On Intra-Firm Trade and Multinationals: Foreign Outsourcing and Offshoring in Manufacturing

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For advanced industrialized economies, the era of globalization has created key roles for both the foreign outsourcing of intermediate inputs and intra-firm trade.[1] Recent papers, including Feenstra and Hanson [1996] and Brainard [1997], have treated these subjects separately, but their interaction and possible intersection (viz. transnational intra-firm trade in intermediate inputs) have received little attention.[2] Low-cost foreign outsourcing has long attracted many firms, whether part of a multinational enterprise or acting as independent companies. Increasingly, however, organizational and other considerations have motivated firms to use imported inputs from affiliates abroad, instead of inputs from arms' length domestic manufacturers; this activity amounts to vertical integration across borders. The process seems to be particularly intense in the case of high tech sectors. Indeed, one of the signal attributes of a manufactured high-tech product is the extensive nature of its value-chain, the number of intermediate products and services, and the global, fragmented, nature of the final output.[3] Progress in transportation, communications and standardization has significantly increased the fragmented nature of production. The high-tech value-chain is now a multilateral, multinational production mosaic, involving many countries but often just one firm or a group of affiliated firms.

The phenomenon of outsourcing is no longer restricted to the manufacturing sectors. Business process outsourcing and business services outsourcing is gathering momentum, and

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[1] See Markusen [1995], Douglas [1996], and Feenstra [1998] for surveys of the basic patterns for international trade with particular attention to intra-firm trade and international outsourcing.

[2] Other recent studies of trade and sales by multinational firms and their affiliates include Zeile [1997], Markusen and Maskus, [2001], and OECD [2002]. Other recent studies of international outsourcing include Hummels, Raporport, and Yi, [1997], Campa and Goldberg [1997], and Swenson [2000].

[3] Outsourcing is not a sequential concept in the sense that the final assembly is necessarily done in the developed country after importing the intermediate inputs; sometimes the final assembly is done abroad after a series of cross-border transactions and trade.

jobs and occupations ranging from medical transcription to stock market research are being outsourced to other countries. As with manufacturing, this kind of outsourcing also encompasses both outsourcing to arms' length firms, as well as to subsidiaries and affiliates in foreign countries. Although similar issues arise in both goods and services, data limitations constrain us to consider only goods trade in this paper.

In this paper, we look at intra-firm trade and imported intermediate inputs, with a special focus on the high-tech computer industry. The main questions that we pose are:

(1) What are the cross-country determinants of US imports of intermediate inputs?

(2) What is the relationship between imported intermediate inputs and intra-firm imports?

(3) Does the importance of intra-firm and intermediate input trade vary across industry lines?

The foreign affiliates of US multinational enterprises (MNEs) can provide either distribution or production facilities for their parent companies. In this paper, we focus on affiliates functioning as production centers. The output of these affiliates can be directed in several ways:

1) To the MNE parent;
2) To customers in the home country of the MNE;
3) To worldwide customers of the MNE.

Category (1) is one form of intra-firm imports for the US. The other, symmetric, form of intra-firm US imports occurs when a foreign-based MNE ships goods to its US-based affiliate. Both types of intra-firm trade will be influenced by industrial organization factors such as transactions costs, as well as specific international trade factors such as tariffs, long-distance transportation costs, worldwide marketing, and issues related to taxation and exchange rate hedging.

Intra-firm trade can cover both final and intermediate goods. Here we focus on intermediate goods. The use of imported intermediate inputs in manufacturing depends on the industrial

organization and international trade factors just mentioned, as well as on supply chain management tools that control demand, supply, and quality variability. Global economic integration has allowed MNEs to create fragmented, sequential, production processes by locating their intermediate production activities in various parts of the world. Together with such fragmented production comes an intensive trade in intermediate inputs for the purpose of production of the final manufactured good.[4]

Table 1 shows aggregate US data on intermediate-input imports and intra-firm imports, for 1992 and 1997. Approximately 3/8 of all US goods imports have been intermediate inputs (the remainder are final goods). About 43 percent of all US goods imports arrived through intra-firm channels in 1992, rising to 52 percent in 1997 (the remainder came through arms-length channels). The computer industry is a particularly telling example of both intermediate input and intra-firm trade. The complexity and sophistication of the end products of this sector dictate a wide range of specialized production activities and stages, and hence a large number of intermediate inputs. The geographical spread of the production base of most of the large multinational firms in this industry results in a brisk international trade in intermediate products.

