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Vertical Integration in Services at US Multinational Firms

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Abstract

International trade in services is growing quickly but the sales of foreign affiliates of U.S. multinational firms are much larger and growing even more rapidly. From the perspective of these macro data, the hypothesis that horizontal integration dominates the international strategy of U.S. multinationals is confirmed. However, the micro data give a more nuanced view. Close examination of the micro data on U.S. imports of Other Private Services reveals a small number of affiliates that are tightly vertically integrated with the U.S. parent. These few vertically integrated services affiliates are important contributors to US multinational parent imports of Other Private Services, accounting for 38 percent of affiliated service imports. But, with unaffiliated imports dominating cross-border trade, the universe of these tightly integrated firms accounts for only about 6 percent of total cross-border imports of Other Private Services. The probability of being a tightly vertically integrated affiliate increases with distance, with English-speaking countries, and with service activities that are classified as more tradable. Per capita income, our proxy for wages, has no effect on the probability of being vertically integrated; vertically integrated service affiliates are located in high wage countries and pay higher average wages than the average affiliate, even controlling for country and industry.

Keywords: international trade in services, multinationals, vertical integration, foreign affiliates, offshoring, outsourcing, micro-data

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Introduction

U.S. imports of services are increasing rapidly. Between 1994 and 2005, total imports of private services increased from $120 billion to $281 billion. Concurrent with this increase in services trade, the composition of the unemployed has changed. While manufacturing workers have historically accounted for more than half of displaced workers, in the most recent downturn non-manufacturing workers accounted for 70 percent of displaced workers.[2] These coincident trends have led to considerable interest in "services offshoring" and its potential implications for the U.S. labor market; see for example Blinder (2006).

From the popular press, one has the impression that U.S. multinational corporations are rushing to set up service affiliates in low-wage countries including India. While there is considerable interest in how trade in services affects the U.S., and considerable hype and anecdote, there is little empirical research. In this paper we provide a first look at how U.S. multinationals organize services production internationally.

Though motivated by the offshoring debate in the popular press, the research is well-grounded in the economics literature, the literature on manufacturing that is-- because, in standard models of international trade, services have been the 'non-traded' activity. It has often been assumed that services could not be fragmented into stages of production due to high transactions costs and because services were seen as embodied in core activities and products of the firm. For example, it has been assumed that services demand close proximity between buyer and seller (loan origination at the local bank), that services production has important economies of scope (coding of computer programs is integral to software application design) and must be done inside the firm (payroll checks signed by the CEO). Therefore, services were not amenable to the business strategy of vertical integration.

Add in being attuned to local regulations (accounting and law) and the need for cultural sensitivity (at minimum the correct language) meant that if a multinational firm wanted to grow into a foreign market, building on its intellectual property, management and production skills, or tacit knowledge of global best practice[3], foreign affiliates were the means by which the multinational did service-oriented business in host countries. So horizontal integration should dominate the business strategy of multinational firms.[4]

But, the non-traded assumption was never quite true, and for a variety of reasons including investment in information technology, it is even less true today. In this paper,

[2] Jensen and Kletzer (2006).
[3] Dunning's OLI framework for the rationale for multinational structure.
[4] Indeed, in light of these assumed relationships between parent, affiliate, and local market, foreign direct investment is one of the four "modes" of international delivery of services under the General Agreement on Trade in Services (GATS) in the World Trade Organization.

we use both public and micro data collected by the Bureau of Economic Analysis on the activities of multinational firm parent and affiliates to take a first look at the horizontal vs. vertical integration hypotheses for US international trade in services.[5]

The structure of the paper is as follows. The next section reviews selections from the literature on foreign investment, fragmentation of production, and international trade from the viewpoint of manufacturing firms, a subject which has a much longer research history. Substantial research on manufacturing has been done with publicly available ('macro') data; but more recent research has utilized the confidential firm level ('micro') data available by special permission through the Bureau of Economic Analysis. Recent research using these micro data for manufacturing activities suggests a greater prevalence of vertical integration as compared with the here-to-fore conclusion revealed by publicly available data that horizontally integrated production dominates the US MNC scene. One reason for looking at both macro and micro data for services is to determine to what extent the two data sources yield similar conclusions about the nature of global sourcing in services.

Section three focuses on the public data to assess the assumption that services are 'non-traded' and therefore horizontal integration should dominate the data and behavior of US multinationals. Part of the assessment involves examining whether global sourcing and sales of services differs by country-of-affiliate, or over time. And, how important US parent multinationals might be relative to foreign-parent multinationals. The assessment over time (from 1992 to 2005) is of particular interest given that the micro data currently available are from the 1999 benchmark. The importance of foreign parent multinationals is another aspect of putting the micro data analysis into the broader context of cross-border trade in services.

Section four turns to the micro data, including a brief synopsis of the data employed and presents a profile of US-parented multinational services firms. This section also gives a preliminary assessment of the relative importance of different country characteristics for the type of international activities of services affiliates of US multinationals.

To summarize the findings: We use both macro and micro data to examine the prevalence of intra-firm service imports of U.S. multinational parents. First, the macro data support the hypothesis of horizontal integration: Only about 5 percent of affiliate sales go back to the US parent, and about 80 percent of the affiliate sales are to unaffiliated local persons. Moreover, cross-border trade between parents and affiliates accounts for only about 1/3 of total cross-border trade in Other Private Services (2005). So most cross-border services trade is between unrelated parties; and most services of affiliates are sold in their own market.

However, a more nuanced view is gained by examining the micro data. Matched parent and services affiliate data reveal that for some small number of firms, vertical

[5] Beginning in 2003 the *Survey of Current Business* presents analysis of cross-border trade in services and the activities of affiliates annual, generally in its October issue.

integration in services trade is quite important. While these vertically integrated affiliates are rare in number, they account for a significant share of U.S. parent intra-firm service imports.

We examine the industry and country characteristics associated with being a vertically integrated affiliate and find that affiliates in industries with high measures of "tradability" are more likely to be vertically integrated. Affiliates in countries that speak English are also more likely to be vertically integrated. Unlike manufacturing, distance is positively related with being a vertically integrated service provider. Last, there is no evidence that income levels in the host country are associated with the probability of being a vertically related service provider – vertical service affiliates seem to be in high wage countries much like other service affiliates. Further, service affiliates that export have higher compensation levels than other affiliates in the same country in the same industry.

