a net national welfare product was produced by a financial econo-

mist, rather than a member of the guild of theoretical and practical adherents of GNP. Methodological scruples condemn adherents of GNP to inactivity in this area. Without the conviction—regardless of whence derived—of the need for revised indicators of national welfare-oriented net production and net consumption for qualitative questions, it is impossible to mobilize the intestinal fortitude to display vulnerable calculations concerning difficult problems of delimitation.

James Tobin, the world-renowned Yale economist who was awarded the Nobel Prize in Economics in 1981 for his macroeconomic work in the Keynesian tradition, also confirmed the political impetus behind the development of an indicator of net national welfare. Together with his colleague, William Nordhaus, he developed, in the early 1970s, a consumption-based indicator of economic welfare with the aim of influencing the political discussion then underway in the United States [Nordhaus and Tobin 1972]. Their initiative was aimed at what was in their view the nonsensical zero growth debate. They wanted to show that GNP, for all its flaws, nevertheless generally reflected the development of economic welfare. Their "Measure of Economic Welfare" grew somewhat less strongly than GNP during the period 1929–1965.

Tobin believed that, for short-term investigations, GNP growth could still function as a measure of economic welfare. As long as the annual rate of economic growth was linked to an increase in employment, the positive welfare context could not be denied.⁶ What in the short term appears to be an increase in national welfare can nevertheless, from a long-term economic and ecological perspective, turn out to be a reduction in and an impairment of the basis of society's enduring welfare. In a situation where unemployment is high, as it is today, it is beyond dispute that an increase in employment, concomitant with an increase in production, results in an increase in the individual welfare of those unemployed who thus find work. They are able once again to provide for their own and their families' existence with the fruits of their labors. This can go hand-in-hand with a decrease in society's welfare when the increase in production leads to a more rapid rate of depletion of non-renewable raw materials and energy resources, to excessive use, and resulting loss, of supposedly renewable resources or to severe additional, partly irreversible environmental damage. The sole presupposition here, of course, is that society has an interest in its own survival that far exceeds the individual's time reference.

If against the background of the ecological crisis we suddenly become aware of the crucial importance of non-renewable resources and the irreversible nature of damage to the ecosystems and to resources that are in principle renewable, GNP growth rates—with no further qualifica-

tions—lose their importance as an indicator of society's welfare. In order to judge their relevance to welfare at a time when awareness of the ecological limitations is increasing, there is a need for a great deal of additional information. How great a proportion of gross production, for example, will be required to compensate for damage and losses caused by the economic process, and to replace environmental functions that were formerly available at no cost? To what extent will deposits of renewable resources, as a result of the production process, be irreversibly damaged, used in an ecologically satisfactory manner, or expanded by ecological development measures? What implications does production have for the consumption of non-renewable resources? What role does recycling play? What is the role of the transition from the consumption of non-renewable resources to the use of renewable resources? How great is the environmental damage caused by production? What sectors produce without emitting toxic substances, or with drastically reduced emissions?

If these qualifications, which in the future will be essential, are taken into consideration, there should be no contradiction between the short- and long-term impact of the growth of GNP and employment on the welfare of the individual and society.

Current Developments in the Area of Economic and Ecological Accounting

The work and discussions in progress since 1983 at the World Bank and at the United Nations Environment Program (UNEP) are especially important in the development of a statistical base for the environment and for natural resources and of foundations for integrating economic and ecological data. In Washington, I was able to talk with Henry Peskin (Resources for the Future), Edward Wolf (Worldwatch Institute), Robert Goodland (Environment and Scientific Affairs Department of the World Bank) and in Baton Rouge with Herman Daly of Louisiana State University, all of whom have been closely involved in the evolving debate over "environmental accounting."

The work currently underway at UNEP and the World Bank's Environment and Scientific Affairs Department is to some extent a reaction to the decision of the U.N. Statistical Division to abandon its attempts to develop a statistical system for the environment and for resources, which in turn would make it possible to construct higher aggregate indicators. Instead, the Statistical Division decided to concentrate on improving and extending environmental data-gathering capacities for all member states, especially in the Third World.

The papers and reports stemming from two workshops on Environmental Accounting in March 1983 and November 1984 reveal that the discussions of the best way to penetrate this unexplored territory are by no means exhausted. This is apparent even in the fundamental question of whether environmental accounting should be developed in the context of expanding and modifying GNP or, to begin with, separately and independently of economic reporting, with the possibility of its eventual integration into economic information systems.