[4] See Arndt and Kierzkowski [2001] for a collection of papers on fragmented production.

Table 1: Imports into the United States by Trade Categories: As percent of total imports		
	1992	1997
Intermediate Inputs/Final Goods		
Percent intermediate inputs	37%	38%
Percent final goods	63%	62%
Intra-Firm/Arms' Length		
Percent Intra-Firm	43%	52%
a) US MNEs	17%	30%
b) Foreign MNEs	26%	22%
Percent Arms' Length	57%	48%
Addendum: Total Imports $ Billions	505	748
Sources: See Appendix		

The empirical tests in this paper focus on United States imports, due to the importance of US MNEs in international trade and because the US Bureau of Economic Analysis (BEA) has provided high-quality tabulations of several especially relevant data sets. First, the BEA publishes detailed data on intra-firm trade in goods, involving both US and foreign MNEs and their respective affiliates. These data are based on extensive benchmark surveys taken every 5 years, as well as smaller annual surveys. The BEA also publishes related data on US foreign direct investment abroad and foreign direct investment in the US. Finally, US imported intermediate inputs can be computed by combining three BEA data sets:

(1) An input-output data set, based on the 1992 and 1997 US Census of Manufactures, is applied to determine the total quantity of intermediate inputs by industry.

(2) Industry import data are then used to estimate imported intermediate inputs.

(3) Import data by industry and country of origin are then used to estimate imported intermediate inputs by country of origin.

See the Appendix for how we determine imported inputs by industry and country of origin.

Previous studies involving imported intermediate inputs have applied only steps (1) and (2) of this methodology. Also, these studies primarily use industry data and have focused on the labor market impacts or exchange rate exposures.[5] Our analysis, in contrast, focuses on a country cross-section, and applies the data to study the intersection and interaction of imported intermediate inputs and intra-firm trade.

I. LITERATURE REVIEW

The issue of intra-firm trade is inextricably linked to the study of multinationals and of foreign direct investment (FDI). A large part of the FDI literature deals with its country-wise determinants, such as size, relative endowments, and trade and investment costs (Carr, Markusen, Maskus [2001]). The literature also studies relative rates of return (Chernotsky [1987]), and, in the case of foreign investment in R&D activity, the size of the scientific base (Kuemmerle [1999]) and company strategies to tap locally embedded expertise or to develop an organizationally complex international network for technological learning (Cantwell [1999]). There is also a literature that assesses the impact of FDI on the local, host, economy in terms of its impact on innovation (Glass and Saggi [2002]), on benefits accruing from increased competition and efficiency gains (Graham and Wada [2001]), and on economic growth (Zhang [2001], Nair-Weichert and Weinhold [2001]) or, on the other hand, the lack of robust influence of FDI on growth (Carkovic and Levine [2003]).

For our purposes, the literature that deals with transnational vertical integration and intra-firm trade is of even greater relevance. For example, Wilamoski and Tinkler [1999] show that there was a rise of intra-firm exports and imports between the US and Mexico as a result of US

[5] Work on this method was pioneered by Campa and Goldberg [1997], Feenstra and Hanson [1996], and Hummels, Raporport, and Yi, [1997].