Returning to the macro data, however, where the sample ranges over time from 1992 to 2005 reveals that intra-firm imports of services from affiliates in higher-income countries has fallen somewhat whereas the intra-firm imports of services from affiliates in lower-income per capita countries has risen dramatically. Thus, the release of the 2004 benchmark data, which will allow an update of the micro sample is very important for assessing the extent to which the global sourcing patterns of US multinational service providers has changed.

The structure of a multinational: review of the literature

A multinational faces a range of production and sales opportunities that can be evaluated from two main perspectives and assessed and measured from the viewpoint of both international borders and the boundaries of the corporate family. Therefore it is not surprising that there is a huge literature on evaluating the rationale behind the business strategy of multinational corporations. An initial cut of the research takes one of two different viewpoints: that of the parent or that of the foreign affiliate (and in either direction, e.g. US parent and foreign affiliate or US affiliate of foreign parent).

In the parent-centric view, the initial decision is to produce at home and export to third parties (that is, engage in traditional international trade at arm's length) or, alternatively, invest abroad and sell directly rather than export. There is a huge portfolio of research on this decision by the parent—to export or engage in FDI—which will not be reviewed here.

Once invested abroad, the viewpoint changes to the behavior of the affiliate and the affiliate's relationship to its parent. Does the foreign affiliate of the US parent produce and sell primarily in the host market—e.g. do local affiliate sales and therefore horizontal integration dominate? Does the affiliate sell to third parties (e.g. is it an 'export-platform'). Does the affiliate sell a lot back to the parent; e.g. is it vertically integrated such that trade with the parent dominates the total sales of the affiliate?

Several papers from the manufacturing literature shed light on the sales patterns of manufacturing affiliates. Brainard (1997, Table 7), one of the first uses of the micro data (63 industries, 27 countries from 1989) finds that affiliate sales outside its own market (back to the US parent and to third markets) increase with per capita income similarities, destination market income, tax rates, trade and investment openness, and plant and management scale. That affiliate sales back to the parent and to others increase with per capita similarities is not consistent with the vertical integration hypothesis.

Hanson, Mataloni, and Slaughter (2001) similarly research the drivers of affiliates to export vs. sell at home. They take account of characteristics of both the home market and the export-destination market using 12 two-digit industries (manufacturing and non-manufacturing, 58 countries, and 1989 and 1994). In an estimation that distinguishes between local sales and exports (e.g. is the affiliate an export platform, including to the US), they find that *exports relative to local sales* are greater from affiliates in smaller markets with lower tax rates, and to markets with higher average income, *are greater in less-skill intensive industries* and high production-scale industries, but less in trade-barrier protected local markets. (Table 5). These results give more credence to the outsourcing of low-skill activities to low-wage countries.

Yeaple (2003) examines affiliate exports independently of affiliate sales and compares coefficients on similar explanatory variables. (Table 2) Transport costs are more likely to deter affiliate exports, i.e. deter vertical integration. Trade barriers promote local sales. A large domestic market promotes export platforms even more than local sales, consistent with plant-scale measures. A measure of human capital is modestly negatively associated with both local and export sales, thus supporting both horizontal and vertical integration based on skill differences.

Hanson, Mataloni, and Slaughter (2005) (Vertical Production Networks in US Multinational Firms) examine both the affiliates use of intermediates from the parent as well as the affiliate's pattern of sales using 1994 micro data. Affiliate sales to the US relative to total affiliate sales is "*negatively correlated with less-skilled wages*, host-country trade costs, and corporate taxes, and *positively correlated with high-skilled wages*, and EPZs". (Table 6). Considering both the use of intermediate inputs from the parent and sales back to the US together, they conclude that 'where affiliates are more specialized in processing inputs imported from the United States, they also export a higher fraction of their output to the United States"—hence the notion of vertical production *networks*. Despite the existence of networks, the skill variables are not consistent with factor-proportions rationale for outsourcing.

Ekholm, Forslid, and Markusen (2003) focus only on the destination markets for affiliate sales to address the extent to which regional trade agreements affect multinational structure and affiliate trade. They find that affiliates of US multinationals are 50 percent less likely to export to third markets and EU multinationals 30 percent more likely to do so. Foreign affiliates of US multinationals appear to be more tightly aligned with the parent than are multinationals in general.

Borga and Zeile (2004) model the propensity of foreign affiliates to buy intermediate goods *from* its US parent. They use 1994 benchmark data and focus on manufacturing. Their findings support vertical production networks (a high share of intermediates in two-way parent-affiliate trade), that is positively (negatively) associated with the R&D intensity of the parent (affiliate), and positively associated with host countries with lower GDP per capita and/or lower quality-adjusted labor costs, controlling for infrastructure. These findings suggest that factor-proportions (at the affiliate) and knowledge-capital (at the parent) are important determinants of the pattern of affiliate trade.

All told, the research on relative importance of affiliate sales for exports vs. for the home market suggests vertically integrated production networks for manufacturing, and finds increasing support for vertical integration as the research window moves from the 1990s forward and as the researchers move from macro to micro data. But, vertical integration does not necessarily imply 'low-wage outsourcing'.

What do Services Affiliates Do? A look at services using macro data

This section uses macro data to assess the behavior of the foreign affiliate of the US parent. How much of their total sales are to their own market, how important are their sales to third parties, and considering explicitly the vertical integration hypothesis, how important are the parent-affiliate sales in total sales by the affiliate. Moreover, broadening the macro context even more, how important is parent-affiliate trade relative to total US exports and imports of services? That is, even if vertical integration is apparent in the data, is such multinational trade important in overall trade?

We start with the broad question: How important is multinational trade in services compared to overall trade in services? Table A (left panel) and Figures (from BEA Table 8.20) measure the importance of US parent-affiliate intra-firm trade relative to total US trade in Other Private Services by selected countries and regions over time (2005 and 1992 shown). Intra-firm trade by US-parent multinational families (inclusive of firms in all industries, but trading Other Private Services) accounts for a bit less than 20 percent of total exports of OPS and a bit more than 20 percent of total imports of OPS.

For rich countries (particularly in Europe) the intra-firm share of exports is somewhat higher than the all-country average (23 percent), but has fallen substantially from 37 percent in 1992. For middle-income and poorer countries, on the other hand, the intra-firm share of exports is lower than the all country average (11 to 17%) but has risen from 1992.

