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Geography and Ownership as Bases for Economic Accounting

Edited by Robert E. Baldwin, Robert E. Lipsey, and J. David Richardson

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J. David Richardson

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ROBERT E. BALDWIN is professor emeritus of economics at the University of Wisconsin–Madison and a research associate of the National Bureau of Economic Research. ROBERT E. LIPSEY is professor emeritus of economics at Queens College and the Graduate Center of the City University of New York and a research associate and director of the New York office of the National Bureau of Economic Research. J. DAVID RICHARDSON is professor of economics in the Maxwell School at Syracuse University, a research associate of the National Bureau of Economic Research, and a visiting fellow at the Institute for International Economics.

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Contents

Prefatory Note

This volume contains revised versions of most papers presented at the Conference on Research in Income and Wealth entitled Geography and Ownership as Bases for Economic Accounting, held in Washington, D.C., on 19–20 May 1995.

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Introduction

Robert E. Baldwin, Robert E. Lipsey, and
J. David Richardson

Economic accounting can be done in a variety of ways to answer different questions and serve different purposes. One of the distinctions that can be made is between measures of economic activity based on geographical location and measures based on ownership. One of the main purposes of this volume is to raise the question of the degree to which changes in the world economy may have increased the usefulness of international accounts drawn up on an ownership basis relative to those on a geographic basis. Among these changes are the growth of multinational corporations, for which many transactions across geographical borders are internal to the firm; the growth of service industries, for which the geographical location, but not the ownership of production, is ambiguous; and the seeming absence of many of the expected unfavorable consequences of persistent U.S. current account deficits, measured in geographical terms.

The United States for many years used ownership-based measures, such as national income and gross and net national product, as the central totals in its economic accounts. It joined most of the other developed countries in emphasizing geographical totals, such as gross domestic product, in the 1991 revision of the accounts. However, in the accounts for international transactions, the only strictly geographical element is commodity trade, because goods can be observed as they pass over national geographical borders. Most service transactions recorded as international take place entirely within one country and are assigned international transaction status on the basis that one of the transactors

Robert E. Baldwin is professor emeritus of economics at the University of Wisconsin–Madison and a research associate of the National Bureau of Economic Research. Robert E. Lipsey is professor emeritus of economics at Queens College and the Graduate Center of the City University of New York and a research associate and director of the New York office of the National Bureau of Economic Research. J. David Richardson is professor of economics in the Maxwell School at Syracuse University, a research associate of the National Bureau of Economic Research, and a visiting fellow at the Institute for International Economics.

is a "resident" of another country. Foreign residence is a legal characteristic rather than a geographical one. It depends on place of incorporation or legal status, rather than on the physical location of production or consumption.

The choice between geographical and ownership bases for economic accounting was discussed at the Fourth Income and Wealth Conference in 1939, not in connection with international issues, but with respect to the treatment of ownership across state lines within the United States. In the paper "Some Problems Involved in Allocating Income by States" presented at that conference, published in volume 3 of *Studies in Income and Wealth,* Robert R. Nathan concluded that the ownership-based measure was the central one. He asked, "Is there any point in determining the net value of goods and services *derived from* economic activities taking place within the physical confines of North Carolina . . . when this net product is *derived by* residents of other states?" If a choice were necessary, "it would seem more important . . . to allocate the net value of product by states on the basis of such a concept as 'the net value of product *derived by* residents of a state from their labor and from the services of their property, wherever located,' rather than on the basis of the concept of 'the net value of product *derived from* the resources of labor and wealth employed in a state.'" He went on in a way that foreshadowed the later shift in emphasis: "If a person, as a contributor of his capital to production, is the primary force rather than the capital itself, then the *derived by* concept is more significant. On the other hand, if the actual capital equipment is regarded as the primary force, the 'derived from' concept predominates." Thus there is some hint that a physical production function calls for a geographical concept (Conference on Research in Income and Wealth 1939, 401–29).

Simon Kuznets, in commenting on Nathan's paper, admitted the case for the "derived by" measure but introduced another theme, suggesting that "this inference overlooks the possibility that consciousness of a kind may extend to the productive resources to which a given group applies its labor; that inhabitants of a given state may have a sense of proprietary interest in the total output in whose production they participate." The point was intended as a justification for a geographical measure but could be applied equally to the aggregation of all the output of a firm, wherever it was produced (Conference on Research in Income and Wealth 1939, 430–34).

The merits of the two approaches appeared quite different to Richard Stone and Kurt Hansen (1953) a little more than a decade later. "The system . . . should . . . contain the distinction between 'domestic' and 'national' concepts since, to give one reason, the former is more appropriate as a basis for constructing a measure of real product." The geographical measure, with the idea of an aggregate production function in the background, had gained ascendancy.

When the U.S. Department of Commerce shifted from GNP to GDP as the "featured" total in the national accounts, one reason given was that GDP, since it referred to "production taking place in the United States," was "the appropriate measure for much of the short-term monitoring and analysis of the U.S.

economy" because it is "consistent in coverage with indicators such as employment, productivity, industry output, and investment in equipment and structures" (1991, 8). Another consideration was that GDP is the central total in the UN System of National Accounts and the use of that total simplifies comparisons with other countries. Still another point was that some of the foreign elements of GNP are not available quarterly, or are available only with considerable delay, or are not available at all. Inventory and capital consumption adjustments are mentioned in this category, and any deflation becomes much more difficult if prices are needed for foreign elements of income and production. GNP remains in the accounts. It is described as "appropriate for analyses related to sources and uses of income." It is the appropriate denominator for saving rates and "is better for analyses that focus on the availability of resources, such as the Nation's ability to finance expenditures on education."

The connection between productivity measurement and a geographical basis for economic accounting is strong if the only important inputs are land, labor, physical capital, and possibly human capital to the extent that it is attached to immobile labor. If, however, technology, organizational skills, patents, or brand names are major determinants of output and productivity, the advantage of the geographical measure disappears because these types of intangible capital reside not in locations but in organizations that may span state and national borders.

One reason for organizing the conference was that it has come to seem that, just as state borders were crossed by multiplant firms many years ago, national borders are now more porous than in the past and strictly geographical measures are in some respects increasingly artificial. With many organizations spanning national borders, many transactions that were once arm's-length transactions at market prices now take place within firms. The prices and values involved are imputed rather than market values.

Another development that makes geographically based measures less informative is the growth in importance of intangible services. It is relatively simple to know the geographical location of agricultural, mining, manufacturing, and tangible service production, but it is much harder to know the location of the production of banking, insurance, consulting, and other intangible services. For these services, the ownership of the production is clear and is known to the purchaser, even if there is no clear meaning to the location of production. Even in the tangible goods industries, there are parts of the production process, such as invention, engineering, and design, that may not have any identifiable geographical location, but for which the organizational location is clear.

An example of a comparison between geographical and ownership measures on the international level is the series of studies by Kravis and Lipsey (1985, 1987) in which they compared shares in world manufactured exports of firms located in the United States with the export shares of U.S. multinational firms, including both their domestic and overseas operations. One point of the comparison was that the factors that determined the export share of the United

States as a location, such as exchange rates, wage levels, and other prices, are quite different from those that determine the export share of U.S. firms operating in many countries. If U.S. firms had fallen behind those of other countries in technological or management capabilities, as was argued at the time, the effects should have appeared in their worldwide operations, since technology and management are assets of firms. However, although the export share of the United States as a geographical entity declined over the period of the study (1966–83), the export share of U.S. multinationals remained nearly stable.

Revived interest in ownership-based measures was signaled by the 1992 report of the National Academy of Sciences, *Behind the Numbers,* which called for supplementary international transactions accounts, drawing borders around groups of firms classified by nationality of ownership rather than around geographical entities (National Research Council 1992). One suggested accounting format provides a comparable net sales measure of both the cross-border and foreign-affiliate (U.S.-affiliate) activities of U.S. (foreign) firms in supplying goods and services to foreigners (Americans). Another format measures the value-added activities of U.S. (foreign) firms in providing goods and services to foreigners (Americans) through cross-border and affiliate transactions. Other ownership-based accounting formats that provide additional insights into the internationalization of production can also be formulated.

Two of the papers in this volume, by Baldwin and Kimura on the United States and Kimura and Baldwin on Japan, carry out the proposals in *Behind the Numbers* for the international transactions of these countries. Their findings that net sales to foreigners by foreign affiliates of U.S. firms were only 6 percent less than export sales by Americans to foreigners in 1992 and that net purchases of goods and services by Americans from U.S. affiliates of foreign firms were only 12 percent less than imports of goods and services from foreigners in 1992 bring out clearly the extent to which U.S.- and foreign-owned firms supply markets beyond their borders from foreign-based facilities, as well as by exporting domestically produced goods. By reporting only the income earned from affiliate production activities, the traditional balance-of-payments format does not adequately indicate the relative importance of these two ways of supplying foreign markets. The finding that net sales to foreigners by foreign affiliates of Japanese firms in 1992 were 38 percent greater than export sales by the Japanese to foreigners, while net purchases by the Japanese from Japanese affiliates of foreign firms were 40 percent less than Japanese imports from foreigners indicates the significant reliance of Japanese-owned firms on the marketing activities of their foreign affiliates yet the comparatively modest importance of Japanese affiliates of foreign firms as suppliers in Japan's domestic market.

The difference between a country's production measured from a geographical standpoint and a country's firms' production measured from an ownership standpoint is what is called "internationalized production" in the paper by Lipsey, Blomström, and Ramstetter. Internationalized production is production in one country by firms based in another country, or, in other words, production arising from foreign direct investment. The paper attempts to assess the extent of such production and the trend in it over time. It estimates, from very incomplete data, that such production grew from about 4.5 percent of the world's total output in 1970 to almost 7 percent in 1990, and something in the neighborhood of 15 percent of production outside the service sectors.

Ramstetter, Low, and Yeung further explore internationalized production by comparing ownership measures based on country of incorporation with measures based on country of ultimate beneficial ownership. They make the comparison for firms in Hong Kong and Singapore, countries in which a significant part of the outward foreign direct investment is from foreign-controlled firms. Their paper points out that the use solely of the ultimate beneficial ownership criterion would wipe out much of the outward direct investment and internationalized production (as defined in the paper by Lipsey, Blomström, and Ramstetter) of Hong Kong and Singapore, even though such investment has become an important policy for governments and firms in these countries.

Using China as an example, the more familiar problem of separating ownership components in cross-border trade among countries is studied by K. C. Fung. Although two-thirds of China's exports and one-third of its imports pass through Hong Kong, China did not differentiate these reexports from trade with Hong Kong until recently, thus leading to wide discrepancies between bilateral trade balances reported by China and by its trading partners. For example, according to Chinese statistics, the United States had a trade surplus with China of $0.3 billion in 1992, whereas U.S. statistics indicated a trade deficit with China of $20 billion in that year. Other sources of problems with China's trade statistics are the markups that Hong Kong middlemen add to reexports to and from China and the illegal trade between Taiwan and China. The large share of trade controlled by foreign investors is another important feature of the trade of parts of China.

Issues in accounting differences according to geography and ownership exist at disaggregate as well as aggregate levels. Using the United States as an example, the papers by William Zeile and by Mark Doms and J. Bradford Jensen investigate the extent to which domestically based firms owned by foreigners behave in economically different ways from firms that are domestically owned. In comparing the domestic content of production by foreign-owned and domestically owned firms in the United States, Zeile finds that the overall domestic content of the foreign firms is only slightly below that of the domestically owned firms, namely, 89 percent versus 93 percent. However, in five industries (his sample covers 24 industries), which include computer and office equipment, electronic components and accessories, and motor vehicles, the domestic content share of foreign-owned firms is at least 15 percent lower than that of domestically owned firms. Among his other findings are that Japanese- and German-owned firms tend to have low domestic content ratios, whereas

British- and Canadian-owned firms tend to have high ratios. Japanese firms, in contrast to British-owned affiliates, also tend to source a high proportion of their imported intermediate inputs in their home country.

Doms and Jensen compare wage, capital intensity, and productivity levels in domestic and foreign-owned manufacturing establishments in the United States. As did previous investigators, they find that, on average, foreign-owned plants pay higher wages, are more capital intensive, and are more productive than U.S. plants. However, in reclassifying the data so that they are able to compare foreign affiliates with U.S.-owned plants belonging to firms with significant assets outside of the United States, that is, U.S. multinationals, they reach the important conclusion that the key factor influencing these operating characteristics is whether the plant is owned by a multinational, domestic or foreign. Plants of both U.S. multinationals and foreign multinationals pay more, are more capital intensive, and are more productive than either large or small U.S.-owned, domestically oriented firms, with the U.S. multinationals ranking at the top with regard to these characteristics.

As foreign direct investment has become an increasingly important feature of the international economy, the effects of various tax and promotion policies on this form of investment as well as on cross-border trade has become an increasingly important research issue. The papers by John Mutti and Harry Grubert and by Deborah Swenson address particular aspects of this issue. Mutti and Grubert examine how U.S. international tax rules influence the form in which taxable income is reported and the location of economic activity. As they point out, U.S. firms can service foreign customers by supplying goods produced by affiliates abroad, by shipping goods produced domestically, or, sometimes, by exporting a service. The effects of two important provisions of U.S. tax law on the choice of these alternative delivery methods, namely, allowing a portion of export income to be regarded as foreign-source income (sales source rules) and treating royalties as from foreign sources, are analyzed by the authors. Using various assumptions about income and withholding tax rates, tariffs, and the importance of tangible and intangible capital, Mutti and Grubert show how the sales source rules stimulate exports, while the treatment of royalties as foreign-source income encourages foreign production in high-tax locations.

Swenson investigates the impact of changes in the tax and promotion policies of U.S. states on the interstate distribution of employment by foreign-owned firms. She finds that foreign firm employment in manufacturing is sensitive to tax differences—that is, states whose taxes are high appear to deter investment—but that employment in all nonbank foreign firms is not. Employment in nonmanufacturing operations appears to be directed toward sales and service functions, and thus, proximity to final markets tends to dominate the tax variable. Another important finding is that promotional policies other than reduced tax rates do not produce identifiable effects.

Issues in appropriate spatial accounting have a variety of parallels in temporal accounting. The paper by Eric Fisher extends the concept of generational accounts to open economies and illustrates these accounts using Japanese data. The aggregate generational current account measures the annual change in the expected present value of net foreign assets broadly defined and captures changes over time in the expected present value of the goods and services that a country can import from abroad. A related account presents a generational cross section of the net foreign assets of domestic residents. In calculating the country's generational account, Fisher adjusts Japanese current account data on annual inward and outward flows of long-term capital for changes in domestic and international bond and equity prices as well as for exchange rate changes in order to obtain estimates of the market value of Japan's international investment position. Year-to-year changes in this figure combined with annual estimates of the present value of net transfers from abroad yield the aggregate generational current account. Fisher shows that the present value of Japan's net foreign assets has risen markedly in the past two decades and that the market value of these assets is higher than its more familiar net international investment position measured at historical prices.

While the editors realize that no definitive prescriptions have been provided for the solution of the issues raised here, they hope that the papers will stir renewed discussion of international economic accounting measures. In particular, they hope that the adequacy of the standard measures of the net current balance can be reconsidered in the light of the spread of multinational firms, the increase in the importance of service transactions, and the apparent absence of the expected consequences of persistent U.S. current account deficits.

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1 Measuring U.S. International Goods and Services Transactions

Robert E. Baldwin and Fukunari Kimura

1.1 Introduction

One of the roles of economists concerned with organizing national and international economic data into meaningful accounting formats is to ask periodically whether existing sets of accounts adequately describe important economic trends and are as useful to public and private policymakers as possible. The Panel on Foreign Trade Statistics established under the auspices of the National Academy of Sciences (NAS) in 1989 (which Baldwin chaired) considered addressing this question to be an important part of its task. In particular, it focused on whether existing ways of presenting data on firms' cross-border trading activities and the sales and purchasing activities of their foreign affiliates adequately captured the close relationship between these two types of international economic transactions.

The panel concluded that the present system of economic accounting could be improved in this regard and recommended that cross-border sales (exports) and purchases (imports) of goods and services as well as net sales of foreign affiliates of U.S. firms (FAUSFs) and net sales to U.S. affiliates of foreign firms (USAFFs) be presented on an ownership basis to supplement the residency approach followed in the balance-of-payments accounts (National Research Council 1992).[1] In the net sales calculations, the selling and purchasing activities of firms are measured as those undertaken by the firms' capital own-

Robert E. Baldwin is professor emeritus of economics at the University of Wisconsin–Madison and a research associate of the National Bureau of Economic Research. Fukunari Kimura is associate professor of economics at Keio University.

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1. It should be emphasized that the panel did not propose that the existing framework for the balance of payments be changed but rather that additional information on international transactions be presented in supplementary accounting formats.

ers and employees, that is, by the productive factors used directly to create value added by the firm. Thus, net sales of foreign affiliates are defined as sales less purchases of intermediate goods and services.[2] This suggested supplemental framework combines net cross-border sales of Americans to foreigners, net sales by FAUSFs to foreigners, and net sales of U.S. firms to USAFFs to yield a figure that shows net sales of Americans to foreigners. The panel report also estimated value added on this basis, and we believe that measuring cross-border and foreign affiliate activities on a value-added basis is also a useful accounting format for representing international transactions. However, fundamentally, the usefulness of these as well as existing or other formats depends on the purpose for which the information is utilized.

The outline of the paper is as follows. Section 1.2 discusses the need for a supplementary framework and its benefits to both private and public officials. Section 1.3 considers various conceptual and practical issues that arise in measuring cross-border and foreign affiliate activities on a net sales basis and also discusses some of the key relationships brought out in the tables measuring international transactions on an ownership basis over the period 1987–92. Measurements of cross-border and direct investment activities on a value-added basis for this period are presented in section 1.4, and important relationships based on this approach are discussed. Section 1.5 presents net sales figures on an industry basis and includes an analysis of the international structure and relative competitiveness of American industries that these figures reveal. Section 1.6 briefly summarizes the main argument of the paper.

1.2 The Need for a Supplementary Framework

A key aspect of the increasing internationalization of economic activities is that firms have found they can profitably exploit their unique technological and managerial knowledge by establishing production units in foreign countries as well as by exporting to or importing from foreign firms or permitting foreign firms to use their specialized knowledge. Thus, when supplying goods and services to foreign markets, business decision makers consider the alternatives of producing the goods and services domestically and exporting them or undertaking direct foreign investment and producing them in their facilities abroad. If they do choose to produce abroad, firms must also decide on the extent to which they will export components for further processing in their overseas facilities or purchase the needed intermediate inputs abroad. To compare the economic importance of these alternative means of serving foreign markets, it is necessary to have comparable data with respect to these different activities.

2. Consequently, purchases from foreigners by FAUSFs, e.g., include purchases by the firms of intermediate goods and services from foreign-owned firms located abroad but do not include the cost of foreign labor hired directly by the affiliates of U.S. firms.

The current set of accounts documenting the international activities of U.S. and foreign firms does not provide such comparability. The balance of payments summarizes international transactions between residents of one country and residents of other countries. Total merchandise and service exports and imports of firms residing in the United States and in other countries are recorded, but no information is provided concerning whether the exports are shipped from U.S.-owned firms to FAUSFs or USAFFs to their foreign parents. Imports also are not distinguished on an ownership basis. Furthermore, since total exports include imported inputs, one is not able to compare properly the relative importance of value added through export activities with value added through affiliate activities or with total value added (GDP).

More important, the only measure of the level of activity of FAUSFs or USAFFs in the balance of payments is the income earned on U.S. direct investment abroad and on foreign direct investment in the United States. Comparing these income receipts and cross-border merchandise and service trade leads to an apples-and-oranges adding problem. The balance-of-payments framework measures the participation of U.S.-owned firms located in the United States in cross-border activities by their sales but measures their participation in direct investment activities abroad by the income earned on these direct investment activities. Since exports and direct investment income are not comparable (the first is a sales figure, while the second represents factor income), one does not get an adequate picture of the nature of firms' international activities from the balance of payments.

Economic data on sales and purchases of foreign affiliates of domestic firms and domestic affiliates of foreign firms are available for the United States and Japan, but these are presented in other sets of accounts constructed by these governments.[3] The U.S. government, for example, annually publishes data on the operations of U.S. parent companies and their foreign affiliates and the operations of USAFFs. These reports provide information on the cross-border trade between parent firms and their foreign affiliates as well as on the foreign sales and purchases of foreign affiliates. However, prior to the work of DeAnne Julius (1990, 1991) and an earlier study by Evelyn Lederer, Walter Lederer, and Robert Sammons (1982), no effort apparently had been made to integrate information in both sets of accounts as a means of better understanding the nature of the increasing globalization of economic activities.

Not only are supplementary statistical summaries of cross-border and foreign-based transactions of firms needed to improve our understanding of the evolving international economy, but such accounting frameworks would be helpful to government officials in reaching policy decisions. As the various papers in this conference volume indicate, ownership as well as geography matters for economic behavior. For example, the domestic content of foreign-

3. Purchases by FAUSFs can only be estimated indirectly.

owned firms in the United States, though high, is substantially lower than that of domestic U.S.-owned firms. Similarly, plants owned by foreign multinational companies are more capital intensive, more technology intensive, and more productive and pay higher wages than the average U.S. plant. Moreover, the output of these firms is generally growing at a different (sometime faster, sometime slower) pace than is output of domestically owned firms. National tax rules also affect the way in which foreign-owned firms report taxable income, price their products, and locate their production activities in a manner that differs from the behavior of domestic firms. Furthermore, foreign affiliates may respond differently to domestic monetary policies than domestically owned firms do because their access to international capital markets is likely to be better. Since these various differences are important for a variety of macroeconomic and microeconomic policy decisions by governments, it is useful to have an accounting framework that facilitates the comparison and interpretation of the differences. However, quite aside from the various differences in economic behavior between domestically owned and foreign-owned firms, it seems prudent on national security grounds to measure the cross-border and affiliate activities of U.S.-owned and foreign-owned firms on a comparable basis.

Expressing cross-border and affiliate activities in comparable terms can also be helpful to trade negotiators. Increasingly, it is the objective of governments not only to reduce the restrictive effects of traditional border measures but to reduce the discriminatory effects of various rules and regulations imposed by other governments that restrict the selling and buying activities of foreign affiliates within foreign markets. To determine the extent to which a country's negotiators have achieved both objectives, it is necessary to assess the liberalization achieved in both areas in a comparable manner, a goal that is not attained by only utilizing the information available in the balance of payments. Furthermore, the proposed accounting frameworks are helpful in informing the ongoing debate on American competitiveness in the world economy. By providing data on the extent to which U.S. firms compete against foreign firms through sales and purchases from their foreign-based operations as well as through their cross-border sales and purchases, government officials can better inform the public on this issue.[4]

Of course, for most public policy and research issues, the relevant relationships are the level of domestic activity, regardless of whether it is undertaken by domestically owned or foreign-owned firms, and the income accruing to U.S.-owned firms from their foreign investment activities rather than the level of activities of their foreign affiliates. The traditional residency approach followed in the balance of payments remains the appropriate accounting framework to utilize under these circumstances.

4. However, as Guy Stevens points out in his comment on this paper, no simple accounting measure can accurately measure the many different meanings of international competitiveness.

1.3 Measuring Cross-Border and Direct Investment Activities on a Net Sales Basis

1.3.1 Some Conceptual Issues

The first issue that arises in estimating net sales of goods and services by Americans to foreigners is how to define U.S.-owned and foreign-owned firms. For balance-of-payments purposes, the Bureau of Economic Analysis (BEA) regards a business located abroad (in the United States) as representing U.S. (foreign) direct investment if one U.S. (foreign) person, in the legal sense that includes a firm, controls 10 percent or more of the voting securities of the business. Under such a practice, two or more countries can treat the same firm as a foreign affiliate. This will lead to double counting of total sales and purchases for the world if an affiliate is assigned to each country. One way of avoiding this problem would be to allocate the sales and purchases of affiliates in proportion to the ownership interests of the different countries. Another would be to include only those affiliates that are majority owned, that is, affiliates in which the combined ownership of those persons individually owning 10 percent or more of the voting stock from a particular country exceeds 50 percent. One could assign all sales and purchases of affiliates to countries with majority ownership interests or only the proportions equal to the ownership interests.

The procedure followed here is to treat only majority-owned affiliates as U.S.-owned or foreign-owned firms and assign all the sales and purchases to either the United States or foreigners, depending on who has the majority ownership interest. Unfortunately, while data on the sales and purchases of goods and services are available for majority-owned FAUSFs, data on majority-owned USAFFs, although collected, are not published. In the tables included in this paper, figures on these affiliates cover firms in which the ownership interest is only 10 percent or more.[5]

Another problem in identifying U.S.-owned and foreign-owned firms is that some FAUSFs may belong to U.S. firms that are themselves USAFFs, and some USAFFs may belong to foreign firms that are themselves FAUSFs. Unfortunately, the data for identifying such firms and properly classifying them as foreign-owned and domestically owned firms are not available. Still another issue in estimating net sales of Americans to foreigners is the lack of data on sales and purchases of U.S. citizens living abroad and households of foreign citizens living in the United States. Because of this problem, it is necessary to classify households on a country-of-residence basis, as in the balance-of-payments statistics. That is, the household of a private foreign citizen in the United States (not employed by a foreign government) is combined with house-

5. An exception is service data from DiLullo and Whichard (1990) and Sondheimer and Bargas (1992, 1993, 1994), which cover majority-owned USAFFs.

holds of U.S. citizens living in the United States and the U.S. government and regarded as an American unit. Similarly, the household of a private U.S. citizen living abroad (not employed by the U.S. government) is combined with households of foreign citizens living abroad and foreign governments and regarded as a foreign unit.

The focus is on identifying the selling and purchasing activities of FAUSFs and USAFFs. Thus, the term "Americans," as used here, refers to U.S.-owned firms in the United States and abroad, households of U.S. and private foreign citizens residing in the United States (U.S.-resident households), and U.S. government units. Similarly, the term "foreigners" refers to foreign-owned firms in the United States and abroad, households of foreign and U.S. citizens residing abroad (foreign-resident households), and foreign governments.

In comparing the net sales of Americans to foreigners over time, it is, of course, necessary to deflate the value figures by appropriate price indexes. Cross-border sales should be deflated by U.S. export and import price series, while the appropriate deflator for net sales to USAFFs is an index of U.S. producer prices. Net sales of FAUSFs should be deflated by a weighted average of foreign producer prices, where the weights reflect the relative importance of the sales of FAUSFs across the countries.[6]

1.3.2 Estimates of Net Sales of Americans to Foreigners

Estimates of the net balance of sales by Americans to foreigners for 1987–92 are presented in table 1.1. The net sales figure is the sum of three parts: (1) cross-border sales to and purchases from foreigners by Americans, (2) sales to and purchases from foreigners by FAUSFs, and (3) sales to and purchases from USAFFs by Americans. Panel I of the table indicates cross-border sales (exports) to and purchases (imports) from foreigners only. Cross-border sales to foreigners are obtained by subtracting from total exports of goods and services both U.S. exports to FAUSFs and U.S. exports shipped by USAFFs.[7] Since the first export figure represents sales by U.S.-owned firms and U.S. private residents to U.S.-owned firms located abroad and the second represents sales of foreign-owned firms to foreigners abroad, both must be excluded in estimating sales by U.S.-owned domestic firms and U.S. private residents in the United States to foreigners abroad. In 1987 exports of U.S. firms to their foreign affiliates equaled 25 percent of total exports, while exports of U.S. affiliates of foreign firms amounted to another 15 percent. In 1991 these figures

6. A problem of growing importance with regard to measuring cross-border trade is that many goods and services now pass across borders with no transactions taking place. Consequently, cross-border flows are increasingly imputations, akin to those for the services of owner-occupied housing. Moreover, for many internationally traded goods and services, there are no markets comparable to the rental market for homes from which to draw prices in imputing the value of trade.

7. These subtractions exclude both intrafirm exports and exports to FAUSFs by nonaffiliated U.S.-owned firms and by USAFFs to nonaffiliated foreigners. The BEA surveys on U.S. investment abroad collect the data needed to divide exports into these different categories, if such a breakdown is desired.

were 23 and 18 percent, respectively. The estimate of cross-border sales (exports) to foreigners by Americans in 1991 is $344,725 million. (Data for 1991 rather than 1992 are cited in the text, since the figures for 1992 are preliminary.)

The $344,725 million figure is only an approximate estimate for several reasons.[8] For example, since exports by USAFFs to FAUSFs are included in both U.S. exports to FAUSFs and in U.S. exports shipped by USAFFs, this amount is subtracted twice from total exports of goods and services. Also, data on U.S. exports of services to FAUSFs, which should be subtracted from total exports of services, are not available except for the sales of some services by U.S. parent companies to their foreign affiliates. These divergences between the desired and actual figures are not likely to be large, however.

Cross-border purchases (imports) of goods and services from foreigners are estimated in a manner similar to cross-border sales. U.S. imports from FAUSFs and U.S. imports shipped to USAFFs are both subtracted from total imports of goods and services in order to obtain just the trade between Americans and foreigners.[9] In 1987 U.S. imports from FAUSFs amounted to 15 percent of total imports, while imports shipped to USAFFs were equal to 29 percent of total imports. By 1991 the first ratio had risen to 17 percent and the second to 31 percent. As before, the $320,364 million estimate of purchases by Americans from foreigners for 1991 is only approximate because of the double subtraction of U.S. imports from FAUSFs going to USAFFs and the absence of data on service imports shipped to USAFFs, except for some services obtained by USAFFs from their foreign parent companies.

A more serious problem concerns the subtraction of merchandise imports going not just to USAFFs where the ownership interest is 50 percent or more but to USAFFs with an ownership interest of 10 percent or more. This causes the import figure of $320,364 million to be too small compared to the export figure and thus the estimate of the surplus in net cross-border sales, namely, $24,361 million, to be too large.

Estimates of sales and purchases by FAUSFs are presented in panel II of table 1.1. To obtain net sales of these firms to foreigners, it is necessary to subtract both sales among themselves and sales to the United States from their total sales. This yields sales to foreigners of $898,046 million. This figure also is only an approximation of the desired number, since it improperly excludes the sales of FAUSFs to USAFFs. But, again, this exclusion is likely to be comparatively small.

No direct data are available on the purchases of intermediate goods and services by FAUSFs, let alone their purchases of these goods and services from foreigners. A rough estimate of purchases of goods from foreigners by

8. For a detailed discussion of the differences between the estimate of net sales by Americans to foreigners and the conceptually correct measure, see National Research Council (1992, app. A).

9. The same point about intrafirm and arm's-length transactions made in n. 7 also applies here.

Table 1.1 Net Sales of Goods and Services by Americans and Foreigners, 1987–92 (in millions of dollars)

Transaction	1987	1988	1989	1990	1991	1992
I. *Cross-border sales to and purchases from foreigners by Americans*						
Exports to foreigners						
+ U.S. exports of merchandise and services	348,024	430,216	488,955	537,605	581,197	619,848
− U.S. exports to FAUSFs	87,647	106,036	117,218	122,631	132,352	139,587
− U.S. exports shipped by USAFFs	51,843	73,520	92,024	99,185	104,120	108,166
Total	208,534	250,660	279,713	315,789	344,725	372,095
Imports from foreigners						
+ U.S. imports of merchandise and services	500,005	545,040	579,300	615,986	609,117	659,575
− U.S. imports from FAUSFs	75,986	86,053	94,703	100,721	102,879	110,939
−U.S. imports shipped to USAFFs	146,985	159,400	176,607	188,687	185,874	189,849
Total	277,034	299,587	307,990	326,578	320,364	358,787
Net cross-border sales by Americans to foreigners	−68,500	−48,927	−28,277	−10,789	24,361	13,308
II. *Sales to and purchases from foreigners by FAUSFs*						
Sales by FAUSFs						
+ Sales by FAUSFs	815,541	927,886	999,506	1,184,823	1,213,719	1,266,717
− Sales among FAUSFs	125,107	144,401	150,392	186,427	194,133	215,797
− Sales to the United States by FAUSFs	88,923	101,444	111,106	120,437	121,540	126,378
Total	601,511	682,041	738,008	877,959	898,046	924,542
Purchases abroad from foreigners by FAUSFs	358,715	395,973	431,885	541,755	559,050	575,265
Net sales to foreigners by FAUSFs	242,796	286,068	306,123	336,204	338,996	349,277
III. *U.S. sales to and purchases from USAFFs*						
U.S. sales to USAFFs	425,915	523,318	646,596	727,988	735,018	757,244
U.S. purchases from USAFFs						
+Sales by USAFFs	723,956	860,037	1,022,163	1,139,792	1,142,903	1,181,633
− Sales among USAFFs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

– U.S. exports shipped by USAFFs	51,843	73,520	92,024	99,185	104,120	108,166
Total	672,113	786,517	930,139	1,040,607	1,038,783	1,073,467
Net sales to USAFFs	−246,198	−263,199	−283,543	−312,619	−303,765	−316,223
IV. *Net sales by Americans to foreigners*	−71,902	−26,058	−5,697	12,796	59,592	46,362
Reference						
Cross-border merchandise trade balance	−159,557	−126,959	−115,249	−109,033	−73,802	−96,138
Cross-border trade balance of merchandise and services	−151,981	−114,824	−90,345	−78,381	−27,920	−39,727

Estimation Procedure and Data Sources: Cross-border trade data are on a calendar-year basis, while data on FAUSFs and USAFFs are on a financial-year basis. Data on FAUSFs are for majority-owned nonbank affiliates, while data on USAFFs are for nonbank affiliates with an ownership of 10 percent or more, except for data from DiLullo and Whichard (1990) and Sondheimer and Bargas (1992, 1993, 1994). In the following, figures in parentheses are for 1987, 1988, 1989, 1990, 1991, and 1992, respectively.

U.S. exports of merchandise and services: U.S. merchandise exports (250,208; 320,230; 362,116; 389,303; 416,937; 440,138) and U.S. service exports (97,816; 109,986; 126,839; 148,302; 164,260; 179,710) are from Murad (1993, 71, table 1).

U.S. exports to FAUSFs: U.S. exports of goods to FAUSFs (74,907; 90,780; 97,488; 100,232; 108,839; 114,139) are from FAUSF87, 88 (table 51), 89, 90, 91, 92 (table III.H.2). U.S. exports of services to FAUSFs are not directly available; royalties and license fees (7,400; 8,893; 10,613; 12,867; 13,819; 15,226) and other private services (5,340; 6,363; 9,117; 9,532; 9,694; 10,222) received by U.S. parent companies from their foreign affiliates, obtained from Sondheimer and Bargas (1992, tables 4.2, 4.3, 6.1, 6.2) for 1987 and 1988 data; Sondheimer and Bargas (1993, tables 4.1, 6.1) for 1989 data; and Sondheimer and Bargas (1994, tables 4.1, 4.2, 4.3, 6.1, 6.2) for 1990, 1991, and 1992 data.

U.S. exports shipped by USAFFs: U.S. exports of goods shipped by USAFFs (48,091; 69,541; 86,316; 92,308; 96,933; 100,615) are from USAFF87, 88, 89, 90, 91, 92 (table G-1). U.S. exports of services shipped by USAFFs (3,752; 3,979; 5,708; 6,877; 7,187; 7,551) are from DiLullo and Whichard (1990, table 11) for 1987 and 1988 data; Sondheimer and Bargas (1992, table 10) for 1989 data; Sondheimer and Bargas (1993, table 10) for 1990 data; and Sondheimer and Bargas (1994, table 10) for 1991 and 1992 data.

U.S. imports of merchandise and services: U.S. merchandise imports (409,765; 447,189; 477,365; 498,336; 490,739; 536,276) and U.S. service imports (90,240; 97,851; 101,935; 117,650; 118,378; 123,299) are from Murad (1993, 71, table 1).

U.S. imports from FAUSFs: U.S. merchandise imports from FAUSFs (65,542; 75,578; 84,298; 88,641; 90,512; 98,850) and U.S. service imports (10,444; 10,475; 10,405; 12,080; 12,367; 12,089) are from FAUSF87, 88 (tables 51, 42), 89, 90, 91, 92 (tables III.H.2, F.18).

U.S. imports shipped to USAFFs: U.S. merchandise imports to USAFFs (143,537; 155,533; 171,847; 182;936; 178,702; 182,152) are from USAFF87, 88, 89, 90, 91, 92 (table G-1). U.S. service imports are not directly available; royalties and license fees (1,141; 1,285; 1,632; 1,967; 2,830; 3,069) and other private services (2,307; 2,582; 3,128; 3,784; 4,342; 4,628) paid by USAFFs to their foreign parents, obtained from Sondheimer and Bargas (1992, tables 4.2, 4.3, 6.1, 6.2) for 1987 and 1988 data; Sondheimer and Bargas (1993, tables 4.1, 6.1) for 1989 data; and Sondheimer and Bargas (1994, tables 4.1, 4.2, 4.3, 6.1, 6.2) for 1990, 91, 92 data.

(*continued*)

Table 1.1 (continued)

Sales by FAUSFs: Sales of goods by FAUSFs (718,086; 816,597; 889,875; 1,051,484; 1,069,729; 1,113,043) and sales of services by FAUSFs (97,455; 111,289; 109,631; 133,339; 143,990; 153,674) are from FAUSF87, 88 (tables 40, 42), 89, 90, 91, 92 (tables III.F.14, F.18).

Sales among FAUSFs: Sales of goods by FAUSFs to other foreign affiliates (110,606; 128,425; 137,587; 173,671; 181,112; 200,761) and sales of services by FAUSFs to other foreign affiliates (14,501; 15,976; 12,805; 12,756; 13,021; 15,036) are from FAUSF87, 88 (tables 40, 42), 89, 90, 91, 92 (tables III.F.14, F.18).

Sales to the Unites States by FAUSFs: Sales of goods by FAUSFs to the United States (78,479; 90,969; 100,701; 108,357; 109,173; 114,289) and sales of services by FAUSFs to the United States (10,444; 10,475; 10,405; 12,080; 12,367; 12,089) are from FAUSF87, 88 (tables 40, 42), 89, 90, 91, 92 (tables III.F.14, F.18).

Purchases abroad from foreigners by FAUSFs: Purchases of goods abroad from foreigners by FAUSFs (309,941; 340,400; 378,908; 472,906; 483,272; 495,883) are estimated as follows: substract from cost of goods sold (629,137; 705,845; 779,024; 934,474; 970,398; 1,021,043: FAUSF87 [table 28], 88 [table 33]—see below for calculation of 1989, 1990, 1991, and 1992 figures) employee compensation (105,452; 117,418; 132,565; 151,051; 160,082; 169,623: FAUSF87, 88 [table 49], 89 [table III.G.2], 90, 91, 92 [table III.G.7]), depreciation, depletion, [and like charges] (24,847; 26,245; 29,191; 33,190; 33,542; 37,095: FAUSF87 [table 28], 88 [table 33], 89 [table III.D.2], 90, 91, 92 [table III.E.2]), production royalty payments (3,384; 2,677; 3,285; 3,424; 3,551; 3,542: FAUSF87 [table 28], 88 [table 33], 89 [table III.J.2], 90, 91, 92 [table III.E.2]), purchases from other FAUSFs (equal to sales among FAUSFs; see above for data sources), and U.S. exports shipped to FAUSF (74,907; 90,780; 97,488; 100,232; 108,839; 114,139: see above for data sources).

For 1989, 1990, 1991, and 1992, first sum up "cost of goods sold and selling, general, and administrative expenses" (913,308; 1,080,482; 1,126,092; 1,183,876: FAUSF89, 90, 91, 92 [table III.E.2]) and "other costs and expenses" (41,317; 64,634; 63,046; 67,322; FAUSF89, 90, 91, 92 [table III.E.2] and multiply it by the 1988 ratio of "cost of goods sold" (705,845; FAUSF88) to the sum of "cost of goods sold" and "other costs and expenses" (705,845 + 159,106; FAUSF88) to obtain cost of goods sold in 1989, 1990, and 1991 (779,024; 934,474; 970,398; 1,021,043). Then follow the same procedure as for 1987 and 1988.

Purchases of services abroad from foreigners by FAUSFs (48,774; 55,573; 52,977; 68,849; 75,778; 79,382) are estimated as follows: major sectors for service sales are finance, insurance, and services. Thus, estimate purchases/sales ratio of 0.78 from the sales and purchases data of these sectors of USAFFs from Lowe (1990, table 6). Then multiply total sales of services by FAUSFs (97,455; 111,289; 109,631; 133,339; 143,990; 153,674: see above for data sources) by 0.78 to obtain total purchases of services (76,015; 86,805; 85,512; 104,004; 112,312; 119,866). Subtract U.S. exports of services to FAUSF (7,400 + 5,340; 8,893 + 6,363; 10,613 + 9,117; 12,867 + 9,532; 13,819 + 9,694; 15,226 + 10,222: see above for data sources) and sales of services by FAUSFs to other foreign affiliates (14,501; 15,976; 12,805; 12,756; 13,021; 15,036: see above for data sources) from total purchases of services (76,015; 86,805; 85,512; 104,004; 112,312; 119,866).

The sum of local purchases of goods abroad by FAUSFs (309,941; 340,400; 378,908; 472,906; 483,272; 495,883) and those of services (48,774; 55,573; 52,977; 68,849; 75,778; 79,382) is local purchases abroad by FAUSFs (358,715; 395,973; 431,885; 541,755; 559,050; 575,265).

U.S. sales to USAFFs: U.S. sales of goods to USAFFs or local purchases of goods by USAFFs (356,963; 434,310; 533,167; 604,544; 602,465; 622,597) are estimated as follows: subtract from cost of goods sold (616,310; 733,908; 877,203; 984,080; 993,949; 1,024,825: USAFF87 [table E-1]—see below for 1988–91), employee compensation (96,009; 119,588; 144,158; 163,592; 175,969; 181,709: USAFF87, 88, 89, 90, 91, 92 [table F-1]), depletion and depreciation (19,801; 24,477; 28,031; 33,008; 36,813; 38,367: USAFF87, 88, 89, 90, 91, 92 [table D-8]), and U.S. merchandise imports shipped to USAFFs (143,537; 155,533; 171,847; 182,936; 178,702; 182,152: see above for data sources).

For 1988–91, first multiply "cost of goods sold and selling, general, and administrative expenses" (859,963; 1,027,871; 1,153,105; 1,164,669; 1,200,848: USAFF88, 89, 90, 91, 92 [table E-1]) by the 1987 ratio of "cost of goods sold" (616,310: USAFF87 [table E-1]) to the sum of "cost of goods sold" and "selling, general, and administrative expenses" (616,310 + 105,857: USAFF87 [table E-1]) to obtain cost of goods sold in 1988–91 (733,908; 877,203; 984,080; 993,949; 1,024,825). Then follow the same procedure as for 1987.

U.S. sales of services to USAFFs or local purchases of services by USAFFs (68,952; 89,008; 113,429; 123,444; 132,553; 134,647) are estimated as follows: major sectors for service sales are finance, insurance, and services. Thus, use again the estimate of purchases/sales ratio of 0.78 calculated above. Multiply total sales of services by USAFFs (92,820; 119,071; 151,524; 165,634; 179,135; 182,492: USAFF87, 88, 89, 90, 91, 92 [table E-12]) by 0.78 to obtain total purchases of services (72,400; 92,875; 118,189; 129,195; 139,725; 142,344). Subtract U.S. imports of services shipped to USAFFs (1,141 + 2,307; 1,285 + 2,582; 1,632 + 3,128; 1,967 + 3,784; 2,830 + 4,342; 3,069 + 4,628: see above for data sources) from total purchases of services (72,400; 92,875; 118,189; 129,195; 139,725; 142,344).

The sum of U.S. sales of goods to USAFFs (356,963; 434,310; 533,167; 604,544, 602,465; 622,597) and those of services (68,952; 89,008; 113,429; 123,444; 132,553; 134,647) is U.S. sales to USAFFs (425,915; 523,318; 646,596; 727,988; 735,018; 757,244).

Sales by USAFFs: Sales of goods by USAFFs (631,136; 740,966; 870,639; 974,158; 963,768; 999,141) and sales of services by USAFFs (92,820; 119,071; 151,524; 165,634; 179,135; 182,492) are from USAFF87, 88, 89, 90, 91, 92 (table E-12).

Sales among USAFFs: Not available.

Cross-border merchandise trade balance: From Murad (1993, 71).

Cross-border trade balance of merchandise and services: From Murad (1993, 71).

Note: FAUSFs: foreign affiliates of U.S. firms abroad; USAFFs: U.S. affiliates of foreign firms in the United States.

FAUSFs is obtained by subtracting employee compensation, depreciation, depletion, and other charges, production royalty payments, purchases from other FAUSFs, and U.S. exports shipped to FAUSFs from the cost of goods sold. Purchases of services from foreigners are estimated by applying the ratio of total purchases of USAFFs by the finance, insurance, and service sectors to the total sales of these sectors, namely, 0.78 (as calculated from Lowe 1990), to the total sales of services by FAUSFs to yield a total purchases estimate. A part of imports of services from the United States and purchases from other FAUSFs are then subtracted from the total purchases figure to yield the estimate of local purchases of services from foreigners. Adding this to the sum for goods yields a total of $559,050 million for local purchases for goods and services by FAUSFs. Since these calculations only approximate the purchases of intermediate goods and services, the figure of net sales to foreigners by FAUSFs ($338,996 million) must be interpreted carefully.

Panel III of table 1.1 presents the estimates of net sales by Americans to USAFFs. Again, the data on U.S. sales of goods and services to USAFFs, or, in other words, local purchases of intermediate goods and services by USAFFs, are not available directly. The estimate of U.S. sales of goods to USAFFs is obtained by a procedure similar to the one used in estimating local purchases by FAUSFs, except that there are no data on production royalty payments and purchases from other USAFFs. U.S. sales of services to USAFFs are also estimated in a manner similar to local purchases of services by FAUSFs. The sum of U.S. sales of goods and services is $735,018 million. U.S. purchases of goods and services from USAFFs, or, in other words, sales to Americans by USAFFs, are estimated by subtracting U.S. exports shipped by USAFFs from total sales by USAFFs. The 1991 estimate of this figure is $1,038,783 million. Data on sales among USAFFs are not available. Thus, the estimate of net U.S. sales of goods and services to USAFFs is −$303,765 million.

By summing up the three components, we obtain an estimate of net sales of goods and services by Americans to foreigners in 1991 of $59,592 million (panel IV of table 1.1). The conventional cross-border trade balance in 1991 was −$27,920 million, as shown at the bottom of the table. The estimates of net sales by Americans to foreigners for 1987, 1988, 1989, 1990, and 1992 are −$71,902, −$26,058, −$5,697, $12,796, and $46,362 million, respectively. These net sales figures have not been deflated but, instead, are expressed in current dollars.

As the table shows, in 1987 net sales to foreigners by FAUSFs were about 16 percent greater than export sales by Americans to foreigners. However, this margin gradually declined between 1987 and 1991 so that by the latter year, net sales to foreigners by FAUSFs were 2 percent less than exports by Americans to foreigners. Cross-border purchases by Americans from foreigners in 1987 were about 13 percent greater than net purchases by Americans from USAFFs. In 1991 this margin was 5 percent.

1.4 Measuring Cross-Border and Direct Investment Activities on a Value-Added Basis

Although the volume of firms' sales is widely used to compare the relative importance of their different economic activities, a comparison more closely related to national accounting procedures is based on the value added by the primary productive factors involved in these economic activities. By rearranging the data presented in table 1.1, the value added by FAUSFs and by USAFFs can easily be estimated. These estimates are presented in table 1.2. The value added by FAUSFs ($328,184 million in 1991, e.g.) is calculated by subtracting from sales of goods and services by FAUSFs the sum of local purchases abroad by FAUSFs, imported goods and services by FAUSFs, and purchases from other locally located FAUSFs.[10] The value added of USAFFs ($222,011 million in 1991) is derived in the same manner.[11]

To help readers understand the economic significance of affiliates, ratios of value added by FAUSFs to value added by all U.S.-owned firms (the latter being defined as U.S. GDP minus value added by USAFFs plus value added by FAUSFs) are also presented in table 1.2, as well as ratios of value added by USAFFs to the GDP of the United States. The former ratios indicate that in 1991 5.6 percent of the value-adding activities of U.S.-owned firms were performed by their foreign affiliates, whereas 3.9 percent of the country's GDP was contributed by USAFFs.

Another relationship brought out in the table is the lower ratio of value added to total sales for USAFFs (19 percent in 1991) than for FAUSFs (27 percent in 1991). This asymmetry could be due to several factors. One may simply be that foreign firms in the United States choose to produce products with a low value-added component. However, another may be the existence of low profits for USAFFs (see Lipsey 1993). Profits for these firms may be low because foreign firms are forced to move their production sites to the United States by the threat of formal or informal American protectionism, even if these operations are not very profitable. Or the relatively recent rapid increase in foreign direct investment in the United States may simply mean that many production plants of USAFFs are in their initial stages of activity and have not been able to earn significant profits thus far. Other possibilities are the existence of pervasive transfer pricing practices to avoid U.S. taxation and the greater concentration of USAFFs compared to FAUSFs in trading activities as opposed to manufacturing.

10. Inventory changes should be included in the calculation of value added by FAUSFs, but information on these changes is not available. However, this information is available for USAFFs in 1987 and is taken into account in estimating value added by these firms.

11. In the absence of any change in inventories, value added by USAFFs will exceed (fall short of) net sales of USAFFs to Americans by the amount by which imports of intermediate goods and services falls short of (exceeds) sales of goods and services by USAFFs to foreigners.

Table 1.2 **Value Added by FAUSFs and USAFFs, 1987–92 (in millions of dollars)**

Transaction	1987	1988	1989	1990	1991	1992
I. *Value added by FAUSFs*						
+ Sales by FAUSFs	815,541	927,886	999,506	1,184,823	1,213,719	1,266,717
− Purchases abroad from foreigners by FAUSFs	358,715	395,973	431,885	541,755	559,050	575,265
− U.S. goods and services imported by FAUSFs	87,647	106,036	117,218	122,631	132,352	139,587
− Purchases from other FAUSFS	125,107	144,401	150,392	186,427	194,133	215,797
Total	244,072	281,476	300,011	334,010	328,184	336,068
In goods and services sold to						
Americans	64,054	74,578	78,491	86,507	85,357	90,781
Foreigners	180,018	206,898	221,520	247,503	242,827	245,287
Received by						
Americans	n.a.	n.a.	n.a.	n.a.	50,820	n.a.
Foreigners	n.a.	n.a.	n.a.	n.a.	277,364	n.a.
Value added/sales ratio (%)	29.93	30.34	30.02	28.19	27.04	26.53
II. *U.S. value added in exports of U.S.-owned firms*[a]	278,410	335,294	373,115	412,115	448,452	480,981
In exports to FAUSFs	82,388	99,674	110,185	115,273	124,411	131,212
In exports to foreigners	196,022	235,620	262,930	296,842	324,042	349,769
III. *Value added by USAFFs*						
+ Sales by FAUSFs	723,956	860,037	1,022,163	1,139,792	1,142,903	1,181,633
− Purchases within the United States by USAFFs	425,915	523,318	646,596	727,988	735,018	757,244
− Imported goods and services by USAFFs	146,985	159,400	176,607	188,687	185,874	189,849
− Purchases from other USAFFs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
+ Inventory changes by USAFFs	4,671	n.a.	n.a.	n.a.	n.a.	n.a.
Total	155,727	177,319	198,960	223,117	222,011	234,540

In goods and services sold to						
Americans	144,575	162,161	181,048	203,701	201,785	213,070
Foreigners	11,152	15,158	17,912	19,416	20,226	21,470
Received by						
Americans	n.a.	n.a.	n.a.	n.a.	223,461	n.a.
Foreigners	n.a.	n.a.	n.a.	n.a.	−1,450	n.a.
Value added/sales ratio (%)	21.51	20.62	19.46	19.58	19.43	19.85
IV. *Value added in exporting country by foreign-owned firms*[a]	398,578	431,448	455,521	484,349	475,864	515,718
In exports to Americans	260,412	281,612	289,511	306,983	301,142	337,260
In exports to USAFFs	138,166	149,836	166,011	177,366	174,722	178,458
Reference						
GDP of the United States	4,539,900	4,900,400	5,250,800	5,546,100	5,724,800	6,020,200
Ratio of value added of FAUSFs to that of U.S.-owned firms (%)	5.27	5.62	5.61	5.90	5.63	5.49
Ratio of value added of USAFFs to U.S. GDP (%)	3.43	3.62	3.79	4.02	3.88	3.90

Data Sources: Inventory changes by USAFFs, Lowe (1990, 51, table 6). GDP of the United States, ERP95 (274, table B-1). See table 1.1 for the other figures.

Note: "Gross product" of FAUSFs in *Survey of Current Business* 74 (February 1994): 42–63: 319,994 (1989), 356,033 (1990), and 356,069 (1991). "Gross product" of USAFFs in *Survey of Current Business* 72 (November, 1992): 47–54: 157,869 (1987), 191,728 (1988), 226,031 (1989), and 241,182 (1990).

[a]Figures in panels II and IV are estimated using the share of imported outputs in exports (6 percent). See the text for details.

Since value added is a more fundamental measure of economic activity than net sales, an alternative approach for measuring the international activities of a country's firms is to measure both cross-border and affiliate activities on a value-added basis.[12] This approach involves combining the value added abroad by FAUSFs ($328,184 million in 1991) and the U.S. value added by U.S.-owned firms embodied in their cross-border sales (exports) to obtain a measure of the international activities of American firms. The export figure can be calculated by subtracting exports of USAFFs from total cross-border exports and then subtracting the import component in the remaining exports. (One would also have to estimate the U.S. affiliate component in these exports to avoid double counting.) Unfortunately, good data on the use of imports as intermediate inputs do not exist, but a rough estimate can be made by utilizing information in the U.S. input-output table. A special unpublished BEA study (Planting 1990) of the use of imports as intermediate goods indicates that the share of imported inputs in U.S. exports in 1977 was about 6 percent. Using this import ratio, the estimate of the U.S. value added in exporting by U.S.-owned firms is $448,452 million for 1991, as reported in table 1.2. Thus, the estimated value added by U.S.-owned firms through their export and foreign affiliate activities is $776,636 for 1991.

In calculating the foreign value-added component in the exports of foreign-owned firms of goods and services to the United States, input-output tables of these countries should be used to net out the imported input component in these exports. Unfortunately, the lack of such tables for many countries makes it impossible to measure adequately the imported input component in the exports of foreign countries to the United States. The 6 percent share of imported inputs in U.S. exports is probably smaller than the figure for most other countries because of the large size of the United States. However, for lack of an adequate estimate for foreign countries, the U.S. figure is used to obtain an estimate of the net value added abroad through the exports of foreign-owned firms to the United States. This net value-added figure was $475,864 million in 1991. Combining this with the 1991 value added by USAFFs ($222,011 million) yields a figure of $697,875 for the 1991 total value added by foreign-owned firms in exporting to the United States and in undertaking affiliate activities in this country.

The value-added approach can also be used in focusing on transactions between Americans and foreigners, as under the net sales approach. The value added by FAUSFs can be divided into the value-added components in the goods and services sold by FAUSFs to foreigners and in the goods and services sold by these firms to Americans by assuming that the value-added share in the sales to the United States by FAUSFs is the same as in total sales. The 1991 breakdown of value added on this basis yields figures of $242,827 and $85,357

12. As Lois Stekler (1993) has pointed out, except for net changes in inventories, net sales of Americans to foreigners are equal to the trade balance plus the value added by FAUSFs minus the value added by USAFFs.

million, respectively. Similarly, the U.S. value-added component in the exports of U.S.-owned domestic firms can be divided into the value-added components in their exports to FAUSFs and in their exports to foreigners by assuming the same fraction of imported inputs in these exports. In 1991, the value-added components in these two types of exports were $124,411 and $324,042 million, respectively.

The breakdown of value added in the goods and services sold by USAFFs both to Americans and to foreigners as well as the value added in goods and services imported both by Americans and by USAFFs from foreign-owned firms located abroad can be estimated in a similar fashion. For 1991, the estimates for the first breakdown are $201,785 and $20,226 million, respectively, and for the second $301,142 and $174,722 million, respectively. The value-added component in the net sales of Americans to foreigners is the sum of the value-added components in the net cross-border trade (exports less imports) between Americans and foreigners ($22,900 million for 1991), in the net sales of FAUSFs to foreigners ($242,827 million in 1991), and in the net sales of Americans to USAFFs (−$201,785 million in 1991), or $63,942 million in 1991. As indicated in table 1.1, under the net sales approach the net sales figure for 1991 is $59,592 million.

The value-added approach indicates that in 1991 the economic activity (as measured by value added) embodied in the goods and services purchased by foreigners located abroad and produced by U.S.-owned firms in the United States ($324,042 million) exceeded the value added embodied in goods and services purchased by foreigners located abroad and produced by U.S. firms abroad ($242,827 million) by 33 percent. With regard to purchases by Americans from foreigners, the value-added approach indicates that the value added embodied in goods and services produced by foreign firms abroad ($301,142 million) exceeded the value added in goods and services produced by foreign firms in the United States ($201,785 million) by 49 percent.

The value-added data can also be arranged to show the contribution of foreign affiliates and domestic firms engaged in international trade to a nation's output and the income of its citizens. The value added in exporting by domestic U.S.-owned firms plus the value added by USAFFs ($448,452 million plus $222,011 million, or a total of $670,463 million, in 1991) measures the contribution of these activities to the GDP of the United States. Similarly, the importing and foreign affiliate activities of Americans contributed $804,048 million to the GDP of foreign countries. Furthermore, combining the portion of the value added by FAUSFs that represents the net receipts of the U.S. owners of these affiliates ($50,820 million in 1991; see Landefeld, Whichard, and Lowe 1993, table 4), the value added by USAFFs less the net receipts of the foreign owners of these firms ($222,011 million minus −$1,450 million, or $223,461, in 1991; Landefeld et al. 1993, table 4), and the value added in the United States by the export activities of U.S.-owned firms ($448,452 million in 1991) yields the income earned by Americans in these international activities, namely, \$722,733 million in 1991. These relationships bring out the point that exporting activities by American firms are still twice as important as a source of income for Americans than the activities of USAFFs and that the income earned by Americans from FAUSFs is only about 11 percent of the income earned through exporting.

The sum of the income earned by foreigners from the activities of FAUSFs (\$277,364 million in 1991), from the earnings of USAFFs (−\$1,450 million in 1991), and from exporting to the United States (\$475,864 million in 1991) amounted to \$751,778 in 1991. Thus, although international activities between the United States and foreign firms contributed 20 percent more to the GDP of foreign countries than to the GDP of the United States in 1991, the division of the total value added from these activities into income shares yields a figure for foreigners only 4 percent higher than the income earned by Americans.

One argument often made in support of using only the balance-of-payments accounts to depict international economic transactions is that this accounting framework is integrated with the broader national accounts. The current account balance (exports minus imports) taken from the balance of payments (with minor adjustments) is added to the expenditures on goods and services by consumers, business, and the government, that is, $C + I + G$, to yield GDP. Exports minus imports (rather than just exports) are added to the other three components because these expenditures are measured inclusive of imports. In other words, in calculating GDP, the current account balance is used mainly to correct the other three expenditure components. The only items in the balance of payments that are direct measures of domestic or national product are the net receipts of FAUSFs and of USAFFs. In contrast, calculating trading and direct investment activities in value-added terms measures both types of international transactions in terms of standard national accounts concepts. By separating value added by firms engaged in international transactions on a nationality and geography basis, the value-added approach supplements the traditional national accounts framework under which the GDP accounts divide aggregate production activities on the basis of geography and the GNP accounts allocate value added by primary factors on the basis of nationality. The value-added approach can easily be presented in a form that yields the current account balance needed for estimating aggregate domestic and national product. Consequently, this advantage of the balance-of-payments approach could be incorporated into the value-added accounting framework.

1.5 A Sectoral Approach

1.5.1 Sectoral Net Sales

Net sales balances by nationality can be measured for individual industrial sectors as well as for the entire economy. These net sales figures provide a rough idea of the relative international performance of American and foreign firms by industry. If technological know-how and managerial ability are major determinants of firms' competitiveness in international markets, these data may be more appropriate for analyzing international activities by nationality than cross-border trade balances alone.

Nationality-adjusted sales for individual sectors are calculated by subtracting U.S. exports shipped by USAFFs, U.S. exports to FAUSFs, sales to the United States by FAUSFs, and sales to other FAUSFs by FAUSFs from the sum of U.S. cross-border exports and sales by FAUSFs. Nationality-adjusted purchases are estimated by subtracting U.S. imports from FAUSFs, U.S. imports shipped to USAFFs, U.S. exports shipped by USAFFs, and sales to other USAFFs by USAFFs from the sum of U.S. cross-border imports and sales of USAFFs. Data on sales among USAFFs or between FAUSFs and USAFFs are unfortunately not available.

A major difficulty in estimating nationality-adjusted net sales balances by industry arises in trying to estimate purchases of FAUSFs and USAFFs. Sectoral intermediate input purchases by industry origin are not available. One possible way to estimate such purchases would be to use input-output tables and assume identical input-output structures for U.S.-owned firms in the United States, FAUSFs, and USAFFs. Instead, it is assumed here that each industry purchases intermediate inputs only from its own industry. Such an assumption greatly simplifies the derivation of nationality-adjusted net sales by sector: nationality-adjusted net sales are simply cross-border net sales (net exports) plus value added by FAUSFs minus value added by USAFFs.

Another problem is that the value-added estimates for FAUSFs are classified by industry, while those for USAFFs are disaggregated on an establishment basis. As Lipsey (1993) points out, this could generate biases in the estimation procedure. In addition, the U.S. cross-border exports and imports only include merchandise trade, while value added by FAUSFs and USAFFs contains both merchandise and service transactions. However, this is unlikely to cause serious measurement errors, since the machinery industry (except electrical) is the only manufacturing sector that has large service sales (about 10 percent of total sales).

Table 1.3 shows both net cross-border sales (net exports) and estimated nationality-adjusted net cross-border plus affiliate sales for individual manufacturing sectors from 1988 through 1991. The ratios of net cross-border sales to total sales in the United States and nationality-adjusted net cross-border sales to total sales of U.S.-owned firms are also presented as indicators of firms' "revealed" international competitiveness. To discuss comparative advantage across industries, it would be necessary to adjust the net export data for macroeconomic trade balances by using some method such as the one in Bowen and Sveikauskas (1992). Table 1.3, however, presents unadjusted figures only.

Despite significant problems with the estimation process, the figures provide a number of useful insights about the competitiveness of U.S. industries. For the total manufacturing sector, the ratios of nationality-adjusted net cross-

Table 1.3 **Cross-Border and Nationality-Adjusted Sales by Manufacturing Sector**

SIC Code and Sector		Cross-Border Net Sales (Net Exports)[a]				Nationality-Adjusted Net Sales[a]			
		1988	1989	1990	1991	1988	1989	1990	1991
	Manufacturing total	−147,002	−132,163	−100,833	−69,246	−312,073	−81,733	−89,922	−68,153
22	Food and kindred products	−3,989	−3,613	−3,750	−1,754	−18,178	−9,550	−7,887	−4,311
21	Tobacco products	2,918	3,646	5,045	4,588	3,758	5,736	7,534	7,600
22+23	Textile products and apparel	−23,986	−26,446	−26,293	−26,305	−24,079	−27,094	−27,310	−27,658
24+25	Lumber and furniture	−5,570	−5,257	−4,505	−3,596	−5,369	−4,999	−4,091	−3,302
26	Paper and allied products	−4,831	−4,649	−3,896	−2,338	−5,022	−2,361	−482	−316
27	Printing and publishing	268	1,085	1,535	1,921	−6,192	−6,988	−7,469	−7,135
28	Chemicals and allied products	7,463	10,601	10,569	11,650	−28,453	−1,896	−2,454	−1,626
29	Petroleum and coal products	−10,169	−10,850	−12,318	−8,046	−67,246	36,771	−8,263	−3,764
30	Rubber and plastics products	1,326	596	2,283	4,281	2,648	−1,121	−446	1,443
32	Stone, clay, and glass products	−7,397	−7,084	−5,844	−5,364	−9,837	−14,717	−10,454	−9,865
33	Primary metal industries	−16,868	−14,203	−11,888	−8,217	−24,213	−21,163	−20,544	−16,612
34	Fabricated metal products	−5,711	−4,868	−3,488	−2,817	−2,514	−5,314	−3,758	−4,283
35	Industrial machinery and equipment	−2,158	−2,155	4,357	10,087	−16,870	18,407	29,654	31,026
36	Electronic and other electric equipment	−23,775	−21,889	−16,088	−14,847	−29,323	−25,607	−18,269	−19,032
37	Transportation equipment	−33,998	−29,156	−19,676	−11,414	−41,262	−3,143	5,661	11,993
38	Instruments and related products	744	2,765	3,224	3,617	−16,483	1,980	2,968	3,201
31+39	Other manufacturing industries	−21,268	−20,685	−20,099	−20,689	−21,385	−21,745	−20,880	−21,344

SIC Code and Sector		Cross-Border Net Sales/Total Sales of Firms in the U.S. (%)				Nationality-Adjusted Net Sales/Total Sales of U.S.-Owned Firms (%)			
		1988	1989	1990	1991	1988	1989	1990	1991
	Manufacturing total	−5.48	−4.75	−3.51	−2.45	−10.76	−2.73	−2.88	−2.21
20	Food and kindred products	−1.13	−0.94	−0.98	−0.45	−5.00	−2.44	−1.98	−1.06
21	Tobacco products	12.24	14.13	16.86	14.32	12.71	15.85	17.90	16.60
22+23	Textile products and apparel	−18.48	−21.91	−20.17	−20.07	−18.57	−22.60	−21.14	−21.48
24+25	Lumber and furniture	−5.01	−4.55	−3.88	−3.25	−4.81	−4.30	−3.50	−2.95
26	Paper and allied products	−3.94	−3.54	−2.96	−1.81	−3.95	−1.70	−0.34	−0.23
27	Printing and publishing	0.19	0.72	0.98	1.23	−4.53	−5.05	−5.15	−4.91
28	Chemicals and allied products	2.87	3.81	3.67	3.99	−10.01	−0.64	−0.80	−0.51
29	Petroleum and coal products	−7.74	−7.55	−7.14	−5.09	−42.50	20.32	−3.96	−1.87
30	Rubber and plastics products	1.41	0.67	2.25	4.25	2.71	−1.25	−0.44	1.45
32	Stone, clay, and glass products	−11.73	−11.13	−9.21	−9.00	−17.09	−27.29	−18.62	−18.50
33	Primary metal industries	−11.31	−9.29	−8.14	−6.19	−18.36	−16.44	−17.07	−15.32
34	Fabricated metal products	−3.60	−3.20	−2.14	−1.79	−1.55	−3.44	−2.26	−2.71
35	Industrial machinery and equipment	−0.89	−0.85	1.70	4.14	−5.50	5.70	8.73	9.54
36	Electronic and other electric equipment	−12.72	−11.36	−8.26	−7.50	−15.11	−12.88	−8.87	−9.22
37	Transportation equipment	−9.60	−7.97	−5.34	−3.14	−9.27	−0.69	1.22	2.62
38	Instruments and related products	0.65	2.33	2.60	2.84	−13.38	1.57	2.23	2.34
31+39	Other manufacturing industries	−47.76	−45.27	−42.68	−44.71	−47.59	−47.84	−43.57	−45.18

Data Sources: FAUSF88 (tables 33, 40, 42, 49), 89 (tables III.D.2, E.2, F.3, F.14, F.18, G.2, J.2), 90, 91 (tables III.E.2, F.3, F.14, F.18, G.7); UN90, 92; USEST88, 89, 90, 91 (table 1.1).

Notes: Nationality-adjusted net sales = cross-border net exports + value added by FAUSFs − value added by USAFFs.

We are assuming that purchases by an industry are all from own industry since by-origin purchases data are not available.

[a]In millions of dollars.

border and affiliate sales are larger than the ratios for cross-border trade alone from 1989 through 1991.[13] This suggests that U.S. industries have a greater "revealed" comparative advantage than indicated by the cross-border trade balance alone.[14] Industries where the total ratios are larger than those for trade alone include industrial machinery and transportation equipment. Thus, considering only cross-border import penetration for these industries may be misleading in appraising their international competitiveness. Industries where the combined ratio is lower than the trade ratio are stone, clay, and glass and primary metal products. In particular, cross-border net exports indicate that the chemical industry is a leading export industry of the United States, while nationality-adjusted total net sales are negative.

1.5.2 Sectoral Significance of FAUSFs and USAFFs

Ratios of value added by FAUSFs and USAFFs relative to value added for the U.S. economy as a whole are given in table 1.2. Since the activities of FAUSFs and USAFFs are concentrated in the manufacturing industries and the wholesale trade sector, the impact of multinational enterprises on those sectors is generally more significant than at the macroeconomic level.

Table 1.4 indicates for the various manufacturing sectors the share of sales of FAUSFs in total sales of U.S.-owned firms and the share of sales by USAFFs in total sales of firms in the United States from 1988 through 1991.[15] In addition, comparable shares in employment terms are shown in the table. Note that the data for USAFFs and firms in the United States are on an establishment basis, while those for FAUSFs are on an industry basis.[16] Also note that the data for USAFFs are again for affiliates in which the foreign ownership interest is 10 percent or more. The sales, value added, and employment ratios of FAUSFs to U.S.-owned firms in the total manufacturing sector in 1991 were 22, 14, and 17 percent, respectively. Considering the size of the whole U.S. manufacturing sector, the magnitude of the activities of FAUSFs was surprisingly large. The sales, value added, and employment ratios of USAFFs to firms in the United States in total manufacturing were also significant, namely, 15, 14, and 11 percent, respectively, for 1991. Thus, more than 10 percent of manufacturing activity in the United States was accounted for by foreign companies.

It is in the chemicals, petroleum and coal, industrial machinery, electronics

13. Nationality-adjusted net sales in 1988 are much smaller than those in other years because the estimated value added earned by FAUSFs is small. In 1988, sales of FAUSFs were smaller than usual, while purchases were larger.

14. Kravis and Lipsey (1987) agree with the view that taking the activities of FAUSFs into consideration is useful in appraising the international competitiveness of U.S. firms.

15. Lipsey (1993) examines the shares of USAFFs in all U.S. firms in terms of assets, employment, and plant and equipment expenditures.

16. The definition of value added in the establishment data is also slightly different from the one used here, although the difference does not seem to cause large estimation errors. See the detailed note in U.S. Department of Commerce, Economics and Statistics Administration (1994b, M-6).

Table 1.4 **Sales, Value Added, and Employment Shares of FAUSFS and USAFFS (percent)**

SIC Code and Sector		Share of FAUSF in U.S.-Owned Firms				Share of USAFF in Firms in the U.S.			
		1988	1989	1990	1991	1988	1989	1990	1991
		Sales							
	Manufacturing total	17.95	19.44	21.25	22.04	11.31	13.36	14.53	14.97
20	Food and kindred products	13.42	12.91	15.36	16.66	10.44	11.17	12.20	12.29
21	Tobacco products	19.37	28.70	28.89	30.04	0.00	0.00	0.00	0.00
22+23	Textile products and apparel	3.21	4.28	4.82	4.14	3.29	4.94	5.69	5.79
24+25	Lumber and furniture	1.71	2.26	2.89	3.20	1.46	1.63	1.99	2.09
26	Paper and allied products	11.49	12.69	15.34	14.99	8.16	7.84	8.67	9.03
27	Printing and publishing	2.27	2.77	3.08	3.38	7.08	10.18	10.51	10.36
28	Chemicals and allied products	31.43	32.17	35.01	35.93	24.97	28.24	30.42	30.70
29	Petroleum and coal products	36.52	40.58	39.56	41.90	23.57	25.18	26.87	26.07
30	Rubber and plastics products	16.73	17.43	17.35	16.92	13.53	16.34	17.55	17.73
32	Stone, clay, and glass products	10.72	8.13	16.17	15.70	18.50	22.16	25.85	24.59
33	Primary metal industries	4.77	4.43	5.13	5.44	15.77	19.58	21.84	22.82
34	Fabricated metal products	9.51	9.93	10.36	10.27	7.70	8.64	8.57	9.76
35	Industrial machinery and equipment	27.34	30.88	33.64	34.65	8.46	11.93	12.10	12.69
36	Electronic and other electric equipment	17.41	19.96	22.16	23.02	14.27	17.41	17.76	19.71
37	Transportation equipment	24.55	25.02	26.73	27.82	5.16	6.35	7.84	9.09
38	Instruments and related products	16.45	17.34	18.85	19.05	10.09	11.78	12.80	12.76
31+39	Other manufacturing industries	8.61	8.13	10.41	11.10	7.79	8.62	8.84	9.24

(*continued*)

Table 1.4 (continued)

SIC Code and Sector		Share of FAUSF in U.S.-Owned Firms				Share of USAFF in Firms in the U.S.			
		1988	1989	1990	1991	1988	1989	1990	1991
		Value Added							
	Manufacturing total	−3.03	15.63	14.08	14.04	10.44	12.38	13.37	13.97
20	Food and kindred products	0.71	9.45	11.23	12.55	11.65	13.52	13.83	14.08
21	Tobacco products	4.67	9.95	9.94	10.95	0.00	0.00	0.00	0.00
22+23	Textile products and apparel	2.87	3.12	3.61	3.43	3.02	4.17	5.26	5.60
24+25	Lumber and furniture	1.80	1.99	2.48	2.29	1.40	1.50	1.68	1.69
26	Paper and allied products	7.35	10.54	12.85	11.29	7.66	7.19	7.87	8.22
27	Printing and publishing	−0.53	1.39	1.49	1.54	6.37	9.53	10.09	10.13
28	Chemicals and allied products	−0.98	23.53	25.58	25.85	25.32	30.08	31.91	32.21
29	Petroleum and coal products	163.73	71.27	26.10	30.35	19.84	18.74	15.09	17.94
30	Rubber and plastics products	15.65	11.25	12.78	12.89	13.26	14.44	17.55	17.80
32	Stone, clay, and glass products	11.81	−0.13	13.01	11.37	18.10	22.05	24.75	23.90
33	Primary metal industries	−0.22	3.29	3.67	3.61	12.81	15.41	19.30	20.97
34	Fabricated metal products	10.26	7.30	7.63	7.58	6.67	7.81	7.94	9.35
35	Industrial machinery and equipment	−4.03	21.98	24.68	24.12	7.80	10.04	10.26	11.33
36	Electronic and other electric equipment	7.28	12.54	13.86	14.11	12.25	15.60	15.61	17.48
37	Transportation equipment	−1.89	17.67	18.87	18.02	3.27	3.74	4.88	5.40
38	Instruments and related products	−16.87	10.02	11.63	11.40	9.59	10.92	11.90	11.85
31+39	Other manufacturing industries	7.60	4.42	6.00	6.38	8.06	8.60	8.98	8.90

Employment

	Manufacturing total	15.25	16.29	16.95	17.28	8.06	9.53	10.64	11.10
20	Food and kindred products	18.46	18.99	20.01	20.83	8.44	10.09	10.84	10.63
21	Tobacco products	44.19	48.44	51.88	52.95	0.00	0.00	0.00	0.00
22+23	Textile products and apparel	3.95	4.82	5.02	5.41	2.50	3.40	4.33	4.43
24+25	Lumber and furniture	1.48	3.04	3.82	3.74	1.08	1.21	1.44	1.51
26	Paper and allied products	15.67	18.08	19.57	18.66	7.57	7.47	7.74	7.98
27	Printing and publishing	2.07	2.25	1.97	2.00	5.08	6.22	6.76	6.76
28	Chemicals and allied products	42.68	42.81	44.50	44.94	22.58	25.27	28.41	27.49
29	Petroleum and coal products	53.73	54.14	40.37	38.86	18.83	20.69	22.91	22.51
30	Rubber and plastics products	15.29	14.93	15.59	14.90	10.22	11.32	13.90	14.09
32	Stone, clay, and glass products	12.44	13.31	13.71	13.56	15.47	18.44	20.74	20.16
33	Primary metal industries	5.19	5.08	6.78	6.69	11.16	13.44	16.73	17.83
34	Fabricated metal products	9.28	9.53	9.50	9.29	5.33	6.17	6.49	7.49
35	Industrial machinery and equipment	19.43	22.77	23.36	23.08	7.57	9.96	10.20	10.86
36	Electronic and other electric equipment	24.40	25.64	28.21	28.90	12.21	14.96	15.24	16.49
37	Transportation equipment	24.44	25.69	26.36	27.93	3.60	4.40	5.87	6.54
38	Instruments and related products	14.67	15.73	16.81	17.44	9.86	11.16	12.81	12.50
31+39	Other manufacturing industries	8.43	8.55	10.13	10.11	5.87	6.62	6.44	6.81

Data Sources: FAUSF88 (tables 33, 40, 42, 47, 49), FAUSF89 (tables III.D.2, E.2, F.3, F.14, F.18, G.2, G.7, J.2), FAUSF90, 91 (tables III.E.2, F.3, F.14, F.18, G.4, G.7); USEST88, 89, 90, 91 (table 1.1).

and electrical equipment, and transportation equipment sectors that the sales, value added, and employment shares for FAUSFs are particularly high. The presence of USAFFs is large in chemicals, petroleum and coal, rubber and plastics, stone, clay, and glass, primary metal, and electronics and electrical equipment. The chemical industry looks special in that its shares are very large for both FAUSFs and USAFFs.

1.6 Conclusions

This paper has argued that the increasing internationalization of firms' economic activities has brought about the need for supplementary accounting formats to document these activities better. In particular, because of the close relationship between firms' international trade and international investment decisions, the paper argues for sets of accounts that provide comparable data on both the cross-border trading activities of firms and the selling and purchasing activities of their foreign affiliates. In providing such comparability, the net sales and value-added approaches set forth provide information about the nature of the economic globalization process that can assist government officials in reaching decisions on a variety of international economic policy issues. Fortunately, much of the data required for constructing such accounts already exists, although certain relationships must be investigated more carefully before the figures in the accounts presented here can be regarded as more than rough estimates.[17]

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17. In particular, there is a need for sales and purchases data for FAUSFs and USAFFs on the same basis in terms of the degree of domestic ownership and for better estimates of the share of imported inputs in exports.

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Comment Guy V. G. Stevens

Much of what appears in the present paper and in Robert Baldwin's related work in the book *Behind the Numbers* I agree with and support (National Research Council 1992). This includes agreement that balance-of-payments data are not adequate to answer many internationally oriented questions in an era when multinational firms are important; in fact, as Baldwin and Kimura make clear throughout their paper, virtually no question involving the activities of multinationals or their impact on the U.S. economy is answerable using balance-of-payments data alone. One result of this agreement has been our long-standing advocacy, along with that of numerous other researchers and public servants, of a large number of improvements in the data on multinational corporations collected by the Bureau of Economic Analysis (BEA).

In this paper the authors do many things. They refine and extend the work, begun by Baldwin in *Behind the Numbers,* on the net sales balance of Ameri-

Guy V. G. Stevens is senior economist in the division of international finance, Board of Governors of the Federal Reserve System.

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cans to foreigners and on the measurement of trade and direct investment activity in value-added terms. They also break the net sales balance down by industrial sector. Finally, in detailing the drawbacks of balance-of-payments data for examining such policy questions as the degree of U.S. international competitiveness, they challenge and invite us to examine all the existing international data and the interrelationships among them.

In this comment, I would like to focus on two topics. The first is whether, in advocating more emphasis on the role of multinational firms in international economic activities, we should also be advocating changes in, a revamping of, or, as the authors say, a "supplementing" of the balance-of-payments accounts. The second is what the merits might be of the net sales balance, particularly as a measure of U.S. international performance or competitiveness.[1]

An Ownership-Based Balance of Payments?

Baldwin and Kimura (B&K) in this and their earlier work challenge us to reflect on the adequacy of our present *residence-based* balance-of-payments accounting system. Does the fact that much of the important data on multinational firms are not to be found in the balance of payments mean that the latter should be altered?

The authors agree that we need certain balances derived from balance-of-payments data—for example, the trade and current account balances—because of their role in national income and product calculations. Thus, they usually talk in terms of "supplementing" the balance-of-payments accounts. However, they also suggest at the end of section 1.3 in their discussion of value-added data that a value-added accounting approach that emphasizes directly the contributions of direct investment activities would also, as a by-product, contain the trade and current account balances.

In response to B&K's challenge, I have played around with the construction of an ownership-based balance of payments. By grouping transactions on the ownership principle and making use of some the direct investment identities, along with the normal balance-of-payments identity, I have convinced myself that such a beast can be constructed. As B&K indicate for the value-added approach, I agree that the trade and current account balances fall out as by-products. Moreover, all trade and service flows can be divided into those that pass through foreign subsidiaries and those that flow directly from the United States. But what of this? If one has complete and accurate data on all transactions—between affiliated and unaffiliated parties—one can group them in any way desired. However, we do not have this complete and accurate data set, as B&K's calculations make clear. Does the answer to the question of whether

1. See table 1–1 in *Behind the Numbers* (National Research Council 1992) for the use of the net sales balance as an alternative to the trade balance as a measure of "U.S. international performance." In section 1.1 of Baldwin and Kimura's present paper, this balance is called "net sales of Americans to foreigners"; in table 1.3, it is called "nationality-adjusted net sales."

we push for an altered balance-of-payments accounting system depend, then on how such a system would promote the collection of certain data that nov are either unavailable or inaccurate?

B&K's Net Sales Balance and What It Might Be Good For

Although all of us agree that some of the concepts and data developed withi the U.S. balance-of-payments accounting system are crucially important, B&K argue forcefully that these concepts need to be supplemented. In this section would like to focus on one of the major new concepts they propose, the *ne sales of Americans to foreigners*, examining the purposes for which it was cre ated and the degree to which the concept achieves these purposes (see sectio 1.2 in this volume; National Research Council 1992, 37–45).

The major issues the authors hope this concept will illuminate are the com petitiveness of U.S. firms, the impact of U.S. international transactions on U.S employment, and the proper measurement of the impact of policy proposal dealing with trade and other international issues. An impetus to their attemp to develop new measures to analyze these questions is their view that th change in the trade balance has been given undue weight as a measure of th severity of international problems in these three areas. It seems reasonable an compelling to argue, as they do, that a balance-of-payments measure like th trade balance, which necessarily focuses only on transactions between U.S and foreign *residents*, cannot possibly be a relevant indicator; this seems obvi ous because the trade balance does not capture the effects of U.S.-owned, bu nonresident foreign subsidiaries (FAUSFs in the terminology of the authors)— sales of which now amount to over 21 percent of the total sales of U.S.-owne firms in manufacturing, and as much as 35 percent for important industrie such as chemicals (see table 1.4).

But what about their measure? However a measure may be constructed— and I will get to that below—I would interpret it as a good measure to th degree that (1) it moves in the same direction as the concept it purports t measure and (2), better still, it is *linearly* related to the underlying concep (at least within a relevant range). Since it may be quite difficult to determin analytically the relationship between a given measure and the underlying con cept or condition, I have constructed a small simulation model, laid out in th appendix, of a country like the United States that has a multinational-base economy, featuring domestic firms with related foreign subsidiaries (but, fo simplicity, no domestic U.S. firms that are owned by foreigners). The produc tion interdependencies among the parent firms and the related foreign affiliate are developed far enough in the model, I believe, to exhibit most of the flow that B&K take pains to measure: for example, in addition to traditional export and imports to or from unrelated parties, flows of intermediates from th United States to the foreign subsidiary, flows of intermediates and labor fron the foreign economy to the foreign subsidiary, and flows of final goods fron the subsidiary either to foreign consumers or to the United States.

The Baldwin and Kimura Measure

B&K make it clear that they are after, conceptually, a measure of *net sales of goods and services by Americans to foreigners.* By nearly heroic efforts, they manage to combine balance-of-payments data with BEA data on the operations of U.S. foreign affiliates and, in my opinion, get very close to an accurate measure. If this or other similar measures were eventually agreed to be of paramount value, B&K's calculations indicate some of the important flows that might be collected in the context of an ownership-based accounting system.

In my little model, because data availability is no problem, transactions may be grouped in any way that is useful, subject to the usual adding-up identities. B&K's net sales concept, what I call below the "Baldwin balance," is fairly easily defined. It can be shown to be equal to the value of foreign citizens' demand for the (single) U.S. good minus final goods imports to U.S. citizens minus intermediate purchases by U.S. foreign affiliates from foreign citizens.[2]

In passing, I might note one potential problem with the B&K definition. Their net sales balance does not subtract labor payments by U.S. foreign subsidiaries to foreign citizens, although it does subtract payments to foreign *firms* for goods and services. To me this poses a conceptual puzzle, for if what is a foreign labor payment today is turned into a payment for foreign goods and services tomorrow by a (mere) change in corporate organization, the Baldwin balance changes, but American GDP, employment, and, perhaps, competitiveness do not.[3] For this reason, I also define an alternative, Baldwin balance*, in which intermediate imports to U.S. foreign subsidiaries from foreigners are not subtracted.[4]

2. This is a somewhat simplified version of B&K's concept, but I believe that it retains the essential elements. The first element, foreign demand for the (single) U.S. good, equals the sales to foreigners from U.S. plants and U.S. foreign affiliates (FAUSFs); exports from the United States of intermediate goods to the FAUSFs cancel in this expression (although not in alternative concepts like the trade balance)—they appear in total U.S. exports but are subtracted by B&K in getting to their *net* sales concept. My version of their balance is simplified by the nonexistence of foreign-owned multinationals in the United States.

3. An example of a "mere" change in corporate organization, in my view, would be the case in which a foreign laborer employed by the foreign subsidiary became an independent contractor. Even if all production relations and productivity remained constant, the value of the Baldwin balance would fall. This seems like a contradiction to me, since all agents would be in exactly the same position before and after the change.

4. Because I did not identify separately in the models payments to foreign firms and foreign labor, to distinguish between the two Baldwin balances I have arbitrarily assumed that 50 percent of the bill for foreign labor is paid to foreign firms, which can be looked at as foreign contractors.