FDI in Mexico. Other studies of multinational firms have looked at the motivation behind investment abroad and whether FDI complements or substitutes trade (Konan [2000] and Roy et al. [1998]). Konan's theoretical model, in particular, shows that intra-firm trade in intermediate goods implies that vertical investment complements rather than substitutes for trade. Lipsey and Weiss (1981) show that foreign production by a US firm does not, on balance, substitute for exports by that firm to the area in which the production occurs, and that a firm's output in a foreign area and the firm's exports from the US to that area are positively correlated, particularly for exports of intermediate goods.

Another branch of the intra-firm trade literature deals with its determinants. For example, Helpman [1984] develops a model that generates shares of intra-firm trade as a function of relative nation size and variations in relative factor endowments. A large literature also exists on transfer-pricing and taxation issues and their relationship with intra-firm trade (Taylor [2002], while Madan [2000] shows how different levels of taxation in the host-country give rise to a different mix of intra-firm trade in final and intermediate goods.

Turning to outsourcing, Grossman and Helpman [2002] study the determinants of outsourcing locations in a global economy using a general equilibrium trade model. Costly searches and incomplete contracts are critical in this model. The relative thickness of markets for input suppliers, relative search costs, and the contracting environment impact the extent of global outsourcing. Countries with an active inputs market and reliable contracting environment would be a relatively dependable site for outsourcing. In an empirical study, Andersson and Fredriksson [2000] show that internal imports of intermediate goods by Swedish firms were dependent on the international organization and concentration of production, market-size, and R&D expenditures.

The large size of the literature reviewed in this section confirms the importance attached to the separate topics of intra-firm trade and imports of intermediate inputs. On the other hand, the combination and integration of these two key aspects of globalization appears not to have been studied. This intersection of intra-firm trade and imports of intermediate inputs is thus the focus of our empirical tests, to which we now turn.

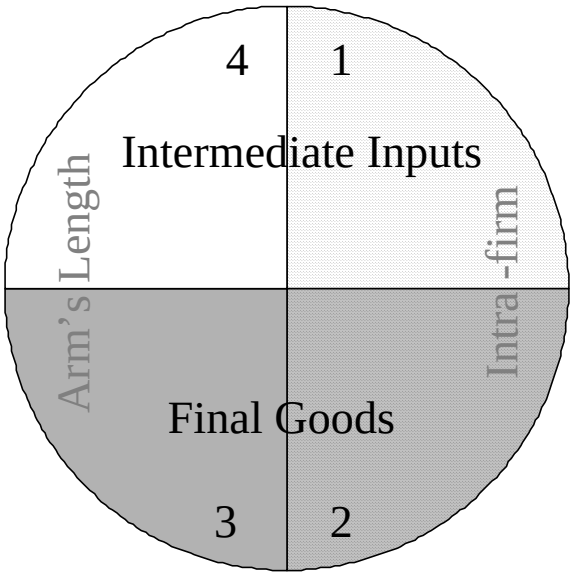

Figure 1. Total Imports into Home country, Classified as Intermediate Inputs or Final Goods and As Intra-Firm or Arm's Length Trade

II. ANALYSIS

To start, it is useful to clarify the relationship between imported intermediate inputs and intra-firm imports. This relationship is illustrated in Figure 1. The full 360 degree circle represents the total amount of goods imported by the home country from any given foreign country in any given year. The right hemisphere (quadrants 1 and 2) show intra -firm imports, representing transactions between a MNE and its affiliate, either from a foreign affiliate to a home country MNE, or from a foreign MNE to its home country based affiliate. Intra-firm trade can occur in either intermediate inputs or final goods, represented by quadrants (1) and (2) of the circle respectively. The left hemisphere (quadrants 3 and 4) represents imports from arms' length trading partners, meaning that these imports are not carried out within the same firm. Arms' length trade can also occur in either intermediate inputs or final goods (in quadrants 4 and 3 respectively).