On the import side, the share of total US imports of OPS accounted for by US-parent affiliate trade rose modestly from 21 to 23 percent (1992 to 2005). Looking at various countries and regional groups, the intra-firm share of imports rose only a bit, or

even fell for the richer country trading partners. But for middle-income and poorer countries, the intra-firm share of imports has risen dramatically.

Taken together, these public data point to more extensive vertical integration for OPS with richer trading partners, but with a declining trend over time. On the other hand, with regard to cross-border trade with middle-income and poorer countries, intra-firm trade in services is currently a lower share of cross-border trade in OPS, but is catching up to the richer-countries' share. Increased vertical trade both outbound from the US and particularly inbound to the US is apparent for the developing economies. Therefore these data tend to support the hypothesis that vertical integration in services trade is becoming more important, particularly on the import side, and particularly from lower-income countries.

The right hand panel of Table A gives the share of intra-firm trade that is accounted for by US parented multinationals. That is, affiliated trade takes place between a US parent and its foreign affiliate, but also between a US-based affiliate with a foreign parent. Overall, US parented multinational families account for about 60 percent of intra-firm cross-border trade in services, with higher percentages for middle- and lower-income countries. Analyzing why the shares of US MNC-intermediated intra-firm trade differ over country and time period takes us too far afield for this paper.

A somewhat different impression comes from an examination of the data from the viewpoint of affiliates sales. Table B (From III.F.16) considers the sales of services by foreign affiliates of US parents and asks where those affiliate sales go. Three types of affiliates are considered: affiliates of all industries and affiliates classified in four NAICS categories information (which includes Internet, data processing, and other information services); professional, scientific, and technical services (which includes computer and information systems); management of nonblank companies and enterprises; administrative support and waste management, with is a NAICS-based classification similar to the trade-based OPS classification.

For all these industry classifications of the affiliate, surprisingly, the share of affiliate sales exported to the US parent are about the same – 3 to 5 percent. Between 1999 and 2004, the share has increased by 1 percentage point. This hardly seems to warrant the public outcry about offshoring, and certainly does not point to vertical integration with the US parent as being an important activity of the affiliate.

About 75 percent of the sales of service affiliates go to unaffiliated persons in the local market, which tends to support the original 'non-traded' hypothesis and horizontal integration rationale for foreign direct investment . On the other hand, there has been a drop of about 10 percentage points in the share of total affiliate sales that go to unaffiliated persons since 1999. Most of the decline in that share comes from NAICS 4 (OPS-proxy).

Finally, across the board there is evidence of increased affiliate *network*. The share of affiliate sales going to other foreign affiliates nearly doubled (4 to 7 percent) for

all industries. The increase was most noted in NAICS-4 with no change (8%) for the manufacturing affiliates.

All told, the macro data point to a rising importance of intra-firm trade in trade flows of services, but still only a small share of affiliate sales destined to the US parent. Horizontal integration dominates.

The Micro Data Profile of Services Multinationals

The aggregate data are suggestive of a small but growing role for vertical trade in services between US multinational parents and their foreign affiliates. In this section we explore the micro structure of vertical trade in services between US parent and their foreign affiliates. The firm and affiliate level microdata allow us to identify with much better resolution the nature of vertical relationships between parents and their affiliates.

To examine the vertical relationships between US parents and their affiliates, we use several surveys collected by the Bureau of Economic Analysis. We use data from the survey of international transactions between U.S. parents and their foreign affiliates (BE-577), the benchmark survey of U.S. foreign direct investment abroad (BE-10), and data from the survey of cross-border trade between U.S. persons and unaffiliated foreign persons (BE-22). Additional information on the data is provided in the data appendix. We provide cross-sectional information from 1994, 1999, and limited analyses from the preliminary version of the 2004.

Identification of "type" or "industry" of service

The BE-577 collects information on other private services trade broken out for six categories, financial services, transportation, computer and information services, management and consulting services, research, development, and testing services, and other services. In examining vertical relationships between affiliates and parents, we would like to exploit additional cross-industry variation in the determinants of services trade.

Instead of using the six categories of service types reported on the BE-577 form, we classify the type of services being traded based on the 4-digit NAICS industry code assigned to the foreign affiliate. For example, the BE-577 collects information for the detailed category "Computer and Information Services." We instead use the 4-digit NAICS code assigned to the foreign affiliate to obtain higher resolution on the type of service the affiliate is providing. Using the 4-digit NAICS codes, we can classify affiliates into 5112 Software Publishers, 5414 Specialized Design Services, and 5415 Computer systems design and related services.

Therefore, instead of six categories of service types, we have service sector foreign affiliates classified into 44 4-digit NAICS industries giving us considerably more industry detail than available from the six categories. This is consistent with the treatment used by researchers examining the manufacturing sector and for our classification of

"vertically integrated" affiliates it is particularly appropriate (as they are exporting a large share of the total output on which their industry classification is based).

As a result of this classification, we exclude foreign affiliates that are not in the service sector from much of the analysis. Table 1 shows the growth of services trade between U.S. parents and their foreign affiliates over the 1994-2004 period and the growth in services trade between parents and their service affiliates. Data from the universe of firms covered is a so-so match for the public data (particularly for parent service export to affiliates in 2004). These differences may be because of classification issues.

Table 2 shows the prevalence of services trade between U.S. parents and their foreign affiliates. The share of U.S. parents that trade services with their foreign affiliates is relatively stable, though decreasing over time; 42 percent of parents export services to their foreign affiliates in 1999; about 10 percent of parents export services to a service affiliate. Importing services from affiliates is less prevalent than intra-firm exporting, with only about half the share of parents doing intra-firm importing relative to intra-firm exporting. In spite of the significant growth in intra-firm services trade, the share of parents engaged in intra-firm service trade has not increased at all.

Table 3 shows the prevalence of vertical relationships between the foreign affiliates of US multinationals and their parents. The share of affiliates that import services from a parent is decreasing over time. The share of affiliates that export to a parent is remarkably stable given the large increases in parent service imports from affiliates. About 10 percent of service affiliates export to their parent over time. There are not significant increases in the share of affiliates that export to or import from their US parents. Affiliates overall are more likely to import services from their parents than export services to their parents.