Peskin, for example, is an energetic advocate of the proposition that environmental accounting should begin with the modification and expansion of economic accounting. The changes in the environment and in resources brought about by economic activity (demands on the environment and generation of toxic pollutants and subsequent damage) should be recorded directly in modified economic indicators. In his view, there is a danger that economists and economic policy makers (who are influenced by the economists) will continue to ignore environmental factors unless they are integrated into the accounting system that absorbs, if not monopolizes their attention, namely the national accounts. In most countries economic planners wield more power than environmental planners.

Roefie Hueting of the Netherlands Statistical Bureau and Richard Norgaard of the University of California counter this objection by saying that the inclusion of environmental factors in economic accounting systems is possible only to a limited extent. At the same time, furthermore, a typically economic distortion occurs, because the emphasis is on those factors and aspects that are relatively easily monetarized.

According to Hueting, an ideal combination of environmental factors and GNP would occur if losses of environmental functions and resource depletion in the wake of economic activity were recorded as costs for the period in which they occurred and the repair of impaired environmental functions as final demand for goods and services for the period in which they were undertaken.⁷ This approach however, is not really feasible. Only in exceptional cases is it possible to construct shadow prices that accurately reflect the value of environmental functions and resources. In the neo-classically inspired environmental economics, particular use is made of indicators of willingness to pay and other auxiliary values.⁸ In contrast to Hueting, Peskin sees the possibility of consistently including environmental factors in GNP precisely through applying the methodology of neo-classical environmental economics.⁹ Hueting, on the other hand, prefers a partial solution to this problem, and feels this view is shared by most authors. The solution consists of a goal-oriented delineation and differentiation of GNP cate-

gories of environment-oriented expenditures such as: to reduce environmental stress; to remove waste and other environmental pollutants; to control the detrimental effects of environmental stress (for example, through noise barriers); to repair ancillary damage (for example, damage to buildings and health); to compensate for higher production costs occasioned by environmental factors (for example, higher costs of water purification due to ground water pollution); and to compensate financially those who have suffered damage.

There is a strong similarity between this proposal and the basic concept behind the current project on "environmental damage, defensive expenditures, and measurement of net national welfare" undertaken by the International Institute for Environment and Society in Berlin. The aim is to identify society's "defensive expenditures," which, in welfare and from a longer-term perspective, do not form part of net production but rather represent additional costs of economic and ecological reproduction occasioned by growth and concentration.¹⁰

Hueting believes that a step along this path would be an initial step in the right direction. The isolation of environment-related expenditure categories would make possible a heightened awareness of the interrelationships between production and environmental destruction—although admittedly only to the extent that environmental stress and damage have already produced economic reactions. Beyond that, the identification of society's environment-related defensive expenditures prepares the ground for an answer to the question: is national income or net production still rising in real terms, or does it merely appear to be because of an obsolete accounting system?

One further advantage of this procedure is the creation of the necessary prerequisites for linking environment-related expenditures with satellite accounts, in which the (environmental) results of these economic counterreactions can be recorded as physical values. As long as the limitations of this approach are recognized, Hueting is fully justified in pursuing it. The difficulties of this type of differentiation and partially new interpretation of (part) aggregates of GNP are to be found less at the conceptual level, as far as changes in established conventions are concerned, than in the empirical conversion that gives rise to problems of identification, delimitation, and the collection of relevant data.

Norgaard's position is the direct opposite of Peskin's. He speaks of two schools of thought.¹¹ One advocates the incorporation of environmental and resources factors in an (expanded) economic accounting. Peskin, for example, would be considered a rigorous advocate of this school. The second, to which Norgaard owes his allegiance, regards the separate development of environmental and economic accounting as

the most promising course. Both the goals and the problems of measurement of the two approaches are different. For users of the systems (politicians, planners, scientists, concerned citizens) the aim is to establish the methodological prerequisites for the integration of information from both accounting systems. Perhaps the most important argument against according environmental accounting a role subordinate to the further development of national accounts, Norgaard suggests laconically, is that "it simply doesn't work." It is impossible to create reasonable monetary values that are susceptible to interpretation for many (including some of the most important) environmental factors and resources. Despite the contention that GNP would become a better indicator of social welfare through the inclusion of environmental services and damages, this is very much open to dispute. There are many other reasons why GNP is a poor measure of social welfare, so that it would take more than the inclusion of environmental phenomena to make it acceptable as a social welfare indicator.