The quadrants in Figure 1 are of equal size only for graphical convenience. In fact, a primary goal of this study is to determine the average size of these quadrants, and to determine what factors cause the quadrant sizes to vary across countries. As already noted in Table 1 for 1997, however, we do have information concerning the size of the two sets of hemispheres in Figure 1:

- 38 percent of all US imports were intermediate goods and 62 percent were final goods;
- 52 percent of all US imports were intra-firm imports and 48 percent were arms-length.

Also, about 3/5 of all intra-firm imports were carried out by US MNEs, the remainder being imports by the US affiliates of foreign multinationals.

The size of the 4 quadrants individually cannot be derived from aggregate data that only separate intra-firm from arms length trade and intermediate from final goods trade. We need 3 pieces of independent information, in addition to the total amount of imported goods (the size of

the circle), to determine the size of each quadrant. Data that separate (1) intra-firm and arms' length trade and (2) intermediate and final goods trade provide only 2 pieces of independent information. In fact, we know of no standard data set that provides separate quadrant sizes. However, the same information that we have illustrated in Figure 1 and summarized in Table 1 for aggregate imports into the United States are also available on a disaggregated basis by country of origin (i.e. the exporting country). These data have the potential to provide substantially more information about the distribution of import flows across the 4 quadrants.

As a simple example, assume the split between intra-firm and arms' length trade is 50-50, and the split between intermediate input and final good trade is also 50-50. With no further information, we cannot know the size of each of the 4 quadrants of Figure 1. Now also assume that intermediate input and intra-firm imports always occur together, and that final goods and arms' length imports also always occur together, although the two factors may vary across countries. This pattern is still consistent with an aggregate 50-50 aggregate split between intra-firm and arms' length trade and also between intermediate inputs and final goods trade. But the disaggregated patterns provide additional information. In particular, we now know that quadrants 2 and 4 of Figure 1 must be empty, and that exactly 50 percent of the trade would appear in each of quadrants 1 and 3.

This example illustrates why data disaggregated by country of origin may provide insights into the aggregate data, which are not available from the aggregate data directly. It is, of course, a stylized case. In the real world, the best hope is to find that the cross-country correlations for the various import categories are sufficiently informative to allow us to decipher the true structural features at a reasonable level of confidence.

Table 2 shows total imports and input imports into the US from the major countries of origin in 1997. The table also provides input imports/total imports ratios and intra-firm imports/total imports ratios by country; for all data, see the Appendix. Much greater variation is apparent in the intra-firm import ratios. More than 70% of the exports to the US from countries such as Japan are carried out through intra-firm trade, while at the other end of the spectrum, imports from Taiwan are primarily of an arms length nature. The table also reflects the diverse nature of the countries shipping intermediate inputs to the United States, covering developing and developed countries, and European and Asian countries alike: a true testimonial to globalization.

Table 3 shows total imports and intermediate input imports for the four industries with the largest amount of total imports among all US 3-digit NAICS industries in 1997. The table also shows the top 3 countries of origin for intermediate inputs for each industry. Computers and Electronics (NAICS 334) and Transportation Equipment (NAICS 336) are first and second with respect to both total imports and input imports. The input import ratio of 39 percent for NAICS 334 is somewhat lower than the other industries shown, since many computer and electronic products are fully assembled abroad and then imported as final goods.

Table 2: 1997 Imports into the United States by Trade Categories and Major Selected Countries

	Total Imports, $ Billions	Input Imports/ Total Imports Ratio	Intra-firm Imports/ Total Imports Ratio
Canada	168	0.40	0.47
Japan	121	0.42	0.71
Mexico	86	0.36	0.35
Germany	43	0.43	0.60
China	63	0.29	0.10
UK	33	0.43	0.47
Taiwan	33	0.43	0.08
France	21	0.46	0.38
Korea	23	0.36	0.22
Italy	19	0.40	0.67
US Total	748	0.38	0.52

Sources: See Appendix

Table 3: Imported Inputs into the United States, by Largest Importing Industries, 1997

	Total Imports, $ Billions	Input Imports, $ Billions	Input Imports/ Total Imports Ratio	Top 3 Countries of Origin of Inputs
Computers and Electronics NAICS 334	173	68	0.39	Japan, Taiwan, Mexico
Transportation Equipment NAICS 336	149	72	0.48	Canada, Japan, Mexico
Machinery except Electrical NAICS 333	65	35	0.54	Japan, Canada, Germany
Chemicals NAICS 325	51	26	0.51	Canada, Japan, Germany

Sources: See appendix.