This is also true of service affiliates. Service affiliates are much more likely to import services from their US parent than to export to their US parent: 18 percent of service affiliates import services from their parent and 10 percent export services to their parent in 1999. The higher frequency of importing relative to exporting suggests that most service affiliates are horizontal in nature.

Similarly, the macro data, which is by value show a stable pattern of intra-firm trade, with increases in the value of intra-firm trade rising by 1 percentage point for both exports and imports. (One percentage point, though, is a significant growth rate given the low base percentage in 1999.) However, by value, intra-firm sales are a much smaller share of what the affiliate sells.

Classification of "vertically integrated" affiliates

Our focus is on the vertical provision of intermediate service inputs by foreign affiliates to their US parents. We develop a different measure of the vertical relationship than has been used in previous research. Yeaple (2003) examines the determinants of

level affiliate export sales back to their US parent at the industry-country level as a measure of vertical integration between parents and affiliates. Hanson, Mataloni, and Slaughter (2005) examine imported intermediates for further processing as a share of sales as a measure of how vertically integrated foreign affiliates are in manufacturing and examine affiliate exports.

To examine vertically related foreign affiliates, we classify service affiliates based on the share of their total output that is exported back to the US parent. Affiliates that export a large share of their total sales to their parent are considered to be vertically integrated with their parent. By contrast, affiliates that export a small share of their output back to their US parent are deemed to be "horizontal" affiliates. This measure of how vertically integrated a foreign affiliate is intuitively appealing and a natural way to measure vertical integration.

We classify foreign affiliates based on their service exports back to their US parent as a share of their total sales. Note that the denominator is total sales, not just service sales (although, when the affiliate is classified in a NAICS service activity, it is hard to imagine what else they are selling). Foreign affiliates that have service exports to their US parent between 0 and 10 percent of their output are in "export share class" 1, those that export between 10 and 20 percent are in export share class 2, and so on. Table 4 shows the share of foreign affiliates by the export share class. While it is not surprising that the vast majority of foreign affiliates classified outside of the services sector do not have high levels of service exports back to their US parents, it is striking that over 99 percent of service affiliates export less than 10 percent of their sales back to their US parents.

Clearly, the vast majority of service affiliates are predominantly "horizontal" in nature. Over 95 percent of total sales from service affiliates are at affiliates that send less than 10 percent of their output to their parent. This is consistent with the macro data that show that the share of total sales of services that go back to the parent is 5 percent for all industries, and only 6 percent when the affiliates classified in NAICS OPS plus finance and insurance are considered (column 5 Table B).

While small in number, service affiliates that are vertically integrated with their US parents account for a significant share of total US parent affiliated service imports. Collectively, service affiliates in export share class 6 and above account for 38 percent of US parent affiliated imports from service affiliates. Affiliates in export share class 10, those that export between 90 and 100 percent of their sales to their US parent, alone account for 23 percent of US parent imports from service affiliates. While the average level of exports from foreign affiliates is very low, highly vertically integrated service affiliates provide a significant share of total US parent imports from service affiliates.

Determinants of Vertically Integrated Affiliates

We focus on five factors that influence whether a service affiliate is vertically integrated with its parent. We examine whether the "tradability" of the service influences

the vertical relationship in services provision, whether incomes (a proxy for lower service sector wages), distance to the U.S., higher levels of telecommunications coverage, and whether a country is English-speaking affect the probability of a service affiliate exporting to its US parent and the probability of being vertically integrated. The measures for GDP/capita, distance, telecommunications coverage, and whether English is spoken come from well known sources. GDP/capita comes from the World Bank and the distance and English variables come from Glick and Rose (2002).[6] The measure of telecommunications coverage is telephones per 1,000 people and is from the World Bank Development Indices.

"Tradability" Measure – Geographic Concentration

Previous studies of the manufacturing sector have typically included measures of impediments to trade, for example including measures of distance, freight costs, and tariffs, in examining the vertical relationship in manufacturing. For services, because many service activities can now be transferred electronically at very low cost, the issue has more to do with technological primitives relating to whether the service transaction can be conducted at a distance. We expect that service activities that require face-to-face interaction are less likely to be traded internationally, while service activities that do not require co-location to be traded.

We use a measure of "tradability" developed by Jensen and Kletzer (2006) that exploits the geographic concentration of service employment across metropolitan areas within the U.S. to identify service activities that are tradable. The economic intuition they rely upon is that non-traded services will tend to be ubiquitously distributed in proportion to population or income. Production activity of traded goods tends to be geographically concentrated (to capitalize on increasing returns to scale, access to inputs like natural resources, etc.), while goods that are not traded (due to high transport cost to value ratios, for example) tend to be more ubiquitously distributed. They apply this same intuition to service production and find that a significant number of service industries exhibit levels of geographic concentration consistent with the activity being traded within the U.S. While industries in the manufacturing sector tend to have higher levels of geographic concentration than the service sector, many service industries exhibit levels of geographic concentration consistent with them being traded within the U.S. For example, software publishing, sound recording, motion picture production, securities and commodities trading all exhibit high levels of geographic concentration. In addition, service industries identified as non-tradable also conform to our notions of industries that are likely to be non-tradable and also exhibit low levels of geographic concentration.[7]

[6] GDP per capita by country by year comes from the IMF World Economic Outlook Databases, http://www.imf.org/external/ns/cs.aspx?id=28. Distance and English-speaking come from Glick and Rose (XX), http://faculty.haas.berkeley.edu/arose/RecRes.htm.

[7] Using establishment level data on U.S. service producers, Jensen (2006) finds that U.S. service industries with higher measures of tradability have higher export participation measured as both the share of establishments that export and higher exports to sales ratios.

Determinants of Vertical Integration – Empirical Results

We estimate a probit of the form:

$$Prob(X_a) = \Phi(GDP/capita_c + Distance_c + English_c + Telecomm_c + Tradable_i)$$

where X_a is an indicator variable for one of three measures of export participation for each affiliate: (1) Affiliate Exports represents whether an affiliates exports any services to the parent, (2) Vertically Integrated Affiliate (60%) represents whether an affiliate exports more than 60 percent of its sales to its parent, and (3) Vertically Affiliated (90%) represents whether an affiliate exports more than 90 percent of its sales to its US parent.