While ostensibly a small point, whether labor payments to foreign workers are subtracted from the various balances turns out to be important. In an analysis of an earlier, related construct by DeAnne Julius (1990), in which labor payments were subtracted, I showed in Stevens (1990) that the Julius concept could be reduced to the effect of multinational corporations on the U.S. current account, as traditionally defined. On the basis of this earlier work, I would conjecture that if labor payments to foreigners were treated symmetrically to payments to foreign firms for goods and services (some of which may be labor services), the Baldwin balance would simplify to that part of the current account that is affected by the multinational firm in question. For similar questions and reservations, see Stekler (1993).

Baldwin Balances in Performance

Employment has a straightforward definition in simple models of this kind, but competitiveness, I submit, does not. My musings on this latter concept take up part of the next (and last) section of this comment. To avoid getting bogged down, I will carry out a set of simulations that trace the effects of changes that I believe everyone would agree represent improvements in U.S. competitiveness. Each simulation begins with a shift in one or more production functions that unambiguously represents an improvement in U.S. technical capabilities. In all cases, more output of the U.S. good can be produced for any given allocation of resources; similarly, the U.S. cost function for any level of output shifts downward. I trust that, however one may want to define U.S. competitiveness, such shifts represent positive movements. Technically, I accomplish the shifts as follows: in the model, production operations in the U.S. and the foreign subsidiary are both described as the assembly, with an increasing cost technology, of intermediates supplied from outside the firm.[5] The cost of assembly is exclusively the cost of labor input. For the U.S. operation, this cost of assembly equals $W_{us}A_hO_h^2$, where W_{us} is the U.S. wage rate, A_h the intercept of the home (h) labor cost function, and O_h, the level of output produced in the home (U.S.) country; symmetrically, the cost of assembly in the FAUSF is $W_fA_fO_f^2$. Positive technical change is represented by a fall in the coefficient A_h, for U.S. assembly, or, for foreign subsidiary assembly, a fall in A_f.

Table 1C.1 shows the effects of technical change of this general type for three alternative variants of the model: (1) a model in which the firm prices competitively (price equal to marginal cost), (2) a model in which the firm prices monopolistically, and (3) a classical variant in which the foreign subsidiary is removed from the model and all sales to foreigners are exports from the United States. The last in each set of columns lists the baseline equilibrium solution for the model in question, prior to the improvement in competitiveness; thus, for example, for the competitive pricing model, the price of the U.S. good in equilibrium is \$5.71 and the exchange rate, 0.236 dollars per unit of foreign currency; output of the U.S. good is 12.027 units, 11.839 units produced in the United States and 0.188 units of the identical good produced in U.S.-owned subsidiaries abroad. Capital flows are excluded from the model, so the current account must be zero in equilibrium; because of positive direct investment profits abroad (D.I. receipts), in equilibrium there is a small trade

5. The cost functions for both the home production operation and the foreign subsidiary are of the same basic form: cost is made up of two parts, the cost of an intermediate good (a part), A_p units of which (at price P_p) are assembled by labor, and, possibly, other foreign inputs into the final product. So that we will have production in both home and foreign locations by the multinational, the labor costs of assembly are assumed to be increasing with the square of output (W_{us} is the home cost of labor, the U.S. wage rate). A typical cost function, in this case for the U.S. production operation, looks like the following:

$$C(O_h) = P_pA_pO_h + W_{us}A_hO_h^2 .$$

Table 1C.1 Effects of Improvements in U.S. Competitiveness for Alternative Models

	Competitive Pricing Model				Monopoly Pricing Model				Classical Model	
Variable	Change in A_h	Change in A_f	Change in Both	Level Baseline	Change in A_h	Change in A_f	Change in Both	Level Baseline	Change in A_h	Level Baseline
Trade balance ($)	0.035	−0.033	0.019	−0.067	0.141	−0.218	−0.007	−0.435	0.000	0.000
Baldwin balance	−0.033	0.027	−0.020	0.063	−0.005	0.005	−0.006	0.010	0.000	0.000
Baldwin balance*	−0.035	0.033	−0.019	0.067	−0.011	0.010	−0.006	0.020	0.000	0.000
D.I. receipts	−0.035	0.033	−0.019	0.067	−0.141	0.218	0.007	0.435	0.000	0.000
Current account	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Price, exports ($)	−0.229	−0.005	−0.232	5.710	−0.169	−0.002	−0.170	10.962	−0.235	5.721
Exchange rate ($/f)	−0.010	0.000	−0.010	0.236	−0.006	0.000	−0.006	0.436	−0.009	0.236
Price, imports (f)	0.000	0.000	0.000	10.000	0.000	0.000	0.000	10.000	0.000	10.000
MNC profits ($)	−1.349	−0.028	−1.363	4.272	−0.197	0.007	−0.193	50.941	−2.055	67.695
U.S. labor	−1.310	−0.055	−1.340	4.200	−0.748	−0.019	−0.752	2.359	−1.375	4.326
Total output	0.130	0.009	0.134	12.027	0.097	0.001	0.098	8.944	0.138	12.009
U.S. output	0.185	−0.085	0.123	11.839	0.121	−0.036	0.096	8.867	0.138	12.009
Foreign subsidiary output	−0.055	0.011	0.011	0.188	−0.024	0.039	0.003	0.076	0.000	0.000
Imports ($)	−0.201	−0.002	−0.202	7.827	−0.011	0.000	−0.011	10.115	−0.202	7.830
Imports (real)	0.046	0.000	0.046	3.322	0.031	0.000	0.031	2.321	0.046	3.321

deficit. The Baldwin balance, defined above, is positive at 0.063 dollars, while the alternative, the Baldwin balance*, which does not subtract off the value of goods and services purchased by the foreign subsidiary from foreigners (exclusive of direct wages), is slightly higher at 0.067 dollars.

The preceding columns in each set detail the *changes* from the baseline solution caused by three alternative combinations of technical progress in the assembly operations of U.S.-owned firms. For the column labeled "change in A_h," technical progress is limited to U.S. domestic operations; the labor requirement in assembly operations is reduced by one-third (a change in the coefficient A_h of 33 percent, from 0.03 to 0.02). The simulation reported in the column labeled "change in A_f" is based on a similar one-third reduction in needed assembly labor for the foreign subsidiary only; the third column in the first two sets presents the results for the case of a one-third reduction of labor requirements for both production locations simultaneously.

Fortunately for explanatory purposes, the results do not depend on the pricing policy of the U.S. firm; the results in the first two models are qualitatively identical. Focusing on the competitive pricing model for clarity, we note that the general pattern of price and output changes corresponds to theory: no matter where the technical change occurs within the multinational firm, either at home or in the foreign subsidiary, the price of the U.S. good falls and its overall output rises; this makes intuitive sense because the technical change in all cases implies a downward shift in the supply curve for the U.S. good, with the demand curve unchanged (all of the above assuming that the exchange rate does not change). To me the logical necessity of the observed effect on the exchange rate—an appreciation in all cases—is quite unclear, but nonetheless appealing from an intuitive point of view. For a given fall in the price of the U.S. good, there seems to be an increase in the real demand for exports that outweighs the negative effect of the fall in price, sending the ex ante balance of payments into surplus. Another way of looking at the comparative statics is to plot in price and exchange rate space, the U.S. goods market equilibrium locus along with the balance-of-payments (BOP) equilibrium; we will observe the pattern of price and exchange rate changes of table 1C.1 if, as in figure 1C.1, the BOP locus slopes upward more steeply than the goods market equilibrium locus. Although the Marshall-Lerner conditions hold for this model, they alone do not seem to necessitate these loci.

Although the changes induced in major endogenous variables—the equilibrium prices and quantities—do not seem surprising, those induced in some of the balances do. Here we will concentrate on the trade balance and the Baldwin balance. The change in neither is uniformly of the same sign. The trade balance improves in two out of the three cases of technical improvement, but in the case where technical progress is limited to the foreign subsidiary, the trade balance deteriorates. However, neither of the Baldwin balances performs better; in two of the three cases, the clear improvement in U.S. competitiveness leads to a *lower* Baldwin balance—even the clearest of the cases, where tech-

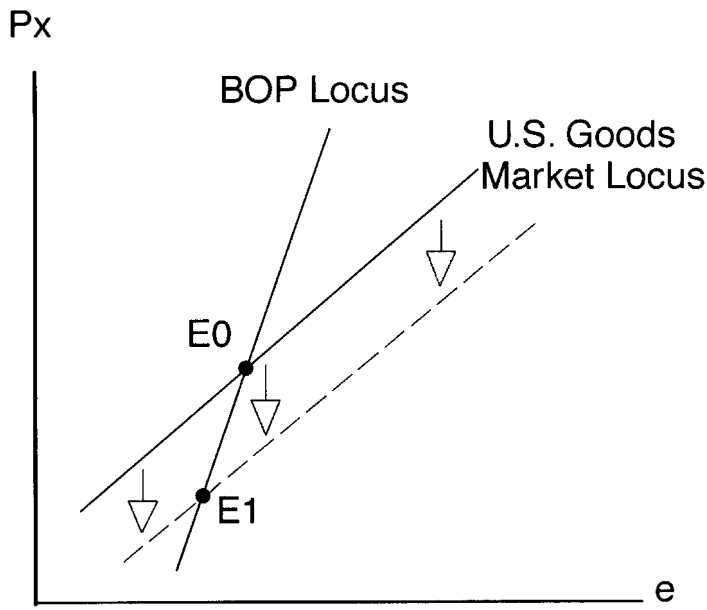

Fig. 1C.1 Shift in initial equilibrium (E0) as result of technical progress in production of U.S. good

nical progress is spread over all U.S.-owned production facilities, the balance deteriorates.

What intuitively seemed to me to be a possible key to the disappointing performance by both the trade balance and the Baldwin balance was that they are *nominal* measures, while changes in competitiveness can cause quantities and prices to change in opposite directions. The lower price of the U.S. good, certainly to be expected in this sort of case, may more than offset any increase in the real quantity of U.S. exports, thus leading to a fall in the dollar value of U.S. sales. Moreover, some of these measures, particularly those that are related to the balance of payments *and are nominal,* naturally tend to zero or some other limit; thus, in the simple model I developed above, the current account could never be used as a measure of competitiveness because it always tends to zero as a condition of equilibrium; whether the United States is technically very progressive or the exact opposite, prices and exchange rates will change in our model to leave the current account at zero.

In order to examine the truth of this intuition, I construct a real version of the Baldwin balance by dividing the nominal balance by the (endogenous) price of the U.S. export good (P_x). To my surprise, when the simulations were rerun, the results for the real Baldwin balance did not improve the situation: the signs turned out to be identical to those for the other versions of the Baldwin balance in table 1C.1.

Conclusions and Further Musings on "Competitiveness"

The previous section focused on the effects of technical progress in U.S.-owned production facilities—it is hoped a universally accepted instance of an improvement of U.S. competitiveness—on alternative quantities that might be used as indicators of changes in competitiveness. In the context of the simple models developed there, neither the trade balance nor the variants of Baldwin's net sales balance were closely correlated with this sort of change in competitiveness. These negative results invite us to reflect on what is wrong and what might be done to improve the situation.

I have come to the opinion that defining and measuring competitiveness is a very difficult, if not impossible, enterprise because the term is used as a sort of a conceptual suitcase. A good example is the definition offered by the Competitiveness Policy Council, chaired by Fred Bergsten: "Competitiveness is defined as our ability to produce goods and services that meet the test of international markets while our citizens earn a standard of living that is both rising and sustainable over the long-run" (Competitiveness Policy Council 1993, 4). The council's definition is then elaborated to include growth in per capita income, such growth to be financed by national saving, as opposed to foreign capital inflows. Such an elaborate and slippery definition has not been adopted for nothing, however: the more precise and specific measures of competitiveness that I have seen, such as those considered in the last section, seem invariably to lead to inconsistencies.

Consider, for example, the implications of adopting a definition that included only the first part of the council's definition: "our ability to produce goods and services that meet the test of international markets." A seemingly reasonable indicator of our ability to meet this goal would be the ability to produce a current account in balance; but we have seen above that, in some worlds at least, a current account balance is an equilibrium condition that *always* will be produced, whatever a country's level or rate of change of technology may be. Price changes, in particular a depreciating exchange rate, may compensate for lagging technical progress. An equilibrium current account in this latter case probably would not meet the council's supplementary competitiveness criteria of a rising and sustainable standard of living over time.

For this and the reasons discussed in the previous section, it seems that any relevant measure of competitiveness will have to be in real, not nominal, terms. But, so far, I have searched in vain for an adequate real measure—other than those that are direct measures of the underlying changes in technology that we think enhance competitiveness.[6]

6. It might be noted that even losses in competitiveness can contribute to the rising standard of living featured in the definition of the Competitiveness Policy Council. A technical innovation adopted by foreign-owned firms abroad would make foreign firms relatively more technically advanced and would generally be viewed as loss of competitiveness by U.S. firms. However, normally

If these musings are correct, we should not base our calls for a better integration of balance-of-payments and multinational firm data on searches for the best, or even better, measures of competitiveness. Rather, it would seem, such a call should be based on the demonstrated need for specific data concepts required to investigate specific international questions. Baldwin and Kimura have shown that many, and possibly most, interesting international questions require an analysis that includes the impact of multinational firms.

Appendix

Listed below are the equations for the three models on which the results in table 1C.1 are based. In table 1C.1, the models labeled "competitive pricing model" and "monopoly pricing model" feature a multinational firm that has the possibility of producing a single good at home or in a subsidiary located abroad; these two models differ only by the pricing equation for the (export) good. Both contain all of the other equations listed below. The third model, the "classical model," eliminates all equations dealing with the foreign subsidiary and also assumes competitive pricing.

The two models containing the foreign subsidiary require the firm to produce the last unit of output in the most cost-efficient way; thus, total costs for the firm as a whole are minimized—implying that, for any level of output, marginal costs are equalized in both locations. Such an equilibrium exists because marginal costs of assembly are assumed to be increasing (quadratic) in both production locations. The total cost functions for both of the models are identical, independent of the firm's pricing rule. Costs in both locations are made up of two parts: (1) the cost of components or parts, which are linearly related to both the level of output and the price of parts (e.g., $A_p P_p O_h$; see below for the definition of all symbols), and (2) the quadratic costs of labor and, possibly, other inputs into the assembly of the components (e.g., $A_h W_{us} O_h^2$). The optimality condition for cost minimization can be shown to be O_h = RATIO* O_f, where RATIO $= eW_f A_f/(W_{us} A_h)$. As noted above, the two multinational models differ only because of their different pricing rules. In the competitive pricing model, price is set equal to marginal cost. In the monopoly pricing model, marginal revenue, rather than price, is set equal to marginal cost.

Two market-clearing conditions are required to determine all the endogenous variables. The first is a market-clearing condition equating demand and supply for the U.S. good (i.e., the export good with price P_x). In addition, there

this technical advance abroad would make Americans, as well as foreigners, better off; if the U.S. terms of trade improved, U.S. consumers would share in the benefits of the innovation. The analysis in Caves and Jones (1973, sec. 25.4) suggests, I believe, this outcome.

is an ex ante balance-of-payments clearing condition, which can be justified as a linear combination of the other market-clearing conditions in the model (e.g., Stevens et al. 1984, 64–67).

Symbols

Coefficients

A_p, A_h, A_f: Technical coefficients in cost function for, respectively, parts, home labor, and foreign labor.

j, k, r, s, t, u: Coefficients, respectively, for demand (D_h, D_f) and import functions (M).

Exogenous Variables

P_p, P_m: Price of parts (for assembly) and price of imports (in foreign currency).

W_{us}, W_f: Wage rates in United States and foreign country.

CPI_{us}, CPI_f: Consumer price indexes in United States and foreign country.

Y_{us}, Y_f: Real disposable income in United States and foreign country.

Endogenous Variables

CO_h, CO_f, CO_t: Total costs in home (U.S.) plant, total costs in foreign subsidiary, and optimal total costs.

O_h, O_f, O_t: Output produced at home, output produced abroad in foreign subsidiary, and sum of the two (O_t).

D_h, D_f: Demand at home and by foreign citizens for U.S. good (whose price is P_x).

P_x, e: Price of U.S. final good and nominal exchange rate (dollars per unit of foreign currency).

M: Import demand (real).

$X_{final\$}$: Value in dollars of exports of U.S. good for final demand (whose price is P_x).

$X_{interm\$}$: Value in dollars of exports of U.S.-produced intermediate good (whose price is P_p).

$M_{final\$}$: Value in dollars of imports to the United States.

R_{di}: Direct investment receipts (profits of U.S.-owned foreign subsidiary).

$\mathrm{MNC}_{\mathrm{Revenue}}$, $\mathrm{MNC}_{\mathrm{Profits}}$: Total revenue for and total profits of U.S.-based multinational firm.

$\mathrm{BAL}_{\mathrm{Baldwin}}$, $\mathrm{BAL}_{\mathrm{Baldwin*}}$, $\mathrm{BAL}_{\mathrm{BaldwinReal}}$: Various measures of the Baldwin balance.

Equations

Goods Market

Building the total cost function:

$$CO_h = A_p P_p O_h + A_h W_{us} O_h^2,$$

$$CO_f = A_p P_p O_f + A_f W_f O_f^2,$$

$$\text{RATIO} = eW_f A_f / (W_{us} A_h),$$

$$O_h = \text{RATIO} * O_f,$$

$$O_t = O_h + O_f.$$

The total cost function for a multinational firm producing optimally in two locations:

$$CO_t = A_p P_p O_t + A_h W_{us}[\text{RATIO}/(\text{RATIO} + 1)]O_t^2$$
$$+ eA_f W_f [1/(\text{RATIO} + 1)]O_t^2.$$

Home and foreign demand for U.S. good:

$$D_h = jY_{us} - kP_x / \text{CPI}_{us},$$

$$D_f = rY_f - sP_x/(e\text{CPI}_f).$$

Alternative price functions:
Competitive pricing:

$$P_x = A_p P_p + 2A_h W_{us}\left[\frac{\text{RATIO}}{(\text{RATIO} + 1)}\right]^2 O_t + 2eA_f W_f \left[\frac{1}{(\text{RATIO} + 1)}\right]^2 O_t.$$

Monopoly pricing:

$$P_x = A_p P_p + 2A_h W_{us}\left[\frac{\text{RATIO}}{(\text{RATIO} + 1)}\right]^2 O_t + 2eA_f W_f \left[\frac{1}{(\text{RATIO} + 1)}\right]^2 O_t$$
$$+ \frac{D_h + D_f}{k/\text{CPI}_{us} + s/(e\text{CPI}_f)}.$$

Goods market clearing condition for U.S. good:

$$O_t = D_h + D_f.$$

Balance-of-Payments Equations

Exports and imports:

$$X_{\text{final\$}} = P_x(D_f - O_f),$$

$$X_{\text{interms\$}} = P_p A_p O_f,$$

$$M = tY_{us} - u * eP_m / \text{CPI}_{us},$$

$$M_{\text{final\$}} = eP_m M,$$

$$R_{di} = P_x O_f - CO_f.$$

BOP equilibrium condition:

$$X_{\text{final\$}} + X_{\text{interms\$}} + R_{di} - M_{\text{final\$}} = 0.$$

Balances and Definitions

$$\text{BAL}_{\text{trade}} = X_{\text{final\$}} + X_{\text{interm\$}} - M_{\text{final\$}},$$

$$\text{BAL}_{\text{Baldwin*}} = P_x D_f - M_{\text{final\$}},$$

$$\text{BAL}_{\text{Baldwin}} = \text{BAL}_{\text{Baldwin*}} - 0.5 A_f W_f O_f^2,$$

$$\text{BAL}_{\text{BaldwinReal}} = \text{BAL}_{\text{Baldwin}} / P_x,$$

$$\text{MNC}_{\text{Revenue}} = P_x(D_h + D_f),$$

$$\text{MNC}_{\text{Profits}} = \text{MNC}_{\text{Revenue}} - CO_t.$$

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2 Application of a Nationality-Adjusted Net Sales and Value-Added Framework: The Case of Japan

Fukunari Kimura and Robert E. Baldwin

2.1 Introduction

In the companion paper for the United States (chap. 1 in this volume), we propose a nationality-adjusted net sales and value-added framework and apply it to U.S. data in order to show its usefulness in analyzing a number of current economic issues and to specify points for statistical improvement. The framework should eventually be expanded to an internationally integrated statistical system that captures all activities of multinational enterprises in the world. As a preliminary effort, this paper applies the framework to Japan.

The proposed framework analyzes the globalization of firms' activities from a new viewpoint. Traditional balance-of-payments statistics conceptually present international transactions between economic agents in different locations, a framework consistent with GDP or national accounts statistics.[1] Since the balance-of-payments format primarily follows the residency of economic agents, the value added of foreign affiliates is conceptually decomposed into a residents' portion and a nonresidents' portion, with the latter portion being

Fukunari Kimura is associate professor of economics at Keio University. Robert E. Baldwin is professor emeritus of economics at the University of Wisconsin–Madison and a research associate of the National Bureau of Economic Research.

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1. The balance-of-payments framework determines the residency of individuals by whether or not they reside in a country for one year or more (in the International Monetary Fund [IMF] version of the balance-of-payments manual; in the Japanese version, more than two years for Japanese abroad and more than six months for foreigners in Japan) and that of firms by whether or not they are officially established and registered as local firms. This means that, e.g., a U.S. affiliate of a Japanese firm is treated as American. Hence, merchandise and service trade is basically captured as transactions between economic agents in different geographical locations rather than between economic agents with different nationalities.

captured as investment income (including retained earnings). Thus, the balance-of-payments framework is not very convenient for analyzing the behavior of globalized firms. Merchandise and service transactions between parent companies and affiliates may be qualitatively different from usual transactions between domestic firms and foreign firms. A firm may have its own resources for competitiveness, such as firm-specific technology and managerial ability, that can be used both inside and outside of the home country. Furthermore, even if a firm has multiple establishments across the world, it may make managerial decisions jointly. Our proposed framework assigns nationalities to firms and treats each firm as an individual entity. By doing so, we can analyze the competitiveness of firms in international markets, the importance of foreign-controlled affiliates in a national economy, firms' decisions on whether to export or to invest abroad, and other related issues. These features of firms' activities are particularly important in the case of Japan where firms' activities have globalized rapidly.

Although Japan is one of the few countries that collect extensive operational data on inward and outward direct foreign investment (DFI), we still encounter a number of problems in applying the framework. We try to identify explicitly various statistical deficiencies in the available data and relate them to the proposed statistical format. However, despite large possible estimation errors, we believe that the framework is very useful for analyzing the relationship of the Japanese economy to the world economy. Our analysis confirms the often-claimed asymmetry between the inward and outward DFI of Japan. We also find a rapid expansion of Japanese firms' activities abroad that exceeds the expansion of exports. In addition, we show that the activities of commercial affiliates of Japanese firms abroad, particularly those of general trading companies, play an important role in Japanese international transactions.

In section 2.2, the existing data for Japanese inward and outward DFI are briefly explained. Sections 2.3 and 2.4 present our estimation of aggregate and sectoral net sales by the Japanese to foreigners and the value added of foreign affiliates. Section 2.5 provides a preliminary overview of commercial affiliates of Japanese firms, which are specific to Japan and must be taken into consideration in developing an internationally integrated statistical format. Section 2.6 summarizes what is specific to Japan and discusses directions for the improvement of the statistical format.

2.2 Data on Sales and Purchases by Affiliates

A Ministry of International Trade and Industry (MITI) data set (hereinafter called "the old FAJF series") is the only currently available source for long time-series data on the sales and purchases of foreign affiliates of Japanese firms (FAJFs). The International Enterprises Section of MITI annually distributes questionnaires to parent Japanese companies that are identified by the Foreign Exchange and Foreign Trade Control Law as having foreign affiliates in which they own more than a 10 percent share.[2] A detailed survey was initiated in 1980 and has been conducted every three years since 1983. A shortened questionnaire is used in the other years. Among the particularly useful information collected is data on purchases by FAJFs (such data are not collected in the U.S. surveys of foreign direct investment).[3] This survey, however, is so-called *shounin toukei* ("approved statistics"), and it is not legally mandatory for firms to complete the questionnaire. Therefore, the data are much less reliable than the U.S. data. A serious problem is low coverage. For example, in 1992, only 65.5 percent of the questionnaires sent to foreign affiliates were returned to MITI. Moreover, not all firms returning the questionnaire answered all of the questions. To make matters worse, MITI does not report the number of firms that answered each question. This problem is particularly serious for purchases data. In addition, not all firms that provide total sales or purchases data report by-destination disaggregation of sales or by-origin disaggregation of purchases.

The Research and Statistics Department of the Minister's Secretariat of MITI has recently begun to publish another statistical series covering FAJFs. This survey, called the Basic Survey of Business Structure and Activity (hereinafter "the new FAJF series"), collects data on FAJFs as a part of information obtained on private firms' activities in Japan. The new series is so-called *shitei toukei* ("designated statistics"), and companies have a legal obligation to return completed questionnaires. The survey was scheduled to be conducted annually from 1994. Only figures for the 1991 and 1994 financial years have been published as of 1997. Table 2.1 presents the 1991 financial year data on the activities of FAJFs from the two sources, the old and new FAJF series. The new FAJF series provides more reliable figures than the old FAJF series, but its coverage is narrower and biased toward large companies.[4]

Data on Japanese affiliates of foreign firms (JAFFs) are also reported by the International Enterprises Section of MITI. The structure of this survey is basically the same as that of the old FAJF survey. The coverage is, however, even narrower; for the 1992 financial year, for instance, only 53.7 percent of the questionnaires were returned to MITI.[5]

2. One of the problems with this list of enterprises is that there is no systematic procedure for updating the list. It therefore may include enterprises or foreign affiliates that once existed but are not in business anymore.

3. The Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce tried to collect purchases data in the past, but it deleted the question from the questionnaire because it could not collect reliable figures.

4. The new FAJF series can be used to check the accuracy of the old FAJF series. For the 1991 financial year data, e.g., one may question the quality of sales and purchases data reported by the old FAJF series, which differ widely from those in the new FAJF series. MITI is currently trying to reformat the old and new FAJF series into an integrated framework.

5. Again, one of the problems is that there is no systematic procedure to update the list of JAFFs. MITI is currently trying to integrate the JAFF series and domestic establishment surveys. The Organization for Economic Cooperation and Development (OECD) is promoting this approach with a number of countries, including the United Kingdom and France.

Table 2.1 **Comparison between the Old and New FAJF Series, 1991 Financial Year**

	No. of FAJFs covered		Number of Employees		Sales by FAJFs (million yen)		By Destination Shares in Sales by FAJFs (%)					
							Local		Japan		Third Countries	
	OLD91	NEW91	OLD91	NEW91	OLD91	NEW91	OLD91	NEW91	OLD91	NEW91	OLD91	NEW91
						By Sector						
Total	8,505	2,851	1,620,829	919,294	88,737,186	67,111,539	69.8	65.5	11.8	14.2	18.4	20.3
Manufacturing	3,528	1,723	1,261,012	744,253	25,364,961	16,149,008	69.5	74.2	8.4	7.4	22.1	18.3
Food processing	157	67	33,788	9,833	493,781	214,800	53.0	62.5	25.9	23.5	21.1	13.9
Textiles	185	60	92,020	21,663	676,604	192,059	55.3	64.9	10.1	9.7	34.6	25.3
Chemicals	495	151	78,262	26,377	1,890,649	591,268	66.3	61.1	5.9	5.8	27.7	33.1
Basic metals	216	93	59,726	18,752	1,411,713	310,581	78.9	79.4	5.1	8.0	16.0	12.6
General machinery	291	162	65,687	42,072	2,367,135	1,176,577	67.2	79.5	4.4	5.7	28.4	14.9
Electrical machinery	940	530	435,796	329,712	8,107,032	5,906,542	64.0	61.2	10.9	11.2	25.0	27.6
Transport equipment	425	218	257,264	136,271	7,004,617	5,283,201	85.0	89.4	2.6	1.7	12.3	8.9
Precision machinery	139	75	28,689	25,318	405,423	361,769	48.8	54.6	19.4	24.2	31.8	21.2
Petroleum and coal products	18	3	5,644	n.a.	139,736	n.a.	61.3	n.a.	0.0	n.a.	38.7	n.a.
Other manufacturing	662	364	204,136	134,255	2,868,271	2,112,211	68.1	78.0	9.9	7.9	22.0	14.2
Commerce	2,589	1,112	238,975	171,098	58,337,017	50,811,689	69.0	62.7	14.5	16.4	16.5	20.9
Services	619	n.a.	37,588	n.a.	1,173,761	n.a.	96.1	n.a.	2.8	n.a.	1.1	n.a.
Others	1,769	17	83,254	55	3,861,447	43,620	75.4	13.8	16.9	49.7	7.7	36.5

By Location

World total	8,505	2,851	1,620,829	919,294	88,737,186	67,111,539	69.8	65.5	11.8	14.2	18.4	20.3
North America	2,399	971	444,289	272,999	40,368,155	32,957,029	84.4	77.4	10.5	12.4	5.1	10.2
United States	2,177	890	415,666	255,264	37,653,870	30,795,603	84.8	77.3	10.5	12.2	4.7	10.5
Middle and South America	584	108	105,519	52,444	2,524,748	1,218,308	59.3	47.8	24.1	28.7	16.6	23.5
Asia	3,156	949	744,520	386,110	16,702,312	11,211,411	57.5	46.9	15.2	18.7	27.3	34.4
ASEAN4	1,194	364	394,330	211,021	4,713,576	1,835,711	60.4	47.6	13.9	19.4	25.7	32.9
NIEs4	1,693	529	277,459	154,995	11,576,548	9,297,727	54.1	46.7	16.4	18.5	29.5	34.8
Middle East	51	4	9,276	n.a.	907,197	n.a.	21.5	n.a.	40.8	n.a.	37.6	n.a.
Europe	1,785	688	250,608	178,216	23,661,636	18,207,633	63.4	59.3	5.3	9.5	31.3	31.2
EC	1,615	657	240,333	175,603	22,591,507	17,952,678	66.4	59.0	5.6	9.5	28.0	31.5
Oceania	407	129	56,368	24,134	4,051,605	3,118,578	62.4	54.1	30.3	37.3	7.3	8.6
Africa	123	2	10,249	n.a.	521,533	n.a.	31.0	n.a.	31.0	n.a.	38.0	n.a.

(*continued*)

Table 2.1 (continued)

	Purchases by FAJFs (million yen)		By Origin Shares in Purchases by FAJFs (%)						Purchases/Sales Ratios (%)	
			Local		Japan		Third Countries			
	OLD91	NEW91	OLD91	NEW91	OLD91	NEW91	OLD91	NEW91	OLD91	NEW91
By Sector										
Total	47,850,264	53,895,778	36.5	27.8	41.8	n.a.	21.7	n.a.	53.9	80.3
Manufacturing	10,380,640	10,484,599	43.6	44.6	42.4	n.a.	13.9	n.a.	40.9	64.9
Food processing	193,038	108,287	88.3	75.4	4.7	n.a.	7.0	n.a.	39.1	50.4
Textiles	173,492	105,103	44.1	50.9	20.0	n.a.	36.0	n.a.	25.6	54.7
Chemicals	482,020	266,287	62.8	52.6	23.6	n.a.	13.6	n.a.	25.5	45.0
Basic metals	725,757	201,238	51.4	60.4	17.3	n.a.	31.3	n.a.	51.4	64.8
General machinery	505,600	614,433	43.2	65.2	48.7	n.a.	8.1	n.a.	21.4	52.2
Electrical machinery	3,836,972	3,820,493	32.1	36.5	49.5	n.a.	18.5	n.a.	47.3	64.7
Transport equipment	2,910,419	3,960,656	51.2	52.2	45.4	n.a.	3.4	n.a.	41.6	75.0
Precision machinery	127.440	195,332	28.4	22.5	67.0	n.a.	4.6	n.a.	31.4	54.0
Petroleum and coal products	46,729	n.a.	58.9	n.a.	17.4	n.a.	23.7	n.a.	33.4	n.a.
Other manufacturing	1,379,173	1,212,771	61.0	31.1	21.5	n.a.	17.4	n.a.	48.1	57.4
Commerce	35,486,167	43,290,361	31.5	23.7	42.4	n.a.	26.1	n.a.	60.8	85.2
Services	441,532	n.a.	79.2	n.a.	15.6	n.a.	5.2	n.a.	37.6	n.a.
Others	1,541,928	37,282	89.0	1.3	8.7	n.a.	2.3	n.a.	39.9	85.5

By Location

World total	47,850,264	53,895,778	36.5	27.8	41.8	n.a.	21.7	n.a.	53.9	80.3
North America	22,215,404	27,365,443	52.7	34.4	37.2	n.a.	10.1	n.a.	55.0	83.0
United States	20,844,276	25,496,874	53.9	35.0	36.3	n.a.	9.8	n.a.	55.4	82.8
Middle and South America	1,298,949	909,132	34.6	27.2	36.3	n.a.	29.1	n.a.	51.4	74.6
Asia	9,334,981	8,665,570	33.7	24.5	39.6	n.a.	26.7	n.a.	55.9	77.3
ASEAN4	2,721,950	1,293,308	42.1	41.2	36.9	n.a.	21.0	n.a.	57.7	70.5
NIEs4	6,469,430	7,317,362	29.5	21.4	41.0	n.a.	29.5	n.a.	55.9	78.7
Middle East	605,886	n.a.	9.3	n.a.	41.2	n.a.	49.4	n.a.	66.8	n.a.
Europe	11,864,239	13,764,828	15.6	17.3	49.3	n.a.	35.1	n.a.	50.1	75.6
EC	11,039,056	13,573,922	17.0	17.3	49.3	n.a.	33.6	n.a.	48.9	75.6
Oceania	2,117,517	2,765,517	40.9	29.8	54.3	n.a.	4.8	n.a.	52.3	88.7
Africa	413,288	n.a.	78.1	n.a.	9.2	n.a.	12.8	n.a.	79.2	n.a.

Data Sources: OLD91 (57, 75, 78–101, 126); NEW91 (398–401, 450–53).

Notes: The sample set of the old FAJF series (OLD91) includes affiliates in which the Japanese have more than a 10 percent share and affiliates in which Japanese majority-owned affiliates have more than a 50 percent share, and the parent companies of which are in industries other than finance, insurance, and real estate. The new FAJF series (NEW91) covers majority-owned foreign affiliates of Japanese firms with more than U.S.$1 million of capital, in the mining, manufacturing, and commerce sectors, whose parent companies have more than 50 employees and more than 30 million yen of capital in the mining, manufacturing, and commerce sectors.

"n.a." in NEW91 means that the data are not available, which is in part the result of small sample sizes.

Sales and purchases by FAJFs obtained from NEW91 are converted from U.S. dollars to yen using IMF92 (437): U.S.$1 = 134.71 yen.

Large differences between the two series are partly due to different coverage and partly due to the data quality of the old FAJF series. One of the serious problems with the old FAJF series is that not all firms that returned the questionnaire provided figures for all questions (at least for 1991 and 1992) and MITI publicizes total figures only. What we are particularly concerned about is the quality of the calculated value-added estimates. The purchases figures are probably understated in the old FAJF series (at least for 1991 and 1992), though we could not make any adjustment because the numbers of affiliates are unknown for purchases. Lipsey, Blomström, and Ramstetter (chap. 3 in this volume) try to adjust the data for fluctuations in survey coverage using various information from other sources. We do not attempt any such adjustments.

Another difference between MITI and BEA data is that the former data set does not report sales of goods and services separately. In particular, the questionnaire by the International Enterprises Section of MITI does not explicitly specify sales and purchases as "sales and purchases of goods and services," so we are not sure if firms report service transactions. Therefore, in our estimations, we tentatively use merchandise trade (not including service trade) for cross-border trade data.

2.3 Estimation of Aggregate Net Sales

2.3.1 Defining Nationalities

MITI's old FAJF series defines "foreign affiliates of Japanese firms" as firms in which the Japanese have more than a 10 percent share and "majority-owned affiliates" as firms in which the Japanese have more than a 50 percent share. For our purposes, it is better to use data for majority-owned affiliates, but they are not available in time-series form.[6] Thus, we define FAJFs as firms in which the Japanese have more than a 10 percent share. This may cause considerable measurement error, particularly since it is a common practice for Japanese general trading companies to participate in joint ventures between Japanese and foreign companies as third parties with minor shares. For inward DFI, MITI's JAFF series defined "Japanese affiliates of foreign firms" as majority-owned affiliates until the 1990 financial year and as affiliates with more than one-third shares in the 1991 and 1992 financial years.

As in the case of the United States, we do not have data on sales and purchases by foreign citizens in Japan and those by Japanese living abroad. It is therefore necessary to classify households on a country-of-residence basis rather than on a nationality basis.

The term "Japanese" thus refers to Japanese-owned firms in Japan and abroad, households of Japanese and private foreign citizens residing in Japan (Japanese-resident households), and Japanese government units. Similarly, the term "foreigners" refers to foreign-owned firms in Japan and abroad, households of foreign and Japanese citizens residing abroad (foreign-resident households), and foreign governments.

2.3.2 Estimates of Net Sales of the Japanese to Foreigners

Table 2.2 presents estimates of the net sales of the Japanese to foreigners for 1987–92. The table consists of (I) cross-border sales to and purchases from foreigners by the Japanese, (II) sales to and purchases from foreigners by FAJFs, and (III) Japanese sales to and purchases from JAFFs.

In panel I, Japanese cross-border sales (exports) to foreigners are estimated by subtracting the sum of Japanese exports shipped to FAJFs and Japanese

6. The definition of FAJFs in the new FAJF series is "majority owned."

Table 2.2 **Net Sales by Japanese to Foreigners, 1987–92 (in millions of yen)**

Transaction	1987	1988	1989	1990	1991	1992
I. *Cross-border sales to and purchases from foreigners by Japanese*						
Exports to foreigners						
+ Japanese exports (merchandise only)	33,315,000	33,939,000	37,823,000	41,457,000	42,360,000	43,012,000
− Japanese exports shipped to FAJFs	20,571,156	24,271,567	25,067,600	24,644,049	19,364,991	14,653,484
− Japanese exports shipped by JAFFs	1,029,374	1,495,679	1,259,571	1,885,337	1,921,777	1,841,958
Total	11,714,470	8,171,754	11,495,829	14,927,614	21,073,232	26,516,558
Imports from foreigners						
+ Japanese imports (merchandise only)	21,737,000	24,006,000	28,979,000	33,855,000	31,900,000	29,527,000
− Japanese imports shipped by FAJFs	9,294,170	11,184,629	17,802,290	17,647,431	11,013,452	11,514,761
− Japanese imports shipped to JAFFs	2,820,984	3,198,105	4,122,046	5,714,953	5,381,077	4,724,046
Total	9,621,846	9,623,266	7,054,664	10,492,616	15,505,471	13,288,193
Net cross-border sales to foreigners	2,092,624	−1,451,512	4,441,165	4,434,998	5,567,761	13,228,365
II. *Sales to and purchases from foreigners by FAJFs*						
Sales by FAJFs						
+ Sales by FAJFs	54,808,975	68,426,994	93,177,600	99,806,407	88,737,186	79,007,218
− Sales to other FAJFs	3,354,457	4,795,450	6,228,815	7,800,237	6,570,591	8,455,537
− Japanese imports shipped by FAJFs	9,294,170	11,184,629	17,802,290	17,647,431	11,013,452	11,514,761
Total	42,160,348	52,446,915	69,146,495	74,358,739	71,153,143	59,036,921
Local purchases abroad by FAJFs						
+ Purchases by FAJFs	42,135,754	57,987,023	77,139,161	73,880,197	47,850,264	39,660,435
− Purchases from other FAJFs	3,354,457	4,795,450	6,228,815	7,800,237	6,570,591	8,455,537
− Japanese exports shipped to FAJFs	20,571,156	24,271,567	25,067,600	24,644,049	19,364,991	14,653,484
Total	18,210,141	28,920,006	45,842,746	41,435,911	21,914,682	16,551,414
Net sales to foreigners by FAJFs	23,950,207	23,526,909	23,303,749	32,922,828	49,238,461	42,485,506

(continued)

Table 2.2 (continued)

Transaction	1987	1988	1989	1990	1991	1992
III. *Japanese sales to and purchases from JAFFs*						
Japanese sales to JAFFs						
+ Purchases by JAFFs	6,284,978	7,665,564	9,247,364	12,032,837	12,060,981	11,275,793
− Sales among JAFFs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
− Japanese imports shipped to JAFFs	2,820,984	3,198,105	4,122,046	5,714,953	5,381,077	4,724,046
Total	3,463,994	4,467,459	5,125,318	6,317,884	6,679,904	6,551,747
Japanese purchases from JAFFs						
+ Sales by JAFFs	10,420,519	12,292,986	14,003,962	16,810,563	17,792,870	16,300,170
− Sales among JAFFs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
− Japanese exports shipped by JAFFs	1,029,374	1,495,679	1,259,571	1,885,337	1,921,777	1,841,958
Total	9,391,145	10,797,307	12,744,391	14,925,226	15,871,093	14,458,212
Net sales to JAFFs	−5,927,151	−6,329,848	−7,619,073	−8,607,342	−9,191,189	−7,906,465
IV. *Net sales by Japanese to foreigners*[a]	20,115,680	15,745,549	20,125,841	28,750,484	45,615,033	47,807,406
	(139,074)	(122,868)	(145,882)	(198,567)	(338,617)	(377,477)
Reference						
Cross-border merchandise trade balance[a]	11,578,000	9,933,000	8,844,000	7,602,000	10,460,000	13,485,000
	(80,047)	(77,511)	(64,106)	(52,504)	(77,648)	(106,475)
Exchange rates (rf; yen per dollar)	144.64	128.15	137.96	144.79	134.71	126.65

Estimation Procedure and Data Sources: In the following figures in parentheses are for 1987, 1988, 1989, 1990, 1991, and 1992, respectively; they are expressed in millions of yen (except exchange rates).

Japanese exports: Merchandise exports only. JSY90 (338), 92 (338), 95 (417): (33,315,000; 33,939,000; 37,823,000; 41,457,000; 42,360,000; 43,012,000).

Japanese exports shipped to FAJFs: One of the shortfalls of the old FAJF series is that firms in the sample report total purchases but many of them fail to report the by-origin disaggregation. E.g., out of total purchases in 1987 (42,135,754), only 38.4 percent (16,189,035) are disaggregated into local purchases (5,880,385), purchases from Japan (7,721,739), and purchases from third countries (2,586,911). We therefore estimate Japanese exports shipped to FAJFs as the sum of sectoral estimates, each of which is derived by multiplying total purchases of the sector by the share of purchases from Japan of the sector (calculated from the limited sample). OLD87/88 (94–95, 202–3), 89 (222–23), 90 (104–5), 91 (100–101), 92 (210–11): (20,571,156; 24,271,567; 25,067,600; 24,644,049; 19,364,991; 14,653,484).

Japanese exports shipped by JAFFs: AF87/88 (71, 225), 89 (73), 90 (77), 91 (75), 92 (79): (1,029,374; 1,495,679; 1,259,571; 1,885,337; 1,921,777; 1,841,958).

Japanese imports: Merchandise imports only. JSY90 (338), 92 (338), 95 (417): (21,737,000; 24,006,000; 28,979,000; 33,855,000; 31,900,000; 29,527,000).

Japanese imports shipped by FAJFs: As in Japanese exports shipped to FAJFs, firms in the sample report total sales but many of them fail to report the by-destination disaggregation. E.g., out of total sales in 1987 (54,808,975), only 42.2 percent (23,144,497) are disaggregated into local sales (15,388,102), sales to Japan (3,770,459), and sales to third countries (3,985,936). We therefore estimate Japanese imports shipped by FAJFs as the sum of sectoral estimates, each of which is derived by multiplying total sales of the sector by the share of sales to Japan of the sector (calculated from the limited sample). OLD87/88 (82–83, 190–91), 89 (210–11), 90 (88–89), 91 (88–89), 92 (198–99): (9,294,170; 11,184,629; 17,802,290; 17,647,431; 11,013,452; 11,514,761).

Japanese imports shipped to JAFFs: AF87/88 (105, 239), 89 (107), 90 (111), 91 (109), 92 (113): (2,820,984; 3,198,105; 4,122,046; 5,714,953; 5,381,077; 4,724,046).

Sales by FAJFs: OLD87/88 (83, 191), 89 (211), 90 (89), 91 (89), 92 (199): (54,808,975; 68,426,994; 93,177,600; 99,806,407; 88,737,186; 79,007,218).

Sales to other FAJFs: Although data on sales among FAJFs are not available, intrafirm transactions between affiliates can be estimated. For 1989, using the same method as in estimating Japanese imports from FAJFs, we first estimate local sales and sales to third countries of each sector. Then, by multiplying ratios of intragroup sales in local sales and sales to third countries of each sector, we can estimate the intrafirm trade of the sector. The sum of sectoral estimates provides a proxy of sales to other FAJFs. For 1987, 1988, 1990, and 1991, ratios of intragroup sales in 1989 are used. OLD87/88 (82–83, 190–91), 89 (210–11, 229), 90 (88–89), 91 (88–89), 92 (198–99, 217): (3,354,457; 4,795,450; 6,228,815; 7,800,237; 6,570,591; 8,455,537).

Purchases by FAJFs: OLD87/88 (95, 203), 89 (223), 90 (105), 91 (101), 92 (211): (42,135,754; 57,987,023; 77,139,161; 73,880,197; 47,850,264; 39,660,435).

Purchases from other FAJFs: Data on purchases among FAJFs are not available. As a proxy, we use sales to other FAJFs estimated above.

Purchases by JAFFs: AF87/88 (105, 239), 89 (107), 90 (111), 91 (109), 92 (113): (6,284,978; 7,665,564; 9,247,364; 12,032,837; 12,060,981; 11,275,793).

Sales among JAFFs: Not available.

Sales by JAFFs: AF87/88 (71,225), 89 (73), 90 (77), 91 (75), 92 (79): (10,420,519; 12,292,986; 14,003,962; 16,810,563; 17,792,870; 16,300,170).

Exchange rates: Yen per dollar (rf series). IMF92 (437), 94 (316): (144.64; 128.15; 137.96; 144.79; 134.71; 126.65).

Notes: FAJFs: Foreign affiliates of Japanese firms abroad, which include affiliates in which the Japanese have more than a 10 percent share and affiliates in which Japanese majority-owned affiliates have more than a 50 percent share. Only the parent firm with the largest share reports the figures. Only affiliates whose parent companies are in industries other than finance, insurance, and real estate are covered. Coverage of affiliate data (in terms of number of affiliates) for 1987–92 is 79.4, 78.8, 72.3, 78.2, 78.5, and 65.5 percent.

JAFFs: Majority-owned (with more than a one-third share from 1991 fiscal year) Japanese affiliates of foreign firms in Japan, which report their direct investment to MITI and have foreign participation in management. Coverage of affiliate data (in terms of number of affiliates) for 1987–92 is 50.1, 52.3, 51.8, 51.8, 51.9 and, 53.7 percent.

Years: Japanese exports and imports are on a calendar-year basis, while data for FAJFs and JAFFs are on a financial-year basis.

[a]Figures in parentheses are in millions of dollars.

exports shipped by JAFFs from cross-border exports of Japan valued on an f.o.b. basis. The estimate of such cross-border sales (exports) in 1987, for example, is 11,714 billion yen, which is much smaller than Japan's cross-border exports of 33,315 billion yen.

Quite aside from the above-mentioned coverage problem, the 11,714 billion yen figure is, for several reasons, still only an approximation. The most serious problem is that the figure for Japanese exports shipped to FAJFs (20,571 billion yen) is a very rough estimate. Among FAJFs reporting the total amount of purchases are many that do not provide figures for purchases disaggregated by origin; that is, a considerable portion of FAJFs do not report separately local purchases, purchases from Japan, and purchases from third countries. In 1987, for example, only 38.4 percent of total purchases by FAJFs can be disaggregated by origin. We, hence, first calculate the ratio of purchases from Japan to total purchases for firms in each sector reporting purchases by origin. Then we multiply that ratio by total purchases by all firms in the sector and sum up all sectors' estimates of purchases from Japan. Another potential estimation problem concerns the treatment of purchases by FAJFs from commercial FAJFs. When an FAJF in the commercial sector imports intermediate goods and sells them to a noncommercial FAJF, both the commercial and noncommercial FAJFs may treat these purchases as purchases from abroad. This means that the purchases ratios from Japan (and those from third countries) may be overstated to some extent. The estimation of purchases by FAJFs from Japan or Japanese exports shipped to FAJFs (20,571 billion yen) in 1987 may therefore differ from the true figure. In addition, exports by JAFFs to FAJFs are subtracted twice in this calculation since they are included in both Japanese exports shipped to FAJFs and Japanese exports shipped by JAFFs. This, however, probably does not affect our estimates very much.[7]

The lower half of panel I of table 2.2 shows our estimates of Japanese cross-border purchases (imports) from foreigners, namely, 9,622 billion yen in 1987. These are again much smaller than cross-border imports (21,737 billion yen). They are calculated by subtracting the sum of Japanese imports shipped by FAJFs and Japanese imports shipped to JAFFs from Japanese cross-border imports valued on a c.i.f. basis. Again, the estimates of Japanese imports shipped by FAJFs or sales to Japan by FAJFs (9,294 billion yen) may contain large errors. Since a large portion of FAJFs do not report by-destination disaggregation of their sales (to the local market, to Japan, and to third countries), sales by FAJFs to Japan are estimated by calculating the ratio of sales to Japan to total sales for each industrial sector, multiplying this ratio by total sales of the

7. Possible errors listed in this paragraph do not affect our estimation of Japanese net sales to foreigners shown in panel IV of table 2.2. As Lois Steckler of the Board of Governors points out in personal correspondence, Japanese net sales to foreigners are conceptually equivalent to cross-border net exports plus FAJF value added (sales minus purchases) minus JAFF value added (sales minus purchases). The possible error terms cancel out in the calculation of Japanese net sales to foreigners.

sector, and summing up all sectors' estimates of sales to Japan. Again, the ratios of sales to Japan to total sales may be overstated due to double counting in the transactions through commercial FAJFs. In addition, Japanese imports from FAJFs shipped to JAFFs are subtracted twice.[8]

By subtracting 9,622 billion yen from 11,714 billion yen, we obtain Japanese net cross-border sales to foreigners, 2,093 billion yen in 1987. Our estimates are considerably smaller than the cross-border trade balance, except in 1992.

Panel II of table 2.2 presents estimates of sales and purchases by FAJFs to and from foreigners. To obtain sales by FAJFs to foreigners (42,160 billion yen in 1987), we subtract from their total sales both sales among themselves and their sales to Japan. Data on sales among FAJFs are not available. However, intragroup sales of FAJFs to local markets and third countries, which are a part of sales among FAJFs, can be estimated. The old FAJF series for the years 1989 and 1992 gives shares of intragroup sales of FAJFs (to local markets, to Japan, and to third countries) to total sales of FAJFs for each sector. By multiplying each sector's total sales by these shares and adding them across sectors, we obtain proxies for sales among FAJFs. Since these shares are available only for 1989 and 1992, the 1989 shares are used for 1987–88 and 1990–91. The other term to be subtracted, Japanese imports shipped by FAJFs, may contain a large error, as discussed above.

Purchases by FAJFs from foreigners abroad (18,210 billion yen in 1987) are calculated by subtracting from their total purchases both purchases from other FAJFs and Japanese exports shipped to FAJFs. Data on purchases by FAJFs are directly available, which is an advantage the Japanese statistics have compared with U.S. BEA statistics. The next term, purchases from other FAJFs by FAJFs, is not directly available. We use intragroup sales of FAJFs to local and third countries, estimated above, as a proxy.[9] The other terms to be subtracted, Japanese exports shipped to FAJFs, may contain large estimation errors for the above-mentioned reasons. Our estimation of net sales by FAJFs to foreigners is 23,950 billion yen for 1987.

Panel III of table 2.2 presents the estimates of net sales of Japanese to JAFFs, which were −5,927 billion yen in 1987. Again, the JAFF series published by MITI directly provide data on purchases by JAFFs. Sales among JAFFs, however, are not available. We thus calculate Japanese sales to JAFFs (3,464 billion yen in 1987) by subtracting Japanese imports shipped to JAFFs from total purchases by JAFFs. Japanese purchases from JAFFs (9,391 billion yen in 1987) are obtained by subtracting Japanese exports shipped by JAFFs from total sales by JAFFs.

By summing up these three components, we obtain estimates of net sales to foreigners by the Japanese, for example, 20,116 billion yen in 1987 (panel IV).

8. These possible errors do not affect our estimation of Japanese net sales to foreigners.

9. Intragroup purchases from local and third countries can be estimated in a symmetric manner. However, the estimates differ from intragroup sales to local and third countries, though these must be equivalent in principle.

Despite the possible differences from the true figures, our nationality-based account characterizes various key feature of the Japanese economy. First, the asymmetry between FAJFs and JAFFs is apparent. As often pointed out (see, e.g., Lawrence 1993; Bergsten and Noland 1993, 79–82), the activities of JAFFs are much smaller than those of FAJFs. Second, net sales by the Japanese to foreigners are consistently larger than cross-border net sales (exports). This, of course, is due to the greater activity of FAJFs compared with JAFFs. According to our estimates, nationality-adjusted net sales grew at a considerably faster pace than cross-border net sales between 1988 and 1992.[10] The strong yen, the saving-investment balance, the "bubble economy," the competitive edge vis-à-vis the exchange rate, and fear of foreign protectionism seem to have accelerated Japanese outward DFI. Third, compared with the United States, the proportion of cross-border transactions through foreign affiliates is large. Based on our estimates for 1987, U.S. exports and imports through foreign affiliates of U.S. firms (FAUSFs) were 25.1 and 15.2 percent of total U.S. exports and imports, while Japanese exports and imports through FAJFs were 61.7 and 42.8 percent of total Japanese exports and imports. Although the ratio on the export side for Japan declined sharply to 34.1 percent in 1992, both ratios were still higher than those for the United States.[11] As we mentioned, our estimates of by-destination sales and by-origin purchases of FAJFs could contain large errors, but we can still infer that Japan depends on its foreign affiliates in export and import transactions much more extensively than the United States does. Activities by FAJFs in the commercial sector are particularly important. According to our estimates, Japanese exports and imports through commercial FAJFs amounted to 48.2 and 36.0 percent of total Japanese exports and imports in 1987. We discuss commercial FAJFs further in section 2.5.

2.3.3 Estimates of Value Added by FAJFs and JAFFs

The same data set that we used in constructing table 2.2 can also be used to estimate value added by FAJFs and JAFFs. Since the old FAJF and JAFF series published by MITI directly report total sales and purchases by FAJFs and JAFFs, value added can be calculated by simply subtracting total purchases from total sales. Strictly speaking, we need to take into consideration such factors as depreciation, indirect taxes, and changes in inventory stock, but data on these variables are not available. Table 2.3 presents our estimates. The format of the table follows that used in our companion paper for the United States.

10. The estimate of nationality-adjusted sales for 1988 is particularly small, while those for 1991 and 1992 look very large. This fluctuation is mainly due to changes in the value added by FAJFs, which may contain large estimation errors. We, however, can at least conclude that the activities of JAFFs expanded until 1990.

11. The decline in the estimated ratio on the export side for 1992 may be due to the understatement of purchases by FAJFs.

Table 2.3 also reports ratios of value added by FAJFs to value added by all Japanese-owned firms, the latter being defined as Japanese GDP plus value added by FAJFs minus value added by JAFFs, and ratios of value added by JAFFs to the GDP of Japan.[12] The ratio of value added by FAJFs to value added by all Japanese-owned firms increased during the period, but the figures of 8.33 and 7.87 percent for 1991 and 1992 may be overstated due to a purchases figure that is unusually low compared with the corresponding sales figure.[13] We can, however, conclude that Japanese firms have increased the extent of production abroad and have reached roughly the same degree of internationalization of activities as U.S. firms have. As reported in our companion paper, the ratio of value added by FAUSFs to that of U.S.-owned firms ranges from 5 to 6 percent. The ratio of value added by JAFFs to Japanese GDP, in contrast, is generally only a little larger than 1 percent. The asymmetry between the behavior of FAJFs and JAFFs is obvious.

The proportion of foreign activities by Japanese firms is often measured by the foreign production ratio, which is defined as the ratio of the value of production of FAJFs to total domestic production. The figure for the manufacturing sector in the 1993 fiscal year, for example, is estimated as 6.4 percent by MITI (1994d, 46). The value of production, however, includes the value of intermediate inputs and thus is not appropriate for measuring the size of economic activities in Japan and abroad. Our value-added method is conceptually better for indicating the proportion of foreign activities of Japanese firms, although it may contain considerable measurement error due to the quality of data.

2.3.4 Comparison of Exports and Direct Foreign Investment on a Value-Added Basis

In other empirical studies, firms' choices between exports and DFI are usually captured by comparing basically incomparable figures, namely, exports and DFI flows. Our value-added method makes it possible to compare directly two ways in which firms can sell their products to foreigners abroad: by producing domestically and exporting and by producing abroad and selling there.

Following the companion paper for the United States, we calculate Japanese value-added figures in exports of Japanese-owned firms. They are useful in comparing the proportion of Japanese firms' sales activities to foreigners through cross-border transactions and through the activities of FAJFs. To obtain the estimates, we subtract exports by JAFFs from total cross-border ex-

12. Value added by Japanese-owned firms as well as Japanese GDP includes production that takes place outside firms, such as in the government and household sectors.

13. As mentioned in the note to table 2.1, the 1991 data on sales and purchases provided by the new FAJF series suggest much smaller value added by FAJFs. The ratios of value added by FAJFs to sales under the old FAJF series in table 2.3 also look too large for 1991 and 1992. This discrepancy may be due to the small number of FAJFs providing purchases figures, though this cannot be proved from published documents.

Table 2.3 **Value Added by FAJF and JAFF, 1987–92 (in millions of yen)**

Transaction	1987	1988	1989	1990	1991	1992
I. *Value added by FAJFs*						
+ Sales by FAJFs	54,808,975	68,426,994	93,177,600	99,806,407	88,737,186	79,007,218
− Local purchases abroad by FAJFs	18,210,141	28,920,006	45,842,746	41,435,911	21,914,682	16,551,414
− Japanese exports shipped to FAJFs	20,571,156	24,271,567	25,067,600	24,644,049	19,364,991	14,653,484
− Purchases from other FAJFs	3,354,457	4,795,450	6,228,815	7,800,237	6,570,591	8,455,537
Total	12,673,221	10,439,971	16,038,439	25,926,210	40,886,922	39,346,783
In goods and services sold to						
Japanese	2,924,682	2,438,096	4,136,417	6,610,413	8,102,098	9,945,509
Foreigners	9,748,539	8,001,875	11,902,022	19,315,797	32,784,824	29,401,274
Received by						
Japanese	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Foreigners	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Value added/sales ratio (%)	23.12	15.26	17.21	25.98	46.08	49.80
II. *Japanese value added in exports of Japanese-owned firms*[a]	28,940,835	29,082,193	32,775,458	35,472,039	36,904,826	36,248,823
In export to FAJFs	18,439,984	21,757,033	22,470,597	22,090,926	17,672,923	12,901,895
In exports to foreigners	10,500,851	7,325,160	10,304,861	13,381,113	19,231,902	23,346,928
III. *Value added by JAFFs*						
+ Sales by JAFFs	10,420,519	12,292,986	14,003,962	16,810,563	17,792,870	16,300,170
− Purchases within Japan by JAFFs	3,463,994	4,467,459	5,125,318	6,317,884	6,679,904	6,551,747
− Japanese imports shipped to JAFFs	2,820,984	3,198,105	4,122,046	5,714,953	5,381,077	4,724,046
− Purchases from other JAFFs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total	4,135,541	4,627,422	4,756,598	4,777,726	5,731,889	5,024,377

In goods and services sold to						
Japanese	3,727,018	4,064,407	5,328,771	4,241,895	5,112,798	4,456,610
Foreigners	408,523	563,015	427,827	535,831	619,091	567,767
Received by						
Japanese	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Foreigners	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Value added/sales ratio (%)	39.69	37.64	33.97	28.42	32.21	30.82
IV. *Value added in exporting country by foreign-owned firms*[a]	11,153,753	11,493,077	10,018,803	14,528,465	18,722,702	16,146,171
In exports to Japanese	8,625,023	8,626,296	6,323,801	9,405,581	13,899,104	11,911,536
In exports to JAFFs	2,528,730	2,866,781	3,695,002	5,122,884	4,823,597	4,234,635
Reference						
GDP of Japan	353,989,000	376,889,000	402,311,000	432,862,000	455,862,000	465,431,000
Ratio of value added of FAJFs to that of Japanese-owned firms (%)	3.50	2.73	3.88	5.71	8.33	7.87
Ratio of value added to JAFFs to Japanese GDP (%)	1.17	1.23	1.18	1.10	1.26	1.08

Data Sources: GDP of Japan: JSY92 (555), 95 (142). See estimation procedure and data source note to table 2.2 for other data.

Notes: Value added of Japanese-owned firms = GDP of Japan + value added of FAJFs − value added of JAFFs.

All data are on a financial-year (April–March) basis.

[a]Figures in panels II and IV are estimated using the import inducement coefficient of export (10.36 percent) obtained from IO90 (321, 388). See the text for details.

ports and then subtract the import component in the remaining exports.[14] In Japan, input-output tables are presented in the non-competitive-import form and hence directly provide the import inducement coefficient of exports or the direct and indirect import content of exports. This was 10.36 percent in 1990. By using this figure for 1987–92, Japanese value added in exports of Japanese-owned firms can be calculated. This amounted to 28,941 billion yen in 1987, for example. Out of the 28,941 billion yen, 10,501 billion yen was the value added in exports by Japanese firms located in Japan to foreigners abroad. This figure is directly comparable with the 9,749 billion yen of value added in the goods and services sold by FAJFs to foreigners. There are two ways for Japanese firms to sell their products to foreigners: by producing in Japan and exporting and by producing abroad and selling there. The comparison between 10,501 billion yen and 9,749 billion yen provides a clear idea of the relative importance of these two marketing methods. Compared with the same figures for the United States reported in Baldwin and Kimura (chap. 1), transactions by Japanese foreign affiliates are more important, mainly because the ratio of exports by FAJFs to total exports is large. Even after discounting the large estimates of value added by FAJFs in 1991 and 1992, transactions by FAJFs seem to be becoming more important over time.

Value added in exporting countries by foreign-owned firms is estimated in a similar way. Because input-output tables for the rest of the world are not available, the figure for Japan, 10.36 percent, is tentatively used. The estimate of value added in exporting countries by foreign-owned firms abroad is 11,154 billion yen in 1987. Out of this, value added in foreign exports to the Japanese in Japan is 8,625 billion yen. This figure can be directly compared with 3,727 billion yen, which is the value added in goods and services sold by JAFFs to the Japanese in Japan. The importance of transactions through JAFFs seems to be declining over time.

2.4 Estimation of Sectoral Net Sales

2.4.1 Sectoral Net Sales

In this section, we estimate nationality-based net sales by individual industrial sectors. We believe that they provide a better idea of firms' international competitiveness determined by technological know-how and managerial ability than cross-border net exports do.

A problem arising in sectoral matching of DFI figures and trade statistics is that affiliate data are classified by industry while cross-border trade data are classified by commodity. This difference leads to a serious problem, particu-

14. Precisely speaking, we must consider the JAFF component in these exports to avoid double counting, but the data are not available.

larly in the treatment of the commercial sector. We therefore estimate net sales only for the manufacturing sector.

Nationality-adjusted sales for individual sectors are calculated as follows:

Nationality-adjusted sales = Japan's cross-border exports
+ sales by FAJFs + purchases by JAFFs
− Japan's exports shipped to FAJFs
− Japan's imports shipped by FAJFs
− sales to other FAJFs by FAJFs
− Japan's exports shipped by JAFFs
− Japan's imports shipped to JAFFs.

On the other hand, nationality-adjusted purchases for individual sectors are defined as follows:

Nationality-adjusted purchases = Japan's cross-border imports
+ sales by JAFFs + purchases by FAJFs
− Japan's exports shipped to FAJFs
− Japan's imports shipped by FAJFs
− purchases from other FAJFs by FAJFs
− Japan's exports shipped by JAFFs
− Japan's imports shipped to JAFFs.

Nationality-adjusted net sales are calculated by subtracting nationality-adjusted purchases from nationality-adjusted sales. We assume that each industry purchases intermediate inputs only from its own industry, since data on sectoral purchases by industrial origin are not available. This is, of course, a strong assumption, but it should roughly hold for the manufacturing sector. Nationality-adjusted net sales of an individual industrial sector then become equivalent to cross-border net sales (exports) plus value added by FAJFs minus value added by JAFFs for the sector. By following this estimation procedure, possible estimation errors in by-destination sales and by-origin purchases by FAJFs and JAFFs cancel out in the calculation.[15]

Table 2.4 presents cross-border net sales, nationality-adjusted net sales, and their ratios to the corresponding total sales (of all firms in Japan or of all Japanese-owned firms). To be consistent with the macroeconomic figures, we

15. The sector matching list between our industry (commodity) classification and SITC Revision 2 is available upon request.

Table 2.4 Cross-Border and Nationality-Adjusted Net Sales by Sector

	Cross-Border Net Sales[a]						Nationality-Adjusted Net Sales[a]					
Sector	1987	1988	1989	1990	1991	1992	1987	1988	1989	1990	1991	1992
Total	11,528,693	9,939,713	8,874,690	7,550,636	10,478,920	13,504,594	20,066,373	15,752,262	20,156,531	28,699,120	45,633,953	47,827,000
Manufacturing	21,297,715	19,675,032	20,204,591	20,925,081	22,848,678	24,918,951	21,589,169	21,055,289	23,208,815	28,484,365	33,803,547	36,509,672
Food processing	−1,101,196	−1,310,955	−1,584,472	−1,707,678	−1,752,546	−1,826,175	−1,085,176	−1,269,383	−1,542,527	−1,573,097	−1,656,842	−1,647,090
Textiles	−324,978	−718,266	−1,133,064	−1,058,343	−1,017,400	−1,099,777	−214,835	−538,177	−993,237	−607,435	−541,197	−760,918
Chemicals	−296,351	−375,906	−391,840	−333,545	−336,878	−196,899	−704,518	−796,094	−941,477	−393,287	−258,662	94,310
Basic metals	905,759	455,336	281,819	62,211	115,725	637,167	1,380,705	948,252	616,772	600,633	473,811	1,365,507
General machinery	6,270,341	6,767,426	7,705,274	8,051,638	8,379,562	8,813,466	6,209,419	6,948,108	8,000,782	9,344,367	10,164,196	9,161,093
Electrical machinery	6,114,123	6,393,681	6,880,890	7,282,399	7,477,108	7,424,773	6,489,225	7,219,511	7,218,124	9,788,039	10,709,812	10,186,766
Transport equipment	8,576,168	7,640,115	8,223,757	8,784,646	9,085,143	9,731,532	9,071,394	8,349,570	9,760,246	10,850,617	13,139,792	15,183,381
Precision machinery	1,261,682	1,260,404	1,347,500	1,411,273	1,470,442	1,428,276	1,302,296	1,450,029	1,516,363	1,398,055	1,625,172	1,383,764
Petroleum and coal products	−1,059,410	−982,160	−1,228,198	−1,444,532	−1,011,156	−741,460	−2,187,322	−2,211,888	−1,717,838	−1,941,294	−1,630,928	−746,129
Other manufacturing	951,576	545,357	102,925	−122,988	438,679	748,050	1,327,980	955,361	1,291,607	1,017,767	1,778,394	2,288,990
Others	−9,769,022	−9,735,318	−11,329,901	−13,374,444	−12,369,758	−11,414,357	−1,522,796	−5,303,026	−3,052,284	214,756	11,830,403	11,317,328

Sector	Cross-Border Net Sales/Total Sales[b] 1987	1988	1989	1990	1991	1992	Nationality-Adjusted Net Sales/Total Sales[b] 1987	1988	1989	1990	1991	1992
Total	1.79	1.44	1.18	0.92	1.22	1.57	2.91	2.10	2.42	3.19	4.90	5.19
Manufacturing	7.75	6.63	6.27	6.01	6.24	7.09	7.70	6.88	6.92	7.83	8.88	9.96
Food processing	−3.39	−3.93	−4.61	−4.74	−4.66	−4.74	−3.33	−3.77	−4.44	−4.33	−4.39	−4.24
Textiles	−4.50	−9.66	−15.10	−14.00	−13.48	−15.15	−2.82	−6.75	−12.69	−7.37	−6.63	−9.83
Chemicals	−1.35	−1.62	−1.56	−1.25	−1.22	−0.71	−3.28	−3.51	−3.90	−1.50	−0.97	0.35
Basic metals	3.04	1.37	0.78	0.16	0.30	1.90	4.49	2.76	1.65	1.52	1.19	3.93
General machinery	22.04	20.59	20.70	19.08	18.35	20.91	21.75	20.76	21.13	20.85	21.40	21.29
Electrical machinery	15.29	14.35	14.16	13.99	13.32	14.33	15.04	14.73	13.57	17.01	17.27	17.93
Transport equipment	25.38	21.43	20.54	20.00	19.72	20.58	24.65	21.33	20.80	21.36	24.81	27.13
Precision machinery	32.17	29.81	29.44	28.40	27.64	29.80	32.55	28.41	31.23	29.81	29.96	29.35
Petroleum and coal products	−10.40	−9.90	−11.37	−11.42	−7.83	−5.99	−28.92	−29.87	−21.40	−21.24	−17.05	−7.67
Other manufacturing	1.42	0.76	0.13	−0.15	0.50	0.87	1.95	1.30	1.61	1.18	1.96	2.60
Others	−4.70	−4.37	−4.65	−5.12	−4.54	−4.11	−0.37	−1.20	−0.61	0.04	2.15	2.04

Data Sources: OLD87/88, 89, 90, 91, 92; AF87/88, 89, 90, 91, 92; EPA94; IMF92; UN90, 92.

Notes: Cross-border net sales / total sales = ratio of cross-border net exports to sales by all firms in Japan.

Nationality-adjused net sales / total sales = ratio of nationality-adjusted net sales to sales by Japanese-owned firms (all firms in Japan + FAJFs − JAFFs).

The old FAJF and JAFF series are on a financial-year basis, while the others are on a calendar-year basis.

[a]In millions of yen.

[b]Percentage.

use sectoral data on the value of output (in producer prices) obtained from the national accounts statistics as a proxy for the total sales of all firms in Japan.[16] The figures for aggregate cross-border net sales are slightly different from those for the cross-border merchandise trade balance shown in table 2.2 because the former are based on UN data reported in U.S. dollars while the latter are from the *Japan Statistical Yearbook* reported in yen. The other data are taken directly from the FAJF and JAFF series published by MITI.

For the manufacturing sector as a whole, net sales figures, both cross-border and nationality-adjusted, are positive as expected. However, whereas the ratios of nationality-adjusted net sales to total sales have increased since 1989, those of cross-border sales have not changed much. This suggests that the international competitiveness of Japanese manufacturing firms has increased, while that of firms in territorial Japan has not. We again have to note reservations about the 1991–92 figures, however. As for sectoral patterns, large positive net sales, both cross-border and nationality-adjusted, are found in general machinery, electrical machinery, transport equipment, and precision machinery, and negative net sales are shown for food processing, textiles, chemicals (except nationality-adjusted net sales in 1992), and petroleum and coal products. The ratios of nationality-adjusted net sales to total sales sometimes exhibit significant sudden changes, for example, textiles in 1989 and petroleum and coal products in 1992, even though the ratios of cross-border net sales to total sales do not change appreciably. Such jumps are mainly caused by drastic increases in sectoral value added by FAJFs.

2.4.2 Sectoral Significance of FAJFs and JAFFs

The macroeconomic significance of the activities of FAJFs and JAFFs has already been discussed. The sectoral significance of the activities of FAJFs and JAFFs can be evaluated by using sectoral data on output, value added, and employment in the Japanese national accounts statistics. Table 2.5 presents shares of FAJFs in Japanese-owned firms (firms in Japan minus JAFFs plus FAJFs) and shares of JAFFs in firms in Japan in terms of sales, value added, and employment.

Although there are some irregular up and downs partly due to the sampling problem, the figures still provide useful information for analyzing differences in the relative importance of FAJFs and JAFFs across manufacturing subsectors and across time. The value-added shares are particularly useful for comparative purposes. The major findings are as follows: first, the value-added share of FAJFs in Japanese-owned firms for the total manufacturing sector increased from 3.76 percent in 1987, to 8.57 percent in 1990, and then to 10.76 percent by 1992. The importance of the activities of foreign affiliates for

16. Alternatively, we can use sales data from "Financial Statements of Corporations by Industry" by the Ministry of Finance or value of shipments data from the "Census of Manufactures" collected by MITI, though the figures differ widely mainly due to the difference in coverage and the definition of firms or establishments.

Table 2.5 **Sales, Value Added, and Employment Shares of FAJFs and JAFFs (percent)**

	Share of FAJFs in Japanese-Owned Firms						Share of JAFFs in Firms in Japan					
	1987	1988	1989	1990	1991	1992	1987	1988	1989	1990	1991	1992
						Sales						
Total	7.39	8.52	10.47	10.40	8.91	7.99	1.50	1.65	1.73	1.92	1.92	1.76
Manufacturing	4.66	5.76	6.64	7.21	6.66	6.85	2.68	2.76	2.86	3.08	2.90	2.88
Food processing	0.84	1.35	1.49	1.37	1.31	1.43	0.64	0.61	0.56	0.57	0.81	0.56
Textiles	5.37	6.90	4.32	8.63	8.29	6.53	0.18	0.12	0.18	0.34	0.86	0.37
Chemicals	4.53	5.30	5.37	6.93	7.07	6.26	6.40	7.76	9.28	8.87	10.28	8.87
Basic metals	3.55	4.29	4.23	4.05	3.55	4.46	0.25	0.92	0.84	0.87	0.99	1.21
General machinery	3.03	3.30	2.95	7.10	4.98	2.86	2.70	1.55	1.25	1.38	1.20	0.83
Electrical machinery	10.97	13.07	12.74	13.83	13.07	12.88	3.96	4.36	4.47	4.72	4.00	4.44
Transport equipment	8.72	9.66	15.40	13.74	13.23	15.97	0.59	0.80	0.86	0.25	0.26	0.55
Precision machinery	5.22	20.78	9.23	9.05	7.47	6.42	3.31	4.37	3.68	14.15	5.65	7.93
Petroleum and coal products	0.96	0.22	0.16	0.26	1.46	6.57	26.46	25.53	25.80	27.93	27.01	26.53
Other manufacturing	1.80	2.15	3.68	3.48	3.16	2.71	0.42	0.57	0.57	0.46	0.37	0.53
Commerce	37.22	40.57	47.21	46.59	41.07	36.02	4.15	5.13	5.80	6.64	7.29	6.13
Services	0.28	0.40	0.44	0.70	0.88	0.88	0.04	0.07	0.04	0.09	0.31	0.26
Others	0.62	0.82	1.44	1.11	1.14	1.12	0.05	0.08	0.06	0.11	0.05	0.04

(*continued*)

Table 2.5 (continued)

	Share of FAJFs in Japanese-Owned Firms						Share of JAFFs in Firms in Japan					
	1987	1988	1989	1990	1991	1992	1987	1988	1989	1990	1991	1992
						Value Added						
Total	3.54	2.75	3.92	5.79	8.40	7.94	1.18	1.24	1.19	1.12	1.27	1.09
Manufacturing	3.76	4.70	5.84	8.57	10.53	10.76	3.48	3.47	3.37	2.98	3.07	2.77
Food processing	0.99	1.32	1.31	1.98	2.14	2.10	0.86	0.99	0.98	1.00	1.47	0.91
Textiles	4.30	6.61	6.06	16.54	17.54	12.08	0.07	0.04	0.31	0.60	1.12	0.47
Chemicals	3.51	4.46	5.39	9.64	13.57	11.18	8.21	8.97	10.65	10.18	12.91	8.74
Basic metals	6.33	6.44	4.63	7.55	6.63	10.47	0.44	1.24	1.31	2.38	3.28	3.37
General machinery	2.21	2.21	2.78	8.08	9.75	3.19	2.77	0.79	0.72	0.61	0.44	1.08
Electrical machinery	8.84	10.96	11.05	17.25	18.03	17.29	6.47	6.31	9.33	6.31	5.07	5.09
Transport equipment	5.30	6.92	12.21	14.60	24.30	29.66	0.74	0.76	0.40	0.28	0.31	0.69
Precision machinery	5.68	13.41	11.12	12.71	12.13	6.38	3.31	4.04	3.25	13.29	5.77	8.56
Petroleum and coal products	0.52	0.13	0.06	0.21	2.09	11.98	27.84	30.59	11.45	11.43	14.03	12.06
Other manufacturing	1.80	2.02	4.34	3.69	3.89	4.46	0.45	0.65	0.69	0.49	0.40	0.52
Commerce	15.05	8.96	13.83	17.75	28.83	26.71	1.33	1.67	1.61	1.47	2.48	2.03
Services	0.22	0.27	0.35	0.90	1.01	1.22	0.02	0.04	0.01	0.09	0.26	0.20
Others	0.55	0.34	0.58	1.36	1.20	1.04	0.04	0.06	0.05	0.13	0.04	0.04

						Employment						
Total	1.84	2.05	1.76	2.30	2.36	2.03	0.25	0.27	0.27	0.28	0.30	0.28
Manufacturing	5.86	6.68	5.80	7.49	7.39	6.61	0.84	0.89	0.92	0.93	0.97	0.96
Food processing	1.56	1.91	1.81	2.03	2.03	1.84	0.27	0.18	0.19	0.22	0.28	0.22
Textiles	7.37	8.34	4.68	7.36	7.61	7.37	0.02	0.01	0.02	0.14	0.16	0.14
Chemicals	11.37	12.26	11.03	14.00	14.86	13.18	6.23	8.41	9.63	9.11	10.51	9.64
Basic metals	10.47	12.31	11.25	9.62	8.48	8.53	0.27	0.77	0.75	0.76	0.97	1.00
General machinery	3.40	3.78	3.15	4.85	3.51	2.67	1.48	0.76	0.68	0.73	0.81	0.50
Electrical machinery	12.68	13.82	11.45	14.86	14.81	13.55	1.84	2.04	2.00	2.19	1.95	2.10
Transport equipment	9.29	11.63	9.48	13.47	14.32	13.30	0.23	0.32	0.38	0.20	0.20	0.33
Precision machinery	5.91	10.63	6.39	8.55	7.82	3.66	1.22	1.34	1.12	1.50	1.98	2.35
Petroleum and coal products	4.75	12.05	0.82	13.29	13.62	2.05	22.88	21.57	20.37	20.40	18.65	19.19
Other manufacturing	2.17	2.20	3.11	3.57	3.43	2.99	0.12	0.14	0.17	0.14	0.11	0.14
Commerce	1.53	1.52	1.16	1.50	1.99	1.34	0.20	0.25	0.23	0.24	0.33	0.25
Services	0.18	0.17	0.22	0.34	0.26	0.32	0.01	0.01	0.01	0.02	0.05	0.04
Others	0.29	0.30	0.28	0.33	0.33	0.30	0.03	0.03	0.02	0.03	0.02	0.01

Data Sources: OLD87/88, 89, 90, 91, 92; AF87/88, 89, 90, 91, 92; EPA94.

Japanese-owned manufacturing firms does not appear to be as extensive as for U.S.-owned firms, but it has been increasing. We again need to discount the figures for 1991 and 1992, however. The share of JAFFs in the activities of all firms in Japan has been low and nearly constant. The asymmetry of inward and outward DFI is also apparent at the sectoral level.

Second, industries of comparative advantage for Japan, such as electrical machinery and transport equipment, have rapidly increased the ratio of value added in FAJFs to that in Japanese-owned firms. In 1992, the ratios were as high as 17.29 and 29.66 percent for electrical machinery and transport equipment. The value-added shares of JAFFs to firms in Japan, in contrast, started from a low level in 1987 and remained low in 1992—for example, 5.09 and 0.69 percent in electrical machinery and transport equipment, respectively. The value-added shares of FAJFs to Japanese-owned firms for general machinery and precision machinery show some anomalies in 1992; in that year, value added by FAJFs in these industries decreased drastically. We are not sure whether this apparent decrease is due to a small, unstable sample, to industry reclassification of firms, or to changes in firms' strategies.

Third, in industries of comparative disadvantage for Japan, such as textiles and chemicals, the shares of FAJFs in Japanese-owned firms have also increased. The share of JAFFs in firms in Japan also increased in the chemical industry up to 1991. Large outward and inward DFI characterizes the chemical industry in the case of the United States, and the Japanese chemical industry seems to behave in the same manner.

2.5 Commercial FAJFs and the Presence of General Trading Companies

A special feature of foreign affiliates of Japanese firms is the large presence of commercial FAJFs in the commercial sector, particularly in the wholesale trade sector. Table 2.6 presents a Japan-U.S. comparison of manufacturing and commercial affiliates in 1991. The table classifies industries both for parent companies and for foreign affiliates. FAJFs in the wholesale trade sector had 75 and 56 percent shares in all FAJFs in terms of sales and value added, while FAUSFs in the wholesale trade sector (excluding petroleum wholesale trade) had shares of 18 and 12 percent.[17] Although the figures for FAUSFs would be larger if the wholesale petroleum trade were included, the figures for FAJFs are still much larger than those for FAUSFs. FAJFs in the wholesale trade sector are also characterized by high value added per employee compared with FAUSFs.

17. It should be noted that FAJFs do not include affiliates (or parent companies) in the finance, insurance, and real estate sectors, while FAUSFs do include affiliates (or parent companies) in the finance (excluding banking), insurance, and real estate sectors. We should also take into account that affiliates in the service sector have a larger share in the case of FAUSFs than in the case of FAJFs.

Table 2.6 **Comparison of Manufacturing and Commercial Affiliates: Japan and the United Sta**

Industry	Affiliates: Number	Affiliates: %	Sales: Millions of Dollars	Sales: %	Value Added[a]: Millions of Dollars	Value Added[a]: %	Employment: Number	Employment: %	Average Number of Employees	Value-Added Ratio[b] (%)
						Foreign Affiliates[d] of Japanese Firms (FAJFs)				
						By Parent Companies' Classification				
All industries	2,851	100.00	498,193	100.00	98,105	100.00	919,294	100.00	322	19.69
Manufacturing	2,119	74.32	240,706	48.32	67,213	68.51	741,615	80.67	350	27.92
Wholesale and retail trade	710	24.90	256,964	51.58	30,645	31.24	174,829	19.02	246	11.93
Wholesale	638	22.38	254,658	51.12	30,021	30.60	162,918	17.72	255	11.79
Retail	72	2.53	2,307	0.46	624	0.64	11,911	1.30	165	27.03
						By Affiliates' Classification				
All industries	2,851	100.00	498,193	100.00	98,105	100.00	919,294	100.00	322	19.69
Manufacturing	1,723	60.43	119,880	24.06	42,049	42.86	744,253	80.96	432	35.08
Wholesale and retail	1,112	39.00	377,193	75.71	55,833	56.91	171,098	18.61	154	14.80
Wholesale	1,012	35.50	372,534	74.78	54,795	55.85	154,294	16.78	152	14.71
Retail	100	3.51	4,659	0.94	1,038	1.06	16,804	1.83	168	22.28
						Foreign Affiliates[d] of U.S. Firms (FAUSFs)				
						By Parent Companies' Classification				
All industries	15,710	100.00	1,242,635	100.00	335,963	100.00	5,386,500	100.00	343	27.04
Manufacturing	10,720	68.24	982,139	79.04	n.a.	n.a.	3,945,600	73.25	368	n.a.
Manufacturing (excl. petro. and coal prod.)	10,689	68.04	784,872	63.16	n.a.	n.a.	3,778,700	70.15	354	n.a.
Wholesale and retail trade	1,041	6.63	127,437	10.26	n.a.	n.a.	519,000	9.64	499	n.a.

(continued)

Table 2.6 (continued)

Industry	Affiliates: Number	Affiliates: %	Sales: Millions of Dollars	Sales: %	Value Added[a]: Millions of Dollars	Value Added[a]: %	Employment: Number	Employment: %	Average Number of Employees	Value-Added Ratio[b] (%)	Value-Added Productivity[c] ($)	By-Destination Shares in Sales (%): Local	By-Destination Shares in Sales (%): Japan/US	By-Destination Shares in Sales (%): Third Countries	By-Origin Shares in Purchases (%): Local	By-Origin Shares in Purchases (%): Imports
Wholesale	871	5.54	102,057	8.21	n.a.	n.a.	180,100	3.34	207	n.a.	n.a.	52.41	11.03	36.56	n.a.	n.a.
Wholesale (excl. petro. wholesale)	750	4.77	79,613	6.41	n.a.	n.a.	168,400	3.13	225	n.a.	n.a.	45.78	12.27	41.95	n.a.	n.a.
Retail	170	1.08	25,380	2.04	n.a.	n.a.	338,900	6.29	1,994	n.a.	n.a.	91.58	7.42	0.99	n.a.	n.a.
By Affiliates' Classification																
All industries	15,710	100.00	1,242,635	100.00	335,963	100.00	5,386,500	100.00	343	27.04	62,371	66.35	10.10	23.55	n.a.	n.a.
Manufacturing	6,459	41.11	680,525	54.76	n.a.	n.a.	3,355,400	62.29	519	n.a.	n.a.	62.90	10.98	26.12	n.a.	n.a.
Manufacturing (excl. petro. and coal prod.)	6,390	40.67	596,257	47.98	182,082	54.20	3,299,600	61.26	516	30.54	55,183	59.86	11.99	28.15	n.a.	n.a.
Wholesale and retail trade	4,339	27.62	367,216	29.55	n.a.	n.a.	1,040,100	19.31	240	n.a.	n.a.	70.78	6.50	22.72	n.a.	n.a.
Wholesale	4,121	26.23	327,559	26.36	n.a.	n.a.	554,800	10.30	135	n.a.	n.a.	67.55	7.27	25.18	n.a.	n.a.
Wholesale (excl. petro. wholesale)	3,807	24.23	227,069	18.27	40,832	12.15	520,500	9.66	137	17.98	78,448	70.22	4.53	25.26	n.a.	n.a.
Retail	218	1.39	39,657	3.19	n.a.	n.a.	485,300	9.01	2,226	n.a.	n.a.	97.39	0.21	2.40	n.a.	n.a.

