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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

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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:

$$\begin{aligned}
 (1) \text{ Domestic content of total output} \\
 &= (\text{Total output} - \text{Imports}) / \text{Total output} \\
 &= (\text{Valued added} + \text{Total purchased inputs} - \text{Imports}) / \text{Total output} \\
 &= (\text{Value added} + \text{Domestically sourced inputs}) / \text{Total output}.
 \end{aligned}$$

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:

$$(2) \quad \text{Vertical integration} = \text{Value added} / \text{Total output}.$$

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

$$(3) \quad \text{Import content of purchased inputs} = \text{Imports} / \text{Total purchased inputs}.$$

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

Industry	Foreign-Owned Affiliates ^a			Domestically Owned Companies ^b			Ratio of Measure for Affiliates to Measure for Domestically Owned Companies		
	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

*Calculated from preliminary data from BEA's 1992 benchmark survey of foreign direct investment in the United States by foreign companies that had total assets, sales, or net income exceeding \$50 million at the end of 1992. They cover only those affiliates whose imports were not primarily used for further processing or manufacture by the affiliates.

^bCalculated from data on the operations of U.S. parent companies classified in manufacturing, from BEA's 1989 benchmark survey.

^cExcludes 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

Industry	Number of Affiliates in Sample			Domestic Content/Total Output (%)			Value Added/Total Output (%)			Imports/Total Purchased Inputs (%)		
	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
<i>Domestic Content/Total Output (%)</i>					
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
<i>Value Added/Total Output (%)</i>					
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
<i>Imports/Total Purchased Inputs (%)</i>					
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.

^aSuppressed 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
<i>Domestic Content/Total Output (%)</i>								
All industries ^a	0.94*** (0.16)	0.97* (0.14)	0.96** (0.13)	0.92*** (0.19)	0.93*** (0.14)	0.99 (0.11)	0.90*** (0.18)	0.94*** (0.16)
Machinery-type industries ^b	0.89*** (0.21)	1.07*** (0.09)	0.94 (1.90)	0.84*** (0.22)	0.91** (0.14)	0.99 (0.16)	0.80*** (0.21)	0.94** (0.17)
Other industries	0.96*** (0.13)	0.94*** (0.14)	0.97* (0.09)	0.97 (0.14)	0.95*** (0.13)	0.99 (0.08)	0.97 (0.10)	0.98** (0.16)
<i>Value Added/Total Output (%)</i>								
All industries	0.81*** (0.65)	0.83*** (0.37)	0.87** (0.35)	0.88** (0.50)	0.89** (0.36)	0.89*** (0.37)	0.69*** (0.80)	0.82** (0.91)
Machinery-type industries ^b	0.80*** (0.59)	0.96 (0.33)	0.83** (0.27)	0.85** (0.40)	0.97 (0.40)	0.91* (0.27)	0.68*** (0.86)	0.75*** (0.37)
Other industries	0.82*** (0.68)	0.79*** (0.38)	0.90 (0.39)	0.89 (0.55)	0.85** (0.33)	0.88** (0.41)	0.70*** (0.74)	0.84* (1.01)
<i>Imports/Total Purchased Inputs (%)</i>								
All industries ^a	2.02*** (3.48)	2.45*** (4.48)	1.94** (3.02)	2.20*** (2.44)	2.23** (3.42)	1.17 (1.95)	1.85*** (2.30)	2.52*** (5.15)
Machinery-type industries ^b	1.91*** (2.09)	0.41*** (0.56)	2.21 (3.37)	3.10*** (2.81)	2.27** (1.98)	0.92 (1.33)	2.27*** (1.69)	1.38 (1.68)
Other industries	2.08*** (4.01)	2.99*** (4.89)	1.78 (2.84)	1.64** (2.01)	2.21 (4.02)	1.29 (2.17)	1.48* (2.70)	2.86*** (5.77)
<i>Number of Affiliates</i>								
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.

^aIndustries listed in table 6.1.

^bIndustries 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 Invested Countries, 1992

Type	Number of Observations	Canada	Germany	United Kingdom
		<i>Domestic Content/Total Output (%)</i>		
France	701	0.063*	-0.052	0.137***
Other type industries	238	0.237***	-0.105	0.196***
Other countries	463	-0.072	0.007	0.095**
		<i>Value Added/Total Output (%)</i>		
France	701	0.006	0.036	0.052
Other type industries	238	0.072	0.036	0.084
Other countries	463	-0.018	0.038	0.039
		<i>Imports/Total Purchased Inputs (%)</i>		
France	701	0.044	0.019	-0.109***
Other type industries	238	-0.193***	0.224***	-0.204***
Other countries	463	0.089*	-0.039	-0.090*

French variables for France and Switzerland are insignificant in all correlations.

* Marginally significant at the 90 percent confidence level.

** Statistically significant at the 95 percent confidence level.

*** Statistically significant at the 99 percent confidence level.

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.

^aCalculated 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

Origin	Country of Ownership					
	Canada	France	Germany	Switzerland	United Kingdom	Japan
<i>Geographic Origin of Imports by Investing Country's Affiliates in All Manufacturing Industries</i>						
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
<i>Geographic Origin of Imports by Investing Country's Affiliates in Machinery-Type Industries</i>						
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
<i>Geographic Origin of Imports by Investing Country's Affiliates in Other Manufacturing Industries</i>						
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

^aFor 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.

^bExcludes Japan, Australia, and New Zealand, which are member nations of the OECD.

^cSuppressed to avoid disclosure of data of individual companies.

^dIncludes 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.

^aSales by affiliates in sample as a percentage of sales by all affiliates covered in the 1992 benchmark survey.

^bExcludes petroleum refining.

Table 6A.2

Measures of Domestic Content of Production, Vertical Integration, and Foreign Sourcing of Inputs by Domestic and Foreign-Owned
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

^aRatio 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

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.