$GDP/capita_c$ is a proxy for wages in country c, $Distance_c$ is a measure of the distance between country c and the US, $English_c$ is an indicator variable for whether English is spoken in country c, $Telecomm_c$ is a measure of telecommunications coverage in country c, and $Tradable_i$ is the tradability index for industry i. Table 5 shows summary statistics for our sample of 6,356 service affiliates for 1999.

Table 6 reports the results. The first column reports determinants of whether an affiliate exports any services back to its parent. Affiliates that are in countries that speak English are more likely to sell services back to their parents. Somewhat surprisingly, affiliates that are further from the U.S. are also more likely to export services back to their parent. None of the other country or industry characteristics influence the probability of an affiliate exporting to its parent.

The results in the second column of Table 6 show that affiliates are more likely to be vertically integrated (i.e. have service exports back to their parent account for more than 60 percent of their sales) when they are in a tradable industry, when they are in a country farther from the US, and in a country that speaks English. GDP/capita, our proxy for service sector wages, is not significant. The third column of Table 6 shows that an affiliate is more likely to be very vertically integrated (i.e. those whose service sales back to their parent account for more than 90 percent of their sales) when they are in a country that speaks English and in an industry with higher tradability. Again, GDP/capita, our proxy for service sector wages, is not significant.

Contrary to previous results in the manufacturing sector (and to the perception in the popular media), lower wages in the host country do not influence the probability of a foreign affiliate being vertically integrated. Vertically integrated affiliates tend to be in high income countries just like the average affiliate. This is consistent with the macro data from the 1990s which showed the richer countries dominated the affiliate trade in services.

Wages at Exporting Affiliates

The average affiliate is located in a high income country. Vertically integrated affiliates are also likely to be in high wage countries – suggesting the vertically integrated

affiliates make use of inputs that are relatively abundant in high income countries. To further explore what inputs US parents might be seeking in their vertically integrated foreign affiliates, we examine average wages at affiliates that export and vertically integrated affiliates. We run the following ordinary least squared regression:

$$\text{Log(average compensation}_a) = X_a + \text{4-digit NAICS} + \text{country}$$

where average compensation is total compensation divided by the number of employees at the affiliate and X_a is an indicator variable for one of three measures of export participation for each affiliate. Affiliate Exports represents whether an affiliates exports any services to the parent, Vertically Integrated Affiliate (60%) represents whether an affiliate exports more than 60 percent of its sales to its parent, and Vertically Affiliated (90%) represents whether an affiliate exports more than 90 percent of its sales to its US parent.

Table 7 reports that the average foreign affiliate that either exports or is vertically integrated with its US parent has average wages between 50 and 63 percent higher than other service affiliates. Controlling for industry and country, affiliates that export and vertically integrated affiliates pay approximately 25 percent higher wages, suggesting that vertically integrated affiliates are more skilled worker intensive than the average affiliate. When US parents import services from their foreign affiliates, they tend to import from high wage countries and import from relatively high wage affiliates within those countries.[8]

Conclusion

The vast majority of service affiliates appear to be horizontal in nature – they exist to serve the local market and ship a small fraction of their output back to their US parent. Therefore, over all, affiliate trade only accounts for about 20 percent of total cross-border trade in services. However, a very small fraction of service affiliates have significant vertical relationships with their US parents. While small in number, these affiliates account for 38 percent of that affiliated services trade.

When we examine factors that influence whether service affiliates are vertically integrated, based on the 1999 benchmark data, there is no evidence that US parents seek low wage countries for their vertically integrated service providers. Vertically integrated service affiliates tend to be in high wage countries just like the average affiliate. In addition, vertically integrated service affiliates pay higher wages than the average affiliate in a country in an industry.

Finally, affiliates in countries that are further from the US and that speak English are more likely to be vertically integrated. Affiliates in industries with higher tradability are also more likely to be vertically integrated.

[8] Foreign-owned establishments tend to pay higher wages than the average establishment in a country, see Doms and Jensen for the U.S., XXX for other countries.

Future Work

This paper uses micro data to shed a bright, albeit narrow beam of light onto the behavior of the affiliates of US services multinationals. The set of firms that engage in vertically integrated imported services is very small, but they are important players in intra-firm imports, accounting for almost 90 percent of intra-firm service imports (see Table 9), and are therefore modestly important in total imports of services (accounting for about 6 percent of total cross-border trade in services.

A first extension is to consider unaffiliated service imports. We have made a preliminary link of the BE-22 survey of international transactions with unaffiliated foreign persons and the BE-577/BE-10 data. Table 8 shows that over 70 percent of the unaffiliated import value matches to a US parent.[9] Table 9 shows the share of affiliated imports accounted for by US parents with vertically integrated service affiliates. This small share of firms (under 5 percent of US parents) accounts for almost 90 percent of US affiliated service imports. However, these US parents with vertically integrated affiliates account for a much smaller share of unaffiliated imports, only about 20 percent. We intend to investigate the factors that influence whether US parents choose to import services from affiliates or at arm's-length.

As the 2004 benchmark data become more completely available, it will be important to reassess the prevalence of vertical integration and the prevalence of cross-border sales. The macro data, from the viewpoint of both the trade data and the affiliate sales data, suggests a tightening of vertical integration over the time period between the two benchmarks, as well as important diversification of affiliate sales away from their own market to both unaffiliated US persons and to affiliated third parties. Moreover, the 2005 data reveal a much more important role for affiliate imports from middle-income and poorer economies. With the 2004 benchmark data, international services production networks and a greater role for cross-border trade in services from affiliates in low-wage countries could be revealed. Will the same firms being playing such a disproportionate role, or will other firms become more important players in international trade in services?

Finally, whereas telecommunications and other IT-related aspects of trade in digital activities of services were not relevant for location of affiliate in the context of the 1999 micro data, these infrastructures may be found to be important once 2004 data can be integrated into the analysis.

[9] This is consistent with the importance of US multinationals in mediating goods trade, see Bernard, Jensen, and Schott (2005).