Data Sources: NEW91; FAUSF91 (tables III.A.2, E.8, F.3, F.9, G.4, G.11); Mataloni (1994, 61).

[a]Value added: for Japan, sales minus purchases; for the United States, gross product in Mataloni (1994, 61).

[b]Value-added ratio: value added/sales.

[c]Value-added productivity: value added/employment.

[d]Foreign affiliates: for Japan, see notes to table 2.1; for the United States, see chap. 1 in this volume.

Table 2.7 **Sales and Purchases by Major Foreign Branches of Japanese General Trading Companies and Commercial FAJFs, 1987 Financial Year**

Transaction	GTC Branches[a] (a)	Commercial FAJFs[b] (b)	Total FAJFs[b] (c)	(a)/(b)*100 (d)	(b)/(c)*100 (e)
Total sales	23,482,200	39,876,831	54,808,975	58.89	72.76
To local	8,209,900	24,796,290	36,219,960	33.11	68.46
To Japan	7,631,200	7,825,381	9,294,170	97.52	84.20
To third countries	7,641,200	7,255,160	9,294,845	105.32	78.06
Total purchases	n.a.	31,914,173	42,135,754	n.a.	75.74
From local	n.a.	9,637,230	14,535,836	n.a.	66.30
From Japan	n.a.	16,063,493	20,571,156	n.a.	78.09
From third countries	n.a.	6,213,450	7,028,762	n.a.	88.40

Data Sources: GTC; OLD87/88.

Note: Cols. (a), (b), and (c) are in millions of yen; cols. (d) and (e) are in percent.

[a]Data are for major foreign branches of nine Japanese general trading companies, which include 197 affiliates in 37 countries. GTC branch data, originally in U.S. dollars, are converted by IMF92 (437): $1 = 144.64 yen.

[b]By-destination sales by commercial FAJFs and total FAJFs are estimated using sectoral by-destination ratios. See the text for details.

Table 2.6 also shows an interesting contrast between figures based on the industry classification of parent companies and those based on the classification of affiliates. In the case of FAUSFs, we see that most FAUSFs in the wholesale trade sector have parent companies in non-wholesale-trade sectors. This means that a major function of wholesale FAUSFs is undertaking foreign marketing operations for manufacturing parent companies. In contrast, in the case of FAJFs, about half of FAJFs in the wholesale trade sector have parent companies in the wholesale trade sector. This suggests that general trading companies (GTCs) play a large role in Japanese international transactions.

A special study conducted by the Japan Foreign Trade Council presents data for sales by the "major branches" of the nine largest Japanese GTCs.[18] The "major branches" are defined as foreign affiliates of GTCs that have close contacts with the Japanese headquarters and organize local activities. The sample covered 197 affiliates in 37 countries. Table 2.7 presents the sales figures. Although we have some reservations about the quality of these data, particularly because of double counting of transactions among the firms, the significance of GTC activities is apparent. Sales to Japan by GTC major branches have a 98 percent share in those by commercial FAJFs in our estimates. The same share in terms of the sales to third countries is 105 percent. These shares are, of course, subject to estimation error, but they clearly indicate that the presence of GTCs in international transactions of commercial FAJFs is large.

18. The nine largest Japanese GTCs are C. Itoh, Mitsui, Sumitomo, Marubeni, Mitsubishi, Nissho Iwai, Tomen, Nichimen, and Kanematsu Gosho. The study by the Japan Foreign Trade Council covers only the financial years 1983 and 1987.

2.6 Concluding Remarks

In this paper, we applied our nationality-based net sales and value-added framework to Japanese data. Foreign production activities of Japanese firms have become increasingly important, and the nationality-based net sales estimates proved to be useful in analyzing firms' international activities. Our value-added accounting also provides an integrated framework for analyzing both exports and activities of foreign affiliates and thereby for understanding key characteristics of the Japanese economy.

We found that Japan is special in the following four ways. First, Japanese-owned firms have become increasingly dependent on the marketing activities of their foreign affiliates, rather than depending on cross-border exports by parent firms located in Japan. Second, the asymmetry between inward and outward DFI is apparent in terms of sales, value added, and employment, at both the macroeconomic and sectoral levels. Third, Japanese net sales to foreigners are consistently larger than the cross-border net exports of Japan. Fourth, among the activities of FAJFs, the importance of commercial FAJFs is particularly large, with these commercial affiliates handling a large portion of Japanese exports and imports. Our statistical framework is useful for identifying these characteristics.

To apply our analytical framework more rigorously, a number of statistical improvements are required. First, MITI or the government of Japan must develop an enforceable data collection system for both inward and outward DFI on a proper legal basis. This statistical reform should increase the coverage of the surveys as well as improve the quality of the information requested on the questionnaires, particularly that on by-destination sales and by-origin purchases of affiliates. In this regard, the introduction of the new FAJF series has been a major step by MITI in improving data collection. We hope that more questions on foreign affiliates will be included in the survey and that the survey will be integrated with the old FAJF series. Second, the extended surveys of the old FAJF series implemented once every three years report ratios of "within the same firm group" sales and purchases to total sales and purchases, but no data on sales among FAJFs or among JAFFs are collected, as U.S. BEA surveys do. Adding questions on sales among affiliates will help us apply our method more precisely. Third, we need to develop a proper statistical framework to capture the activities of commercial FAJFs. Possible double counting in sales to or purchases from Japan or third countries by FAJFs must be corrected. In addition, possible double counting coming from the definition of FAJFs must be eliminated.

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Comment Michael G. Plummer

Like its U.S. companion piece, this chapter takes a nationality-based accounting approach to international transactions, using the new technique to calculate, inter alia, net sales by Japanese to foreigners, value added by foreign affiliates of Japanese firms (FAJFs), and value added by Japanese affiliates of foreign firms (JAFFs), in the aggregate and by sector. By concentrating on the nationality of firms rather than on their location (as is traditionally done), the authors are able to give a more accurate picture of the evolving competitiveness and characteristics of Japanese firms, providing new insights into a number of old questions.

This approach has many exciting applications, particularly for the private sector and policy circles. For example, Ford Motor Company recently launched its Ford 2000 strategy, which involves a major reorganization of its domestic and international operations to develop a truly global company. Moreover, its competitors are embracing variations of the same corporate strategy. This globalization of the automobile industry underscores the increasing irrelevance of geography-based accounting to formulate implicit proxies of competitiveness in a critical sector. Clearly, nationality-based accounting creates a far more accurate picture of the international competitiveness of American and Japanese firms.

Unfortunately, from a policy perspective, the results of Kimura and Baldwin end up reinforcing a number of accepted stereotypes about Japan and its firms that have generated repeated trade disputes, threats of retaliation against Japan, and the recurrent possibility of trade war. I would like to outline below a few of the more salient policy issues that relate to the paper, in anticipation of erroneous interpretation of the results. In citing numbers between the Japanese and U.S. papers, I ignore the important differences and shortcomings in data collection. After all, such imperfections will generally be ignored by policy-

Michael G. Plummer is assistant professor of economics and director of the master's programs in the Graduate School of International Economics and Finance, Brandeis University.

makers in discussing the issues, an inevitable and heavy burden that applied economists must shoulder, albeit with regrets.

First, net sales of Japanese firms to foreigners are not only positive but huge, growing from $139 billion (U.S. dollars) in 1987 to $377 billion in 1992, far exceeding and growing more rapidly than the usually cited Japanese (cross-border) merchandise trade balance ($80 and $106 billion, respectively). This compares to a $72 billion *deficit* and $61 billion surplus in the case of net sales by Americans to foreigners in 1987 and 1991 (corresponding to deficits in the cross-border merchandise trade balance of $160 and $74 billion, respectively) found in the U.S. companion paper. These results reinforce the view of Japan as the quintessential mercantilist; it could be argued that not only is Japan a closed market at home but Japanese firms tend only to "buy Japanese."

Second, a related issue is that of the asymmetry between Japanese inward and outward direct foreign investment. The share of foreign affiliates in Japanese economic activity is far smaller than that of Japanese affiliates abroad, as well as compared to other developed countries. For example, in 1991, in terms of value added, JAFFs accounted for only 1.1 percent of manufacturing value added by Japanese firms, whereas the comparable figure for FAJFs was 8.6 percent and for foreign affiliates in the United States 13.3 percent. A number of critics have stressed that the intractable trade and other commercially oriented imbalances of Japan are related to direct and indirect restrictions on inward direct foreign investment; they will, perhaps, find more ammunition from the nationality-based approach.

Finally, at the sectoral level, the role of Japan as a "strategic" protectionist could also be supported through a selective interpretation of the data. For example, JAFFs have a relatively large share of total sales of Japanese firms in areas where Japan is thought to have a comparative disadvantage (with the exception of textiles). But "strategic" sectors like electrical machinery and transport equipment show huge discrepancies: JAFFs as a percentage of total Japanese sales grew from only 4 percent to 4.4 percent from 1987 to 1992 in the former and actually fell from an extremely low 0.59 percent to 0.55 percent over the same period in the latter. For the same years and sectors, these figures compare to rises from 11 to 13 percent and from 9 to 16 percent for FAJFs. Expect these discrepancies to get worse with any increases in the value of the yen and trade frictions.

While some of these numbers seem to provide ample grist for the Japan-bashing mill, it is important to keep in mind a number of caveats in interpreting them. My intent here is not to be an apologist but rather to try to ensure that the results are understood in the spirit in which they were derived: as an important step toward the development of a nationality-based accounting system rather than as a new weapon of (trade) war.

First, aside from the obvious differences in the surveys being used between the U.S. and Japanese papers and, in particular, the biases inherent in the MITI survey, nationality-based accounting in these papers is applied to only two countries, and hence, we have an important identification problem: who is the outlier? In fact, the authors—one Japanese, one American—perhaps "suffer" from having (intellectual and locational) comparative advantages in each of these two countries, which happen to be at the forefront of economic confrontation in the global economy. If instead we were comparing, say, Germany, Korea, the United States, and Japan, who would be the outlier? Who would be the "mercantilist"? This problem underscores the importance of expanding the country coverage.

Second, as is noted in part in the U.S. paper, the activities of FAJFs have been affected by the international commercial policy environment. Trade frictions between Japan and its most important trading partners in the developed world have led, perhaps, to a "premature" globalization of Japanese industry in order to reduce geography-based bilateral trade discrepancies. Any tendency for FAJFs to buy from Japanese suppliers would, therefore, be logical: the preference is to produce in Japan, so when they are "pushed" offshore, they include as much Japanese value added as possible. Interestingly, what might seem to be antimarket policies leading to lower geography-based imbalances could actually lead to lower nationality-based imbalances. As FAJFs become more accustomed to the foreign environment, local sourcing will naturally increase, thereby reducing net sales by the Japanese to foreigners.

Third, we are limited to four years in these studies and, hence, are not able to get a historical perspective on the issues. As is well known, relatively large increases in U.S. direct foreign investment began after World War II, whereas the upsurge in Japanese direct foreign investment is far more recent. In order to confirm that Japan is "special," we would have to know what the United States (and preferably other countries) was like at a similar phase of structural adjustment. Now, this is not to say that the authors should therefore extend their analysis back 50 years—though this would be nice!—as data limitations would preclude such an extension.

Although it is important to be careful in interpreting the results of Kimura and Baldwin, it is clear that their approach effectively complements the existing balance-of-payments approach. Moreover, it holds considerable potential in rendering global computational general equilibrium models and derived measures of national sectoral competitiveness more realistic. In short, I am convinced that the Kimura and Baldwin approach is a seminal contribution to the literature.

3 Internationalized Production in World Output

Robert E. Lipsey, Magnus Blomström, and
Eric D. Ramstetter

3.1 Introduction

Internationalized production, that is, the operations of multinational firms outside their home countries, represents a separation between the geographical location of production and the ownership of production. It is an extension of the activities and influence of residents of a country outside the geographical borders of the country.

Much of the literature on multinationals is based on the idea that they possess firm-specific assets that are immobile among firms but mobile across geographical boundaries. To the extent that that is the case, the profitability of R&D and the incentive to invest in it or in other activities that contribute to the accumulation of firm-specific assets depends on the size of the worldwide market for the firm's output rather than on the size of the firm's home-country markets. A judgment about the quality of a firm's management or of the management of a country's firms in general would take into account firms' worldwide operations rather than only those in the firms' home countries.

In this paper, we compare the geographical view and the ownership view of production for a number of countries and try to assess the overall importance of

Robert E. Lipsey is professor emeritus of economics at Queens College and the Graduate Center of the City University of New York and a research associate and director of the New York office of the National Bureau of Economic Research. Magnus Blomström is professor of economics at the Stockholm School of Economics and a research associate of the National Bureau of Economic Research. Eric D. Ramstetter is research professor at the International Centre for the Study of East Asian Development, Kitakyushu, Japan.

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the internationalized production that separates the two views. The geographical measure for a country reflects the capabilities of the combination of the geographically immobile factors of production located in the country with home and foreign firms' mobile factors. The ownership measure for a country reflects the capabilities of the mobile factors controlled by the country's firms, combined with various countries' immobile factors. We make the comparisons in two ways, from the home-country side and from the host-country side. The home-country view compares the production of a country as a geographical unit with the overseas, and in a few cases, the worldwide production of firms based in that country. The host-country view compares the production of the country as a geographical unit with that part of production controlled by foreign firms.

Although it is not our focus here, the ownership basis could also be used to compare groups of firms, such as Japanese-, U.S.-, and British-based multinationals, or large and small multinationals, or those based in developed countries with those based in developing countries. In each case, the output of the group of firms would reflect their command over geographically mobile assets. However, in a world where access to immobile assets, such as natural resources, is not available on a nondiscriminatory basis, a home country's immobile assets may contribute to the capabilities of firms based in a country.

A series of previous papers has compared export market shares and the composition of exports of countries with those of firms based in those countries (Kravis and Lipsey 1985, 1987, 1992; Blomström and Lipsey 1989a, 1989b, 1993; Blomström 1990; Lipsey, Blomström, and Kravis 1990; Lipsey 1995b). These export market share comparisons have several advantages over other measures. One is that production for export may be more footloose, less subject to host-government manipulation or control, and therefore more revealing about economic factors than shares in host-country markets. Another advantage of export market shares is that it is relatively easy to define the denominators of the share ratios. These might be total world exports, or developed-country exports, or exports of manufactured goods or particular products. Quite comprehensive trade data are collected and published by the United Nations, using classifications of commodities fairly comparable from one country to another.

On the other hand, export sales account for a minority of production, and a small minority for some countries' affiliates. They are uninformative about competition in services, many of which cannot be exported and must be produced where they are consumed. Even within manufacturing, usually classified as producing tradables, a concentration on export shares gives a high weight to those products that are most tradable and a low weight to less tradable goods. The effects of skills in advertising and marketing that enable American manufacturers of soft drinks and breakfast cereals to enter many markets would probably not be evident in export market shares.

Another problem with exports as a measure is that exports, unlike value added, for example, can be duplicative. The same product can appear as parents' exports of components to an affiliate and in affiliate exports of a finished product. The same type of duplication characterizes the world trade data that are the denominators for export shares.

The obvious candidates for nonduplicative measures are value added and gross product originating in a country, a sector of the economy, an industry, or a set of firms. The denominators for such share measures are available for almost all countries for aggregates and major industry groups, although the quality of the data declines as one moves to narrower industry classifications. The numerators present worse problems, especially for measures of the shares of groups of firms spanning national borders. Very few countries report value added for their own multinationals' worldwide operations or for any operations outside home-country borders. However, on the inward side, a number of countries have coded their industrial censuses to distinguish establishments controlled by foreign firms, thus providing foreign firms' shares of geographically defined host-country production, by industry of establishment. For the United States, the first example of this type of establishment-based inward investment data was the results of the Bureau of Economic Analysis (BEA)–Census of Manufactures match for 1987 (U.S. Department of Commerce 1992c), although enterprise-based data go back to 1974. On the outward side, there have been several reports on value added by U.S. affiliates, but the first comprehensive estimates covering a substantial period, with industry and country detail, appeared in Mataloni and Goldberg (1994).

While gross output shares are informative about the control of production, they do not measure market shares. A firm or group of firms could have control over a market by supplying it through exports, or through control of downstream activities such as wholesaling or retailing, where the share in production would be much smaller than the share in final sales. Information on market shares is rarely available on any national or world basis for consumption in general, although there are some data for individual industries. It is possible, for example, to learn what portion of world sales of passenger automobiles is accounted for by American companies or Japanese companies around the world. The data on pharmaceutical sales collected by IMS could presumably be used to measure the degree of control of these markets by each company or group of companies. The share of each major producer in sales of transport aircraft is also known. What is not readily available is such data for all industries and data on the size of markets for groups of products, needed to calculate market shares.

The broadest summary of our conclusions is that the share of internationalized production (i.e., production by multinational firms outside their home countries) in world output was about 7 percent of world output in 1990 and had grown somewhat over the preceding two decades. However, there was a great variety of experience among individual countries. Most notable in the home-country histories has been the big decline in the share of U.S. internationalized production. That decline almost offset the increases in internationalized production in other countries. The host-country data show a mixed picture for the individual countries, with increasing importance of foreign-owned multinationals' production in some countries and decreasing importance in others.

Section 3.2 of this paper examines the internationalization of production from the home-country side. It compares the production of four countries—the United States, Japan, Germany, and Sweden—with the internationalized, and in some cases, the worldwide production of firms based in those countries. In section 3.3, internationalized production is examined through host-country reports on production by foreign-owned firms. Section 3.4 estimates the aggregate importance of internationalized production in world output, and section 3.5 summarizes our findings.

3.2 Production Viewed from the Home-Country Side

3.2.1 United States

Some hints of the role of U.S.-based multinationals in world output can be derived from data on the gross product of U.S. multinationals. Changes in the share of nonbank majority-owned affiliates of U.S. firms in world output outside the United States and in their importance relative to U.S. output are described in table 3.1. Nonbank American affiliates in foreign countries accounted for about 3 percent of output in the world outside the United States at what was probably their peak share, and that share fell by about a third between 1977 and 1993, after rising during the previous decade. The extent of internationalization of U.S.-owned production (the ratio of affiliate production overseas to output in the United States) jumped from less than 5 percent in 1966 to over 8 percent in 1977 before a long decline that brought the ratio back down to less than 6 percent in 1993.

Within the United States there was a similar decline in the importance of parent companies in total output. The share of U.S. nonbank parents in U.S. business output outside banking[1] fell from 32 percent in 1977 to 26 percent in 1989, and the share in total output fell from 25 to 20 percent (table 3.2). However, the decline in the U.S. multinational share within the United States came later than in the share outside and was not quite as sharp as the decline outside the United States. Among the three years for which data are available, 1982 was the peak. The parent share in U.S. multinational production remained close to three-quarters, rising somewhat from 1977 to 1982 and then falling to not far above the 1977 level in 1989.[2] Thus, the role of U.S. multinational firms in production was declining both at home and abroad, a little more rapidly abroad.

1. Business output excludes output produced in the government and household sectors.
2. Parent gross output estimates are available only for benchmark years beginning in 1977.

Table 3.1 **U.S. and U.S. Affiliate[a] Gross Product as a Percentage of U.S. and World GDP**

	U.S. Affiliate Gross Product as a Percentage of			U.S. GDP as a Percentage of World GDP	
Year	U.S. GDP	World GDP Outside United States	World GDP	Nominal[b]	In 1985 World Prices
1960	n.a.	n.a.	n.a.	36.5	26.9
1966	4.89	2.67	1.73	35.4	26.7
1970	6.88	2.46	1.81	26.3	24.0
1977	8.16	3.13	2.26	27.7	22.2
1982	7.10	2.80	2.01	28.3	20.6
1989	6.15	2.31	1.68	27.3	20.7
1990	6.49	2.29	1.69	26.1	20.4
1991	6.29	2.20	1.63	25.9	19.8
1992	6.09	2.11	1.56	25.6	19.8
1993	5.72	2.07	1.52	26.5	

Sources: Howenstine (1977, table 1), Mataloni and Goldberg (1994, table 6), Mataloni (1995, table 6), United Nations (1993), World Bank (1995), and Penn World Tables (5.6).

[a]Nonbank majority-owned foreign affiliates of nonbank U.S. parents.

[b]Converted to U.S. dollars by current exchange rates.

Table 3.2 **Gross Product of Nonbank U.S. Parents and Their Foreign Affiliates**

	Gross Product (million U.S. $)		U.S. Parent Share (%) in Gross Product of			
Year	Parents	Parents and Affiliates	U.S. Nonbank Business[a]	United States	U.S. Multinationals	U.S. Multinational Share (%) in World GDP
1977	490,529	651,665	32.3	24.8	75.2	9.15
1982	796,017	1,019,734	33.0	25.3	78.1	9.16
1989	1,044,884	1,364,878	25.9	20.1	76.6	7.16

Sources: Mataloni and Goldberg (1994, tables 1 and 3) and World Bank (1995).

[a]Excluding banks, government and government enterprises, private households, imputed rental income on housing, rental income of persons, business transfer payments, subsidies, and the statistical discrepancy.

A rough picture of the worldwide role of these firms shows a much larger share in world production for U.S. multinationals (parents and affiliates combined) than in production outside the United States for their affiliates alone. The U.S. multinational share was much greater in U.S. production than in foreign production, and U.S. production was still, in 1989, over a quarter of world output.

The trend in the share of the United States as a geographical area in world output is shown in table 3.1. The U.S. share declined substantially from 1960 and 1966 to 1970, but during the period for which we can compare the United States as a country with U.S. firms, starting in 1977, there was virtually no

Table 3.3 **U.S. Parent Share of U.S. Business GDP,[a] 1989**

Industry	Percentage
All industries	26
Petroleum extraction and refining	8
Manufacturing[b]	61
Services	6
All other[c]	16

Source: Mataloni and Goldberg (1994, table 3).

[a]Excluding production in the banking, government, and household sectors.

[b]Excluding petroleum and coal product manufacturing.

[c]Including agriculture, mining, except petroleum, construction, wholesale and retail trade, transportation and public utilities, and finance.

further change in the U.S. role. Thus, this history includes two very different periods for the United States and for U.S. firms. From the first half of the 1960s to the mid-1970s, the United States as a geographical entity had a declining share of world output, while U.S. firms' production outside the United States had a rising share of world output and a large rise relative to domestic U.S. output. After the mid-1970s, the United States as a country held on to a quite steady share of world production, while the U.S. multinational share of world output was falling, U.S. affiliate output was declining relative to geographical U.S. output and their own parents' domestic output, and the parents' share of domestic U.S. output was falling.

One reason why the share of U.S. multinationals in production outside the United States is so low is that much of the world's production takes place in sectors in which multinationals do not operate, such as government and households, or from which foreign firms are often barred or limited, such as transportation, communication, public utilities, and certain services. Even within the private business sector in the United States, the role of U.S. parents varies greatly across industries, as can be seen in table 3.3. Multinational home, or parent, operations account for a majority of U.S. production in the petroleum and manufacturing sectors, but for only a small part of production in the rest of the economy.

For the internationalized production of U.S. firms (production by affiliates in foreign countries) we can make comparisons to world totals by industry only for "industry" as contrasted with "services," the latter including agriculture and finance, and the former including mining; manufacturing; transportation, communication, and public utilities; construction; and wholesale and retail trade. This crude industrial origin breakdown is shown in table 3.4. The share of U.S. affiliates in service output outside the United States was negligible but stable, while the share in this very broadly defined "industry" category declined by almost 20 percent.

Table 3.4 **Shares of Nonbank Majority-Owned Foreign Affiliates of U.S. Firms in "Industry" and "Services" Output, Outside the United States**

	Affiliate Share (%) in Non-U.S. GDP	
Year	Industry[a]	Services[b]
1977	8.07	.16
1982	7.67	.16
1989	6.67	.17

Sources: Mataloni and Goldberg (1994, table 8) and United Nations (1993).

[a]Mining; manufacturing; transportation, communication, and public utilities; construction; and wholesale and retail trade.

[b]Agriculture, finance (except banking), insurance and real estate, and other services.

3.2.2 Japan

The next largest home country for which some production-related indicators are available is Japan. However, the Ministry of International Trade and Industry (MITI) surveys of multinational firms provide data on sales, the value of production, and intermediate expenditures. It is therefore possible to estimate value added by subtracting intermediate expenditures from sales (which we use) or from the value of production.

A major problem with the MITI surveys is that the coverage rates are low, vary sharply over time, and differ substantially from variable to variable even within a single year, causing large fluctuations in reported value added. A rough attempt, explained in appendix A, is made here to adjust the data for changes in coverage. The adjusted estimates indicate more stable growth in the value added of both parents and affiliates and more stable shares for multinationals in corporate value added in Japan (table 3.5A). After the adjustment, the multinational parent share of total corporate value added in Japan shows a downward trend, from around 30 percent in the early 1980s to less than a quarter at the end of the decade. Ratios of affiliate value added to Japanese corporate value added fluctuated between 4 and 6.5 percent, with no clear trend, but there was a large increase in manufacturing affiliates and something of a decline in trade affiliates, a much larger group at the beginning of the 1980s.

Multinational shares of Japanese GDP are, of course, smaller than their shares of corporate value added, but the two series show similar trends (table 3.5B). While Japanese multinational value added has fallen relative to Japanese GDP, Japan's share of world GDP has risen so much that the Japanese multinational share of world GDP and the Japanese affiliate share of world GDP outside Japan have both increased greatly.

While Japanese multinational affiliate value added grew less rapidly after 1986 than before, the stock of Japanese foreign direct investment (FDI) rose more rapidly. This divergence in trends may indicate that there was a deteriora-

Table 3.5A **Japanese Multinationals' Value Added and Ratios to Corporate Value Added in Japan**

	Parents			Affiliates		
Fiscal Year[a]	All Industries	Manufacturing	Trade	All Industries	Manufacturing	Trade
			Adjusted Value Added[b] (million U.S. $)			
1980	241,693	192,607	24,809	45,450	13,516	26,341
1983	293,608	225,400	29,433	57,547	14,187	34,264
1986	495,035	381,200	46,151	99,618	35,262	57,189
1987	n.a.	n.a.	n.a.	88,627	34,561	45,457
1988	542,116	438,504	45,432	95,734	43,791	44,018
1989	473,534	346,479	47,286	119,497	50,267	56,368
1990	601,583	451,925	56,059	151,879	68,886	68,889
1991	716,941	485,841	95,740	176,302	79,554	84,530
1992	661,076	537,301	56,542	180,918	88,760	82,786
			Ratios of Adjusted Value Added to Corporate Value Added in Japan (%)			
1980	31.11	58.43	11.02	5.85	4.10	11.70
1983	32.80	61.40	11.67	6.43	3.86	13.58
1986	29.53	60.54	9.53	5.94	5.60	11.81
1987	n.a.	n.a.	n.a.	4.09	4.21	7.23
1988	23.92	51.56	7.10	4.22	5.15	6.88
1989	23.70	44.64	8.93	5.98	6.48	10.65
1990	24.06	48.37	8.16	6.07	7.37	10.03
1991	24.96	47.15	11.85	6.14	7.72	10.46
1992	21.27	50.52	6.35	5.82	8.35	9.29

Source: Lipsey, Blomström, and Ramstetter (1995, tables A-3, A-4, and A-5).
[a]Fiscal years ending 31 March of the following calendar year.
[b]See appendix A for an explanation of how adjusted estimates are calculated.

tion in profitability of Japanese FDI, or that adjustment for the falloff in the coverage rates of the MITI surveys in recent years is not sufficient, or that the adjustment in 1986 (a year of particularly poor coverage) was too large.

3.2.3 Other Countries

For other home countries we have no information on affiliate production, and only for a few countries do we have data even on affiliate sales.

Since 1976, German affiliate sales have approximately doubled relative to German GDP and world GDP outside Germany, eventually reaching around 30 percent of German GDP and about 2 percent of world GDP outside Germany (table 3.6). However, sales are substantially larger than production. If the difference between sales and production is as large for Germany as for the United States, German firms' internationalized output may have reached 11 to 12 percent of German home output, up from 6 percent, and the German affiliate share of world production might have risen from about 0.4 percent to about 0.8 percent.

Table 3.5B **Japanese Multinationals' Share of World GDP, World GDP Outside Japan, and Japanese GDP**

Year	Parents and Affiliates Relative to World GDP	Affiliates Relative to World GDP Outside Japan	Parents and Affiliates Relative to Japanese GDP	Parents and Affiliates Relative to Corporate Value Added in Japan	Japanese GDP Relative to World GDP
	Multinational Shares Based on Adjusted Value Added (%)				
1980	2.58	.45	27.11	36.97	9.53
1983	3.04	.55	29.60	39.23	10.26
1986	4.10	.80	29.95	35.48	13.68
1987	n.a.	.64	n.a.	n.a.	14.72
1988	3.50	.62	22.01	28.14	15.88
1989	3.11	.74	20.65	29.68	15.05
1990	3.56	.83	25.70	30.14	13.87
1991	4.06	.95	26.69	31.10	15.22
1992	3.61	.92	22.94	27.09	15.73

Sources: Table 3.5A and World Bank (1980, 1993, 1995).
Note: World GDP and Japanese GDP as estimated by the World Bank.

Table 3.6 **Sales of German Foreign Affiliates**

		Sales of German Affiliates as a Percentage of		
Year	Sales (billion U.S. $)	German GDP	World GDP Outside Germany	World GDP
1976	68.71	15.4	1.16	1.08
1977	81.56	15.8	1.23	1.14
1982	172.83	26.4	1.65	1.55
1985	191.58	30.9	1.64	1.55
1989	373.40	31.6	2.08	1.96
1990	463.35	30.9	2.37	2.20
1991	477.85	27.8	2.37	2.19
1992	531.47	27.0	2.50	2.29
1993	535.29	28.1	2.49	2.27

Sources: Germany, Deutsche Bundesbank (1991) and earlier issues, Germany, Deutsche Bundesbank (1995, table 1) and earlier issues, Lipsey (1989), and World Bank (1980, 1993, 1995).

For Sweden we have data on sales for both parents and foreign affiliates, shown in table 3.7. There has been no clear trend in the world production share of Swedish multinationals as a whole during the period for which we have data since a large rise from 1970 to 1974. There was a very strong upward trend in the internationalized production share (the production share of Swedish affiliates), especially in the last few years, and a large shift in shares from parent sales to affiliate sales. The Swedish geographical output share shows little trend over the whole period.

Table 3.7 **Sales of Swedish Parent Firms and Their Foreign Affiliates**

	Sales (million U.S. $)			Share (%) in					
				World GDP of			Swedish GDP of		
Year	All Parents	Parents with Foreign Production Affiliates	Manufacturing Affiliates (Net Sales)[c]	Sales of Multinationals with Foreign Production Affiliates	Affiliate Net Sales	Swedish GDP	Affiliate Net Sales	Parent Sales	Swedish Multinational Sales of Affiliate Net Sales[c]
1965	n.a.	n.a.	1,426	n.a.	.07	1.12	6.5	n.a.	n.a.
1970	(10,817)[a]	7,997	2,598	.35	.09	.85	10.1	31.00	24.52
1974	24,102	17,818	5,849	.45	.11	1.10	10.0	30.54	24.71
1978	(32,179)[b]	24,736	10,535	.41	.12	1.09	11.4	26.80	29.87
1986	46,959	39,220	22,097	.42	.15	.93	16.6	29.49	36.04
1990	n.a.	50,962	45,370	.46	.22	1.09	19.7	22.18	47.10

Sources: Swedenborg, Johansson-Grahn, and Kinwall (1988, tables 2.4, C.4A, and C.4B), Andersson, Fredriksson, and Svensson (1996), and World Bank (1980, 1993, 1995). Data are translated into U.S. dollars using exchange rates from International Monetary Fund (1995).

[a]Estimated by assuming same ratio to sales of parents with only foreign production affiliates as in 1974.

[b]Estimated by assuming same ratio to sales of parents with only foreign production affiliates as average of 1970 and 1978.

[c]Sales minus imports.

The four home countries for which we have some data on internationalized production or sales present quite different histories. Internationalized production by U.S. multinationals reached its peak relative to aggregate output outside the United States in the middle or late 1970s and now accounts for a smaller share than in 1966. It has also declined substantially relative to U.S. GDP since 1977. U.S. multinationals and U.S. multinational parents have declined in importance relative to world output and U.S. output, respectively, after a peak in the early 1980s. Within U.S. multinationals, affiliate output declined relative to parent output after 1977 but regained most of its share during the 1980s, with little overall change over a dozen years.

Internationalized production by Japanese multinationals, as far as can be gathered from the incomplete data available, has doubled relative to total world output outside Japan but remains much smaller than that of American firms. Relative to all Japanese corporate output, internationalized production has changed little, but internationalized production in manufacturing has roughly doubled in comparison to Japanese manufacturing output. Japanese multinational parents have lost ground within Japan, in manufacturing and in all industries, and Japanese multinationals have declined in importance relative to total corporate output and total Japanese GDP.

For Germany and Sweden we have information only on sales and for Germany only on sales from internationalized production. If output followed the trend of sales, German internationalized production has risen substantially since the mid-1970s. Swedish internationalized production, to judge by sales, has grown the fastest, tripling since 1965 and almost doubling since 1978 relative to world output.

Internationalized production has apparently increased, relative to world output, in three of the four countries. However, because of the much larger initial importance of U.S. internationalized production, the decline for U.S. firms has pretty well offset the increases in the three other countries over the past decade and a half.

3.3 Production Viewed from the Host-Country Side

A different view would be obtained by examining host-country reports on production owned by foreign firms. The great advantage of the host-country view is that the data for production by foreign-owned firms are usually from the same sources as, and comparable to, data for production in general and production by domestically owned firms.

Host-country data do present additional adding-up problems since they are usually calculated in each host-country's own currency. Our solution to that problem is to calculate foreign-owned production shares in each country's home currency and then apply these shares to measures of real GDP in each country such as those calculated by Summers and Heston (1991).

One advantage of home-country data is that outward direct investment is more concentrated among countries than is inward investment, so that we could cover roughly half of internationalized production with data from only three countries. The drawback is that no other countries collect such data on their companies' activities overseas. While inward direct investment is much less concentrated, many more countries collect data on the activities of inward direct investors.

There are several comparisons we can make between foreign-owned and total production in a country. One is to compare foreign-owned production with GDP, as a measure of the importance of such production in a country's total output. Since GDP is the only denominator for which we have an appropriate translation to a common currency for aggregation across countries, we calculate these ratios of foreign-owned to total production for all countries.

Many sectors are essentially closed to production by foreign firms, including various types of governmental and household production. One can therefore also think of measuring foreign shares in "eligible" sectors, such as the business or corporate sector of each economy.

Since the importance of internationalized production varies greatly among sectors of the economy, it is also of interest to examine shares in individual sectors. In most countries, manufacturing is the only sector for which data are available. That and the petroleum sector are probably the most internationalized of all.

3.3.1 Developed Host Countries

United States

The trend within the United States, since 1974, has been that the share of production accounted for by foreign-owned firms has increased steadily, almost tripling over that period. By 1993, the foreign-owned firm share had reached 4.5 percent of total output and 6 percent of output in the nonbank business sector, excluding not only banks but also government and household production not open to foreign firms (table 3.8).

The foreign presence has always been much larger in petroleum and manufacturing than in other sectors of the U.S. economy. From less than 5 percent in 1974, the foreign-owned share grew to something in the neighborhood of 15 percent in 1993, a little faster growth than in other sectors. Foreign-owned manufacturing by itself tripled in importance relative to U.S. total and nonbank business output, reaching 3 percent of the latter in 1993.

The growth in the foreign firm share in U.S. output has taken place during a period after the rapid growth in the U.S. multinational share of world output described earlier. Thus, while U.S. domestic output was growing relative to U.S. multinational worldwide output, foreign firm U.S. output was growing faster than that of U.S.-owned firms.

Table 3.8 **United States: Share of Foreign Firms in Output, 1974–93**

	Share (%) in					
	Total GDP of		Nonbank Business GDP of		U.S. Manufacturing GDP	
Year	Total Foreign-Owned Output	Foreign-Owned Manufacturing Output	Total Foreign-Owned Output	Foreign-Owned Manufacturing Output	Excluding Petroleum and Coal Products	Including Petroleum and Coal Products and All Petroleum[a]
1974	1.64	.76	2.17	1.01	3.13	4.79
1977	1.78	.84	2.27	1.07	3.57	5.21
1978	1.92	.91	2.48	1.18	3.91	5.68
1979	2.23	1.06	2.89	1.38	4.59	6.65
1980	2.62	1.14	3.43	1.50	5.27	8.15
1981	3.26	1.55	4.18	1.99	7.22	10.48
1982	3.29	1.50	4.29	1.96	7.29	10.45
1983	3.27	1.54	4.33	2.04	7.57	10.44
1984	3.41	1.63	4.38	2.09	7.94	10.62
1985	3.34	1.55	4.31	2.00	7.85	10.51
1986	3.33	1.54	4.34	2.01	7.93	10.00
1987	3.48	1.66	4.54	2.17	8.60	10.73
1988	3.89	1.85	5.04	2.41	9.46	11.69
1989	4.25	2.08	5.56	2.72	10.87	13.28
1990	4.31	2.16	5.67	2.84	11.70	14.30
1991	4.50	2.20	5.96	2.91	12.20	14.59
1992	4.42	2.23	5.90	2.97	12.62	15.02
1993	4.58	2.26	6.10	3.02	12.84	15.18

Source: Lipsey, Blomström, and Ramstetter (1995, table B-1).
[a]Of which more than three-quarters was in petroleum and coal products.

United Kingdom

The United Kingdom is a major recipient of direct investment and is one of the countries that has distinguished foreign-owned manufacturing enterprises in its Census of Production for a fairly long period. The share of foreign-owned firms in U.K. manufacturing production has hovered in the neighborhood of 20 percent since 1977, with the latest years' shares a little above the earliest ones, but without a clear trend (table 3.9). The lowest foreign share, 17 to 18 percent, was reached in 1986, and there was a substantial rise after that to 22 to 23 percent in 1990 and 1991.

Since manufacturing has been declining relative to other industries in the United Kingdom, the stable foreign share in manufacturing meant a decline in the share of foreign-owned manufacturing in the economy as a whole. That share fell by about a third from 1979 to 1986 and then recovered somewhat but never reached more than 80 percent of the share in 1977 and 1979. We do

Table 3.9 **United Kingdom: Share of Foreign-Owned Manufacturing Enterprises in Manufacturing and Total Output**

	Share (%) of Foreign-Owned Enterprises in		
	Manufacturing		
Year	Net Output	Gross Value Added at Factor Cost	Aggregate GDP[a]
1977	19.87	19.76	6.62
1979	21.29	21.41	6.79
1981	18.55	18.30	5.15
1983	18.97	18.61	5.05
1984	20.30	20.15	5.27
1985	18.84	18.67	4.85
1986	17.71	17.31	4.53
1987	19.05	18.79	4.81
1988	18.52	18.23	4.76
1989	21.48	21.06	5.53
1990	22.39	21.77	5.67
1991	22.54	21.71	5.32

Source: Lipsey, Blomström, and Ramstetter (1995, table B-2).
[a]Share of net output of foreign-owned manufacturing firms.

not have data to tell whether information for all industries would show that same stability as in manufacturing or a declining share.

Canada

Canada, another important host country for multinationals, also provides long series of information on the operation of foreign firms. From the 1960s through the mid-1980s, foreign firms accounted for about a third of total sales in all industries and all nonfinancial industries, and more than half in manufacturing industries. The peak shares seem to have been reached around 1970, but there was little change until the late 1980s. The share of foreign-owned firms had dropped substantially by 1988, but it then increased slightly. Taken together, these figures suggest a declining importance of foreign-owned firm sales in Canada since the 1960s and 1970s.

The comparison of our crudely estimated value added in foreign-owned operations with total Canadian GDP gives a somewhat different picture. The share in total national output of foreign-owned production, in manufacturing and in all industries, reached a peak in the mid-1970s. Then it declined, to the point that over the whole period from 1967 to 1993 there was some decline in the foreign-owned share of total Canadian output (table 3.10).

Norway

By all the available measures, the foreign-owned share in Norway's output has declined over the past 15 years and particularly during the 1980s, after an

Table 3.10 Canada: Share of Foreign-Owned Firm Value Added in GDP

	Estimated Share (%) of Foreign-Owned Firm Value Added in Total GDP: Foreign-Owned Firms in		
Year	All Industries[a]	Nonfinancial Industries[a]	Manufacturing[b,c]
1967	16.5	16.1	14.1
1968	17.0	16.7	14.3
1969	16.6	16.3	14.1
1970	16.3	15.9	13.2
1972	16.6	16.3	13.6
1974	18.0	17.6	14.5
1978	n.a.	17.1	n.a.
1983	16.2	14.7	11.5
1988	15.6	13.9	11.1
1990	14.8	13.2	n.a.
1992	14.3	12.8	n.a.
1993	15.1	13.5	n.a.

Source: Lipsey, Blomström, and Ramstetter (1995, table B-3).

[a]Sales or operating revenue multiplied by 0.3, using approximation to ratios for U.S. majority-owned affiliates in Canada, which were as follows (%): 1977, 32.8; 1982, 31.5; 1989, 30.1; and 1991, 26.6 (from Mataloni and Goldberg 1994).

[b]Sales or operating revenue multiplied by 0.4, using approximation to 1972 Canadian ratios for foreign-owned manufacturing establishments, which were as follows (%): foreign-owned establishments, all activities, 38.6; and foreign-owned establishments, manufacturing activity, 41.7.

[c]Enterprise basis. On an establishment basis the ratio for 1972 is 11.3, and that for 1991 is 10.5.

earlier increase (table 3.11). Within manufacturing there was a rise in the foreign share in 1973 and another large rise in 1979, followed by a sharp drop, by over a half, to the low point in 1985. Since then there has not been any strong trend.

The dates of the major changes in the foreign-owned share, coinciding with large increases in oil prices, suggest that relative price changes may have played a major role in these fluctuations. That could be the case if there was substantial foreign ownership in petroleum refining and large changes in refining margins or margins in other downstream petroleum-related output, since these would enter manufacturing value added.

Whatever the source of these fluctuations, they seem also to have been associated with corresponding fluctuations in the importance of the manufacturing sector in aggregate national output. That relationship is shown by the fact that the fluctuations in the foreign share of GDP were wider than those in the foreign share of manufacturing output. For example, when the foreign share of manufacturing output rose by a quarter from 1972 to 1974, the foreign share in GDP rose by a third. And when the foreign share in manufacturing fell by 54 percent from 1979 to 1986, the foreign share in GDP fell by 65 percent.

The trend in foreign ownership of Norwegian production seems quite clear. Foreign-owned production has been declining in importance both within man-

Table 3.11 Norway: Share of Foreign-Owned Manufacturing Establishments in Manufacturing and Total Output

	Manufacturing Value Added at Factor Prices: Foreign-Owned as a Percentage of		Manufacturing Value Added at Purchasers' Prices: Foreign-Owned as a Percentage of
	Total Manufacturing Value Added at Factor Prices (1)	Aggregate GDP (2)	Aggregate GDP[a] (3)
	Foreign Ownership 50 Percent or More, Four Industries[b]		
1952	40.27		1.60
1957	36.62		1.38
1961	29.04		1.19
	Foreign Ownership 50 Percent or More, All Manufacturing		
1962	6.43		1.59
1962	6.35	1.51	
	Foreign Ownership 20 Percent or More, All Manufacturing		
1962	11.59		2.87
1962	11.79	2.80	
1972	14.69	3.10	2.91[c]
1973	18.46	4.01	3.77[c]
1977	17.23	3.43	3.08
1980	14.36	2.40	2.20
1982	13.29	1.93	1.82
1985	9.41	1.28	1.24
1986	11.27	1.60	1.54
1987	10.74	1.53	1.47[d]
1989	13.58	1.87	1.80[d]
1990	11.18	1.43	1.38[d]

Source: Lipsey, Blomström, and Ramstetter (1995, table B-4).

[a]Estimated by multiplying col. (2) by the ratio for all Norwegian manufacturing of value added at market prices to value added at factor prices (the ratio of col. [3] to col. [2] of Lipsey, Blomström, and Ramstetter 1995, table B-4).

[b]Electrochemical; other chemical, except oil refining; basic metals, except iron and steel; and electrotechnical.

[c]Extrapolated from 1975 by col. (2).

[d]Extrapolated from 1986 by col. (2).

ufacturing and for the economy as a whole ever since the peak share reached in 1973 or 1974. In addition, there is evidence of a decline in the foreign share during the 1950s in the four industries for which foreign ownership data are available, industries that were growing relative to the average within the declining manufacturing sector.

Sweden

The trajectory of foreign ownership of Swedish industry appears to have been quite different from that for Norway, although the severe reduction in

Table 3.12 **Sweden: Share of Foreign-Owned Firms in Manufacturing and Total Production**

	Value Added in Foreign-Owned Production as a Share (%) of					
	Value Added in All Corresponding Enterprises				GDP:	
	Manufacturing Establishments in Enterprises with Foreign Ownership		Enterprises with Foreign Ownership		Manufacturing Establishments in Enterprises with Foreign Ownership	
Year	>50	≥20%	>50%	≥20%	>50%	≥20%
1971	6.2	n.a.	5.3	8.1	1.65	n.a.
1972	6.3	10.9	5.3	8.3	1.68	2.91
1973	6.4	10.7	5.9	9.7	1.80	3.00
1974	6.7	11.0	5.8	9.0	2.05	3.38
1975	6.4	10.2	5.3	7.8	1.84	2.93
1976	6.9	11.0	5.2	7.8	1.90	3.04
1977	7.0	11.7	5.4	8.5	1.84	3.09
1978	7.5	12.5	5.3	8.5	1.89	3.13
1979			6.1	9.5		
1986			13.5			
1990			17.0			

Source: Lipsey, Blomström, and Ramstetter (1995, tables B-5 and B-6).

availability of data after 1978 makes inferences rather uncertain. Most of the measures show little change in the share of foreign-owned enterprises in manufacturing or in total production from 1971 through 1976 or 1977, but if there was any change, it was toward an increase in foreign shares, especially after 1978 (table 3.12). After 1979 very little is available on value added, but the one series that does continue shows more than a doubling of the foreign share by 1986 and 1990. That impression is reinforced by the foreign shares in employment. The employment share of foreign-owned enterprises rose similarly (Lipsey, Blomström, and Ramstetter 1995, table B-6), a little faster in manufacturing than in all industries, but both confirming the impression of rapid growth in the foreign share of Swedish production during the 1980s.

Japan

The data on production by foreign firms in Japan suffer from many of the same defects as the data on Japan-based multinationals. In particular, they are based on voluntary surveys with low and fluctuating degrees of coverage. Response rates have varied between a high of 59 percent and a low of 31 percent but fell between 45 and 55 percent in 11 out of the 15 years for which coverage is known. The definition of foreign ownership has also changed over time: 25 percent equity ownership in 1977–81, 50 percent in 1982–91, and 33 percent in 1991–92.

While those changes of definition might not have a major effect on measures of production in most host countries, minority-owned operations are of much greater importance in Japan than elsewhere. The 1991 change from 50 percent to 33 percent as the criterion for foreign control does not appear to have made a large difference, but the earlier increase from 25 percent to 50 percent may have been much more important.[3]

A way of estimating the effect of the strict criterion on estimated foreign ownership shares in Japan is to compare data for all U.S.-owned affiliates in Japan with data for majority-owned affiliates, both from U.S. outward investment surveys. Such a comparison is not possible for value added because those estimates cover only majority-owned affiliates. However, it is possible for a crude proxy for value added: the sum of employee and net income, both components of value added. The ratios of all affiliates to majority-owned affiliates for this proxy in three of the benchmark survey years are as follows (U.S. Department of Commerce 1981, 1985a, 1992b):

	1977	1982	1989
All industries	3.63	3.22	2.21
Manufacturing	2.95	3.86	2.61

In table 3.13 we present, first, estimates of foreign shares in corporate value added and in Japanese GDP according to the 50 percent foreign ownership criterion, the official one from 1982 through 1991. The 33 percent criterion introduced in 1991 added only about 4 percent to the foreign share in manufacturing and a little more than 10 percent to the overall foreign share, mainly because it added over 40 percent to the foreign share in trade.

The second part of the table gives two estimates of the foreign share by the 10 percent ownership criterion used in the U.S. data. The low estimate is based on the assumption that only U.S. firms held any minority interests above 10 percent in Japanese firms. The high estimate assumes that minority holdings by other countries bear the same relation to majority and 50 percent holdings as in U.S. investment.

The 10 percent criterion would put foreign shares higher, as far as we can judge: somewhere between 1.5 and 2.5 percent of GDP, according to the low estimate, and 2.5 to 3.5 percent, by the high estimate. The foreign share of corporate value added ranges from about 2 to over 3 percent in the low estimate and from almost 3 to around 6 percent in the high estimate, with fairly clear downward trends. Foreign shares are, and have mostly been, around 4 percent in manufacturing judged by the low estimate but 6 or 7 to over 10 percent according to the high estimate. Both, but particularly the high estimate, suggest a decline in the foreign share since the early or mid-1980s.

The data point to an important characteristic of value added as a production measure: its sensitivity to cyclical and exchange rate fluctuations. The fall in

3. For a discussion of some of the difficulties with Japanese data, see Weinstein (1997).

Table 3.13 **Japan: Share of Foreign-Owned Firms in Corporate Value Added and in GDP, by Various Ownership Criteria and Methods of Estimation**

Year	Foreign Share (%) of Corporate Value Added in Japan: All Industries		Foreign Share (%) of Corporate Value Added in Japan: Manufacturing		Foreign Share (%) of Japanese GDP: All Industries	
Foreign Ownership Criterion: 50 Percent or More						
1977	1.75		2.91		1.10	
1978	1.62		2.91		1.00	
1979	1.35		2.39		0.90	
1980	1.37		2.38		0.93	
1981	1.53		2.83		1.06	
1982	1.53		2.83		1.05	
1983	1.90		3.88		1.35	
1984	1.54		3.07		1.09	
1985	1.11		2.27		0.80	
1986	1.66		3.69		1.22	
1987	1.51		3.33		1.19	
1988	1.53		3.27		1.25	
1989	1.51		3.14		1.20	
1990	1.35		2.78		1.13	
1991	1.34		2.83		1.14	
1992	1.16		2.61		0.97	
Foreign Ownership Criterion: 10 Percent or More						
	Low	High	Low	High	Low	High
1977	3.61	6.36	4.35	8.58	2.27	4.00
1978	3.40	5.75	4.59	9.13	2.09	3.54
1979	2.92	4.68	4.04	7.91	1.94	3.11
1980	2.82	4.62	4.15	8.34	1.93	3.16
1981	2.90	5.04	4.63	10.40	2.01	3.49
1982	2.89	4.91	4.84	10.92	1.99	3.38
1983	3.18	5.49	5.67	13.57	2.26	3.90
1984	2.67	4.02	4.76	9.40	1.88	2.83
1985	2.26	3.00	4.10	7.33	1.63	2.17
1986	2.64	3.99	5.27	10.18	1.94	2.93
1987	2.30	3.35	4.71	8.46	1.81	2.63
1988	2.28	3.38	4.61	8.74	1.85	2.75
1989	2.29	3.32	4.53	8.21	1.83	2.65
1990	2.08	3.01	4.16	7.57	1.73	2.51
1991	2.01	2.87	4.03	7.18	1.70	2.43
1992	1.67	2.32	3.63	6.16	1.40	1.93

Sources: Lipsey, Blomström, and Ramstetter (1995, table B-7) and appendix B of this paper.

Table 3.14 Australia: Share of Foreign-Owned and Foreign-Controlled Establishments in Mining, Manufacturing, and Total Output

	Foreign Share (%) of Sector Value Added and GDP			
	By Control		By Ownership	
Industry and Year	Sector	GDP	Sector	GDP
Mining				
1971–72	55.0	1.87		
1972–73	57.7	1.88		
1973–74	60.2	2.03		
1974–75	60.1	2.27	51.8	1.96
1976–77	59.0	2.29		
1981–82	57.9	2.36	51.2	2.09
1982–83	56.6	2.51	50.4	2.24
1984–85	51.5	2.39	44.7	2.08
Manufacturing				
1972–73	n.a.	n.a.	31.2	6.82
1982–83	34.6	5.87	32.9	5.57
1986–87	33.3	5.38	30.9	5.00

Source: Lipsey, Blomström, and Ramstetter (1995, tables B-8 and B-9).

foreign firm value added from 1983 to 1985 probably represents the effects of the sharp rise in the exchange value of the U.S. dollar, as U.S. affiliates, especially those in trade, cut margins to preserve their markets in Japan.

Although Japan's government restrictions on inward FDI, extremely restrictive until the early 1970s, were largely eliminated in 1980, foreign firms' shares of Japanese production are still relatively low, leading some (e.g., Encarnacion 1992) to suggest that private barriers to FDI have replaced public barriers. Others (e.g., Ramstetter and James 1993) argue that these trends are a result of general entry barriers (e.g., high land costs) and the low priority accorded the Japanese market by many Western multinationals in this period.

Australia

Time series for foreign firms' shares in Australian output appear to be confined to mining and manufacturing, and even these cover only the period from the early 1970s to the mid-1980s. The mining sector is the one for which the longer span of years can be observed, and it is also the sector most dominated by foreign firms. Within that sector, the foreign share of production rose until the mid-1970s and then declined, the latest ratio, for 1984–85, being the lowest of the period (table 3.14). However, there was no real indication of a trend before that. The share of GDP originating in foreign-owned mining production did appear to have an upward trend, however, because the mining sector, though quite small, increased in importance during these years.

The foreign share in the much larger, but relatively shrinking, manufacturing sector declined somewhat over the period for which we have data, but the share of foreign-owned manufacturing production in total output declined substantially. Thus, there is little doubt that the foreign share in Australian production as a whole declined, given that foreign production in these two major industries fell from about 9.5 percent to about 7.5 percent of GDP.

Of the seven developed host countries for which we have data from national sources on production by inward investors, only two, the United States and Sweden, have undergone substantial growth in foreign-owned shares in their production, mainly during the 1980s. The growth was particularly large in manufacturing for the United States, although the shares have not reached high levels compared with those in other countries. For Sweden, we do not have data by industry for the period of high growth in the foreign share.

The opposite trend, for manufacturing at least, characterized Norway and Canada. In Norway, the foreign share in manufacturing was cut substantially after rising in the 1970s, and the contribution of foreign-owned manufacturing to GDP fell far more steeply, as manufacturing declined in importance in the whole economy. In Canada, the foreign share of production, which reached a peak in the mid-1970s, fell substantially until 1988 and then recovered a bit by 1993, but the final shares were below the levels of the 1960s. Japan, the United Kingdom, and Australia are harder to characterize by any particular trends. Thus, among these seven countries, there is no strong consensus regarding the direction of changes in the importance of foreign-owned production. The strongest case for a trend is that of the United States, which absorbed an unprecedented share of the world's direct investment during the 1980s, but that may have been a temporary episode not likely to be repeated.

3.3.2 Developing Host Countries

Our data for developing countries are less complete. Table 3.15 presents the data we have assembled on foreign firm shares of value added in Asia's developing economies.[4] Across countries these shares vary in a wide range, from very close to zero in India and in China's industrial sector for a number of years to well over 50 percent for some years in Malaysia and all years in Singapore. In the three countries for which data covering all industries are available for a reasonably long period of time (India, Malaysia, and Taiwan), there is a pronounced downward trend in Malaysia due in large part to declines of foreign shares in agriculture and mining (Ramstetter 1995, 123). There are no such strong trends in India and Taiwan, but in Taiwan foreign shares were, in the late 1980s, high relative to the past.[5] In India and Korea, foreign firm shares

4. The data for China refer to gross value of output for industry, including intermediate expenditures. Figures on sales and the gross value of output, including intermediate expenditures, are provided in the appendix tables of Lipsey et al. (1995).

5. Ratios of foreign firm sales to Taiwanese total output indicate that high foreign shares continued into 1991 (see Lipsey et al. 1995, table C-8). The two value-added estimates for foreign firms in 1990 and 1991 are inconsistent and seem inconsistent with the sales data as well.

Table 3.15 Selected Asian Developing Economies: Share of Foreign Firms in Value Added

Year	All Industries						
				Taiwan			
	India	Korea	Malaysia	1	2	India	Ko
Ownership definition	b	b	a	b	b	b	
Output measure		c		g	c		
Industry coverage			e			d	
1968	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n
1969	n.a.	n.a.	63.5	n.a.	n.a.	n.a.	n
1970	n.a.	n.a.	60.2	n.a.	n.a.	n.a.	n
1971	n.a.	n.a.	56.6	n.a.	n.a.	n.a.	n
1972	n.a.	n.a.	54.2	n.a.	n.a.	n.a.	n
1973	n.a.	n.a.	55.5	n.a.	n.a.	n.a.	n
1974	n.a.	2.73	57.1	6.1	n.a.	n.a.	9
1975	1.75	3.83	50.0	6.4	n.a.	7.6	13
1976	1.95	4.66	46.2	6.5	n.a.	n.a.	16
1977	1.82	5.54	43.0	7.1	n.a.	n.a.	18
1978	1.86	5.32	41.0	8.0	n.a.	n.a.	17
1979	1.89	n.a.	40.3	8.4	10.4	7.0	n
1980	1.71	n.a.	39.4	6.7	8.9	7.0	n
1981	n.a.	n.a.	39.6	6.1	8.5	n.a.	n
1982	1.26	n.a.	37.4	5.7	6.6	5.2	n
1983	1.23	n.a.	36.9	6.8	6.3	5.1	n
1984	1.68	n.a.	34.0	8.8	11.3	5.8	10
1985	1.75	n.a.	31.4	5.7	7.8	6.1	11

1986	1.79	n.a.	31.3	7.1	6.9	6.4	12.
1987	1.78	n.a.	32.9	8.0	7.8	6.3	n.
1988	n.a.	n.a.	32.0	11.4	10.5	n.a.	n.
1989	n.a.	n.a.	30.9	12.6	12.2	n.a.	n.
1990	n.a.	n.a.	30.1	14.0	7.8	n.a.	n.
1991	n.a.	n.a.	30.1	7.8	11.0	n.a.	n.
1992	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.

	Industry					
		Guangdong			Indonesia	
Year	China: Upper Limit	Upper Limit	Actual	Hong Kong	Total	No
Ownership definition				a	b	
Output measure	i	i	i			
Industry coverage						
1974	n.a.	n.a.	n.a.	n.a.	n.a.	n
1975	n.a.	n.a.	n.a.	n.a.	19	
1976	n.a.	n.a.	n.a.	n.a.	25	
1977	n.a.	n.a.	n.a.	n.a.	26	
1978	n.a.	n.a.	n.a.	n.a.	23	
1979	n.a.	n.a.	n.a.	n.a.	21	
1980	0.48	1.9	n.a.	n.a.	22	
1981	0.58	n.a.	n.a.	n.a.	22	
1982	0.68	n.a.	n.a.	n.a.	20	
1983	0.78	n.a.	n.a.	12.8	19	

(*continued*)

Table 3.15 (continued)

	Industry				Manufacturing				
		Guangdong			Indonesia		Singapore		
Year	China: Upper Limit	Upper Limit	Actual	Hong Kong	Total	Nonoil	1	2	Thailand
1984	1.01	n.a.	n.a.	13.0	14	19	63.1	67.9	n.a.
1985	1.21	4.6	n.a.	10.7	13	18	64.8	67.0	n.a.
1986	1.46	n.a.	n.a.	12.8	14	18	65.9	73.5	13.3
1987	2.02	n.a.	n.a.	13.5	15	18	72.4	74.0	n.a.
1988	2.72	n.a.	n.a.	14.3	14	17	71.7	72.4	n.a.
1989	3.44	n.a.	n.a.	14.6	16	19	73.6	74.4	n.a.
1990	4.38	24.3	8.34	16.2	15	19	72.7	74.2	14.8
1991	5.66	29.1	27.0	17.3	n.a.	n.a.	72.2	72.9	n.a.
1992	7.11	33.6	31.8	17.1	n.a.	n.a.	70.2	69.5	n.a.
1993	10.16	43.8	33.2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Source: Lipsey, Blomström, and Ramstetter (1995, tables C-1 through C-11).

Notes: Ownership definition: (a) foreign firms defined as firms with 50 percent or higher foreign ownership shares and (b) foreign firms defined to include firms with minority foreign ownership shares.

Output measure: (c) value added estimated as total sales less expenditures for raw materials and parts; (g) estimates given by the original source equal to total income less expenditures for raw materials and parts, electricity, and other intermediate consumption; (i) gross value of output, including intermediate expenditures; (j) gross value added; (k) net value added; and (l) ratios to national accounts measures of value added.

Industry coverage: (d) foreign firm manufacturing data refer to the sum of textiles, chemicals, and engineering (metals and machinery) only; (e) data from surveys of limited companies; (f) data from industrial surveys; (h) data exclude paper and printing, precision machinery, and miscellaneous manufacturing; (m) data refer only to firms promoted by the Board of Investment—including nonpromoted foreign firms, the foreign share was 30.6 percent in 1990 (many nonpromoted firms had been promoted firms earlier).

were much larger in manufacturing than in all industries. Foreign shares in Malaysia and Taiwan generally followed a U-shaped pattern, being relatively high in the mid- to late 1970s, bottoming out in the early to mid-1980s, and rising again in the late 1980s and early 1990s.

For the remaining countries (China, Hong Kong, Indonesia, Singapore, and Thailand), data are available only for industry or manufacturing. A very strong upward trend is observable in China, though the figures here represent only an upper limit on foreign joint venture shares, and the data for Guangdong Province indicate that there are substantial differences between the upper limit and the actual share in some years. Nonetheless, there is no doubt that foreign shares in China have increased dramatically in recent years and have reached moderately high levels in Guangdong Province, mainly in firms owned by overseas Chinese.[6] Upward trends are present in Hong Kong and Singapore, and a downward trend in Indonesia. In Thailand, shares of foreign firms promoted and surveyed by the Thai Board of Investment have not changed much over time, but it is also clear that these firms accounted for only about one-half of all foreign firm production in Thailand in 1990.

On balance, it appears that foreign firm shares of manufacturing production have increased somewhat in Asia's developing economies. The fact that Asian manufacturing has grown extremely rapidly in the past two decades, combined with constant or rising shares of foreign firms in these industries, means that the share of Asian manufacturing operations of foreign multinationals in world production has been increasing. Moreover, if one could account for the production of the growing number of Asian manufacturing multinationals in their home markets, the increase in the share of Asian multinationals in world production would likely be seen to be even more pronounced. As the Malaysian data indicate, internationalized production has long played an important role in Asian primary industries as well, though this role has become smaller in recent years in Malaysia.

We also have some information on the activities of multinationals in Latin America (table 3.16). In the two largest economies, Brazil and Mexico, as well as in Uruguay, foreign-owned firms play an important role in manufacturing production. In Brazil, foreign-owned production accounted for about 29 percent of manufacturing gross output in 1980, the only year for which data on all foreign affiliates are available. Little change has taken place in the share of U.S. affiliates (dominated by majority-owned affiliates), which accounted for approximately half of all foreign affiliate manufacturing output in Brazil in the beginning of the 1980s. If the growth of other foreign firms was like that of U.S. majority-owned foreign affiliates, there have been only small changes in the foreign manufacturing share in Brazil since the mid-1970s.

In Mexico, we find no significant change in the role of multinationals during

6. In 1992, 23 percent of the gross value of industrial production in Guangdong occurred in overseas Chinese firms (Lipsey et al. 1995, 41).

Table 3.16 **Three Latin American Countries: Share of Foreign-Owned Production in Manufacturing Output**

	Brazil		Mexico			
			Total Foreign			
Year	Total Foreign	U.S. MOFAs[a]	A	B	U.S. MOFAs[a]	Uruguay
1970		n.a.	34	28.7		n.a.
1975		n.a.	31			n.a.
1977		10.5			9.2	n.a.
1978		n.a.			n.a.	18.0
1980	28.5			27.2		n.a.
1982		12.3			8.5	n.a.
1988		n.a.			n.a.	28.0
1989		12.9			13.0	n.a.
1990		10.3			13.0	29.0
1991		9.2			n.a.	n.a.

Source: Lipsey, Blomström, and Ramstetter (1995, tables C-12 through C-14).

[a]In 1982, U.S. majority-owned foreign affiliates (MOFAs) accounted for 85 percent of manufacturing employment in all U.S. affiliates in Brazil and 60 percent in Mexico.

the 1970s, and if U.S. majority-owned foreign affiliates can represent all foreign affiliates in Mexico as we assumed they did in Brazil, the role of the multinationals remained unchanged in Mexican manufacturing in the 1980s. In 1970, 28.7 percent of Mexican manufacturing value added was produced by foreign-owned firms. In 1980, the last year for which figures for total foreign-owned production are available, that share was almost unchanged (27.2 percent). Looking only at U.S. majority-owned foreign affiliates in Mexican manufacturing, we see a downward trend until 1982, but then it shifted dramatically. Between 1982 and 1990, the share of these affiliates in Mexican manufacturing value added increased by 53 percent (from 8.5 to 13.0 percent). However, this seems to be a result of policy changes in Mexico after the debt crisis in 1982. Mexico abandoned its strict restrictions on FDI dating from the 1970s, which, among other things, prevented majority-ownership in new investments, and American firms seem to have responded to that change. In 1982, U.S. majority-owned foreign affiliates accounted for 60 (55) percent of the employment (sales) of all U.S. affiliates in Mexican manufacturing, and by 1990, this share had increased to 71 (66) percent.

The foreign share in Uruguay has also increased steadily since the 1970s. Almost 30 percent of the country's manufacturing output was produced by foreign firms in 1990. Given that Uruguay is a financial center for the Southern Cone, one would expect the foreign share of service industry production to be even higher.

In sum, it seems safe to guess that approximately 30 percent of our three Latin American countries' manufacturing output today is produced by foreign-

Table 3.17 **Estimate of Internationalized Production from the Home-Country Side**

Year	Affiliate (Internationalized) Output of Firms from Four Home Countries as a Percentage of World GDP[a] (1)	Share (%) of Four Home Countries in World Stock of Outward FDI[b] (2)	Share of Internationalized Output in World GDP[c] (3)
1960		49.6	
1970	2.5	(55)	4.5
1975		57.1	
1977	3.1	(57)	5.4
1980		56.5	
1982	3.2	(55)	5.8
1985		54.2	
1988	3.3	(53)	6.2
1990	3.4	51	6.7

[a]Roughly estimated from country tables.

[b]Lipsey (1995b, table E-7). Figures in parentheses are straight-line interpolations, rounded to two significant digits.

[c]Including four home countries. Calculated as (col. [1] ÷ col. [2]) × 100.

owned multinationals. The foreign share has been essentially unchanged in Mexico since 1970. It increased somewhat in Brazil during the 1970s but fell back again during the 1980s. In Uruguay, the trend has been upward since 1978, but the economy is small compared to the others. Thus, taking the three countries together, there has been little change in the foreign manufacturing share since the early or mid-1970s. During this period, these Latin American countries' manufacturing sectors have been growing more slowly than those of the Asian countries discussed above, but still faster than the world average. This suggests that the share of internationalized production in world output has been increasing somewhat for these developing countries as well.

3.4 Measuring World Internationalized Production

3.4.1 From Home-Country Data

Home-country data on affiliate production were available for four countries—the United States, Japan, Germany, and Sweden. Judging from data on stocks of direct investment, it appears that these four countries have accounted for about half or more of all outward investment stocks since 1960. If we assume that shares of world internationalized production are proportionate to shares of outward investment stocks, we can estimate how much of aggregate world output is from internationalized production, as shown in table 3.17.

The share in world output of affiliates of multinationals from the four home countries reporting affiliate sales or output has changed little since 1977. However, these countries' share of the stock of total world outward direct investment has declined since then. Given our assumptions, we can roughly estimate that the share of internationalized, or affiliate, production has risen from about 4.5 percent to between 6.5 and 7 percent of world output since 1970.

Of course, the share of production accounted for by the multinationals from these countries, including parent (noninternationalized) as well as affiliate (internationalized) production, is much larger. In the United States, Japan, and Sweden, it was probably about 12 percent in 1980 and a little less at the end of the 1980s.

We have no information as to what part of the world's multinational production is represented by these three countries' firms. If we assumed, with no justification, that the parents account for the same share of world output as their affiliates do of the stock of FDI (48 percent in 1980 and 41 percent in 1990), we would estimate that multinationals accounted for about 25 percent of world output at the beginning of the 1980s and somewhat more at the end. That is almost certainly a maximum estimate because these countries probably account for more of internationalized (affiliate) production than of home production.

3.4.2 From Host-Country Data

We aggregate the internationalized output in the seven developed countries we cover by taking ratios of foreign-owned (internationalized) production to aggregate GDP in each country, calculated in national currencies at current prices, and applying these ratios to GDP in current-year international prices for each country. The results are shown in appendix tables 3C.1 and 3C.2 and summarized in table 3.18.

Foreign-owned production increased its share of total output in the group of countries surveyed by a little over a quarter from 1977 to 1991, judged by the middle estimate that assumes minority ownership in Japan only by U.S. multinationals. The increase was not continuous, to judge from the five countries with data for the most years (appendix table 3C.1), but the upward trend is clear.

The shares of internationalized production in these countries as a group ranged from about 3.5 to 4.5 percent. The share of foreign-owned production in Japan was far below the average for these countries. By the broadest measure, Japan does not stand out at the beginning of the period, but by the end it appears to have lower foreign shares in production than is typical.

Since most host countries report foreign-owned shares only in manufacturing, it is difficult to judge the implications of these numbers, which mix data for all industries in some countries with data only for manufacturing in other countries. The second part of each panel in table 3.18 is a more consistent version, limited to manufacturing output, where possible. For manufacturing

Table 3.18 Growth in Foreign-Owned Shares of Production in Seven Developed Host Countries, 1977–91

Industry	Percentage
Growth in Foreign-Owned Shares in Host-Country Output	
All industries[a]	
Assuming minority ownership in Japan only by U.S. multinationals	+27.7
Assuming minority ownership in Japan by all foreign multinationals	+21.1
Manufacturing[b]	
Assuming minority ownership in Japan only by U.S. multinationals	+15.5
Assuming minority ownership in Japan by all foreign multinationals	+13.7
Growth in Foreign-Owned Host-Country Output as a Percentage of World Output	
All industries[a]	
Assuming minority ownership in Japan only by U.S. multinationals	+21.6
Assuming minority ownership in Japan by all foreign multinationals	+15.3
Manufacturing[b]	
Assuming minority ownership in Japan only by U.S. multinationals	+10.0
Assuming minority ownership in Japan by all foreign multinationals	+ 8.3

Source: Appendix tables 3C.1 and 3C.2.
[a]Seven countries, 1977–86; six countries, 1986–91.
[b]Seven countries, 1977–86; six countries, 1986–90.

production there is not such a large upward trend. There was little change for the first decade or so and then a fairly continuous increase from 1985 to 1989 before another dip. However, the share in 1991 was substantially above those for the late 1970s (appendix table 3C.2).

The share of internationalized production in these countries in world output reflects its growth within the seven countries, but also the rate of growth of these seven countries relative to the world as a whole. The growth in shares of world output was between 16 and 27 percent, the broader measure producing the smaller increase. The increases in the shares of world output are smaller than those for shares in country output because these countries were growing less quickly than the world as a whole. The contrast is even stronger for shares of internationalized manufacturing production in these countries in aggregate world output. These grew by between 8 and 10 percent. There did seem to be some upward trend, especially in the last few years, but it was not a strong one.

The slower growth of these countries than of the world partly reflects the implicit weighting in these calculations, which is by the size of internationalized aggregate or manufacturing production. Even within the group of seven countries, that weighting tends to raise the importance of the slow-growing United States and lower that of the fast-growing Japan.

From these calculations, we can gather that there has been some long-term growth in the importance of internationalized production in the developed countries relative to their total output and to world output.

We have also aggregated the internationalized output in the nine developing countries we cover, using the same method as for developed countries. There

Table 3.19 Share of Foreign-Owned Total and Manufacturing Production in Nine Developing Countries in Their Real Output and in Real World Output

	Share (%) of Foreign-Owned Production in Real Output[a] of			Share (%) in Real World Output[a] of Foreign-Owned Production in		
Year	Seven Countries	Nine Countries A	Nine Countries B	Seven Countries	Nine Countries A	Nine Countries B
			Total Production			
1975	1.79			0.22		
1977	2.17		3.38	0.26		0.59
1980[b]	1.73		3.11	0.24		0.55
1983[c]	1.83	2.99	3.03	0.27	0.46	0.56
1989[d]	2.38	3.29	(3.33)	0.38	0.59	(0.72)
1990[d]	2.79	3.41	(3.46)	0.46	0.64	(0.78)
			Manufacturing Production			
1975	1.65			0.21		
1977[e]	2.00		3.25	0.24		0.52
1980[b]	1.60		3.01	0.22		0.53
1983[f]	1.71	2.89	2.93	0.25	0.52	0.54
1989[d]	2.04	3.01	(3.05)	0.33	0.58	(0.60)
1990[d]	2.34	3.03	(3.07)	0.38	0.59	(0.61)

Sources: Text tables and Penn World Tables (5.6).

Note: Seven countries are China, India, Indonesia, Malaysia, Mexico, Singapore, and Taiwan. Nine countries A also include Brazil and Hong Kong. Nine countries B also include Brazil and Korea. Numbers in parentheses are extrapolated from 1983 by figures for nine countries A.

[a]Real GDP in current international prices.

[b]For Malaysia, 1979, and for Korea, 1978.

[c]For Brazil and Mexico, 1982, and for Korea, 1978.

[d]For India, 1987.

[e]For India, average of 1975 and 1979.

[f]For Brazil, 1982 and for Korea, 1984.

appears to have been a fall in the share of internationalized production in the developing countries' own output from 1977 to 1983, following an earlier rise (table 3.19). Then there was large growth in the share after 1983. Relative to aggregate world output there was little change from 1977 to 1983, after an earlier increase, but a very large rise after that, suggesting growth of over 50 percent relative to world output up to 1990. The growth was probably even faster after that because foreign investment in China accelerated in the 1990s. The increase in foreign-owned production was much larger relative to world output than relative to these countries' own output because these countries were growing faster than the rest of the world.

Even more than for the developed host-country data, the data for foreign-owned production in developing countries are limited to the manufacturing sector. The same ratios, confined as far as possible, to the manufacturing sector, are shown in the second panel of table 3.19. The time pattern for manufacturing alone relative to the countries' output is similar to that for the hybrid values in the first panel, with a rise to 1977, a decline to the early 1980s, and then another increase. However, there is no clear trend over the whole period. In contrast, the shares of world output do show an upward trend. The difference between the trends in shares of country output and in shares of world output results from the fact that the ratios are dominated by Asian countries that were growing much faster than the rest of the world.

If we add the foreign-owned manufacturing production in developed and developing host countries, we find that there was some rise over the period since 1977 in the share of world output, as indicated by column (1) of table 3.20.

These numbers understate the share of internationalized output in total output for two reasons. One is that they cover only manufacturing output, and the other is that they include only 16 host countries. To make up for the limitation to manufacturing we use estimates of the share of manufacturing in total internationalized output, as reported by five host countries (col. [2]).

Dividing the manufacturing output share measures of column (1) by these ratios, we estimate shares of world GDP for total internationalized output of the 16 host countries (col. [3]). Since these 16 host countries accounted for about 60 percent of all the inward stock of FDI (col. [4]), we can make an estimate of the share of internationalized production in the whole world by assuming that the share of world internationalized production of these 16 countries was equal to their share of the inward direct investment stock. The corresponding estimates for the share of internationalized production in the output of all host countries are in column (5).

This calculation from the host-country side implies a substantial growth in the share of internationalized production in world output, as does the calculation from the home-country side in column (6), but here almost all the growth is after 1985. The shares estimated from host-country data are smaller, but the growth is faster, over a third from 1977 to 1990 as compared with about a quarter in the estimates from home-country data.

3.5 Summary and Conclusions

The difference between a geographical and an ownership view of production is measured by the amount of internationalized production: that is, production in enterprises owned by nonresidents of the country where the production is located. That internationalized production is also one aspect of the much talked about "globalization" of production, for any one country and for the world as a whole.

The internationalization of production can be measured from two sides: that of the home country and that of the host country. Viewed from the home country, the question is, How much of production owned or controlled by home-country residents takes place outside the geographical boundaries of the home

Table 3.20 Estimates of Internationalized Production from the Host-Country Side

	Internationalized Manufacturing Output in 16 Host Countries as a Percentage of World GDP[a] (1)	Foreign-Owned (Internationalized) Manufacturing Output as a Percentage of Total Foreign-Owned Output: 5 Host Countries[b] (2)	Total Internationalized Output in 16 Host Countries as a Percentage of World GDP[c] (3)	Share (%) of 16 Host Countries in World Stock of Inward FDI[d] (4)	Share (%) of Internationalized Output in World GDP: Estimated from Host-Country Side[e] (5)	Share (%) of Internationalized Output in World GDP: Estimated from Home-Country Side[f] (6)
1970						4.5
1977	1.55	65.4	2.37	(60.2)	3.9	5.4
1980	1.48	60.1	2.46	60.2	4.1	
1982						5.8
1985[g]	1.49	57.7	2.58	62.0	4.2	
1988						6.2
1990	1.88	59.6	3.15	59.5	5.3	6.7

[a]Appendix table 3C.2 for developed countries, and table 3.19 for developing countries. We use the conservative estimate from table 3C.2, assuming that only U.S. firms have minority ownership in Japan.

[b]Lipsey, Blomström, and Ramstetter (1995).

[c](Col. [1] ÷ col. [2]) × 100.

[d]United Nations (1994, annex table 3).

[e](Col. [3] ÷ col. [4]) × 100.

[f]Table 3.19.

[g]1986 for developed countries, and 1983 for developing countries.

country? Viewed from the host country, the question is, How much of production located in the host country is owned or controlled by residents of other countries?" For the world as a whole, the two views, if measured perfectly, are identical.

Using host-country data, mostly limited to manufacturing, we estimated that the share of internationalized, or affiliate, output in world production increased from 4 percent in 1977 to over 5 percent in 1990, with most of the gain taking place in the late 1980s. The affiliate share of world production estimated from home-country data rose from 4.5 percent in 1970 to 5.4 percent in 1977 and to almost 7 percent in 1990. Since home-country data require fewer assumptions to move from the sample to a world total, we would be inclined to accept them as the best estimates and treat those from the host-country side as mainly a check on the orders of magnitude involved.

The general impression of a much greater importance of internationalized output stems from the contrast between shares of such production in goods industries, particularly manufacturing, and in services. Internationalized output by U.S. and Japanese firms was almost 6 percent of world output in "industry" in 1989, but less than 0.2 percent of the output of "services." "Industry" is defined here to include manufacturing, mining, transportation, communication, public utilities, construction, and trade, and it accounted for about 35 percent of world output in 1989, down from 41 percent in 1970. "Services" accounted for 58 percent, as compared with 49 percent in 1970. Since the United States and Japan account for about three-quarters of the outward direct investment stock of the four countries for which data are available (including also Germany and Sweden), we might guess that the four countries combined account for about 7.5 percent of world output of "industry." Since the four countries own about half of the world's outward investment stock, all internationalized production amounted to something in the neighborhood of 15 percent of world "industry" output.

In the "services" sector, which covers all except agriculture and industry, the internationalized share of production for these four countries' firms was negligible, somewhere between a quarter of 1 percent and a half, but closer to a quarter, with no strong trend.

Another reason for the impression of a much greater role of internationalized or globalization is that our calculations are not intended to describe the total output of multinationals, but only the part that is outside their home countries. Most output by multinationals takes place in their home countries. For example, U.S. multinational firms produced three-quarters of their output in the United States in 1977, and a little more than that fraction in 1989. Japanese multinationals produced 84 percent of their output at home in 1980, and almost 80 percent in 1992. A very rough calculation suggests that multinationals (parents and affiliates) accounted for about 22 percent of world output both at the beginning and at the end of the 1980s.

Given all the attention that globalization has received from scholars, international organizations, and the press, these numbers are a reminder of how large a proportion of economic activity is confined to single geographical locations and home-country ownership. Internationalization of production is clearly growing in importance, but the vast majority of production is still carried out by national producers within their own borders.

Appendix A
Adjusting the MITI Survey Data on Japanese Multinationals

Estimates for Japanese parents and their foreign affiliates are based on data obtained from the Ministry of International Trade and Industry's surveys of parents and affiliates, the only source that provides estimates of production-related activities of Japanese multinationals for more than one year. The coverage of these surveys is incomplete and varies from year to year as well as from variable to variable. This appendix explains the methods used in this paper to compensate for these variations in coverage.

The coverage problems can be most clearly seen by comparing the MITI surveys with generally more comprehensive surveys by a private publishing company, Toyo Keizai (table 3A.1). The number of parents identified by MITI is usually slightly larger than the number surveyed by Toyo Keizai, but because reply rates were low, the number of replying parents is far lower. Moreover, the number of firms reporting even such a basic indicator as sales is smaller than the number of replies for several years. Since we wish to calculate value added, the fact that the number of firms reporting intermediate expenditures is smaller in many years than the number reporting sales is a concern.

For affiliates, reply rates are generally much higher than for parents, but here again the number of firms reporting sales is often lower than the number of replying firms, and the number of firms reporting intermediate expenditures is still smaller in most years (table 3A.1, note c). Moreover, although the number of affiliates to which MITI has sent out questionnaires and the number of affiliates included in the Toyo Keizai surveys were roughly equal in 1988, in subsequent years the number of affiliates to which MITI sent out questionnaires increased much more slowly than the number of affiliates in the Toyo Keizai surveys. Thus, by 1992, the number of affiliates in the Toyo Keizai surveys was 31 percent larger than the number of affiliates receiving MITI questionnaires and 2.3 times as large as the number of affiliates reporting sales to MITI. The Toyo Keizai estimates of affiliate employment are far larger than MITI estimates in the years for which comparisons are possible. One reason the Toyo Keizai estimates are higher is that they apparently cover a large num-

Table 3A.1 Japan: Comparison of MITI and Toyo Keizai Surveys

	Parent Samples (number of firms)					Affiliate Samples (number of firms)				Affiliate Employment (thousands)	
	MITI Surveys[b]				Toyo Keizai Survey Replies[d]	MITI Surveys[c]			Toyo Keizai Survey Replies[d]	MITI Surveys[c]	Toyo Keizai Surveys[d]
Fiscal Year[a]	Sent Out (1)	Replies (2)	Sales (3)	Intermediate Expenditures (4)	(5)	Sent Out (6)	Replies (7)	Sales (8)	(9)	(10)	(11)
1980	3,247	1,401	1,256	1,180	n.a.	n.a.	3,853	3,288	6,270	739	n.a.
1983	3,331	1,271	1,161	1,153	n.a.	n.a.	4,383	3,705	7,351	709	n.a.
1984	3,301	1,617	1,488	n.a.	n.a.	n.a.	4,962	4,962	7,684	926	n.a.
1985	3,385	1,413	1,293	n.a.	n.a.	n.a.	5,343	5,343	8,187	1,057	n.a.
1986	3,425	1,144	1,031	832	n.a.	7,112	4,579	4,519	8,146	962	n.a.
1987	3,708	1,718	1,511	n.a.	2,329	8,367	6,647	6,647	8,933	1,168	1,544
1988	3,525	1,771	1,606	1,441	3,165	9,576	7,544	7,544	9,859	1,326	1,672
1989	3,331	1,563	1,360	1,359	3,191	8,804	6,362	6,362	11,484	1,157	1,941
1990	3,529	1,776	1,616	1,553	3,284	10,210	7,986	7,986	12,522	1,550	n.a.
1991	3,368	1,789	1,630	1,325	3,331	10,835	8,505	7,620	13,522	1,621	2,277
1992	3,378	1,594	1,439	1,296	3,290	10,844	7,108	6,243	14,238	1,404	2,416

Sources: MITI (various years-a–c) and Toyo Keizai (various years-a–e).

[a]Fiscal years ending 31 March of the following calendar year. MITI estimates refer to the end of the fiscal year. Toyo Keizai estimates refer to the same calendar year (June–July for 1983–89, December for 1990–91, and October for 1992); figure for 1980 estimated as number of firms in June 1981 minus firms established from 1980 forward.

[b]Data refer to parent firms owning at least 10 percent of a foreign affiliate.

[c]Data refer to directly owned affiliates with 10 percent or larger Japanese ownership shares and indirectly owned affiliates that are majority owned by directly owned affiliates. Data for 1982 and 1984–85 exclude indirectly owned affiliates—indirectly owned affiliates accounted for 7 percent of the number of replying affiliates and 3 percent of affiliate employment in 1980; 9 and 5 percent, respectively, in 1983; and 8 and 4 percent, respectively, in 1986. Sample sizes for intermediate expenditures are not calculable for affiliates but, as in the case of parents, are thought to be much smaller than for sales in some years. For example, for directly owned affiliates in 1983, the sales sample was 3,368 but the intermediate expenditure sample was only 2,704.

[d]Since 1990 Toyo Keizai surveys have covered affiliates with Japanese ownership shares of 10 percent or more; before 1990 the cutoff is unclear.

ber of smaller affiliates that may be excluded from the MITI surveys.[7] The relatively stable growth rates of affiliate employment implied by the Toyo Keizai surveys are much more believable than the wild gyrations implied by the MITI surveys.