III. REGRESSION ESTIMATES

We now turn to regression tests on intra-firm and intermediate input imports into the United States. Our dependent variable is the log of US intermediate input imports from a cross-section of countries of origin. The descriptions for all data are given in the appendix. We estimate multivariate cross-section regressions for the years 1992 and 1997 separately to determine which factors are most highly correlated with the observed cross-country pattern.

Our specification starts with a one-direction version of the gravity model, since we are looking only at the imported intermediate inputs from each trading partner to the US; see Feenstra, Markusen, and Rose [2001] for a recent survey.[6] We then modify the standard model by including intra-firm and arms' length goods imports by country as additional explanatory variables. We also separate intra-firm trade into imports from the foreign affiliates of US MNEs and imports from foreign MNEs to their US affiliates. The following are the primary independent variables, (all variables except the Asian dummy are measured in logs):[7]

IFUSA	US imports from the foreign affiliates of US-based MNEs.
IFFOR	US imports from foreign-based MNEs to their US-based affiliates.
ARML	US imports sent to arms' length recipients (= Total US Imports – IFUSA - IFFOR).
GDPPC	Gross domestic product per capita of the country of origin of imports.
POP	Population of the country of origin.
DIST	Great circle distance between largest city of foreign country and Kansas City, Mo.[8]
ASIAN	Dummy variable: 1 for Asian countries of Asia-Pacific Economic Cooperation.

[6] The gravity equation has been derived by economists from basic principles of international economics. The equation postulates that bilateral trade between two countries would be proportional to the product of their respective outputs and declining in distance between them. Deardorff (1995) shows how the basic Heckscher-Ohlin model of international trade can lead to a gravity specification for bilateral trade. Harrigan (2001) reviews the theoretical and empirical literature on gravity models, and similarly stresses the role played by relative as well as absolute transportation and other trade and transactions costs.

[7] We also note that the following identity holds among the trade variables (also see Figure 1): Total Imports = Intermediate Input Imports + Final Good Imports = IFUSA + IFFOR + ARML.

[8] We have also calculated distances to some of the larger countries, such as Russia, India and Australia by taking into account the country size, rather than the distance to the largest city, with insignificant impact on the results.

Table 4: Regression Results

Eqt #	Constant	IFUSA	IFFOR	ARML	GDPPC	POP	DIST	ASIAN	Adj. R^2
Part A: Imported Intermediate Inputs is the Dependent Variable--1992 Data									
1	-5.31 (2.15)**				.92 (11.94)**	.77 (8.99)**	-1.00 (3.97)**	1.90 (7.27)**	0.779
2	-5.31 (2.56)**	.008 (.12)	.06 (.74)	.80 (5.34)**	.49 (2.72)**	.18 (1.65)	-.19 (.77)	.47 (1.18)	0.895
Part B: Imported Intermediate Inputs is the Dependent Variable--1997 Data									
3	-7.96 (2.51)**				.93 (9.15)**	.87 (8.38)**	-.89 (3.8)**	1.65 (4.88)**	0.763
4	-2.93 (1.98)*	.17 (2.98)**	.24 (4.53)**	.36 (6.17)**	.24 (2.97)**	.22 (2.89)**	-0.13 (.90)	.46 (2.63)**	0.950
Part C: High-Tech (NAICs 334) Imported Intermediate Inputs is the Dependent Variable--1997 Data									
5	-27.93 (3.36)**				1.54 (5.96)**	1.34 (5.46)**	-0.55 (.98)	3.39 (4.15)**	0.58
6	-23.25 (2.33)**	.77 (2.50)**	.38 (1.11)	.06 (.26)	.50 (1.12)	.39 (.93)	.92 (1.74)	1.54 (1.87)*	0.731

Notes:

Ordinary Least Squares with White heteroskedasticity adjustment.