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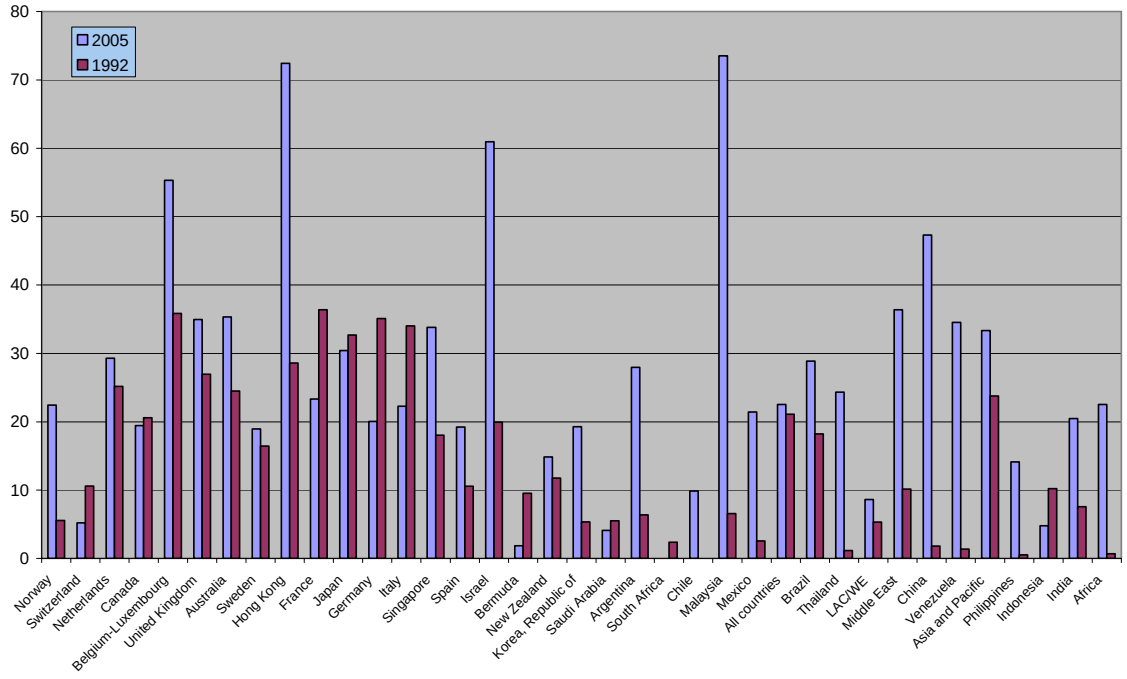
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US Parent-Affiliate Trade: Share of Total Imports OPS
(ranked by GDP per capital PPP intl$, 2003)



US Parent-Affiliate Trade: Share of US Exports of OPS
ranked by GDP per capita PPP intl$, 2003

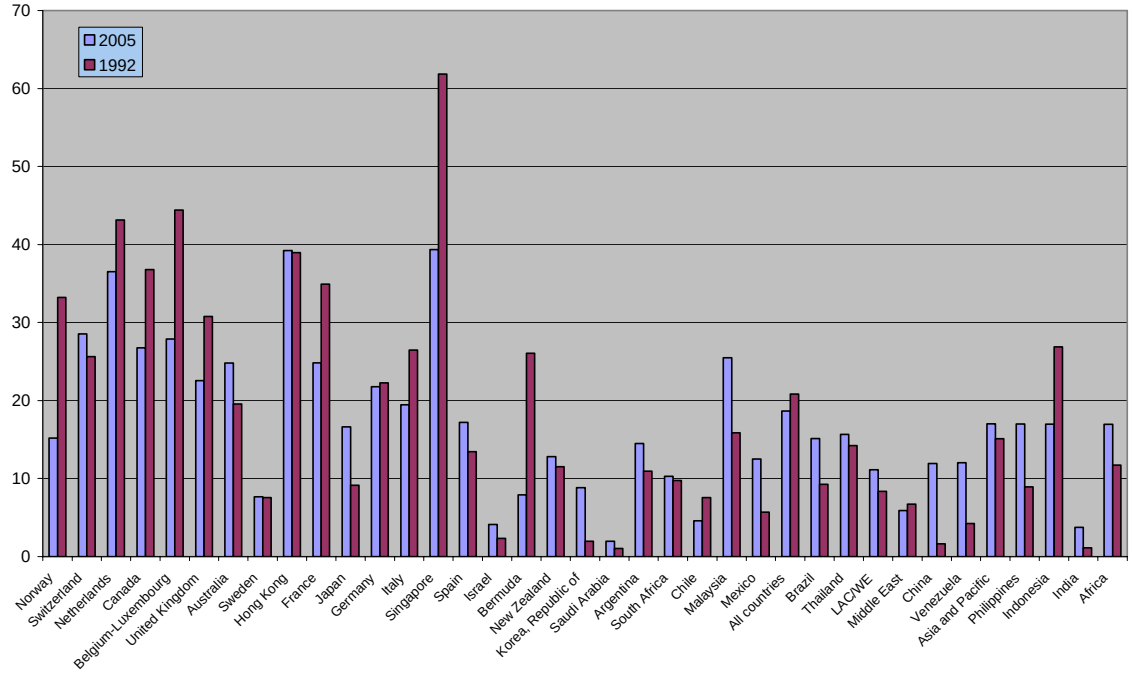


Table A: US Parent-Affiliate Trade: What Share of Total OPS Trade?