Unfortunately, the Toyo Keizai publications do not attempt to compile sales (the only production-related indicator included in these surveys). We can compare the MITI data with U.S. BEA data on Japanese affiliates operating in the United States, from surveys that are legally mandatory and adjusted to compensate for known variations in coverage. This comparison covers 22 to 27 percent of the number of Japanese affiliates abroad reporting sales and 40 to 55 percent of affiliate sales in 1983–92 (tables 3A.1, 3A.2, and 3A.4).

For sales, the variable for which coverage is among the best in the MITI surveys, MITI estimates were larger than BEA totals in 1983–84 and 1986–88, and BEA estimates were larger in other years (table 3A.2). For most years, the differences between the two estimates were under 10 percent, the exceptions being 1987 and 1990–92, with the MITI estimate being much lower in 1992. BEA numbers of affiliates were smaller than MITI's sales samples in 1983 and 1986–88, but the BEA numbers grew much faster thereafter. BEA estimates of Japanese affiliate employment were generally far larger than corresponding MITI estimates. Thus, it appears that estimates of sales are much closer in the two sources than estimates of the number of affiliates or affiliate employment.

MITI estimates of value added in Japanese affiliates in the United States are much larger than corresponding U.S. estimates of gross product originating in them, implying that MITI estimates of intermediate purchases are much lower. Moreover, although ratios of value added to sales calculated from U.S. data are relatively stable, rising slowly from 6 percent in 1980 to 13 percent in 1992, corresponding ratios calculated from MITI data varied from 15 percent to 58 percent. MITI's recently initiated business structure surveys indicate that corresponding ratios for majority-owned affiliates worldwide in 1991 (the only year available as yet) were close to the low end of the MITI estimates but slightly higher than U.S. estimates, 20 percent in all industries, 35 percent in manufacturing, and 15 percent in trade (MITI 1994). Thus, if the coverage of affiliates in the United States is representative of the MITI multinational survey coverage in general, estimates of sales appear to have been reasonably reliable in the 1980s, but poor coverage appears to have had a particularly adverse effect on more recent sales estimates, on estimates of intermediate purchases, and therefore on calculated value added.

Adjustments to the MITI estimates of sales and value added, presented in tables 3A.3 and 3A.4, attempt to compensate for (1) fluctuations in coverage over time and (2) the particularly low and variable coverage of intermediate expenditures. The first step involves adjusting the sales series to compensate

7. E.g., in 1992, average affiliate employment reported to MITI was 220 (MITI, various years-a), while the figures in appendix table 3A.1 indicate an average of 170 employees per affiliate in the Toyo Keizai sample.

Table 3A.2 **Japan: Sales and Value Added of Japanese Affiliates in the United States**

	Sales (billion yen)			Value Added (billion yen)			Value Added/Sales			
Year	All Industries	Manufacturing	Trade	All Industries	Manufacturing	Trade	All Industries	Manufacturing	Trade	No. of Affiliates, All Industries[a]
					MITI Surveys[b]					
1983	27,414	2,358	24,700	8,872	1,168	7,424	0.32	0.50	0.30	833
1984	36,781	5,660	30,136	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1985	25,199	3,862	20,654	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1986	25,969	4,845	20,600	15,060	2,989	11,691	0.58	0.62	0.57	1,107
1987	27,278	5,600	21,000	5,731	1,597	3,926	0.21	0.29	0.19	1,717
1988	31,222	7,249	22,659	4,657	2,020	2,362	0.15	0.28	0.10	1,957
1989	41,491	11,706	28,672	7,109	3,282	3,448	0.17	0.28	0.12	1,720
1990	40,071	11,196	27,459	10,516	4,539	5,024	0.26	0.41	0.18	2,070
1991	37,654	10,072	26,342	16,810	5,965	10,025	0.45	0.59	0.38	1,935
1992	31,576	9,313	20,474	15,540	5,518	8,828	0.49	0.59	0.43	1,602
					U.S. BEA Surveys[c]					
1980	17,822	844	15,918	1,050	n.a.	n.a.	0.06	n.a.	n.a.	709
1983	25,318	1,526	22,502	1,866	n.a.	n.a.	0.07	n.a.	n.a.	799
1984	34,280	2,485	29,920	2,938	n.a.	n.a.	0.09	n.a.	n.a.	833
1985	27,198	1,994	23,781	2,422	n.a.	n.a.	0.09	n.a.	n.a.	870
1986	24,462	1,754	21,620	2,014	n.a.	n.a.	0.08	n.a.	n.a.	953
1987	23,604	1,958	19,160	2,212	550	1,068	0.09	0.28	0.06	1,159
1988	30,891	3,603	23,752	3,223	1,031	1,199	0.10	0.29	0.05	1,378
1989	42,903	6,722	30,585	4,966	1,698	1,701	0.12	0.25	0.06	1,817
1990	45,114	8,656	31,504	5,001	2,127	1,531	0.11	0.25	0.05	2,233
1991	42,989	8,630	28,952	5,325	2,002	2,208	0.12	0.23	0.08	2,472
1992	41,769	8,517	27,971	5,382	2,104	2,349	0.13	0.25	0.08	3,124

Sources: MITI (various years-a, various years-b), Lowe (1990), U.S. Department of Commerce (1985b, 1990, 1992a, 1994, various years), and Zeile (1994).

[a]For MITI multinational firm surveys, number of firms reporting sales.

[b]For definitional notes, see table 3A.1.

[c]Data refer to nonbank affiliates with 10 percent or more foreign ownership and their largest ultimate beneficial owners in Japan. Value-added data refer to gross product estimates by the source. Original U.S. dollar figures converted to Japanese yen using exchange rates in the MITI multinational firm surveys.

Table 3A.3 Japan: Sales and Value Added Estimates for Japanese Parents

Year	Sales (billion yen)			Value Added[a] (billion yen)		
	All Industries	Manufacturing	Trade	All Industries	Manufacturing	Trade
				Unadjusted		
1980	184,591	79,864	94,551	42,898	37,116	4,213
1983	219,431	91,489	111,945	62,678	51,422	5,669
1984	321,584	172,747	121,143	n.a.	n.a.	n.a.
1985	272,219	114,664	126,028	n.a.	n.a.	n.a.
1986	217,855	91,544	104,722	70,778	57,098	5,785
1987	267,807	119,331	120,473	n.a.	n.a.	n.a.
1988	304,582	138,219	128,843	75,266	58,627	5,786
1989	315,548	125,004	159,502	56,922	46,803	4,958
1990	364,494	154,233	160,167	87,828	62,488	9,527
1991	363,258	151,615	158,758	152,800	79,611	34,965
1992	327,024	144,363	143,852	90,908	79,087	6,721
				Adjusted[b]		
1980	227,620	98,480	116,591	51,154	40,765	5,251
1983	279,407	116,495	142,542	65,768	50,490	6,593
1984	336,296	180,650	126,685	n.a.	n.a.	n.a.
1985	317,390	133,692	146,940	n.a.	n.a.	n.a.
1986	298,872	125,587	143,666	72,696	55,979	6,777
1987	301,680	134,424	135,711	n.a.	n.a.	n.a.
1988	317,155	143,925	134,161	72,210	58,409	6,052
1989	349,072	138,284	176,448	74,818	54,744	7,471
1990	376,041	159,119	165,241	85,154	63,970	7,935
1991	363,273	151,622	158,765	95,317	64,593	12,729
1992	352,708	155,701	155,150	82,482	67,039	7,055

Source: See tables 3A.1 and 3A.2.

Note: See table 3A.1 for definitional details.

[a]Value added estimated as sales less intermediate expenditures. For 1988 and 1990–91, intermediate expendit imports and IR = ratio of imports to intermediate expenditures. Due to apparent differences in sample sizes acro errors in the value-added calculations not present for other years.

[b]See appendix A text for details on the calculation of adjusted values.

Table 3A.4 **Japan: Sales and Value Added Estimates for Japanese Affiliates**

	Sales (billion yen)			Value Added (billion yen)			Value Added/Sales		
Year	All Industries	Manufacturing	Trade	All Industries	Manufacturing	Trade	All Industries	Manufacturing	Trade
				Unadjusted[a]					
1980	37,940	6,510	30,979	11,136	3,205	7,706	0.29	0.49	0.25
1983	49,914	7,218	41,345	17,157	3,953	12,179	0.34	0.55	0.29
1984	68,933	13,442	52,564	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1985	50,953	9,949	38,151	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1986	48,166	11,362	35,510	27,478	7,483	19,118	0.57	0.66	0.54
1987	54,809	13,060	39,877	12,673	3,747	7,963	0.23	0.29	0.20
1988	68,427	17,621	48,128	10,440	5,082	4,644	0.15	0.29	0.10
1989	93,178	22,267	66,044	16,038	6,856	7,957	0.17	0.31	0.12
1990	99,806	26,195	69,149	25,926	11,233	11,586	0.26	0.43	0.17
1991	88,737	25,365	58,337	40,887	14,984	22,851	0.46	0.59	0.39
1992	79,007	25,114	48,785	39,347	15,185	21,166	0.50	0.60	0.43
				Adjusted[b]					
1980	44,834	7,693	36,608	9,619	2,861	5,575	0.21	0.37	0.15
1983	57,392	8,300	47,539	12,891	3,178	7,675	0.22	0.38	0.16
1984	72,350	14,108	55,169	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1985	54,173	10,578	40,562	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1986	54,190	12,783	39,951	14,629	5,178	8,398	0.27	0.41	0.21
1987	55,408	13,203	40,313	11,198	4,367	5,743	0.20	0.33	0.14
1988	68,422	17,620	48,124	12,752	5,833	5,863	0.19	0.33	0.12
1989	99,224	23,712	70,330	18,881	7,942	8,906	0.19	0.33	0.13
1990	103,452	27,152	71,675	21,498	9,751	9,751	0.21	0.36	0.14
1991	94,510	27,015	62,132	23,439	10,577	11,238	0.25	0.39	0.18
1992	88,363	28,087	54,561	22,573	11,075	10,329	0.26	0.39	0.19

Source: See tables 3A.1 and 3A.2.

[a]See table 3A.1 for definitional notes regarding the multinational firm surveys. Note also that data for 1984 and 1985 exclude indirectly owned affiliates that accounted for 7 percent of all affiliate sales in 1983 and 8 percent in 1986.

[b]For details on calculation of adjusted figures see appendix A text.

for changes in coverage from year to year. To estimate the marginal effect of changes in coverage rates, worldwide affiliate sales and parent sales were estimated as functions of sales by affiliates in the United States taken from BEA data and the applicable coverage rate. The idea here is to use the strong correlations between parent sales, affiliate sales, and sales of affiliates in the United States to remove trend effects independent of variance in reply rates, and then measure the effect of changing reply rates. The resulting ordinary least squares regressions for 1980 and 1983–92 are as follows:

$$\underset{}{SP_t} = \underset{(0.69)}{-29736} + \underset{(5.60)}{4.1794}\,(SAU_t) + \underset{(3.34)}{442766}\,(NPS_t / NP_t),$$

$$\text{Adj. } R^2 = 0.920, \; DW = 0.83,$$

$$SA_t = \underset{(2.07)}{-19945} + \underset{(15.7)}{2.1625}\,(SAU_t) + \underset{(2.19)}{28653}\,(NAS_t / NA_t),$$

$$\text{Adj. } R^2 = 0.961, \; DW = 1.10,$$

where NA is number of affiliates in the Toyo Keizai surveys, NAS is number of affiliates reporting sales to MITI, NP is number of parents sent MITI questionnaires, NPS is number of parents reporting sales, SA is worldwide affiliate sales, SAU is BEA estimates of sales of Japanese affiliates in the United States, SP is parent sales, and t is a subscript indicating year t. Figures in parentheses are t-statistics. Durbin-Watson (DW) statistics are uncomfortably low, especially in the parent equation, where first-order autocorrelation is definitely indicated, but the small samples involved make it difficult to correct this problem with any degree of confidence, and these estimates are used as is.

Aggregate adjusted sales (SAADJ and SPADJ for affiliates and parents, respectively) are then calculated as the sum of reported sales and the product of the coefficient on the reply rate from the above equations and the difference between the maximum observed reply rate and the actual reply rate:

$$SAADJ_t = SA_t + (0.765 - NAS_t / NA_t)(442{,}766),$$

$$SPADJ_t = SP_t + (0.484 - NPS_t / NP_t)(28{,}653).$$

The use of the maximum observed reply rate as opposed to one (implying 100 percent coverage) reflects a primary concern with compensating for variations in coverage rates rather than for the levels of coverage rates. To obtain estimates for the manufacturing and trade sectors (sector being indicated by subscript i), sectoral shares from reported sales data are multiplied by adjusted sales estimates:

$$SAADJ_{it} = (SAADJ_t)(SA_{it} / SA_t),$$

$$SPADJ_{it} = (SPADJ_t)(SP_{it} / SP_t).$$

The second step is to calculate value added from the adjusted sales figures. Since the levels and volatility of ratios of value added to sales in the MITI data seem clearly unrealistic, adjusted value-added estimates are derived by first adjusting the ratios of value added to sales downward somewhat and reducing their volatility, and then multiplying these adjusted ratios by the corresponding adjusted sales estimates. Because the average of MITI estimates for the years 1988–90 is relatively low and closer to other corresponding estimates, this average is taken as a base, and adjusted ratios of value added to sales are calculated as an 80–20 weighted average of this base and reported ratios. The resulting calculations are as follows:

$$\mathrm{VSADJ}_{it} = 0.8(\mathrm{VSB}_{i}) + 0.2(\mathrm{VS}_{it}),$$

$$\mathrm{VADJ}_{it} = (\mathrm{VSAADJ}_{it})(\mathrm{SPADJ}_{it}),$$

where VSB is the base (average 1988–90) ratio of value added to sales (for affiliates, 0.19 in all industries, 0.34 in manufacturing, and 0.13 in trade; for parents, 0.22 in all industries, 0.40 in manufacturing, and 0.05 in trade), VADJ is adjusted value added, VS is the reported ratio of value added to sales, and VSADJ is the adjusted ratio of value added to sales.

The resulting adjusted estimates for sales and value added are thought to be more realistic than the unadjusted figures in that fluctuations due to changes in the coverage of MITI surveys are somewhat compensated for. The resulting adjusted figures are correspondingly subject to far less variation than the unadjusted values.

Finally, there is also a problem encountered when trying to calculate multinational shares of Japanese value added or sales (or total output including intermediate expenditures) at the sector level. If one calculates the ratio of parent sales to total output on a national accounts basis for the trade sector, the resulting ratios are 1.68 to 2.25 (tables 3A.3 and 3A.5). If one uses the Ministry of Finance's corporation statistics to calculate parent shares of sales, these ratios fall to the 0.29–0.40 range. In other words, either differences between the definition of total sales and total output (i.e., inventory changes) or differences in accounting by establishments (national accounts data) or enterprises (corporation and multinational firm statistics) are extremely large. Due to the control of a large number of nontrade establishments by large trading firms in Japan, the latter is probably by far the larger factor. This makes the use of the corporation statistics preferable for sectoral-level analysis, but use of these data may lead to overestimation of multinational shares because estimates of value added based on corporation statistics are below national accounts estimates of GDP.

Table 3A.5 **Japan: Sales or Total Output and Value Added**

Year	Sales or Total Output (billion yen)			Value Added (billion yen)		
	All Industries	Manufacturing	Trade	All Industries	Manufacturing	Trade
				All Corporations in Japan[a]		
1980	662,415	229,489	313,737	164,405	69,773	47,667
1983	766,836	260,240	360,230	200,482	82,230	56,508
1984	811,901	283,075	378,607	211,635	89,955	60,201
1985	857,031	295,821	392,407	231,619	95,000	62,497
1986	860,670	272,667	404,049	246,152	92,463	71,117
1987	953,937	300,878	448,820	273,814	103,733	79,388
1988	1,035,465	326,172	471,390	301,925	113,274	85,200
1989	1,093,531	345,425	484,382	315,698	122,623	83,630
1990	1,200,607	375,069	529,832	353,891	132,240	97,218
1991	1,256,101	387,860	550,597	381,881	137,005	107,446
1992	1,230,330	368,516	535,788	387,752	132,702	111,163
				National Accounts Estimates (Establishments)[b]		
1980	544,284	242,496	55,396	239,951	70,232	36,792
1983	614,674	264,895	61,900	279,169	81,416	41,774
1984	647,176	279,496	64,698	300,429	89,245	41,977
1985	674,321	287,810	65,896	320,258	94,673	42,836
1986	675,725	275,271	67,189	334,450	96,262	43,567
1987	696,821	274,715	70,158	349,516	99,297	45,540
1988	746,587	296,560	74,306	373,137	106,649	48,010
1989	810,513	322,246	78,391	398,238	114,455	50,377
1990	877,125	348,072	84,913	426,559	123,443	54,501
1991	924,561	366,078	90,286	451,873	131,336	57,830
1992	926,688	351,620	92,326	461,334	129,570	59,273

Sources: Japan, Economic Planning Agency (various years) and Japan, Ministry of Finance (various years).

[a]Data refer to fiscal years ending 31 March of following calendar year. Data in "sales or total output" columns r cost of sales plus labor costs.

[b]Data refer to calendar years. Data in "sales or total output" columns refer to total output, including intermediate prices.

Appendix B

Table 3B.1 Estimating Foreign-Owned Production in Japan, Including Minority-Owned Firms

			U.S.-Owned Affiliates in Japan						
			Sum of Employee Compensation and Net Income						
			U.S. Dollars (million)		Yen (billion)				
Year	Exchange Rate[a] (yen per U.S.$) (1)	Value Added in Foreign Majority-Owned Firms[b] (billion yen) (2)	Total[c] (3)	Majority Owned[c] (4)	Total (5)	Majority Owned (6)	Minority Owned (7)	Ratio: Total to Majority Owned (3)/(4) (8)	Gross I of Ma Ow (billion (9
1977	268.51	2,045	5,523	1,522	1,483	409	1,074	3.629	3,
1978	210.44	2,041					(1,108)	(3.547)	
1979	219.14	1,988					(1,141)	(3.464)	
1980	226.74	2,245					(1,175)	(3.382)	
1981	220.54	2,725					(1,209)	(3.300)	
1982	249.08	2,843	7,236	2,249	1,802	560	1,242	3.217	4,
1983	237.51	3,812	8,300	2,876	1,971	683	1,288	2.886	
1984	237.52	3,262	8,467	3,247	2,011	771	1,240	2.608	
1985	238.54	2,572	9,476	3,511	2,260	838	1,423	2.699	
1986	168.52	4,075	13,478	5,597	2,271	943	1,328	2.408	
1987	144.64	4,136	15,487	6,991	2,240	1,011	1,229	2.215	
1988	128.15	4,627	18,830	8,532	2,413	1,093	1,320	2.207	
1989	137.96	4,757	19,949	9,042	2,752	1,247	1,505	2.206	14,

(continued)

Table 3B.1 (continued)

			U.S.-Owned Affiliates in Japan						
			Sum of Employee Compensation and Net Income						
			U.S. Dollars (million)		Yen (billion)				
Year	Exchange Rate[a] (yen per U.S.$) (1)	Value Added in Foreign Majority-Owned Firms[b] (billion yen) (2)	Total[c] (3)	Majority Owned[c] (4)	Total (5)	Majority Owned (6)	Minority Owned (7)	Ratio: Total to Majority Owned (3)/(4) (8)	Gross P of Maj Own (billion (9
1990	144.79	4,778	20,506	9,209	2,969	1,333	1,636	2.227	14,
1991	134.71	5,131	22,707	10,629	3,059	1,432	1,627	2.136	16,
1992	126.65	4,497	21,673	10,851	2,745	1,374	1,371	1.997	15,
1993	111.20		24,396	12,688	2,713	1,411	1,302	1.923	17,

Note: Numbers in parentheses were interpolated on a straight line.

[a]International Monetary Fund (1995).

[b]Lipsey, Blomström, and Ramstetter (1995, table B-7).

[c]U.S. Department of Commerce (1981, 1985a, 1992b) and corresponding annual volumes.

[d]Mataloni and Goldberg (1994) and Mataloni (1995).

[e]Assuming the same ratio of total to majority-owned in all countries as in United States.

[f]Assuming only U.S. firms had minority holdings.

Table 3B.2 Estimating Foreign-Owned Manufacturing Production in Japan, Including Minority-

			U.S.-Owned Manufacturing Affiliates in Japan						
			Sum of Employee Compensation and Net Income						
			U.S. Dollars (million)		Yen (billion)				
Year	Exchange Rate[a] (yen per U.S.$) (1)	Value Added in Foreign Majority-Owned Firms[b] (billion yen) (2)	Total[c] (3)	Majority Owned[c] (4)	Total (5)	Majority Owned (6)	Minority Owned (7)	Ratio: Total to Majority Owned (3)/(4) (8)	Gross P of Ma Owr (billion (9
1977	268.51	1,548	2,810	952	755	256	499	2.952	1,4
1978	210.44	1,604					(594)	(3.134)	
1979	219.14	1,548					(689)	(3.316)	
1980	226.74	1,663					(784)	(3.499)	
1981	220.54	2,178					(879)	(3.681)	
1982	249.08	2,183	5,277	1,366	1,314	340	974	3.863	2,1
1983	237.51	3,188	5,513	1,575	1,309	374	935	3.500	
1984	237.52	2,762	6,087	1,988	1,446	472	974	3.062	
1985	238.54	2,159	6,819	2,113	1,627	504	1,123	3.227	
1986	168.52	3,414	8,851	3,210	1,492	541	951	2.757	
1987	144.64	3,455	10,728	4,226	1,552	611	941	2.539	
1988	128.15	3,701	12,575	4,701	1,611	602	1,009	2.675	

(*continued*)

Table 3B.2 (continued)

			U.S.-Owned Manufacturing Affiliates in Japan						
			Sum of Employee Compensation and Net Income						
			U.S. Dollars (million)		Yen (billion)				
Year	Exchange Rate[a] (yen per U.S.$) (1)	Value Added in Foreign Majority-Owned Firms[b] (billion yen) (2)	Total[c] (3)	Majority Owned[c] (4)	Total (5)	Majority Owned (6)	Minority Owned (7)	Ratio: Total to Majority Owned (3)/(4) (8)	Gross P of Maj Own (billion (9
1989	137.96	3,852	13,450	5,147	1,856	710	1,146	2.613	7,6
1990	144.79	3,674	13,867	5,090	2,008	737	1,271	2.724	7,3
1991	134.71	3,882	14,384	5,680	1,938	765	1,173	2.532	7,9
1992	126.65	3,463	13,418	5,686	1,699	720	979	2.360	7,8
1993	111.20		14,896	6,597	1,656	734	922	2.258	8,9

Note: Numbers in parentheses were interpolated on a straight line.

[a]International Monetary Fund (1995).

[b]Lipsey, Blomström, and Ramstetter (1995, table B-7).

[c]U.S. Department of Commerce (1981, 1985a, 1992b) and corresponding annual volumes.

[d]Mataloni and Goldberg (1994) and Mataloni (1995).

[e]Assuming the same ratio of total to majority-owned in all countries as in United States.

[f]Assuming only U.S. firms had minority holdings.

Appendix C

Table 3C.1 **Share of Foreign-Owned Production in Seven Developed Countries in Their Real Ou Minority Ownership in Japan**

Year[a]	Omitting Minority Ownership in Japan			Assuming Minority Ownership in Japan Only by U.S. Multinationals		
	Seven Countries	Six Countries	Five Countries	Seven Countries	Six Countries	Five Countries
			Share (%) of Foreign-Owned Production in Real Output[b]			
1977	3.28	3.10	3.12	3.50	3.33	3.35
1979	(3.59)[c]	3.39	3.42	(3.79)[c]	3.60	3.63
1980	(3.74)[d]		3.56	(3.93)[d]		3.76
1981			3.77			3.97
1982			3.67			3.88
1985			3.65			3.83
1986	3.76	3.64	3.65	3.91	3.80	3.81
1989		4.24	4.24		4.38	4.38
1990	(4.34)[e]	4.20	4.21	(4.47)[e]	4.35	4.35
1991	(4.34)[e]	4.21	4.21	(4.47)[e]	4.35	4.35
			Share (%) of Foreign-Owned Manufacturing Production in Real Ou			
1977	2.47	2.34	2.35	2.55	2.42	2.43
1979		2.47	2.48		2.57	2.58

(continued)

Table 3C.1 (continued)

	Omitting Minority Ownership in Japan			Assuming Minority Ownership in Japan Only by U.S. Multinationals		
Year[a]	Seven Countries	Six Countries	Five Countries	Seven Countries	Six Countries	Five Countries
1980	(2.49)[c]	2.35	2.37	(2.60)[c]	2.46	2.47
1981	(2.58)[d]		2.45	(2.70)[d]		2.57
1982			2.31			2.44
1985			2.33			2.45
1986	2.46	2.38	2.36	2.55	2.47	2.46
1989			2.85			2.95
1990	(2.94)[e]	2.83	2.81	(3.03)[e]	2.93	2.92
1991	(2.87)[e]		2.75	(2.95)[e]		2.84

Sources: Text tables, appendix B, and Penn World Tables (5.6).

Note: Seven countries are Australia, Japan, Norway, Sweden, the United Kingdom, the United States, and Cana
exclude Australia and Sweden.

[a]In 1977, average of 1974 and 1979 for Canada. In 1978, U.K. figure for 1977. In 1979, figure for Sweden from
figure for 1981. In 1987, figure for Sweden from 1986. In 1988, figure for Norway from 1987. In 1991, figures fo

[b]Real GDP in current international prices.

[c]Extrapolated from 1977 by figures for six countries.

[d]Extrapolated from 1979 by figures for five countries.

[e]Extrapolated from 1986 by figures for five countries.

Table 3C.2 Share of Foreign-Owned Production in Seven Developed Countries in World Output Minority Ownership in Japan

Year[a]	Omitting Minority Ownership in Japan: Seven Countries	Six Countries	Five Countries	Assuming Minority Ownership Only by U.S. Multinationals: Seven Countries	Six Countries	Five Countries
			Share (%) in World Output[b] of Foreign-Owned Production			
1977	1.22	1.12	1.11	1.31	1.21	1.19
1979	(1.33)[c]	1.22	1.21	(1.41)[c]	1.30	1.29
1980			1.22			1.29
1981			1.30			1.37
1982			1.25			1.32
1985			1.26			1.32
1986	1.38	1.29	1.27	1.43	1.35	1.33
1989		1.50	1.48		1.55	1.53
1990	(1.57)[d]	1.48	1.45	(1.62)[d]	1.53	1.50
1991	(1.55)[d]	1.45	1.43	(1.59)[d]	1.50	1.48
			Share (%) in World Output[b] of Foreign-Owned Manufacturing Prod			
1977	0.93	0.85	0.84	0.96	0.88	0.87
1979		0.89	0.88		0.93	0.92
1980	(0.90)[c]	0.82	0.81	(0.93)[c]	0.86	0.85
1981			0.85			0.89
1982			0.79			0.83
1985			0.80			0.84

(*continued*)

Table 3C.2 (continued)

	Omitting Minority Ownership in Japan			Assuming Minority Ownership Only by U.S. Multinationals			Assuming Minority Ownership by Foreign Multinationals in Same Proportion to Majority Ownership as for United States		
Year[a]	Seven Countries	Six Countries	Five Countries	Seven Countries	Six Countries	Five Countries	Seven Countries	Six Countries	Five Countries
1986	0.90	0.84	0.82	0.93	0.88	0.86	1.04	0.98	0.96
1989			0.99			1.03			1.12
1990	(1.06)[d]	0.99	0.97	(1.10)[d]	1.03	1.01	(1.18)[d]	1.12	1.09
1991	(1.02)[d]		0.93	(1.05)[d]		0.96	(1.13)[d]		1.04

Sources: Text tables, appendix B, and Penn World Tables (5.6).

Note: Seven countries are Australia, Japan, Norway, Sweden, the United Kingdom, the United States, and Canada. Six countries exclude Australia. Five countries exclude Australia and Sweden.

[a]In 1977, average of 1974 and 1979 for Canada. In 1978, U.K. figure for 1977. In 1979, figure for Sweden from 1978. In 1980, U.K. figure for 1979. In 1982, U.K. figure for 1981. In 1987, figure for Sweden from 1986. In 1988, figure for Norway from 1987. In 1991, figures for both Norway and Sweden from 1990.

[b]Real GDP in current international prices.

[c]Extrapolated from 1977 by figures for six countries.

[d]Extrapolated from 1979 by figures for five countries.

[e]Extrapolated from 1986 by figures for five countries.

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Comment Raymond J. Mataloni, Jr.

This paper by Blomström, Lipsey, and Ramstetter examines the changing role of multinational companies (MNCs) in the world economy using time-series estimates of their production of goods and services (MNC gross product). The first half of the paper examines MNC production from the home-country perspective by measuring production shares for home-country-based MNCs; these include parent company shares of home-country GDP, foreign affiliate shares of foreign-host-country GDP, and whole MNC shares of gross world product. The second half examines MNC production from the host-country perspective, calculating the foreign-country-based MNC share of host-country GDP. The research is significant in both its scope and methods; the authors have compiled an extensive collection of data on MNC production in terms of both the number of countries and the number of years covered, and they use a variety of ratios to uncover meaningful trends.

My comments will deal primarily with the share of world production accounted for by home-country MNCs, first because it is the broadest measure,

Raymond J. Mataloni, Jr., is an economist in the research branch of the International Investment Division, Bureau of Economic Analysis, U.S. Department of Commerce.

but more important because it deals with a central theme of this conference: How do you measure the competitiveness of a nation's companies in an increasingly integrated global economy? This share should reflect the "competitiveness" of home-country MNCs, in the sense that it reflects the quality of their geographically mobile corporate assets (such as management, production techniques, and designs); however, because all world markets are not equally accessible for a given country's firms, the share will also be influenced by barriers to direct investment and the additional costs to foreign versus domestic production. This ownership-based measure of a nation's companies' standing in the global economy differs from the other ownership-based measure presented at this conference (the Baldwin and Kimura framework) because it encompasses MNC production for all customers—home-country and foreign alike.

The paper presents the home-country MNC share of world production for two countries (the United States and Japan) because they are the only ones for which all of the necessary data are available. (No other countries are known to produce estimates of parent company production.) Over the period examined—roughly speaking, the 1980s—there were markedly different changes in this share for the two groups of MNCs. The share of world production accounted for by Japanese MNCs increased from 1.5 to 4.1 percent while that accounted for by U.S. MNCs *declined* from 8.7 to 6.7 percent. Although it is quite possible that these divergent changes partly reflect changes in the relative competitiveness of Japanese and U.S. MNCs, there are other factors that may have contributed. The bulk of my comments will deal with those other factors and I hope, in doing so, will offer possible future improvements to this measure.

The first factor, other than changes in competitiveness, is the convention of introducing all existing domestic operations to the parent company universe once a company undertakes its first foreign direct investment. When a large domestic company suddenly becomes a multinational by establishing as little as one foreign affiliate, it usually causes a sizable increase in the aggregate parent company data and only a minor (if not negligible) increase in the aggregate foreign affiliate data. For example, suppose that a large U.S. company such as General Motors were a purely domestic manufacturer and that it had U.S. production valued at $50 billion. If GM suddenly became a U.S. parent by establishing a Canadian affiliate with production valued at $100 million, U.S. MNC gross product would be increased by $50.1 billion, of which only $100 million (or well under 1 percent) reflected an actual expansion of production. Thus large changes can occur in aggregate MNC production data that have little to do with actual expansion—or heightened competitiveness—of given MNCs.

It is likely that the "new parent company" effect had a much greater impact on the Japanese MNC data than on the U.S. MNC data. The 1980s was a period of great expansion in Japanese direct investment abroad and was accompanied by a rise in the number of Japanese parent companies. During 1980–88, the number of Japanese parent companies showed a net increase of 210 companies (up 12 percent). By comparison, the U.S. parent company universe was much more stable, showing a net increase of only 71 companies (up 3 percent) during 1982–89. Perhaps consequently, Japanese parent companies accounted for the bulk (92 percent) of the growth in the share of world production accounted for by Japanese MNCs. In fact, had the Japanese parent share of worldwide GDP remained unchanged, while the Japanese foreign affiliate share increased as it did, the share of world production accounted for by Japanese MNCs would have only increased marginally (from 1.5 to 1.7 percent). To the extent that the rise in Japanese parent company production reflected additions to the parent company universe rather than expansion by existing parent companies, the rise in the Japanese MNC share of world production is unrelated to heightened competitiveness of given Japanese MNCs.

The phenomenon of new MNCs causing large increases in the parent company data, by bringing well-established domestic operations into the MNC universe, can cause analytical problems that cannot readily be controlled, or adjusted, for by data users. Any solution (if one exists) must come from the data producers.

Exchange rate changes are the second factor, other than rising competitiveness, that may have significantly boosted the Japanese MNC share of world production (measured in U.S. dollars) during the 1980s. The home-country MNC shares of world production were calculated in U.S. dollars. During the period for which the Japanese shares were calculated—1980 to 1988—the Japanese yen appreciated 62 percent relative to the U.S. dollar. Because the yen's appreciation was significantly greater against the dollar than against other foreign currencies, it boosted the dollar value of both Japanese parent production (translated from yen to dollars) and Japanese foreign affiliate production (translated from foreign currency to yen to dollars). Because Japanese parents accounted for 93 percent of Japanese MNC production worldwide in 1988, the exchange rate effect on the dollar value of their production alone would have increased the dollar value of Japanese MNC production by roughly 58 percent (93 percent of 62 percent).

During the roughly comparable period for which the U.S. shares were calculated—1982 to 1989—the dollar depreciated about 20 percent against other currencies, on average, which boosted the dollar value of U.S. foreign affiliate production. However, because foreign affiliates accounted for only 23 percent of U.S. MNC production worldwide in 1989, the exchange rate changes increased the dollar value of U.S. MNC production by only 5 percent, roughly (23 percent of 20 percent).

There are perhaps two ways that the comparison of Japanese and U.S. MNC shares of world production can be made more reflective of actual changes in the underlying competitiveness of those companies. First, to exclude the effects of exchange rate changes, the shares could be computed in base-period exchange rates. Researchers in the International Investment Division of the Bureau of Economic Analysis (BEA) may eventually be able to produce such estimates for U.S. MNCs. We are currently studying the effects of exchange rate (and price) changes on U.S. MNC gross product and evaluating the utility of developing alternative measures that exclude the effects of these changes. Second, it may be possible to exclude the effects of new parent companies entering the MNC universe. The most restrictive solution would be to exclude parent companies from the analysis and to compare the foreign affiliate production shares of world GDP excluding the home country. Another possible solution would be to produce a subset of data for "well established" MNCs and to restrict the analysis to this group. (Obviously, this could be done only with the cooperation of the statistical agencies that produce the data.) Neither of these "solutions" is perfect in that something is lost for whatever is gained; in the first case, the parent company perspective is lost, and in the second, the meaningful effects of new MNCs on the foreign affiliate data are lost.

In addition to the statistical issues just mentioned, there may also be a conceptual limitation to the MNC world production shares. Despite growing openness in the world economy, MNCs retain a competitive advantage at home. They can be shielded from cross-border foreign competition through tariff or nontariff barriers and from local foreign competition through explicit barriers to foreign direct investment or less tangible barriers such as language and cultural differences or restrictive market structures (such as the Japanese *keiretsu* system). These advantages could have a major effect on the MNC world production shares because an overwhelming share of global MNC production occurs in the home country (77 percent for U.S. MNCs in 1989 and 93 percent for Japanese MNCs in 1988). Therefore, when examining the world production shares for any two countries' MNCs, it is important to consider the relative openness of their domestic markets.

I would like to end by noting steps that BEA has taken to maintain and I hope expand its MNC gross product estimates in order to facilitate this type of research. Since the release, in the February 1994 *Survey of Current Business*, of the U.S. MNC gross product estimates used in this paper, the bureau has released revised 1991 estimates of gross product by majority-owned foreign affiliates in the June 1994 *Survey*, as well as revised 1992 and preliminary 1993 estimates in the June 1995 *Survey*. In addition, annual estimates of U.S. parent company, and thus worldwide U.S. MNC, gross product may soon be available. Those estimates are currently available only in benchmark survey years (the last of which covered 1989) because the necessary data items are not collected in the annual surveys. The bureau has proposed adding the necessary data items to its annual surveys following the 1994 benchmark survey. If these changes are approved, U.S. parent, foreign affiliate, and worldwide U.S. MNC gross product will be available annually from 1994 forward. Worldwide U.S. MNC gross product estimates are an important addition to the statistical information on MNCs that can enhance our understanding of direct investment, the operations of multinational companies, and the relevance of geography-based and ownership-based measures of international transactions.

4 Accounting for Outward Direct Investment from Hong Kong and Singapore: Who Controls What?

Linda Low, Eric D. Ramstetter, and
Henry Wai-Chung Yeung

4.1 Introduction

Hong Kong and Singapore provide a unique opportunity to examine the implications of different methods of classifying investments by multinational corporations. On the one hand, classifying investments by country of ownership, that is, by country of the owner of the investing parent firm, has gained increasing acceptance and is now widely used in the compilation of U.S. and Singaporean data, for example. This method differs from classification by country of capital source when the investing firm is owned by a firm from a country other than the country of capital source and seems clearly advantageous when, for example, investments are channeled through holding companies in tax havens like the Netherlands Antilles and the Cayman Islands. In Hong Kong and Singapore, a significant amount of investment is also channeled from foreigners through local holding companies to other foreign countries. In these two economies, however, there is also a large amount of outward investment made by foreign-controlled companies that have long histories in one or both of these economies. Moreover, such firms are often largely controlled and operated by long-term residents of the host economy who are empowered to take a wide range of decisions, including decisions to invest abroad. These characteristics, combined with the increasing sophistication of local firm management in each of these host economies, mean that foreign-controlled overseas investors may

Linda Low is associate professor of business policy at the National University of Singapore. Eric D. Ramstetter is research professor at the International Centre for the Study of East Asian Development, Kitakyushu, Japan. Henry Wai-Chung Yeung is lecturer in the department of geography at the National University of Singapore.

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sometimes have more in common with locally controlled overseas investors than with their foreign parents. One possible implication of such behavior is that accounting by country of ultimate beneficial owner may be less enlightening than accounting by geographic source of investment in some cases.

The purpose of this paper is thus to illustrate, by examining the Hong Kong and Singapore examples, the nature of the problems encountered when trying to decide how to classify foreign investors by ownership. The paper outlines the rationales behind various classification rules (section 4.2) and summarizes the published information on outward investments from Hong Kong and Singapore by ownership (section 4.3). It then examines several cases of outward investment by foreign-controlled firms from these economies (section 4.4) and summarizes the major results that emerge (section 4.5).

4.2 Economics and Accounting for Sources of Foreign Direct Investment

What must be considered when foreign direct investment (FDI) is classified by its sources, and what are the implications of various classification schemes? Broadly stated, there are two primary ways of classifying FDI by source, classification by country of capital source and classification by country of ownership. Classification by country of capital source may be viewed as having its logical basis in international economics, which has emphasized the importance of cross-border transactions, especially international trade. Moreover, accounting by country of capital source is the traditional way in which international transactions have been handled in the balance of payments. The advantages of this accounting method include its suitability for a focus on the relationships among international transactions and economic activity (e.g., employment) in a specific location and its relative ease of implementation, as one needs only to measure cross-border transactions. On the other hand, there are also several drawbacks, the most important of which are difficulties encountered when a large amount of entrepôt activity is involved. In this context, accounting for the large amounts of outward investment from so-called paper companies in tax havens is the entrepôt activity of primary concern. However, the principal question involved in accounting for any entrepôt activity is the same: Just where is it most reasonable to view a given activity, be it trade or investment, as originating?

Accounting by country of ownership is a method of accounting that has been devised primarily as a means of dealing with the problem of entrepôt investments. Indeed, in its simplest form, accounting by country of ownership can be thought of as a means of understanding sometimes large outward investments from relatively small tax havens and is based on the premise that it makes little sense to attribute such investments to the tax havens themselves. Although the distinction may not be very important economically in the cases of portfolio investments, in the case of direct investments it is potentially significant. FDI is distinguished from portfolio investment in that it implies a greater degree of foreign control and in the case of FDI, most of the economic effects of that investment are thought to result, not from the capital flow involved, but from the transfer of knowledge-based, intangible assets (e.g., production technology, marketing networks, management know-how, and other similar assets) that accompanies the capital flow.[1] If the nature of these intangible assets depends on the country of the investing parent firm, it then becomes important to establish the source of investment because investments from different home economies may be expected to have different characteristics.[2] Correspondingly, in relatively simple cases, for example when a 100 percent U.S.-owned firm in the Cayman Islands undertakes an investment in Thailand, for most purposes it is clearly more reasonable to attribute such investment to the country of the owner than to the geographic source. However, this accounting can soon become quite complicated, especially in highly developed entrepôt centers like Hong Kong and Singapore, and this paper seeks to illuminate some of the gray areas involved in such cases.

One of the gray areas involves multiple ownership. For example, in Hong Kong and Singapore there are several cases of outward investment by firms that are the result of joint ventures between firms from two or more home economies. Furthermore, these joint ventures often involve several partners, none of which has a majority holding. In such cases, it is clearly impossible to unambiguously classify such FDI by country of ultimate beneficial owner.[3] A second gray area surrounds the issue of management control. In sophisticated entrepôts like Hong Kong and Singapore, one rarely sees simple entrepôt investments. Much of the reason for this is that high costs of doing business in these two city-states make it relatively expensive to establish and maintain paper companies in these two economies. On the other hand, firms in these economies, both local and foreign, are often very sophisticated, and there can be large benefits from entrepôt investment that involves a crucial resource contribution from the affiliate through which the investment is being conducted. At the extreme, such entrepôt investments may be entirely planned and managed by the staff of the affiliate with minimal assistance from the company's foreign parent. In such cases, the distinction between geography-based and ownership-based classifications may become clouded because the characteristics of the geographic source of investment may have more bearing on the nature of intangible assets transferred through such investments than do the characteristics of the ultimate parent firm. On the other hand, even if a high degree

1. See Caves (1982), Dunning (1993), and Markusen (1991), among others, for related theoretical analyses.

2. E.g., Kojima (1990) and Ozawa (1979) have argued that Japanese FDI is different from U.S. and European investments in a number of ways.

3. Moreover, given the international convention of defining FDI as a foreign investment where foreign ownership shares exceed a given minority percentage (usually 10 to 25 percent), there is substantial potential to double count such investments, attributing them to more than one home economy.

of autonomy is observed in the investing firm, this autonomy may only be a result of corporate organizational strategy, and one may argue that it is still preferable to classify such investments by country of ultimate beneficial owner.

In any case, the general lack of empirical analysis of this topic makes it of some interest to evaluate (1) how much of the outward FDI from Hong Kong and Singapore is by foreign-controlled firms and (2) how much of the outward FDI by foreign-controlled firms is by firms that exhibit a good deal of local control.

4.3 An Overview of Outward Direct Investment from Hong Kong and Singapore

According to traditional geography-based accounting, Hong Kong and Singapore were rather minor sources of the world's outward FDI flows throughout the 1980s, though they were among the major investors from the developing world. Between 1981–84 and 1988–90, the world experienced a more than fivefold increase in average annual FDI outflows, with shares of Asian economies rising from 13.8 to 24.8 percent (table 4.1). Japan and Taiwan accounted for the bulk of this increase; the combined shares of the two economies rose from 11.5 to 22.2 percent. Shares for Hong Kong and Singapore were larger than those for most other developing economies and regions as early as 1981–84 (1.2 and 0.3 percent, respectively) and remained rather stable throughout this period. Hence the absolute level of outward FDI flows from these economies increased markedly in this period.[4] In more recent years, Hong Kong has seen its share increase from 1.4 percent in 1988–90 to 5.3 percent in 1991–93, mainly as a result of its large contributions to the FDI boom in China. Singapore's outward FDI flows and shares of the world total have actually declined somewhat in this recent period. In summary, Hong Kong and Singapore were the among first Asian countries outside of Japan to make substantial outward investments, and high levels of FDI from these economies, combined with rapid growth in outflows from Korea and Taiwan, have made Asia's newly industrializing economies (NIEs) an increasingly important source of FDI in recent years.

4.3.1 Hong Kong

In view of Hong Kong's rather large outward FDI, it is perhaps surprising that the Hong Kong government does not keep any comprehensive records on outward FDI. Thus, before trying to evaluate how much of Hong Kong's outward FDI is undertaken by foreign-controlled firms, it is first necessary to esti-

4. Since, as noted in table 4.1, 1981–84 figures for Hong Kong exclude investments in China, the growth of the Hong Kong share is exaggerated somewhat. Note that this is also true for Malaysia, but China's share of Malaysia's FDI is much smaller than its share of Hong Kong's FDI.

Table 4.1 Estimated Outward Flows of Direct Foreign Investment by Investing Economy

Investing Economy	1981–84	1985–87	1988–90	1991–93
World	41,610	97,061	214,022	198,506
Africa	289	105	81	120
Asia	5,743	16,161	53,073	37,094
Japan	4,755	13,483	42,140	20,573
Asian NIEs	741	2,130	9,809	14,368
Hong Kong	489	1,529	3,090	10,504
Korea	88	109	425	1,153
Singapore	119	208	856	653
Taiwan	46	283	5,438	2,058
Other Asia	246	548	1,124	2,153
China	68	574	820	1,638
Malaysia	178	−88	211	344
Pakistan	−1	3	19	−6
Sri Lanka	0	1	2	5
Thailand	2	57	71	172
Europe	23,986	52,074	123,745	108,568
Latin America	245	325	687	1,374
Middle East	197	411	668	1,371
North America	10,117	24,312	31,800	48,944
Oceania	1,034	3,672	3,968	1,034

Sources: Data come from International Monetary Fund (various years) balance-of-payments data or are adjusted to be, in principle, consistent with those data. For Thailand, 1993 data come from Thailand, Bank of Thailand (various years). For Hong Kong and Malaysia, estimates are based on data from selected recipients of outward FDI from these economies (see table 4.2). For these two countries, note that 1981–84 figures exclude FDI in China, while figures for subsequent years include it; this exclusion is large for Hong Kong but not large for Malaysia. In any case, figures for both these economies are underestimates as FDI in only a few selected host economies is covered.
Note: Figures are in millions of U.S. dollars.

mate the magnitude of Hong Kong's outward FDI. To estimate the size of total outward FDI from Hong Kong, we have collected data on inward FDI from nine of the major recipients of Hong Kong's outward FDI. Since definitions differ greatly among host countries, an attempt has been made to adjust the data to be consistent, in principle, with balance-of-payments estimates of FDI flows, such as those presented in table 4.1 (see table 4.2 for details). According to these estimates, since the mid-1980s China has emerged as by far the largest host to Hong Kong's FDI, its share of stocks in the nine economies rising from 9 percent in 1984 to 54 percent in 1988 and 75 percent in 1993. Viewed from the Chinese side, Hong Kong's share of total inward FDI stocks in China rose from 11 percent in 1984 to 49 percent in 1988 and 61 percent in 1993.

Note also that there is significant investment from China to Hong Kong, with stocks of Chinese FDI in Hong Kong's manufacturing industries alone rising from $365 million (U.S. dollars) at year-end 1985 to $534 million at year-end 1992, these amounts representing 18 and 11 percent, respectively, of the total FDI stocks in Hong Kong's manufacturing.[5] Furthermore, it seems likely that Chinese investments in Hong Kong's service industries are several times larger than investments in manufacturing, though we have no hard figures to support this assertion. The observation of significant Chinese FDI in Hong Kong is consistent with the often-heard assertion that much of what the Chinese record as FDI from Hong Kong is in fact investment originating in local Chinese firms but circulated through Hong Kong in order to benefit from the incentives offered to foreign investors. In this respect, Hsueh and Woo (1991, 484; see also Shih 1989) indicate that at least 40 percent of Hong Kong's investment in China is from China-involved companies in Hong Kong and that China's banking groups are a large source of this investment. Moreover, there is also significant indirect FDI in China by foreign-controlled firms in Hong Kong, with Wong, Chen, and Nyaw (1991, xxix) citing Chinese figures that 30 percent of Hong Kong's FDI is of foreign origin. Although certainly not comprehensive, these figures suggest that accounting by country of ultimate beneficial owner would substantially reduce estimates of Hong Kong's FDI in China.

Similarly, indirect FDI through Hong Kong is also an important element of Hong Kong's FDI in other economies. Table 4.2 indicates that after China, Singapore was the second largest host to Hong Kong FDI in 1993, followed by the United States, Malaysia, Thailand, Indonesia, and Taiwan. Stocks were much smaller in the Philippines and Korea and even smaller in most other host economies for which spotty information was obtained.[6] This ordering represents a change from 1984, when Malaysia was the largest host, followed by Singapore and more distantly by the United States. In other words, these estimates indicate that Singapore and Malaysia, and to a lesser extent the United States, have historically been the most important destinations of Hong Kong's FDI, while Thailand and Indonesia, as well as China, have been more important in recent years.[7]

Some of the earliest outward investment from Hong Kong occurred in the nineteenth century when some British-controlled banks in Hong Kong extended their operations to Southeast Asia in order to serve increasing British

5. Data on FDI stocks come from Hong Kong, Industry Department (1993) and are translated into U.S. dollars using end-of-period exchange rates from International Monetary Fund (1995).

6. The only other host economies in which substantial FDI stocks from Hong Kong are known to exist are Canada ($1,261 million in 1990) and Australia ($556 million in 1990; International Monetary Fund 1995; United Nations 1993, 1994). In the United Kingdom, FDI stocks from developing Asian economies rose from $1,712 million in 1987 to $3,771 million in 1991 (United Kingdom, Central Statistical Office 1991), and we suspect that a substantial portion of this FDI is from Hong Kong. Japanese figures on approved FDI also indicate rather large FDI stocks from Hong Kong ($613 million as of 31 March 1993), but on a worldwide basis, actual stocks at year-end 1992 were only 58 percent of total approved stocks as of 31 March 1993, so actual FDI stocks are likely much smaller than approved stocks (International Monetary Fund, various years; Japan, Ministry of Finance 1993).

7. For details on Hong Kong's investment in Southeast Asia, see Yeung (1994, 1995, 1996).

Table 4.2 Estimated Flows and Stocks of FDI from Hong Kong to Selected Host Economies

Host	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
				Stocks of FDI from Hong Kong (million U.S. $)						
Subtotal	3,832	4,692	6,036	8,420	11,113	14,509	17,689	22,171	31,827	49,200
China	341	1,151	2,284	3,882	5,978	8,055	9,969	12,456	20,269	36,684
Indonesia	275	272	298	337	393	459	632	876	1,192	1,442
Korea	31	38	46	86	104	116	131	137	150	162
Malaysia	1,208	1,308	1,491	1,370	1,322	1,464	1,510	1,938	2,429	2,186
Philippines	43	48	48	67	126	163	198	239	253	301
Singapore	986	881	765	1,000	1,197	1,480	1,806	2,127	2,568	3,016
Taiwan	162	181	214	301	418	585	722	825	950	1,070
Thailand	213	236	273	304	414	637	911	1,365	1,937	2,109
United States	574	576	617	1,073	1,161	1,549	1,808	2,210	2,078	2,229
				Hong Kong's Share of Total FDI Stocks (%)						
Subtotal	2.3	2.5	2.7	2.9	3.0	3.2	3.4	4.0	5.3	7.4
China	11.1	24.4	34.6	43.6	49.4	52.0	52.5	53.3	59.0	60.7
Indonesia	9.2	8.2	8.3	8.5	8.7	8.8	10.0	11.2	12.5	12.5
Korea	2.8	2.9	2.6	3.6	3.2	2.9	2.8	2.4	2.4	2.4
Malaysia	13.5	13.6	14.8	13.0	11.8	11.3	9.9	10.1	10.2	7.8
Philippines	5.6	6.1	5.3	5.5	5.9	6.0	6.1	6.3	6.3	6.3
Singapore	10.0	8.1	6.1	6.5	6.3	6.7	6.6	6.6	6.6	6.6
Taiwan	11.2	10.1	10.1	10.6	11.0	10.8	10.7	10.3	10.7	10.9
Thailand	9.5	9.9	10.2	10.1	10.1	10.8	10.8	13.1	15.4	15.0
United States	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5

Sources: China, State Statistical Bureau (various years), Hill (1988, 1991), Indonesia, Bank Indonesia (various years), Indonesia, BKPM (1993), International Monetary Fund (various years, 1995), Korean Foreign Trade Association (1992), Malaysia Industrial Development Authority (various years), Malaysia, Ministry of Finance (various years), Pangestu (1991), Philippines, Central Bank of the Philippines (various years), Republic of China, Central Bank of China (various issues), Republic of China, Investment Commission (1993, various years), Samudram (1995), Singapore, Department of Statistics (1993a, 1994), Thailand, Bank of Thailand (various years), U.S. Department of Commerce (1990, 1994), Zhang (1993).

Notes: In principle, estimates are obtained by first calculating total FDI flows and stocks, where stocks are defined as cumulative flows from 1970 forward. Second, Hong Kong shares are multiplied by these totals to obtain a proxy for FDI from Hong Kong that is in principle consistent with balance-of-payments estimates. Note, however, that calculation methods differ significantly among host economies. Contact the authors for more details.

business involvement in these Southeast Asian economies. In more recent years, Hong Kong has also been a springboard for investment by foreign-controlled companies in Southeast Asia as well as in China. One indication of this is the fact that a large number of firms have chosen Hong Kong as headquarters for their Asian operations.[8] A more concrete indication of the extent to which Hong Kong's FDI in Southeast Asia is indirect FDI can be obtained

8. According to a small-scale survey by the Industry Department in 1985, 163 of 470 affiliates of foreign multinationals in Hong Kong were operational headquarters in charge of the Asian region. An enlarged survey in 1990 found that 572 of 2,310 affiliates were operational headquarters, with half of the operational headquarters being affiliates of U.S. firms (Wilson 1992).

Table 4.3 **Ratios of Selected Indicators for Hong Kong- and Singapore-Owned Establishments in Singapore's Manufacturing Sector Classified by Country of Ultimate Beneficial Owner to the Same Indicators Classified by Capital Source**

Indicator	1980	1981	1982	1983	1984	1985	198
Hong Kong–owned establishments							
Establishments	0.86	0.90	0.87	0.90	0.86	0.86	0.81
Employees	0.57	0.68	0.72	0.74	0.67	0.73	0.7
Output	0.48	0.54	0.42	0.54	0.42	0.43	0.4
Value added	0.49	0.58	0.51	0.62	0.53	0.53	0.5
Sales	0.49	0.56	0.42	0.53	0.42	0.44	0.41
Exports	0.42	0.52	0.37	0.45	0.31	0.37	0.3
Fixed investment	0.39	0.46	0.56	0.52	0.36	0.16	0.3
Singapore-owned establishments							
Establishments	1.05	1.05	1.05	0.99	0.98	0.98	0.9
Employees	1.12	1.12	1.10	0.97	0.96	0.96	0.9
Output	0.93	0.77	0.73	0.67	0.72	0.72	0.7
Value added	1.07	1.04	1.02	0.90	0.86	0.91	0.81
Sales	0.94	0.77	0.73	0.68	0.72	0.72	0.7
Exports	1.00	0.64	0.61	0.53	0.58	0.62	0.6
Fixed investment	1.09	1.07	1.04	0.96	0.90	0.94	0.8

Sources: Singapore, Department of Statistics (various years); Singapore, Economic Development Boar (1994).

Note: Original indicators are in number of establishments, number of employees, and millions of Singapore dollars.

from Singapore's Census of Industrial Production for 1980–86. Comparisons indicate that classification by country of ultimate beneficial owner reduces the estimates of the importance of Hong Kong–owned establishments in Singaporean manufacturing significantly (table 4.3). Reductions of shares are relatively small in terms of the number of firms or employment but much larger in terms of output, sales, value added, exports, or investment, with estimates often being cut in half or even more. In addition, Hill (1988) indicates that British companies based in Hong Kong account for a large portion of Hong Kong's FDI in Indonesia, while firm-level data from Toyo Keizai (1994) show that a number of Japanese investments are routed through Hong Kong–based affiliates.[9] In contrast to these examples, Hong Kong's FDI position in the United States was larger, often much larger, when classified by country of ultimate beneficial owner in 1989–92, though this was reversed in 1993.[10] Thus, although the available data are limited, there is a clear indication that classifying

9. See subsection 4.4.2 for examples of indirect investment in Thailand. Casual thumbing through the Toyo Keizai surveys indicates substantial indirect investment in China and other Southeast Asian economies as well.

10. The ratio of Hong Kong's FDI position (stocks) classified by ultimate beneficial owner to the FDI position classified by country of each member of the parent group was 3.6 in 1989, 1.5 in 1990, 1.1 in 1991, 1.4 in 1992, and 0.8 in 1993 (U.S. Department of Commerce 1994).

Hong Kong's FDI by country of ultimate beneficial owner greatly reduces such FDI, especially in Asia.

4.3.2 Singapore

The data on outward FDI for Singapore are much more comprehensive than those for Hong Kong and are consistent in suggesting that much of the outward FDI from this economy is also from foreign-controlled firms. The share of foreign-controlled companies in total FDI stocks fell from 48 percent in 1981 to a low of 26 percent in 1985 and then increased to a peak of 58 percent in 1989, before it fell back to 51 percent in 1991 (table 4.4). The large increase in this share in the late 1980s came as a result of increased investment by wholly foreign-owned firms, whose share of the total grew from 17–25 percent in 1981–88 to 45 percent in 1989.

Another similarity with Hong Kong is that neighboring Asian economies have received the bulk of outward FDI from Singapore. Malaysia is by far the largest recipient of Singapore's FDI, accounting for 60 percent of these FDI stocks in 1981, 50 percent in 1984, and 23 percent in 1991 (table 4.4). Hong Kong has been the second largest destination of Singapore's FDI, its share of the total rising from 11 percent in 1981 to 20 percent in 1985 before falling off to 12 percent in 1991. Australia has traditionally been the third largest destination with shares of 4 to 8 percent, while the United States has seen its share rise from 2–3 percent through 1987 to 4–6 percent since. Shares for the Netherlands and New Zealand have also increased rapidly in recent years, reaching double-digit levels in some years. No other individual economy had shares of more than 3 percent.

Despite these similarities, there are also some conspicuous contrasts between Hong Kong and Singapore related to outward FDI. For example, although most outward FDI by locally controlled firms comes from the private sector in Hong Kong, government-linked companies dominate outward FDI by locally controlled firms in Singapore (Singapore, Economic Development Board 1993). Another difference is the relatively conspicuous role the government plays in Singapore's economy, in particular, the government's active promotion of the development of corporate regionalization strategies and outward FDI in recent years.

The breakdown by country of FDI by foreign-controlled companies reveals relatively small shares for Asian economies, 40 percent in 1991, compared to a similar breakdown of FDI by local companies, 61 percent (table 4.5). For foreign-controlled companies, shares of Malaysia (18 percent) and Hong Kong (8 percent) are notably low compared to corresponding shares for local companies (28 and 17 percent, respectively). Indeed, the only listed Asian economies for which shares are higher in foreign-controlled companies are Japan (1.6 vs. 0.2 percent) and Thailand (4.0 vs. 2.6 percent); however, for the other Asia category, the differential is even larger (4.9 vs. 1.0 percent). For Europe and the United States also, shares tend to be larger in local-controlled firms (17

Table 4.4 **Singapore's Direct Investment Stocks Abroad by Ownership of Investing Firm and C**

Variable	1981	1982	1983	1984	1985	1986	19
Total outward FDI stocks[a]							
Cumulative flows (IMF)	1,177	1,829	1,933	2,129	2,653	3,047	3,4
Outward FDI stocks (DOS)	1,678	2,087	2,233	2,399	2,257	2,598	2,9
Outward FDI stocks by ownership of investing firm[b]							
Foreign-controlled firms	799	988	1,007	1,004	585	744	1,1
Wholly foreign	293	380	526	552	384	547	7
Majority foreign	507	608	481	452	201	198	3
Local-controlled firms	878	1,099	1,226	1,395	1,672	1,854	1,8
Majority local	298	303	350	329	710	742	7
Wholly local	580	796	876	1,067	962	1,111	1,0
Outward FDI stocks of all investors by host economy[b]							
Asia	1,290	1,587	1,662	1,805	1,721	1,837	1,9
Brunei	4	6	9	49	53	50	
China	0	0	0	0	58	94	1
Hong Kong	182	317	357	391	461	498	5
Indonesia	40	40	44	56	65	68	
Japan	0	0	1	1	5	6	
Malaysia	1,007	1,162	1,163	1,209	972	986	1,0

Philippines	18	16	18	18	22	23	
Taiwan	13	15	25	27	33	38	
Thailand	10	10	8	9	21	30	
Other Asia	16	21	38	45	32	45	
Europe	51	58	58	72	89	167	3
Netherlands	1	1	12	11	12	14	1
United Kingdom	50	57	43	44	46	82	
Other Europe	0	0	2	17	31	72	1
Other regions	337	442	513	523	447	594	6
Australia	63	91	121	132	177	176	2
New Zealand	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n
United States	32	44	48	54	66	65	
Other countries	243	307	333	325	186	335	3

Note: Figures are in millions of Singapore dollars.

[a]From International Monetary Fund (1995, various years).

[b]From Singapore, Department of Statistics (1991, 1993a, 1993b, 1993c).

Table 4.5 **Singapore's Direct Investment Stocks Abroad by Capital Source, Country, and Indus**

Variable	All Industries	Manufacturing	Construction	Commerce	Transport
Outward FDI stocks of foreign-controlled companies by host economy					
All countries	4,370	705	12	367	48
Asia	1,742	640	3	330	16
Brunei	6	0	0	6	0
China	27	22	0	6	0
Hong Kong	341	18	0	19	0
Indonesia	46	24	2	3	0
Japan	68	16	0	1	1
Malaysia	793	312	0	238	14
Philippines	28	14	0	4	0
Taiwan	43	7	0	27	0
Thailand	175	134	0	5	1
Other Asia	214	94	0	21	0
Europe	122	25	0	15	4
Netherlands	−57	9	0	0	0
United Kingdom	113	1	0	14	1
Other Europe	65	15	0	1	3
Other regions	2,507	41	9	22	28
Australia	214	30	7	9	2
New Zealand	818	4	0	7	0
United States	157	6	0	2	3
Other countries	1,318	1	2	3	23

Outward FDI stocks of local companies by host economy									
All countries	4,181	1,019	69	609	94	1,921	272	101	95
Asia	2,551	864	40	561	80	621	235	69	81
Brunei	47	1	7	3	0	37	0	0	0
China	125	73	0	27	19	2	0	4	1
Hong Kong	716	226	7	81	15	262	103	20	2
Indonesia	129	32	11	0	29	44	6	0	6
Japan	9	0	0	6	3	0	0	0	0
Malaysia	1,164	427	9	298	6	231	113	13	67
Philippines	34	13	0	0	0	16	0	0	4
Taiwan	179	46	3	108	0	20	0	1	0
Thailand	109	19	2	39	3	8	7	31	1
Other Asia	40	27	0	0	5	0	6	1	0
Europe	719	28	29	3	2	641	0	3	13
Netherlands	584	0	0	0	0	582	0	2	0
United Kingdom	83	8	0	1	2	59	0	1	13
Other Europe	52	20	29	2	1	0	0	1	0
Other regions	911	127	0	46	11	659	37	30	1
Australia	219	18	0	34	2	155	9	0	1
New Zealand	115	0	0	0	3	93	0	19	0
United States	256	92	0	10	2	122	21	10	0
Other countries	320	18	0	1	5	289	7	1	0

Source: Singapore, Department of Statistics (1993b).

Note: Figures are in millions of Singapore dollars.

and 6 percent, respectively) than in foreign-controlled firms (3 and 4 percent, respectively). On the other hand, the substantial recent investments in New Zealand and in the other country category appear to have come primarily from foreign-controlled firms.

Contrary to the popular impression that local manufacturing firms facing high labor costs have been the major investors abroad, Singapore's outward FDI is dominated by investments in financial services, with this activity accounting for 60 percent of the FDI stocks of foreign-controlled firms and 48 percent of the FDI stocks of local firms (table 4.5). For foreign-controlled firms, the largest shares of these financial service investments are in other countries (46 percent) and New Zealand (31 percent), followed distantly by Malaysia (7 percent) and Hong Kong (7 percent). For local firms, the largest shares are in the Netherlands (30 percent), other countries (15 percent), Hong Kong (14 percent), and Malaysia (12 percent). Shares of Australia, New Zealand, and the United States are also relatively large at 5 to 8 percent. Thus, both foreign-controlled and local firms have apparently undertaken somewhat similar patterns of investment in that financial service investments in developed economies, Malaysia, Hong Kong, and other countries are a significant element of both types of investment.[11]

Investment patterns of the two groups of investors are also similar in that manufacturing is the second largest sector of investment, accounting for 16 percent of the FDI by foreign-controlled firms and 24 percent of the FDI by local firms (table 4.5).[12] For both foreign-controlled and local firms, the vast majority of such investments are concentrated in Asia, 91 and 85 percent, respectively. For foreign-controlled firms, Malaysia (44 percent), Thailand (19 percent), and other Asia (13 percent) are by far the dominant destinations of such investments, with shares in other Asian countries being much smaller (4 percent or less). The pattern for local firms is similar in that Malaysia is the largest destination (42 percent) but differs in that it is much more diversified with notably larger shares in Hong Kong (22 percent), China (7 percent), and Taiwan (5 percent) but lower shares in Thailand and other Asia (2 to 3 percent). These differences suggest that a relatively large amount of investment by local firms in manufacturing seeks to exploit the so-called Chinese connection, while a relatively large amount of FDI by foreign-controlled firms seeks to

11. We speculate that the large investments in other countries are concentrated in tax havens such as the Bahamas, the Cayman Islands, and the Netherlands Antilles, though we have no concrete evidence of this.

12. Note also the correlation between the data in table 4.4, which indicate that foreign-controlled firms accounted for 41 percent of Singapore's manufacturing FDI in 1991, and the data in table 4.3, which suggest that classification by country of ultimate beneficial owner reduces the scope of activities by Singapore-owned establishments for many years in the 1980–86 period, with exports, sales, and output being the activities most affected. Although these two data sources are not consistent in that the latter sample includes a large number of local establishments that do not invest abroad, they are consistent in suggesting that a large portion of manufacturing activity that would be considered Singaporean if country of capital source were the basis for classification would not be Singaporean if country of ultimate beneficial owner were the basis of classification.

expand operations in neighboring Southeast Asian economies, especially Thailand.[13]

Among the remaining industries listed in table 4.5, commerce (8 percent of the total), business services (7 percent), and real estate (6 percent) were the only industries with shares of total FDI stocks exceeding 1 percent for foreign-controlled firms. Among these investments, commerce investments in Malaysia, business service investments in Japan and the United States (and to a lesser extent Hong Kong and Thailand), and real estate investments in Australia and Hong Kong are conspicuous. For local companies, construction (15 percent) and real estate (6 percent) were the only industries with shares of total FDI stocks greater than 2 percent. Here construction investments are concentrated in other Europe (43 percent) and four Asian economies (Brunei, 10 percent; Hong Kong, 10 percent; Indonesia, 16 percent; and Malaysia, 13 percent). Thus, outside of the main sectors of investment (finance and manufacturing), differences in the patterns of outward FDI by foreign-controlled firms and local firms are relatively pronounced.

Although revealing, the above estimates of FDI stocks do not cover investments by primarily local individuals, sole proprietors, and partnerships. Another survey was carried out by the Singapore Manufacturers' Association between February and March 1993. Of its 323 respondents, half were small to medium-size firms.[14] The survey confirmed Malaysia as the traditional favorite spot for Singapore investors, with 34 percent of the respondents reporting that they had operations in that economy. Relatively large shares of the respondents also reported having affiliates in Indonesia (16 percent), China (11 percent), and Thailand (10 percent), but no other economy had over 5 percent of the respondents reporting investments. Thus these data also suggest that the geographical orientation of local investors venturing abroad is different from that of foreign-controlled firms.

4.4 Characteristics of Hong Kong's and Singapore's Outward Investors

The data in section 4.3 indicate that ownership-based estimates of outward FDI from Hong Kong and Singapore would be far smaller than geography-based estimates. The large differences in geography-based and ownership-based classifications, combined with the often complex nature of outward FDI by foreign-controlled firms in these economies, suggests that a closer examination of the criteria underlying these different classifications is warranted. In this context, we are primarily concerned with the issue of control of investment decisions in foreign-controlled firms undertaking outward investment from

13. One of the authors has personally encountered several examples of investment in Thailand through affiliates in Singapore and Malaysia during a recent survey of intrafirm trade and networking in multinationals operating in Thailand.

14. The results of this survey are quoted from the *Straits Times*, 30 April 1993.

these two economies. Parallel to the discussion in section 4.2 above, concern with control stems from recognition that control-related issues underlie many of the arguments in favor of using ownership-based classifications, combined with recognition that evaluation of the origin of control of investment decisions as well as evaluation of the implications of the origin of that control is sometimes extremely complex in these firms.

To examine these issues more closely, we have assembled survey information on foreign-controlled investors in Hong Kong with the aim of ascertaining just how management decisions, including decisions to invest, are made in the surveyed firms.[15] In addition, we have generated a rather comprehensive list of investors from Hong Kong and Singapore in Thailand that makes some more general evaluations of the two groups of investors possible.

4.4.1 Outward Investors from Hong Kong

Table 4.6 presents a synopsis of 20 case studies of foreign-controlled firms that have undertaken outward investment from Hong Kong.[16] These companies reflect a diverse mix of organizational approaches to multinational operations by the ultimate foreign parent firms through their regional headquarters based in Hong Kong. The case-study firms tend to be relatively old, with only three established after 1985 and nine in the 1970s or earlier. By industry, four firms are primarily involved in manufacturing, six in trade or distribution, one in finance, six in other services, and three in a combination of manufacturing, trade, and service operations. All but one of the 20 firms have affiliates in Singapore; about half of the firms have affiliates in Malaysia (11 firms), Indonesia (9 firms), and Thailand (9 firms); and one-fifth of the firms have affiliates in the Philippines.

In order to highlight some basic characteristics of these firms, the ASEAN affiliates of the 20 foreign-owned firms are classified by degree of autonomy of the Hong Kong–based investor as well as by source of finance and method of control used for operations in the ASEAN affiliates (table 4.7). Perhaps of most interest in this context is that the majority of these affiliates (30/56 or 26/42) are controlled by relatively autonomous Hong Kong firms. If one looks at the sample of 56 affiliates for which information on the source of finance could be obtained, the vast majority (80 percent) are seen to rely primarily on finance through the internal capital reserves of the foreign-controlled firms (regional headquarters) based in Hong Kong. Furthermore, reliance on this source of finance is even more pronounced in affiliates of relatively autonomous firms (90 percent) compared to parent-controlled firms (69 percent). Hong Kong

15. Originally, we had hoped to have parallel coverage of investors from Hong Kong and Singapore, but difficulties in obtaining interviews with Singapore-based firms have precluded this.

16. These cases are abstracted from a larger project in which one of the authors has interviewed more than 110 headquarters firms in Hong Kong and another 60 odd subsidiaries or affiliates in Indonesia, Malaysia, Singapore, and Thailand. For confidentiality reasons, company names are not revealed.

Table 4.6 Characteristics of Case-Study Foreign-Owned Firms in Hong Kong

Company	Year Established	Main Business	Country of Ultimate Parent Firm	Country of ASEAN Operation[a]
A	1975	Electronic manufacturing	Netherlands	S
B	n.a.	Solder chemical manufacturing	United States	S
C	1983	Computer software solutions	United States, Thailand	I, M, S, T
D	1980	Electronic components, distributor	United States	M, S
E	n.a.	Power supplies, distributor	United States	S
F	1971	General insurance	Netherlands, United Kingdom	I, M, P, S, T
G	1987	Distribution, testing services	United Kingdom	M, S, P, T
H	1972	Travel services	Australia	S, T
I	1975	Pharmaceuticals manufacturing and trade	Sweden	I, M, S, T
J	1964	Market research	United States	I, M, P, S, T
K	1983	Software distribution	United Kingdom	M, S
L	1990	Software distribution	United States	S
M	1836	General insurance	United States	S
N	1984	Lead frame manufacturing	Germany, Netherlands	M, S
O	1965	General insuarnce	Indonesia	I
P	1959	Furniture manufacturing	United States	I, M, S, T
Q	1981	Merchant banking	United Kingdom	I, M, S, T
R	1977	Chemical products, transportation	Singapore	I, M, S, T
S	1989	Electronic components trading	Singapore	S
T	1981	Department store trading, sourcing	Belgium	I, S, P, T

Source: Field interviews by Henry Yeung.
[a]I = Indonesia, M = Malaysia, P = Philippines, S = Singapore, and T = Thailand.

capital markets and the ultimate parent companies were the second and third most frequently used sources of finance for affiliates of parent-controlled firms, but these sources were not used at all by the affiliates of autonomous firms. This limited sample thus suggests somewhat different financial strategies in the two groups of firms.

A second variable examined here is the method of controlling the ASEAN affiliates used by the Hong Kong–based, foreign-owned firms (table 4.7). Most of the 42 affiliates in this sample were controlled by the Hong Kong headquarters in one of three ways: cost control (26 percent), periodic reports to headquarters (24 percent), and periodic inspections by top executives from headquarters (14 percent). Autonomous firms tend to rely more on these methods, especially reports to headquarters, than do controlled firms, though the ranking

Table 4.7 Source of Finance, Method of Control, and Extent of Ultimate Control for ASEAN Subsidiaries of a Sample of Foreign-Owned Firms in Hong Kong

Source of Finance or Method of Control	Controlled	Autonomous	Total
Source of finance (number of firms)	26	30	56
Regional headquarters, Hong Kong	18	27	45
Capital market, Hong Kong	4	0	4
Family reserve, Hong Kong	0	1	1
Host-country partners	1	2	3
Ultimate parent company	3	0	3
Source of finance (% of firms)	100.00	100.00	100.00
Regional headquarters, Hong Kong	69.23	90.00	80.36
Capital market, Hong Kong	15.38	0.00	7.14
Family reserve, Hong Kong	0.00	3.33	1.79
Host-country partners	3.85	6.67	5.36
Ultimate parent company	11.54	0.00	5.36
Method of control (number of firms)	16	26	42
Production, market planning from headquarters	2	1	3
Inventory, quality control by headquarters	0	2	2
Cost control by headquarters	4	7	11
Broad guidelines from corporate groups	0	1	1
Centralized decision making from headquarters	1	2	3
Inspections by top management from headquarters	2	4	6
Reports from local managers to headquarters	3	7	10
Sourcing information from headquarters	0	1	1
No specific ways	1	0	1
Mutual exchange of information	2	1	3
Annual meetings	1	0	1
Method of control (% of firms)	100.00	100.00	100.00
Production, market planning from headquarters	12.50	3.85	7.14
Inventory, quality control by headquarters	0.00	7.69	4.76
Cost control by headquarters	25.00	26.92	26.19
Broad guidelines from corporate groups	0.00	3.85	2.38
Centralized decision making from headquarters	6.25	7.69	7.14
Inspections by top management from headquarters	12.50	15.38	14.29
Reports from local managers to headquarters	18.75	26.92	23.81
Sourcing information from headquarters	0.00	3.85	2.38
No specific ways	6.25	0.00	2.38
Mutual exchange of information	12.50	3.85	7.14
Annual meetings	6.25	0.00	2.38

Source: Field interviews by Henry Yeung.

of these methods is markedly similar in both groups. Among other methods, reliance on inventory and quality control, guidelines from corporate groups, and information sourcing are observed in a few affiliates of autonomous firms but not in controlled firm groups. On the other hand, affiliates of controlled firms use production and market planning, mutual exchange of information, and annual meetings more than do autonomous firm groups. Thus, to a certain extent, there is a regional division of control in which ASEAN subsidiaries report to regional headquarters based in Hong Kong rather than directly to their ultimate parent companies.

Among foreign-owned firms in Hong Kong that have been given substantial autonomy in running the group's operations in the Asia Pacific region, four broad types are observed in this sample: recently acquired firms, firms with strong local entrepreneurial involvement, customer-oriented firms, and relocated holding companies. This typology is based on the limited sample used here and is by no means exhaustive. Moreover, there are overlaps in organizational structures among the different types of firms. The examples below illustrate how these four types of firms have come to have a good deal of control over their operations, including investment decisions.

The sample contains two autonomous firms that were recently acquired by ultimate foreign parent companies, companies D and J. As has been explained by previous researchers (e.g., Dicken, Forsgren, and Malmberg 1994) these kinds of firms often do not experience much change in their internal operating systems because their management structures tend to be embedded, and these two firms generally fit this pattern. Company D was first established in Hong Kong in early 1980 (table 4.6), but it was acquired as a wholly owned subsidiary by its American ultimate parent company in August 1993. Even after the takeover the firm has continued to be run by its present ethnic Chinese president who continues to make decisions for the parent firm's operations in Asia. The company is now owned by a holding company registered in the British Virgin Islands, which is, in turn, wholly owned by the U.S. parent and owns 100 percent of the firm's operations in Hong Kong, China (Beijing, Shanghai, and Shenzhen), Korea, Singapore, and Malaysia.

Company J has been a market leader in the field of market research in Asia, with offices spanning the entire Asia Pacific region (Australia, Canada, China, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore, Taiwan, Thailand, the United States, and Vietnam). Ever since its establishment in 1964, the firm has been a multinational, with operations in several countries and employees of several nationalities. In the early 1980s, the firm merged with a British research company that owned 30 percent of the firm until the management of the company bought itself out in the late 1980s. After a period as an employee-owned firm, it then merged with the largest U.S. research firm of its type in early 1994. The first merger did not bring significant changes to the group's corporate structure, which was characterized by a large degree of decentralization. However, since the merger with the U.S. firm, the firm's Hong Kong–based executive committee has tried to exert more influence over the firm's foreign affiliates.

Firms with strong local entrepreneurial involvement can exercise significant control over their foreign investment activities, despite being foreign owned, as illustrated by two of the cases considered here, companies N and P. Company N is a joint venture between a Hong Kong (ethnic Chinese) entrepreneur (40 percent shareholding) and a large German conglomerate (60 percent shareholding) in which the Hong Kong entrepreneur is an expert in the plating industry. The firm is also the regional headquarters for the Far East and is currently in charge of operations in Singapore and Malaysia. Corresponding to the ownership structure of the Hong Kong company, operations in Singapore and Malaysia are both 60–40 joint ventures between the holding company in Germany and the Hong Kong entrepreneur, who is also the managing director for all three Asian firms. The Hong Kong office, as the regional headquarters, has the autonomy to make most of its own operational, marketing, and investment decisions provided it follows the general guidelines laid down by the German head office and reports strategic changes in operations. Daily operations of plants in Singapore and Malaysia are financed by the regional headquarters based in Hong Kong and are managed by top executives sent from Hong Kong who are encouraged to develop their own markets. The relative autonomy given to subsidiaries is due to the German parent's decentralization policy, whereby parent control is only exercised in financial areas such as budgeting, borrowing from banks, and distribution of profits, and is also reflected in the ownership structure of the parent itself, which has been turned into a trustee holding company and is governed by an executive board of directors.

Company P is a wholly owned subsidiary of probably the world's largest home furnishing company based in the United States, and as in company N, Hong Kong is the financial and administrative center for manufacturing operations worldwide. Knockdown furniture components are manufactured in the Far East, and final assembly of these components is completed by related firms in the United States and European countries. The majority of sales by manufacturing plants in the Far East is thus intrafirm trade. Experienced supervisors from existing plants in ASEAN countries are transferred to help set up new plants in the region as they are initiated. Regional management control is in Singapore, where the chief executive officer (CEO) and the chairman (both former Hong Kong Chinese) are based. All financial matters in ASEAN subsidiaries must be reported to and controlled by the CEO who reports to the U.S. parent at annual meetings. The Hong Kong office thus exercises control over the accounting of financial matters, while the CEO in Singapore controls investment decisions and the ultimate source of capital is usually the firm's registered holding company in the British Virgin Islands. Hong Kong has been chosen as the operational headquarters mainly for tax purposes and for its accessibility.

The two customer-oriented firms in the sample, companies C and T, tend to exercise their control in a slightly different way. Namely, because frequent contacts with key clients at the highest possible level are required, top-level executives are often sent from the ultimate parent companies to Hong Kong and given authority to make in situ investment decisions, though this does not necessarily mean that investment capital comes from regional headquarters based in Hong Kong. Company T, for example, is wholly owned by its Belgian parent and is one of more than 40 offices and subsidiaries worldwide, mainly in the form of wholly owned subsidiaries. It specializes in apparel sourcing, primarily for major garment companies (90 percent of its business) and also for department stores. The Hong Kong office is the regional headquarters for the Far East and controls all subsidiaries throughout the Asia Pacific region, which must report to the regional headquarters, though these subsidiaries make many decisions independently. There are four offices in the ASEAN region and eighteen throughout the rest of Asia. The regional headquarters in Hong Kong has been given complete control over operations within Asia, and according to the Belgian managing director in Hong Kong, there is no interference with decision-making processes from the parent.

Company C is a multiparty joint venture among IBM Hong Kong/China (25 percent, financed through IBM Hong Kong/China based in Hong Kong), a New Zealander managing director and chairman (37.5 percent), and a Thai banker (37.5 percent). Neither IBM nor the Thai banker are involved in day-to-day operations. The group controlled by the Hong Kong firm is now one of the largest computer software companies in Asia. It prefers to establish joint ventures when investing in the ASEAN region, the exception being in Singapore, where there is a wholly owned affiliate. In these joint ventures, the firm seeks out reputable local businessmen or companies as partners to strengthen its competitive advantages in host-economy markets. Management control is primarily exercised by the managing director/chairman in Hong Kong, though local general managers are put in charge of day-to-day operations. Because joint ventures are preferred, the sources of investment in ASEAN affiliates are often economies other than Hong Kong, with differences among joint ventures depending on the host country and the partner initiating the investment. For example, in Thailand, although ownership of the Thai office is shared among the three parties, it is controlled by the local general manager and is financed from Thailand instead of Hong Kong. In contrast, the establishment of the Malaysian firm was initiated by IBM in order to facilitate support of IBM mainframe systems.

There are two firms in the sample, companies G and Q, that can be classified as relocated holding companies. As companies have tried to grapple with the uncertainties surrounding the return of Hong Kong to China in 1997, many have chosen to relocate their holding companies abroad, often to tax havens such as Bermuda, the British Virgin Islands, and Panama, or in the case of multinationals that had migrated to Hong Kong from other economies, back to the original home economy (primarily the United Kingdom). The two examples considered here fall into the category of firms that were originally British, then incorporated in Hong Kong, but have since moved their headquarters back to the United Kingdom. However, both firms have maintained their Hong Kong operations at more or less the same level since the relocation.

Company G is a regional subsidiary of its international ultimate parent company, which, as an international service and marketing group, operates in over 80 countries worldwide and employs some 48,000 people. The firm has a long history in Asia and other international markets, with some of its businesses dating back more than 150 years. In a period of three to six years, the group had carried out what they called "business streaming" on a worldwide basis. As a result of this business streaming, all overseas affiliates have to report to a headquarters of that stream, usually based in London. Within this organizational structure, the Hong Kong firm is responsible for the group's operations in Hong Kong, China, Taiwan, Macau, the Philippines, Vietnam, Cambodia, and Laos, focusing on three core businesses, distribution of motors, marketing of premier consumer goods, and international services (insurance, shipping, testing, and buying). The firm and its affiliates in China and Taiwan apparently have control of most daily matters but are often referred to the London parent on strategic matters, including most investment decisions. The Hong Kong firm is the international head office for the group's global buying service operation and controls the sourcing of apparel and general merchandise from developing and newly developed countries for major department stores and other buyers, primarily in the United States, Europe, and Australasia. Another of the Hong Kong firm's functions is as regional headquarters for the group's testing services in the Asia Pacific region. All major decisions in ASEAN subsidiaries are reported to the Hong Kong firm and frequently reported to the London parent, but the Hong Kong firm has large influence on actual decisions as its familiarity with regional issues is valued highly by the parent.

Company Q is the merchant banking arm of a large British bank formerly incorporated in Hong Kong that has transferred its holding company back to London. The Hong Kong firm is the regional headquarters for the Asia Pacific region and is seeking to become the market leader in merchant and investment banking with strong financial support from the holding company. Although the Hong Kong firm and its Asian operations are wholly owned by the holding company in London, it is run rather independently. Key investment decisions are made at board meetings usually held in Hong Kong. The parent is represented at board meetings, and directors can raise questions on investment proposals. Outside of these meetings, however, the parent exercises little control over how these investment proposals are executed. One reason is that the holding company is much more concerned with the commercial banking arm of the group. Investment projects are financed from various sources in Hong Kong or local capital markets. It appears that ownership has very little relation to outward direct investments and control of these investments. The Malaysian office, for example, is managed autonomously, with the Malaysian director reporting to the CEO in the Hong Kong firm as well as the CEO in the bank's Malaysian branch.

These case studies thus indicate that there is often a high degree of autonomy exercised by foreign-owned Hong Kong firms investing in Southeast Asia, and it is evident that several foreign-owned companies are using Hong Kong not only as a "stepping stone" to penetrate the lucrative and emerging Asian markets but also as a regional center of decision making and control in its own right. This might suggest that the geography of ownership often does not correspond to the geography of control. On the other hand, even among the relatively autonomous firms, there are a number of examples where autonomy is a result of a conscious decentralization strategy by the parent firm. In other words, the very lack of a correlation of the geography of ownership and the geography of control may be dictated by the parent firm.

4.4.2 Investors from Hong Kong and Singapore in Thailand

There are a number of published corporate directories in Thailand that have made it possible to classify 95 Thai affiliates of Hong Kong and Singapore investors by whether the Hong Kong or Singapore investor can be identified as foreign controlled or not (see table 4.8 for some summary statistics; the firm list on which other observations are based is available from the authors). It should be noted that a few of the firms not identified as foreign controlled are probably foreign controlled but it simply has not been possible to identify them as such. On the other hand, we are reasonably sure that all the affiliates identified as foreign controlled (the results of indirect investment) are indeed ultimately owned by a firm or individual that is not from Hong Kong or Singapore.