Absolute values of t-statistics shown in parentheses; ** Significance at 5%, * Significance at 10%.

All regressions are estimated on a cross-section of countries, 48 countries in 1992, 38 countries in 1997.

All data are in logs except for the Asian dummy.

See Appendix for detailed description of data series.

The results in Table 4 are divided into three sections. Section A has the log of imported intermediate inputs as the dependent variable, and the regression is estimated on a cross-section of 48 countries for which data are available for 1992. Equation (1) is a standard gravity model, based on per capital GDP, population (as a measure of size), distance, and a dummy variable for the Asian countries. The adjusted R^2 is over 75 percent, indicating that an important share of the cross-country distribution of US intermediate inputs can be explained on the basis of gravity variables alone. We also tested a variety of other gravity variables, but none were consistently significant. Our basic results would be unaffected by including any of these variables.

Equation 2 in Table 4 adds three disaggregated import flows as potential determinants of imported intermediate inputs. Their coefficients measure the elasticity of imported inputs with

respect to each of the US import categories. The results indicate that intra-firm trade was primarily related to final good imports as of 1992. We also tested for a direct effect of US foreign direct investment in each country, but it did not provide an independent effect over and above the effect of the related intra-firm trade flows. We also estimated all the equations in Table 4 using instrumental variables, but none of the results were changed in any substantive way.[9]

Part B of Table 4 repeats the estimation of Part A for 1997 data. The sample size is now only 38 countries, since the 1992 data rely on a special tabulation carried out by the Bureau of Economic Analysis (see Zeile [1997]), and a comparable tabulation is not yet available for the 1997 data. Equation (3) provides estimates based on the gravity specification alone, with results similar to those obtained for the 1992 data. Equation (4) adds the same three import variables used in equation (2). The coefficient estimates for 1997 for these variables indicate a significant increase in the importance of intra-firm trade, related to both US and foreign MNEs, and a corresponding reduction in the importance of arms' length trade, as a determinant of imported intermediate inputs. This is an important result, since it confirms the view that MNEs are increasingly using foreign outsourcing as they decentralize their production processes.[10]

Part C of Table 4 repeats Parts A and B (with 1997 data), but the dependent variable is now the log of imports of only high-tech intermediate inputs, defined here as NAICSs code 334.[11] Equation (5) begins with the gravity model variables, with two notable differences from the results in equations (1) and (3). First, the distance variable is now much less important. This is

[9] The two instruments were: (1) an index of competitiveness that took into account the investment climate, and availability of skilled labor among other measures, and (2) the share of high-tech exports in total exports.

[10] It is useful at this point to note again that our import data correspond only to goods imports. We hope to consider trade flows in services at a later time.

[11] Specifically, NAICS 334 is defined as Computers and Electronic Product Manufacturing, and includes semiconductors, scientific instruments and telecommunications equipment.

understandable since high-tech imports are commonly referred to as “weightless” in terms of their value-to-weight ratio implying that they are much less sensitive to transportation costs. Second, the Asian country dummy is much more important than it is in the earlier equations. This too makes sense, since there is other evidence that the Asian countries are of increasing importance as sources of intermediate inputs for US high-tech industries.

Equation (6) of Table 4 adds the imports variables to the basic gravity model for high-tech imported inputs. Compared with equations (2) and (4), equation (6) indicates that US imports of high-tech intermediate inputs depend primarily on intra-firm trade (not arms’ length transactions), and especially on imports by US MNEs. Indeed, imports by US MNEs are now the predominant source of imported high-tech intermediate inputs into the US. This result provides empirical verification of the view that foreign outsourcing has become especially important for US MNEs in high-tech industries.