If environmental reporting were integrated into economic accounting, Norgaard fears, it would most likely be developed in accordance with the priorities of scientists schooled in the economic paradigm. In such a context, prime attention would be paid to phenomena to which a monetary value can be assigned, environmental factors that are closely related to material production, and finally to developments considered of particular importance by non-ecologists.

In my view Norgaard has constructed a dichotomy that does not reflect the actual state of current research. There are more than two general schools of thought: this would be true only if there existed such a thing as *the* economic method or *the* economic perspective. Many non-economists, both scientists and concerned citizens, have the impression that such is the case. The belief is widespread in the ecology movement, where economics is often the target of generalized criticism.

Economics is not a monolithic discipline, despite the impression created by the omnipresence of the dominant paradigm, neo-classicism, whose influence in politics and in the universities has grown significantly over the past ten to fifteen years. There are also non-neo-classical perspectives in economics, such as Marxist or institutionalist. In this context the ecological or entropic perspective, which owes its development essentially to N. Georgescu-Roegen, is important.¹² The integration of environmental and resource aspects in national accounts in a neo-classical perspective, as Peskin conceives it, must be considered mistaken from an ecological standpoint. The expansion of economic accounting in this way is a further step in the expansion, in this case to

the natural environment and resource depletion, of the neo-classical analytical apparatus, which is particularly ill-suited to the analysis of environmental and resource problems.

There is no reason why a modification of the economic accounting system from an ecological perspective should be uncritical—ignoring the genesis of the environmental problem—and corroborative of the dominant scientific and political viewpoint. One possible step in the direction of reform was mentioned above. It has the limited objective of defining and empirically determining that portion of GNP that is substantially defensive or compensatory by nature and, in the longer term, constitutes no positive contribution to society's (welfare-oriented) net product. This would be an empirical reinforcement of the necessary criticism of GNP (the indicator of economic growth) that today plays a fateful role, both ecologically and—increasingly—economically, in the formulation of economic policy. Furthermore, the misapplication of GNP in discussions of economic policy objectives, which would appear to be virtually ineradicable, is made more difficult on the basis of well-founded scientific expertise. This is a critical appraisal and makes no claim to be a consistent integration of all economically relevant aspects of the environment and resources in an enlarged system of economic reporting, which in any event cannot be integrated in a substantive way. The estimate of defensive expenditures, on the other hand, can be seen as part of the future development of an accounting system for environment- and resource-related social costs of the economic process, which in turn forms part of a still-to-be-created accounting system for economic, social, and ecological flows and stocks.

When environmental accounting is separated entirely from the development of an economic accounting system, there is a danger—and here one is forced to agree with Peskin—that economists and economic policy makers will take scant notice of these new information systems and continue to work with the purely economic concepts of national accounting. Under present conditions this is clearly to the detriment of the environment and thus detrimental to mankind's long-term living conditions. The history of the social indicator movement provides both an example and a warning. Economics as a profession did not absorb either the content or the methodological impulses for an expansion of the analytical perspective, at least in part because the analytical connection between the central economic concepts and the essential point of departure for the social indicator movement was not worked out precisely by the latter's adherents.

Herman Daly is an economist who, in the discussions about the out-

look for a system of ecological accounting, has taken the opposite position to Peskin's neo-classical concept.¹³ Peskin's proposals for revision consciously retain the conceptual framework of traditional national accounting, merely expanding production accounts to include the dimension of environmental services used by production activities and environmental damage caused thereby. Daly, on the other hand, is concerned with the development of a new concept for an accounting system that throws into sharp focus the necessity for a frugal, conservationist approach to the natural environment and its finite natural resources, based on a fundamental, ecologically-based critical appraisal of GNP as a central concept in economic theory and policy.

His central thesis is the replacement of a flow concept (GNP) by a stock concept (capital), including natural capital, as the decisive reference concept for economic accounting. He is in the tradition of Irving Fisher and of Boulding, who pointed out the problems inherent in the use of GNP as a goal measure for economic policy or as an indicator of social welfare [Boulding 1949–1950].¹⁴ Fisher pointed to the decisive reference concept for a social welfare measure, which is capital stock, from which the "psychic income," so crucial to social welfare (the consumer's subjective enjoyment) is derived.