The most conspicuous pattern observed from these data is that 59 percent of the affiliates of Hong Kong firms and 64 percent of the affiliates of Singapore firms are actually controlled by investors outside of Hong Kong and Singapore. This finding is consistent with the data presented in section 4.3 that suggested a large portion of the FDI from Hong Kong and Singapore is of the indirect variety.[17] These data also suggest that, in terms of the number of investors at least, the shares of indirect investment are similar in Hong Kong and Singapore. If measured in terms of sales, however, the shares are somewhat different, with 18 foreign-controlled affiliates accounting for 68 percent of the sales of the 33 Hong Kong affiliates for which sales data were available, but 29 foreign-controlled affiliates accounting for only 50 percent of the sales of the 50 Singapore affiliates for which data were available.

Also, as indicated by the numbers in section 4.3 and the Hong Kong case

17. Because the sample is biased toward large investors and investors from Japan, it is likely to overstate the relative importance of indirect investors. At the same time, however, the sample is reasonably comprehensive, and this bias is not likely to be large.

Table 4.8 A Sample of Thai Affiliates of Firms Based in Hong Kong and Singapore

	Industry				Major Foreign Country						Ownership Shares					
Measure	Manuf.	Trade	Trade plus Manuf. or Other	Other	Hong Kong	Singapore	Japan	Other OECD	Other Countries	Unknown	Hong Kong or Singapore	Foreign Total	Local	Year of Start-Up	1991 Employment[a]	1991 Sales[b]
Affiliates of foreign-controlled Hong Kong firms																
Number in sample	2	5	7	8	0	0	16	4	2	0	22	22	22	22	20	18
Mean											34.0	49.6	4.4	1980	465	28.378
Sample standard deviation											19.3	16.8	11.3	8	949	36.011
Affiliates of Hong Kong firms not known to be foreign controlled																
Number in sample	7	7	0	1	4	0	0	1	1	9	15	15	15	15	6	15
Mean											44.2	46.7	0.0	1983	1,092	15.743
Sample standard deviation											18.1	16.5	0.0	8	1,218	10.058

Affiliates of foreign-controlled Singapore firms											
Number in sample	6	10	12	9	1	0	30	6	0	0	3
Mean											3
Sample standard deviation											2
Affiliates of Singapore firms not known to be foreign controlled											
Number in sample	5	12	1	3	0	9	0	0	0	12	2
Mean											3
Sample standard deviation											2

Sources: Data taken from published lists of firms operating in Thailand; primary sources are International Business Research (Thai Business Information and Research (1993), and Toyo Keizai (1992, 1993). The former two publications cover most large and me with sales of U.S.$4 million or more are included in one of these lists. The third source covers so-called supporting industries a Japanese firms. Hence the sample is biased toward large firms and firms with ultimate parents in Japan. In addition to these primar a number of secondary sources, namely, Datapool (1993), American Chamber of Commerce in Thailand (1992), and Thai-Ca supplemental information on ultimate parents.

[a]Number of employees.

[b]In millions of U.S. dollars.

studies above, these investments are in a wide range of activities. By industry, the largest number of firms were in trade (36 percent) and another large group combined trade with manufacturing (19 percent) or other activities (2 percent). The remaining sample firms were evenly divided between manufacturing (21 percent) and other activities (22 percent), primarily services. If one compares foreign-controlled investors and investors not known to be foreign controlled, the shares of trade combined with other activities and other industries are larger for foreign-controlled investors than for investors not known to be foreign controlled, while the reverse is true in manufacturing and trade alone, for both Hong Kong and Singapore investors.[18] In contrast, the differences between investors by country are less consistent, suggesting that distinguishing the level of foreign control may be more important for understanding investment patterns than distinguishing the geographical source of investment.

Another interesting characteristic is that affiliates of Hong Kong and Singapore firms are rarely characterized by high foreign ownership shares, with only 13 percent of the sample firms having total foreign ownership shares of 90 percent or greater and 29 percent with shares of 50 percent or greater. Low foreign ownership shares are due in part to Thai policies that restrict foreign equity shares in a number of activities, but there are many ways around these equity restrictions, and the sources used to construct table 4.8 suggest that high foreign ownership shares are generally more common among foreign affiliates in Thailand.[19] In this sample, there is also a tendency for total foreign ownership shares to be larger in affiliates of foreign-owned investors, with the differences being largest in the Singaporean case.

However, when comparing affiliates of foreign-owned investors and other affiliates, the more pervasive difference is the relatively large gap between total foreign ownership shares and Hong Kong/Singapore investor ownership shares in the case of affiliates of foreign-owned investors. In other words, indirect investment from Hong Kong or Singapore is often accompanied by investment from other foreign firms, most often those in the investing firm group. This pattern is especially common among Japanese investors in this sample. A related pattern of some significance in this case is the tendency for many Japanese affiliates to receive equity investment from other affiliates located in Thai-

18. Comparisons of shares for foreign-controlled firms vs. firms not known to be foreign controlled are as follows: in manufacturing only for Hong Kong affiliates, 2/22 vs. 7/15, for Singapore affiliates, 6/37 vs. 5/21; in trade only for Hong Kong affiliates, 5/22 vs. 7/15, for Singapore affiliates, 10/37 vs. 12/21; in trade and other activities (including manufacturing) for Hong Kong affiliates, 7/22 vs. 0/15, for Singapore affiliates, 12/37 vs. 1/21; and in other activities only for Hong Kong affiliates, 8/22 vs. 1/15, for Singapore affiliates, 9/37 vs. 3/21.

19. E.g., defining "foreign firms" as firms with 10 percent or more of their equity coming from foreign investors, 20 percent of 516 foreign firms listed in Advanced Research Group (1992) had ownership shares of 90 percent or greater and 29 percent had shares of 50 percent or greater. In a 791-firm sample from SEAMICO Business Information and Research (1993), these shares were 26 and 44 percent, respectively. Finally, of the 533 Japanese affiliates listed in Toyo Keizai (1993) that had their equity financed by Japanese parents only, these shares were 20 and 34 percent.

land.[20] The combination of investment from foreign affiliates and indirect investment through Thai affiliates is perhaps best understood as a way to secure ownership control in the presence of equity restrictions. On the other hand, the combination of indirect investment through Hong Kong and Singapore affiliates and investment from other foreign sources, usually Japanese parents, indicates that these Hong Kong and Singapore affiliates are acting as integrated parts of a worldwide network. Interviews with a few Japanese firms in Thailand that received equity investment from related firms in other Asian economies (mainly Hong Kong and Singapore, but also some from Malaysia) also indicated that this type of investment pattern is often the result of deliberate efforts by parent firms to spur regional integration and coordination among foreign affiliates.

Finally, there are clear differences between the Hong Kong and Singapore economies, notably the more dominant role of foreign multinationals (e.g., Ramstetter 1994) and the relatively small size of the local entrepreneurial class in Singapore (e.g., Lee and Low 1990), that might lead one to think that investment patterns from the two economies would differ greatly in a place like Thailand. However, this sample suggests that the patterns are quite similar in a number of respects.

4.5 Conclusions

This paper has surveyed information on outward investors from Hong Kong and Singapore with the aim of illuminating the implications of accounting for outward FDI by geographical source or by country of ultimate beneficial owner. By any measure it is clear that a very large portion of the FDI from these economies comes from foreign-controlled firms and hence that traditional, geography-based estimates of FDI from these economies greatly exceed corresponding ownership-based estimates. Examination of case studies from Hong Kong indicated a tendency for investment decisions to be relatively autonomous in four types of foreign-controlled Hong Kong firms: recently acquired firms, firms with strong local entrepreneurial involvement, customer-oriented firms, and relocated holding companies. On the other hand, evidence from some of these case studies and a sample of Thai affiliates of foreign-controlled Hong Kong or Singapore investors suggested that many of the investors were acting as parts of an integrated network of foreign investors, even when the foreign-controlled investor in Hong Kong and Singapore had a large degree of control over investment decisions. Moreover, if the Thai sample is representative, it does not appear that autonomous foreign-controlled investors constitute a majority among foreign-controlled investors in Hong Kong and Singapore.

20. Note that 38 percent (329) of the 872 Thai affiliates of Japanese firms listed in Toyo Keizai (1993) received equity investment from affiliates of Japanese investors located outside of Japan, including other affiliates located in Thailand.

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Comment Rachel McCulloch

The move from economic theory to empirical analysis always requires a leap of faith. Key concepts that shine out clearly in theoretical modeling rarely find

Rachel McCulloch is the Rosen Family Professor of International Finance at Brandeis University.

neat counterparts in the data. In the case of foreign direct investment (FDI), the difficulty is not simply one of incomplete or inaccurate data, although this is often a formidable hurdle. The deeper problem arises because there is only a loose correspondence between conveniently measurable characteristics of firms and the economic phenomena to be investigated. Even data that are complete and accurate can leave much to be desired, and what are the "correct" data cannot always be specified in advance of the question to be answered using those data.

In their investigation of FDI from Hong Kong and Singapore, Low, Ramstetter, and Yeung (LRY) offer a rare opportunity to look behind the numerical indicators to the actual business operations the data are intended to capture. The authors' focus is the appropriate statistical treatment of outward direct investments of corporate parents in Hong Kong and Singapore that are themselves foreign-controlled subsidiaries of firms based elsewhere. Such investments may be classified by geographical source or by ultimate ownership. Because of the important role played by foreign-controlled firms, using an ownership definition of source greatly reduces the measured extent of outward FDI originating in Hong Kong and Singapore. Which accounting measure provides the more accurate statistical picture? To address this question, the authors combine information from published statistics with case studies of outward FDI by foreign-controlled Hong Kong parents and of Thai affiliates controlled by parent firms in Hong Kong and Singapore.

Who Is in Control?

Theory distinguishes FDI from other types of international capital flows on the basis of foreign managerial control over host-country operations. The standard empirical proxy for control is a required minimum equity participation in the host-country enterprise. Given the arbitrary character of the proxy, it is not surprising that the required minimum varies across countries, or that the observed degree of control bears little relationship to the statistical measure. The equity participation yardstick also allows joint ventures to be "controlled" simultaneously by source firms in several countries or, as Baldwin and Kimura (chap. 1 in this volume) point out, to be attributed to more than one industry. Moreover, because measurement of FDI almost always relies on cross-border flows, standard data fail to capture equity positions financed by subsidiaries' local borrowing in the host country.

The authors examine 20 cases of ASEAN investments by foreign-owned Hong Kong companies to determine the degree of autonomy of the Hong Kong parent in its outward investment activities. Of these 20, eight are judged to have a substantial degree of autonomy in making decisions with regard to outward investment. But the significance of this finding is unclear. The Hong Kong companies in the sample are all headquarters firms. Each thus has a specific role to play in the parent firm's global management structure as the locus of corporate decision making for the region. Observing a decision-making function in the area of outward FDI does not make the case for autonomy as long as the top management at the regional headquarters can be replaced should their actions fail to satisfy the needs of the parent. What is observed for these eight is better described as decentralization of a particular function rather than autonomy in an economic sense.

If the question to be answered is whose business interests these investments serve, ultimate ownership may be the appropriate criterion for classifying investments regardless of the location where particular decisions are made. Any systematic differences in the apparent autonomy of Hong Kong subsidiaries may simply reflect differences in management structure (as suggested by LRY's study of Thai affiliates). However, the authors note that the "autonomous" subsidiaries fall into several categories. This finding suggests the interesting further hypothesis that certain types of companies are better served by a decentralized management structure.

Whose Firm-Specific Assets?

The criterion of control focuses on where decisions are made, and for whose benefit. A different possible reason to classify FDI by source is the assumption that the firm-specific assets (FSAs) associated with FDI are related to characteristics of the investing firm's home base. For geographical sources that are notable mainly as tax havens, for example, the Netherlands Antilles, it is clear that any FSA (other than perhaps a certain type of financial know-how) is linked more to the ultimate beneficial owner. But what about a geographical source like Hong Kong or Singapore, one that is financially advantaged but also an important locus for business decision making?

Recent theory views FDI as a cross-border intrafirm conduit for hypothesized FSAs that can be used profitably in advantageous locations abroad. But how are such FSAs identified and measured? Empirical research has shown that differences in the extent of FDI across manufacturing industries is explained in part by industry ratios of R&D to sales and advertising to sales, that is, by expenditures used to create and maintain FSAs. In fact, these ratios are proxies for current or recent *additions* to FSAs rather than for their current importance. Moreover, anecdotal FSAs have less to do with technology in the formal sense than with accumulated practical know-how relevant for successful organization of production, quality control, and marketing.

The Hong Kong case studies summarized in the paper suggest that a foreign-owned parent may be a significant independent source of FSAs even when managers lack decision-making power in the area of outward investment. In fact, the choice of Hong Kong as a regional headquarters site by a significant fraction of all multinationals investing there may reflect the ready availability of certain types of region-specific know-how. Presumably, the FSAs transmitted to Asian affiliates will be a blend of firmwide assets (brand identification, marketing linkages, technology in the narrow sense) and Asia-specific assets (language, culture).

The paper's approach of going behind the data through the use of case studies is very illuminating for any user of FDI data. Although it cannot resolve the underlying conceptual problems, the use of case studies allows users to be more fully aware of the implications of choosing one data series rather than another. The paper also provides an interesting perspective on the classification scheme proposed by Baldwin and Kimura (chap. 1 in this volume). To add together U.S. trade with foreigners and sales to foreigners of U.S. subsidiaries abroad, it is first necessary to decide which U.S. subsidiaries to include in the calculation. For example, a number of foreign subsidiaries in Mexico have U.S. parents that are themselves controlled by Japanese parents. According to the Baldwin and Kimura methodology, these Mexican enterprises should be classified as Japanese, but the conceptually "right" answer is not obvious. And a practical problem in implementing the Baldwin-Kimura approach is that while the United States, unlike Hong Kong, does collect data on outward FDI, the U.S. data do not separate outward FDI on an ownership basis.

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5 Accounting for Chinese Trade: Some National and Regional Considerations

K. C. Fung

5.1 Introduction

In this paper I examine various conceptual and data issues related to trade and investment in China. This topic is interesting because China is the most dynamic, fastest growing economy in the world. Despite cycles of inflation and contraction, real GDP in China has grown at almost 10 percent annually over the period 1979–92. For the coastal provinces, from Guangdong in the south up through Fujian, Jiangsu, Zhejiang to Shandong in the north, the annual growth rate averaged over 12 percent for the same period (Ho 1993). This economic performance has led many to predict that China will one day be the next economic superpower (Survey of China 1992). For example, Larry Summers (1992) once extrapolated that if the growth differential between China and the United States during the 1980s persists, China could surpass the United States to become the largest economy in the world in 11 years. He further pointed out that if the per capita income of China reached that of Taiwan, China's GDP would exceed that of all Organization for Economic Cooperation and Development (OECD) countries. According to estimates by the

K. C. Fung is associate professor at the University of California, Santa Cruz, and associate director at the Hong Kong Centre for Economic Research.

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Table 5.1 **China's Foreign Merchandise Trade**

Year	Total	Exports	Imports
1978	20.7	9.8	10.9
1979	29.4	13.7	15.7
1980	38.1	18.1	20.0
1981	44.0	22.0	22.0
1982	41.6	22.3	19.3
1983	43.6	22.2	21.4
1984	53.5	26.1	27.4
1985	69.7	27.4	42.3
1986	73.8	30.9	42.9
1987	82.7	39.4	43.2
1988	102.8	47.5	55.3
1989	111.7	52.5	59.1
1990	115.4	62.1	53.4
1991	135.7	71.9	63.8
1992	165.6	85.0	80.6
1993	195.8	91.8	104.0

Source: China, State Statistical Bureau (1994).
Note: Figures are in billions of U.S. dollars. Exports are valued on a f.o.b. basis, imports on a c.i.f. basis.

International Monetary Fund (IMF) (1993), based on purchasing-power-parity exchange rates, China has the third highest GDP in the world, behind only the United States and Japan. Some argue that China's economic performance since the economic reform era has brought about one of the biggest improvements in human welfare anywhere at any time (Survey of China 1992).[1]

Since December 1978, when the history-making third plenary session of the eleventh Central Committee of the Chinese Communist Party decided to abandon the Stalinist strategy for growth and opted for a program of open door policies and reforms, there has been a tremendous increase in China's foreign trade activities. In the prereform era, China had traded relatively little with the outside world, given its size. By 1992, China's total foreign trade volume ranked eleventh in the world, a jump from thirty-second in 1979. Using China's official statistics, table 5.1 shows the changes over time in China's trade.[2]

1. As China grows in importance, the amount of research into various aspects of China has also exploded; see, e.g., Lau (1995), Wong (1995), Wong, Heady, and Woo (1993), and McKinnon (1991). However, work on the foreign trade of China and direct investment in the country has been relatively sparse. Exceptions are, e.g., Sung (1991), Liu et al. (1992), Lardy (1994), Fung (1997, 1996), Fung and Iizaka (1998), and Fung and Lau (1996). Baldwin and Nelson (1993), Bergsten and Noland (1993), Feenstra (1995), Ito and Krueger (1993), and Noland (1990) contain recent research related to trade and trade policies with Taiwan or Hong Kong.

2. As Lardy (1992) points out, even different agencies within the Chinese government report Chinese data differently. For example, Ministry on Foreign Economic Relations and Trade export statistics on processing include only the processing fees earned from such exports, which are less than 10 percent of the value of the exports. By contrast, China's customs statistics include the entire value of these exports.

The money value of China's merchandise exports of $85 billion (U.S. dollars) in 1992 was more than eight times the $9.8 billion in 1978. In nominal terms, this means a compound growth rate of 16.8 percent per year. For imports, the $80.6 billion in 1992 was more than seven times the $10.9 billion in 1978. This translates into nominal growth of 15.4 percent. This is almost twice as fast as the growth of global trade for the same period. According to the OECD (1993), China was sixteenth by its share of global exports in 1990, with a share of 1.6 percent of world exports. But if we add Hong Kong and Taiwan to mainland China (Greater China), Greater China's rank was fifth, behind only the United States, Japan, Germany, and France.

Beyond the very rapid growth of China's economy and trade and the country's new role as a global player, there are other reasons why I want to look into data concerning China's trade. First, Chinese trade data are often at odds with the data of its trading partners. Trade data discrepancies are actually quite common, but the situation with China is particularly striking. In 1992, for example, according to Chinese statistics exports to the United States were $8.6 billion and imports from the United States were $8.9 billion. This translates into a small U.S. *surplus* of $0.3 billion. But U.S. trade statistics show that imports from China were $25.7 billion and exports were $7.4 billion, resulting in a U.S. trade *deficit* of $18.3 billion. From an economic standpoint, bilateral trade imbalance is not generally a cause for concern, but political factors often cause trade imbalances to fuel trade frictions. Trade data discrepancies between China and its trading partners heighten these trade tensions.

A significant part of the discrepancy in trade data related to China is due to Chinese trade with and via Hong Kong, its small but prosperous southern neighbor. According to China's customs statistics, 44 percent of China's 1992 exports went to Hong Kong and 26 percent of China's 1992 imports came from Hong Kong. Using these figures, Hong Kong is China's largest trading partner.

Because of its strategic location, its modern facilities in banking, finance, insurance, transportation, and other services, and the fact that there is a sound legal framework in place, Hong Kong is China's main gateway to the West, and vice versa. Much of Hong Kong's role in China's trade is to act as a middleman. This means that a lot of trade involving Hong Kong is entrepôt trade: reexport and transshipment. Even after 30 June 1997, when Hong Kong will become officially a part of China, Hong Kong will remain a separate customs territory and a separate member of the General Agreement on Tariffs and Trade (GATT)—more accurately, the World Trade Organization (WTO)—according to the 1984 Sino-British Joint Declaration and also according to the promise that China had made to GATT. In other words, the problems with China's trade data due to a separate Hong Kong are not likely to go away in the near future.

Until very recently, China's official trade data counted exports to Hong Kong for consumption in Hong Kong and exports to Hong Kong to be reexported elsewhere both as exports to Hong Kong. Similarly, U.S. goods reexported via Hong Kong to China are not always counted as U.S. exports to China in U.S.

data. We will look at China's trade by taking into account its important *reexport* character.[3] One example of this complication is that using Chinese data, Hong Kong was the largest exporter to China from 1987 to 1992. But in 1993, when Chinese authorities began to trace the origin of Chinese imports more seriously, Hong Kong dropped to fourth largest exporter behind Japan, the United States, and Taiwan (Sung 1994).

Another source of the problem with China's trade statistics is the markup that the Hong Kong middleman adds to reexports to and from China. This added value is attributed to the exporting country but in fact should be attributed to Hong Kong. Thus, in addition to reexports, trade data with China should be adjusted by taking the reexport markup into account. Reexports and reexport markups affect China's trade with *all* countries and regions, including the three on which we will focus in this paper, Hong Kong, Taiwan, and the United States. Furthermore, both reexports and reexport markups are large and thus significantly affect Chinese trade data.

Another interesting aspect of China's trade is that a large part of it is fueled by foreign direct investment (FDI), particularly investment by Hong Kong and Taiwan in Guangdong and Fujian. Exports and imports related to investment are not unique to China, but such FDI-related trade is especially important in the Greater China region. In Chinese trade data, both geography and foreign ownership play an important role.

For geographical and historical reasons, China's trade with Taiwan is of special interest. According to 1992 Chinese trade data, Taiwan is China's fourth largest export market, behind Hong Kong, Japan, and the United States. Cold war politics and the historical rivalry between the Chinese Nationalists and the Chinese Communist Party caused most direct trade to be banned between Taiwan and mainland China. In 1978, mainland China wanted to reestablish mail, travel, and trade. Taiwan initially responded with a continuation of the "three no's policy": no contact, no negotiations, no compromise (Kao 1993). However, by 1985, Taiwan no longer interfered with indirect exports, though indirect imports were still to be subject to control. Taiwan's control of indirect imports would later be relaxed. Taiwan's official policy is still that all trade and investment must be carried out indirectly. A substantial portion of trade between mainland China and Taiwan is indirect reexport trade via Hong Kong.

In addition to reexports, which also form a large part of China's trade with its other trading partners (e.g., the United States), China-Taiwan trade is further characterized by forms of direct trade, such as transshipment, that are illegal from the Taiwanese standpoint.[4] Because of this illegal trade, statistics from Taiwan concerning China-Taiwan trade are also inaccurate. Based on the limited information we have, illegal trade is a large part of trade between mainland China and Taiwan.

3. Sung (1991) and, more recently, Lardy (1994), Fung (1997), and Fung and Iizaka (1998) were among the first to highlight quantitatively the importance of reexports in China's trade.

4. Kao (1993), Sung (1994), and Fung (1997) discuss the issue of transshipment.

From the U.S. side, trade with China represents both an opportunity and an increasing concern. China can be a large and growing market for American business; at the same time, the United States is worried about trade barriers in the Chinese market and the export potential of the Chinese. These worries have fueled several trade disputes. Some of the disputes have focused on the different ways that both sides look at trade data. For the United States, reexports and reexport margins are the dominant factors complicating the trade data.

In this paper I focus mainly on China's trade with and via Hong Kong, Taiwan, and the United States. There will also be special attention paid to the southern provinces of Guangdong and Fujian, where most FDI from Hong Kong and Taiwan takes place. Hong Kong and Taiwan deserve special attention because of their roles in FDI, reexport, and transshipment. U.S.-China trade is of interest because it highlights how different trade-accounting methods in data can lead to trade problems between important economic powers. In the next section, I examine and update the recent evolution of the Chinese foreign trade regime. In section 5.3, I look at the role of Hong Kong reexports in China's trade and discuss reexports and reexport margins in the context of trade with Hong Kong, Taiwan, and the United States. In section 5.4, I cover the importance of FDI-related trade, using first Hong Kong data, then official national Chinese data, and finally data from the provinces of Guangdong and Fujian. In section 5.5, I examine transshipment and other forms of illegal trade. There is some indication that smuggling is important for some segment of U.S.-China trade. Concluding remarks are given in section 5.6.

5.2 China's Evolving Foreign Trade Regime

Various writers have written about China's trade system (Sung 1991; Lardy 1992; Ho 1993; Fung 1997). In this section, we update and condense their work. Before 1978, the Ministry of Foreign Trade (MOFT) completely controlled China's foreign trade system. Under a mandatory trade plan, 15 product-specific national foreign trade corporations (FTCs) operated China's trade. International trade was just an extension of the domestic planning process. The Soviet style of material balances was used to construct the basic economic plan, which coordinated the flow of raw materials and intermediate goods among industries. The production of each good was equated to the intermediate and final demands by other major state enterprises. The plan used imports to fill the difference between planned demand and domestic production. Exports needed to pay for imports were then identified, first using goods of which there were excess supplies. The State Planning Commission set preliminary annual and long-term targets for broad categories of imports and exports. Then, on the basis of the State Planning Commission's targets, MOFT prepared more detailed plans and sent these plans to the FTCs.

Based on the foreign trade plan, the FTCs purchased goods from domestic enterprises at fixed prices, sold them abroad, and sent all foreign exchange to the Bank of China, which was the sole organization allowed to handle foreign exchange. The FTCs bought fixed quantities of foreign goods for domestic use at fixed prices and paid foreign suppliers with foreign exchange obtained from the Bank of China. World market prices had little impact on the Chinese domestic prices of tradable goods. Since the renminbi (the mainland Chinese currency) was overvalued, the FTCs usually suffered a loss on exports but earned a profit on imports.

In 1979, provincial and municipal governments and some large state enterprises were allowed to establish their own foreign trade enterprises. In March 1982, China's trade regime was further reformed. MOFT, the Import-Export Administration Commission, the Foreign Investment Administration Commission, and the Ministry of Foreign Economic Relations were consolidated into the Ministry of Foreign Economic Relations and Trade (MOFERT), with the latter organization supervising the 15 national FTCs and the local foreign trade bureaus. Recently, MOFERT has been reorganized into the Ministry of Foreign Trade and Economic Cooperation (MOFTEC) and given the responsibility to formulate and implement China's foreign trade policies.

In 1984, the State Council ended the monopoly power of the national FTCs and reduced the scope of foreign trade planning. The number of FTCs increased dramatically. In addition to the new national FTCs under the control of central government ministries and other state organizations, almost every provincial and municipal government had its own network of FTCs.

With decentralization, the number of FTCs increased from 15 in 1978, to more than 1,000 by the mid-1980s, to about 6,000 by the latter half of the 1980s. The new FTCs did not have to report to MOFERT. Unfortunately, there were some unscrupulous activities, and some new FTCs were unable to fulfill their contracts (e.g., some were unable to purchase the promised domestic goods for export). Since China had a long-standing reputation of fulfilling foreign contracts, the increasing failure to meet contractual obligations became a major concern not only to China's trading partners but also to the Chinese central authority.

These events led to a retrenchment in mid-1988. As many as 2,000 FTCs were dissolved, reorganized, or stripped of their right to conduct foreign trade. By the end of 1991, there were roughly 4,000 FTCs.

The scope of mandatory planning for foreign trade was also significantly reduced. The old foreign trade system was replaced by a system that combined mandatory planning, guidance planning, and the market. The 1984 trade reform assigned mandatory exports and imports (i.e., trade specified in quantitative terms) to designated national FTCs and allowed other FTCs to conduct their trade both within and outside the guidance plans. Unlike mandatory plans, guidance plans were generally specified in value terms. In addition to being more flexible, these plans allowed FTCs to take market demand and supply into account when deciding the mix of tradables within each broad product group.

The mandatory export plan covered about 3,000 items before 1979, but by 1988 the number fell to 112. By the end of the 1980s, exports under mandatory or guidance plans accounted for about 34 percent of total exports. Compared to the export system, the import system remained relatively unreformed in the 1980s. There were import licensing and high tariffs on protected products. In addition, almost all importers faced a series of complicated approval procedures. However, in the process of reforming the foreign trade system, the scope of mandatory planning for imports was also reduced. By 1991, no more than 40 percent of China's imports were under mandatory or guidance plans. In addition, as a consequence of a U.S. market access Section 301 case in 1992 and China's desire to join the WTO, China has made progress in making its trade regime more transparent.

In 1992, the Chinese government took important steps to reform its trade policy (World Bank 1993). A large number of trade documents previously unavailable to foreigners were published. Several steps were also taken to liberalize imports. The Customs Tariff Commission of the State Council reduced a large number of tariff rates. Rates were cut on 225 tariff lines, beginning on 1 January 1992. In addition, special import regulatory duties that had been instituted for 14 products in 1985 were lifted as of 1 April 1992.[5]

5.3 Issues Related to Reexports

The only data source on reexports that I am aware of are the official statistics of the Hong Kong government. Reexports, as defined by the Hong Kong government, occur when imports to Hong Kong are consigned to a buyer in Hong Kong who takes legal possession of the goods. These imports must clear customs (that is why Hong Kong has such statistics). Buyers in Hong Kong add a markup and then reexport the goods elsewhere. They may also undertake minor processing of the imports before reexporting them. However, they do not change the fundamental character or nature of the goods (no substantial transformation) so that *no* Hong Kong origin is supposed to be conferred. If the process substantially changes the imports, then they become goods "made in Hong Kong," and exports of these goods are regarded as exports of Hong Kong goods. They are then classified in official Hong Kong statistics as "domestic exports" rather than "reexports." Sung (1991) and, more recently, Lardy (1994) and Fung (1997) were among the first to consider the issue of reexports in the context of Hong Kong–China trade.

Reexports cost more than direct exports since they typically need additional loading, more customs clearing, and further insurance. The middleman also adds a markup before reexporting. In 1988, the Hong Kong Trade Development Council carried out a large-scale survey of Hong Kong traders. One find-

5. However, the effects of these measures have been essentially to bring the average tariff level back to pre-1987 levels (see World Bank 1993).

Table 5.2 Reexports in Hong Kong Trade

Reexport Category	1992	1993
1. Total reexports	690.8	823.2
2. Reexports to China	212.1	274.6
3. Reexports of Chinese origin	403.8	474.0
4. Reexports not involving China	95.1	96.5

Source: Hong Kong Government (1993).
Note: Figures are in billions of HK dollars. Rows 2, 3, and 4 sum to more than row 1 because reexports of Chinese origin back to China have been counted twice in rows 2 and 3.

ing was that the reexport markup on Chinese goods was 16 percent and the markup on other countries' goods was 14 percent. Another survey conducted by the Hong Kong Census and Statistics Department indicated that the reexport markup for all reexports in 1990 was 13.4 percent but the markup for Chinese goods was much higher. The department, however, did not publish the exact markup figure for Chinese goods in this survey. The higher markup for Chinese goods probably reflects the lower quality control on goods in China and Chinese producers' lack of information about overseas markets. Hong Kong middlemen thus need to do more repackaging and to look harder for markets for Chinese products.[6]

5.3.1 China–Hong Kong Trade

The bulk of trade between Hong Kong and China involves reexports. Hong Kong reexports registered significant growth in 1993. The value of reexports was HK$823 billion in 1993, about 19 percent higher than in 1992.[7] As reexports grew rapidly while domestic exports by Hong Kong declined, the share of reexports in total Hong Kong exports rose from 75 percent in 1992 to 79 percent in 1993.

China was the most important *source* of goods reexported through Hong Kong. In 1993, Chinese goods reexported via Hong Kong amounted to HK$474 billion, or 58 percent of total reexports (table 5.2). A large proportion of the reexports from China were products of outward processing commissioned by Hong Kong companies in China.[8] The major reexport items from China were clothing, telecommunications and sound recording equipment, footwear, and textile yarn and fabrics. China also remained the largest *market* for Hong Kong's reexports, accounting for HK$275 billion, or 33 percent in

6. Another interpretation is that the higher markup of Chinese goods reflects transfer pricing by mainland Chinese traders based in Hong Kong. I am indebted to Larry Lau for suggesting this interpretation.

7. The exchange rate between the HK and U.S. dollars is fixed. In 1993, the rate was U.S.$1 = HK$7.7.

8. I discuss trade related to outward processing in section 5.4.

Table 5.3 Hong Kong Reexports by Major Market

	1992	1993	Growth Rate in 1993 (%)
All markets	690.8	823.2	19
	(100)	(100)	
China	212.1	274.6	29
	(31)	(33)	
United States	148.5	180.3	21
	(21)	(22)	
Japan	37.5	44.2	18
	(5)	(5)	
Germany	33.1	40.8	23
	(5)	(5)	
United Kingdom	20.6	24.5	19
	(3)	(3)	
Taiwan	26.2	21.9	−16
	(4)	(3)	
Rest of the world	212.9	236.9	11
	(31)	(29)	

Source: Hong Kong Government (1993).

Note: Reexports values are in billions of HK dollars. Numbers in parentheses are shares of the reexports.

value terms of all goods reexported through Hong Kong in 1993 (table 5.3). Reexports to China consisted mainly of textile yarn and fabrics, textile madeup articles, motor vehicles, electrical machinery, telecommunications and sound recording equipment, industrial machinery, and plastic materials. The other major market for Hong Kong's reexports was the United States (accounting for HK$180 billion, or 22 percent of the total value in 1993).

Besides reexports, the Hong Kong government collects data on retained imports (imports for domestic consumption), which are defined as total imports by Hong Kong minus reexports. A more accurate definition would be total imports minus reexports adjusted for the reexport markup.[9]

If we take the average markup on Chinese goods to be around 16 percent, the amount of retained imports from China becomes negligible or *negative* in recent years (table 5.4). This implies that the markup for Chinese goods must be higher than 16 percent. However, we do not have much information on what the actual percentage is. In my interviews with Hong Kong businessmen in July 1994, a figure of 25 percent was suggested several times. Hong Kong officials who had presented cases in GATT also suggested that the markup was 25 percent. For the rest of this paper, we use an average reexport markup of 25 percent for Chinese goods.

Data on Hong Kong's exports to China also are complicated by the existence

9. See Sung (1991) for an early discussion.

Table 5.4 **Hong Kong Imports from China**

Year	Adjusted[a] Retained Imports	Unadjusted Retained Imports
1977	1,377	1,286
1979	2,268	2,076
1981	3,715	3,325
1983	4,048	3,588
1984	4,686	4,075
1985	4,546	3,790
1986	5,966	4,842
1987	7,428	5,591
1988	7,948	5,084
1989	8,801	4,698
1990	5,624	−549
1991	4,212	−3,913
1992	2,457	−7,975
1993	1,147	−11,108

Source: Hong Kong Government (various years, b).
Note: Values are in millions of U.S. dollars.
[a]Adjusted for 25 percent reexport markup.

of reexports. But, given that Hong Kong government statistics provide data on Hong Kong's *domestic exports,* we can rely on these as figures for exports of Hong Kong goods to China.

5.3.2 China–Taiwan Trade

As previously noted, Taiwan forbids Taiwanese firms from trading directly with China, so all trade is supposed to occur indirectly. Most of this indirect trade takes place via Hong Kong. Trading via Hong Kong is often referred to as "triangular trade." There is also indirect trade between Taiwan and mainland China via Japan, Singapore, Guam, and other third parties (Kao 1993). In terms of trade data, neither Taiwanese sources nor mainland sources are entirely accurate. The mainland data are again contaminated by lumping trade with Hong Kong and reexports together. In Taiwanese data, trade with China shows up mainly as trade with Hong Kong and other third parties. Table 5.5 shows Taiwanese indirect trade via Hong Kong, using Hong Kong data. There is also illegal direct trade that is not recorded properly in Taiwanese trade statistics. Trade with mainland China is heavily influenced by periods of contraction in China. The significant decrease of indirect trade between Taiwan and the mainland in 1982–83 and in 1986 was due mainly to mainland China's deflationary policies during those periods.

5.3.3 China–U.S. Trade

Chinese export statistics reported all exports to Hong Kong, whether for Hong Kong consumption or for reexport to the United States via Hong Kong

Table 5.5 **Trade between Taiwan and Mainland China via Hong Kong**

Year	Taiwan to Mainland	Mainland to Taiwan
1979	21	55
1980	242	78
1981	390	76
1982	208	89
1983	168	96
1984	425	127
1985	987	116
1986	811	144
1987	1,226	289
1988	2,242	478
1989	2,896	586
1990	3,278	765
1991	4,679	1,129
1992	6,288	1,119

Source: Hong Kong Government (various years, a).
Note: Figures are in millions of U.S. dollars.

Table 5.6 **U.S. Exports to China Adjusted for Reexports**

Year	U.S. Source	Reexports to China via Hong Kong		Total Adjusted Exports	
1993	8.77	2.79	(3.18)	11.56	(11.95)
1992	7.47	2.06	(2.35)	9.53	(9.82)
1991	6.29	1.50	(1.71)	7.79	(8.00)
1990	4.81	1.16	(1.32)	5.97	(6.13)
1989	5.76	1.16	(1.32)	6.92	(7.13)

Sources: Hong Kong Government (various years, a) and U.S. Department of Commerce (various years).
Note: Figures are in billions of U.S. dollars. Numbers in parentheses are unadjusted for reexport markup.

as exports to Hong Kong. Chinese import statistics do take country of origin into account, but inconsistently. U.S. import data distinguish country of origin, including reexports, but U.S. export data deal with exports to Hong Kong inaccurately. This is because reexports, by definition, change legal possession, and U.S. exporters do not always know the final destination of the U.S. goods.

In calculating U.S. exports to China, we should add reexports of American goods via Hong Kong to China to recorded exports to China (although this may overstate the error because the U.S. data may capture some exporters who know and declare that the final destination of the goods is China even when they are first shipped to Hong Kong). Table 5.6 illustrates the importance of taking reexports into account when using U.S. export data.

The amount of U.S. goods reexported to China via Hong Kong is not trivial.

Table 5.7 **Adjusted U.S.–China Bilateral Trade Balance (U.S. Source)**

Year	Unadjusted Balance	Adjusted Trade Balance	
1993	−22.76	−15.63	(−19.59)
1992	−18.26	−12.58	(−15.91)
1991	−12.68	−8.50	(−10.97)
1990	−10.43	−7.17	(−9.11)
1989	−6.18	−3.38	(−4.91)

Sources: See table 5.6.

Note: Figures are in billions of U.S. dollars. Numbers in parentheses are not adjusted for reexport margins.

On average over 1989–93, reexports were *30.0 percent* of U.S. direct exports to China. Another important issue is the role of the reexport margin. Hong Kong middlemen raise the value of the U.S. goods shipped via Hong Kong. The average markup on non-Chinese goods is 14 percent. Reexports and total exports not discounted by the markup are given in parentheses in table 5.6.

U.S. imports take reexports into account. While there are severe difficulties in tracing the country of origin (Krueger 1995), this problem is not unique to trade with China. We assume that U.S. data for imports from mainland China are by and large correct, or at least no worse than other published sources. But we do need to take the reexport margin into account. For Chinese goods, we take a markup of 25 percent, as discussed earlier. The adjusted trade balance, taking both reexports and reexport margins into account, is

Adjusted U.S. trade balance with China

= (Direct exports of U.S. goods to China

+ Reexports of U.S. goods to China via Hong Kong

− 14% reexport margin)

− (Direct imports of Chinese goods to the U.S.

+ Reexports of Chinese goods to the U.S. via Hong Kong

− 25% Reexport margin).

Using the adjusted figures, U.S.-China bilateral trade deficits are shown in table 5.7. The adjusted trade deficits, using U.S. and Hong Kong data, are quite different from the unadjusted, published deficits. If we use deficits adjusted for both reexports and reexport margins, the deficits have to be revised downward by 31.1, 33.0, 31.3, and 45.3 percent for the years 1992, 1991, 1990, and 1989, respectively. This gives a four-year average of 35.2 percent.[10]

10. This downward revision is larger than those reported in Lardy (1994) primarily because of the use of a different reexport margin. West (1995) also reported different adjustments because she used different markups for different periods and she also took into account other minor adjust-

Table 5.8 **Adjusted U.S. Trade Deficit with China**

Year	Adjusted Chinese Data		Adjusted U.S. Data		Chinese Source	U.S. Source
1989	2.14	(3.7)	3.38	(4.91)	−3.5	6.18
1990	5.84	(7.8)	7.17	(9.11)	−1.4	10.43
1991	7.42	(9.9)	8.50	(10.97)	−1.8	12.68
1992	12.12	(15.5)	12.58	(15.91)	−0.3	18.26
1993	20.95	(24.9)	15.63	(19.59)	6.3	22.76

Sources: See table 5.6 and China, General Administration of Customs (various years) and Hong Kong Government (1993).

Note: Figures are in billions of U.S. dollars. Numbers in parentheses are not adjusted for reexport margins.

Table 5.8 shows six different U.S. trade imbalances with China: published U.S. data, which show a growing trade deficit; published Chinese data, which show a U.S. surplus until 1993, when reexports were beginning to be considered; Chinese data adjusted for reexports only (in parentheses); Chinese data adjusted for both reexports and reexport margins; U.S. data adjusted for reexports only (in parentheses); and U.S. data adjusted for both reexports and reexport margins. The most reliable amount should be the U.S. data adjusted for both reexports and reexport margins. However, as noted earlier, this correction overstates the problem, since some U.S. firms that export to China via Hong Kong may know in advance the final destination and may declare this on their customs forms.

If we compare the adjusted Chinese data with the U.S. published data, we see that the discrepancies are diminishing over time. As percentages of the published U.S. data, the adjusted Chinese data are 34.6, 56.0, 58.5, 66.4, and 92.1 percent from 1989 to 1993, respectively. If we use adjusted U.S. data as the benchmark, as a percentage the differences between U.S. adjusted data and Chinese adjusted data are 36.7, 18.6, 12.7, 3.66, and −34.0 percent from 1989 to 1993. It is interesting that by 1992, the difference between the two adjusted numbers is negligible. This gives us indirect confirmation that our adjustments are not completely off the mark.

5.4 Issues Related to FDI-Related Trade

5.4.1 China–Hong Kong Outward Processing Trade

The Hong Kong Census and Statistics Department began to compile statistics on domestic exports and reexports to China related to outward processing in the third quarter of 1988 and statistics on imports from China related to outward processing in the first quarter of 1989. According to the Hong Kong government, outward processing arrangements are made between Hong Kong

ments (such as the low-level threshold; i.e., U.S. customs does not report export transactions that are under U.S.$2,500).

Table 5.9 Hong Kong Domestic Exports to China of an Outward Processing Nature as a Share of Total Domestic Exports to China, by Product Group (percent)

Product Group	1989	1990	1991	1992	1993
Textiles	84.8	84.2	83.7	87.4	86.8
Clothing	85.1	87.9	89.6	93.2	94.2
Plastic products	83.9	86.1	79.6	77.5	81.5
Machinery and electrical appliances	56.7	62.2	58.6	59.7	54.0
Electronic products	94.6	94.4	92.5	92.7	94.7
Watches and clocks	98.5	97.3	98.1	98.5	98.6
Toys, games, and sporting goods	96.4	96.9	96.1	91.9	97.2
Metals and metal products	64.2	71.1	73.5	69.0	65.1
All products	76.0	79.0	76.5	74.3	74.0

Source: Hong Kong Government (various years, a).

companies and manufacturing entities in China under which the companies concerned subcontract all or part of the production processes relating to their products to the Chinese entities. Raw materials or semimanufactures are exported to China for such processing. The Chinese entity involved can be a local enterprise, a joint venture, or some other form of business involving foreign investment (Hong Kong Government 1994). Almost four-fifths of Hong Kong manufacturers have transferred production to China. About 25,000 factories in the Pearl River Delta region of Guangdong are engaged in outward processing for Hong Kong companies, while 3 to 4 million workers are directly or indirectly employed by these firms (Ash and Kueh 1993). In 1993, the entire labor force in manufacturing in Hong Kong was only 0.5 million. Employment in China for outward processing of Hong Kong goods is then between six to eight times that in Hong Kong. Tables 5.9, 5.10, and 5.11 document, respectively, the extent of domestic exports, imports, and reexports related to Hong Kong processing in China.

From tables 5.9, 5.10, and 5.11, we see that 74 percent of Hong Kong's domestic exports to China were related to outward processing in 1993. The highest amount of outward processing was in watches and clocks, with 98.6 percent. For the five years between 1989 and 1993, the overall percentage is fairly consistent, hovering between 74.3 and 79 percent. For imports from China, there is an increase from a low of 58.1 percent in 1989 to a high of 73.8 percent in 1993. As with domestic exports, watches and clocks had the highest outward processing ratio in 1993. For Hong Kong's reexports to China, table 5.11 shows that in 1993, 42.1 percent of all products were for outward processing. Compared to domestic exports and imports, this lower ratio is due to the low outward processing character of bulkier reexports such as machinery and electrical appliances and metal and metal products (26.1 and 35.8 percent in 1993, respectively). Bulkier items tend to be produced outside of Hong Kong and reexported via Hong Kong to China without further processing. As

Table 5.10 **Hong Kong Imports from China of an Outward Processing Nature as a Share of Total Imports from China, by Product Group (percent)**

Product Group	1989	1990	1991	1992	1993
Textiles	12.8	18.2	20.5	23.0	27.3
Clothing	84.5	87.4	86.6	84.4	83.1
Plastic products	73.4	78.0	84.8	89.3	90.4
Machinery and electrical appliances	77.8	73.3	78.7	81.0	76.4
Electric products	85.2	88.7	89.7	92.7	91.5
Watches and clocks	94.6	94.9	96.4	94.3	95.8
Toys, games, and sporting goods	94.1	94.8	92.1	96.9	91.6
Metals and metal products	30.2	32.5	29.6	43.6	52.3
All products	58.1	61.8	67.6	72.1	73.8

Source: Hong Kong Government (various years, a).

Table 5.11 **Hong Kong Reexports to China of an Outward Processing Nature as a Share of Total Reexports to China, by Product Group (percent)**

Product Group	1989	1990	1991	1992	1993
Textiles	71.5	75.9	77.1	81.9	81.0
Clothing	87.3	86.5	84.1	76.0	80.2
Plastic products	58.0	68.7	58.3	64.5	63.0
Machinery and electrical appliances	24.9	31.2	26.7	27.3	26.1
Electric products	43.1	52.9	46.9	41.4	35.7
Watches and clocks	93.5	96.9	96.3	97.7	98.7
Toys, games, and sporting goods	60.1	73.2	66.8	80.1	79.9
Metals and metal products	37.8	46.4	48.1	34.8	35.8
All products	43.6	50.3	48.2	46.2	42.1

Source: Hong Kong Government (various years, a).

regards Hong Kong's reexports of Chinese origin to overseas markets (not shown in the tables), 74, 78, and 81 percent were products of outward processing arrangements commissioned from Hong Kong in 1991, 1992, and 1993, respectively (Hong Kong Government 1994).

Hong Kong's outward processing arrangements with China involve a combination of assembly by Chinese firms and production in China by Hong Kong–owned firms.[11] Technically, this trade is not all related to FDI but is a combination of FDI and Hong Kong *subcontracting*. However, in practice, outward processing often involves situations in which the Hong Kong investor has de facto (though not necessarily legal) control of the operations.

We can compare the above outward processing activities with the extent of intrafirm trade involving U.S. multinationals. In essence, we compare intrafirm

11. I discuss the different types of foreign investment in China immediately following the section on outward processing from Hong Kong.

Table 5.12 **Intrafirm Exports and Intrafirm Imports as a Share of Total U.S. Exports and Imports with U.S. Parents, 1989 (percent)**

Industry	Exports	Imports
Textile products and apparel	11.42	10.98
Rubber and plastics	23.88	6.23
Machinery	20.41	18.25
Electric and electronic equipment	22.16	15.45
Primary and fabricated metals	7.26	2.93
All industries	24.64	15.46

Sources: U.S. Department of Commerce (1992) and U.S. Bureau of the Census, *Statistical Abstract of the United States* (Washington, D.C.: U.S. Bureau of the Census, 1991).

trade between Hong Kong parents and their affiliates in China to that between U.S. parents and their affiliates outside the United States. But the comparison is not exact because Hong Kong outward processing can involve some local mainland Chinese enterprises. The industries also are not entirely comparable across countries. Unlike Hong Kong, the United States does not have statistics related to intrafirm trade on reexports. Nor do we expect reexports to be an important share of total trade for the United States.

From tables 5.9, 5.10, and 5.12, we see that Hong Kong–China intrafirm activity is significantly larger for most industries. For all products, 76 percent of Hong Kong's domestic exports were related to outward processing in 1989, while the percentage of intrafirm exports for the United States was only 24.6 percent. On the import side, the corresponding figures for Hong Kong and the United States were 58.1 and 15.5 percent, respectively. Using this comparison as an index of economic integration, Hong Kong is clearly more integrated with China than the United States is with the rest of the world. Next we compare the outward processing activities of Hong Kong in China to intrafirm trade between the United States and Mexico.

Table 5.13 reports related-party imports to the United States from Mexico in 1991. "Related-party trade" is defined in Section 402 (g) (1) of the Tariff Act of 1930, as amended, to include transactions between parties with various types of relationships, including "any person directly or indirectly owning, controlling, or holding with power to vote, 6 percent or more of the outstanding voting stock or shares of any organization" (U.S. Department of Commerce 1993). Related-party trade includes imports into the United States by U.S. companies from their foreign subsidiaries as well as imports by U.S. subsidiaries of foreign companies from their parent companies. I assume that imports into the United States by Mexican firms are small relative to imports by U.S. firms.

Related-party imports in textiles were more intense between the United States and Mexico than outward processing imports between Hong Kong and China, though for clothing, the figure for Hong Kong was much higher

Table 5.13 U.S. Related-Party Imports from Mexico, 1991

Product	Share of Related-Party Imports in Total Product Imports (%)
Textile yarns, fabrics, madeup articles	58.49
Articles of apparel and clothing accessories	47.15
Articles of plastics	59.33
Machinery, electrical and others	85.04
Toys and sports equipment	85.28
Electronic products and parts	89.53
Metals and metal products	43.87
All products	63.2

Source: U.S. Department of Commerce (1993).

(tables 5.10 and 5.13). For metals and metal products, the U.S. import figure was, however, higher than that for Hong Kong. Loosely speaking, FDI-related trade in 1991 was somewhat larger between Hong Kong and China than between the United States and Mexico (for all products, the percentage was 67.6 percent for Hong Kong–China vs. 63.2 percent for U.S.-Mexico). If we take FDI-related trade as one index of economic integration, then Hong Kong and China are more integrated than the United States and Mexico.

5.4.2 China's FDI-Related Trade

China's customs statistics contain information about imports and exports related to FDI (or trade related to foreign-invested firms). FDI arrangements include three types of enterprises: Sino-foreign contractual joint ventures, Sino-foreign equity joint ventures, and wholly foreign-owned enterprises. Contractual joint ventures, sometimes called cooperative ventures, are flexible arrangements that may take almost any form as long as the arrangement is acceptable to both parties. Usually the foreign partner contributes funds, equipment, and technology, and the Chinese partner supplies land, factory buildings, labor, and raw materials.[12] Legally, China discourages subcontracting in joint ventures, hoping for more transfer of technology and management skill.[13]

In addition to statistics on trade associated with FDI, there is also information about imports and exports related to foreign subcontracting, compensation trade, and processing and assembling operations (see China, General Administration of Customs, various years).[14] FDI arrangements are those in which the

12. See Sung (1991), Ash and Kueh (1993), and Fung (1997) for further discussion of the three types of enterprises.

13. But according to my own interviews with Hong Kong businessmen, in practice subcontracting seems to be quite common among joint ventures as well.

14. Ash and Kueh (1993), Sung (1991), and Fung (1997) discuss these activities.

Table 5.14 Foreign-Investment–Related Trade in Mainland China

Trade Category	1992		1993	
Imports				
Total	24.36	(100)	34.37	(100)
Processing and assembling	12.64	(51.89)	12.97	(37.73)
Equipment imported for processing and assembling	1.207	(4.96)	1.324	(3.85)
Equipment and materials imported as investment by FDI	8.018	(32.92)	16.63	(48.38)
Compensation trade	0.250	(1.02)	0.330	(0.96)
Materials or components imported by FDI for manufacturing products for domestic use	2.243	(9.21)	3.121	(9.08)
Exports				
Total	15.60	(100)	16.28	(100)
Processing and assembling	15.30	(98.09)	15.96	(98.07)
Compensation trade	0.298	(1.91)	0.314	(1.93)

Source: China, General Administration of Customs (various years).

Note: Figures are in billions of U.S. dollars. Numbers in parentheses are shares of foreign-investment–related imports and exports.

foreign investors have some legal control of the enterprises. In subcontracting, the Chinese partner has legal control of the operations.[15] In processing and assembling, the foreign entity gives its manufacturing operation to a Chinese partner, providing the necessary materials and selling the finished products abroad. In return, the Chinese partner gets subcontracting fees for conducting the prescribed operations (usually no more than 10 percent of the value of the finished products; see Lardy 1994). In compensation trade, the foreign partner provides the Chinese partner with equipment and receives products in return. Outputs from subcontracting have to be exported. Outputs from FDI can be sold domestically (Sung 1991). In this paper, foreign investment refers to both FDI and foreign subcontracting. Until recently, investments from Hong Kong and Taiwan tended to concentrate on subcontracting, while investments from the United States and Japan tended to concentrate on FDI (Fung 1997; Fung and Iizaka 1998). Table 5.14 decomposes Chinese imports and exports associated with different kinds of foreign investments (both FDI and foreign subcontracting) for the years 1992 and 1993.

According to China's customs statistics, 33.0 percent of 1993 Chinese imports were related to FDI and subcontracting while 17.7 percent of exports were related to subcontracting.[16] The bulk of imports associated with foreign investment were processing and assembling (37.7 percent of imports related to

15. But in practice, the Chinese partner manufactures according to the orders given by the foreign partner, who arguably has real control.

16. These figures are calculated by dividing foreign-investment–related imports and exports by China's total imports and exports for 1992 and 1993.

Table 5.15 **Trade by FDI Enterprises in Guangdong Province (Customs Source)**

Enterprise Category	1989	1992	1993
Imports			
Total	4.85	13.95	19.80
Sino-foreign contractual joint venture	1.14	3.32	5.88
Sino-foreign equity joint venture	3.11	7.43	9.28
Foreign-owned enterprise	0.61	3.19	4.64
Exports			
Total	3.53	10.79	14.37
Sino-foreign contractual joint venture	0.71	2.40	3.35
Sino-foreign equity joint venture	2.26	5.69	6.88
Foreign-owned enterprise	0.56	2.70	4.14

Source: China, General Administration of Customs (various years).
Note: Figures are in billions of U.S. dollars.

foreign investment in 1993) and equipment and materials imported as investment by FDI (48.4 percent of imports related to foreign investment in 1993).[17]

We can further focus on trade activity related to foreign investment in two provinces where foreign investment from Hong Kong and Taiwan is most intense: Guangdong and Fujian. There are two sets of data on trade related to foreign investment in these two provinces, one from China's customs statistics and the other from the statistical yearbooks of the respective provinces.[18] The customs data show imports and exports related to the three types of foreign enterprises. Imports and exports of these foreign firms are growing rapidly. For example, in Guangdong, total exports from foreign firms grew by 33.1 percent while imports grew by 41.9 percent in 1993 (table 5.15).[19] Trade (both imports and exports) related to foreign-owned enterprises is an increasing share of total FDI-related trade in both provinces. In Fujian, 55.5 percent of FDI exports and 49.0 percent of imports were from foreign-owned enterprises in 1993 (table 5.16). Since the tour by Deng to southern China in early 1992, there has been a rush of FDI to China from Hong Kong and Taiwan firms. Part of the general increase in imports and exports in 1993 may reflect this trend.

The *Guangdong Statistical Yearbook* and the *Fujian Statistical Yearbook* have different classifications from the customs statistics, and the classifications of these yearbooks also differ from one another. The provincial yearbooks attempt to separate out FDI and foreign subcontracting. According to these yearbooks, in 1991, 45 percent of Guangdong's exports were associated with either

17. On the export side, exports by foreign-invested firms amounted to U.S.$25.2 billion, or 27.5 percent of Chinese total exports (Lardy 1994). Total exports associated with foreign investment (both FDI and subcontracting) in 1993 were 45 percent of total Chinese exports.

18. China, Provincial Government of Guangdong (various years) and China, Provincial Government of Fujian (various years). Ash and Kueh (1993) also contains discussions of trade related to foreign investment in Guangdong and Fujian.

19. Growth rates are not shown in tables 5.15 and 5.16.

Table 5.16 Trade by FDI Enterprises in Fujian Province (Customs Source)

Enterprise Category	1989	1992	1993
Imports			
Total	0.760	2.50	3.57
Sino-foreign contractual joint venture	0.047	0.106	0.201
Sino-foreign equity joint venture	0.591	1.31	1.63
Foreign-owned enterprise	0.120	1.09	1.75
Exports			
Total	0.490	1.93	2.49
Sino-foreign contractual joint venture	0.047	0.0908	0.123
Sino-foreign equity joint venture	0.363	0.929	0.984
Foreign-owned enterprise	0.086	0.910	1.382

Source: China, General Administration of Customs (various years).
Note: Figures are in billions of U.S. dollars.

Table 5.17 Foreign-Investment–Related Trade of Guangdong Province (Guangdong Source)

Trade Category	1988	1989	1990	1991
Imports				
Guangdong imports	5.11	4.83	5.75	8.51
FDI enterprise	1.13	1.95	3.30	4.51
Exports				
Guangdong exports	7.48	8.17	10.6	13.7
Processing and assembling	0.347	0.578	0.583	0.800
Compensation trade	0.06	0.06	0.078	0.095
FDI enterprise	1.20	2.28	3.72	5.33

Source: China, Provincial Government of Guangdong (various years).
Note: Figures are in billions of U.S. dollars.

subcontracting or FDI (table 5.17). The bulk of it was from FDI enterprises (38.9 percent). In Fujian, 9.4 percent came from subcontracting (table 5.18). But there is no record of exports by foreign-invested firms in the *Fujian Statistical Yearbook.* Furthermore, if we look at the reported FDI exports from the statistical yearbook and compare these exports with those in the customs statistics, the data differ quite significantly. In general, data from the customs statistics are more reliable.

Another interesting question about foreign firms in China is where their products are going.[20] If they are made under subcontracting arrangements, then they are exported. But if they are produced by the three types of foreign enterprises, they can be intended for domestic use or for export. In 1994, the Chung-Hua Institution for Economic Research reported the results of a large-scale

20. For a comparison of U.S. firms and Japanese firms in China, see Fung and Iizaka (1998).

Table 5.18 **Foreign-Investment–Related Trade of Fuijian Province (Fujian Source)**

Trade Category	1988	1989	1990	1991
Imports				
Fujian imports	1.43	1.59	1.90	2.61
Processing and assembling	0.15	0.16	0.16	0.25
Equipment and materials imported by foreign-invested enterprises	0.23	0.17	0.24	0.28
Compensation trade	0.005	0.01	0.004	0.005
Components imported by FDI for manufacturing products for domestic use	0.01	0.08	0.01	0.02
Exports				
Fujian exports	1.42	1.83	2.45	3.15
Processing and assembling	0.12	0.18	0.21	0.29
Compensation trade	0.01	0.01	0.01	0.005

Source: China, Provincial Government of Fujian (various years).
Note: Figures are in billions of U.S. dollars.

Table 5.19 **Markets for Manufactured Products Produced by Foreign Firms in Mainland China, 1992**

	Market						
Firm	Mainland China	Taiwan	Hong Kong	Europe	Japan	United States	Others
Hong Kong/Macau	35.4	12.0	13.2	7.0	7.5	14.1	10.8
United States	69.5	0.0	2.8	3.6	1.9	15.6	6.6
Taiwan	59.6	0.9	22.3	4.1	2.2	4.8	6.1
Singapore	55.2	1.0	9.7	9.0	4.2	8.0	12.9

Source: Chung-Hua Institution for Economic Research (1994).
Note: Figures are percentages of the value of sales.

survey in China on this issue. Table 5.19 indicates the export markets of the foreign firms.

From table 5.19, we see that most products of foreign firms are destined for the domestic Chinese market. U.S. firms have the highest domestic percentage, with a figure close to 70 percent. Hong Kong has the lowest percentage, with 35 percent. About 16 percent of the value of U.S. goods produced in China is for sale back to the United States. For Hong Kong firms, export markets are evenly spread over the United States, Hong Kong, and Taiwan, with the U.S. market being most important. For Taiwanese firms, after China, the largest market is Hong Kong. But it seems strange that only 0.9 percent of the sales go back to Taiwan. One reason may be that, again, exports have to go through Hong Kong before they go to Taiwan. In sum, the picture here is that foreign-invested firms sell most of their goods in China. This illustrates the growing importance of the domestic Chinese market. For both U.S. and Hong Kong firms, the United States is the next largest market.

5.5 Issues Related to Illegal Trade

5.5.1 China-Taiwan Illegal Trade

As mentioned earlier, the Taiwanese government still has an official policy of no direct contact with mainland China. Much of the indirect trade occurs via Hong Kong as reexports. But Taiwan's import controls on the mainland's products have gradually been liberalized. By the end of 1990, indirect imports of 92 items were permitted, including all agricultural and industrial raw materials (Kao 1993).

Transshipment (using the Hong Kong government's definition) means that goods are consigned directly from the exporting country to a buyer in the importing country, though the goods are transported via Hong Kong and are usually loaded into another vessel for further journey. Since transshipment is a form of direct trade, it is illegal from Taiwan's standpoint. Transshipment is not a part of Hong Kong trade because nobody has legal possession of the goods in Hong Kong.[21] The goods do not clear customs. According to Sung (1994), Taiwan's customs allow exporters to leave final destinations open and specify Hong Kong as the port from which goods will be transported elsewhere. In Taiwan's trade statistics, such exports are entered under exports to Hong Kong. When the cargo arrives in Hong Kong, the shipping company can pick a mainland port as the final destination.

Transshipment is different from transit shipment, which means that goods do not change vessels and just pass through Hong Kong on their way to the final destination. Exporters from Taiwan claim that their goods are going to Hong Kong when they leave Taiwan and then claim in Hong Kong that they are going to the mainland (Sung 1994). Unlike transshipment, this method of direct trade is risky since it involves lying to the Taiwanese government. The Hong Kong government has data on transshipments by *weight* but does not keep records on cargo in transit. The value of transshipments is not known because transshipped goods do not go through customs. Table 5.20 reports reexports and transshipments via Hong Kong between Taiwan and mainland China.

As early as 1980s, fishing boats were conducting direct barter trade between Taiwan and Fujian. Fujian legalized this trade in 1985. But the Taiwanese government considers such trade illegal smuggling. Researchers at the Chung-

21. This definition of transshipment is different from the term "transshipment" used in popular discussions of Chinese trade. In the popular press, "transshipment" is often used in the context of false declaration of origins and misuse of quotas, particularly Multifiber Arrangement (MFA) quotas.

Table 5.20 Reexports and Transshipments via Hong Kong: Taiwan and China

Year	Reexports		Transshipments	
1989	2,897	(587)	33,283	(6,662)
1990	3,283	(766)	43,757	(12,447)
1991	4,685	(1,130)	272,475	(87,610)
1992	6,336	(1,128)	527,427	(211,026)

Sources: Hong Kong Government (various years, b) and Hong Kong Government, *Hong Kong Shipping Statistics* (Hong Kong: Census and Statistics Department, various years).

Note: Reexports are in millions of U.S. dollars; transshipments are in tons. Numbers without parentheses are reexports and transshipments from Taiwan to China via Hong Kong. Numbers in parentheses are reexports and transshipments from China to Taiwan via Hong Kong.

Table 5.21 Taiwan's Exports to Mainland China

Year	Reexports via Hong Kong	Reexports via Others	Direct Exports		Total	
1988	2,242	960	116	[236]	3,318	[3,438]
	(3.6)				(5.5)	(5.7)
1989	2,896	1,241	642	[793]	4,779	[4,930]
	(4.4)				(7.2)	(7.4)
1990	3,278	1,405	1,361	[1,525]	6,044	[6,208]
	(4.9)				(9.0)	(9.2)
1991	4,679	2,005	3,189	[3,399]	9,873	[10,083]
	(6.1)				(13.0)	(13.3)
1992	6,288	2,695	5,392	[4,705]	14,375	[13,688]
	(7.2)				(17.6)	(16.8)

Sources: Kao (1993), Sung (1994), and Taiwan, Ministry of Finance (various years).

Note: Figures are in millions of U.S. dollars. Numbers in parentheses are percentages of total Taiwanese exports. Numbers in brackets are alternative estimates from Sung (1994).

Hua Institution for Economic Research estimated that in the late 1980s such smuggling of mainland Chinese goods to Taiwan was about one-third of Hong Kong reexports of Chinese goods to Taiwan (Kao 1993). For 1989, this estimate puts the value of such illegal trade at U.S.$195 million.

Table 5.21 reports Taiwanese exports to China via Hong Kong, exports via other places (Singapore, Japan, Guam, etc.), and illegal direct exports (including transshipment, transit shipment, minor trade, etc.). Total Taiwanese exports to mainland China are significantly higher than "legal" trade alone. In 1991 and 1992, the percentages of illegal trade were 31.3 and 36.5 percent, respectively. In 1992, illegal exports (direct exports) were between 52 and 60 percent of legal exports (reexports through Hong Kong and elsewhere). As indicated in table 5.22, the corresponding figure for imports was between 44 and 76 percent.

Table 5.22 Taiwan's Imports from Mainland China

Year	Reexports via Hong Kong	Reexports via Others	Direct Imports		Total	
1988	478	205	n.a.	[14]	683	[697]
	(1.0)				(1.4)	(1.43)
1989	586	251	93	[37]	930	[874]
	(1.1)				(1.8)	(1.69)
1990	765	328	320	[70]	1,413	[1,163]
	(1.4)				(2.6)	(2.14)
1991	1,129	484	595	[501]	2,208	[2,114]
	(1.8)				(3.5)	(3.35)
1992	1,119	479	698	[1,219]	2,296	[2,817]
	(1.6)				(3.2)	(3.93)

Sources: Kao (1993), Sung (1994), and Taiwan, Ministry of Finance (various years).
Note: Figures are in millions of U.S. dollars. Numbers in parentheses are percentages of total Taiwanese imports. Numbers in brackets are estimates by Sung (1994).

5.5.2 Other Forms of Illegal Trade

While illegal trade between Taiwan and China arises primarily from the policies of the Taiwanese government, there are also other more standard forms of illegal trade such as smuggling and tariff evasion, as documented by Sung (1991), Lardy (1994), and West (1995). In 1993, Chinese customs seized a record of U.S.$0.41 billion in smuggled products, an increase of almost 80 percent over the 1992 level. From 1981 to early 1993, more than 10,000 cases of smuggling at sea were discovered.[22]

Geographically, smuggling as a form of illegal trade is now a *national* rather than regional phenomenon. In the past, smuggling was confined mainly to southern coastal areas. In recent years, it has spread all the way up to the coast of Shandong and Dalian. However, it is unclear whether the increase in reported smuggling reflects improved enforcement or greater incidence of smuggling.

Smuggling is most popular for products whose import is restricted by the government, either by tariffs or other barriers. From an economic standpoint, this illegal trade may be regarded as induced by inefficient governmental interventions.[23] Commonly smuggled items include color television sets, cars, cigarettes, motorcycles, air conditioners, steel products, and polyester fibers. In the first quarter of 1993, cars and cigarettes were reported to be the number one and number two smuggled goods.[24]

One can often get an idea of how significant smuggling is by comparing

22. West (1995) contains a more detailed discussion.
23. Some of the governmental interventions in U.S.-China trade are imposed by the U.S. government. In textile and clothing, trade is regulated via the MFA. In high-technology trade, the U.S. government imposes some export controls (Richardson 1993).
24. See West (1995) for further discussion.

bilateral trade statistics, preferably by quantity and, with some care, also by value. For example, according to South Korean customs, between January and April 1993 South Korea exported 26,688 cars to China, but Chinese customs statistics show only 166 cars imported from South Korea for the same period. One can infer that some of the "missing" cars have been smuggled into China to avoid Chinese customs (West 1995).

In the first quarter of 1994, about 35 percent of the major reported smuggling cases involved the use of fake customs certificates, seals, and customs officers' signatures. There are also false declarations of origin (Lardy 1994). It has been reported that a Thai certificate of origin can be obtained for as little as $100 (Sung 1991). The U.S. Trade Representative (USTR) reported that U.S. Customs Service officers have found Chinese goods illegally labeled in at least 25 other nations, including Honduras, Panama, and Hong Kong.

5.6 Conclusion

In this paper I try to clarify various conceptual and data issues related to China's trade. China's trade is characterized by at least *three* features: high incidence of reexports via Hong Kong, high incidence of trade related to foreign investment, and high incidence of "illegal" trade, most notably with Taiwan. There are also indications that illegal trade in the form of smuggling and evasion of trade barriers is spreading to China's trade with all its trading partners.

In 1993, 67 percent of China's exports were reexported via Hong Kong, and 34 percent of China's imports were reexports via Hong Kong from the rest of the world. These reexports complicate China's trade data with all its trading partners, and not until 1993 did China differentiate these reexports from trade with Hong Kong. If we take these reexports and reexport margins into account, bilateral U.S.-China trade deficits (using U.S. trade data) must be adjusted downward by about 35 percent. Reexport and reexport margins affect not only Chinese trade data but also make other countries' trade data with China inaccurate.

Much of China's trade is also foreign investment related. According to Chinese data, in 1993, 45.2 and 33 percent of Chinese exports and imports, respectively, were due to foreign firms and foreign subcontracting.[25] In 1991, according to Guangdong data, about 44 percent of Guangdong's exports were associated with foreign investments. Furthermore, there are good reasons to believe that this figure is understated.

With respect to China–Hong Kong trade, 74.0 percent of China's imports from Hong Kong were related to outward processing in 1993. For China's exports to Hong Kong, the corresponding figure was 73.8 percent. Of the reex-

25. In 1993, exports associated with subcontracting alone were 17.7 percent while exports associated with FDI were 27.5 percent.

ports of Chinese goods to overseas markets via Hong Kong, 81.0 percent were commissioned by Hong Kong firms, while 42.1 percent of reexports via Hong Kong to China were due to outward processing.

"Illegal" trade between mainland China and Taiwan was primarily induced by Taiwan's policy banning direct trade. Most of the legal exports from Taiwan to mainland China occur as reexports via Hong Kong. In 1992, illegal direct exports from Taiwan to mainland were between 52 and 60 percent of legal indirect exports. There are also some indications that other forms of illegal trade such as smuggling may be spreading. But other than a few isolated figures, it is difficult to get accurate estimates of illegal trade.

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Comment Marcus Noland

It's a dirty job but someone had to do it, and K. C. Fung has written a very useful paper plowing through the accounting morass of China's burgeoning trade. I will simply elaborate on three issues: valuation, trade between Taiwan and China, and transshipment and smuggling.

Valuation

The issue of Hong Kong reexport margins is particularly salient because of the asymmetrical role Hong Kong plays in intermediating imports and exports in U.S.-China trade. The reason is that U.S. exports to China are concentrated in products such as aircraft, chemicals, and logs in which Hong Kong firms do not play much of an intermediation role and the products are shipped directly from the United States to China. In contrast, Chinese exports to the United States are concentrated in light manufactures in which Hong Kong firms are more active in ancillary manufacturing activities such as packaging, and indeed many of these exports originate from Hong Kong–owned plants in China.

In any event, policy reforms and the real exchange rate changes of the late 1980s have led to a relocation of light manufactures production from Hong Kong and Taiwan to China. Again, it would be interesting to evaluate the "shifting surplus" story depicted in table 5C.1 in light of Fung's accounting adjustments.

Taiwan Trade

Trade between Taiwan and China is booming. In March 1995, Hong Kong replaced the United States as Taiwan's largest export destination for the first time ever. In May 1995, the Taiwanese government announced that it would begin to permit direct shipping across the Taiwan Straits to the mainland. Trade was $14.4 billion in 1993 based on Chinese government figures, $13.74 according to the ROC Board of Trade; some 30,000 Taiwan businesses have an

Marcus Noland is a senior fellow at the Institute for International Economics and visiting professor at Johns Hopkins University.

Table 5C.1 **Bilateral U.S.-Chinese Economic Area Trade Balances**

Year	Chinese Economic Area	People's Republic of China	Hong Kong	Taiwan
1987	−25.9	−2.8	−5.9	−17.2
1988	−20.6	−3.5	−4.6	−12.6
1989	−22.6	−6.2	−3.4	−13.0
1990	−24.4	−10.4	−2.8	−11.2
1991	−23.7	−12.7	−1.1	−9.8
1992	−28.4	−18.3	−0.7	−9.3
1993	−31.4	−22.8	0.3	−8.9
1994	−37.4	−29.5	1.7	−9.6
1995	−39.6	−33.8	3.9	−9.7

Source: U.S. Department of Commerce.
Note: Figures are customs valuation, in billions of U.S. dollars.

estimated $20 billion (give or take $5 billion) invested in China. (Again, figures are highly uncertain because of circumvention of Taiwanese capital controls.) Taiwanese firms are beginning to set up R&D facilities, as well as production facilities, on the mainland. And, indeed, the Taiwanese are probably the biggest investors in China.

This poses a real political dilemma for the Taiwanese authorities. On the one hand, trade with and investment in the mainland is the logical result of shifting comparative advantage. On the other hand, increased contact poses a potential security threat in the narrow sense and loss of independence in a deeper sense. The Taiwanese government has become concerned about dependence, and in 1992 the government introduced a new monitoring system based on customs data released by the Hong Kong government on growth rate and market share of 30 leading imports and exports transshipped through Hong Kong. The 100-point system is divided into cold, cool, normal, warm, and overheated. The government has also introduced a "Look South" policy of encouraging investment diversion away from the mainland and toward Southeast Asia, but it is not obvious that the policy is having much effect.

Some interesting surveys of the activities of Taiwanese firms in China have been done. In 1992, the Ministry of Economic Affairs found that 18.5 percent of firms primarily sold their output within the People's Republic of China, 12.1 percent exported back to Taiwan, and the remainder primarily exported the output to third markets, supporting the shifting surplus story. Indeed, the worsening intellectual property rights disputes between the United States and China can in some part be seen as a case of Taiwan offloading its pirate activities (at least with respect to compact disks) to China.

A subsequent survey in 1993 by the Chung-Hua Institution for Economic Research found that 63.75 percent of Taiwanese firms in China primarily procured intermediates from Taiwan, while 20 percent indirectly purchased parts from Chinese suppliers.

With respect to financing, nearly three-quarters of Taiwanese plants in China are financed from Taiwan (72.25 percent), 17.2 percent get their financing from Chinese financial institutions, 7.0 percent are financed by banks in third countries, and 1.45 percent get financing from Chinese subsidiaries of third-country banks. In 1993 the first Taiwanese firm, Tsann Kuen Enterprise Ltd., an appliance maker, listed on a mainland stock exchange (Shenchen).

Transshipment

Last, on the issue of transshipment and smuggling, there is one channel that Fung does not mention. South Korean firms currently transship through China to North Korea and then back again. This trade is in the hundreds of millions of dollars and growing rapidly, though how it continues is obviously contingent on North Korea–South Korea relations. Also, there is significant smuggling across the North Korea–China border. Again, observers have put the magnitude in the hundreds of millions of dollars.

The real money is in textile and apparel transshipment, however, and I believe that Fung has grossly underestimated the quantitative importance and policy relevance of this issue. In an earlier version of the paper, transshipment to circumvent the Multifiber Arrangement was brushed off in two sentences, with the statement that the estimated $2 billion in illegal textile imports into the United States is an inflated figure from a textile producer group. My understanding is that figure comes from the U.S. Customs Service.

China circumvents its bilateral textile and apparel quotas, mainly by transshipping products through third countries that are also covered by bilateral quotas. In other words, the Chinese substitute their products for the unfulfilled quotas of third countries. A Treasury study also put the value of these transshipments at $2 billion. The main transshipment points are the high-wage locations of Hong Kong, Taiwan, Macau, and Singapore. Textile and apparel imports from these four countries were $8.5 billion in 1993. In other words, the Treasury figure implies that nearly 25 percent were transshipped.

A bilateral agreement on this issue was signed in January 1994. Government sources indicate that the problem appears to be getting worse, however. According to the Customs Service (not the textile lobby!), there appears to be roughly $10 billion in Chinese textiles and apparel floating around the world not properly accounted for.

For example, Chinese customs officials reported $13 billion in exports to 120 countries in 1992. Eighty-one countries alone reported $23.7 billion of imports from China in the same year. (The Ministry of Foreign Trade and Economic Cooperation reports $7.7 billion in textile and apparel exports in 1992, making the discrepancy even bigger.)

China reports $6.4 billion in textile and apparel exports to Hong Kong in 1992. Hong Kong reports $8.6 billion in consumption imports (a enormous figure), and $9.7 billion in reexports. Even allowing for high reexport markups, these discrepancies are huge.

The Customs Service found that half of the 36 fastest growing apparel suppliers to the U.S. market had no significant domestic production for export but reported a significant increase in imports from China. Kenya, for example, has recently experienced a 790 percent growth rate in apparel imports from China, and a 212 percent growth in exports to the United States. Other countries, including Belize, the Czech Republic, Ecuador, and Qatar, exhibit similar triple-digit growth rates. All in all, the Treasury Department estimates that at least $200 million of illegally transshipped apparel is coming into the United States through these countries.

Transshipping is currently subject to criminal prosecution, and the Customs Service and the Justice Department have launched an ambitious campaign to prosecute transshippers. There was recently a major conviction involving a Chinese state-owned firm.

Transshipping is potentially a big issue. Growing imports from China put downward pressure on the wage rates of low-skilled American workers. Moreover, the United States and China clash over issues such as China's desultory human rights record and arms proliferation. This is a combination that is likely to spell trouble for U.S.-China relations and could have a big impact on things like China's accession to the World Trade Organization.

Conclusion

When asked about an apparent musical plagiarism, Ringo Starr reportedly replied, "When you steal, steal from the best." I will give a paper next month in Hong Kong called "China in the World Economy." I am sure that I will be able to make good use (with proper attribution, of course) of "Accounting for Chinese Trade: Some National and Regional Considerations."

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6 Imported Inputs and the Domestic Content of Production by Foreign-Owned Manufacturing Affiliates in the United States

William J. Zeile

In recent years, foreign multinational firms have come to occupy a conspicuous position in U.S. manufacturing industries. Growth in the market share of foreign-owned manufacturing affiliates has been substantial, reflecting the dramatic surge in inward direct investment that occurred in the late 1980s. Recent data on the establishment-level operations of foreign-owned manufacturers, for example, indicate that from 1987 to 1991 the share of total U.S. manufacturing shipments accounted for by foreign-owned establishments increased from less than 10 percent to 15 percent; in such manufacturing industries as fabricated metal products, industrial machinery, and transportation equipment, the share of shipments by foreign-owned establishments doubled (U.S. Department of Commerce 1992, 1994).

This growing presence has prompted questions concerning the degree to which the output sold by foreign-owned manufacturers represents actual production within the borders of the United States. Concerns have been expressed in some quarters, for example, that foreign-owned manufacturing affiliates may be little more than final assembly operations set up to increase penetration of the U.S. market, with most of the value added in production taking place abroad. To the extent that these affiliates displace production by domestically owned firms, it is feared, they may reduce domestic employment and factor rents both in the industries in which they compete and in upstream industries supplying materials and components to domestically owned firms. Fears have also been expressed that, to the extent that they source their inputs from

William J. Zeile is an economist in the International Investment Division, Bureau of Economic Analysis, U.S. Department of Commerce.

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abroad, affiliates may contribute to increased import dependency in intermediate product sectors deemed to be of national importance.

Such concerns, while relatively new in the United States, have long been voiced in other countries that have been host to substantial foreign direct investment. In the case of developing countries, a related concern has been the possibility that foreign-owned manufacturers, relying on foreign sources for their intermediate inputs, might impede the development of indigenous suppliers through backward linkages.[1] Does the evidence for the United States support these concerns? At the end of our analysis, our answer is "only mildly, if at all."

Earlier work at the Bureau of Economic Analysis (BEA) suggests that the domestic content of production by foreign-owned manufacturing affiliates operating in the United States has been quite high, at least in the aggregate. For manufacturing affiliates in 1987, Lowe (1990) estimates an aggregate ratio of domestic content to sales of 91 percent, with imports accounting for 16 percent of affiliate purchases of intermediate inputs. Similar results at the aggregate level are reported in Zeile (1993) for manufacturing affiliates in 1991: the share of domestic content in total output is estimated to be 88 percent, with imports accounting for 17 percent of purchased inputs.

In the latter article, however, estimates from BEA's tabular data on affiliates aggregated by industry and country of ownership indicate that the import content of purchased inputs for affiliates is quite high in a number of specific industries, particularly for Japanese-owned affiliates. An outstanding question from this research is the degree to which the high import content observed for particular groups of affiliates may reflect finished goods imports associated with the affiliates' secondary activities in wholesale trade, rather than intermediate goods imports used in their strictly manufacturing operations.

Expanding on this earlier research, this paper presents detailed measures of the domestic content and sourcing behavior of foreign-owned U.S. manufacturing affiliates, based on affiliate-level data collected in BEA's 1992 benchmark survey of foreign direct investment in the United States.[2] The benchmark survey provides new information on the intended use of affiliate imports that can be used to construct a sample limited to affiliates whose imports consist mainly of intermediate goods used in manufacturing. The benchmark survey data also include information on the geographic origin of affiliate imports that is not collected in BEA's annual surveys.

The paper begins with a discussion of three measures related to the content of affiliate production and their construction from the benchmark survey data. Industry-level measures are presented for affiliates in 24 manufacturing indus-

1. Much of the existing empirical literature on the domestic content of production by foreign-owned firms is concerned with the issue of Hirshmanian linkages. For a summary of this literature, see Caves (1982, 270–72) and Dunning (1993, 445–73).

2. Data from the benchmark survey aggregated by industry of affiliate and country of ownership appear in U.S. Department of Commerce (1995).

tries, in comparison with similar measures for domestically owned manufacturing firms. The relation between the three content measures and affiliate age is also examined, using data constructed for a panel of affiliates in selected manufacturing industries. The paper then turns to an examination of differences in the content of affiliate production by investing country. Finally, the paper examines differences in import sourcing among affiliates of the major investing countries, in terms of the importance of intrafirm imports and the geographic origin of imports.

6.1 Measuring the Content of Affiliate Production

In its benchmark and annual surveys of foreign direct investment in the United States, BEA collects data on the consolidated operations of U.S. affiliates of foreign companies.[3] The data collected include balance sheet and income statement items, employment data, and data on the U.S. merchandise exports and imports shipped by or to affiliates. From data related to factor payments and certain other costs, BEA calculates the value added of affiliates.[4] Total output can be computed from the reported data as sales plus the change in end-of-year inventories. The value of intermediate inputs purchased by affiliates can be computed as the difference between total output and value added.

These data can be used to construct three measures that reveal information about the content of affiliate production. The first measure is the domestic content of affiliate total output, expressed as follows:

$$\begin{aligned}(1)\quad & \text{Domestic content of total output} \\ & = (\text{Total output} - \text{Imports}) / \text{Total output} \\ & = (\text{Valued added} + \text{Total purchased inputs} - \text{Imports}) / \text{Total output} \\ & = (\text{Value added} + \text{Domestically sourced inputs}) / \text{Total output}.\end{aligned}$$

As the final expression shows, domestic content can take the form of either internal production by the affiliate or production by the affiliate's domestic suppliers. In both cases, value is added within the borders of the affiliate's host country.

Dunning (1993) refers to two distinct decisions a foreign-owned affiliate

3. A U.S. affiliate is defined as a U.S. business enterprise in which a single foreign person owns or controls, directly or indirectly, 10 percent or more of the voting securities of an incorporated U.S. business enterprise or an equivalent interest in an unincorporated U.S. business enterprise. The 10 percent ownership threshold used in this definition conforms with International Monetary Fund (IMF) and Organization for Economic Cooperation and Development (OECD) standards on the definition of foreign direct investment.

4. The gross product (value added) of affiliates is calculated from the income side as the sum of employee compensation, profit-type return, net interest paid, indirect business taxes, and capital consumption allowance.

makes that affect its linkages with the domestic economy: the "make or buy" decision and the "import or procure locally" decision.

The make-or-buy decision determines the degree to which an affiliate internalizes the production of its intermediate inputs through vertical integration. Vertical integration at the affiliate level can be measured by the share of value added in total output:

$$\text{(2)} \qquad \text{Vertical integration} = \text{Value added / Total output}.$$

Assuming that all of the labor and other primary factors contributing to the affiliate's value added are supplied domestically, a higher degree of vertical integration implies higher domestic content.[5]

The import-or-procure-locally decision determines the import content of the affiliate's purchased intermediate inputs, which can be measured as

$$\text{(3)} \quad \text{Import content of purchased inputs} = \text{Imports / Total purchased inputs}.$$

Ceteris paribus, a higher share of imports in the affiliate's purchased inputs implies lower domestic content.

It should be noted that measures (1) and (3) capture direct (or first round) imports only—by construction, they exclude any imports (direct or indirect) that may be embodied in the inputs purchased from domestic distributors or manufacturers, data for which are not available. The measures also fail to count as "foreign" any purchases of services from abroad, as the data for affiliate imports cover merchandise imports only.

As an added caveat, measures (1) and (3) will be distorted to the extent that the data on affiliate imports include additions to the affiliates' capital stock (which, not being intermediate inputs, would not appear in the denominator of the measures) or goods for resale without further manufacture (which are part of the sales data used to construct the denominator, but which are not related to manufacturing production). Some affiliates classified in manufacturing may have substantial imports of goods for resale without further manufacture due to secondary activities in wholesale trade.[6]

Affiliate activities in secondary industries can also create distortions in the measure of vertical integration, insofar as the data on value added and total

5. An interesting question that challenges this assumption is how one should treat the contribution to value added provided by the depreciation of machinery and equipment that were imported. This question must remain an academic one, however, given the absence of data on the share of affiliate capital stock originating from imports.