IV. CONCLUSIONS

High and growing levels of intra-firm trade and trade in intermediate inputs are among the stylized facts of international trade, and are thought to play key roles in the new era of globalization. Although they have been intensively studied individually, little attention has been paid to their interaction, i.e. intra-firm trade in intermediate inputs. One major problem has been the absence of data that could measure the amount of intra-firm trade that involves intermediate inputs, or vice versa. Our paper offers two primary innovations. First, we have developed a data set of imported intermediate inputs by both industry and country of origin. Second, we have used estimates from a regression model with intermediate inputs imported into the United States as the dependent variable to determine the absolute and relative importance of intra-firm imports as a determinant of trade in intermediate inputs.

Our key results, from Table 4, are:

(1) Intra-firm imports were a relatively unimportant source of intermediate imports as of 1992. Most US intermediate goods imports at that time were the result of arms' length trades.

(2) By 1997, intra-firm trade, by both US and foreign MNEs had become very important as a source of imported intermediate inputs. However, arms' length trade also remained a significant determinant of US intermediate input imports.

(3) Standard gravity model variables were found to be important determinants of US imports of intermediate inputs, in addition to the key role of intra-firm trade variables.

(4) Estimates were also derived for high-tech intermediate input imports, defined as NAICS code 334 which represents computers and electronic products. These additional results were:
(a) transportation costs, measured by distance, were not a major hindrance to high-tech intermediate imports, consistent with the high-value, low-weight, character of these goods.
(b) intra-firm trade (not arms' length transactions), and especially imports by US MNEs, were the key determinants of high-tech intermediate input imports, consistent with the view that foreign outsourcing has become especially important for US MNEs in high-tech industries. In particular, US MNEs were responsible for more than two-thirds of all imports of high-tech intermediate inputs into the US.

For further research, we plan to investigate intra-firm trade flows and outsourcing in services, as well as to study the possibility of spillover effects of intra-firm trade and trade in intermediate inputs on trade overall.

V. DATA APPPENDIX

Computation of Imported Intermediate Inputs by Country of Origin

To calculate imported intermediate inputs by sector and by country of origin, we applied the following formulas to each 6-digit input sector in US manufacturing (all amounts in $ Billions):

$$(1) \quad II_i = I_i\left(\frac{M_i}{(P_i - X_i + M_i)}\right)$$

where

I_i = amount of sector i goods used as inputs in all of US manufacturing (from US Census of Manufacturing Input/Output data for 1992 and 1997 respectively).

II_i = imported inputs of sector i goods;

M_i = total imports of sector i goods;

P_i= US production of sector i goods;

X_i = US exports of sector i goods;

The basic assumption here is that, for any input sector, the percentage that imports of intermediate input represent of total intermediate inputs is the same as the percentage that imports represent of all net sources of that commodity (= $P_i - X_i + M_i$).[12]

$$(2) \quad II_{ic} = M_{ic} II_i .$$

where

II_{ic} = Imported intermediate inputs of sector i from country c.

M_{ic} = Sector i imports from country c as a proportion of US total sector i imports.

The basic assumption here is that country c's share of imported intermediate imports of sector i goods equals that country's share of all imports of sector i goods.

[12] Components imported for sale in the aftermarket as spare parts do not count as intermediate goods but are considered final goods, since they are not used as inputs in production.

Data Sources

Trade data by countries and industries

All import data by countries and industries are from US International Trade Commission's Trade DataWeb web site: http://dataweb.usitc.gov

Intra-Firm Trade Imports by Country of Origin

Data for 1992 are from Zeile [1997].

Data for 1997 are from Mataloni [1999] for US MNEs and from Zeile [1999].

Gravity Model Variables

The distance data have been calculated using Encarta. Gross Domestic Product (GDP), Gross Domestic Product per Capita (GDPPC) and Population (POP) are from the World Bank database**:** http://devdata.worldbank.org/data-query

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