From Table 8.20.--Other Private Services by Affiliation of Transactors									
	US parent-affiliate intra firm trade as a share of total trade				US-parent to affiliate trade as a share of total intra-firm trade				
	foreign affiliate share of total exports		foreign affiliate share of total imports		US intra-firm as a share of all intra-firm exports		US intra-firm as a share of all intra-firm imports		GDP per capital PPP curr intl$
	2005	1992	2005	1992	2005	1992	2005	1992	2003
All countries	19	21	23	21	60	62	57	56	8370.871
Canada	27	37	19	21	65	77	D	42	30014.29
Europe	23	31	25	27	58	64	60	55	
Belgium-Luxembourg	28	44	55	36	80	87	80	78	29426.7
France	25	35	23	36	61	67	43	58	28086.95
Germany	22	22	20	35	46	39	49	66	27195.91
Italy	19	26	22	34	79	60	51	72	27150.08
Netherlands	37	43	29	25	69	70	43	32	30671.93
Norway	15	33	22	6	50	88	40	25	36509.79
Spain	17	13	19	11	64	85	67	67	24104.88
Sweden	8	8	19	16	D	19	44	34	28220.41
Switzerland	29	26	5	11	52	54	32	22	31746.91
United Kingdom	23	31	35	27	65	62	72	68	29265.42
Other	19	42	16	8	D	91	65	21	
Latin America and Other Western Hemisphere	11	8	9	5	65	66	61	59	7469.371
South and Central America	12	6	17	3	68	77	60	62	
Argentina	14	11	28	6	100	100	D	100	12047.94
Brazil	15	9	29	18	88	63	90	94	7744.674
Chile	5	8	10 D		89	76	93 D		10508.1
Mexico	13	6	21	3	58	87	52	56	9313.31
Venezuela	12	4	35	1	98	60	100	14	5049.925
Other	8	6	4	1	91	68	D	26	
Other Western Hemisphere	10	17	6	8	60	55	62	57	
Bermuda	8	26	2	10	33	69	39	72	22386.99
Other	11	14	16	5	86	50	75	36	
Africa	17	12	23	1	98	88	D	50	1856.503
South Africa	10	10	D	2	93	100	D	100	10634.12
Other	18	12	D	0	99	88	D	25	
Middle East	6	7	36	10	D	31	88	80	5521.819
Israel	4	2	61	20	D	43	87	84	23157.01
Saudi Arabia	2	1	4	6	D	4	100	100	13210.03
Other	8	16	11 D		D	83	95 D		
Asia and Pacific	17	15	33	24	D	51	54	60	4834.405
Australia	25	20	35	24	88	86	90	88	28911.4
China	12	2	47	2	86	68	89	67	5265.15
Hong Kong	39	39	72	29	90	93	90	61	28151.05
India	4	1	20	8	D	100	30	82	2883.062
Indonesia	17	27	5	10	98	100	86	100	3397.146
Japan	17	9	30	33	37	20	42	57	27850.79
Korea, Republic of	9	2	19	5	92	56	53	82	19186.78
Malaysia	25	16	74	7	D	96	97	100	9544.547
New Zealand	13	12	15	12	96	100	97	83	22133.04
Philippines	17	9	14	1	87	100	D	100	4368.347
Singapore	39	62	34	18	74	97	42	71	25787.75
Taiwan	13	10	36	12	82	93	92	62	na
Thailand	16	14	24	1	D	100	80	25	7483.132
Other	2	2	1	0	84	100	D	50	
Addenda:									
European Union [3]	23	34	28	29	58	65	62	61	

Table B: Affiliate Sales: Where to?

Based on Table III.F 16. Sales of Services by Affiliates, Industry of Affiliate by Destination [1]

[Millions of dollars]

	Sales to the United States		Sales to foreign countries			
			Local [3]	To other foreign countries [4]		
	Total	To U.S. parents	To unaffiliated persons	Total	To other foreign affiliates	To unaffiliated persons
	(4)	(5)	(12)	(13)	(14)	(15)
		"MOFA imports"				
2004 All industries	**35,552**	**23,796**	**395,198**	**78,425**	**38,379**	**40,046**
percent of affiliate sales to all destinations		5	75		7	8
percent of unaffiliated sales to all destinations			88			9
1999 'All industries	**19,646**	**14,779**	**310,896**	**32,520**	**13,866**	**18,654**
percent of affiliate sales to all destinations		4	83		4	5
percent of unaffiliated sales to all destinations			93			6
2004 NAICS 4 other private services	13,543	10,866	190,982	47,309	19,177	28,132
percent of affiliate sales to all destinations		4	74		7	11
percent of unaffiliated sales to all destinations			86			13
1999 NIACS OPS	**6,819**	**5,371**	**143,287**	**17,534**	**6,329**	**11,205**
percent of affiliate sales to all destinations		3	83		4	7
percent of unaffiliated sales to all destinations			92			7
2004 NAICS OPS + F&I	**40,809**	**30,485**	**325,121**	**91,415**	**43,930**	**47,485**
percent of affiliate sales to all destinations		6	68		9	10
percent of unaffiliated sales to all destinations			85			12
1999 total of the NAICS OPS + F&I	19249	15088	**252,024**	**40,974**	**17,620**	**23,354**
percent of affiliate sales to all destinations		5	78		5	7
percent of unaffiliated sales to all destinations			90			8
2004 Professional, scientific, and technical services	**6,843**	**5,550**	**81,852**	**12,374**	**5,653**	**6,721**
percent of affiliate sales to all destinations		5	79		5	6
percent of unaffiliated sales to all destinations			91			7
1999 Professional, scientific, and technical	**5,042**	**4,001**	**61,870**	**8,332**	**3,191**	**5,141**
percent of affiliate sales to all destinations		5	79		4	7
percent of unaffiliated sales to all destinations			91			8

Table 1

US Multinational Parent Affiliated Service Imports and Exports ($000s)			
	1994	1999	2004
N	19,638	21,307	17,655
Parent service exports to affiliates	10,663,835	17,572,160	17,737,273
Macro data Tabl8.20 ($)	*13, 343,000*	*22,222,000*	*27,445,000*
Parent service imports from affiliates	6,712,828	15,006,081	18,119,427
Macro data Tabl8.20 ($)	*6,538,000*	*15,480,000*	*21,437,000*
Parent service exports to service sector affiliates	3,185,229	6,252,529	5,746,742
Parent service imports from service sector affiliates	3,002,135	10,019,726	10,498,368
Total affiliate sales (including non-service sales)	1,679,440,825	2,476,441,239	3,375,685,748

Table 2

Prevalence of Intra-Firm Services Trade (%) Parents				**Macro data**	
	1994	**2004**	**2004**	**1992**	**2005**
N	2,681	2,564	1,888	**By value**	
Share of parents that export services to an affiliate	48.0	42.4	39.1	21%	19%
Share of parents that import services from an affiliate	21.3	20.7	19.2	21%	23%
Share of parents that import and export services with affiliates	18.1	17.4	16.3	na	NA
Share of parents that export services to a service affiliate	8.9	10.3	9.4	na	Na
Share of parents that import services from a service affiliate	5.6	6.0	5.5	na	Na
Share of parents that import and export services with a service affiliate	3.7	4.7	4.2	Na	na

Table 3

Prevalence of Intra-Firm Services Trade (%) Affiliates					
	1994	**1999**	**2004**	**1999**	**2004**
N	19,638	21,307	17,655	**Macro by value**	
Share of affiliates that export services to US parent	8.3	9.0	9.9	4%	5%
Share of affiliates that import services from US parent	25.2	22.2	20.7	NA	NA
Share of affiliates that import and export services with US parent	5.1	5.9	6.3	NA	NA
N	5,461	7,278	6,041		
Share of service affiliates that export services to US parent	10.7	9.9	9.0	5%	6%
Share of service affiliates that import services from US parent	20.3	18.5	14.9	NA	NA
Share of service affiliates that import and export services with US parent	5.8	5.9	5.6	NA	NA