6. In BEA's surveys of foreign direct investment in the United States, each affiliate is assigned to the industry in which it has the largest sales, based on a breakdown of its sales by BEA International Surveys Industry Classification code. Whereas sales and employment for an affiliate can be disaggregated by each industry in which it reports sales, the data for the other financial and operating items collected in the surveys are necessarily all assigned to the single industry in which the affiliate is classified. Data from the 1992 benchmark survey indicate that manufacturing sales accounted for 85 percent of total sales by affiliates classified in manufacturing. Sales in wholesale trade accounted for a little more than 6 percent of total sales by manufacturing affiliates.

output used to compute the measure are consolidated data covering all of an affiliate's operations, which may be diverse. Thus, in comparisons between affiliates classified in the same manufacturing industry, a lower measure of "vertical integration" observed for a particular affiliate could simply reflect the existence of substantial secondary activities in wholesale trade (where the ratio of value added to total output is relatively low) rather than any difference in the structure of the affiliate's purely manufacturing operations. Similarly, changes over time in this measure could reflect changes in the composition of an affiliate's secondary activities rather than changes in the structure of its manufacturing output.

For this paper, the three content measures described above have been constructed for a sample of foreign-owned U.S. affiliates in 24 manufacturing industries, using preliminary data from the 1992 benchmark survey of foreign direct investment in the United States. The data from this survey include new detail on the intended use of affiliate imports. Specifically, all affiliates required to complete a detailed "long" form (i.e., affiliates with assets, sales, or net income exceeding $50 million) were asked to provide a dollar breakdown of their merchandise imports according to three categories: goods intended for further manufacture by the affiliate, goods intended for resale without further manufacture, and capital goods intended as additions to the affiliate's plant and equipment.

To minimize the potential distortions associated with wholesale trade activity or imports of capital goods, the sample is confined to manufacturing affiliates that reported on the long form and had imports that mainly consisted of goods intended for further manufacture. ("Mainly" was defined by a share of over 50 percent.) The sample consists of 701 affiliates (out of a total of 2,752 affiliates classified in manufacturing and 878 manufacturing affiliates that reported on the long form). The collective sales of these 701 affiliates account for two-thirds of total sales by all affiliates classified in manufacturing.[7]

Limiting our analysis to this relatively "pure" sample of manufacturing affiliates, we can be reasonably confident that the measures constructed provide the intended information on the content of manufacturing production. A necessary trade-off, however, is the sacrifice of information on a number of large affiliates that have substantial operations in both manufacturing and wholesale trade. The sample excludes, for example, some of the largest affiliates producing motor vehicles since (in the data used to compute the content measures) their manufacturing operations cannot be segregated from their large-scale operations as wholesale distributors of vehicles produced abroad by their parent companies.[8]

7. As shown in appendix table 6A.1, affiliates in the sample account for a majority of affiliate sales in all but 2 of the 24 manufacturing industries for which the content measures have been constructed.

8. Some of the largest affiliates with operations in automobile manufacturing are actually classified in wholesale trade (where their sales are largest) rather than in manufacturing.

For purposes of comparison, the three content measures have also been constructed at the industry level for U.S. parent companies of foreign affiliates, using data from BEA's 1989 benchmark survey of U.S. direct investment abroad.[9] In the absence of industry-level data on imported inputs by all U.S. businesses, the data for U.S. parent companies provide the best available measures of the domestic and import content of production by domestically owned U.S. companies. Because U.S. parent manufacturing companies in 1989 accounted for about 60 percent of the production by all U.S. companies in manufacturing, the measures for these parent companies can be taken as indicative of the content of production for domestically owned manufacturing firms in general.[10]

6.2 Industry-Level Results

In the aggregate, foreign-owned manufacturing affiliates in the United States display a high level of domestic content in production, just slightly below that for domestically owned U.S. manufacturing companies. Table 6.1 shows that, for all affiliates in the sample combined, the domestic content of total output is 89 percent, compared to 93 percent for domestically owned companies. Of the 89 percent share, 32 percent represents value added by the affiliates; the remaining 57 percent consists of intermediate inputs purchased domestically. The share of imports in purchased inputs is 16 percent. These results are consistent with the aggregate estimates reported for earlier years in Lowe (1990) and Zeile (1993).[11]

Among the 24 manufacturing industries, the domestic content share of affiliate output is greater than 90 percent in 16 industries; in 13 of these industries, the domestic content measure for affiliates is within 5 percent of the measure

9. In its benchmark and annual surveys of U.S. direct investment abroad, BEA collects financial and operating data for both U.S. parent companies and their foreign affiliates. The latest benchmark survey data cover the year 1989. In nonbenchmark survey years, the data collected for U.S. parent companies do not include all of the items required to compute the content measures examined in this paper. For further discussion, see Mataloni and Goldberg (1994), which presents industry-level measures of content for U.S. parent companies in each of the benchmark survey years 1977, 1982, and 1989.

10. The use of domestically owned U.S. firms as a comparison group for foreign-owned U.S. affiliates fits in with the theme of this volume, as the comparison is between firms with a common geographic location distinguished by country of ownership. Alternatively, it would be useful to compare the domestic content and sourcing behavior of foreign-owned U.S. affiliates with that of foreign affiliates of U.S. parent companies. Unfortunately, data are not available to construct comparable measures of domestic and import content for U.S.-owned foreign affiliates. Specifically, the data collected in BEA's annual and benchmark surveys of U.S. direct investment abroad include only imports by foreign affiliates that originate in the United States, not their total imports.

11. As noted above, these measures may overstate the domestic content of affiliate output insofar as they fail to capture any imports embodied in the affiliates' purchases from domestic suppliers. This limitation, however, also applies to the measure of domestic content for domestically owned U.S. manufacturing companies, the reference group used for comparison.

for domestically owned companies (cols. [1] and [7] of table 6.1). The high domestic content level in these industries reflects a marked propensity for affiliates to procure most of their intermediate inputs from domestic suppliers: in all 16 industries, imports account for less than one-sixth of the affiliates' intermediate input purchases (col. [3]).[12] Even so, affiliates in these industries tend to rely on imports substantially more than their domestically owned counterparts (col. [9]).[13] In 7 of the 16 industries, the import content share for affiliates is more than twice as high as the very low share for domestically owned companies.

While the domestic content of affiliate output is generally high, it is relatively low—less than 80 percent—in five industries: construction, mining, and materials handling machinery; computer and office equipment; household audio and video, and communications, equipment; electronic components and accessories; and motor vehicles and equipment.[14] (In each of these industries, the domestic content measure for affiliates is at least 15 percent lower than that for domestically owned companies.) These industries, which can all be categorized as "machinery type" industries, share the characteristic of having intermediate inputs that consist mainly of manufactured components (which may be subject to product differentiation across suppliers) rather than commodity-type bulk materials (which generally can be procured most cheaply from domestic suppliers due to transportation costs). In all five industries, imports account for more than one-third of the intermediate inputs purchased by affiliates. In four of these industries, more than 60 percent of the imported inputs are sourced from the affiliates' foreign parent companies or other foreign firms with which the parents are affiliated (table 6.2).

The measure of domestic content for affiliates is lowest in the computer and motor vehicle industries, with domestic content in each case constituting slightly less than two-thirds of affiliate output. In both industries, the low domestic content share reflects a relatively low level of vertical integration in affiliate production (the share of value added in total output being one-third lower than that for domestically owned companies) coupled with a high reliance on imports for the affiliates' intermediate inputs. Imports account for more than 50 percent of the purchased inputs of affiliates in the computer industry and for more than 40 percent of the purchased inputs of affiliates in

12. Across the 24 industries shown in table 6.1, the coefficient of correlation between the domestic content of total output and the import content of purchased inputs for foreign-owned affiliates is −0.99. The correlation between the measures of domestic content and vertical integration for affiliates is much weaker, the correlation coefficient being 0.41 (barely significant at the 95 percent confidence level).

13. The sole exception appears in printing and publishing, where the domestic content measure for affiliates is actually higher than that for domestically owned companies.

14. It should be noted that a substantial portion of the sample data in "motor vehicles and equipment" represents affiliates producing motor vehicle parts and accessories.

Table 6.1 **Measures of Domestic Content of Production, Vertical Integration, and Import Content of Purchased Inputs for Foreign-Owned Manufacturing Affiliates in 1992 and Domestically Owned U.S. Manufacturing Companies in 1989**

	Foreign-Owned Affiliates[a]			Domestically Owned Companies[b]			Ratio of Measure for Affiliates to Measure for Domestically Owned Companies		
Industry	Domestic Content/Total Output (%) (1)	Value Added/Total Output (%) (2)	Imports/Total Purchased Inputs (%) (3)	Domestic Content/Total Output (%) (4)	Value Added/Total Output (%) (5)	Imports/Total Purchased Inputs (%) (6)	Domestic Content/Total Output (7)	Value Added/Total Output (8)	Imports/Total Purchased Inputs (9)
Manufacturing[c]	89.3	32.3	15.9	93.2	37.6	10.9	0.96	0.86	1.45
Food and kindred products	93.3	21.1	8.5	98.1	31.6	2.8	0.95	0.67	3.09
Textile products and apparel	93.6	34.4	9.7	97.2	38.1	4.5	0.96	0.90	2.18
Paper and allied products	93.8	32.9	9.3	98.0	42.6	3.4	0.96	0.77	2.73
Printing and publishing	99.2	38.0	1.3	97.7	39.7	3.9	1.02	0.96	0.34
Industrial chemicals and synthetics	92.5	35.0	11.6	93.5	40.2	10.8	0.99	0.87	1.07
Drugs	90.0	40.1	16.8	96.1	52.1	8.1	0.94	0.77	2.07
Other chemicals	92.9	26.2	9.7	96.5	33.1	5.3	0.96	0.79	1.82
Rubber products	91.8	35.3	12.7	94.6	39.2	8.9	0.97	0.90	1.43
Miscellaneous plastics products	91.5	21.0	10.7	98.1	34.8	2.9	0.93	0.60	3.65
Glass products	92.9	40.6	11.9	97.8	50.1	4.5	0.95	0.81	2.64
Stone, clay, and concrete products	96.1	34.4	5.9	97.4	37.2	4.2	0.99	0.93	1.42
Primary ferrous metals	93.0	29.1	9.9	95.6	35.7	6.8	0.97	0.82	1.45

Primary nonferrous metals	81.4	24.3	24.6	91.3	38.9
Fabricated metal products	94.7	33.5	8.0	96.8	33.2
Construction, mining, and materials handling machinery	75.5	28.6	34.3	90.6	32.7
Other nonelectrical machinery	87.0	29.4	18.5	94.6	38.9
Computer and office equipment	63.8	29.9	51.7	87.4	44.8
Household audio and video, and communications, equipment	72.4	34.3	42.0	89.4	36.1
Electronic components and accessories	72.4	30.3	39.6	87.4	43.3
Other electric and electronic equipment	93.0	35.0	10.8	96.1	39.1
Motor vehicles and equipment	66.4	17.5	40.8	82.5	27.3
Other transportation equipment	90.7	31.9	13.6	97.4	44.9
Instruments and related products	94.5	43.8	9.8	95.0	48.1
Other manufacturing	91.4	45.9	15.9	97.3	37.9

[a]Calculated from preliminary data from BEA's 1992 benchmark survey of foreign direct investment in the Unite foreign companies that had total assets, sales, or net income exceeding $50 million at the end of 1992. They co those affiliates whose imports were not primarily used for further processing or manufacture by the affiliates.

[b]Calculated from data on the operations of U.S. parent companies classified in manufacturing, from BEA's 1989 l

[c]Excludes petroleum refining, which, in the data for many large affiliates, is integrated with oil and gas extraction

Table 6.2 Measures Relating Intrafirm Imports, Total Imports, and Total Purchased Inputs of Foreign-Owned Manufacturing Affiliates, 1992

Industry	Total Imports/ Total Purchased Inputs (%)	Intrafirm Imports/ Total Imports (%)	Intrafirm Imports/Total Purchased Inputs (%)
Manufacturing	15.9	67.0	10.6
Food and kindred products	8.5	31.7	2.7
Textile products and apparel	9.7	41.8	4.1
Paper and allied products	9.3	56.0	5.2
Printing and publishing	1.3	9.5	0.1
Industrial chemicals and synthetics	11.6	20.7	2.4
Drugs	16.8	96.4	16.2
Other chemicals	9.7	86.8	8.4
Rubber products	12.7	90.3	11.5
Miscellaneous plastics products	10.7	95.2	10.2
Glass products	11.9	52.6	6.2
Stone, clay, and concrete products	5.9	33.5	2.0
Primary ferrous metals	9.9	47.1	4.7
Primary nonferrous metals	24.6	68.8	16.9
Fabricated metal products	8.0	71.4	5.7
Construction, mining, and materials handling machinery	34.3	65.4	22.5
Other nonelectrical machinery	18.5	74.2	13.7
Computer and office equipment	51.7	90.7	46.9
Household audio and video, and communications, equipment	42.0	47.3	19.9
Electronic components and accessories	39.6	80.8	32.0
Other electric and electronic equipment	10.8	76.8	8.3
Motor vehicles and equipment	40.8	96.4	39.3
Other transportation equipment	13.6	86.1	11.7
Instruments and related products	9.8	62.1	6.1
Other manufacturing	15.9	33.0	5.3

Note: Intrafirm imports are imports by affiliates from their foreign parent groups.

motor vehicles. In both cases, more than 90 percent of the imports are intrafirm imports shipped from the affiliates' foreign parent groups.

6.3 Relation to Age

Given the large influx of new foreign investment that occurred in the late 1980s, it is appropriate to ask whether the relatively low domestic content observed for affiliates in some machinery-type industries can be attributed to an immature phase in their U.S. production operations. Many have argued that foreign direct investment in manufacturing typically begins with affiliates undertaking final assembly operations that rely heavily on components and parts sourced from the foreign parent or other established suppliers abroad. Over time, these affiliates are expected to increase their domestic content, both through vertical expansion of their production operations and through increased procurement from domestic suppliers.[15]

To investigate whether domestic content is related to the age of affiliate operations, a panel was created from the 238 sample affiliates classified in machinery-type industries.[16] The panel consists of 119 affiliates that existed in 1987 (the earliest year for which affiliate-level data are readily accessible) and were fully operational in each of the years 1988–92.[17]

As a first step in this investigation, the panel can be used to determine whether, at a given moment in time, older affiliates have higher domestic content than newer affiliates. Table 6.3 presents industry-level comparisons of the three content measures in 1992 for affiliates in the panel (termed "old" affiliates) and nonpanel sample affiliates that entered the direct investment universe sometime after 1987 (termed "new" affiliates). The results shown appear to contradict the expectation that older affiliates have higher domestic content than their younger counterparts. In all but two of the nine machinery-type industries, the domestic content of total output is lower (and the import content of purchased inputs is correspondingly higher) for "old" affiliates than for "new" affiliates. This finding can probably be attributed to the fact that foreign direct investment in the United States has predominantly taken the form of acquisitions of existing companies rather than the sort of "greenfield" investment to which the expected association between affiliate age and domestic content really applies.[18]

Although domestic content does not appear to be positively associated with age in same-year comparisons *among* affiliates, there is a marked tendency in some industries for affiliate domestic content to increase over time. For affiliates in the panel, table 6.4 shows an upward trend in the domestic content of total output (accompanied by a downward trend in the import content of purchased inputs) in four of the nine machinery industries. In the other five

15. McAleese and McDonald (1978) find support for this hypothesis in the case of foreign-owned "greenfield" manufacturing enterprises in Ireland.

16. Machinery-type industries are defined as all industries in electrical and nonelectrical machinery, transportation equipment, and instruments. Of the 24 industries listed in table 6.1, 9 are classified as machinery-type industries.

17. The panel excludes some affiliates that existed in 1987 but did not have sales or value added in one or more of the years 1988–91. Because affiliate-level estimates of value added exist only for the years 1988 forward, 1988 is the earliest year for which the three content measures can be constructed for affiliates in the panel.

18. Data from BEA's annual survey of new foreign direct investment in the United States indicate that acquisitions of existing manufacturing enterprises accounted for more than 80 percent of the outlays by foreign direct investors to acquire or establish U.S. manufacturing enterprises in each of the years 1980–91.

Table 6.3 **Measures of Content for Machinery-Type Industry Affiliates Segregated by Age, 1992**

	Number of Affiliates in Sample			Domestic Content/Total Output (%)			Value Added/Total Output (%)			Imports/Total Purchased Inputs (%)		
Industry	Total	"Old" Affiliates	"New" Affiliates	Total	"Old" Affiliates	"New" Affiliates	Total	"Old" Affiliates	"New" Affiliates	Total	"Old" Affiliates	"New" Affiliates
Construction, mining, and materials handling machinery	20	9	11	75.5	78.7	73.7	28.6	27.3	29.3	34.3	29.3	37.1
Other nonelectrical machinery	56	33	23	87.0	85.8	88.5	29.4	28.0	31.0	18.5	19.8	16.7
Computer and office equipment	12	5	7	63.8	51.3	72.3	29.9	33.9	27.2	51.7	73.7	38.0
Household audio and video, and communications, equipment	12	8	4	72.4	71.9	78.7	34.3	33.8	40.3	42.0	42.4	35.6
Electronic components and accessories	30	12	18	72.4	66.5	76.2	30.3	30.8	30.0	39.6	48.5	34.0
Other electric and electronic equipment	28	15	13	93.0	92.5	94.0	35.0	32.6	39.8	10.8	11.2	10.0
Motor vehicles and equipment	34	13	21	66.4	64.6	69.4	17.5	16.4	19.4	40.8	42.4	38.0
Other transportation equipment	18	9	9	90.7	85.1	97.3	31.9	33.6	29.9	13.6	22.5	3.8
Instruments and related products	28	15	13	94.5	95.3	87.7	43.8	45.0	34.7	9.8	8.5	18.8

Note: "Old" affiliates are affiliates in 1992 sample that existed in 1987 and were fully operational in 1988–92. "New" affiliates are affiliates in 1992 sample that entered BEA's data after 1987; they include some affiliates that were in existence in 1987 but were not fully operational in one or more of the years 1988–91.

Table 6.4 Time Series of Measures of Content for "Old" Machinery-Type Industry Affiliates, 1988–92

Industry	1988	1989	1990	1991	1992
Domestic Content/Total Output (%)					
Construction, mining, and materials handling machinery	70.5	73.4	75.5	88.2	78.7
Other nonelectrical machinery	83.7	81.9	84.8	84.4	85.8
Computer and office equipment	–[a]	47.7	40.5	46.4	51.3
Household audio and video, and communications, equipment	64.0	67.4	68.4	75.7	71.9
Electronic components and accessories	63.8	78.0	69.1	68.9	66.5
Other electric and electronic equipment	78.8	91.6	91.6	91.8	92.5
Motor vehicles and equipment	45.9	52.1	60.7	63.6	64.6
Other transportation equipment	69.5	78.2	83.3	81.8	85.1
Instruments and related products	93.5	94.8	94.7	95.5	95.3
Value Added/Total Output (%)					
Construction, mining, and materials handling machinery	28.2	25.7	24.6	29.0	27.3
Other nonelectrical machinery	27.8	28.3	29.7	27.5	28.0
Computer and office equipment	–[a]	42.5	38.7	38.5	33.9
Household audio and video, and communications, equipment	27.0	31.9	33.6	35.3	33.8
Electronic components and accessories	29.9	30.6	24.5	25.4	30.8
Other electric and electronic equipment	23.4	33.0	33.0	33.0	32.6
Motor vehicles and equipment	12.2	10.1	14.7	16.5	16.4
Other transportation equipment	23.7	30.2	34.7	27.0	33.6
Instruments and related products	35.9	38.7	40.1	41.8	45.0
Imports/Total Purchased Inputs (%)					
Construction, mining, and materials handling machinery	41.1	35.8	32.5	16.6	29.3
Other nonelectrical machinery	22.5	25.3	21.6	21.5	19.8
Computer and office equipment	–[a]	90.9	97.0	87.0	73.7
Household audio and video, and communications, equipment	49.3	47.9	47.6	37.6	42.4
Electronic components and accessories	51.7	31.7	41.0	41.7	48.5
Other electric and electronic equipment	27.7	12.6	12.5	12.2	11.2
Motor vehicles and equipment	61.6	53.2	46.1	43.6	42.4
Other transportation equipment	40.0	31.2	25.6	24.9	22.5
Instruments and related products	10.2	8.4	8.8	7.7	8.5

Note: Measures constructed from data for a fixed panel of affiliates that existed in 1987 and were fully operational in 1988–92.

[a]Suppressed to avoid disclosure of data of individual companies.

industries, the domestic and import content measures are either stable or display no sustained trend.[19]

19. In seven of the nine industries, the import content of purchased inputs decreases in 1988–89, perhaps reflecting a lagged response to the substantial depreciation of the U.S. dollar in international currency markets in 1985–88. In 1985–88, the multilateral-trade-weighted value of the U.S. dollar in real terms depreciated 33 percent. In contrast, in 1988–92—the period covered by the

For panel affiliates in the motor vehicles and equipment industry, the domestic content of total output increases every year, from 46 percent in 1988 to 65 percent in 1992. This increase mainly reflects a large and sustained decrease in the import share of the affiliates' purchased intermediate inputs, from 62 percent in 1988 to 42 percent in 1992. It also appears to reflect a mild increase in the vertical integration of affiliate production.

6.4 Comparisons by Investing Country

We now turn to an investigation of differences among foreign-owned manufacturing affiliates by country of ownership. The domestic content and sourcing behavior of affiliates are compared across six major investing countries: Canada, France, Germany, Switzerland, the United Kingdom, and Japan.[20] Affiliates with owners in these six countries collectively account for 550 of the 701 affiliates in the sample.

Comparisons among the investing countries' affiliates are made in terms of the three content measures normalized by industry. To normalize, each content measure for a given affiliate was divided by the corresponding aggregate content measure (shown in table 6.1) for domestically owned companies in the affiliate's industry.

Table 6.5 presents the unweighted mean values of the normalized content measures for affiliates of each country. Mean values are also shown for the countries' affiliates in two industry subgroups: machinery-type industries and other industries. A mean value equal to one indicates that the content measure for affiliates, on average, is equal to that for domestically owned companies in comparable industries. For affiliates of each investing country, a t-test was performed to determine whether the sample mean of the normalized content measure is significantly different from one.

Supplementing the summary statistics in table 6.5, appendix table 6A.2 presents the aggregate content measures for affiliates of selected investing countries in individual machinery-type industries. The presentation in this table is necessarily selective in order to ensure the confidentiality of data for individual companies.

Among the six investing countries, affiliates with owners in Japan and Germany stand out in table 6.5 as having substantially lower domestic content, and a substantially higher import content of purchased inputs, than domestically owned companies in comparable industries. The difference is particularly

panel data—the real depreciation of the dollar was a relatively modest 5 percent. Data on the real exchange rate appear in *Economic Report of the President* (1997, table B-108).

20. The 1992 benchmark survey data for all affiliates indicate that manufacturing affiliates with ultimate beneficial owners in these six countries account for more than 80 percent of the total value added of affiliates classified in manufacturing. In terms of affiliate value added, the United Kingdom ranks as the leading investing country in manufacturing, followed by Canada, Japan, Germany, France, and Switzerland.

Table 6.5 **Mean Values of Normalized Content Measures for Manufacturing Affiliates of All Countries and Six Major Investing Countries, 1992**

Industry Type	All Countries	Canada	France	Germany	Switzerland	United Kingdom	Japan	Other Countries
				Domestic Content/Total Output (%)				
All industries[a]	0.94***	0.97*	0.96**	0.92***	0.93***	0.99	0.90***	0.94***
	(0.16)	(0.14)	(0.13)	(0.19)	(0.14)	(0.11)	(0.18)	(0.16)
Machinery-type industries[b]	0.89***	1.07***	0.94	0.84***	0.91**	0.99	0.80***	0.94**
	(0.21)	(0.09)	(1.90)	(0.22)	(0.14)	(0.16)	(0.21)	(0.17)
Other industries	0.96***	0.94***	0.97*	0.97	0.95**	0.99	0.98*	0.94***
	(0.13)	(0.14)	(0.09)	(0.14)	(0.13)	(0.08)	(0.10)	(0.16)
				Value Added/Total Output (%)				
All industries	0.81***	0.83***	0.87**	0.88**	0.89**	0.89***	0.69***	0.82**
	(0.65)	(0.37)	(0.35)	(0.50)	(0.36)	(0.37)	(0.80)	(0.91)
Machinery-type industries[b]	0.80***	0.96	0.83**	0.85**	0.97	0.91*	0.68***	0.75***
	(0.59)	(0.33)	(0.27)	(0.40)	(0.40)	(0.27)	(0.86)	(0.37)
Other industries	0.82***	0.79***	0.90	0.89	0.85**	0.88**	0.70***	0.84*
	(0.68)	(0.38)	(0.39)	(0.55)	(0.33)	(0.41)	(0.74)	(1.01)
				Imports/Total Purchased Inputs (%)				
All industries[a]	2.02***	2.45***	1.94**	2.20***	2.23**	1.17	1.85***	2.52***
	(3.48)	(4.48)	(3.02)	(2.44)	(3.42)	(1.95)	(2.30)	(5.15)
Machinery-type industries[b]	1.91***	0.41***	2.21	3.10***	2.27**	0.92	2.27***	1.38
	(2.09)	(0.56)	(3.37)	(2.81)	(1.98)	(1.33)	(1.69)	(1.68)
Other industries	2.08***	2.99***	1.78	1.64**	2.21	1.29	1.48*	2.86***
	(4.01)	(4.89)	(2.84)	(2.01)	(4.02)	(2.17)	(2.70)	(5.77)
				Number of Affiliates				
All industries	701	77	49	83	46	117	178	151
Machinery-type industries	238	16	18	32	16	37	84	35
Other industries	463	61	31	51	30	80	94	116

Note: The measures were normalized at the affiliate level by dividing the content measure for each affiliate by the aggregate content measure for domestically owned companies in the industry of the affiliate. Numbers in parentheses are standard deviations.

[a]Industries listed in table 6.1.

[b]Industries listed in table 6.3.

*Significantly different from one at the 90 percent confidence level.

**Significantly different from one at the 95 percent confidence level.

***Significantly different from one at the 99 percent confidence level.

pronounced in machinery-type industries, with the import content of purchases by Japanese- and German-owned affiliates averaging two to three times that of their domestically owned counterparts.[21] In both machinery-type and other industries, Japanese-owned affiliates display a relatively low share of value added in total output, averaging about 30 percent less than that for domestically owned companies.

Examining the averages for the other major investing countries, we find that Swiss-owned affiliates also display lower domestic content than domestically owned companies, with the difference being significant in both machinery-type and other industries. In contrast, the average measure of domestic content for British-owned affiliates is barely distinguishable from that for domestically owned companies. The difference is also insignificant for French-owned affiliates in machinery-type industries, due to the large variance in the domestic content measure across individual affiliates.

For Canadian-owned affiliates, the results of the comparison with domestically owned companies are mixed. In machinery-type industries, Canadian-owned affiliates actually display a significantly higher measure of domestic content than their domestically owned counterparts, reflecting a significantly lower reliance on imports for their intermediate inputs. In other industries, however, Canadian-owned affiliates display significantly lower domestic content, with an average import content share three times as high as that for domestically owned companies. The high import content share in non-machinery-type industries appears to be related to the relatively low transportation costs involved in shipping bulk materials from the affiliates' home country, owing to Canada's unique proximity across the U.S. border. It may also reflect Canada's relative abundance of natural resources. An examination of the data for individual industries revealed that the share of imports in purchases by Canadian-owned affiliates is particularly high in such materials-intensive industries as paper and allied products, miscellaneous plastics products, and primary nonferrous metals—in each of these industries, virtually all of the affiliates' imports originate in Canada.

In the results just summarized, affiliates of each of the six major investing countries were compared with domestically owned companies in comparable industries. Each can also be compared with affiliates of the other investing countries. Direct comparisons among the investing countries *across the sample affiliates* are summarized in table 6.6, which reports the results of simple correlations between the normalized content measures and a set of dummy variables for each of the major investing countries. The correlations were taken across the full sample of 701 affiliates and across two subsamples consisting of the affiliates in machinery-type industries and all other industries. Each entry in

21. Appendix table 6A.2 shows that the domestic content measure for Japanese-owned affiliates is uniformly low in most machinery-type industries, with the share of imports in their purchased inputs exceeding 40 percent in five industries.

Simple Correlations across Affiliates between Normalized Content Measures and Dummy Variables for Major Inves Countries, 1992

pe	Number of Observations	Canada	Germany	United Kingdom
		Domestic Content/Total Output (%)		
es	701	0.063*	−0.052	0.137***
type industries	238	0.237***	−0.105	0.196***
tries	463	−0.072	0.007	0.095**
		Value Added/Total Output (%)		
es	701	0.006	0.036	0.052
type industries	238	0.072	0.036	0.084
tries	463	−0.018	0.038	0.039
		Imports/Total Purchased Inputs (%)		
es	701	0.044	0.019	−0.109***
type industries	238	−0.193***	0.224***	−0.204***
tries	463	0.089*	−0.039	−0.090*

my variables for France and Switzerland are insignificant in all correlations.
y significant at the 90 percent confidence level.
lly significant at the 95 percent confidence level.
ally significant at the 99 percent confidence level.

the table can be interpreted as the correlation between the particular measure and the identity of the investing country vis-à-vis all other investing countries.

The correlations across the full sample reveal that Japanese-owned affiliates tend to have significantly lower domestic content than affiliates of other investing countries. For German-owned affiliates, the correlation is also negative, but insignificant. British-owned affiliates, in contrast, tend to have significantly higher domestic content and a significantly lower share of imports in their purchases.

In machinery-type industries, Canadian- as well as British-owned affiliates tend to have higher domestic content, with each displaying a relatively low propensity to source their intermediate inputs through imports. Japanese-owned affiliates show a marked tendency to have lower domestic content; they also tend to have a relatively high share of imports in their purchased inputs, although here the correlation is not as strong as that for German-owned affiliates.[22]

In all three sets of industries, Japanese-owned affiliates stand out as unique among affiliates in displaying a lower degree of internalization (and a correspondingly higher reliance on outsourcing) in production, as indicated by a significantly lower share of value added in total output.

The results can be summed up by remarking that Japanese- and British-owned affiliates appear to occupy two polar extremes in terms of the three content measures, with domestic content being relatively low for Japanese-owned affiliates and relatively high for British-owned affiliates. In machinery-

22. The relatively low correlation between the normalized import content measure and the dummy variable for Japanese ownership appears to reflect the fact that the industries in which Japanese-owned affiliates have very high import content are those in which domestically owned firms also have high import content, so that the ratio between the two is not very high. Based on the industry-level data in table 6.1, the coefficient of correlation across the 24 industries between the normalized and unnormalized versions of the import content measure is only 0.15, whereas the coefficient of correlation between the two versions of the domestic content measure is 0.98.

As an alternative to the correlations reported in table 6.6, regressions were run on the unnormalized measure of import content, with the import content of domestically owned companies in the affiliate's industry entered as a control variable. With this specification, the dummy variable for Japanese ownership is positive and significant at the 99 percent confidence level, both for the full sample and for the reduced sample of affiliates in machinery-type industries. The estimated regression equation for the 238 affiliates in machinery-type industries is as follows:

$$\underset{}{\text{MCNTAF}} = 8.43 + \underset{(3.64)}{0.78\ \text{MCNTUS}} + \underset{(4.55)}{14.27\ \text{JPNDMY}}, \qquad R^2 = 0.18,$$

where MCNTAF is the import content measure for the affiliate, MCNTUS is the import content measure for domestically owned companies in the industry of the affiliate, and JPNDMY is a dummy variable for Japanese ownership. The t-statistics for the independent variables appear in parentheses.

The same regressions were run using dummy variables for the other five major investing countries. For these countries, the significance levels of the dummy variables in the regressions do not differ substantially from those reported in table 6.6 for the correlations using the normalized import content measures.

type industries, German- and Canadian-owned affiliates can also be positioned at the poles occupied, respectively, by Japanese- and British-owned affiliates.

While a formal investigation of the reasons behind these differences by investing country is beyond the scope of this paper, we can speculate on some possible factors. First, we note that the differences observed for Japanese- and British-owned affiliates may partly reflect differences in the means by which their direct investment occurred. Data from BEA's survey of new foreign direct investment in the United States suggest that British investment in manufacturing has almost exclusively taken the form of acquisitions of existing U.S. companies, whereas Japanese investment has included substantial outlays for the establishment of new enterprises (table 6.7).[23] One would expect the domestic content of production to be substantially higher for an affiliate created through acquisition of an existing firm (which may involve only a transfer of management to a foreign headquarters office) than for a newly established affiliate (which represents an extension of the parent firm's production overseas to a location within the borders of the host country).

Second, the higher domestic content observed for British- and Canadian-owned affiliates may be related to the fact that these two countries share a common language and legal system with the United States. For the other major investing countries, the differences in language and legal institutions may very well constitute a barrier that makes it more costly for their affiliates to contract with U.S. suppliers for their intermediate inputs.

Finally, some of the observed differences in the content measures may reflect differences between the investing countries in established methods of organizing production. The finding, for example, that Japanese-owned affiliates tend to have a lower share of value added in total output is consistent with the observation that Japanese companies rely heavily on subcontracting in their production.[24] Japanese companies also tend to forge long-term bonds with their suppliers, which may be a factor contributing to the relatively high import content observed for their U.S. affiliates.

6.5 Import Sourcing by Investing Country: Geography and Ownership

Differences by major investing country can also be perceived in the import-sourcing behavior of affiliates, both in terms of the share of imports related to

23. Data by investing country on outlays to establish new U.S. manufacturing enterprises are readily accessible only for the years 1987 forward. The data from BEA's survey of new investment are maintained separately from, and for a variety of reasons cannot readily be integrated with, the operating data on affiliates from BEA's annual and benchmark surveys of foreign direct investment in the United States, which were used to construct the content measures for this paper. Unfortunately, it is not possible to segregate the operating data for affiliates according to whether the affiliates were originally acquired or newly established.

24. A discussion of this and other features of Japanese business organization appears in Aoki (1990).

Table 6.7 **Outlays by Foreign Direct Investors to Establish New U.S. Manufacturing Enterprises as a Percentage of Their Total Outlays to Acquire or Establish U.S. Manufacturing Enterprises, 1987–92**

Year	All Countries	Canada	France	Germany	Switzerland	United Kingdom	Japan
1987	4.3	1.4	2.3	4.3	8.3	0.0	18.0
1988	6.8	1.0	0.6	5.0	1.9	0.3	11.5
1989	7.6	0.4	0.7	1.6	12.2	7.4	20.1
1990	4.6	13.3	0.9	1.6	7.2	1.1	8.3
1991	15.6	2.5	5.6	0.3	2.5	0.3	10.6
1992	23.8	11.5	0.3	20.8	9.6	13.6	38.0
Average, 1987–92							
Unweighted	10.5	5.0	1.7	5.6	7.0	3.8	17.8
Weighted[a]/1/	7.6	2.7	1.8	4.8	7.8	3.6	14.2

Source: The data used for this table are from BEA's annual survey of new foreign direct investment in the United States. Aggregate results from this survey for 1987–93 are reported in "U.S. Business Enterprises Acquired or Established by Foreign Direct Investors in 1993," *Survey of Current Business* 74 (May 1994): 50–61.

[a]Calculated as the percentage of cumulative investment outlays in 1987–92 accounted for by outlays on new establishments. Investment outlays for each year were deflated using the GDP deflator then summed over the years 1987–92.

ownership (i.e., intrafirm imports) and in terms of the geographic origin of the affiliates' imports.

For sample affiliates of the six major investing countries, table 6.8 presents aggregate figures on the share of imports sourced from the affiliates' foreign parent groups (their foreign parent companies plus other foreign companies with strong ownership ties to the parents)[25] in comparison with the share of imports originating in the investing country. In the table, affiliates with owners in Switzerland and Japan stand out as sourcing about nine-tenths of their imported inputs through intrafirm trade (line 1). Close to 90 percent of the imports by Japanese-owned affiliates originate in Japan, whereas about 75 percent of the imports by Swiss-owned affiliates originate in Switzerland (line 2).[26] Imports from the investing country also account for a dominant share of the imports by German- and Canadian-owned affiliates, with about three-fourths of the imports by German-owned affiliates representing intrafirm trade. In contrast, only about one-third of the imports by French- and British-owned affiliates originate in the investing country, and less than one-half of the imports by French-owned affiliates are sourced through intrafirm trade.

As shown in table 6.9, a large share of the imports by British- and French-owned affiliates are sourced from OECD countries other than the investing country (which can be taken to represent other "developed" countries). The share of imports originating in other OECD countries is particularly high for British- and French-owned affiliates in non-machinery-type industries, about 40 percent in each case. In machinery-type industries, almost one-half of the imports by French-owned affiliates are sourced from the developing and newly industrializing countries of East Asia. By way of contrast, Japanese-owned affiliates in machinery-type industries rely on Japan for 90 percent of their imported inputs, sourcing less than 5 percent of their imports from other East Asian countries.

6.6 Conclusion

The measures of content discussed in this paper, though subject to some limitations due to the consolidated nature of company data reports, are a useful aid to furthering our understanding of the relationship between foreign ownership and manufacturing production within the borders of the United States.

The measures reveal that domestic content for foreign-owned manufactur-

25. In addition to inputs actually produced by the affiliates' foreign parent companies, such intrafirm imports may include materials and components procured by the parents from unaffiliated suppliers for shipment to the affiliates.

26. As shown in line 3 of table 6.8, intrafirm imports by affiliates (which include imports from all members of a given affiliate's foreign parent group) need not originate in the country of ownership: e.g., only 52 percent of the intrafirm imports by British-owned affiliates are shipped from the United Kingdom. Line 4 shows that intrafirm imports do not account for all affiliate imports from the country of ownership; however, for five of the six major investing countries, more than 90 percent of the affiliates' imports from their respective home countries are through intrafirm trade.

Table 6.8 Measures of Intrafirm Imports and Imports Sourced from Country of Ownership for Affiliates of Major Investing Countries

Measure	Canada	France	Germany	Switzerland	United Kingdom	Japan
1. Intrafirm imports as a percentage of total imports by the investing country's affiliates	54.5	39.2	73.4	90.2	62.6	86.8
2. Imports from investing country as a percentage of total imports by the investing country's affiliates	65.7	29.5	69.4	76.4	35.3	88.1
3. Intrafirm imports from investing country as a percentage of total intrafirm imports by the investing country's affiliates	94.4	69.2	87.4	85.4	52.2	95.6
4. Intrafirm imports from investing country as a percentage of total imports from investing country by the investing country's affiliates	78.8	92.1	95.8	99.2	93.1	94.7

Note: Intrafirm imports are imports by affiliates from their foreign parent groups.

Table 6.9 Geographic Origin of Imports by Manufacturing Affiliates of Major Investing Countries, 1992

	Country of Ownership					
Origin	Canada	France	Germany	Switzerland	United Kingdom	Japan
Geographic Origin of Imports by Investing Country's Affiliates in All Manufacturing Industries						
All countries	100.0	100.0	100.0	100.0	100.0	100.0
Investing country	65.7	29.5	69.4	76.4	35.3	88.1
Other OECD countries[a]	16.6	31.1	25.7	18.5	40.2	4.0
Other Asia and Pacific[b]	2.5	23.5	2.9	–[c]	11.2	4.7
Latin America and other Western Hemisphere[d]	13.3	13.1	–[c]	3.3	10.2	–[c]
Other	1.9	2.8	–[c]	–[c]	3.0	–[c]
Geographic Origin of Imports by Investing Country's Affiliates in Machinery-Type Industries						
All countries	100.0	100.0	100.0	100.0	100.0	100.0
Investing country	–[c]	15.4	71.3	69.7	31.9	90.2
Other OECD countries[a]	1.7	–[c]	24.8	25.1	32.7	2.2
Other Asia and Pacific[b]	–[c]	44.8	2.4	–[c]	33.9	4.8
Latin America and other Western Hemisphere[d]	0.0	–[c]	1.5	–[c]	1.5	–[c]
Other	0.0	0.0	0.0	0.0	0.0	–[c]
Geographic Origin of Imports by Investing Country's Affiliates in Other Manufacturing Industries						
All countries	100.0	100.0	100.0	100.0	100.0	100.0
Investing country	59.3	44.7	65.6	79.2	36.1	67.2
Other OECD countries[a]	20.4	39.6	27.4	15.7	41.9	21.5
Other Asia and Pacific[b]	1.2	0.7	3.8	0.2	6.2	4.1
Latin America and other Western Hemisphere[d]	16.7	9.1	–[c]	–[c]	12.2	–[c]
Other	2.4	5.9	–[c]	–[c]	3.7	–[c]

[a]For affiliates of the investing country identified in the column heading, includes the other five major investing countries. Does not include Mexico, which became a member nation of the OECD in 1994.

[b]Excludes Japan, Australia, and New Zealand, which are member nations of the OECD.

[c]Suppressed to avoid disclosure of data of individual companies.

[d]Includes Mexico.

ing affiliates is generally very high but is substantially lower than that of domestically owned companies in a few machinery-type industries involving the assembly of manufactured components. In most such industries, domestic content for older affiliates has tended to increase over time.

An examination of the content measures by investing country reveals that Japanese- and German-owned affiliates tend to have lower domestic content, whereas British- and Canadian-owned affiliates tend to have higher domestic content, with the differences being particularly pronounced in machinery-type industries. Examining the geographic pattern of affiliate sourcing, Japanese-owned affiliates display a high tendency, whereas British-owned affiliates display a low tendency, to source their intermediate inputs from their respective home countries.

Appendix

Table 6A.1 Data by Industry on Sample of Affiliates Used in Study

Industry	Number of Affiliates in Sample	Share of Affiliate Sales Represented by Sample[a]
Manufacturing[b]	701	65.8
Food and kindred products	63	40.3
Textile products and apparel	32	59.7
Paper and allied products	29	82.8
Printing and publishing	25	78.2
Industrial chemicals and synthetics	41	65.6
Drugs	29	96.5
Other chemicals	31	81.5
Rubber products	6	4.3
Miscellaneous plastics products	25	54.3
Glass products	9	53.2
Stone, clay, and concrete products	39	79.2
Primary ferrous metals	31	72.8
Primary nonferrous metals	29	91.4
Fabricated metal products	48	72.2
Construction, mining, and materials handling machinery	20	55.8
Other nonelectrical machinery	56	66.3
Computer and office equipment	12	66.6
Household audio and video, and communications, equipment	12	55.7
Electronic components and accessories	30	69.0
Other electric and electronic equipment	28	50.2
Motor vehicles and equipment	34	60.9
Other transportation equipment	18	67.8
Instruments and related products	28	81.6
Other manufacturing	26	64.0

Note: Sample consists of affiliates reporting in the 1992 benchmark survey that had total assets, sales, or net income exceeding $50 million at the end of 1992, excluding those affiliates whose imports were not used primarily for further processing or manufacture by the affiliates.

[a]Sales by affiliates in sample as a percentage of sales by all affiliates covered in the 1992 benchmark survey.

[b]Excludes petroleum refining.

Table 6A.2 **Measures of Domestic Content of Production, Vertical Integration, and Foreign Sour Affiliates in Selected Machinery-Type Industries, by Major Investing Country, 1992**

Industry and Investing Country	Number of Affiliates	Foreign-Owned Affiliates: Domestic Content/ Total Output (%)	Value Added/ Total Output (%)	Imports/Total Purchased Inputs (%)
Construction, mining, and materials handling machinery	20	75.5	28.6	34.3
Japanese-owned affiliates	8	54.7	16.2	54.1
Affiliates of all other investing countries	12	89.0	36.6	17.4
Other nonelectrical machinery	56	87.0	29.4	18.5
German-owned affiliates	14	79.1	28.4	29.2
Swiss-owned affiliates	7	85.3	37.6	23.5
British-owned affiliates	9	94.5	35.3	8.5
Japanese-owned affiliates	13	86.9	32.6	19.5
Affiliates of all other investing countries	13	84.0	18.8	19.7
Computer and office equipment	12	63.8	29.9	51.7
Japanese-owned affiliates	7	55.9	26.8	60.2
Affiliates of all other investing countries	5	89.6	40.2	17.5

(continued)

Table 6A.2 (continued)

Industry and Investing Country	Number of Affiliates	Foreign-Owned Affiliates: Domestic Content/ Total Output (%)	Value Added/ Total Output (%)	Imports/Total Purchased Inputs (%)
Household audio and video, and communications, equipment	12	72.4	34.3	42.0
Japanese-owned affiliates	3	59.6	17.7	49.1
Affiliates of all other investing countries	9	73.1	35.1	41.5
Electronic components and accessories	30	72.4	30.3	39.6
Japanese-owned affiliates	15	69.7	30.1	43.3
Affiliates of all other investing countries	15	75.1	30.6	35.9
Other electric and electronic equipment	28	93.0	35.0	10.8
French-owned affiliates	6	96.0	42.7	7.0
German-owned affiliates	3	69.1	35.6	48.0
Japanese-owned affiliates	10	89.0	29.8	15.7
Affiliates of all other investing countries	9	94.1	34.5	9.1

Motor vehicles and equipment	34	66.4	17.5	40.8	0.80	0.64	1.70
Japanese-owned affiliates	22	62.9	15.8	44.0	0.76	0.58	1.83
Affiliates of all other investing countries	12	85.7	27.3	19.6	1.04	1.00	0.82
Instruments and related products	28	94.5	43.8	9.8	0.99	0.91	1.01
French-owned affiliates	3	95.4	40.8	7.7	1.00	0.85	0.80
German-owned affiliates	4	88.2	35.0	18.1	0.93	0.73	1.87
British-owned affiliates	8	97.1	47.2	5.4	1.02	0.98	0.56
Japanese-owned affiliates	6	82.7	29.2	24.5	0.87	0.61	2.53
Affiliates of all other investing countries	7	90.2	39.2	16.1	0.95	0.81	1.67

[a]Ratio of measure for affiliates of given investing country to aggregate measure for domestically owned U.S. companies in industry of the affiliates.

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Comment David L. Hummels

This paper seeks to improve what we know about the domestic content of production for foreign-owned manufacturing affiliates. The domestic content of production may have important welfare effects, especially if there are technological externalities in the linkages between manufacturing affiliates and upstream suppliers of components. This is an important issue if foreign-owned affiliates choose to locate in the United States to avoid trade restrictions on final assembled goods while contributing little to the domestic economy in the way of linkages.

Previous studies of the domestic content of foreign-owned affiliates found domestic content to be high and reliance on imports for intermediate inputs to be low. Early work suffered from two problems. First, inclusion of retail enterprises in the affiliate data failed to distinguish between imports intended for furthering manufacturing and those intended for direct sale without additional

David L. Hummels is assistant professor of economics at the University of Chicago Graduate School of Business.

processing. Second, excessive aggregation masked the importance of foreign inputs in certain high-technology sectors. The contribution here is to separate affiliates engaged primarily in retail trade from those that engage in domestic manufacturing and also to disaggregate affiliates by sector, age, and nation of origin in order to pick out characteristics that seem to matter for import behavior.

The author provides a commendably rich array of data for readers to examine, too much to consider properly here. I will focus on some of the main results of this disaggregation, and their implications. In most sectors, domestic content seems to be quite high in absolute terms and close to the domestic content of production for U.S.-owned firms (see table 6.1). However, domestic content is much lower among machinery-type firms.

Of the many numbers in table 6.1, the last columns showing the ratios of domestic content, value added, and import usage for foreign-owned to U.S.-owned firms are most useful. Without knowing the location of world input supplies, or the importance of nontraded inputs in production, it is not possible to say what an "appropriate" quantity of domestic content would be. However, it might be instructive to examine the measures of imported to total inputs in the context of a baseline of expected import dependence. One way is to use a gravity model of trade that relates trade volumes to relative world shares in production and consumption. That is, if the United States produces a large world share of an input, we would expect import dependence (among both affiliates and domestic firms) to be lower for industries that use that input.

Regarding the finding that machinery-type industries have relatively low levels of domestic content, there is good and bad news. The bad news is that if any sector were likely to be important for linkages through upstream suppliers, we would expect it to be machinery. So this finding may be a matter of some concern. The good news is that the low levels of domestic content are mostly due to foreign-owned affiliates creating only a small amount of value added.

Why is this good news? Well, if upstream linkages are important, it helps domestic component suppliers very little if foreign-owned affiliates are entirely self-contained. Put another way, if value added is a good indicator of vertical integration, affiliates with high value added require few inputs from domestic suppliers—there will be no linkages. It may be that foreign-owned affiliates begin life heavily dependent on foreign suppliers for components and gradually switch to domestic suppliers. As these affiliates locate domestic sources of component production over time, their low degree of vertical integration may offer more profound effects for upstream linkages.

Unhappily, the data on domestic content over time casts some doubt on this proposition. Tables 6.3 and 6.4 show that young firms (defined as those established or acquired since the 1987 benchmark study) appear to have higher domestic content than do older firms. However, these older firms do show a tendency to move toward greater domestic content over time. The author ascribes this result to the predominance of acquisitions, rather than greenfield investment, as a method of foreign direct investment. This seems plausible, but I will offer some additional explanations.

First, it may be that there is some trend in the relative cost of domestic versus foreign sourcing. For example, appreciation in the yen or mounting protectionism make the use of domestic sources more attractive. If new entrants are relatively free to choose domestic rather than foreign supply sources, they will immediately choose a higher domestic content mix. Because of existing contracts, older firms will adjust to changing costs more slowly and have lower domestic content initially. Over time, however, these differences will disappear as older firms move to increase domestic content as well.

A second possibility is that domestic content is increasing because entire supply networks, and not just final stages of production, are moving to the United States. That is, domestic content as measured by the location of the plants is increasing, but domestic content as measured by ownership (say, U.S. vs. Japanese) is not.

Finally, the author separates affiliates by country of origin and finds that Japanese affiliates tend to be low-end outliers with respect to domestic content, while firms from the United Kingdom are high-end outliers. It is difficult to tell why this is exactly. It may indicate fundamentally different behavior on the part of Japanese firms, or it may merely reflect that Japanese firms are younger and tend to engage in greenfield investments in machinery-type industries. It may be useful to see whether these results are due to auto industry effects and also to see how U.S. affiliates abroad behave.

As a final note on geographic differences, there are some very interesting results in tables 6.8 and 6.9 on the locations from which foreign-owned affiliates source their inputs. Many countries engage in bilateral sourcing; for example, Japanese parents in Japan send components to Japanese affiliates in the United States. However, France and the United Kingdom are notable for their reliance on third-country sources. It would be interesting to further study which third countries in particular are being used and how this varies over industries. Canada and Mexico are unique in their geography and trade relationships with the United States. It would be interesting to examine the degree to which foreign-owned affiliates in these countries are used as component suppliers for affiliates in the United States. As NAFTA data become available, it will be worthwhile to measure the degree to which these countries are being used to jump trade barriers and achieve higher North American content.

7 Comparing Wages, Skills, and Productivity between Domestically and Foreign-Owned Manufacturing Establishments in the United States

Mark E. Doms and J. Bradford Jensen

Over the past 20 years, there has been a several-fold increase in the foreign ownership of U.S. assets. This increase has generated interest, sometimes concern, over the effects of foreign direct investment (FDI) on the economy (see Graham and Krugman 1989; Froot and Stein 1991; McCulloch 1993). The interest has focused on the nature of employment opportunities provided by foreign-owned plants and their contribution to productivity. How do foreign plants compare to domestically owned plants in terms of wages and productivity? If foreign companies can overcome the costs of entering the U.S. market, this might signal that these companies have specific advantages, such as superior product design, greater production efficiency, and advanced marketing skill, relative to their domestically owned competitors. As a result, these foreign companies might outperform domestically owned plants in a number of respects, including productivity and wages. Alternatively, foreign firms might keep most of their high value-added operations in their home countries, with their U.S. operations consisting primarily of lower value-added assembly operations. In this case, foreign-owned establishments in the United States would have relatively low skilled workers, and hence relatively low wages, and not necessarily high productivity. Whichever case predominates, these arguments suggest that establishments owned by multinational corporations, regardless of

Mark E. Doms is an economist in the Industrial Output Section of the Board of Governors of the Federal Reserve System. J. Bradford Jensen is research scientist at the H. John Heinz III School of Public Policy and Management at Carnegie Mellon University and executive director of the Carnegie Mellon Census Research Data Center.

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country of ownership, might differ from establishments owned by companies with only domestic operations.

We compare the operating characteristics of foreign-owned and domestically owned plants using detailed data from a large number of U.S. manufacturing establishments. We present evidence on how foreign-owned plants compare to domestically owned plants in terms of employment, wages, productivity, capital intensity, and technology. Previously, researchers have identified differences between foreign-owned plants and domestically owned plants using more aggregated data. Using industry-level data, Howenstine and Zeile (1992) suggest that foreign-owned plants pay higher wages than domestically owned establishments. Further, foreign-owned plants account for a larger share of employment in industries that are capital intensive and skilled labor intensive. This research uses industry-level data, which might hide considerable plant-level heterogeneity within the class of foreign- and domestically owned plants.

The heterogeneity across establishments within industries is substantial. In fact, within-industry variance in wages and productivity exceeds the interindustry variance (for wages, see Davis and Haltiwanger 1991; and for productivity, see Baily, Hulten, and Campbell 1992). Thus, using plant-level data to examine differences across plants within an industry offers advantages over industry-level data. Howenstine and Zeile (1994) use plant- and subindustry-level data from the Annual Survey of Manufactures for 1989 and 1990 and find that foreign-owned plants are larger, more capital intensive, and more productive and pay higher wages than domestically owned plants. Globerman, Ries, and Vertinsky (1994) use Canadian plant-level data and examine the economic performance of foreign affiliates in Canada. They find that foreign affiliate plants are more productive than Canadian-owned plants but that when other plant characteristics (size, capital intensity, share of nonproduction workers, and share of male workers) are controlled for, these differences disappear. Further, Globerman et al. do not find statistically significant differences in performance between foreign-owned Canadian plants by country of ownership.

In this paper, we make use of newly available manufacturing plant-level data for 1987 (approximately 115,000 observations) that allow us to control for industry, size, age, and location and more rigorously test for differences between the operating characteristics of foreign- and domestically owned plants than previous research. Our initial results suggest that even controlling for four-digit industry, state, plant age, and plant size, foreign-owned plants are more productive, rely relatively more on capital than labor, and pay higher wages than domestically owned plants.

To investigate the sources of the observed differences between foreign- and domestically owned plants, we suggest a more useful categorization of ownership. We classify plants based on the nationality of ownership, firm size, and whether U.S.-owned plants belong to firms that have significant assets outside the United States. This allows us to compare plants of foreign multinationals to plants of U.S. multinationals, plants of large domestically oriented firms, and plants of small U.S. firms. When we compare across these four categories, we find different results. As a group, the U.S. multinationals are the most productive, biggest, and most capital intensive and pay the highest wages. The foreign multinationals follow closely in terms of pay and productivity, followed by large domestically oriented plants.

These results suggest that multinational firms, whether foreign or domestic, have the most productive, most capital intensive, highest paying plants. Thus, comparing foreign-owned plants to all domestic plants is in some ways comparing apples and oranges. Plants owned by multinationals tend to be much bigger than the average plant in the United States and have the characteristics associated with size. Thus, it is true that foreign-owned plants have desirable characteristics relative to the whole of U.S. manufacturing. However, when compared to plants owned by U.S. multinationals, foreign-owned plants do not compare as favorably. Further, the results are consistent with the theory that firm-specific advantages, like productivity, enable firms, whether U.S. or foreign, to overcome the barriers to direct foreign investment.

The rest of the paper is organized as follows. In the next section we describe the 1987 Foreign Direct Investment Survey–Census of Manufactures link and our four firm classifications. Section 7.2 focuses on regression results comparing foreign- and domestically owned establishments for basic operating characteristics of establishments—wages, worker mix, productivity. Section 7.3 extends the analysis of section 7.2 by segregating domestic firms into three categories. Sections 7.4 and 7.5 examine the differences by country of ownership and the use of advanced manufacturing technologies in foreign-owned plants. Section 7.6 concludes.

7.1 Data Description

This section describes the data used in the subsequent analysis. The data set used in this paper is a combination of several establishment-level data sets: the 1987 Census of Manufactures (CM), 1987 Central Administrative Offices and Auxiliary Establishment Survey, 1988 Survey of Manufacturing Technology (SMT), and the 1987 Bureau of Economic Analysis (BEA) Foreign Direct Investment Survey. Through a joint project between BEA and the Bureau of the Census, the 1987 FDI Survey was linked to the 1987 Standard Statistical Establishment List, of which the 1987 CM, 1988 SMT, and Auxiliary Reports are subsets.[1] The CM provides information on shipments, value added, capital, production workers, nonproduction workers, wages, and other types of production information. The CM has this data for approximately 200,000 establish-

1. For more information on the Census-BEA link, see U.S. Department of Commerce (1992).

ments. The SMT provides information on the use of 17 advanced manufacturing technologies for a sample of approximately 10,000 manufacturing establishments.

In this paper we examine how labor productivity, the mix of production workers and nonproduction workers, and the wages of production and nonproduction workers vary according to whether establishments are domestically or foreign owned. Some of these variables require accurate measures of nonproduction workers. One problem that arises is that nonproduction workers involved in production might not be physically located at manufacturing establishments. Instead, some nonproduction workers might be located at manufacturing auxiliary establishments. Manufacturing auxiliaries are those establishments that do not manufacture goods but are the locations for such things as R&D labs, headquarters, and data-processing centers. The measurement problem that arises is that in some firms these auxiliary functions are performed at manufacturing sites while in other firms these functions are performed at auxiliary establishments. If the nonproduction workers located at auxiliaries are excluded, then labor productivity will be biased upward, and nonproduction worker wages will most likely be biased downward since auxiliaries tend to pay above average wages. One reason why the issue of nonproduction workers is of particular interest in this paper is that the mix of workers in manufacturing operations gives some indication of the activities being performed in the country.

We present results with and without adjustments for auxiliary employment.[2] We use data from the 1987 Central Administrative Offices and Auxiliary Establishment Survey to make the auxiliary adjustments. First, for each firm we compute the total number of nonproduction workers and their salaries (each firm might have more than one manufacturing auxiliary) located in manufacturing auxiliaries. Second, we distribute these auxiliary workers and their wages across all manufacturing establishments of the firm. The proportion of auxiliary workers and auxiliary wage bill that an establishment receives depends on the share of the firm's nonproduction workers that establishment has. For instance, if an establishment has 30 percent of the firm's nonproduction workers who are employed at manufacturing establishments, we allocate to that plant 30 percent of the firm's auxiliary workers.

The FDI data that we currently have access to provide the country of ultimate beneficial ownership for the enterprise to which each establishment belongs. In the FDI Survey, "a U.S. affiliate is a U.S. business enterprise that is owned 10 percent or more, directly or indirectly, by a foreign person." Unfortunately, we do not have degree of foreign ownership. Therefore, in the analysis that follows, we treat all foreign-owned establishments equally.

In our analysis, there is significant sample attrition in terms of the number

2. This assuages, to some extent, a criticism of work that uses U.S. establishment-level manufacturing data, namely, that nonproduction workers are being undercounted in multiplant firms.

of establishments and, to a much lesser degree, in terms of manufacturing employment. The 1987 population of manufacturing establishments in the United States was approximately 350,000. About 200,000 of these establishments were mailed a 1987 Census of Manufactures form that requested information on shipments, labor, wages, and capital. The production data for the other 150,000 records, known as administrative records, are imputed and therefore cannot be used in our analysis. Administrative records almost always have fewer than five employees. The next largest source of attrition is the dropping of records with impute flags. An impute flag is set if any one of the following four variables was not reported by the establishment: employment, salaries and wages, materials, and total value of shipments. We dropped all records with impute flags. These records tend to be below average in terms of size. Table 7.1 reports the number of establishments, employment, average employment, and average earnings for the 1987 CM and some basic statistics for our final sample.

We also make use of the 1987 Large Company Survey (ES9100). The ES9100 is mailed to all enterprises with more than 500 employees. We use the ES9100 to identify whether domestically owned firms have significant foreign assets. Firms are asked to report "all assets in foreign countries, and U.S. possessions, regardless of type." Unfortunately, we do not know the nature of these assets. We divide foreign assets by total assets, and if the ratio of foreign to total assets is greater than 10 percent, we classify the firm as having foreign exposure (or as a U.S. multinational, for short).[3] If the ratio is less than 10 percent, we classify the firm as being a large U.S. firm without foreign exposure (or a large domestic firm). Unfortunately, the ES9100 is only mailed to firms with more than 500 employees, so there is a significant number of establishments for which we do not have foreign asset information. We classify firms with fewer than 500 employees as small U.S. firms. Table 7.1 also presents the breakdown of establishments by domestic ownership type.

7.2 U.S.-Owned Establishments Compared to Foreign-Owned Establishments

We begin by comparing the plant characteristics of U.S.-owned establishments to foreign-owned establishments. The discussion of foreign ownership of manufacturing facilities has typically focused on the nature of employment opportunities. Some suggest that foreign-owned plants undertake a set of activities different from that pursued by domestic plants and therefore use a different class of workers, pay lower wages, and are less productive than domestically owned plants. Other theories of FDI suggest that foreign-owned plants

3. Note that this definition differs from BEA's definition of a "parent" multinational. BEA defines a parent as any U.S. enterprise that owns 10 percent or more of a foreign entity. We do not observe the nature of the foreign assets in the ES9100. For more analysis of the sensitivity of this definition of U.S. "multinational" see Doms and Jensen (1997).

Table 7.1 **Basic Sample Statistics: Comparison between Samples and Populations**

Sample or Population	Number of Establishments	Total Employment	Average Employment per Establishment	Average Annual Earnings[a]
1987 CM manufacturing population	358,941	17,716,649	49.4	19.08
Total sample	115,139	12,420,340	107.9	21.44
Foreign population	7,077	1,180,686	168.8	26.55
Foreign sample	4,463	853,338	191.2	24.95
Domestic population	351,864	16,535,963	47.0	18.92
Domestic sample	110,676	11,567,002	104.5	21.30
Small domestic	87,030	3,902,625	44.8	20.78
Large domestic	15,920	4,229,001	265.6	21.87
U.S. multinational	7,726	3,435,376	444.6	25.90

[a]In thousands of dollars per employee.

belong to firms that have specific advantages that enable them to invest in new markets. These advantages include superior product design, greater production efficiency, and advanced marketing skill. We investigate these claims by comparing measures of average annual wages, skill mix, capital-labor ratios, and productivity between foreign-owned establishments and domestically owned establishments. Table 7.2 provides more precise definitions of the operating characteristics that we use in our comparisons.

In table 7.1 we saw that foreign-owned plants are larger than domestically owned plants. Table 7.3 reports plant means and standard deviations for the operating characteristics of each class of plant. We see that foreign-owned plants do differ from domestically owned plants. Foreign-owned plants pay higher wages to both production workers and nonproduction workers. Production workers in domestic plants average about $18,760 in earnings in 1987, while production workers in foreign plants average about $22,290 in 1987.

The difference in earnings of nonproduction workers is not as large. Without taking auxiliary employment into account, foreign plants pay nonproduction workers about $32,100 a year and domestically owned plants pay about $30,370. When we adjust for nonproduction worker employment at auxiliary establishments, the difference between domestically owned and foreign-owned establishments declines. What is the source of these earnings differentials?

One possibility is differences in human capital. Beyond paying higher wages, foreign-owned establishments are more nonproduction worker intensive than domestic plants, whether auxiliary employment is included or not. Foreign-owned plants use a higher share of nonproduction, or skilled, workers. This in itself would not explain the wage differential for the different categories of workers. But if, in addition to using more nonproduction workers,

Table 7.2 **Variable Definitions**

Variable Name	Definition
A. Dependent Variables	
Production worker wages	Annual salaries (thousand \$) for production workers/ number of production workers
Nonproduction worker wages (1)	Annual salaries (thousand \$) for nonproduction workers/ number of nonproduction workers
Nonproduction worker wages (2)	Same as Nonproduction worker wages (1) except with an adjustment made for employment and payroll in auxiliaries
Production workers/Total employment (1)	Number of production workers/total employment
Production workers/Total employment (2)	Number of production workers/total employment, where total employment is adjusted for auxiliary employment
Capital/Employment (1)	Book value of machinery and building assets (thousand \$)/total employment
Capital/Employment (2)	Book value of machinery and building assets (thousand \$)/total employment, where total employment is adjusted for auxiliary employment
Value added/Employment (1)	Value added (thousand \$)/total employment
Value added/Employment (2)	Value added (thousand \$)/total employment, where total employment is adjusted for auxiliary employment
TFP-R	Natural logarithm of total factor productivity calculated from using the residual from a value-added Cobb-Douglas production function[a]
TFP-FS	Natural logarithm of total factor productivity calculated using a factor share method[b]
B. Independent Variables	
Plant size	Categorical variable band on total plant employment (TE): Size class 1: $1 \leq TE < 50$ Size class 2: $50 \leq TE < 100$ Size class 3: $100 \leq TE < 250$ Size class 4: $250 \leq TE < 500$ Size class 5: $500 \leq TE < 1{,}000$ Size class 6: $1{,}000 \leq TE < 2{,}500$ Size class 7: $2{,}500 \leq TE$ (omitted category)
Plant age	Categorical variable based on year of first CM appearance: Age class 63: First appearance in census is 1963 Age class 67: First appearance in census is 1967 Age class 72: First appearance in census is 1972 Age class 77: First appearance in census is 1977 Age class 82: First appearance in census is 1982 Age class 87: First appearance in census is 1987 (omitted category)
Plant industry	Dummy variables representing four-digit industry

(*continued*)

Table 7.2 (continued)

Variable Name	Definition
	B. Independent Variables
Plant location	Dummy variable representing state in which plant is located

[a]The residual measure is calculated using a Cobb-Douglas specification with capital, labor, and materials (including parts, fuels, and services) included as inputs. The regression coefficients are from four-digit industry regressions.

[b]The factor share method is calculated using the median factor shares of capital, labor, and materials (including parts, fuels, and services) from the four-digit industry. This method is similar to that used in Baily et al. (1992).

Table 7.3 **Variable Means by Foreign and Domestic Ownership**

Variable	Domestic	Foreign
Production worker wages (thousand $)	18.76	22.29
	(8.13)	(8.57)
Nonproduction worker wages (1) (thousand $)	30.37	32.10
	(15.74)	(12.44)
Nonproduction worker wages (2) (thousand $)	32.49	32.94
	(11.06)	(10.58)
Production workers/Total employment (1)	0.73	0.68
	(0.19)	(0.21)
Production workers/Total employment (2)	0.72	0.63
	(0.20)	(0.22)
Capital/Employment (1) (thousand $)	39.34	103.10
	(91.1)	(218.40)
Capital/Employment (2) (thousand $)	36.84	91.83
	(75.9)	(193.49)
Value added/Employment (1) (thousand $)	56.50	109.48
	(77.9)	(160.35)
Value added/Employment (2) (thousand $)	53.75	96.55
	(66.73)	(137.77)
TRP-R	.02	.06
	(.29)	(.28)
TFP-FS	.04	.06
	(.36)	(.36)

Note: See table 7.2 for variable definitions. Numbers in parentheses are standard deviations.

foreign-owned plants also used more skilled or more educated workers within a category, this might explain the observed higher wages within categories. Supporting this claim is Troske (1994), who finds that worker characteristics account for a significant portion of observed cross-plant wage differentials in a sample of plants from the 1987 CM. Unfortunately, we do not have any additional information on the workers in our establishments. Another possibility is that foreign-owned plants pay a wage premium to deter unionization. Although we cannot test this hypothesis, we include controls for state and industry.

Foreign-owned plants are more capital intensive and more productive. Foreign-owned plants average approximately \$103,000 in capital assets per employee (without adjusting for auxiliary employment), while domestic plants average about \$40,000 in capital assets per employee. After adjusting for auxiliary employment, the differential is still quite large, though reduced. Foreign-owned plants have higher labor productivity (which might be due to the higher capital-labor ratio at foreign plants) and higher total factor productivity (TFP), which takes into account the higher capital-labor ratio.

These results suggest that foreign plants differ significantly from domestic plants. However, other studies, such as Howenstine and Zeile (1992, 1994), show that foreign-owned plants are concentrated in industries that are more capital intensive, pay higher wages, and are more productive. Thus, the observed differences described above could be due to industry composition effects. Column (1) of table 7.4 presents regression results comparing foreign-owned plants to domestically owned plants without industry, location, age, or size controls.[4] The regression coefficients in column (1) of table 7.4 tell the same story as the means reported in table 7.3. Foreign-owned plants are significantly more capital intensive, are more productive, and pay higher wages, but this may be due to composition effects. To control for possible composition effects, we include controls for plant size, industry, plant age, and plant location.[5] In column (2), we present regression results that control for these other plant characteristics. When we include controls for plant size, industry (four-digit), plant age, and plant location (state), the observed differences between foreign-owned and domestically owned plants decrease but persist.

The equations controlling for size, age, industry, and location still show that foreign-owned plants pay about 7 percent more to production workers and 1 to 2 percent more to nonproduction workers. Foreign-owned plants are about 30 percent more capital intensive and have about 20 percent higher labor productivity than domestically owned plants of the same age and size, in the same location and industry. In terms of TFP, foreign-owned plants are about 2 to 4 percent more productive. Further, foreign-owned plants use fewer production workers than domestically owned plants.

4. The regression coefficients reported in col. (1) of table 7.4 are from a regression of the dependent variable on an intercept term and a dummy variable that is one if the establishment is foreign owned. These results represent the mean differences between foreign-owned plants and domestically owned plants. See the appendix for a more detailed description of the specification.

5. The regression coefficients reported in col. (2) of table 7.4 are the coefficients from a dummy variable representing whether a plant is foreign owned. The specification also includes controls for plant size, plant age, plant industry, and plant location. We include as controls seven plant-size dummy variables based on employment at the plant. We choose this form of controls as it allows more flexibility than imposing a linear restriction by including a continuous measure of plant employment. We control for plant age by including a categorical variable representing the first CM in which the plant appears. We also include dummy variables for four-digit industry and state. See the appendix for a more detailed description of the specification.

Table 7.4 Differences between Domestically and Foreign-Owned Establishments

Dependent Variable	Foreign Owned No Controls (1)	Foreign Owned With Controls (2)	Foreign Owned Controls + K/L[a] (3)
log Production worker wages	.190	.073	.038
	(.007)	(.006)	(.006)
log Nonproduction worker wages (1)	.104	.012	−.020
	(.008)	(.008)	(.008)
log Nonproduction worker wages (2)	.130	.026	−.005
	(.008)	(.008)	(.008)
Production workers/Total employment (1)	−.052	−.020	−.018
	(.003)	(.003)	(.003)
Production workers/Total employment (2)	−.084	−.031	−.029
	(.003)	(.003)	(.003)
log Capital/Employment (1)	.941	.332	
	(.018)	(.015)	
log Capital/Employment (2)	.877	.308	
	(.017)	(.014)	
log Value added/Employment (1)	.537	.211	.134
	(.010)	(.009)	(.008)
log Value added/Employment (2)	.473	.186	.118
	(.010)	(.009)	(.008)
TFP-R	.041	.037	
	(.004)	(.005)	
TFP-FS	.024	.023	
	(.006)	(.006)	

Note: The numbers are regression coefficients from linear models that do and do not control for establishment size, four-digit industry, plant age, and state. The omitted group is domestically owned establishments. Number of observations is approximately 115,000. Numbers in parentheses are standard errors.

[a]K/L = capital-labor ratio (capital intensity).

Following Globerman et al. (1994), we also include the capital-labor ratio as a control variable. Globerman et al. find that when they include size, capital intensity, and percentage of males in the plant,[6] the observable labor productivity difference between Canadian and foreign-owned plants becomes statistically insignificant. We report the results of including capital intensity among the controls in column (3) of table 7.4.[7] The differences are reduced, but the differential for productivity is still positive and statistically significant. Including the capital-labor ratio also reduces the observed wage premium to produc-

6. We cannot replicate the percentage of males in the plant as we do not know the composition of workers by gender in the plant.

7. We do not include the capital-labor ratio in the TFP regressions as the capital and labor inputs are already controlled for in a less restrictive manner.

tion workers, but it is still positive and statistically significant at about 3.8 percent.

These results suggest that the differences between foreign- and domestically owned plants are partially the result of industry, size, age, and location effects. Including controls for these effects reduces the observed differences between domestically and foreign-owned plants. However, the differences do not disappear. Even after controlling for these effects, foreign-owned plants still have superior operating characteristics relative to domestic plants.

The results suggest that some of the fears expressed over FDI are unwarranted. Foreign-owned plants are more capital intensive, are more productive, pay higher wages, and use a higher proportion of nonproduction workers than the average U.S.-owned plant. Further, although some of the differences between foreign-owned and domestically owned plants are the result of industry composition effects, foreign-owned plants still have superior operating characteristics compared to domestically owned plants controlling for industry, state, age, and size. While these results are suggestive of the impact of foreign-owned plants on the domestic economy, the results do not speak to the potential sources of the different operating characteristics. In section 7.3 we further decompose the plants by ownership type to investigate potential sources of the differences in operating characteristics.

7.3 Foreign-Owned Establishments Compared to U.S. Multinational Establishments

In section 7.2 we compared foreign-owned plants to all domestically owned plants. For some purposes, this is the relevant comparison. However, in trying to uncover the sources of these differences, a more detailed comparison might prove fruitful. According to theories of multinational investment, firms that engage in FDI have some firm-specific advantages that allow them to overcome the hurdles of FDI. Thus, we might expect that plants owned by foreign multinational corporations would be more productive than the average domestically owned plant. However, if this theory of FDI is correct, we would expect to find that plants owned by U.S. multinational corporations would also have these superior characteristics. To investigate this possibility, we further divide our sample and compare plants owned by U.S. multinationals to foreign-owned plants.

We divide plants into four categories: (1) plants owned by foreign companies, (2) plants owned by U.S. firms with fewer than 500 employees, (3) plants owned by U.S. firms with more than 500 employees without significant foreign assets, and (4) plants owned by U.S. firms with more than 500 employees and foreign assets comprising more than 10 percent of total assets. For ease of exposition, we call the first group "foreign-owned plants," the second group "small U.S. firm plants," the third group "large domestic firm plants," and the fourth group "U.S. multinationals."

Table 7.5 **Differences between Foreign-Owned Establishments and Domestic Establishments by Domestic Plant Type**

	Plant Type		
Dependent Variable	Foreign Owned	Large Domestic Firm	Small U.S. Firm
log Production worker wages	−.029	−.069	−.152
	(.007)	(.005)	(.005)
log Nonproduction worker wages (1)	−.004	−.025	−.020
	(.010)	(.007)	(.007)
log Nonproduction worker wages (2)	−.039	−.050	−.095
	(.010)	(.007)	(.007)
Production workers/Total employment (1)	−.021	.008	−.006
	(.003)	(.002)	(.002)
Production workers/Total employment (2)	.009	.036	.056
	(.003)	(.003)	(.002)
log Capital/Employment (1)	−.062	−.212	−.605
	(.017)	(.013)	(.012)
log Capital/Employment (2)	−.006	−.156	−.488
	(.017)	(.013)	(.012)
log Value added/Employment (1)	−.082	−.166	−.446
	(.010)	(.008)	(.007)
log Value added/Employment (2)	−.026	−.110	−.329
	(.010)	(.007)	(.007)
TFP-R	−.036	−.042	−.111
	(.006)	(.004)	(.004)
TFP-FS	−.024	−.024	−.073
	(.007)	(.005)	(.005)

Note: All numbers are regression coefficients from linear models that control for establishment size, four-digit industry, plant age, and state. Number of observations is approximately 115,000. Omitted plant type is U.S. multinational. Numbers in parentheses are standard errors.

In table 7.5 we present regressions comparing plant characteristics for the four plant types (plants of U.S. multinationals is the omitted category). Plants of U.S. multinationals pay the highest wages to both production and nonproduction workers. Production workers are paid 2.9 percent less at foreign-owned plants, 6.9 percent less at large domestic firm plants, and 15.2 percent less at small U.S. firm plants relative to U.S. multinationals. Nonproduction workers at U.S. multinationals do not enjoy as large a pay premium as production workers; the differential ranges from 0.4 percent lower at foreign-owned plants to 2.0 percent lower at small U.S. firm plants (when auxiliary employment is not included), and 3.9 percent lower at foreign-owned plants to 9.5 percent lower for small U.S. firm plants (when auxiliary employment is included).[8]

8. The nonproduction wage differential increases when auxiliary employment is included because large firms tend to have more auxiliary employment and auxiliaries have above average wages.

Plants owned by U.S. multinationals are also the most capital intensive. The capital-labor ratio of foreign-owned plants is 6.2 percent lower than that of U.S. multinational plants. Plants of large domestic firms have a 21.2 percent lower capital-labor ratio, and plants of small U.S. firms have a 60.5 percent lower capital-labor ratio. When employment at auxiliary establishments is included in total employment, the results change. With auxiliary employment included, foreign-owned plants are not statistically different from plants of U.S. multinationals in terms of capital-labor ratios. Plants of large and small U.S. firms still have lower capital-labor ratios, although the differences have decreased to 15.6 percent lower and 48.8 percent lower, respectively. The addition of auxiliary employment increases employment for plants of U.S. multinationals the most. Thus, the capital-labor ratio at these plants decreases relative to the other plant classes when auxiliary employment is included.

In terms of labor productivity and TFP, plants of U.S. multinationals are the most productive. Labor productivity (without adjusting for auxiliary employment) is 8.2 percent lower at foreign-owned plants than at plants of U.S. multinationals. Labor productivity is even lower at plants of large domestic firms, 16.6 percent lower, and lower still at plants of small U.S. firms, 44.6 percent lower. When auxiliary employment is included, the differentials decrease but are still significant. For TFP, the story is much the same. Foreign-owned firms have 3.6 percent lower TFP than plants of U.S. multinationals. For plants of domestic firms, plants of large firms have 4.2 percent lower TFP and plants of small firms have 11.1 percent lower TFP. Again, when auxiliary employment is included, the productivity differentials decrease but are still significant.

These results, and the results from section 7.2, suggest that while foreign-owned plants do indeed have different, and in many ways superior, characteristics compared to the average U.S.-owned plant, there is considerable heterogeneity within the class of U.S.-owned plants. When we divide U.S.-owned plants and look at plants of U.S. multinationals, we see that they compare favorably with foreign-owned plants and with all other domestically owned plants. Further, the results suggest that the plants of multinationals, whether U.S. or foreign, are the most alike and possess superior operating characteristics. These results suggest that plants of multinational corporations are the most productive, are the most capital intensive, and pay the highest wages. This finding is consistent with the notion that multinationals possess firm-specific advantages, whether superior product design, greater production efficiency, or advanced marketing skill, that enable them to overcome the barriers to FDI.

7.4 Comparing Plant Characteristics Based on Country of Ownership

We also break out the plants by country of ownership. Vernon (1993) suggests that in the past researchers have found it useful to distinguish multinational enterprises according to their national bases. He further suggests that this dimension will become less useful in the future. We examine differences in the operating characteristics of foreign-owned plants by country of ownership.

Table 7.6 presents the wage, labor mix, capital-labor ratio, and productivity results. One interesting feature is that no country compares favorably with plants owned by U.S. multinationals. Further, plants owned by Japanese firms do not seem to perform as well as might be expected based on popular perceptions. Plants owned by Japanese firms have the lowest labor productivity of foreign-owned plants and the lowest and second lowest measured TFP.[9] These data are from 1987. Much of the Japanese investment in the United States was done in the early 1980s. While we control for plant age, using the year of the first CM that the plant appears in as a proxy for age, this might not adequately control for age effects.[10] Thus, it is possible that the low productivity numbers for Japan reflect start-up costs. In terms of labor market characteristics, Japan and Australia are again relatively poor performers. Both pay their production workers less than other foreign-owned plants. While plants owned by multinationals from these countries exhibit lower productivity and production worker wages relative to plants owned by other multinationals, they compare favorably to nonmultinational domestically owned plants.

7.5 Technology Use at Foreign- and Domestically Owned Plants

We examine the use of advanced technologies at foreign-owned and domestically owned plants. One potential advantage of FDI is technology transfer. If foreign plants are more technologically advanced than domestic plants, these plants might produce technological spillovers. We use data from the Survey of Manufacturing Technology to examine technology use in domestically and foreign-owned plants. The SMT provides information on the use of 17 advanced manufacturing technologies for a sample of approximately 10,000 manufacturing plants.[11] We use the number of technologies reported as present in a manufacturing plant as a measure of the technology intensity at that plant.

Table 7.7 presents results for regressions with the number of technologies as the dependent variable comparing domestically owned and foreign-owned establishments. On average, foreign plants do use more technologies than domestic plants. However, when we control for industry, location, plant size, and plant age, the difference is reduced and marginally significant. When we control for the capital-labor ratio at the plant, the difference is negligible. Table 7.8 presents results for the comparison with plants owned by U.S. multinationals. We see that plants owned by U.S. multinationals are the most technology-

9. The other country whose plants seem to perform relatively poorly is Australia.

10. We use the first census a plant appears in to proxy for the age of the plant. This identifies a plant birth to prior to one of six five-year censuses: birth prior to the 1963, 1967, 1972, 1977, 1982, or 1987 CM. A problem that arises with this definition is that it pertains to new facilities, commonly referred to as "greenfield" plants. The definition does not measure how long the facility has been operated by a particular firm. Unfortunately, we do not know how long a plant has been owned by a foreign firm.

11. For more information on the design and coverage of the SMT, see Dunne and Schmitz (1992).

Table 7.6 Cross-Country Comparisons

Establishment Ownership	log Production Worker Wages	log Non-production Worker Wages (1)	log Non-production Worker Wages (2)	Production Workers/ Total Employment (1)	Production Workers/ Total Employment (2)	log Capital/ Labor (1)	log Capital/ Labor (2)	log Value Added/ Employee (1)	log Value Added/ Employee (2)	TFP-R	TFP-FS
Australia	−.157	.094	.007	−.029	.013	.077	.164	−.192	−.106	−.068	−.095
	(.038)	(.053)	(.052)	(.018)	(.018)	(.095)	(.094)	(.056)	(.056)	(.030)	(.038)
Canada	−.036	−.025	−.067	−.027	.008	−.036	.033	−.059	.010	−.013	−.017
	(.015)	(.021)	(.020)	(.007)	(.007)	(.038)	(.037)	(.022)	(.022)	(.012)	(.015)
France	−.054	−.001	−.081	−.022	.020	−.219	−.136	−.121	−.037	−.015	.021
	(.020)	(.030)	(.029)	(.010)	(.010)	(.051)	(.051)	(.030)	(.030)	(.016)	(.020)
Germany	.011	.046	.006	−.026	−.004	.130	.173	−.015	.029	−.032	−.035
	(.018)	(.025)	(.025)	(.009)	(.009)	(.046)	(.046)	(.027)	(.027)	(.015)	(.018)
Japan	−.058	−.028	−.039	.018	.059	.001	.080	−.207	−.177	−.102	−.078
	(.019)	(.027)	(.026)	(.009)	(.009)	(.047)	(.047)	(.028)	(.028)	(.015)	(.019)
Netherlands	−.047	−.027	.032	.016	.002	.077	.051	.049	.024	−.020	−.019
	(.024)	(.033)	(.032)	(.011)	(.011)	(.059)	(.059)	(.035)	(.035)	(.019)	(.023)
Other	.016	.049	−.009	−.006	.035	−.056	.021	−.101	−.025	−.041	−.042
	(.015)	(.022)	(.021)	(.007)	(.007)	(.039)	(.039)	(.023)	(.023)	(.012)	(.015)
Sweden	.041	−.008	−.039	−.055	−.020	−.117	−.048	−.154	−.084	−.025	−.027
	(.030)	(.043)	(.042)	(.014)	(.015)	(.076)	(.076)	(.045)	(.045)	(.024)	(.030)
Switzerland	−.028	.003	.004	−.006	−.005	.058	.031	.064	.038	−.004	.016
	(.024)	(.033)	(.032)	(.011)	(.011)	(.059)	(.059)	(.035)	(.035)	(.019)	(.023)
United Kingdom	−.042	−.032	−.071	−.042	−.007	−.172	−.114	−.097	−.038	−.039	−.013
	(.011)	(.016)	(.015)	(.005)	(.005)	(.027)	(.027)	(.016)	(.016)	(.009)	(.011)
U.S. small firm	−.151	−.020	−.095	−.007	.056	−.607	−.489	−.447	−.329	−.112	−.073
	(.005)	(.007)	(.007)	(.002)	(.002)	(.012)	(.012)	(.007)	(.007)	(.004)	(.005)
U.S. large domestic firm	−.069	−.025	−.051	.008	.036	−.214	−.157	−.167	−.110	−.042	−.024
	(.005)	(.007)	(.007)	(.002)	(.002)	(.013)	(.013)	(.008)	(.008)	(.004)	(.005)

Note: All coefficients are relative to U.S. multinational firms. All numbers are regression coefficients from linear models that control for establishment size, four-digit industry, plant age, and state. Number of observations is approximately 15,000. Numbers in parentheses are standard errors.

Table 7.7 Differences between Domestically and Foreign-Owned Establishments

Dependent Variable	Foreign Owned No Controls	Foreign Owned With Controls	Foreign Owned Controls + K/L[a]
Number of technologies	.930	.268	.055
	(.189)	(.152)	(.149)

Note: The numbers are regression coefficients from linear models that do and do not control for establishment size, four-digit industry, plant age, and state. The omitted group is domestically owned establishments. Number of observations is approximately 6,800. Numbers in parentheses are standard errors.

[a]K/L = capital-labor ratio (capital intensity).

Table 7.8 Differences between Foreign-Owned Establishments and Domestic Establishments by Domestic Plant Type

	Plant Type		
Dependent Variable	Foreign Owned	Large Domestic Firm	Small U.S. Firm
Number of technologies	−.229	−.309	−1.03
	(.165)	(.106)	(.109)

Note: All numbers are regression coefficients from linear models that control for establishment size, four-digit industry, plant age, and state. Number of observations is approximately 6,800. Omitted plant type is U.S. multinational. Numbers in parentheses are standard errors.

intensive plants. Foreign-owned plants use fewer technologies than plants owned by U.S. multinationals. Plants owned by large domestic firms also use fewer technologies than plants of U.S. multinationals, and plants of small U.S. firms use even fewer technologies.