Boulding was the first economist to place Fisher's central discovery in an ecological context of finite environmental assets and resources. He defined the goal of maximum economic growth as a collective error on the part of economists. From an ecological standpoint the goal should be the opposite: to achieve a socially-defined level of prosperity while minimizing the necessary levels of production and consumption. Every technological innovation that made it possible to maintain a certain capital stock and the concomitant level of welfare with a lower throughput of production and consumption (including materials and energy) was a success of economic policy.

Daly shows that three quite different (however incomplete) categories are included in GNP: current costs—the material-energy throughput employed in the maintenance and renewal of assets by industry, government, and private households; growth of assets—net investment in the public and private sectors, increase in assets of consumer durables in private households; and consumer services and yields derived from the assets.

It would be pointless to add costs, benefits, and increases to capital stock together to arrive at a macroeconomic figure, which can then be interpreted as a prescriptive measure and employed in a political context. Daly therefore proposes a restructuring of the system of economic accounting on the basis of the following categories: benefit accounting

(including the benefits derived from environmental functions), cost accounting (the material-energy throughput, labor), and capital accounting (including nature capital).

To date, Daly has concentrated on the development of new concepts that take into account the entropic nature of the economic process. The question of the empirical applicability was temporarily left in abeyance. He is himself aware of this weakness and is currently at work on the possibilities of practical application. The proposals, which he has presented in slightly varied form on several occasions at World Bank seminars, have been rejected by the Bank's Economic Division, not least because of the excessive distance from established GNP accounting and the lack of evidence of the concrete application of this revolutionary concept. I personally agree with Daly when he stresses the need, in the present situation, to develop new concepts to replace the old, even if it is not yet possible to point to concrete ways to apply them empirically: "But is not even the poorest approximation to the correct concept always better than an accurate approximation to an irrelevant or erroneous concept? It is admittedly an exaggeration to say that GNP is worse than nothing, but I suspect that the world could get along well enough without it, as it did before 1940. We must face the question of what you would put in its place, but without letting its operational difficulty be converted into an argument for staying with the (misleading) GNP."¹⁵

Christian Leipert

The author is Fellow of the International Institute for Environment and Society (Science Center Berlin for Social Research) and International Correspondent of the Association for Evolutionary Economics.

Notes

1. On the contrary, it stopped publication of the *Social Indicators* volumes, the regular compilation of which by the administration had been an important success for the social indicator movement in the 1970s.
2. Compare, for example, Kapp [1972].
3. Kuznets died on July 9, 1985 at the age of 84.
4. Compare for instance Kuznets [1954].
5. Jaszi can stand as one representative of many; his work is still frequently cited by skeptics. Cf. Jaszi [1971].
6. Tobin's main subject is, on the one hand, the theoretical foundation for critical assessment of the dominant monetarist and supply-side policy of the Reagan Administration and other Western industrial countries, and, on the other, the establishment of an economic policy alternative in the

spirit of the Keynesian tradition of active fiscal and employment policy. He is concerned primarily with the question of combatting the mass unemployment of the 1980s in the OECD countries from an economic policy perspective, in which the governments accept their responsibility for a high level of employment. According to the accepted wisdom of traditional economic policy, oriented around short-term development of production and employment and from which the environmental and resource dimensions of production and consumption are excluded, a decline in unemployment in the wake of GNP growth is presumed to be the inevitable equivalent of an increase in welfare. When one remembers that Tobin stays in the tradition of the Keynesian school, for which the unemployment of the 1930s was a trauma, and that in the current economic policy debate he is one of the very few world-famous economists who has not fallen in with the again-predominant neoclassical orthodoxy with its avoidance of the problem of unemployment, it is understandable that reducing the level of unemployment has become for Tobin the central issue in any policy of "increasing welfare today." Inherent in this perspective is an exclusion of long-term problems of the ecological tolerability of traditional growth policies, which have become for younger scientists the central question of any increase in welfare tomorrow and in the future; these scientists' thinking has, in turn, been decisively influenced by the crisis in the social and natural environment in the 1970s and the discussion about the limits of growth.

7. Compare his paper at the November conference [Hueting 1984, p. 4].
8. Compare for example Endres [1982]. For a critical appraisal of this procedure, see Kapp [1972].
9. Compare for example Peskin [1981, p. 77ff].
10. Compare for example Leipert [1984] and [1986].
11. Compare Norgaard [1985].
12. Compare, above all his major work, Georgescu-Roegen [1971].
13. Compare his paper commissioned by the World Bank: [Daly 1983], based in Daly [1977].
14. Compare Fisher [1930].
15. Daly [1983, p. 18 ff].

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