Table 4

Share of Affiliates, Affiliate Intra-Firm Service Exports, and Affiliate Total Sales
(%)

by Affiliate Export Share Class

1999

		Affiliate export share class									
Weight	Affiliate Sector	1	2	3	4	5	6	7	8	9	10
None	Non Service	98.98	--	--	--	--	--	--	--	--	--
	Service	95.81	--	--	--	--	--	--	--	--	--
Parent Imports	Non Service	55.73	9.38	7.63	2.54	2.86	11.41	1.95	D	D	6.54
	Service	29.81	10.86	9.84	4.3	7.19	2.03	5.65	5.91	1.23	23.18
Affiliate Sales	Non Service	99.62	--	--	--	--	--	--	--	--	--
	Service	96.64	--	--	--	--	--	--	--	--	--

Note: D suppressed to avoid disclosure.

Table 5

Sample Descriptive Statistics 1999			
Service Sector Affiliates	N	Mean	Std. Dev.
English	6,356	0.47	0.50
Log(Distance)	6,356	8.40	0.52
Log(GDP/capita 1999)	6,356	9.59	1.01
Affiliate Exports to Parent	6,356	0.10	0.30
Affiliate Exports > 60% of Sales to Parent	6,356	0.014	0.12
Affiliate Exports > 90% of Sales to Parent	6,356	0.008	0.09
Telecommunications Coverage	6,356	0.80	0.34
Tradability (Geographic Concentration)	6,356	0.21	0.13
Log(Compensation/Employee)	4,323	3.80	0.96

Table 6

Probit Regression Results 1999								
	Affiliate Exports			**Vertically Int. Affiliate (60%)**			**Vertically Int. Affiliate (90%)**	
Variable	dF/dx		Robust SE	dF/dx		Robust SE	dF/dx		Robust SE
Log(GDP/capita 1999)	0.0089		0.0094	0.0031		0.0026	0.0020		0.0020
Log(Distance)	0.0231	**	0.0106	0.0063	**	0.0032	0.0030		0.0022
English	0.0237	**	0.0081	0.0096	**	0.0030	0.0046	**	0.0023
Telecomm Coverage	-0.0080		0.0225	-0.0082		0.0069	-0.0061		0.0065
Tradability	0.0211		0.0839	0.0459	**	0.0180	0.0269	**	0.0131
N	6,356			6,356			6,356		

Table 7

Affiliate Exporter Wage Differentials 1999		
Variable	Coefficients	
Affiliate exporter	0.5018 **	0.2746 **
	(.04)	(.0333)
Affiliate exporter, cap	0.5957 **	0.2170 **
	(.1049)	(.0843)
Affiliate exporter, cap10	0.6297 **	0.2509 **
	(.1376)	(.1094)
Country Controls	No	Yes
Indsutry Controls	No	Yes
N	4,663	4,663

Note: Table reports the coefficients from a regression of affiliate log compensation/employee on a dummy of whether the affiliates exports or is a vertically integrated exporter with other controls as listed.

Table 8

Matched Intra-Firm and Unaffiliated Trade in Services Data	
1999	
	Share of unaffiliated imports
By US MNC parents	71.47
By other US firms	28.53

Table 9

Share of Unaffiliated and Affiliated Trade at US Parents with Vertically Integrated Affiliates		
1999		
	Share of parent imports from unaffiliated parties	Share of parent imports from affiliates
Parent with a captive affiliate exporter (60%+)	21.26	89.47
Parent with a captive affiliate exporter (90%+)	11.56	66.3

Data Appendix

BE-577 Survey Data

We use data from the BE-577 survey of international transactions between U.S. parents and their foreign affiliates. The BE-577 survey was a mandatory survey and was conducted quarterly by the Bureau of Economic Analysis (BEA), U.S. Department of Commerce, under the International Investment and Trade in Services Survey Act during the years covered in this study. The BE-577 collected data on sales and receipts for services between the U.S. parent and its foreign affiliates. The questionnaire asked respondents to include: "Allocated expenses and sales of services – Include (a) allocated expenses (such as R&D assessments) and reimbursements between U.S. Reporter and affiliates for services that are normally included in "other income" of the provider of the service and (b) receipts by U.S. Reporter from, or payments by U.S. Reporter to, affiliate for services that are normally included in sales or gross operating revenues of the seller of the service." The categories of services covered by this question include: Financial services, Transportation services, Computer and information services, Management and consulting services, Research, development, and testing services, and Other services (such as professional, technical, public relations, or other services). The data was collected from the U.S. parent for each affiliate (by industry and country) over the reporting threshold ($40 million in assets or sales in 2004).

BE-10 Survey Data

We combine the BE-577 data with information from the BE-10 Benchmark Survey of U.S. Direct Investment Abroad. The benchmark survey is mandatory and obtains universe data on the financial and operating characteristics of, and on positions and transactions between, U.S. parent companies and their foreign affiliates. Each U.S. business enterprise that directly or indirectly owned or controlled 10 percent or more of a foreign business enterprise must file this survey. The BE-10 data cover a broad range of financial and operating characteristics; we use data on foreign affiliate sales and compensation in the analysis.

BE-22 Survey Data

A BE-22 report is required from each U.S. organization that had transactions (either sales or purchases) in excess of $1,000,000 with unaffiliated foreign persons in any of the covered services during the U.S. organization's fiscal year. Covered services in the BE-22 include agricultural services; research, development, and testing services; management, consulting, and public relations services; management of health care facilities; accounting auditing, and bookkeeping services; legal services; educational and training services; mailing, reproduction, and commercial art; employment agencies and temporary help supply services; industrial engineering services; performing arts, sports, and other live performances, presentations, and events; engineering, architectural, and surveying services (purchases only); financial services (purchases only, by companies or

parts of companies that are not financial services providers); advertising services; computer and data processing services; data base and other information services; telecommunications services; operational leasing services; other trade-related services; auxiliary insurance services; waste treatment services; and “other” private services. Other services, such as transportation and reinsurance, are not covered.