These results suggest that foreign-owned plants are more technology intensive than the average domestically owned plant and, thus, offer the possibility of more technology transfer than the average U.S. plant. The results are also consistent with the notion that multinationals, whether foreign or domestic, use the most technology-intensive means of production.[12]

7.6 Conclusions

The results presented in this paper show that foreign-owned manufacturing plants in the United States in 1987 have superior operating characteristics rela-

12. Using the SMT subsample, we reran all of the regressions reported in tables 7.4 and 7.5, both with and without the number of technologies as a control variable. The results do not change, in general, even with the inclusion of the technology control variable.

tive to the average U.S.-owned plant. Foreign-owned plants pay higher wages, are more capital intensive, are more technology intensive, and are more productive than the average U.S. plant. There do not appear to be large differences among foreign-owned plants based on country of ownership.

This being said, the results also suggest that it is not the fact that the plants are foreign owned that is important to plant operating characteristics, rather it is the fact that the plants are owned by multinational corporations that seems important. Plants owned by U.S. multinationals exhibit the best operating characteristics, followed by plants of foreign multinationals. The combined class of multinationals is significantly different from both plants owned by large domestically oriented U.S. firms and plants owned by small U.S. firms. These results are consistent with the notion that multinationals possess some firm-specific advantages that enable them to overcome the barriers of FDI.

Appendix

In this appendix we present a more detailed description of the specifications we estimate in table 7.4. We use the same general set of specifications throughout the paper. Below, we also present more of the coefficient estimates from the specifications in table 7.4.

For column (1)—no controls—in table 7.4, we estimate

$$Y_i = \alpha + \beta \text{ Foreign owned}_i + \varepsilon_i,$$

where Y_i is the dependent variable listed in the table. Table 7A.1 contains the full set of regression coefficients.

For column (2)—with controls—in table 7.4, we estimate

$$Y_i = \alpha + \beta \text{ Foreign owned}_i + \Gamma X_i + \varepsilon_i,$$

where X_i includes dummy variables for plant size, plant age, state, and industry (see panel B of table 7.2). Table 7A.2 contains an extended set of regression coefficients for this specification. (We suppress the industry and state results to conserve space and to avoid disclosure issues.)

For column (3)—with controls and capital-labor ratio—in table 7.4, we estimate

$$Y_i = \alpha + \beta \text{ Foreign owned}_i + \delta \text{ Capital/Labor}_i + \Gamma X_i + \varepsilon_i,$$

where X_i includes dummy variables for plant size, plant age, state, and industry (see panel B of table 7.2). Table 7A.3 contains an extended set of regression coefficients for this specification.

Table 7A.1 Differences between Domestically and Foreign-Owned Establishments

Independent Variables	log Production Worker Wages	log Non-production Worker Wages (1)	log Non-production Worker Wages (2)	Production Workers/ Total Employment (1)	Production Workers/ Total Employment (2)	log Capital/ Labor (1)	l Cap La (
R^2	.007	.001	.002	.003	.007	.024	.(
Intercept	2.843	3.290	3.306	.732	.718	3.009	2.9
	(.001)	(.002)	(.002)	(.001)	(.001)	(.004)	(.(
Foreign owned	.190	.104	.130	−.052	−.084	.941	.8
	(.007)	(.008)	(.008)	(.003)	(.003)	(.018)	(.(

Note: The numbers are regression coefficients from linear models that include an intercept and a foreign-owned dummy. Numbers of observations is a

Table 7A.2 Differences between Domestically and Foreign-Owned Establishments

Independent Variables	log Production Worker Wages	log Non-production Worker Wages (1)	log Non-production Worker Wages (2)	Production Workers/ Total Employment (1)	Production Workers/ Total Employment (2)	log Capital/ Labor (1)
R^2	.317	.144	.150	.245	.260	.407
Foreign owned	.073	.012	.026	−.020	−.031	.332
	(.006)	(.008)	(.008)	(.003)	(.003)	(.015)
Size class 1 (1–49)	−.482	−.306	−.303	.040	.087	−.983
	(.021)	(.029)	(.028)	(.010)	(.010)	(.053)
Size class 2 (50–99)	−.472	−.188	−.180	.042	.083	−.841
	(.021)	(.029)	(.028)	(.010)	(.010)	(.053)
Size class 3 (100–249)	−.412	−.179	−.162	.042	.075	−.703
	(.021)	(.029)	(.028)	(.010)	(.010)	(.053)
Size class 4 (250–499)	−.348	−.160	−.134	.046	.066	−.587
	(.021)	(.029)	(.028)	(.010)	(.010)	(.054)
Size class 5 (500–999)	−.263	−.138	−.102	.045	.056	−.405
	(.021)	(.030)	(.029)	(.010)	(.011)	(.055)
Size class 6 (1,000–2,499)	−.162	−.061	−.044	.023	.029	−.274
	(.023)	(.032)	(.031)	(.010)	(.011)	(.058)
First census 63	.112	.128	.126	−.022	−.023	.184
	(.003)	(.005)	(.005)	(.002)	(.002)	(.009)
First census 67	.093	.110	.113	−.012	−.014	.166
	(.005)	(.007)	(.006)	(.002)	(.002)	(.012)
First census 72	.075	.105	.105	−.008	−.009	.135
	(.004)	(.006)	(.006)	(.002)	(.001)	(.010)
First census 77	.049	.075	.072	−.005	−.005	.108
	(.004)	(.005)	(.005)	(.002)	(.002)	(.009)
First census 82	.028	.038	.036	−.002	−.001	.066
	(.003)	(.005)	(.005)	(.002)	(.002)	(.008)

Note: The numbers are regression coefficients from linear models that control for establishment size (size class 7 digit industry (results not reported), and state (results not reported). Numbers of observations is approximately 11

Table 7A.3 Differences between Domestically and Foreign-Owned Establishments

Independent Variables	log Production Worker Wages	log Non-production Worker Wages (1)	log Non-production Worker Wages (2)	Production Workers/ Total Employment (1)	Production Workers/ Total Employment (2)	log Value Added/ Employee (1)	log Value Added/ Employee (2)	TFP-R	TFP-FS
R^2	.367	.168	.177	.246	.261	.421	.391	.024	.178
Foreign owned	.038	−.020	−.005	−.018	−.029	.134	.118	.038	.074
	(.006)	(.008)	(.008)	(.003)	(.003)	(.008)	(.008)	(.005)	(.005)
log Capital/Labor (1)	.107	.094		−.009		.231		−.001	−.152
	(.001)	(.002)		(.001)		(.002)		(.001)	(.001)
log Capital/Labor (2)			.096		−.010		.223		
			(.001)		(.001)		(.002)		
Size class 1 (1–49)	−.377	−.213	−.217	.032	.079	−.280	−.225	−.089	−.242
	(.020)	(.028)	(.002)	(.010)	(.010)	(.029)	(.029)	(.017)	(.019)
Size class 2 (50–99)	−.382	−.109	−.107	.035	.076	−.261	−.212	−.081	−.215
	(.020)	(.028)	(.028)	(.010)	(.010)	(.029)	(.029)	(.017)	(.019)
Size class 3 (100–249)	−.337	−.113	−.100	.037	.069	−.218	−.182	−.064	−.179
	(.020)	(.028)	(.028)	(.010)	(.010)	(.029)	(.029)	(.017)	(.019)
Size class 4 (250–499)	−.285	−.105	−.081	.041	.060	−.153	−.132	−.038	−.123
	(.020)	(.029)	(.028)	(.010)	(.010)	(.029)	(.029)	(.017)	(.019)
Size class 5 (500–999)	−.220	−.100	−.065	.041	.052	−.088	−.080	−.017	−.079
	(.021)	(.030)	(.029)	(.010)	(.010)	(.030)	(.030)	(.017)	(.020)
Size class 6 (1,000–2,499)	−.133	−.036	−.019	.021	.027	−.044	−.043	−.001	−.049
	(.022)	(.031)	(.031)	(.011)	(.011)	(.032)	(.031)	(.018)	(.021)
First census 63	.093	.110	.108	−.021	−.021	−.018	−.016	−.012	−.018
	(.003)	(.005)	(.005)	(.002)	(.002)	(.005)	(.005)	(.003)	(.003)
First census 67	.075	.094	.098	−.011	−.012	.003	.003	.000	−.005
	(.004)	(.007)	(.006)	(.002)	(.002)	(.006)	(.006)	(.004)	(.004)
First census 72	.061	.093	.092	−.007	−.008	−.005	−.004	−.004	−.007
	(.004)	(.006)	(.006)	(.002)	(.002)	(.005)	(.005)	(.003)	(.004)
First census 77	.038	.065	.062	−.005	−.004	−.007	−.005	−.001	−.007
	(.004)	(.005)	(.005)	(.002)	(.002)	(.005)	(.005)	(.003)	(.003)
First census 82	.021	.032	.029	−.002	−.000	−.005	−.002	−.000	−.003
	(.003)	(.005)	(.004)	(.002)	(.002)	(.005)	(.005)	(.003)	(.003)

Note: The numbers are regression coefficients from linear models that control for establishment size (size class 7 omitted), plant age (census class 87 omitted), four-digit industry (results not reported), and state (results not reported). Number of observations is approximately 115,000. Numbers in parentheses are standard errors.

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Comment Keith Head

Doms and Jensen ask and answer the question, How do foreign plants compare to domestically owned plants in terms of wages and productivity? Their answer can be summarized as follows. Workers at foreign-owned manufacturing plants generate about 50 percent more value added and receive 20 percent higher wages than employees at the average domestically owned plant. However, most of the premiums in productivity and wages can be explained by observable

Keith Head is assistant professor in the Faculty of Commerce at the University of British Columbia.

differences in the attributes of the plants, rather than in the form of a pure "ownership" effect. Furthermore, the unexplained part of the premiums does not appear to derive from their "foreignness"; rather, it appears that plants owned by multinational corporations pay more and have higher productivity. In fact, employees at plants owned by large U.S.-owned multinationals receive the highest average wages. Doms and Jensen have provided a clear and convincing answer to the question they posed; however, they do not explore the policy implications of their work. In particular, do their results justify policies designed to attract foreign direct investment (FDI)?

In 1994 the state of Alabama helped convince Mercedes Benz to locate a plant there by offering an incentive package of approximately $230 million. This topped a previous record set by Kentucky when its $147 million package drew an auto plant from Toyota.[1] For initial employment levels of 1,500 and 3,000, respectively, these plants cost the host governments around $150,000 and $50,000 per job. What can Doms and Jensen's results tell us about the return on these outlays? To start, let us assume that the only benefit to the host economy is the higher incomes received by the workers employed at these plants. The present value, assuming a discount rate of 0.05, of a 20 percent wage premium over the sample average $25,000 annual earnings in manufacturing is $100,000. This suggests that the Kentucky bid might have been reasonable but Alabama overpaid.

The 20 percent wage premium is the raw increase to wages without any controls. After accounting for the industry, state, plant size and age, and capital intensity of foreign-owned plants, the wage premium falls to 4 percent, or a present value of $20,000. At this premium level, neither incentive package appears to make sense. Which number should the state governor use? It might be argued that the exact mechanisms underlying the wage premium do not matter—just the overall result. However, the governor could allocate the funds to alternative projects designed to improve the attributes of existing firms. For instance, some form of general investment subsidy could be used to increase their size and capital intensity. If such opportunities exist, then perhaps the governor should consider only the premium attributable to foreign multinational management.

The simple calculations above made two key assumptions that should now be critiqued. First, I assumed that the wage premium constituted a welfare gain for the host economy. Second, by focusing solely on the jobs at the particular investment, we omit the potential for external effects. Namely, the foreign plant may generate spillovers that benefit other local manufacturers. These spillovers might induce subsequent investment by the same firm or its suppliers. These factors could make us revise our estimates of the benefits of FDI upward if the wage premium does not represent a welfare improvement or downward if there are substantial positive spillovers.

1. More details on both incentive packages can be found in the *New York Times*, 4 October 1994.

What causes foreign-owned plants to pay higher average wages? To answer this question it is useful to consider some alternative hypotheses. First, suppose foreign-owned plants employ different, but technically equal, management methods. Then we would expect no difference in productivity and would interpret a wage premium as evidence of a compensating differential to induce domestic workers to accept foreign management. Alternatively, suppose workers are indifferent as to ownership but foreign firms really do possess superior techniques. Then we would expect a productivity premium, but wages would be determined by the alternative opportunity of working for a domestic firm. The finding of both wage and productivity premiums might argue for a superior technology that imposes costs on the workers for which they must be compensated.

The high wage premium paid by U.S. multinational-owned plants suggests that the compensation does *not* reflect aversion to foreign control per se. It could be that the higher wages paid by foreign and domestic multinationals reflect the outcome of a bargaining game in which workers share the extra rents generated by the superior technologies used by multinational-owned plants. An alternative interpretation consistent with high productivity and wages would be that multinational plants use production processes that require higher levels of effort from their employees. One reason might be that multinationals have a greater stake in maintaining a reputation for product quality. Alternatively, the multinational may use technologies that make intensive use of more highly skilled—and hence, better paid—workers.

If the wage premium represents compensation for higher effort or greater skills, individual workers may not benefit from employment at a multinational. In one case they have to work harder, in the other case they probably gave up high-paying jobs at other firms. Even if individual workers do not receive a net benefit from working at a multinational plant, the local government may value the increase in the income tax revenues it can obtain as a result of higher average wages. If the skill intensity story is correct, attracting a multinational-owned plant would tend to draw an inflow of skilled workers from other states that might be viewed as a desirable development in its own right.

Defenders of large incentive packages would probably argue that the most critical flaw in the calculations I made on the return to attracting foreign investors is the omission of "job creation" beyond the direct employment of the firm. They would probably point to complementary investments by supplier firms and to the likelihood of future expansion by Mercedes and Toyota. Indeed, Toyota is expected to increase its employment in Kentucky to 6,000, and there are already a couple dozen new Japanese-owned parts suppliers in the state.

In addition, superior technologies employed by multinational plants may spill over to domestic firms, causing additional productivity and wage increases beyond those at the assembly plants themselves. These externality issues could be addressed using the Doms and Jensen data set if it can be extended to include a time-series dimension. With better estimates of the magnitudes of the indirect effects of multinational investments, we could obtain more precise measures of their value to host governments. Even with more precise quantifications of the potential benefits to host-country governments, competition between states may bid away most of the benefits after subtracting the cost of the incentive package. It seems likely that there will be a push for policy reforms designed to curb the tendency of local governments to overbid for investments. The results of Doms and Jensen provide a useful component in evaluating potential agreements on investment incentives.

8 The Significance of International Tax Rules for Sourcing Income: The Relationship between Income Taxes and Trade Taxes

John Mutti and Harry Grubert

As multinational corporations play a greater role in global economic activity, the incentives such firms face in choosing particular locations for production become important determinants of the geographic-based measures of output discussed elsewhere in this volume. International trade economists have long paid attention to the role of tariffs and other trade taxes on the pattern of trade and international investment. This paper assesses how rules for sourcing income in different locations affect parent income tax liabilities and correspondingly create incentives to export or to produce abroad.

From an early postwar perspective, income taxes were presumed to have little influence on the location of real output across countries: a general tax imposed on an internationally immobile resource was borne by that factor and represented a windfall loss that did not alter the pattern of production. In a world of increasingly mobile capital and labor, that perspective became less warranted. In the 1960s and 1970s academicians and policymakers tried to assess the influence of home- and host-country tax and tariff rates on the location of production, investment, and trade internationally (see Bergsten, Horst, and Moran 1978).

The current paper pursues a related but less obvious issue, the way that rules to determine the source of income for tax purposes also can have important effects on the form in which taxable income is reported and economic activity is located. In particular, two issues are evaluated in more detail: the ability to regard a portion of export income as foreign source (sales source rules) and the treatment of royalties received from abroad as foreign-source income. The potential benefits from these source rules have become particularly important

John Mutti is professor of economics at Grinnell College. Harry Grubert is an international economist at the U.S. Department of the Treasury.

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due to U.S. tax policy changes adopted in the 1980s and to the growing role of U.S. production and trade in goods that require intangible intellectual property.

The U.S. computer software industry provides good examples of the conflicting incentives that exist. Relatively similar transactions can be carried out as trade in goods, trade in services, or production by foreign affiliates. How a company chooses to structure these often substitutable transactions will depend on several policy measures: host-country tariffs on software imports, foreign income tax rates and the opportunity to deduct royalty payments from taxable income, foreign withholding rates on royalties, the way U.S. taxes are imposed on foreign-source income, and the U.S. income tax rate. The incentives created by these tax and trade provisions may result in fundamentally similar transactions being characterized quite differently when different industries and countries are involved.

This paper demonstrates several implications of rules that govern whether export income, service income, and royalties are regarded as domestic or foreign-source income, a determination relevant in calculating a firm's foreign tax credit position. The relative significance of these source rules is demonstrated in a set of stylized calculations that show how domestic and foreign policies affect a firm's after-tax returns under various assumptions about the importance of tangible and intangible capital in production. A brief section considers some related examples and issues that arise as a result of source rules applied in foreign countries, which also affect the incentives U.S. firms face.

The empirical significance of the incentives identified above is treated in the final section of the paper. Background information is provided with respect to two issues. First, because these incentives apply to active business income but not to passive income from portfolio investments, a general overview of U.S. income earned abroad is presented. It indicates that the focus on active income is not misplaced or directed at an inconsequential part of U.S. investment activity. Second, because the benefits from characterizing income as foreign source depend on a firm's ability to claim credit for foreign taxes paid, the foreign tax credit position of U.S. multinational corporations is briefly discussed. Finally, work that evaluates the response to these tax incentives is reviewed. While such tax benefits might result only in income shifting, with no effect on the location of economic activity, some evidence suggests that these provisions influence real economic activity as well.

8.1 Basic Approaches in Taxing Foreign-Source Income

The United States, together with Japan and the United Kingdom, applies a worldwide system that taxes all of the income its residents receive regardless of the source of that income across countries. To avoid double taxation of foreign-source income, the United States grants a credit for foreign income taxes paid, where the credit is limited to the amount of the U.S. tax liability on foreign income. The amount of foreign income to declare is defined by U.S. rules, not by foreign rules that determine the foreign tax actually paid.

U.S. law provides for an overall foreign tax credit limitation that does not distinguish by country of origin. The foreign tax paid on a dividend received from an active business in a high-tax country may offset the U.S. tax due on a dividend received from a low-tax country. The United States does, however, separate different types of income into different baskets. Interest income received from a tax haven country that imposes a low withholding tax cannot be combined with dividends received from a country that imposes a high income tax, which otherwise would shield the interest income from U.S. taxation.

Consider the following example that demonstrates the calculation of a U.S. multinational corporation's foreign tax credit limitation and total tax liability. Suppose a firm receives $1,000 of foreign-source income, has paid a foreign income tax of $385, and also has domestic-source income of $1,000. Given a U.S. income tax rate of 35 percent, the foreign tax credit limitation is $350, calculated as the U.S. tax liability on total income (.35 × $2,000) multiplied by the share of income that is foreign source (0.5). In this case the firm owes no residual U.S. tax on its foreign-source income, has excess foreign tax credits of $35, and pays U.S. tax of $350 on its domestic-source income. It pays total income taxes of $735.

If source rules allow the firm to characterize a larger share of its income as foreign source, the firm benefits by being able to claim a larger foreign tax credit, and it avoids U.S. taxation of that recharacterized income. For example, if the firm can treat an additional $100 as foreign-source rather than domestic-source income, the foreign tax credit limitation becomes $385. The firm now can claim all of the foreign tax paid as a credit against the U.S. tax liability on foreign-source income, and its U.S. liability on domestic-source income is $315. It pays total income taxes of $700, a decline of $35 compared to the previous example.

If the circumstances above are changed so that foreign income taxes paid are $285 rather than $385, then the foreign tax limitation remains $350, the foreign tax credit is $285, and the residual U.S. tax due is $65. Being able to characterize more income as foreign source provides no advantage because a residual tax will be due on any additional foreign-source income received by this firm, which is in an excess limit position. Therefore, whether a firm has excess foreign tax credits is a key factor in determining the effects of source rules under the U.S. system of taxing worldwide income.

8.2 U.S. Rules for Sourcing Income

The following discussion presents three alternative types of transactions that are economically similar but are treated differently under U.S. tax law. The three alternatives include the export of a good from the United States, the export of a service from the United States, and the transfer of technology to an affiliate who provides the good or service in the foreign market. An important part of the difference in tax treatment is attributable to rules that determine what part of the income earned is regarded as domestic source and what part as foreign source. The computer software industry is used as a point of reference in the discussion because the three different types of transactions all represent plausible ways of selling software abroad. The different incentives identified, however, apply to other industries as well.

8.2.1 Exports of Goods

Begin by considering the exportation of a good from the United States. Suppose a U.S. company develops a new computer program in the United States and exports prepackaged software to foreign users. The profit it earns depends on the revenue received from the foreign buyer, Rev_f, the tariff rate that must be paid to import the good into the foreign market, τ, the variable cost of goods sold, Cost, and the U.S. income tax rate imposed on export earnings, t_x:

$$\Pi = (1 - t_x)[\text{Rev}_f/(1 + \tau) - \text{Cost}].$$

To apply this simple framework, assume initially that all capital is equity financed, and ignore the distinction between tangible and intangible assets.

The U.S. income tax rate may be lower than the rate imposed on domestic income if the firm takes advantage of the foreign sales corporation (FSC) provisions of the tax code. Under the combined taxable income administrative pricing rule, 15 percent of the corporation's taxable income from exports sold through the FSC is exempt from federal income tax. The exempt income is intended to reflect the FSC's activity abroad in selling the exported goods. An alternative approach, the gross receipts method, results in exempt income equal to about 1.19 percent of gross receipts. Because the benefit from this latter rule declines as the firm's profit margin increases, firms with profit margins greater than 8 percent will find the combined taxable income method more advantageous. In fact, that is the most commonly selected method, and it is particularly relevant for the high-technology examples considered here. In 1987 FSCs reported gross export receipts of $84.3 billion and net exempt income of $2.1 billion. The effective tax rate on U.S. export income, then, will be lower than the statutory corporate tax rate.

If the U.S. firm is in an excess foreign tax credit position, it may benefit even more under provisions of the sales source rules. These rules specify how firms are to determine the source of income (domestic or foreign) from the sale of inventory property. As shown above, if a firm that has excess credits can declare additional foreign-source income, it can claim a larger foreign tax credit and the additional foreign-source income escapes U.S. taxation.

If the exported goods are sold through an FSC and the combined taxable income method is used to determine FSC income, generally no more than 25 percent of the combined taxable income of the FSC and the U.S. exporter can be treated as foreign-source income. In combination with the FSC exemption, that would allow 40 percent of the firm's export income to escape U.S. taxation. If the goods are not sold through an FSC, however, the firm can often use rules to source 50 percent of the export profits abroad. Thus, firms are more likely to forgo operating an FSC if they are in an excess credit position, since they will gain a larger benefit from the other provisions of the sales source rules.

The importance of the sales source rules is indicated by the U.S. Department of the Treasury (1992) calculation that U.S. firms' tax liabilities would rise $1.8 to $2.1 billion in their absence. A more recent estimate suggests a lower tax benefit, roughly half this size (Rousslang 1994). This latter calculation indicates that fewer firms actually claim 863(b) income on Form 1118 than would be predicted on the basis of firms in excess credit positions.

For those companies that do claim 863(b) income, the benefit from a lower U.S. tax rate on export earnings rewards U.S. production. This benefit will be more significant the larger the profit margin on goods exported. Conversely, a higher foreign tariff rate discourages U.S. production. In the case of computer software, tariffs on prepackaged software range from zero in many countries to 85 percent in India. The total value of U.S. merchandise exports reported in 1993 was $2.3 billion.[1]

8.2.2 Exports of Services

An alternative transaction to consider is the U.S. provision of a service to a foreign buyer. In the case of computer software, this item is reported by the Commerce Department as computer and data-processing services, and in 1993 total sales were $1.8 billion. Such a transaction might involve development of a program or analysis carried out in the United States, which is then delivered to the foreign customer. The profit the firm earns is represented by the revenue it receives from the foreign buyer, the cost of providing the service, and the U.S. tax rate:

$$\Pi = (1 - t_{us})[\mathrm{Rev}_f - \mathrm{Cost}].$$

Several factors distinguish this case from the exportation of a good. The delivery of a service is not ordinarily subject to a tariff. The treatment of the income earned by providing the service may be less favorable, however. The United States regards such services provided by domestic establishments as domestic-source income and subject to U.S. tax. Exports of software services do not qualify for FSC treatment,[2] although exports of master disks could benefit from the sales source rules in calculating the foreign tax credit. In general, the relevant U.S. tax rate for providing services will exceed the effective rate on income from exports of goods.

1. This figure recorded under HS 8524905000 includes both prepackaged software valued at the price at which it is sold to the foreign buyer and also the value of the medium (tape, disk, etc.) used to send software that will require customizing or assistance in installation abroad or to send a master disk that will allow foreign reproduction. In the latter two cases the value of the medium typically represents a small fraction of the value of the intangible knowledge being transferred.

2. Architectural and engineering services and export management services qualify for FSC treatment. Receipts from exports of patents and other intangibles do not qualify as foreign trade gross receipts (U.S. Department of the Treasury 1990, 7), although exports of masters for the distribution of copyrighted movies, tapes, and records do qualify.

8.2.3 Direct Investment Abroad and Affiliate Production

Suppose a U.S. company develops a new technology in the United States. If it licenses the technology for use in the United States (or exploits the technology itself domestically), the royalty payment (additional income) is treated as domestic-source income and is subject to U.S. tax. If instead the company licenses the new technology to a foreign producer or produces abroad in a foreign affiliate, the royalty it receives is considered foreign-source income.[3]

The profit the parent firm receives after payment of foreign taxes but before the determination of any residual U.S. tax can be represented in this situation as

$$\Pi = (1 - t_f)(1 - w_d)(\text{Rev}_f - \text{Cost} - R) + (1 - w_r)R,$$

where all profits are repatriated, Rev_f represents the revenue that the foreign affiliate is receiving in the foreign market, Cost is the variable cost of production in the foreign country, R is the royalty paid to the parent, t_f is the foreign income tax rate, w_d is the dividend withholding rate, and w_r is the royalty withholding rate. Assume statutory and effective tax rates are identical. If the parent is in an excess foreign tax credit position and U.S. and foreign rules for defining income and allowable expenses are the same, then the foreign tax paid will be the final tax burden and no residual U.S. tax is paid. A firm operating in a low-tax country does not lose that tax advantage, while a firm operating in a high-tax country pays taxes that exceed the comparable burden on domestic-source income.

If the parent firm is in an excess limit position and owes a residual tax to the U.S. government, then the parent's after-tax income derived from its foreign operation is

$$\Pi = (1 - t_{us})(\text{Rev}_f - \text{Cost}).$$

For a firm operating in a high-tax country, this represents an advantage over the situation depicted in the previous paragraph because the higher foreign tax burden generates credits that can shield other foreign-source income the parent earns. Conversely, if the firm operates in a low-tax country but profits are repatriated when earned, the additional U.S. tax due eliminates the tax advantage gained from foreign production in that location. A firm in excess limit, however, may have an incentive to pay a lower royalty. That strategy allows it to gain the benefits of deferring the U.S. tax liability on the income it earns and retains in a low-tax country. The present discussion ignores the opportunity to

3. This presentation assumes that when the firm transfers technology to its affiliate to produce abroad, the affiliate will pay a royalty to the parent. As established in 1984 under Section 367(d) of the Internal Revenue Code, transferring an intangible as described above cannot be used as a tax-free method of capitalizing a foreign affiliate. Tax legislation in 1986 provides that transferring an intangible shall result in a commensurate royalty payment to the parent.

defer that tax liability and does not evaluate the possible benefits from retaining income abroad because the source rule issues discussed above are most relevant to firms in an excess credit position.

In the case of the software industry, the Bureau of Economic Analysis (BEA) judges that sales of computer-related services by foreign affiliates are by far the dominant method of serving foreign markets. In contrast to the exports of goods or services from the United States, which were roughly $2 billion each, total service sales by affiliates in computer and office equipment manufacturing and in professional and commercial equipment were $40 billion in 1993 (Sandheimer and Bargas 1994). Therefore, royalties are likely to be one of the primary forms in which this activity appears in U.S. tax and balance-of-payments tabulations.

8.3 Comparisons of Alternative Tax Treatment

Table 8.1 summarizes the issues discussed above by comparing the after-tax return to capital earned under several alternative tax treatments. The stylized cases assume that the same revenues are earned from foreign sales in all situations. Variable costs of production are assumed to be the same whether production takes place at home or abroad. Two different cases are presented to reflect a difference in the relative importance of variable cost as a share of total cost. The two values chosen, 40 percent and 65 percent, represent differences among export industries that can be inferred from Internal Revenue Service

Table 8.1 **After-Tax Returns from Alternative Transactions to Serve the Foreign Market**

	Variable Cost/Total Cost		Royalties/Foreign-Source Income	
	.40	.65	.40	.20
Case	(1)	(2)	(3)	(4)
Export of goods				
No tariff, no benefits	9.75	9.75		
Tariff, no benefits	8.27	7.20		
FSC benefits, excess limit	8.94	7.80		
Sales source rules, excess credit	10.50	9.16		
Export of services				
U.S. taxation	9.75	9.75		
Affiliate production				
Excess credit, high tax			9.86	8.64
Excess credit, low tax			13.75	13.45
Excess limit, high tax			9.75	9.75
Excess limit, low tax			9.75	9.75

Assumptions: $t_{us} = .35$, $\tau = .10$. High-tax case: $t_f = .45$, $w_d = .10$, $w_r = .10$; low-tax case: $t_f = .10$, $w_d = .025$, $w_r = .025$.

(1993): in industries such as pharmaceutical drugs the cost of goods sold as a share of business receipts is represented by the 40 percent figure, while in various nonelectrical machinery industries the 65 percent value is observed.

Assume that the firm finances its spending on tangible and intangible capital with equity. The importance of intangible capital can only be approximated in rough terms. The 1989 benchmark survey of U.S. direct investment abroad reports the relative importance of parent receipts from affiliates of direct investment income, royalties, and other direct investment services (U.S. Department of Commerce 1992). Royalties may not represent the entire return to intangible capital if some of the return appears as higher direct investment earnings (Grubert 1998). Also, receipts for other services (or charges for parent headquarter expenses) may represent a source of return comparable to royalties in some sectors, but from a tax perspective they represent U.S. domestic-source income. Those payments are more important in several service sectors, including computer and data-processing services, but they are less important in manufacturing. Two cases are considered, one where intangibles account for 40 percent of foreign operating income (before the deduction of royalty payments), and one where they account for 20 percent.

The U.S. income tax rate is assumed to be 35 percent. Operations in two different foreign countries are presented, one with an income tax rate of 45 percent, to represent a high-tax country such as Japan, and one with an income tax rate of 10 percent, to represent low-tax countries such as Singapore, Hong Kong, and Ireland. In the high-tax case the dividend and royalty withholding rates are both 10 percent, while in the low-tax alternative both rates are 2.5 percent. In both cases the tariff rate imposed on imports from the United States is 10 percent.

First compare the tax consequences of exporting a good versus exporting a service. The base case for exports of goods assumes no tariff and no special tax treatment of export income, and the rate of return is calibrated to be the same (9.75 percent) as when a service is exported. The imposition of a tariff reduces the net revenues to exporters of goods, making that way of serving the foreign market less attractive.[4] FSC benefits are not sufficient to offset the effect of the tariff; when the gross profit margin is small, as in column (2), even applying advantageous sales source rules for a firm with excess foreign tax credits results in a lower return. This outcome reflects a relationship familiar from the effective protection literature: a relatively low tariff imposed on a good where value added accounts for a small share of its price can yield a very high effective rate of protection. Because exports of services are not subject to foreign tariffs, that form of serving the foreign market may appear more attractive, as in column (2).

The tax consequences from affiliate production abroad depend importantly

4. This reasoning assumes the firm currently has excess capacity to produce both at home and abroad, and a higher tariff creates an incentive to expand foreign production at the given foreign market price.

on the foreign tax credit position of the U.S. parent. For a firm in an excess credit position the benefit from being able to treat royalties as foreign-source income is determined by the importance of intangibles in the firm's production and by the host-country tax rate that is avoided when the royalty is a deductible expense. Note in column (3), where high royalties are paid, that the deterrent effect of operating in a country with a high income tax rate is offset by the opportunity to pay royalties, which are subject to a low withholding rate. The parent benefits from being able to use its excess credits to offset any residual U.S. tax due. In column (4) the firm has less intangible income, and the effect of the high foreign income tax rate is not offset by the opportunity to pay royalties. Thus, a high-technology firm that receives more of its return from foreign operations in the form of royalties is more likely to gain from operating an affiliate in a high-tax host country.[5]

In the case of a firm without excess foreign tax credits, a residual tax is due in the United States regardless of the host-country tax rate or the extent to which royalties are paid. Production in a high-tax country is not penalized because the opportunity to use the additional foreign tax credits generated by production there means the U.S. firm does not bear the burden of the higher host tax rate.

If the United States were to treat royalties as domestic-source income, the U.S. firm with excess foreign tax credits would not benefit from bringing home lightly taxed foreign-source income free from U.S. tax. The rates of return previously reported in table 8.1 would drop substantially: for the case of a firm paying out a higher share of royalties, returns fall from 9.86 percent to 7.97 percent in the high-tax host country and from 13.75 percent to 11.70 percent in the low-tax host country. Perhaps such a policy shift would give U.S. parents an incentive to declare fewer royalties and instead to make larger overhead charges for R&D, an item that appears in the BEA category "other direct investment services." While such an entry generally would be regarded as U.S.-source income, it typically has not been subject to a high foreign withholding tax.

The negative effect on U.S. firms is not, however, as disadvantageous as if a high-tax foreign government did not recognize royalties as deductible business expenses. In that situation if the same withholding rate were levied on all payments to the parent, then all of the foreign-source income would become subject to the higher foreign income tax rate. The rate of return would fall from 9.86 percent to 6.75 percent.

In summary, source rules that treat royalties and portions of export income as foreign source influence the attractiveness of production at home or abroad.

5. This example ignores any requirement that the parent firm allocate some portion of its U.S. R&D expenses against its foreign source income. Section 861 of the Internal Revenue Code addresses such allocations, but its implementation has varied considerably over time. Allocating expenses to foreign-source income reduces the size of the foreign tax credit that can be claimed. For a parent firm in an excess credit position the parent's loss equals the amount of the allocation times the U.S. tax rate.

Because services provided to foreigners generally are domestic-source income rather than foreign-source income, firms in an excess credit position may find it attractive to structure those transactions in another form. Few general presumptions emerge because the relative advantages of different locations or transactions depend importantly on host-country trade and tax policies, too.

8.4 Foreign Rules for Sourcing Income

U.S. firms are also influenced by foreign rules for sourcing income. In the case of U.S. exports of goods and services, the purchasing country may claim that some part of the income earned is sourced in that country, even if the provider has no permanent business establishment there.[6] Consider situations that involve services, where a host country pays for oil core logs to be analyzed or an economic consulting report to be prepared, but the work is done outside of the country. In the case of a service provided to a related party, many host-country governments will prohibit that party from deducting the payment from its foreign taxable income. If the payment is not to a related party, Colombia, for example, treats the income as domestic source and subject to Colombian income taxation and withholding taxes (McLure et al. 1990).

When a foreign government claims the right to tax service income, it may have no way of verifying what costs are incurred in providing the service. Therefore, it may levy a tax on the gross payment to the foreigner. That approach is similar to imposing a withholding tax on gross interest or royalty payments where no attention is paid to expenses incurred in earning that income. The present example differs from a royalty or interest payment, however, because in this case the U.S. government does not recognize that any foreign-source income is earned. If the U.S. firm already is in an excess credit position, it can make no use of the additional foreign tax credits generated. In terms of the stylized example above, imposing a tax of 9.1 percent on the gross value of the service payment would reduce returns by exactly the same amount as the 10 percent tariff on U.S. exports reported earlier. The penalty on the U.S. producer again arises because the foreign tax is deductible but not creditable. For a higher foreign tax rate, the provision of services becomes even less attractive.

Host-country taxation of this income represents a trade barrier that discriminates against foreign service providers, since those individuals will also face home-country taxation of what the home country regards as domestic-source income. Are there circumstances, however, in which this treatment will have the same neutral effect on trade that arises under the destination principle of border tax adjustment that is applied to indirect taxes?

Under that principle, an indirect tax is imposed on imports and rebated on exports. As shown by various authors (Baldwin 1970; Feldstein and Krugman

6. Tax laws provide no consistent rationale for determining the source of income in such situations. E.g., in the insurance industry income usually is attributed to the country in which the insured risk is located, even though the actuaries who evaluate the risk or the individuals who bear the risk are located elsewhere.

1990) the goal of such border tax adjustment is to leave unaltered the relative prices of domestic and foreign goods both in the home market and in foreign markets. Suppose domestic prices in countries A and B are initially the same before the imposition of an indirect tax by country A. The price of the domestic good becomes $P_a(1 + t)$, and under a destination principle that imposes the same tax on imports, the price of the foreign good becomes $P_b(1 + t)$. Relative prices do not change. Similarly, the price of foreign goods remains P_b in other markets, and when country A rebates the tax on exports, its price remains P_a. Again, relative prices do not change. To impose an indirect tax in order to be able to gain the benefit of destination principle treatment misinterprets the consequences of making border tax adjustments and mistakenly infers there is some benefit available.

A uniform value-added tax levied on all goods has the same economic effect as a general income tax levied on all income. Making the same border tax adjustment for both taxes would call for imposing the income tax on imports and rebating it on exports. Therefore, the distorting effect of the service tax described above arises not because it is imposed on imports but because it is not rebated on exports.

Note that the tax in the service example is an income tax on an individual or corporation, not an indirect tax on computer programs or consulting reports. Therefore, it does not fall within the standard conditions for border tax adjustment under the General Agreement on Tariffs and Trade (GATT). Historically, the GATT has not allowed rebates of direct taxes at the border, and in fact a GATT panel ruled against the U.S. DISC (domestic international sales corporation) program on the grounds that it effectively taxed export income at a lower rate than domestic income and therefore represented an export subsidy.

The new General Agreement on Trade in Services (GATS) is a possible forum to address issues of double taxation or border tax adjustments applied to direct taxes. In the Uruguay Round negotiations the United States strongly opposed such a move (Matthews 1995). Without considering the precise rationale for the U.S. position, recognize there are significant administrative issues to address in verifying what income taxes have been paid in the production of a particular product. Another reason for caution in introducing this issue before the GATS may the existence of ambiguities in the application of the national treatment standard to income tax systems. Determining what constitutes comparable treatment can be difficult. For example, would levying a withholding tax on foreigners in lieu of imposing an income tax on them be construed as resulting in a heavier burden on some foreigners in some years?

8.5 Foreign-Source Income, Taxation, and Firm Response

How important are the incentives created by the two source rules identified above? To address that question, first consider several general measures that indicate the relative importance of various items of foreign-source income. Special attention to active business income reported in the general basket is warranted because it is used in calculating the foreign tax credit limitation relevant to royalties and allocated export income. A related issue is the likelihood that a firm will have a potential excess of foreign tax credits and thereby benefit from these two source rules. Based on data from 1990, foreign tax credit positions across industries are reported. Finally, efforts to evaluate the effects on firm behavior of the sales source rules and the treatment of royalties are discussed.

8.5.1 The Importance of Active Business Income

Table 8.2 provides a summary of several balance-of-payments entries for investment income and for other payments among affiliated enterprises. In spite of the widely reported surge in portfolio investment as individual savers have bought shares of stock in foreign companies and mutual funds, direct investment receipts are substantial and have risen more rapidly than other private receipts over the decade from 1986 to 1996. Therefore, source rules that govern the calculation of the foreign tax credit limitation for U.S. multinational corporations can have quantitatively significant economic effects.

Royalties grew particularly rapidly between 1986 and 1990, and by 1996 they nearly equaled $30 billion. Over three-fourths of U.S. receipts come from affiliates rather than unrelated parties. That arrangement is not surprising because two unrelated parties may not easily predict or agree on the future profits likely to be generated by an intangible. Affiliation avoids the need to make that sort of forecast. Changes in the tax law discussed above may have given U.S. firms a greater incentive to receive royalties, too. Receipts from other private services are a much larger number than royalties, and from 1990 to 1996 they have grown slightly more rapidly than royalties. In contrast to royalties, however, less than 30 percent are accounted for by receipts from affiliates.

These figures are not directly equivalent to items that appear in the general basket for calculating the foreign income tax limitation. First, only the portion of direct investment earnings repatriated to the United States is subject to a residual U.S. tax or relevant in determining the foreign tax credit limitation. Second, not all foreign-source income declared by U.S. taxpayers appears in the general basket, and therefore it may not be combined with royalties and export income in calculating the foreign tax credit limitation.

With respect to the first point, table 8.2 contains the BEA measure of distributed earnings. The corresponding payout ratio shows considerable variation: it exceeds 70 percent in 1986, 1988, and 1989, but it is less than 40 percent in 1995 and 1996.[7] Predicting future behavior is not straightforward.

7. The BEA series reflects the new convention adopted in 1992 to exclude unrealized capital gains from retained earnings and total earnings. The high payout ratio in 1986 may reflect the desire to repatriate more highly taxed foreign-source income in order to combine it with other income subject to low foreign taxes that subsequently would be treated in separate baskets. For general discussion of the determinants of dividend remittances, including nontax factors such as the potential importance of foreign investment opportunities or parent financial requirements, see Hines and Hubbard (1990) and Altshuler and Newlon (1993).

Table 8.2 **Investment Income and Related Service Flows: United States, 1984–96**

Category	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Income receipts on U.S. assets abroad	104,756	93,679	91,186	100,511	129,366	153,659	163,324	141,408	125,852	129,844	154,510	196,880	206,400
Direct investment receipts	31,262	30,547	31,968	39,608	52,092	55,368	58,740	52,198	51,912	61,241	70,911	90,349	98,890
Earnings	35,593	34,621	35,129	41,918	53,394	55,183	56,958	50,945	50,729	59,559	68,402	86,998	95,514
Distributed earnings	18,687	19,780	26,077	25,264	41,744	43,257	36,553	33,945	34,441	28,847	38,265	32,991	37,629
Other private receipts	68,267	57,633	52,806	55,592	70,571	92,638	94,072	81,186	66,826	63,495	79,498	101,836	102,866
U.S. government receipts	5,227	5,499	6,413	5,311	6,703	5,653	10,512	8,023	7,114	5,108	4,101	4,695	4,644
Royalties and license fees	6,177	6,678	8,113	10,183	12,146	13,818	16,634	17,819	19,656	20,304	22,661	27,383	29,974
Affiliated	n.a.	n.a.	6,174	7,897	9,501	10,961	13,250	14,106	15,718	15,707	17,793	21,670	23,760
Other private services	19,255	20,035	27,303	28,701	30,709	36,204	39,540	47,024	50,294	54,517	61,093	66,850	73,569
Affiliated	n.a.	n.a.	8,385	8,494	9,568	12,296	13,622	14,539	16,581	16,740	18,651	20,272	22,810

Sources: Michael Mann, Daniel Atherton, Laura Brokenbaugh, Sylvia Bargas, "U.S. International Sales and Purchases of Private Services," *Survey of Current Business* 76 (November 1996): 70–112; Christopher Bach, "U.S. International Transactions, Revised Estimates for 1974–96," *Survey of Current Business* 77 (July 1997): 43–99; and unpublished information from the U.S. Department of Commerce.

Note: Figures are in millions of dollars.

With respect to the second point, data reported by the Internal Revenue Service are useful in interpreting the general picture derived from BEA data, even though the calendar-year definitions are not the same. Foreign-source income declared by corporations claiming a foreign tax credit in 1990 was $99.6 billion, while deferred income retained abroad was $34.9 billion. Active foreign-source income reported in the general basket was $73.6 billion; the foreign tax credit limitation was $24.7 billion and the foreign tax credit claimed was $22.6 billion, leaving a residual U.S. tax liability of $2.1 billion. Part of the $99.6 billion received by U.S. corporations was passive foreign-source income (such as interest received), and another part was financial service income. These separate categories of income may be subject to a higher residual rate of U.S. taxation because they cannot be combined with other foreign-source income that has been subject to a high foreign rate of taxation. For example, in the case of passive income of $4.3 billion, the foreign tax credit limitation was $1.462 billion and the foreign tax credit claimed was $385 million; these figures imply an effective foreign income tax rate of 9 percent. In the case of financial service income, the corresponding numbers were a $2.432 billion limitation, a $1.536 billion foreign tax credit claimed, and an effective foreign tax rate of 21.5 percent.

The total foreign tax credit limitation for all corporate income was $29.6 billion, and the foreign tax credit claimed was $25.0 billion. The items in the general basket cited above account for a large share of the U.S. tax liability on foreign-source income (83 percent) but a smaller share of the residual tax collected by the U.S. government after allowing for foreign tax credits (43 percent). While other items are important from the standpoint of tax administration, the incentives examined in this paper apply to a significant part of U.S. activity abroad.

8.5.2 The Excess Credit Position of U.S. Parent Firms

By reducing the U.S. statutory tax rate and establishing separate income baskets to calculate the foreign tax credit limitation, the Tax Reform Act of 1986 made it much more likely that U.S. parent firms would be in excess credit positions with respect to income in the general basket. Tax return data analyzed by Altshuler and Newlon (1993) from the set of U.S. companies with positive foreign-source income indicate that the percentage of income reported by firms in excess credit positions was 35 percent in 1982 and 42 percent in 1984. The postreform figure for 1990 shows that 65 percent of the income declared in the general basket was by firms with excess foreign tax credits. Therefore, a much wider set of firms can benefit from favorable source rules than was true a decade earlier. Whether this figure declines in the future depends in part on how costly firms find it to shift income or operations out of high-tax countries or whether foreign countries reduce their tax rates in competition with the United States.

The extent to which benefits are available from declaring additional foreign-source income varies considerably across industries. Based on 1990 data table 8.3 shows the amount of foreign-source income declared by industry and the extent to which aggregate tax payments exceeded the foreign tax credit limitation for firms in the industry. Column (3) shows the percentage of foreign-source income accounted for by firms in an excess credit position, and column (4) presents the average effective tax rate on active foreign-source income.

Note the unique position of the office and computing machinery industry. Not only does it account for nearly half of all the excess credits reported by nonpetroleum manufacturing parents, but the proportion of industry income accounted for by firms with excess credits exceeds 95 percent. That industry, however, should not be regarded as typical of all high-technology industries where returns to intangibles are an important part of total revenue. Other high-technology industries such as drugs and electronics owe a residual U.S. tax. Some industries may be more reliant on production and sales in high-tax countries, while other industries are more footloose and can locate production in low-tax countries but still serve high-tax markets. Furthermore, the average effective tax rate is an endogenous variable, determined by the mix of repatriated income subject to different tax rates, and some industries may have a lower cost of adjusting the form of their repatriations in order to reduce their overall tax burden.

The Altshuler-Newlon study also reports the likelihood that a firm's foreign tax credit position changes from excess credit to excess limit or vice versa. Comparing 1980 to 1982 and then 1982 to 1984, they find that 52.4 percent and then 58.1 percent of income was reported by firms whose tax credit positions did not shift. That leaves a significant share of firms whose positions did shift, perhaps due to exogenous changes in policy or to random shocks over the business cycle or to tax-motivated adjustments by the firm. While a firm might have less incentive to alter its exports or foreign production if an excess credit position were only transitory, how should observed shifts in the firm's foreign tax credit position be interpreted? Knowing a firm's expected or more permanent ex ante foreign tax credit position would allow a more accurate assessment of the role of taxes. Altshuler and Newlon create such a proxy in their study of multinational repatriation practices, a good precedent for other work. If firms assign a high probability to having excess credits, even firms in excess limit will respond to the source rule incentives discussed above.

8.5.3 The Sales Source Rules

The sales source rules do not provide a neutral incentive to all U.S. exporters. Rather, the incentive only arises when the firm is a multinational corporation with foreign affiliate operations that generate excess foreign tax credits. The greater the profit rate per dollar of sales, the greater the benefit to multinational exports. Because such multinational corporations also may pay high royalties, however, they may not consider sales source rule benefits to be the most desirable strategy to absorb foreign tax credits.

Table 8.3 **Excess Credit Positions of U.S. Corporations, 1990**

Industry	Foreign Source Income (1)	Excess Credit (2)	Share of Income Reported by Firms in Excess Credit (3)	Average Effective Foreign Tax Rate (4)
Food	2,914	26	37.8	34.8
Paper	1,454	−16	13.6	32.9
Industrial chemicals	4,840	59	68.4	34.8
Drugs	3,867	−46	34.2	32.9
Other chemicals	2,616	104	30.2	37.6
Primary metals	1,107	14	33.0	34.6
Fabricated metals	1,173	23	72.3	35.9
Office and computing machinery	10,875	516	95.5	38.8
Other nonelectrical machinery	1,551	117	62.7	40.2
Electrical machinery and electronics	4,222	−153	47.6	29.6
Motor vehicles	4,314	181	99.4	38.2
Other transport equipment	1,105	39	21.5	36.7
Instruments	2,552	95	68.0	37.3
Other manufacturing	4,429	106	44.5	36.1
Total manufacturing, except petroleum	47,019	1,066	62.8	36.0

Source: U.S. Department of the Treasury, Office of Tax Analysis, unpublished information.

Note: All dollar values are in millions.

Rousslang's review of the sales source rules provides direct observation of which firms actually claimed these benefits. Thirty-six percent of the allocated export income was claimed by firms in excess credit positions, although those firms accounted for 73 percent of the tax saving. By claiming additional foreign-source export income, many firms converted their position from one of potential excess credits to one of excess limit. Industries that gained an above average tax benefit, measured as a share of export sales, appear to be paper and publishing, drugs and toiletries, office and computing machinery, electrical machinery and electronics, and instruments.[8] Note that this list includes the three manufacturing industries in table 8.3 that were not in excess credit in 1990. In those industries the tax incentive to expand exports further is much smaller on average.

Rousslang projects the potential effect of the sales source rules by calculating the marginal reduction in the cost of capital from this tax benefit, multiplying the resultant price effect by the relevant export demand elasticity, and finally allowing for subsequent adjustment of the exchange rate. Such a procedure is standard practice when the effect of a tax policy change is difficult to disentangle from other influences, although its accuracy depends on the appropriate elasticities being known.

If the experience of individual firms were to be evaluated to verify such projections, what effects would demonstrate the influence of the sales source rules? One possibility is that the tax benefit from exporting would cause the U.S. parent to serve foreign markets by greater export production rather than affiliate production abroad. Under that scenario the ratio of exports to affiliate sales is likely to rise, especially if the foreign market is fixed in size and greater exports necessarily cause a reduction in affiliate sales. Another possibility, however, is suggested by a complementary relationship between exports and affiliate sales (Lipsey and Weiss 1981; Grubert and Mutti 1991). In this situation, a U.S. export may be an input with few close substitutes in foreign production, but the output produced abroad may be sold in markets where there are many substitutes available. Thus, a lower tax on U.S. exports or a lower tax on foreign profits both promote exports and affiliate sales. Where output will be affected most cannot be predicted a priori when affiliate sales represent a mixture of sales in a protected home market and in more competitive world markets.

For example, in a regression to explain the ratio of U.S. exports to total affiliate sales, based on the Commerce Department's 1982 benchmark survey of direct investment abroad used in Grubert and Mutti (1991), a higher foreign corporate income tax rate reduces the export share:

8. This calculation is based on Rousslang's figure for the foreign tax credits absorbed in each industry divided by U.S. multinational exports in that industry, as reported in U.S. Department of Commerce (1992).

$$
\begin{aligned}
\ln[\text{Exports}/\text{Affiliated sales}] = {} & \underset{(2.42)}{12.69} + \underset{(3.19)}{4.37}\ \ln(1+\text{Tax}) - \underset{(-.86)}{.17}\ln \text{GDP} \\
& - \underset{(-2.06)}{.64}\ \text{Trade barrier} \\
& - \underset{(-2.27)}{1.02}\ \ln \text{GDP}/\text{Capita} + \underset{(1.69)}{2.06}\ \text{Transport}, \\
F_{5,27} = 4.69, \quad & R^2 = .37
\end{aligned}
$$

where Tax is the host-country corporate tax rate, Trade barrier is a World Bank categorization of progressively more restrictive host country trade policy, Transport is a dummy for sales within North America, and the numbers in parentheses are t-statistics. The regression also appears credible in demonstrating that exports will be lower where trade barriers are higher and where production in the host country is more likely due to a larger market and higher labor productivity. Using the next available benchmark survey for 1989 for the same set of countries, however, the tax coefficient is insignificant. That outcome does not indicate that taxes are unimportant but only that there is not a differential effect on exports and affiliate sales.

This distinction can be seen by considering the two separate demand equations:

$$\ln(\text{Exports}) = a_0 + a_1 \ln(1 - \text{Tax}) + a_2 \ln \text{GDP} + \cdots,$$

$$\ln(\text{Affiliate sales}) = b_0 + b_1 \ln(1 - \text{Tax}) + b_2 \ln \text{GDP} + \cdots,$$

and then subtracting the second from the first to give

$$\ln(\text{Exports}/\text{Affiliate sales}) = (a_0 - b_0) + (a_1 - b_1)\ln(1 - \text{Tax}) + (a_2 - b_2)\ln \text{GDP} + \cdots$$

In 1989 higher foreign corporate income taxes still have a negative effect on affiliate sales (a statistically significant estimate of b_1), but the effect on exports is too imprecisely estimated for the difference between the two to be significant.

Kemsley (1995) relies on a similar ratio approach to assess the sales source rules, but he obtains different results. Based on a time-series analysis of Compustat data for individual firms he identifies two trends in the post-1986 period: exports relative to affiliate sales have risen, and a larger share of firms appear to be in excess credit positions. He estimates that firms in excess credit positions account for this increased reliance on exports to serve foreign markets. Average export sales in his sample are \$80 million per firm, and he projects that in the absence of the sales source benefits a firm would export \$70 million less.

This strong effect may be due to systematic differences across firms in the products they make, the country markets they serve, and the tax rates applicable in those markets. For example, exporters may successfully develop markets in high-tax countries, but their sales may be more attributable to tastes or income levels in those countries than to tax factors. Therefore, Kemsley also estimates an aggregate cross-sectional relationship similar to the one reported above.[9] He again reports a strong effect from the sales source rules: in countries with higher tax rates a larger share of the market is served by exports and this relationship is more pronounced in 1989 than in 1982.[10] Because the causation in this relationship still is ambiguous, it is premature to claim a precise measure of the sales source rules' effectiveness.

8.5.4 Royalties as Foreign-Source Income

Royalty receipts are much larger than allocated export income under the sales source rules, and at least in absolute terms a greater influence on multinational operations can be expected. By paying royalties a firm can increase its after-tax return from operating in high-tax countries. The tax saving is greater for firms that would be in excess credit than for those in excess limit. Under what circumstances will this tax saving affect the location of real economic activity?

If the foreign market can only be served by affiliate production and if the technology developed for the home market can be costlessly applied to produc-

9. By looking at two different benchmark years, Kemsley explicitly considers changes in the cost of exporting from the United States. The two demand equations become

$$\ln(\text{Exports}) = a_0 + a_1 \ln P_x + a_2 \ln P_f + a_3 \ln \text{GDP} + \cdots,$$

$$\ln(\text{Affiliate sales}) = b_0 + b_1 \ln P_x + b_2 \ln P_f + b_3 \ln \text{GDP} + \cdots,$$

where P_x represents the price of exporting from the United States, which is affected by the U.S. tax rate on export income, and P_f represents the price of affiliate production in the foreign country, which is affected by the host-country tax rate for firms in excess credit. If changes in export and foreign prices are presumed to have symmetric effects, then the ratio of export to affiliate sales appears as

$$\ln(\text{Exports / Affiliate sales}) = (a_0 - b_0) + e \ln(P_x / P_f) + (a_3 - b_3)\ln \text{GDP},$$

where the elasticity of substitution, e, requires that $a_1 + a_2 = b_1 + b_2$, a testable constraint from parameters estimated in the two separate demand equations (Leamer and Stern 1970).

10. The dominance of the substitution effect in Kemsley's sample of firms may be attributable to a different conceptual measure, aside from the difference in data source and time frame: by focusing only on multinational exports to unrelated parties, which thereby excludes 43 percent of multinational exports, possible complementarities between U.S. and foreign production are less likely to be observed. In the cross-sectional study, treating only the ratio between exports and affiliate sales may obscure the causal relationship involved. For example, affiliate production may be lower in countries with high tax rates, which would cause the ratio of exports to affiliate sales to rise even in the absence of a separate effect on exports from the sales source rules. Because Kemsley does not report separate export and affiliate demand estimates, or the corresponding separability tests noted above, reasons why his results differ from Grubert and Mutti cannot be clearly identified. Possible explanations are differences in the definition of the tax variable (average effective tax rates vs. statutory tax rates) and differences in the set of countries included in the analysis.

tion in the foreign market, then the royalty represents a pure rent. A change in the tax treatment of the royalty merely changes the distribution of the rent without altering the firm's operations in the country. If the firm can exploit the technology elsewhere and still serve the same foreign market, however, favorable tax treatment of the royalty can alter the incentive to produce in a country. In particular, treating royalties as foreign-source income reduces the disadvantage of producing in a high-tax country where the cost of equity-financed investment otherwise is higher.

Two relationships are relevant in assessing the empirical response to this tax incentive. One is the tendency for firms to pay larger royalties from high-tax locations. Aggregate data from the 1989 benchmark survey show this effect quite strongly, for various representations of royalty payments as the dependent variable and for various potentially relevant tax effects. The relevant tax variable is somewhat ambiguous because the tax price of paying a royalty depends on the foreign tax credit position of the parent and the alternative forgone (retaining income abroad, paying a dividend, paying interest, etc.). Also, if royalties are represented relative to assets or sales, the foreign tax rate influences the denominator as well, implying a different functional form.

Estimates based on the aggregate data used above for all affiliates in a host country give the following results:

$$\text{Royalty/sales} = \underset{(2.38)}{.009} - \underset{(-3.28)}{.040}\, w_r - \underset{(-2.48)}{.028} \ln(1-t), \quad F_{2,27} = 8.50,\ R^2 = .34;$$

$$\text{Royalty/sales} = \underset{(2.18)}{.010} - \underset{(-3.19)}{.040}\, w_r + \underset{(-2.01)}{.032}\, t, \quad F_{2,27} = 7.12,\ R^2 = .30;$$

$$\text{Royalty/sales} = \underset{(4.40)}{.017} - \underset{(-3.99)}{.038}\, w_r - \underset{(-.37)}{.0006}\, t - \underset{(-3.74)}{.083}\, \text{High} + \underset{(4.31)}{.23}\, \text{High} * t,$$

$$F_{4,25} = 11.89,\ R^2 = .60;$$

where w_r is the withholding rate imposed on royalties, t is the effective income tax rate, High is a dummy equal to one for those countries where the effective tax rate exceeds 0.34, and the term High $*$ t multiplies this dummy by the tax rate. Royalties as a share of affiliate sales are larger in countries where the foreign income tax rate is higher and the royalty withholding rate is lower. The final equation suggests that firms operating in countries where the foreign tax rate exceeds the U.S. rate are particularly likely to be those that can adopt the strategy of paying higher royalties. This relationship is demonstrated more completely in an analysis of firm-specific data by Grubert (1998), which controls for firm characteristics such as R&D expenditures and also treats other repatriation decisions the firm makes.

This effect on financial practices also may affect the firm's real operations.

Using firm-specific tax return data for 1990, Grubert and Mutti (1995) found that probit estimates of the likelihood of a firm's locating in a given country were quite sensitive to the host-country corporate income tax rate. The size of this deterrent tax effect fell by roughly 20 percent when a variable was included that interacted the relevant tax rate with a firm's expenditure on research and development per dollar of assets. That is, the opportunity to pay royalties is greater for companies that have larger stocks of intangible, intellectual property (represented by research and development expenditures), and firms that can pay higher royalties face less of a penalty operating in high-tax countries. The empirical estimates from 1990 data suggest that the opportunity to treat royalties as foreign-source income does encourage investment in high-tax locations. Subsequent analysis based on 1992 data, however, did not find this relationship to be significant. Establishing the robustness of potential effects of source rules on the location of real activity apparently will require additional data and analysis.

8.6 Conclusions

This paper extends an earlier literature by Horst (1971) and others from the 1970s that demonstrated how low tax rates and the opportunity to defer the repatriation of foreign income created an incentive to locate production abroad rather than export from the United States. The focus here is on a different set of tax provisions that also may influence the location of production internationally. Rather than analyze the level of foreign tax rates, however, the paper evaluates U.S. rules for sourcing income, a determination that is important in calculating the foreign tax credit limitation. These source rules have become increasingly important because a much larger proportion of the income earned abroad by U.S. exporters and by U.S. subsidiaries is reported by parents in excess foreign tax credit positions.

The ability to characterize income as foreign source is especially beneficial to firms with excess credits because income that is subject to little taxation abroad also may be free of U.S. taxation. The stylized examples demonstrate that while the effects of these provisions are not as transparent as the effects of statutory tax rates, they create significant incentives to report taxable income in certain forms. The sales source rules provide an important benefit by allowing roughly half of export income to be regarded as foreign source. Treating royalties as foreign source may provide an even greater benefit to affiliate production, though, since royalties reduce the affiliate's foreign tax burden and may create no U.S. tax liability when the parent is in an excess credit position. That potentially large effects on firm profits lead to large changes in real economic activity cannot be conclusively demonstrated. Tentative evidence suggests that U.S. exports increase as a result of the sales source rules, and foreign production in high-tax locations is encouraged by treating royalties as foreign-source income.

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Comment Kristen L. Willard

One of the persistent questions in international economic research is, Why do some firms choose to develop multinational production facilities while others expand internationally through direct export or licensing arrangements? Despite decades of research into the issue, the profession has arrived at few unequivocal conclusions. Rather, we have learned that the organization of a firm's global expansion efforts may be influenced by many competing factors, including but not limited to standard international trade issues, such as comparative advantage and tariffs; standard industrial organization issues, such as market concentration; and of course taxes. Indeed, the explicit question of the extent to which tax burdens may affect the location of investment has received an increasing amount of attention in the wake of the 1986 tax reform. (See Hines 1996 for a review of the literature.)

This paper contributes to the discussion of the relationship between tax policy and multinational production decisions in two important ways. First, in the tradition of Ault and Bradford (1990), this paper documents the rules governing the sourcing of foreign income for U.S. corporations, providing a much needed resource on such complications as the use of foreign sales corporations, sales source rules for recharacterizing export income as foreign source, and the treatment of royalty income.

Through the use of the extended example of the U.S. computer industry selling computing services abroad, the reader can see the conflicting incentives inherent in the source rules. Moreover, it also becomes clear that firms able to easily recharacterize the nature of a transaction—for example, from a product export to service income—may avoid taxation in a manner unintended by policymakers. This may be particularly relevant in technology-intensive industries: the sale of computer software may be indistinguishable from the provision of some computer service, from the clients' perspective. However, since tariffs are rarely imposed on service provision, this recharacterization gives new meaning to the idea of tariff jumping.

The second contribution of the paper is that the authors provide some comparisons of the likely magnitude of incentive effects from various combinations of these rules and in so doing generate some empirically testable implications of source rules on investment. For instance, higher foreign tariff rates discourage U.S. production relative to licensing or investment in foreign production capacity; hence, reductions in foreign tariff rates should increase domestic production, all else equal. In addition, for excess credit firms, affiliate production when royalties can be classified as foreign-source income is particularly attractive in low-tax locations. Finally, since the value of the tax incentives are closely tied to the domestic tax rate, researchers may be able to mea-

Kristen L. Willard is assistant professor of finance and economics at Columbia University Graduate School of Business.

sure the sensitivity of firms to these incentives by considering individual firm reliance on various methods of global expansion and production before and after changes in the U.S. tax rate, as happened in 1986.

In using these benchmark numbers to generate empirical implications, the reader should be aware that the authors make some incidence assumptions. For instance, in calculating the residual profit from exporting goods subject to an import tariff, the authors have implicitly assumed that consumers in the foreign market bear the full burden of the tariff. This is a reasonable assumption only insofar as the good in question is provided by a firm in a competitive market. The incidence of import tariffs imposed on the product of firms with significant market power is likely to be substantially different, requiring a revision of the return calculation. Since intraindustry trade between oligopolies is an increasingly important aspect of international trade flows, this incidence assumption needs to be considered carefully by researchers confronting data having derived testable implications from the relative returns calculations presented by the authors.

Unfortunately, this work is not as broadly applicable as the researcher interested in international tax policies might guess given the title of section 8.1: "Basic Approaches in Taxing Foreign-Source Income." The paper does not, as that phrase implies, attempt to review the range of approaches to taxing foreign-source income around the globe. Rather, the paper is a more narrowly focused exploration of the U.S. system of sourcing rules. Since few other countries have similar rules, researchers must be careful not to extrapolate too much from U.S. experience, summarized so nicely here, for the differences typically extend beyond the details of tax rates. Fully one-third of the countries in the world impose taxes only on income derived from local activities (so-called territorial taxation). Because foreign-source income plays no role in local tax collections, these countries experience no distortions or complications arising from necessarily arbitrary definitions (Hines and Willard 1994).

Even among those countries that do tax worldwide income of their residents, the U.S. practice of defining foreign-source income appears atypical. Japan and the United Kingdom, for instance, allow host-country definitions of income to prevail for their multinational firms. This U.S.-centric view of taxation is notable, for instance, in the discussion of host-country taxation of service income. Mutti and Grubert argue that this type of income taxation amounts to a trade barrier because "those individuals will also face home-country taxation of what the home country regards as domestic-source income." This conflict will clearly never arise for countries that allow host-country definitions to prevail in determining the source of income.

Nevertheless, with this caveat in mind, the paper by Mutti and Grubert provides a good stepping-off point for understanding the U.S. approach to foreign-source income and gives the reader a good understanding of the marginal decisions that can be distorted by policy rules defining the source of income.

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9 The Effect of U.S. State Tax and Investment Promotion Policy on the Distribution of Inward Direct Investment

Deborah L. Swenson

9.1 Introduction

Foreign investment plays an increasingly significant role in the U.S. labor market. By 1992, foreign investment provided more than 5 percent of all U.S. employment, although there was significant variation among the different states. For example, as table 9.1 indicates, while foreign employment represented almost 12 percent of all employment in Delaware and Hawaii, in Montana and South Dakota it accounted for little more than 2 percent of employees. Foreign investment is often seen as desirable for its employment benefits alone. However, it is widely believed that foreign investment may provide other advantages such as knowledge spillovers to host locations as well.[1] In this context, it is not surprising that state governments during the 1980s intensified their efforts to capture a larger fraction of these new investments. It is natural to ask how successful these states were in altering investment outcomes. It is also important to ask how this investment responded to differences in factor market conditions both across the nation and within regions.

The responsiveness of foreign investment to differences in tax and promotion policies intranationally as well as internationally, however, remains a matter of debate. Uncertainty arises in part from the number of ways to measure the volume of foreign investment. Measures include capital investment, the number of new plant investments, and the new employment generated. The more important reason for uncertainty is the difficulty of measuring and characterizing the significance of fiscal and promotion policies. While one may readily observe the existence of various investment inducements, it is difficult to provide an accurate view of the magnitude of the benefits conferred by these

Deborah L. Swenson is assistant professor of economics at the University of California, Davis, and a faculty research fellow of the National Bureau of Economic Research.

1. This argument applies particularly to "greenfield" investment.

Table 9.1 **Growth in Foreign Employment by State, 1980–92**

State	1992 Employment[a]		Foreign Percentage[b]		1980–92 Percentage Change[c]
	Foreign	U.S.	1980	1992	
Total	4,705.5	93,022	2.08	5.06	2.98
Connecticut	81.7	1,354	2.36	6.03	3.67
Maine	24.1	428	3.15	5.63	2.48
Massachusetts	113.6	2,508	1.79	4.53	2.74
New Hampshire	27.7	427	2.85	6.49	3.64
Rhode Island	12.3	376	1.62	3.27	1.65
Vermont	7.5	212	2.77	3.54	0.77
Delaware	35.8	302	3.29	11.9	8.56
Maryland	74.8	1,727	2.10	4.33	2.23
New Jersey	216.3	2,962	3.67	7.30	3.63
New York	340	6,552	2.41	5.19	2.78
Pennsylvania	215.3	4,496	2.31	4.79	2.48
Illinois	246.4	4,575	2.22	5.39	3.17
Indiana	126.2	2,226	2.00	5.67	3.67
Michigan	140.4	3,394	1.74	4.14	2.4
Ohio	212.6	4,228	1.85	5.03	3.18
Wisconsin	81.8	2,052	2.78	3.99	1.21
Iowa	32.6	1,062	1.5	3.07	1.57
Kansas	27.4	926	1.28	2.96	1.68
Minnesota	94.1	1,896	1.64	4.96	3.32
Missouri	77.2	2,025	1.44	3.81	2.37
Nebraska	16	626	0.72	2.56	1.84
North Dakota	5.3	217	0.88	2.44	1.56
South Dakota	5.8	248	0.37	2.34	1.97
Alabama	60.7	1,380	1.5	4.4	2.9
Arkansas	30.8	815	1.69	3.78	2.09
Florida	194.9	4,666	1.65	4.18	2.53
Georgia	154.3	2,518	2.89	6.13	3.24
Kentucky	69.4	1,260	1.67	5.51	3.84
Louisiana	62.1	1,325	2.41	4.69	2.28
Mississippi	23.8	771	1.02	3.09	2.07
North Carolina	191.3	2,698	2.59	7.09	4.5
South Carolina	111.1	1,267	4.11	8.77	4.66
Tennessee	121.7	1,933	2.3	6.30	4
Virginia	119.9	2,321	1.58	5.17	3.59
West Virginia	34.1	510	2.75	6.69	3.94
Arizona	52.6	1,298	1.29	4.05	2.76
New Mexico	13.6	462	1.4	2.94	1.54
Oklahoma	43.8	980	1.5	4.47	2.97
Texas	324.4	6,090	2.16	5.33	3.17
Colorado	61	1,355	1.46	4.50	3.04
Idaho	13.5	344	0.97	3.92	2.95
Montana	5.4	254	0.55	2.13	1.58
Utah	22.7	638	1.62	3.56	1.94
Wyoming	5.5	154	1.38	3.57	2.19

Table 9.1 (continued)

State	1992 Employment[a]		Foreign Percentage[b]		1980–92 Percentage Change[c]
	Foreign	U.S.	1980	1992	
California	521.8	10,614	2.06	4.92	2.86
Nevada	23	576	1.15	3.99	2.84
Oregon	43	1,063	0.90	4.05	3.15
Washington	78.7	1,870	1.18	4.21	3.03
Alaska	9.7	179	5.05	5.42	0.37
Hawaii	53	451	3.74	11.7	8.01

Source: Data are taken from the Bureau of Economic Analysis benchmark surveys.
[a]Number of employees in thousands.
[b]Foreign percentage of overall employment in each state.
[c]Percentage change in state employment that is provided by foreign affiliates.

programs. Finally, the implementation of programs is not exogenous. Hence, in determining the value of a new program, further analysis of the governmental unit is important.

This study examines U.S. state employment data between the years 1980 and 1992 to determine the effect of state policies on the interstate distribution of employment by foreign firms. The focus on employment is motivated in part by the fact that little work to date has examined the role of fiscal policies in changing the distribution of foreign employment. In addition, since many state policies are justified by their positive employment effects, it is important to assess the significance of these claims.

Two tools are used to identify the effect of state policies on foreign employment. First, contrary to most treatments of investment, this paper does not assume that all states are equal competitors for foreign investment. Instead, states are assumed to compete most intensely with their neighbors. In other words, there should be a higher degree of substitutability among states within a region than between states located in different regions of the United States. Therefore, tax and factor market variables are measured relative to each state's region rather than to the nation as a whole. Second, foreign firms operating in the United States ultimately face one of two different tax treatments of their U.S.-based income when they repatriate their U.S. earnings to their home countries. The implication of this treatment dichotomy is that some countries will respond more vigorously to interstate tax differences than others. This dichotomy will be used as a further discriminant in testing for fiscal effects.[2]

The findings of this paper are as follows. Tax effects are not apparent in the

2. This method is introduced in the context of state data by Hines (1996), which studies cross-sectional data on foreign plant, property, and equipment in 1987. In contrast, this paper will study panel data concerning foreign employment.

employment of all nonbank foreign affiliates. However, tax effects are evident once the focus of attention is shifted to foreign manufacturing employment. Presumably, manufacturing employment is more responsive to interregional tax differences since proximity to final markets is less important than it is for nonmanufacturing activity. Further controls for tax system differences facing investors of different nationalities indicate that the intraregional distribution of investment is affected by state taxes. In contrast, state promotion efforts, such as the opening of state investment promotion offices overseas, provide no measurable stimulus to foreign investment. The failure to identify a significant effect for state promotion efforts may arise for any of a number of reasons. It is possible that the interstate subtleties of these state efforts are not easily captured by indicator variables that denote their presence. On the other hand, some states may implement such programs precisely because they are attempting to overcome intrinsic disadvantages in attracting investment. For example, a state whose industrial base has recently deteriorated may institute new policies that succeed in attracting new investment. The effects may not be readily apparent, however, since the policy brings the state back to the national average for states with similar observable characteristics. In addition, if a state adds a new policy tool but it is matched by neighboring states in its region, no net effect may be observed. Finally, it must be recognized that investment responds not only to tax and fiscal variables but also to nontax factors that enhance the attractiveness of one state over others. It is possible that the lack of a positive finding reflects that fact that foreign investors will not be attracted to a state on the basis of information programs unless the state has attractive characteristics.

The organization of this paper is as follows: Section 9.2 describes investment incentives and briefly reviews some previous work on the issue. Section 9.3 provides a model that relates investment decisions to the tax and promotion environment. Description of the data and discussion of relevant employment and fiscal trends are presented in section 9.4. Estimation proceeds in section 9.5, and section 9.6 concludes.

9.2 Background on Investment Incentives

It is natural to expect that, all else equal, increases in state taxes deter investment while state investment promotion efforts encourage investment. However, much research on state taxation finds that investment is only minimally responsive to tax policy.[3] That corporate tax rates or average tax payments are not shown to consistently deter investment may mean in part that the revenues collected are used for the provision of infrastructure or services valued by busi-

3. Carlton (1983) is unable to find any significant evidence that state taxes exerted a negative effect on investment. In contrast, Helms (1985) and Wasylenko and McGuire (1985), when looking at employment changes, and Bartik (1985) and Papke (1987, 1991), when looking at industry-specific effective tax rates, discover significant tax effects. Extensive surveys of previous findings are provided by Bartik (1991) and Wasylenko (1994).

nesses. Nonetheless, numerous states during the 1980s made major changes to their tax systems, claiming that they would help to attract and retain investment and consequently raise state employment levels.

More recently, a number of papers have examined the responsiveness of foreign investment to state tax policies. Coughlin, Terza, and Arromdee (1991), Woodward (1992), Friedman, Gerlowski, and Silberman (1992), and Luger and Shetty (1985) study international investment in U.S. states as it relates to state promotion attempts, measured by promotion expenditures, promotion offices and unitary taxes, and an effort index. Dynamic aspects of interstate competition are explored in Head, Ries, and Swenson (1994). This paper creates investment-specific measures of the fiscal incentives to be gained by investors selecting the various states and finds that while state investment promotion measures increased the investment received by one state over the others, in the aggregate states neutralized each other's efforts through emulation. Ultimately, states received the same amount of investment that they would have received in the absence of all programs. In order to identify the tax sensitivity of foreign plant, property, and equipment expenditure, Hines (1996), Slemrod (1990), and Swenson (1994) utilize investor nationality to determine the strength of country response to host-country taxation. Hines's results, which consider the interstate distribution of investment, show that states with higher taxes attract smaller shares of foreign capital equipment and plant investments.

In the international context, there is additional work that has examined the responsiveness of investment to taxes and factor markets. Wheeler and Mody (1992) study the international location of manufacturing investment and investment in the electronics industry. They find that risk and factor conditions, such as wage differences across countries, are important determinants of investment location. Grubert and Mutti (1991) and Hines and Rice (1994) give greater attention to tax conditions. Both studies show that foreign investment is responsive to tax differences. The relationship they note is nonlinear, with particularly low rates of tax creating the greatest location incentives.

However, there are a number of advantages to studying the distribution of foreign investment within the United States, rather than examining the international distribution of investment. To begin with, since almost all states use the federal method for calculating corporate income, the computation of profits by state is less complicated than the calculation of profits across countries. After the computation of profit, each state assesses corporate income taxes on this profit according to apportionment formulas that seek to determine how activities in that state contributed to the firm's overall profits.[4] In contrast, a firm's international tax payments are based on the profits it is deemed to have earned in various countries. In this context, differences in tax rates can create incentives to shift income between country jurisdictions for tax purposes as a means

4. The most common apportionment formula gives a one-third weight to payroll, sales, and capital. However, in recent years some states are increasing the relative weight placed on sales.

of reducing a foreign firm's tax liability for a given amount of real activity. For example, a multinational can, subject to some limitations, use the location of its financing to affect the amount of profit that is deemed earned and taxable in different locations. In marked contrast, a multinational operating in the United States cannot alter the amounts it pays to New Jersey versus Kansas, for example, by choosing different states for its debt or equity finance. A second advantage to the study of interstate tax differences is that interstate tax payments are not subject to the same timing issues that are present in the payment of international taxes. Foreign firms tend to become liable for home taxes when they repatriate income from host locations to the home country. As a result, it is financial movements, rather than income earning, that triggers tax payments. In the case of state taxes, taxes are based on current-year profits, rather than the timing of intrafirm financial flows that move across borders.

9.3 A Model of Investment

The objective of this paper is to determine the responsiveness of the interstate distribution of foreign employment to wage and fiscal differences between the states. In order to model this decision, we begin with the assumption that foreign firms distribute a fixed amount of new employment, L, across U.S. states.[5] From the perspective of each individual firm i, labor is allocated to U.S. states in a fashion that maximizes the firm's overall U.S. profits after tax,

$$\Pi_i = f(v_s, \tau_s, p_s). \tag{1}$$

Profits earned by each firm depend on the vector of factor prices in each state, v_s, a vector of each state's tax and promotion efforts, τ_s, and finally a vector of final goods prices, p_s. This profit function governs how much labor, L_s, the firm deploys in each state. Changes in labor demand can now be written as

$$\Delta L_s = \sum_j \beta_j * \Delta v_{sj} + \gamma * \Delta p_s + \delta * \Delta \tau_s . \tag{2}$$

However, since we are examining the geographic distribution of investment, we will now rewrite equation (2) in a way that characterizes changes of employment in state s, relative to overall foreign employment in the United States. It is assumed that there is a single price for final output on national markets, allowing us to remove the price term, Δp_s:

$$\Delta(L_s / L) = \beta_w * \Delta(w_s / w) + \delta * \Delta(\tau_s / \tau). \tag{3}$$

Each of the terms in equation (3) represents the change in the variable in a particular state relative to the average change across all states. Another assump-

5. As is demonstrated by Wheeler and Mody (1992), the *amount* of investment located in the United States will depend, in part, on conditions in the United States relative to other countries. However, we assume that the *distribution* of investment within the United States is unaffected by the international location of non-U.S. investment.

tion that is implicit in equation (3) is that the only factor price that is relevant to the demand for labor is the wage by state. Because the capital market is assumed to operate at the national level, market integration implies that firms will not face interstate differences in the cost of capital. Since it is unlikely that labor markets are integrated to the same degree, the same is not assumed to be true of labor markets. Variants of equation (3) will be used as the basis for estimation.

However, further explanation of the tax coefficient is required. First, the notion that a state will receive less foreign employment if it raises its corporate taxes relative to other states is based on two factors. Naturally, a higher corporate tax rate will subject firms operating in state s to the direct effect of lower after-tax profits. In addition, almost all states use apportionment formulas to determine what fraction of a firm's U.S. earnings will be subject to corporate tax in that state. Each state collects taxes on accounting profits, Π_i^a, that are usually calculated in a similar manner for all states. Total state taxes owed by each firm, Tax_i, are then determined as follows:

$$\text{(4)} \qquad \text{Tax}_i = \Pi_i^a \sum_s \tau_s [\theta_{sL}(L_{is}/L) + \theta_{sK}(K_{is}/K) + \theta_{ss}(S_{is}/S)].$$

The tax collected by each state is determined by the state's tax rate and by its apportionment formula. The apportionment formula determines the taxation of a firm's income according to a set of weights, θ, that are typically based on the firm's employment payroll, L, capital stock, K, and sales, S, within the state. The weights sum to one: $\theta_{sL} + \theta_{sK} + \theta_{ss} = 1$. As a result, if a firm increases its employment in a state, it increases the income that is subject to tax within that state. This factor creates an additional deterrent to placing employment in higher tax states.[6]

9.4 Data and Foreign Employment Trends

Between the Commerce Department benchmark surveys of foreign investment conducted in 1980 and 1992, employment by foreign nonbank affiliates in the United States more than doubled. Foreign nonbank affiliates provided slightly more than 2 million jobs in 1980. The number had risen to 4.7 million by 1992. Tables 9.2A and 9.2B provide further snapshots of foreign employment in the years 1980 and 1992, including a state and country breakdown of that employment. It is interesting to note that the rate of growth within a state is not uniform across investors. In part, these differences probably reflect the relative industry strengths of the investors of different nationalities.

This study uses employment data from these benchmark surveys for the

6. In recent years some states have worked to mitigate this disincentive to employment by changing the weights of their apportionment formulas to weight sales more heavily and the payroll and capital factors less heavily.

Table 9.2A **Distribution of Employment across States, by Country, 1980**

State	Country				
	Canada	France	Germany	Netherlands	Switzerland
Total	290	206.3	375.9	186.7	157.8
Connecticut	2.3	4.4	5.8		1.9
Maine	6.8			0.5	
Massachusetts	6	1.9	10.3	2.2	1.8
New Hampshire	2.6	1.6	2.5	0.7	
Rhode Island	0.5	0.5	1.3		0.984
Vermont	1.5			0.01	1.7
Delaware	0.5		0.9		0.02
Maryland	9	7.3	8.3	3.3	2.4
New Jersey	5.2	11.4	26.8	9.6	21.1
New York	21.4	18.7	23.3	10.9	19.7
Pennsylvania	13	12.9	31.8	2.9	8
Illinois	16.8	6.9	17	11	16.2
Indiana	5.7	5.5	12.4	9.2	2.7
Michigan	16	10.1	13.2	2.4	2.9
Ohio	9	13.2	15.6	4	12.3
Wisconsin	11.4	10.7	7.2	4.1	2.9
Iowa	6	0.7	2.6	1.3	1.6
Kansas	1.6	2.8	3.1	0.7	0.4
Minnesota	14.3	1.7	3.8	1.3	2.6
Missouri	6.6	1.1	6.6	2.3	2.6
Nebraska	0.8			0.3	1.3
North Dakota	1.3	0.03			0.02
South Dakota	0.5		0.04		0.03

Alabama	2.9	3.4	2.8	1.3	1.9
Arkansas	1.5	2	1.2		0.5
Florida	7.7	9.8	11.9	2.9	4.1
Georgia	10.4	7.1	8.1	6.2	2.1
Kentucky	5.2	1.1	5.1		0.5
Louisiana	4.9	2.2	8.8	8.5	2
Mississippi	2.1	0.9	1.8	0.8	0.9
North Carolina	11.1	4.5	12.6	8.7	3.1
South Carolina	3	8.9	11	10.3	2.5
Tennessee	3.9	3.5	4.6	12.5	5.8
Virginia	3	4.5	8.1	2.1	3
West Virginia	6	1	3.3		0.2
Arizona	3.1	0.7	4.4	0.3	0.6
New Mexico	1.8	0.1	2.3		0.07
Oklahoma	2.7	1.6	5.5		1.4
Texas	16.2	12.1	29.8	21.8	7.3
Colorado	4.6	2.8	3.3	1	1
Idaho	0.7		0.08		
Montana	0.6	0.3	0.3		
Utah	1.6	0.5	1.5		0.2
Wyoming	1.4		0.3		0.1
California	25.6	14.8	44.9	21.7	11.3
Nevada	0.9	0.5	0.9	0.02	0.1
Oregon	2.2	1.9	2.1	0.6	0.5
Washington	4.2	2.5	3.6	1.2	2.2
Alaska	0.8		0.005		0.006
Hawaii	0.8			0.08	0.09

Note: Table reports numbers of employees in thousands. The "total" column may contain a number higher than
column includes foreign employment from countries not listed individually.

Table 9.2B **Distribution of Employment across States, by Country, 1992**

	Country					
State	Canada	France	Germany	Netherlands	Switzerland	United K
Total	587.9	358.7	519.5	306.1	295.1	96
Connecticut	6.4	8.7	13.9	14.1	6.9	1
Maine	11	0.9	0.9	1.3	0.7	[illegible]
Massachusetts	14.9	11.3	11.1	3.4	5.3	3
New Hampshire	7.5	1.5	3	1.2	1.2	[illegible]
Rhode Island	1.8	0.4	1.9	0.6	1.4	[illegible]
Vermont	2.4	0.5	0.8	0.4	1.1	[illegible]
Delaware	17.5	0.5	1.3	0.6	0.5	[illegible]
Maryland	12	6.6	8.1	7.2	5.8	1
New Jersey	19.2	16	29	13.9	27.7	4
New York	41.1	28.6	39	31.4	21	8
Pennsylvania	25	21.3	30.8	20.8	8.8	5
Illinois	27	13.3	26.6	14.3	27.2	5
Indiana	13.7	15.6	12.8	9.5	4.9	1
Michigan	19.9	10	23.3	4.2	4.5	2
Ohio	16.6	15.9	15.7	15.5	16.7	5
Wisconsin	12.8	5.3	15	8.5	8.3	1
Iowa	5.8	3.4	3.4	2.6	1.7	[illegible]
Kansas	6.2	2.6	2.6	1.6	2.2	[illegible]
Minnesota	10.7	3.4	12.7	5.3	6.1	1
Missouri	16.1	6.7	6.8	4.6	6.6	1
Nebraska	1.5	1.8	3.1	1.2	1.3	[illegible]
North Dakota	1.8	0.8	0.2	0.3	0.1	[illegible]
South Dakota	1.5	0.1	0.7	0.9	0.1	

Alabama	7.6	12.8	4	1.6	4.2	8.8	1.9	7.8	60.7
Arkansas	5.8	2.7	0.9	1.8	1.7	4.4	1.4	4.9	30.8
Florida	20.4	18	18.1	9.6	8.3	42.7	4.8	22.1	194.9
Georgia	21.2	12.7	13.1	10.4	10.1	34.5	5.3	21	154.3
Kentucky	10.7	4.7	7.9	2.4	1.8	12.8	1.2	19.1	69.4
Louisiana	10	3.6	7	7.3	2.6	11.6	1	2.3	62.1
Mississippi	4.3	2.2	2.3	0.7	2.7	3.8	1	2	23.8
North Carolina	29	14	29.5	6.7	12.6	43	1.6	13.3	191.3
South Carolina	8.4	15	17.4	18.3	5.1	14	0.6	11.7	111.1
Tennessee	16.9	9.6	7.3	6.2	6.9	30.7	4.7	20.3	121.7
Virginia	15.3	8.5	15.1	4.9	5.7	23.3	0.6	15	119.9
West Virginia	7.1	2.1	7.1	2.8	3.2	7		1.9	34.1
Arizona	10.2	3.9	3.3	1.7	2	7.8	17.5	7.5	52.6
New Mexico	1.3	1.2	2.4	1.5	0.3	1.9	1.8	1.8	13.6
Oklahoma	1.7	5.4	2.5	1.8	1.1	7.1	0.4	4	43.8
Texas	2.4	23.2	26.7	22.4	16.5	66.5	9.1	33.8	324.4
Colorado	0.6	3.6	5.5	2.9	4.3	11	1.5	7.9	61
Idaho	1.3	0.4	7.5	0.2	1	2.8	0.1	0.2	13.5
Montana	1.7	0.3	0.6	0.2	0.2	0.9	0.8	0.3	5.4
Utah	2.4	0.7	3.8	1.4	1.5	6	0.3	1.9	22.7
Wyoming	0.6	1.3	0.7	0.4		1.5			5.5
California	35.9	31.2	48.1	27.3	28.9	97.5	17.3	147.9	521.8
Nevada	4.9	0.7	2.8	2.9	0.3	2.9	1.9	4.4	23
Oregon	4.1	1.4	9.4	0.9	1.5	6.1	1.2	12.2	43
Washington	8.9	2.9	11.2	3.7	5.8	13.1	3.5	16.9	78.7
Alaska	1.8	0.1	0.1	0.5	0.2	2.5	0.4	2.6	9.7
Hawaii	0.5	0.6	0.5	0.8	1.6	1.1	3.3	35.7	53

Note: Table reports numbers of employees in thousands. The "total" column may contain a number higher than the sum of the country columns because the "total" column includes foreign employment from countries not listed individually.

analysis in section 9.5.[7] Although employment data are available on an annual basis, the dependent variables used in the next section measure the change in employment between the 1980 and 1987 surveys and the change between the 1987 and 1992 surveys. There are a number of reasons for looking at the data at this lower frequency. First, we assume that foreign employment will adjust to changes in the fiscal and factor environments with a lag. Since it is not clear how long the lags should be, and it is not clear that the rate of adjustment to factor markets is the same as it is to fiscal changes, we examine the changes over longer time frames. Second, mergers and acquisitions were a large component of foreign investment expenditures, especially in the late 1980s. Many of these mergers were large, involving the acquisition of control over large labor forces, some of which might be reduced in subsequent selloffs. By looking at lower frequency data, we intend to capture a smoother picture of trends in foreign employment. The statistics that are of most importance to this study are those detailing investment at the state level, disaggregated by the country of investor origin.

The data on state fiscal characteristics and on policy changes are collected from a number of sources. Fiscal policies were first identified with the aid of the *Directory of Incentives for Business Investment and Development in the United States* (National Association of State Development Agencies [NASDA] 1991). Next, data on state characteristics and on state fiscal collections and expenditures were added from Census Bureau collections. Finally, the timing of changes in fiscal policies were identified through the periodical *Site Selection.*

At first glance, the fiscal environment is notable for its stability. Table 9.3A presents information on some variables of interest. For example, the range of corporate tax rates remained virtually unchanged over the 1982–90 period. The average state tax rate on corporate income did rise, but only from 6.36 to 6.71 percent. But these averages obscure some of the activity that was taking place during this interval. As table 9.3B demonstrates, though the average corporate tax rate changed only slightly, 18 states raised their rates while 7 states lowered theirs. The simultaneous changes in opposing directions mean that relative corporate taxes across states were changing and can be used to examine investment decisions.

A second tax of interest is the sales and use tax rate on manufacturing inputs. This tax applies to firm purchases of inputs, whether sourced from within or outside of the state of operation, and can lead to a significant increase in the cost of materials. Concern over this factor caused the state average sales and use tax on manufacturing inputs to be reduced by almost a third, from 1.89 to 1.27 percent (table 9.3A). State differences in the treatment of sales and use tax on manufacturing inputs are further captured in table 9.3B. Half of all states

7. U.S. Department of Commerce (1985, 1990, 1994). Data are studied from the reported samples of all nonbank affiliates and of manufacturing affiliates.

Table 9.3A National Summary Statistics on State Taxes and Promotion Variables

Variable	1982	1990
Corporate tax rates (%)		
Minimum	0.0	0.0
Maximum	12.0	12.0
Average	6.36	6.71
Standard deviation	2.84	2.80
Sales and use tax rates on manufacturing inputs (%)		
Minimum	0.0	0.0
Maximum	7.5	6.0
Average	1.89	1.27
Standard deviation	2.62	2.03
State corporate income tax provisions[a] (number of states)		
R&D tax credit	12	17
Investment tax credit	16	17

Source: NASDA (1991).

Note: Calculations are based on all 50 states.

[a]Not all states that offered a provision in 1982 continued to offer it in 1990.

Table 9.3B National Summary Statistics on Changes in State Fiscal Offerings, 1982–90

Change[a]	Number of States
Corporate tax rates	
States raising their corporate tax rates	18
States lowering their corporate tax rates	7
States with no corporate tax	4
Sales and use tax rates on manufacturing inputs	
States raising their sales tax rates	25
States lowering their sales tax rates	0
States lowering their taxes on manufacturing inputs	7
States with no sales tax on manufacturing inputs	21
States raising their sales tax rates that exempted sales of manufacturing inputs	6

Source: NASDA (1991).

Note: Calculations are based on all 50 states.

[a]Changes are based on comparison of 1990 and 1982 statistics.

raised their sales taxes on general sales. At the same time 21 states levied no sales and use tax on manufacturing inputs. Of those states that raised their sales taxes, almost one-fourth exempted manufacturing inputs from these increases. The pattern of changes in sales tax rates generally, and in sales and use tax rates on manufacturing inputs specifically, is consistent with a policy that taxes less elastic sales activity at a higher rate than more elastic manufacturing activity, which can avoid the tax by moving to another location.

Another characteristic of the 1980s evidenced in *Site Selection* is that states changed the activities they targeted most directly. High technology was cited as a sector that states wished to foster, and this was reflected in the adoption of R&D credits, raising the number of states offering such credits from 12 to 17. The number of states offering investment tax credits rose overall from 16 to 17, but the identity of those states changed. Similarly, although 19 states had foreign investment promotion offices in both 1982 and 1990, the identity of some of those states changed. Since a number of states opened additional offices, the number of offices rose from 27 worldwide in 1982 to 45 in 1990.

A final cut on the data is provided in table 9.4. Here, fiscal variables are summarized on a regional basis, where the regional classifications conform to regional definitions presented in U.S. Department of Commerce, Bureau of Economic Analysis publications. The corporate tax rate on a regional basis ranges from a low of 4.1 percent to a high of 8.83 percent. Although states can make slight changes in their definitions of income that could potentially offset high tax rates, it appears that this was not the case in practice. The variation in corporate taxes collected as a fraction of value added in the region is highly correlated with the corporate tax rate.

Large dispersion is also seen in the rate of sales taxes across regions. However, the range of sales and use taxes on manufacturing inputs varies even more widely, as some regions, notably the Mideast and Great Lakes, have rates very close to zero, while other regions, such as the Far West and Southwest, offer no reductions for manufacturing inputs as compared with general sales. Two other policies that may be of interest to foreign investors are the availability of foreign trade zones and the existence of foreign investment promotion offices. Here too, we see great regional heterogeneity. Some regions, such as New England, have almost no foreign investment promotion offices, while other regions, such as the Southeast, average more than one per state.

Overall, the distribution of these variables across regions suggests that states may be competing not with the nation as a whole but with their neighbors. If states within a region are more similar, then tax policies that are implemented may actually result in the shifting of employment within a region. In contrast, tax effects may be much less pronounced among regions, since dissimilar regions will not be in competition with each other unless massive fiscal efforts are used to diffuse the general inclination to select one region over the others based on the suitability of factor conditions.

9.5 Estimation

In this section we examine the responsiveness of the interstate distribution of foreign employment to wage and fiscal differences between the states. The dimensions of the geographical responsiveness are tested by two cuts on the

Table 9.4 **Regional Fiscal Variables, 1991**

Variable	New England	Mideast	Great Lakes	Plains	Southeast	Southwest	Rocky Mountain	Far West
Corporate tax rate (%)	8.83	8.44	5.31	7.45	6.35	7.08	5.01	4.10
	(1.34)	(0.83)	(2.90)	(3.93)	(1.35)	(2.55)	(3.04)	(4.58)
Sales tax rate (%)	4.58	5.08	5.40	5.10	5.19	2.32	3.66	4.87
	(2.53)	(2.83)	(0.96)	(0.78)	(1.11)	(2.65)	(2.38)	(3.32)
Manufacturing sales	1.25	0.08	0.03	1.57	2.19	2.32	1.80	4.87
tax rate (%)	(3.06)	(0.18)	(0.67)	(2.28)	(2.93)	(2.68)	(2.49)	(3.32)
Tax per capita ($)	1,192	1,377	1,114	1,006	979	1,057	967	1,227
	(354)	(231)	(139)	(248)	(97)	(178)	(157)	(225)
Corporate tax/Value	2.29	2.79	1.58	1.91	1.73	1.89	2.12	1.29
added (%)	(0.91)	(0.77)	(0.91)	(1.10)	(0.70)	(1.98)	(1.84)	(1.79)
Foreign offices[a]	0.167	1.6	2.6	0.57	1.16	0.5	0.2	0.25
	[0–1]	[0–4]	[0–5]	[0–2]	[0–3]	[0–2]	[0–1]	[0–1]
Foreign trade zones[a]	1.5	4.6	4.2	1.5	3.25	7.5	1.0	4.5
	[0–3]	[1–12]	[2–7]	[0–2]	[0–10]	[1–22]	[0–2]	[2–8]

Note: Regional groupings are calculated according to the groupings used in U.S. Department of Commerce, Bureau of Economic Analysis publications: New England = CT, ME, MA, NH, RI, VT; Mideast = DE, MD, NJ, NY, PA; Great Lakes = IL, IN, MI, OH, WI; Plains = IA, KS, MN, MO, NE, ND, SD; Southeast = AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV; Southwest = AZ, NM, OK, TX; Rocky Mountain = CO, ID, MT, UT, WY; Far West = CA, NV, OR, WA; not included = AK, HI. Numbers in parentheses are standard deviations.

[a]Average number of facilities by region. Numbers in brackets provide numerical range for the states within each region.

data. First, the data are tested to see whether the *interregional* distribution of investment reflects wage and fiscal conditions. Second, the data are examined to see whether the *intraregional* distribution of investment responds to intraregional factor and wage conditions. Further tests are then performed to see whether different types of foreign investment respond more vigorously than others. In particular, it may be that manufacturing employment exhibits different responsiveness to wage and factor conditions than does other nonbank affiliate investment. This possibility is tested through applications of the tests to the subsample of foreign manufacturing employment data.

9.5.1 The Interregional Employment Distribution of All Nonbank Affiliates

In order to estimate the responsiveness of investment to differences across regions, comparison variables are created that normalize the change in the value of a particular variable in each region by the change in that variable nationally. These averages are weighted by population so that the effects of small states are not overrepresented in the regional variables. The estimating equation takes the following form:

$$(5) \qquad \Delta(L_r/L) = \alpha + \beta_w * (w_r/w) + \delta * \Delta(\tau_r/\tau) + \gamma * (Z_r/Z) + \varepsilon_r .$$

The change in a country's employment in region r is related to changes in wages in that region relative to the nation and changes in taxes relative to the nation. The change in employment may also be affected by other characteristics of the region, which are contained in the vector Z. The comparison variables differ when interregional employment is being tested as opposed to intraregional investment. In order to avoid simultaneity bias, the wage variable presented is the relative level of wages across regions rather than the relative change in wages across regions.

It is possible that foreign firms choose the regions in which they will place their investments based on interregional differences. This idea is implicit in the estimation presented in table 9.5, which measures changes in employment by region as a function of the weighted average corporate tax and weighted average wage of the region. These changes are measured between the benchmark survey years 1980 and 1987 and between 1987 and 1992. Columns (1) and (2) test whether employment is proportional to regional activity as measured by either population or value added. In either specification these scale variables are shown to be highly significant. Column (3) tests whether either of these scale factors is more significant as a determinant of the interregional distribution of foreign employment. When both measures are included population remains highly significant while value added loses its significance. This suggests that value added entered significantly in specification (2) only because it proxied for population.

Specification (4) augments the regression with variables representing the weighted average wage in the region and the weighted average corporate tax

Table 9.5 Employment Changes across Regions

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Change in Foreign Employment by Region							
Region population	0.76		1.17	0.69	0.73	0.66	0.75	0.69
	(0.17)		(0.45)	(0.19)	(0.20)	(0.21)	(0.20)	(0.23)
Region value added		0.11	−0.08					
		(0.03)	(0.08)					
Region average wage				0.01	0.01	0.01	0.02	0.01
				(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Region average corporate tax				0.19	0.31	0.57		
				(1.38)	(1.39)	(1.71)		
Region change in corporate tax							4.31	1.80
							(9.20)	(10.15)
Region job credit programs					8.09		8.92	
					(9.57)		(9.77)	
Regional foreign investment offices						1.20		0.35
						(3.12)		(2.86)
Adjusted R^2	0.12	0.08	0.12	0.11	0.11	0.11	0.11	0.11

Note: Numbers in parentheses are standard errors. Regression constant terms not reported. Regional variables are calculated as average of region. Each regression has 144 observations.

rate in the region. Contrary to expectation, both variables enter with a positive sign, though neither coefficient is significant. While a nonpositive coefficient is expected on wages, the positive coefficient on the corporate tax variable could be consistent with the "benefits" view of taxation. As long as the government is providing benefits that are valued by investors, higher corporate taxes can be consistent with rising levels of employment in a region. To examine the effect of including a specific benefit, regression (5) adds regional job creation credit programs as a variable, since it is a benefit that one would assume is directly related to employment decisions. While the expected positive coefficient is found, it is not significant. Moreover, the coefficient on the corporate tax rate remains positive.

Further specifications were tested that included benefit measures such as investment tax credits and R&D credits. The results are not displayed since they were as unpromising and insignificant as the result shown in column (5). If the benefits view of taxation is driving the insignificant positive coefficient found on the regional corporate tax rate, the successful combination of benefits is not discernable in this data set.

Regression (6) examines another variable that might enhance foreign employment in a region, the presence of foreign investment promotion offices. We find a weak positive correlation between foreign employment decisions and the presence of such offices.

Finally, regressions (7) and (8) try a different specification of the corporate tax rate by region. Here, the corporate tax rate variable is taken to be the weighted average *change* in the region's corporate tax rate. The coefficients again go against the common presumption that corporate tax increases decrease employment. However, no conclusions can be drawn, since these estimates are not statistically significant. As in the two previous specifications, these regressions are augmented alternatively by a job creation credit variable and a foreign investment promotion office variable. The coefficients on these variables remain equally insignificant.

It is too early to draw conclusions from the results in table 9.5. It is clearly possible that taxes and wages exert a significant effect on employment and that the regressions fail to capture these effects. However, one hypothesis is suggested. In particular, it appears that the interregional distribution of all affiliate investment is based purely on population, and by association ultimate product markets. The lack of any decisive effect of corporate taxes or wages on employment may reflect the fact that foreign affiliates locate their employment as a means of gaining proximity to final markets. If this proximity is sufficiently valuable, then they will distribute themselves evenly across U.S. regions in a fashion that is proportionate to population.[8]

8. The proximity arguments made here are similar in character to descriptions of international incentives for proximity in Brainard (1997).

9.5.2 The Interregional Employment Distribution of Manufacturing Affiliates

Unless transportation costs are extremely high or customers in final markets require frequent changes in product specifications, it is not necessary to locate production near final markets. Hence, we repeat the tests that were performed, this time on the narrower sample of foreign employment involved in manufacturing.[9] Since the 1980 benchmark survey does not present foreign employment in manufacturing, the manufacturing data examined span the years 1987–92.

The first three columns of table 9.6 examine whether region size as measured by population or value added exerts a significant influence on the level of manufacturing employment placed in that region. The value-added variable has a positive coefficient but is not significant. The population variable is negative and insignificant, alone or in combination with the value-added variable. It appears that the location of foreign manufacturing employment within a region is not strongly influenced by population or manufacturing density as exhibited by value added. Regressions (4) and (5) now augment the specification with regional wages and taxes. Column (5) includes country dummies, while column (4) does not. The wage variables have a negative coefficient that is not significant. Regional variation in corporate tax rates now enters with a negative and significant sign. Column (6) measures the corporate tax with its change rather than its level, but the change does not enter significantly.

Finally, columns (7) and (8) include two indicators of state investment promotion effort. In contrast with the data on all nonbank affiliates, these variables enter with negative signs. In the case of the job creation credit program, the negative coefficient is significant. Interestingly, at the same time, the measured effect of wages in column (7) now approaches marginal significance. One interpretation would be that states with poor-quality labor forces are more likely to adopt job creation programs. The presence of the program provides an indicator variable for interregional variation in labor quality. Once one controls for this quality heterogeneity, it becomes more possible to identify the effects of wage variation.

In summing up, there are two primary differences in the interregional employment regressions performed on the manufacturing subsample relative to the full sample of nonbank affiliates. First, corporate taxes exert an identifiable negative effect on manufacturing, but not on overall affiliate activity. This is consistent with the previous conjecture that much foreign investment is located with proximity to final markets and customers in mind. To the extent that manufacturing can locate at greater distance from final markets, tax differences

9. In aggregate, foreign employment in manufacturing was less than half of total nonbank affiliate employment of foreign firms.

Table 9.6 **Manufacturing Employment Changes across Regions**

Variable	Dependent Variable: Change in Foreign Employment by Region							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Region population	−0.66		−0.49	−0.49	−0.49	−0.19	−0.63	−0.61
	(0.11)		(0.43)	(0.43)	(0.38)	(0.39)	(0.38)	(0.39)
Region value added		0.02	0.07	0.07	0.07	0.04	0.10	0.13
		(0.02)	(0.09)	(0.09)	(0.08)	(0.07)	(0.07)	(0.08)
Region average wage				−.002	−.002	.004	−.009	−.002
				(.006)	(.006)	(.006)	(.006)	(.006)
Region average corporate tax				−2.94	−2.94		−3.21	−3.09
				(1.42)	(1.25)		(1.22)	(1.24)
Region change in corporate tax						19.2		
						(6.05)		
Region job credit programs							−16.1	
							(7.55)	
Regional foreign investment offices								−3.75
								(2.62)
Country dummies	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Adjusted R^2	0.20	0.12	0.24	0.12	0.24	0.29	0.29	0.26

Note: Numbers in parentheses are standard errors. Regression constant terms not reported. Regional variables are calculated as average of region. Each regression has 72 observations (8 countries, 9 regions).

will exert a greater influence. In addition, the effects of apportionment may also be evident here. Payroll is one component of most states' apportionment formulas. As such, this weight factor should discourage firms from locating manufacturing in states with high corporate tax rates. The difference in tax coefficients between the two samples are suggestive that these effects are operating.

The second interesting distinction in the manufacturing subsample reinforces the notion that the distribution of manufacturing employment is subject to different influences. Overall population was identified as the primary determinant of the changes in regional employment by all foreign nonbank affiliates. In the manufacturing subsample, population has a negative effect, if any. This is further evidence that manufacturing activities do not need to be located near customers while other operations do require proximity. At the same time, value added by state has a slight positive influence. This finding is potentially indicative of the presence of agglomeration economies in manufacturing.

9.5.3 The Intraregional Employment Distribution of Manufacturing Affiliates

Our examination now moves to the more disaggregated analysis of the distribution of employment between states within regions, where each state's employment is compared with employment within its region, *r*. These results are presented in table 9.7. In portions of this table, identity of the foreign investor is used as a further discriminant to identify the effect of taxes on investment. The estimating equation takes the following form:

$$(6)\quad (L_{cs}/L_{cr}) = \alpha + \beta_w * (w_s/w_r) + \delta * (\tau_s/\tau_r) + \gamma'(Z_s/Z_r) + \lambda_c + \varepsilon_{cs}.$$

Column (1) provides a benchmark. In considering the relative employment of different states within a region, value added in a state relative to other states in the region is a decisive factor. This factor is consistent with agglomeration stories of investment in which investment benefits from positive spillovers in either labor markets or in markets for intermediate inputs. This finding will not be discussed further since it is consistent throughout table 9.7.

The relative corporate tax rate in column (1) exhibits no discernable effect on the distribution of manufacturing employment. However, as is explained in Hines (1996), the nationality of the investor has important implications for the effect of U.S. taxes on investment. Investors who are headquartered in exemption countries pay no home-country taxes on their U.S. earnings. In comparison, investors who are headquartered in foreign tax credit countries may have a smaller reduction in their after-all-tax profits as a result of high taxes paid to a U.S. state. It is not purely true that all foreign tax credit investors will be unaffected by state tax differences. Firms that are in excess credit positions may not be able to use all their credits generated by state taxes. In this case higher taxes will deter investment by these firms, too. However, the result remains that exemption country investors should be more negatively influenced

Table 9.7 **Manufacturing Employment**

	Dependent Variable: Employment Relative to Region						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Relative value added	1.15	1.14	1.16	1.15	1.16	1.17	1.17
	(0.18)	(0.16)	(0.18)	(0.17)	(0.16)	(0.16)	(0.16)
Relative population	−0.31	−0.30	−0.29	−0.30	−0.29	−0.33	−0.33
	(0.19)	(0.17)	(0.19)	(0.19)	(0.17)	(0.17)	(0.17)
Relative corporate tax rate	0.03	0.07	0.04	0.032	0.71	0.70	0.73
	(0.12)	(0.12)	(0.12)	(0.12)	(0.13)	(0.12)	(0.13)
Relative corporate tax rate*exemption		−0.93	−0.93		−0.93	−0.93	−0.96
		(0.09)	(0.09)		(0.11)	(0.09)	(0.11)
Relative pay			−0.37		−0.46		
			(0.43)		(0.43)		
Relative job credit program offer				−0.03	−0.06		
				(0.04)	(0.06)		
Relative job credit program offer* exemption					0.03		
					(0.07)		
Relative use tax						0.04	0.01
						(0.03)	(0.05)
Relative use tax* exemption							0.04
							(0.06)
N	376	376	376	365	365	376	376
Adjusted R^2	0.36	0.50	0.50	0.38	0.51	0.50	0.50

Note: Numbers in parentheses are standard errors. Regression constant terms not reported.

by U.S. corporate taxes than the average investor who is governed by a foreign tax credit system. This hypothesis is tested in column (2) through an interaction variable that multiplies the relative corporate tax rate variable by a dummy variable that indicates exemption investors. As predicted, the results show that corporate tax variation within a region has a strong negative effect on exemption investors.

The effect of the job credit program is tested in a similar fashion in regressions (4) and (5). Job creation credits reduce state corporate taxes payable by firms. Therefore, foreign investors from exemption countries should derive equivalent, if not larger, benefits from job creation credits. Since these credits usually reduce a firm's state tax payments, it is expected that the job credit program variables will have the opposite sign of the corporate tax variables. The coefficient estimates on this interaction term are of the expected sign, but there are no significant effects, and the values of the credit to the two types of investors are not statistically distinguishable.

Finally, in manufacturing, sales and use tax is a component that may increase the cost of investment. To measure the effect of these sales and use taxes on the intraregional distribution of employment, regression (6) adds a variable that measures the sales and use tax on manufacturing inputs relative to the sales and use taxes applied to manufacturing inputs purchased by firms in other states of the region. No significant effect is found. However, the data present another opportunity to test whether the earlier exemption distinction was a spurious correlation that represented other characteristics of the exemption investors. Column (7) adds a regressor that multiplies the relative sales and use tax variable by the exemption dummy. There should be no effect here since, unlike taxes on corporate income, sales and use taxes are not deductible by firms from foreign tax credit countries. In other words, sales and use taxes do not have differential effects on the overall tax payments of firms from exemption as opposed to nonexemption countries. This spurious exemption variable has no measurable effect. This suggests that the earlier findings regarding the corporate tax reflect differential responsiveness to corporate tax rates rather than unmeasured differences that separate the exemption from the foreign tax credit investors.

As a second check on the robustness of the results, the regional groupings were changed to conform to the regional definitions presented by the Bureau of the Census. There were no discernable differences between the results presented in table 9.7 and the results generated with changes in the regional groupings.

In considering intraregional employment effects in manufacturing, three conclusions emerge. First, the strong coefficients on value added as opposed to population suggest that agglomeration economies are one of the important factors determining the distribution of employment in manufacturing. Second, when corporate tax effects are measured among the set of countries that are expected to respond most vigorously, intraregional differences in corporate taxes appear to reduce employment in the states that have the highest taxes relative to their regions. Finally, the failure to find any correlation between the intraregional distribution of employment and sales and use taxes on manufacturing does not prove that these taxes have no effect. As table 9.4 showed, different regions center on different levels of sales and use tax on manufacturing equipment. Since this variable has a potentially strong effect on manufacturing investment, states within regions may bring their taxes into conformity with the rates that their neighbors have. If this occurs, no effect would be found, since state policymakers have set their tax rates in a way that minimizes loss of employment to other states in their region, leaving inadequate variation within regions to identify any effects econometrically.

9.6 Conclusions

Our results suggest that the geographical distribution of foreign employment across U.S. states is in fact sensitive to both fiscal and labor market conditions in some but not all situations. The distinction that is of most relevance here is whether the foreign employment is in manufacturing or in the broader category of all nonbank affiliates. Both the interregional and the intraregional distribution of foreign employment in manufacturing appear to respond to tax differences. Regions whose taxes are higher than average for the country, or states whose taxes are high relative to their region, appear to deter investment. By way of contrast, the distribution of all nonbank employment does not appear to be sensitive to tax differences. This may reflect the activity mix of the two sectors. If the activity of nonmanufacturing firms in the nonbank affiliate category is directed toward functions such as sales and services, then these activities need to be located in close proximity to final markets. This is consistent with the finding in this study that the broadly defined category of employment appears to be evenly distributed across regions in a fashion that corresponds to population. In contrast, the location of manufacturing is positively related to the current levels of business activities in states, as opposed to the populations themselves.

The differential tax sensitivity of these two types of employment suggests that fiscal policy oriented toward the more general investment levels is likely to be unsuccessful. The finding that foreign employment may in fact be more responsive to intraregional differences than to intranational differences has two implications for state policymakers. First, in crafting promotion policies, the most intense competition is found among one's neighbors. Therefore, it is not necessary for states to copy actions that are taken by states in other regions. Second, some observers claim that in the international context it will be difficult for nations to maintain high corporate tax rates when far lower tax rates are offered by tax havens. These results suggest that firms' real activities are not perfectly elastic in the face of fiscal differences.

While this study finds that foreign manufacturing employment is affected by broad measures of corporate tax, the inclusion of other state promotion tools does not produce identifiable effects. One might suspect that we are unable to find measurable effects because these promotion policies are, for the most part, denoted by indicator variables that cannot capture the full degree of interstate heterogeneity that is present. A more serious problem is that the failure to measure results on this front may very well be due to the fact that states' use of investment promotion tools is endogenous. On the positive side, attractive states may open investment promotion offices since they expect large investments and these investment offices abroad help coordinate foreign firms' planning. On the negative side, states that have failed in the past may implement programs to augment employment. Here, the use of indicator variables for the programs will yield what appear to be negative effects. Yet another possibility is that no successful program will go without imitation. This possibility is explored in Head et al. (1994) in the case of foreign trade zones. If this is the case, imitation removes the differentials in the explanatory variables that are needed to identify the effects of these programs. In order to identify the impact of these promotion variables, future research is needed to model and measure states' use of promotion tools.

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Comment Michael Wasylenko

At a lively debate some years ago on the elasticity of demand for money, one person challenged the group to name one controversial issue in economics that was resolved through empirical work. Each empirical researcher has his or her favorite examples, but most would agree that resolving issues takes replication

Michael Wasylenko is professor of economics and senior research associate of the Center for Policy Research at the Maxwell School of Syracuse University.

of results over several studies using a variety of data sets before one can speak confidently about the size and statistical significance of the coefficients.

Through replication, a strong consensus has recently emerged among researchers studying location decisions about the effect of state and local business taxes on plant locations. State and local taxes affect location decisions of manufacturers but have less or even no impact on the location decisions of nonmanufacturing industries. Another consistent finding is that in the United States the smaller a region over which the location decision is made, the more likely it is that taxes and other fiscal variables will influence location decisions. Those empirical results suggest that intraregional business location decisions are more susceptible to the influences of fiscal variables than are interregional business location choices.

The findings cited above seem to apply to domestic and foreign location decisions in the United States (Wasylenko 1995; Ondrich and Wasylenko 1993), although there are many more studies of location decisions of domestic plants (or employment) than of specifically foreign plants (or employment). For manufacturing firms, the elasticity of employment or location with respect to business taxes appears to be between -0.5 and -0.8, depending on the time period of the study, on whether employment or plants are used as the left-hand-side variable, and on whether aggregate or micro data are used in the analysis.

Agglomeration economies, or plants locating in groups to take advantage of technological transfers, information, proximity to suppliers, or to a workforce, have consistently and strongly determined plant locations in empirical work. Put differently, regions with plants in a particular industry are likely to attract more plants in the same or a similar industry.

The results reported in Deborah Swenson's paper are roughly consistent with the results reported in other papers. Her paper makes a contribution to the literature on the location of foreign direct investors. However, several points should be made about the data and the modeling used in her paper.

Use of Aggregate versus Micro Data

Total employment in foreign-owned plants, which is an aggregate of new plants, plant expansions, mergers, acquisitions, equity increases, joint ventures, and other direct investments, is explained in her paper. Investors typically exercise more choice over where to locate new plants than they would over acquisitions of existing plants and other forms of investment. Therefore, findings on the variables that attract foreign investment to a state have typically been stronger when new plants or "greenfield" investments are analyzed than when other forms of investment are commingled with new plants in the analysis. Empirical results based on greenfield investments may describe what foreign investors actively seek, while the results based on aggregate data describe what investors do when financial and other considerations enter the location decision. Policymakers with an interest in shaping the state business climate would want to know what investors actively seek in a location. Studies using aggregate data might then be less interesting to policymakers.

Tax Variables

While Swenson is careful to acknowledge and to account to the extent possible for several of the complications of the tax code as it applies to foreign investors, there are several points about the tax variables worth reemphasizing. Moreover, the measurement of the tax variables is not pushed as far as one would like in her paper.

Worldwide unitary taxation was used at one time or another in 13 states during the 1980–87 period. However, during that time period many of these states abandoned worldwide unitary taxation. These changes in the tax structure might be important in the analysis of the 1980–87 time period, and her study does not take into account the nature of the unitary tax system in the states. After 1987, however, only five states used worldwide unitary taxation, and the changes in this policy were few and not influential. Thus, in the latter period of the study, the variation in the unitary tax structure among states may be differenced away in her estimation and not important in her analysis of the 1987–92 period. But in the earlier period worldwide unitary taxation could have changed location decisions in the aggregate.

Formulas that are used to apportion corporate income among states vary among states. States do use the three-factor formula based on sales, payroll, and property; however, some states double weight the sales factor, while others allow firms to choose among several apportionment formulas. Again, these variations might difference out of the model if states do not alter their apportionment formulas over the time periods. If apportionment formulas change, however, they could influence the amount of manufacturing investment in the states.

Moreover, states do not typically use the three-factor formula to apportion income in some nonmanufacturing industries, such as finance. This is not taken into account in her model and reasoning.

Effective tax rates are preferred to nominal corporate tax rates as measures of tax burdens. In fact, one would like to have measures of marginal effective tax rates in states. Investment tax credits in New York State, for example, give New York a relatively low marginal effective tax rate, although the state's nominal corporate tax rate is higher than average. In her paper, Swenson uses nominal tax rates, which are likely to mismeasure the marginal tax rates of foreign investors.

However, her analysis accounts for the different state tax circumstances that investors from different home countries face. She distinguishes between home-country territorial and residential tax systems, where investors in territorial countries pay U.S. taxes and no taxes to their home country. An investor from a residence-based tax country might effectively pay no U.S. corporate taxes (upon repatriation of the income), unless he were in an excess credit position in his home country.

Swenson accounts for some variation in the rate of manufacturing sales and use taxes. However, the administration of this tax complicates greatly the accurate measurement of the sales and use tax rate as it affects manufacturers. For example, Ohio exempts business machinery and equipment from sales taxes, but still 30 percent of all sales tax revenue in Ohio is derived from business purchases. The reason is that Ohio uses an administrative list approach, where a specific set of items is sales tax exempt, instead of granting a sales tax exemption to all material and equipment purchased by a firm (the integrated plant approach to levying the exemption). Thus, the findings in her papers that sales and use tax exemptions for business equipment do not influence locations may occur because investors are aware that the sales tax rate itself is a less important determinant of their sales tax burdens than is the administration of the tax. Put another way, there may be quite a bit of measurement error in the sales tax exemption variable used in the paper.

Fiscal Incentives

A generic problem that affects all attempts to analyze the effects of fiscal incentives is measuring accurately the size of fiscal incentive packages or programs. Swenson, for instance, attempts to account for whether a state has a foreign trade office in a country, but there are no easily available measures of the staffing and activity in the office. To emphasize this point, Japan has a Japanese External Trade Organization (JETRO) within the United States. There are eight regional offices, each with a large staff to promote Japanese exports as well as to help small to medium-size U.S. businesses export to Japan. Moreover, JETRO offices arrange exchange programs with universities in the United States for civil servants in Japanese ministries. This example highlights the range of activities that an office in another country could undertake. More important, the size of each state's foreign office in other countries is not measured in Swenson's analysis.

Similar arguments can be made for a host of fiscal incentive programs, which have typically limited participation to new firms or to small firm start-ups and made available everything from loan guarantees to direct loans. The wide variation in the formulation of fiscal incentives among states as well as the wide range of eligibility criteria for firms to qualify for the incentive packages complicates the measurement of these incentive programs and makes it difficult to estimate their effectiveness. As a result, what we can say with confidence about the effectiveness of these programs is limited. Moreover, as Swenson also notes, the presence of fiscal incentive programs in themselves may be an attempt to compensate for inherent weaknesses in the business climate of a state (and thus endogenous to employment growth) rather than an exogenous source of employment growth.

Comments on Specific Regressions

While she does not say so, I assume that a time effect was included as a variable when two different time periods are pooled in the analysis. Carroll and Wasylenko (1994) have shown that fiscal variables have different effects over time because different levels of state competition in different time periods can drive state fiscal systems to look more similar over time. As fiscal variables become more alike among states, fiscal variables become more neutral as determinants of location. (This latter point is also made by Swenson.)

It would be interesting to know the results of her model when it is run on all states without deflating the equations by their regional averages, as in table 9.7. By running all states (weighted appropriately by population to correct for the size of the state), one could learn about the sensitivity of the results when states are compared to averages within their respective regions relative to when states are simply pooled without comparisons to regional averages.

In summary, this is a good paper. Nonetheless, research in this area has moved beyond aggregate analysis and has employed microlevel plant location data. Better measures of the fiscal variables would also help identify their effectiveness with more accuracy.

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10 A Measure of the Current Account Related to the Well-Being of Japan: Generational Accounts in the Open Economy

Eric O'N. Fisher

10.1 Introduction

An article entitled provocatively "Hollywood 1, Japan 0" appeared recently in the national press (Sterngold 1995). It reported that the president of Matsushita Electric Industrial Company paid a brief visit to the chairman of the American entertainment conglomerate MCA early in April 1995 and informed him coldly that Matsushita had sold its controlling interest in MCA to Seagram's, a Canadian firm. This foreign direct investment was the single largest purchase of an American corporation by a Japanese firm; Matsushita had acquired MCA for $6.6 billion in 1990 and sold 80 percent of its stake for $5.7 billion in 1995. During the same period, the comparable return from holding an open position in yen was greater than 13 percent per year. How do investment decisions like this one affect Matsushita's shareholders? Also, if this kind of foreign direct investment is typical of the flow of capital out of Japan in the past two decades, what are the macroeconomic implications of the continuing Japanese external surplus of the past 15 years?

This chapter answers these questions in two ways. First, it describes two new measures of a country's external surplus that are based in economic theory. One is called the *aggregate generational current account,*[1] and the other pre-

Eric O'N. Fisher is associate professor of economics at The Ohio State University.

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1. Fisher (1995) defines the aggregate generational current account, and Fisher and Woo (1997) calibrate this statistic for the postwar Korean economy. The term "aggregate generational current account" is a bit of a misnomer because in practice one ignores the generational heterogeneity that

sents a generational cross section of the net foreign assets of Japanese residents. Both extend the important work of Auerbach, Gokhale, and Kotlikoff (1991) to the open economy. Second, it uses data from Japan's balance of payments in the past two decades to calibrate these measures. The value of Japan's external assets, measured at market prices, has been somewhat higher than that of its net international investment position, measured at historical prices. This fact is true because the surge in Japanese outward investment occurred in the first part of the past decade. Although Japanese investments in real estate in the United States have suffered some spectacular recent losses,[2] Japan's overseas assets have enjoyed large capital gains because securities prices in world markets have risen sharply in the past 15 years.

The measures calculated in this chapter are intuitively related to the well-being of the Japanese. The aggregate generational current account is the entire profile of the annual change in the expected present value of net foreign assets broadly defined. Thus it captures changes in the expected present value of the goods and services that a country can import from abroad. For domestic residents, one aggregate generational current account profile is ex ante Pareto superior to another if, at all time horizons, the present value of the stock of net foreign assets is greater for the former than the latter. For example, consider a one-off capital gain that increases the present value of Japan's net foreign assets. This change raises the expected utility of some Japanese residents and thus, with an appropriate internal redistribution of wealth, permits a Pareto improvement for all current and future residents. On the other hand, consider an increase in Japan's expected official transfers to abroad, perhaps as a part of a commitment to pay for the Allies' military expenses in the Gulf War. Such a transfer implies an analogous Pareto worsening for the residents of Japan.[3]

The aggregate generational current account is constructed in two big steps. First, one determines the market value of net foreign assets. Second, one capitalizes expected transfers from abroad. The sum of these two after any history is a country's net foreign assets position defined broadly. The present value of

is at the heart of Auerbach, Gokhale, and Kotlikoff's measure. The phrase "a utility-theoretic measure of the external surplus" is perhaps too pompous. I have elected to use the phrase "aggregate generational" to place my work firmly within the tradition started by those authors and continued recently by Ablett (1996). Auerbach, Gokhale, and Kotlikoff (1994) give a nice overview of the literature on generational accounts.

2. On 12 May 1995, the front page of the *New York Times* reported that Mitsubishi Estate Company, the holding company that had purchased an 80 percent stake in Rockefeller Center for $1.4 billion, was filing for bankruptcy. The *Survey of Current Business* (May 1994, tables 5.1 and 5.2) shows that real estate purchases represented about 15 percent of Japanese direct investment into the United States in 1992 and 1993. This is a small fraction of Japan's purchases of dollar-denominated securities in those years.

3. The utility generated by the provision of public goods has not as yet been incorporated into the calculation of generational accounts. Thus the appropriate comparison here is between a world in which the Japanese enjoy the benefits of global military security without having to pay unilateral transfers and one in which the Japanese enjoy these benefits and also shoulder some concomitant financial burdens.

this stock of assets puts the current account into an intertemporal framework.[4] Finally, first differences of this present value show how the stock of external assets evolves across time and through history. If the aggregate generational current account is consistently positive, as is the case for Japan in the 20 years between 1973 and 1992, then a country's net foreign assets are increasing more rapidly than world interest rates over a long horizon. In a dynamically efficient world economy, such a situation represents the expectation of a higher future standard of living owing to expected investment income from abroad.

The aggregate generational current account thus uses two standard techniques of generally accepted accounting principles: first, it evaluates net foreign assets at market value, not historical cost; and, second, it forces the economist to use an accrual accounting method to evaluate foreseeable international commitments. From a theoretical perspective, both of these practices make enormous sense. Of course, the difficulty in constructing theoretically meaningful economic statistics is that they are only as good as the assumptions one uses to compute them.

In this chapter, I assume that no Japanese transfer to abroad is enduring. Thus the consistently negative balance for unilateral transfers on current account does not reflect the expectation of an enduring Japanese commitment to a larger geopolitical role. If this assumption is wrong, then I have overestimated the level of Japan's net foreign assets. Also, I have evaluated Japan's net foreign assets only in four regions: the United States, Western Europe, the Communist bloc, and Australia. Japan has played a historically important role in several rapidly growing Asian economies. Since I have excluded these countries from my analysis, I may have underestimated the value of Japan's net foreign assets. Further, I have used equity prices, bond prices, and exchange rates from the United Kingdom only to revalue all of Japan's Western European assets. If the rates of return on European assets in general have been higher in the past 20 years, then I have underestimated the level of Japan's net foreign assets. Finally, I have assumed that Japan's assets in the United States have borne market rates of return. If Japanese investors suffer consistently large losses from real estate holdings, then I have overestimated slightly their net foreign assets in the United States.

This chapter also presents a generational cross section of the net foreign assets of Japan in 1992. Using data on household savings and borrowing rates, I construct the portfolios of net foreign assets of 19 different age cohorts. Different groups hit their years of peak savings in different years. Thus some generations benefited quite substantially from the large capital gains that Japan's overseas investments experienced in the past decade, while others had not yet

4. Since nominal interest rates include a component for expected inflation, the present value of the stock of net foreign assets deflates these assets both for inflation and the opportunity cost of holding real balances. Ulan and Dewald (1989) correct the U.S. stock of net foreign assets for inflation and for market value effects, but they do not consider the full implications of the dynamic pattern of asset accumulation.

accumulated sufficient wealth to have gained much from that boom. For example, this generational profile of net foreign assets shows that Japanese residents in their forties and fifties stand to lose proportionally most from a drop in dollar-denominated bond prices, whereas older generations lose less because they do not hold as large portfolio shares in dollar-denominated assets.

The broad picture that emerges from the data is that the market value of Japan's overseas assets was about 30 percent higher in 1992 than the Bank of Japan's official estimates. The rate of return on European assets was quite high, whereas assets held in the United States bore positive but not stellar returns. Since Japan held about $680 billion in net foreign assets in 1992, the degree of interdependence between Japan and the world economy is probably greater now than at any other time in history.

The rest of this chapter consists of four sections. Readers interested in the theoretical arguments showing that the conventional current account is ill defined should focus closely on section 10.2. Section 10.3 presents rough calculations of the market value of Japan's net foreign assets from 1973 through 1992. That section calibrates a benchmark using the status quo ex ante in the world economy in 1992. Section 10.4 presents the generational cross section of the distribution of these assets. Then it analyzes the effects on the welfare of Japan of three different scenarios: a continued strong yen, higher dollar interest rates, and rapid Chinese economic growth. Section 10.5 presents a brief conclusion. The chapter ends with a data appendix.

10.2 An Illustrative Model

Consider a country trading in a larger world economy. There are two generations, and the world economy lasts for two periods: the present and an uncertain future. Uncertainty is summarized by a random variable whose realization is denoted by $\theta \in \Theta$, the latter denoting the set of all possible future states of the world. This random variable summarizes both intrinsic and extrinsic uncertainty in the market, and its distribution is common knowledge. Intrinsic uncertainty is related to production, consumption, and government policy decisions, while extrinsic uncertainty captures the notion that market equilibria may be subject to a degree of randomness independent of the fundamentals of the world economy.

In the domestic economy, there is one representative agent in each generation. Agent 0 lives for one period only, and agent 1 lives for two periods. Let x_0^1 be the vector describing agent 0's consumption bundle; a subscript denotes a person and a superscript denotes a time period. Since x_0^1 has several elements, one can think of it as consisting of many different goods and services, both traded and not traded, that influence the utility of agent 0. Likewise, the state-contingent consumption profile of agent 1 is $[x_1^1, x_1^2(\theta)]$. Preferences for the people in the domestic economy are summarized by $u_0(x_0^1)$, a utility function for agent 0, and $E\{u_1([x_1^1, x_1^2(\theta)])\}$, an expected utility function for agent 1, where the expectation is taken with respect to the information available in the first period.

Let a_0^1 be the value of agent 0's initial assets, y_0^1 her income, and g_0^1 the domestic government's net transfers to her. Net transfers from the domestic government are positive if the agent's subsidies exceed her tax obligations. Likewise, a_1^1 is the initial wealth of agent 1, $(y_1^1, y_1^2(\theta))$ that agent's income profile, and $(g_1^1, g_1^2(\theta))$ his state-contingent government net transfers. It will be convenient to denote the ex post interest rate by $i(\theta)$.

Assume that asset markets are complete. Then a rational expectations equilibrium will entail that agents choose consumption plans that maximize expected utility subject to the usual budget constraints. Let c_0^1 and $(c_1^1, c_1^2(\theta))$ be solutions to these problems. Agent 1's consumption plans depend in general on risk aversion, expected domestic and foreign transfers, and the profile of earned income. Now let $s_1^1 - a_1^1 = y_1^1 + g_1^1 - c_1^1$ be the increment to agent 1's assets. Since $-a_0^1 = y_0^1 + g_0^1 - c_0^1$, the conventional current account in period 1 is $b^1 = s_1^1 - (a_0^1 + g_0^1) - (a_1^1 + g_1^1)$, the excess of domestic savings over investment. Likewise, the conventional current account in period 2 is $b^2(\theta) = -[a_1^2(\theta) + g_1^2(\theta)]$, where $a_1^2(\theta) = [1 + i(\theta)]s_1^1$ is the law of motion for agent 1's assets. Thus the *conventional current account profile* is

$$(1) \qquad [b^1,\ b^2(\theta)] = [s_1^1 - (a_0^1 + g_0^1) - (a_1^1 + g_1^1),\ -(a_1^2(\theta) + g_1^2(\theta))].$$

The essence of Fisher's (1995) argument is that the term $s_1^1 - a_1^1$ is not well defined. Consider a fixed level of initial wealth for agent 1. Then one can always increase b^1 by raising net transfers from abroad by one dollar and then imposing a offsetting state-contingent decrease in transfers in the amount of 1 + $i(\theta)$ in the next period. This change in the timing of transfers has no effect on the present value of the wealth of any agent after any history, and the consumption and utility of each agent is unchanged in any state of the world. But the conventional current account surplus has risen. Since the equilibrium allocations of the agent in the world economy are unchanged, agents' expected utilities are not affected after any history. This argument is the essence of a general proof showing that the conventional current account can take on any value in all but the final period of any economy. In an economy with an infinite horizon, the conventional current account is arbitrary in every period! Since each agent's expected utility is not affected by the timing of these transfers, changes in the conventional current account profile need not be related at all to changes in the welfare of domestic residents.

How should one interpret the rescheduling of these unilateral transfers from abroad? If this country has a valued fiat asset, then the government improves the conventional current account simply by delaying payments to abroad and promising foreigners principal and interest in the next period. Thus this year's net interest payments from abroad and conventional current account have increased. If the economy has no such asset, then the timing of transfers from abroad is a rescheduling of sovereign debt that leaves the present value of debt service unchanged in every state of the world. This "infusion of foreign official capital" leaves the present value of the equity of any international creditor unchanged, but it allows the conventional current account of the debtor country to be anything.

Rescheduling taxes and transfers among the agents in the domestic economy does not influence the current account. Kotlikoff (1993) shows that a one dollar decrease in g_1^1 that is offset by a future increase of $1 + i(\theta)$ in the next period lowers current savings s_1^1 just as much as the decrease in g_1^1. Of course, this delayed transfer affects no agent's utility after any history. Still, the conventional current account is not affected. Thus rescheduling internal taxes and transfers is another policy tool allowing the government to make its internal deficit any number it wants in all but the final period!

What is a well-defined measure of the external surplus? Let $\tilde{a}_0 = d_0^1 + f_0^1 + t_0^1$ be the present value of agent 0's assets, where d_0^1 denotes assets located domestically, f_0^1 net assets abroad, and t_0^1 the expected value of all current and future transfers from abroad. Since this definition includes expected foreign transfers, $\tilde{a}_0$ is thus broader than a_0^1. Also, there is no superscript on this quantity because these assets incorporate the present value of all current and expected future transfers from abroad that accrue to agent 0. This definition is thus independent of time. Likewise, let

$$\tilde{a}_1 = d_1^1 + f_1^1 + t_1^1 + E\{(1 + i(\theta))^{-1}t_1^2(\theta)\},$$

where the expected value of transfers accruing to agent 1 is explicit.

Further, let $f^1 = f_0^1 + f_1^1$ be the present value of private net foreign assets of all current and future agents in the domestic economy at time 1. For a creditor country, $f^1 > 0$ might be the market value of equity owned reflecting past savings decisions of the economy. Likewise, let $t^1 = t_0^1 + t_1^1 + E\{(1 + i(\theta))^{-1} t_1^2(\theta)\}$ be the aggregate values of net foreign assets net expected transfers from abroad. These transfers are assets in a broad sense because they reflect the capitalized value of foreign economic aid. Both these aggregates are indexed by a time superscript because they represent the aggregate value of current and future net foreign assets, conditional on the history of the world economy up until time 1. These aggregates are independent of agents because they sum across all current and future agents in the domestic economy.

In this simple economy, the profile of net foreign assets evolves according to the realization of the state of nature in the second period. Since there is only one (current and future) domestic agent in the second period, the present value of the aggregates $f^2(\theta) = [1 + i(\theta)]^{-1}f_1^2(\theta)$ and $t^2(\theta) = [1 + i(\theta)]^{-1}t_1^2(\theta)$ should cause no confusion. Again, these aggregates depend only on time since the history of the world economy evolves through time. If the expected value of net foreign assets was zero in the status quo ex ante,[5] the *aggregate generational current account profile* is

5. This assumption is not innocuous. The aggregate generational current account is defined as a flow, just as the conventional current account is. In practical applications, one takes first differ-

$$(2) \qquad [\tilde{b}^1, \tilde{b}^2(\theta)] = [f^1 + t^1, (f^2(\theta) - f^1) + (t^2(\theta) - t^1)].$$

The aggregate generational current account is the (history dependent) change in the expected present value of net foreign assets, broadly defined, across all generations alive and not yet born. This definition shows that a country's welfare includes a component capturing the expected transfer of real resources from abroad. In a more general model, equation (2) would sum across an infinite sequence of generations of domestic residents.[6]

Equation (2) defines the aggregate generational current account as the change in the history-dependent stock of net foreign assets. In practical applications, it is natural to construct annual changes in order to facilitate comparisons with the conventional current account. But, in this and many other economic models, the demarcation of a period serves two functions: it keeps track of calendar time and differentiates between agents. Generational accounts are really indexed by the agents in an economy, and this fact has important implications for how to use them.[7] Since the aggregate generational current account is the increase in the present value of assets owned abroad, a surplus in this measure indicates that net foreign assets have risen more rapidly than the nominal interest rate. Thus current and future generations can expect a larger inflow of goods and services than was the case before.

The aggregate generational current account is useful for two purposes. First, it determines the extent to which a country's standard of living depends on receipt of goods and services from abroad. For example, if $\tilde{b}^2(\theta) > 0$, then agent 1 owns net foreign assets whose market value is larger than the initial net foreign asset position of the economy. This increase is larger than the loss in net foreign assets that occurred when agent 0 liquidated her portfolio, and it represents a high rate of domestic savings, realized capital gains, or unexpected transfers from abroad. There is an inherent legal asymmetry between net assets located abroad, $f_1^2(\theta) + t_1^2(\theta)$, and those located at home, $d_1^2(\theta)$. Domestic assets are the liabilities of a corporate entity subject to some domestic juridical authority; thus disputes arising because of ownership rights can be settled fairly readily. Foreign assets, however, are riskier precisely because there is no simple means for the resolution of conflicts between creditors and

ences of the present value of the stock of net foreign assets. We have thus assumed implicitly that the stock defined in eq. (2) can be interpreted as a flow because the economy's original valuation of net foreign assets was zero.

6. Let $\tilde{a}_h$ be the expected present value of the assets of domestic agent h born at some time in the distant future. If there is no explicit program of foreign aid and no bequest motive in the economy, then domestic assets, foreign assets, expected foreign transfers, and thus $\tilde{a}_h$ would all be zero. In this important case, the profile of the aggregate generational current account is simply the change in the present value of the economy's net foreign asset position. Then the analogue of eq. (2) reports the profile of the present value the economy's conventional current account with assets computed at market value.

7. This important subtlety is recognized by Kotlikoff (1993). I think it has been the source of some confusion in the theoretical and practical interpretations of generational accounts for the closed economy. See the interesting and though-provoking debate in Bohn (1992a), Drazen (1992), and Bohn (1992b).

debtors. Thus $\tilde{b}^2(\theta) > 0$ indicates that the domestic economy has become increasingly dependent on assets located abroad in maintaining its standard of living.

Second, the aggregate generational current account shows how changes in policy or exogenous variables affect the welfare of domestic residents. Consider a change in the stochastic processes describing expectations such that neither component of equation (2) decreases and at least one component increases after every relevant history. Such a change has at least three interpretations. First, there has been a capital gain in the market value of net foreign assets, and thus some agent in the home country can expect to enjoy increased consumption now or later. Second, the interest differential has narrowed at all horizons, raising the value of foreign bonds or decreasing the value of domestic liabilities of fixed maturity. Third, the domestic currency has experienced a real depreciation, lowering the value of liabilities denominated in the domestic currency. The crucial point is that each of these phenomena can be interpreted in terms of an increase in the expected utility of a representative agent in the domestic economy. Since equation (2) is defined using domestic aggregates, there exist lump-sum (domestic) taxes such that all agents in the home country are better off.

There is no simple relationship between the conventional government deficit and the aggregate generational current account.[8] Since the conventional government deficit is not well defined, this fact should come as no surprise. Of course, if foreigners do not acquire domestic assets, then government deficits involve only an internal redistribution of wealth among the generations in a country. Then they influence the aggregate generational current account only to the extent that they crowd out outward foreign investment. However, if foreigners do acquire domestic fiat assets, then an internal deficit causes the aggregate generational current account to increase. Thus part of the burden of the national debt is the present value of the interest payments to foreigners.

Another natural measure of an economy's net foreign asset position is the profile of net foreign assets owned by the current and future generations of its residents. In this simple model, the only interesting such cross section is

$$(3) \qquad [f_0^1 + t_0^1,\ f_1^1 + t_1^1 + E\{(1 + i(\theta))^{-1} t_1^2(\theta)\}],$$

where the second term depends on the expected transfers from abroad to the agent in generation 1. This cross section must be taken at time 1 because there is no generational heterogeneity at time 2 in this simple model. These values simply divide an economy's net international investment position, measured at market values and inclusive of expected transfers from abroad, among the several current and future generations of domestic residents. Of course, this cross section allows specifically for the generational heterogeneity that is at the heart of Auerbach et al.'s (1991) analogous measure for the domestic economy.

8. Dewald and Ulan (1990) have made this point for the conventional current account.

Measuring (2) or (3) requires making explicit assumptions about the stochastic processes driving exchange rates, interest rates, and international transfer policies. Thus the aggregate generational current account is only as good as the assumptions that are used to construct it, and economists must face an essential paradox. Cash flow accounts, like the conventional current account, are measured quite precisely, but compelling theoretical arguments show that they are potentially devoid of economic meaning. On the other hand, accrual accounts, such as the aggregate generational current account are measured imprecisely, but they do have sound foundations in economic theory. So one is caught between Scylla and Charybdis. Is it nobler to accept an accurate measurement of a meaningless number or to attempt a rough measure of a useful economic concept? Recognizing that I must now make many heroic assumptions, I turn my attention to the latter endeavor using 20 years of data from the Japanese economy.

10.3 Japan's Aggregate Generational Current Account

The Bank of Japan reports regional balance-of-payments statistics in the April and November issues of *Balance of Payments Monthly.*[9] These data are reported in millions of current dollars, and they were the primary source for the historical statistics used to compile the aggregate generational current account for Japan. The data cover the period from 1973 to 1992 and describe regional balances with the United States, Western Europe, the Communist bloc,[10] and Australia. These groups of countries have historically represented more than three-quarters of the aggregate bilateral trade of Japan. Taiwan, Korean, Thailand, and Singapore form the only major trading group that was excluded. Since the data were all reported in current dollars, I used the realized nominal interest rate on long-term government bonds in the United States for all relevant present value calculations.

These regional balance-of-payments data are broken down into the current account and the capital account. In constructing the aggregate generational current account, I focused on inward and outward annual flows of long-term capital. The *Balance of Payments Monthly* reports changes in both assets and liabilities in these categories: direct investments, trade credits, loans, securities, external bonds, and others. I assumed that all assets were denominated in the currency of the host county and that all liabilities were denominated in yen.

Outward direct investment is subject to capital gains for two reasons. First, changes in the exchange rate of the host country influence the market value of assets located abroad. Second, movements in local asset market indexes reflect

9. Matsuoka and Rose (1994) give an excellent guide to Japanese economic statistics. Many Japanese publications have statistical sections with bilingual headings in Japanese and English.

10. This nomenclature is a vestige of the cold war. This group of countries includes Russia, several other Eastern European countries, the People's Republic of China, Cambodia, Vietnam, and other countries.

capital gains and losses in local securities markets. The measure reported in this chapter captures both of these sources of fluctuations in asset prices. Likewise, the market value of inward foreign direct investment into Japan fluctuates as the yen appreciates and depreciates and also as yen-denominated assets experience the vicissitudes of Japanese financial markets.

I assumed that assets and liabilities in the *Balance of Payments Monthly* falling under the four headings "trade credits," "loans," "external bonds," and "others" took the form of long-term debt. However, the aggregate called "securities" includes portfolio investments in both bonds and stocks. Indeed, it is difficult to find statistics that distinguish between portfolio investment in debt and equity. Although the Ministry of Finance reports regional portfolio investment in the August issue of *Zaisei Kinyu Tokei Geppo* (Monthly Statistics on Government Finance), it seems that these data do not differentiate between portfolio investment in bonds and in equity. Using data on Japanese investment into the United States reported in the *Survey of Current Business,* I assumed arbitrarily that 40 percent of the value of outward Japanese portfolio investment was in equities and the rest in bonds.[11] I imposed the condition that these shares were also true of inward portfolio investment into Japan.

The appropriate asset market deflator for long-term debt is an index of bond prices for the relevant currency denomination. Long-term interest rates on government debt are reported in the International Monetary Fund's *International Financial Statistics,* and it was assumed that the average duration of the bonds in question was 10 years. Then a simple formula allows one to construct a bond price index for four of the five regions.[12] These indexes are graphed in figure 10.1. That figure shows that the general drop in interest rates in the past decade was a source of capital gains for Japanese investors holding long-term debt denominated in dollars and sterling.

The International Monetary Fund's *International Financial Statistics* also reports price indexes for industrial shares in the markets of Japan, the United Kingdom, the United States, and Australia. Following Dewald and Ulan (1990), I revalued Japanese outward and inward foreign direct investment using local market indexes.[13] These indexes are graphed in figure 10.2. Thus Japanese investors holding equity in the United States and Europe enjoyed appreciable capital gains in the past decade.

11. The June 1990 issue of the *Survey of Current Business* (56, table 1) shows that Japanese investors acquired $115 billion of U.S. securities other than Treasury securities in 1988 and 1989. They acquired $69 billion in corporate and other bonds and $46 billion in corporate stocks in America those two years.

12. See Sharpe, Alexander, and Bailey (1995, 469–71) for a good discussion of duration and bond prices. I used bond prices in the United Kingdom as a proxy for European bond prices, and I assumed that all debt extended to the Communist bloc was denominated in dollars. Thus the bond index for the United States was also used to evaluate the market price of debt in the Communist bloc. If the average duration of debt is actually less than 10 years, then these indexes overstate the effects of interest rate changes on the prices of bonds.

13. The index for the Communist bloc is simply an index of nominal GDP in the People's Republic of China.

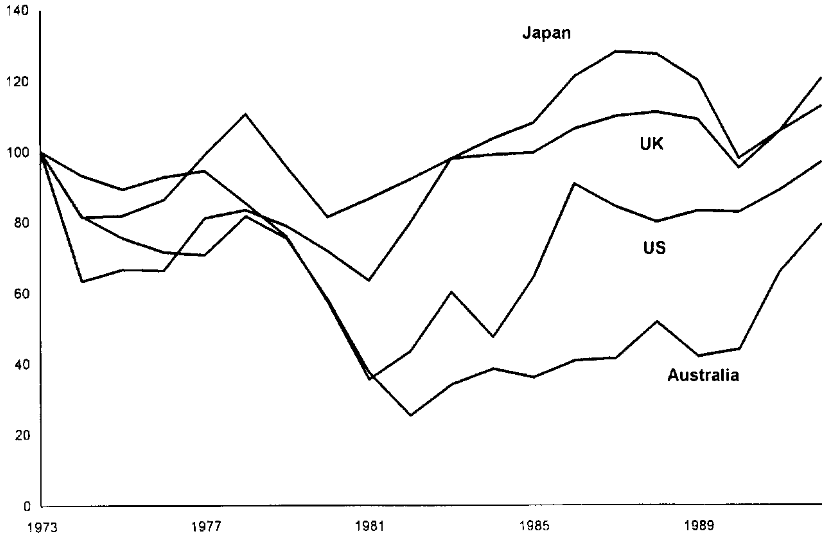

Fig. 10.1 Bond price indexes

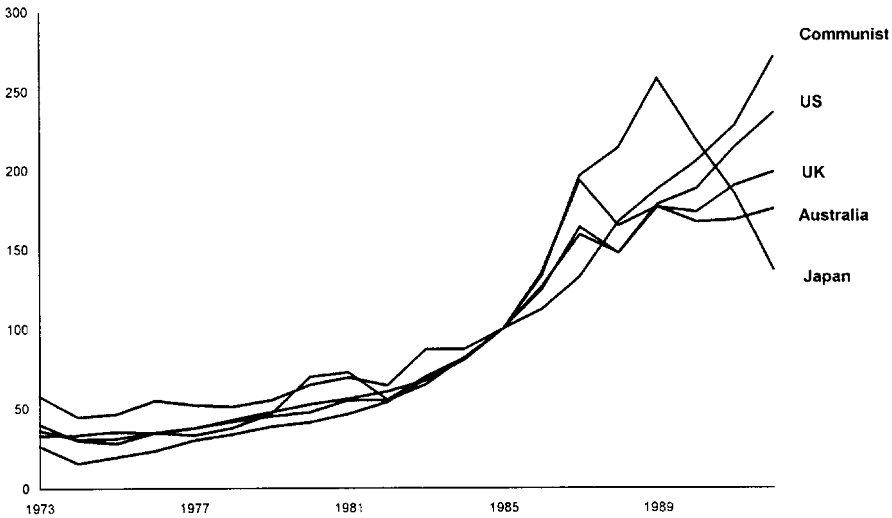

Fig. 10.2 Industrial share price indexes

The last effect that must be accounted for in constructing the market value of the net international position is the effect that currency prices have on the market value of direct or portfolio investment. I used the end-of-period exchange rates reported in *International Financial Statistics* to adjust the value of the stock of assets accordingly. These exchange rates are the dollar prices of the yen, the pound sterling, the Australian dollar, and the huan. The exchange rate indexes are graphed in figure 10.3. They confirm the general long-term appreciation of the yen against the dollar and the analogous depreciation of sterling, the Australian dollar, and the huan. Thus Japanese outward direct investment has suffered capital losses owing to exchange rate movements in each of these broad regions, while inward investment into Japan has experienced capital gains owing to the appreciation of the yen.

These indexes enable one to calculate the market value of Japanese outward and inward direct investment.[14] The rapid increase in Japanese outward direct investment first occurred early in the past decade. In 1982, the market value of Japan's net foreign assets was $12 billion, and by 1992, that figure had grown to $687 billion. Also, by 1992, Japan held 76 percent of its net foreign assets in the United States and 10 percent in Europe. The share of net foreign assets in Australia was 11 percent and that in the Communist bloc was 3 percent. Since the low volume of direct investment into Japan is well documented,[15] these shares show that Japan's outward foreign investment in the past decade was directed primarily into the United States. Indeed, movements in American asset prices have an increasingly important role in determining the market value of Japanese assets and thus influence Japan's aggregate generational current account. In essence, the well-being of Japanese residents is much more dependent, both absolutely and relatively, on macroeconomic factors in the United States than was the case two decades ago.

Table 10.1 presents Japan's aggregate generational current account. Column (1) shows the market value of Japan's international investment position; net foreign assets were adjusted using the price indexes and exchange rates displayed above. The market value of these net assets is about 60 percent higher than the Bank of Japan's own figure for 1992.[16] The surge in Japanese outward investment coincided with the boom in world equity markets after the recession of the past decade; thus Japan's overseas investments have shown strong capital gains. Still, the outward investments in Europe bore a better rate of return than those in the United States. Also, although the rate of return on holding yen-denominated assets was quite high in the past 15 years, the low volume of inward investment into Japan has limited the increase of Japan's liabilities vis-à-vis the rest of the world.

Column (2) of table 10.1 presents Japan's net transfers from abroad. Fisher

14. Let K_t^i be the market value in dollars of direct investment in country i at time t. Let I_t^i be the analogous increase in the dollar value of assets. I used the recursive relationship

$$K_{t+1}^i = K_t^i(P_{t+1}^i / P_t^i)(S_t^i / S_{t+1}^i) + I_{t+1}^i,$$

where P_t^i is the relevant asset price index and S_t^i is the dollar price of a unit of currency i both at time t.

15. See Lawrence (1993) for an extensive discussion.

16. Table 17 of the *Balance of Payments Monthly* for April 1993 states that the dollar value of Japan's external assets at the end of 1992 was $514 billion.

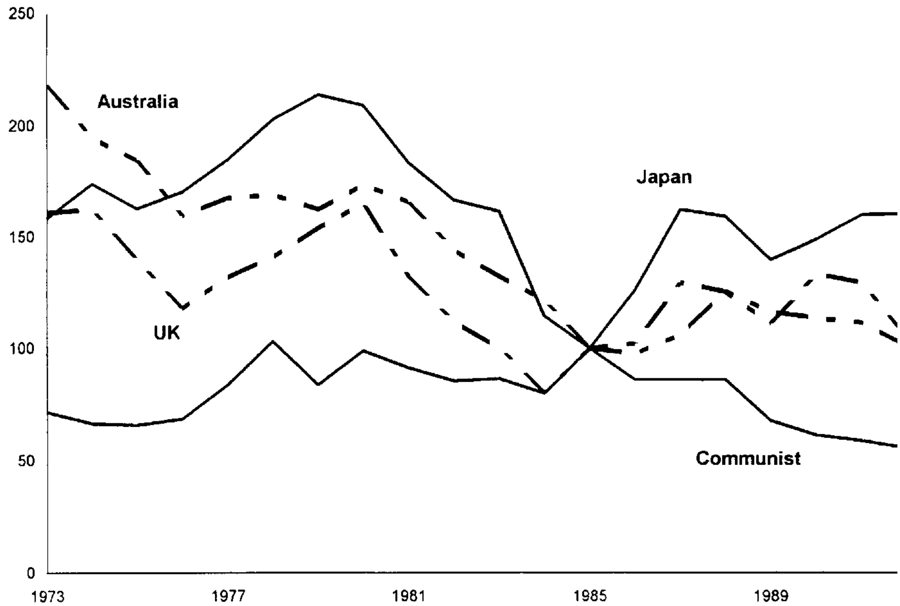

Fig. 10.3 Exchange rate indexes

and Woo (1997) computed the present value of capitalized transfers for Korea, but they made the assumption that military and economic transfers into Korea formed a part of the United States' long-run military policy. I have made the judgment here that Japan's transfers to abroad are not part of ongoing international commitments. This opinion reflects the role imposed by the United States on Japan in the postwar era. Indeed, the single large transfer of $12 billion in 1991 was a contribution to the Allies' defense of Kuwait. This compensation is precisely the kind of one-off payment showing that these unilateral transfers are not part of a continuing geopolitical role imposing long-run liabilities on the residents of Japan.

Column (3) in table 10.1 gives the present value of the net foreign assets of Japan under the assumption that the value of these assets was zero at the beginning of 1973. It is impressive that the dollar value of Japanese net foreign assets has grown more rapidly than the nominal interest rate in the past 20 years. Of course, such an accumulation reflects a rapid increase in the expected flow of goods and services into Japan in the future. The aggregate generational current account is given in column (4) of table 10.1; this column simply presents first differences of the data in the previous column. It shows that the rapid increase in the present value of Japanese net foreign assets first occurred in 1982. Thus the end of the last major recession marked the advent of Japan's sustained external surplus. This observation is confirmed by the data on the present value of the conventional current account reported in column (5). The

Table 10.1 Japan's Aggregate Generational Current Account

Year	Net International Investment Position at Market Values (1)	Transfers from Abroad (2)	Present Value of (1) + (2) (3)	Aggregate Generational Current Account (4)	Present Value of the Conventional Measure (5)
1973	4,580	−210	4,370	4,370	−136
1974	5,630	−203	5,079	709	−4,393
1975	4,792	−272	3,933	−1,146	−593
1976	4,336	−204	3,330	−603	2,965
1977	4,216	−194	3,011	−318	8,176
1978	7,596	−230	5,135	2,124	11,526
1979	15,072	−755	9,206	4,071	−5,629
1980	10,201	−1,288	5,237	−3,969	−6,155
1981	5,886	−1,405	2,362	−2,875	2,514
1982	11,809	−1,297	4,865	2,502	3,170
1983	26,257	−1,369	10,193	5,328	8,518
1984	49,737	−1,372	17,827	7,634	12,902
1985	96,186	−1,375	31,057	13,231	16,106
1986	199,459	−1,465	58,631	27,573	25,421
1987	297,586	−2,697	81,096	22,465	23,929
1988	370,651	−3,007	93,286	12,190	20,206
1989	448,088	−3,253	103,695	10,410	13,324
1990	582,268	−4,468	124,139	20,444	7,683
1991	661,101	−11,834	128,506	4,367	14,429
1992	687,291	−3,362	125,502	−3,004	21,571

Note: Figures are in millions of dollars.

aggregate generational current account and the present value of the conventional measure are highly correlated; they differ in years when large fluctuations in asset prices or exchange rates precipitate large changes in the market value of net foreign assets. At such times, the conventional current account surplus is a poor measure of the increase in the expected present value of resources imported from abroad in the future.

10.4 The Generational Pattern of Ownership of Net Foreign Assets

Who owns Japan's net foreign assets? The data in section 10.3 showed how the market value of Japan's net international investment position has evolved since 1973. But who has benefited from the large capital gains that Japan experienced on its outward investment in the past decade? And who owes the relatively small amount of yen-denominated liabilities that Japan has issued during the past 15 years? This section answers those questions by assuming that these assets and liabilities are allocated according to the patterns of saving and borrowing of Japan's residents during the past three decades.

Japan's savings rate rose and then fell in the past three decades; Horioka (1993) gives a good historical overview, and Ito and Kitamura (1994) show

how savings rates in Japan are influenced by public policy. The Statistics Bureau of Japan's Management and Coordination Agency presents time series on family income and expenditure in Japan. It gathers these data from a random sample of households of Japanese residents. I used data from the bureau's *Comprehensive Time Series Report on the Family Income and Expenditure Survey: 1947–1986* (1988) to construct the savings and borrowing rates of 13 different "generations" of Japanese residents.

A generation is a cohort of Japanese residents born during the five-year period whose central year is used as its label. I identify the first generation with 1906,[17] and subsequent generations occur quinquennially until 1966. For each year between 1966 and 1986, the Family Income and Expenditure Survey gives the total savings and liabilities of the average household in a generation, and it describes the number of households sampled. Thus I was able to compute the share of total savings and also total liabilities that accrued to any one generation in the sample. I used data from the years 1973, 1978, 1983, and 1988[18] to construct the savings and borrowing rates for each of the generations in my sample. In 1973, the generations born later than 1951 were assumed not yet economically active, and by 1988, the generations born after 1966, including those not yet born in 1991, were analogously inactive.

The savings rates were used to allocate new outward investment to the agents in the generations economically active in that year. Likewise, the borrowing rates were used to assign new yen-denominated liabilities among the generations active in that year. Since Japan's transfers to abroad have not been enduring, I allocated each year's unilateral transfers as a lump-sum tax whose burden was distributed uniformly on the agents who were economically active in that year. Then I was able to construct the market value of the net international investment position of each generation for each year between 1973 and 1992. These calculations are entirely analogous to those underlying the construction of the market value of Japan's net international investment position, inclusive of the burden of unilateral transfers to abroad, but new investment and new borrowing are assigned in each year according to the savings and borrowing rates of the economically active generations. These data are stocks of assets, and they are denominated in current dollars. Finally, I divided them by the number of people in each generation in 1993. Thus the data are presented in 1992 dollars per person.

Column (1) of table 10.2 presents the generational pattern of Japan's net international investment position, broadly defined. The calculations presented in table 10.2 make the assumption that a generation's mortality rate is 6 percent per quinquennium, independent of the age of the cohort. Column (1) is a benchmark showing that members of the oldest generation in 1992 own substantial net foreign assets. The generation born around 1926 has benefited from

17. My first generation is really people born before 1909 who are still alive in 1993, but I identify this group with the 1906 generation, those born between 1904 and 1908, inclusive. In contrast with Auerbach et al. (1991), I put males and females together.

18. I actually used data from 1986 as a proxy for those from 1988.

the capital gains in world securities markets more than those before and after it because its years of peak savings occurred at the time when Japan's external surplus first began to grow most rapidly and world asset markets were historically undervalued. The modest positions of the generations born around 1961 and 1966 reflect the fact they paid for Japan's contribution to the Persian Gulf War before they had begun to accumulate substantial net foreign assets. Generations born after 1966 have no net foreign assets because they are not economically active and I have assumed they have no liability for future transfer payments to abroad.

The calculations inherent in column (1) of table 10.2 allow me to make forecasts about the effects of three different policy scenarios on the welfare of these different generations. I examine three changes in exogenous variables from the 1992 benchmark: a strong yen, a rise in dollar interest rates, and rapid economic growth in China. The first situation entails an appreciation of the yen: a rise in the dollar price of the yen from 0.00816 (its value in 1992) to 0.0125 dollars per yen (near its current value in 1995). The second assumes that dollar interest rates rise from 7.01 percent per annum (its value in 1992) to 10.00 percent per annum. The third situation assumes that Chinese economic growth stays more robust than the world average; I modeled this as a 20 percent capital gain in the Japanese assets in the Communist bloc.

Columns (2), (3), and (4) of table 10.2 show the outcomes of each of these scenarios respectively. A strong yen causes a Pareto worsening for the Japanese

Table 10.2 Generational Pattern of Japanese Net Foreign Assets

Generation	Net Foreign Assets (1)	Yen Appreciation (2)	Higher Dollar Interest Rates (3)	Robust Chinese Growth (4)
1906	23,544	22,045	22,031	23,571
1911	23,563	22,077	22,050	23,590
1916	23,201	21,339	21,675	23,228
1921	22,531	20,100	20,976	22,559
1926	18,248	14,041	16,743	18,275
1931	13,633	9,211	12,367	13,657
1936	8,134	3,358	7,150	8,152
1941	4,566	(855)	3,717	4,581
1946	3,711	(1,016)	2,980	3,725
1951	1,832	(2,218)	1,276	1,843
1956	1,777	(832)	1,367	1,785
1961	1,397	(212)	1,111	1,403
1966	494	358	431	495
1971	0	0	0	0
1976	0	0	0	0
1981	0	0	0	0
1986	0	0	0	0
1991	0	0	0	0
After 1991	0	0	0	0

Note: Figures are in 1992 dollars per person.

because the real value of their liabilities have risen. Thus the present value of net foreign assets for every generation is lower, and generations in their middle age in 1992 suffer capital losses especially.[19] These generations have incurred liabilities to foreigners as Japan's traditional barriers to inward foreign investment have relaxed slightly in the past decade. Higher dollar interest rates are a capital loss on the dollar-denominated bonds that are such a large part of the net foreign assets of many generations. A rise in dollar rates is Pareto inferior to the benchmark. Still, this situation is not Pareto superior to the strong yen scenario; the generations born around 1911 and 1916 actually lose slightly more in this situation than they do under a strong yen. Finally, even if the Chinese economic boom continues, there will be little effect on the Japanese. This is so because Japan held only 3 percent of its net foreign assets in the Communist bloc in 1992. Capital gains on Chinese assets represent a slight Pareto improvement over the benchmark.

The important point in each of these three cases is that these generational profiles of assets illustrate in intuitive ways the effects that changes in macroeconomic variables have on the welfare of the Japanese. For example, the generational asset profiles worsen immediately when the yen appreciates. Since the trade balance adjusts over time, the conventional current account worsens only slowly in analogous historical situations. The aggregate generational current account shows that the real effects of a strong yen are the immediate capital losses sustained by Japanese investors owing net foreign assets. These losses are so obvious that they have become the standard grist of financial journalists in the last few months. The conventional current account barely captures such contemporaneous effects at all.

10.5 Conclusion

This chapter has presented a measure of the Japanese external surplus that has its foundation in economic theory. The Japanese have accumulated net foreign assets at a remarkable rate in the past 20 years, and their economic well-being is now inextricably tied into the smooth functioning of the world financial system. There have been other countries that have accumulated net foreign assets at a pace greater than the rate of interest over long periods: Britain in the nineteenth century and the United States in the twentieth century are two important examples. It is tempting to draw historical parallels between the overvaluation of the sterling after the First World War and the current strength of the yen. But I am not a bold or competent enough historian to predict that Japan will suffer a prolonged deterioration in its standard of living if the yen remains as strong as it is now. Still, a generational perspective on the external surplus shows that large movements in the real exchange rate have immediate effects on the market value of assets.

19. I am implicitly assuming a real appreciation of the yen. In a world with not traded goods, the negative income effect of the yen appreciation is not fully offset by a drop in all consumer prices.

Finally, it is important that international economists recognize that the conventional current account depends on the timing of cross-border payments. The International Monetary Fund's *Balance of Payments Manual* (1977) is a classic statement of careful cash-flow accounting principles, and I have relied on it in interpreting the capital account statistics that I have analyzed in this chapter. I am not advocating throwing out the baby with the bathwater because it is indeed obvious that the conventional current account is highly correlated with the aggregate generational current account. Thus the conventional measure does have practical economic significance, especially if one is willing to interpret the conventional current account within the discipline of an explicit economic model. But accurate cash-flow accounts are only part of a bigger picture, and I hope that this chapter spurs further research into accrual-based international accounts.

Appendix
Description of the Data

The data on the net foreign assets of Japan were constructed from the annual long-term capital transactions reported in the regional balance of payments summaries in the April issues of the Bank of Japan's *Kokusai Shushi Tokei Geppo* (Balance of Payments Monthly). The capital account covers six categories: direct investments, trade credits, loans, securities, external bonds, and others. The four regions selected were not entirely consistent across the 20 years of the sample. The geographic definitions for the United States and the Communist bloc are consistent. That for Europe actually covers the United Kingdom and the European Community in 1973 and 1974 and corresponds to the European Economic Community, including its new members as it enlarged, between 1975 and 1992. The data for Australia include New Zealand and South Africa until 1981, and they consist of the category "other OECD" from 1982 to 1988. After that they include Australia alone. The disaggregated Japanese capital account figures reverse the signs for assets (outward flows of capital) but not for liabilities in the years from 1973 to 1978. Since the aggregated figures always follow the usual convention (an increase in assets takes a negative sign), this inconsistency can be vexing. Future researchers beware!

In later years, *Kokusai Shushi Tokei Geppo* also includes a table on the external assets and liabilities of Japan. The text uses figures from this table when comparing the market value of Japan's net foreign assets with the official figures reported by the Bank of Japan.

Direct investments and 40 percent of the value of securities were revalued using the annual industrial share price indexes given in the International Monetary Fund's *International Financial Statistics*. The indexes were for Japan, the

United States, the United Kingdom, and Australia. The analogous series for the Communist bloc was an index of the national income of the People's Republic of China at market prices as reported in *International Financial Statistics*. The categories "trade credits," "loans," 60 percent of "securities," "external bonds," and "others" were revalued using a bond price index constructed from the annual interest rates on long-term government debt reported in *International Financial Statistics*. Again, the data are interest rates from Japan, the United States, the United Kingdom, and Australia. It was assumed that debt extended to the Communist bloc was denominated in dollars. The exchange rate indexes are the end-of-period dollar prices of foreign exchange for Japan, the United Kingdom, the People's Republic of China, and Australia, all taken from *International Financial Statistics*.

The data on household saving and borrowing rates are from the Statistics Bureau of Japan's Management and Coordination Agency's *Comprehensive Time Series Report on the Family Income and Expenditure Survey, 1947–1986* (table 8-2). I used the columns entitled "no. of tabulated households," "savings," and "liabilities" from the years 1973, 1978, 1983, and 1986 (as a proxy for 1988). The 1993 populations for the different generations are reported in the Statistics Bureau of Japan's Management and Coordination Agency's *Japan Statistical Yearbook, 1995* (table 2–9). The per capita asset figures assume implicitly all assets acquired between 1973 and 1992 by a given generation are held by the members of that generation living in 1993.

The text refers at several times to the U.S. Department of Commerce's *Survey of Current Business*. The data giving U.S. international transactions by area (September 1994, table 10) were the basis for allocating 60 percent of securities to bonds and the rest to equity. Tables 5.1 and 5.2 of the May 1994 issue report data on Japan's direct investment into the United States by industry in 1992 and 1993.

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Contributors

Robert E. Baldwin
Department of Economics
1180 Observatory Drive
University of Wisconsin–Madison
Madison, WI 53706

Magnus Blomström
Stockholm School of Economics
P.O. Box 6501
S-113 83 Stockholm, Sweden

Mark E. Doms
U.S. Department of Commerce
Bureau of the Census
Washington, D.C. 20233

Eric O'N. Fisher
Department of Economics
Ohio State University
410 Arps Hall
1945 North High Street
Columbus, OH 43210

K. C. Fung
Department of Economics
University of California
Crown College
Santa Cruz, CA 95064

Harry Grubert
Office of International Tax Analysis
U.S. Department of the Treasury
1500 Pennsylvania Avenue NW
Washington, DC 20220

Keith Head
Faculty of Commerce and Business Administration
University of British Columbia
2053 Mail Mall
Vancouver, BC V6T 1Z2, Canada

David L. Hummels
Graduate School of Business
University of Chicago
1101 East 58th Street
Chicago, IL 60637

J. Bradford Jensen
U.S. Department of Commerce
Bureau of the Census
Washington, DC 20233

Fukunari Kimura
Faculty of Economics
Keio University
2-15-45 Mita, Minato-ku
Fuku, Tokyo 108, Japan

Robert E. Lipsey
National Bureau of Economic Research
50 East 42d Street, 17th Floor
New York, NY 10017

Linda Low
Department of Business Policy
National University of Singapore
10 Kent Ridge Crescent
Singapore 0511

Raymond J. Mataloni, Jr.
U.S. Department of Commerce
Bureau of Economic Analysis
1414 L Street NW (BE-50)
Washington, DC 20230

Rachel McCulloch
Department of Economics
Brandeis University
Waltham, MA 02254

John Mutti
Department of Economics
Grinnell University
Grinnell, IA 50112

Marcus Noland
Institute for International Economics
11 Dupont Circle NW
Washington, DC 20036

Michael G. Plummer
Department of Economics
Brandeis University
Waltham, MA 02254

Eric D. Ramstetter
International Centre for the Study of East Asian Development
11-4 Otemachi
Kokurakita-ku
Kitakyushu, 803, Japan

J. David Richardson
Department of Economics
Syracuse University
347 Eggars Hall
Syracuse, NY 13244

Guy V. G. Stevens
Board of Governors
Federal Reserve System
Washington, DC 20551

Deborah L. Swenson
Department of Economics
University of California, Davis
Davis, CA 95616

Michael Wasylenko
Dean's Office
Syracuse University
200 Eggers Hall
Syracuse, NY 13244

Kristen L. Willard
Graduate School of Business
Columbia University
101 Uris Hall
New York, NY 10027

Henry Wai-Chung Yeung
Department of Geography
National University of Singapore
10 Kent Ridge Crescent
Singapore 0511

William J. Zeile
U.S. Department of Commerce
Bureau of Economic Analysis
1441 L Street NW
Washington, DC 20230

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