



Cornell University  
ILR School

Cornell University ILR School  
**DigitalCommons@ILR**

---

Federal Publications

Key Workplace Documents

---

2011

# FDI, Trade in Services, and Employment and Wages in U.S. Service Industry Firms

Robert E. Lipsey

*National Bureau of Economic Research*

Follow this and additional works at: [http://digitalcommons.ilr.cornell.edu/key\\_workplace](http://digitalcommons.ilr.cornell.edu/key_workplace)

**Thank you for downloading an article from DigitalCommons@ILR.**

**Support this valuable resource today!**

---

This Article is brought to you for free and open access by the Key Workplace Documents at DigitalCommons@ILR. It has been accepted for inclusion in Federal Publications by an authorized administrator of DigitalCommons@ILR. For more information, please contact [hlmdigital@cornell.edu](mailto:hlmdigital@cornell.edu).

---

# FDI, Trade in Services, and Employment and Wages in U.S. Service Industry Firms

## **Abstract**

[Excerpt] Service industries in the United States, which have been the locus of much of U.S. comparative advantage in trade, and some of which had been thought to be virtually impervious to foreign competition, now are the subject of frequent warnings in the press and in academic analyses that their competitiveness is declining or disappearing, or at least that they are newly subject to competition from abroad, especially from developing countries with low wage levels.

The main force behind the change in outlook is the fall in communication costs. These play, for services, the role that transportation costs play for goods as a determinant of the location of production and the extent and direction of trade. A fall in communication costs opens U.S. markets for services to exports by low-cost producers of services in other countries that were previously excluded from the U.S. market by the high cost of international communication. At the same time, it opens markets in other countries to exports by low-cost U.S. producers of services that were previously excluded from foreign markets by international communication costs.

## **Keywords**

service industries, employment, wages, trade in services, foreign direct investment, FDI

## **Comments**

### **Suggested Citation**

Lipsev, R. E. (2011). *FDI, trade in services, and employment and wages in U.S. service industry firms*. Washington, DC: U.S. Department of Labor, Bureau of International Labor Affairs.

U.S. Department of Labor  
Bureau of International Labor Affairs

**Office of Trade and Labor Affairs**  
**Contract Research Program**

Download this and other papers at  
<http://www.dol.gov/ilab/media/reports/otla/>

*The views expressed here are those of the author(s) and do not necessarily represent the views or official positions of the U.S. Government or the U.S. Department of Labor.*

# FDI, Trade in Services, and Employment and Wages in U.S. Service Industry Firms<sup>1</sup>

Robert E. Lipsey

## Introduction

Service industries in the United States, which have been the locus of much of U.S. comparative advantage in trade, and some of which had been thought to be virtually impervious to foreign competition, now are the subject of frequent warnings in the press and in academic analyses that their competitiveness is declining or disappearing, or at least that they are newly subject to competition from abroad, especially from developing countries with low wage levels.

The main force behind the change in outlook is the fall in communication costs. These play, for services, the role that transportation costs play for goods as a determinant of the location of production and the extent and direction of trade. A fall in communication costs opens U.S. markets for services to exports by low-cost producers of services in other countries that were previously excluded from the U.S. market by the high cost of international communication. At the same time, it opens markets in other countries to exports by low-cost U.S. producers of services that were previously excluded from foreign markets by international communication costs.

Similarly, the fall in communication costs reduces the barriers to foreign service producers that wish to open affiliates in the United States to sell services that the parent firm had learned how to produce at low cost and high quality for its domestic market, if the foreign parent firm needed low-cost communication to manage these affiliate operations. In the other direction, the fall in communication costs could enable low-cost service producers in the United

---

<sup>1</sup> The statistical analysis of firm-level data on U.S. multinational companies reported in this paper was conducted at the U.S Bureau of Economic Analysis, under arrangements that maintained legal confidentiality requirements. I am indebted to Kevin Barefoot, Jing Sun, and Takuya Hasebe for research assistance and to Maria Borga for guidance with respect to the BEA data.

States to expand foreign operations that were previously too complex to manage from the United States. In recognition of the internationalization of service industries through foreign direct investment (FDI), the 2004 UNCTAD World Investment Report was subtitled “The Shift Towards Services.”

The result of these reductions in communication costs should be increasing internationalization of each country’s service industries and service markets. That internationalization could take several forms. One is increasing exports of services relative to production in the more competitive of each country’s service industries. Another is increasing imports of services relative to consumption in the less competitive of the country’s service industries. Still another form of internationalization is the increasing production of services by U.S. or other countries’ service industry affiliates operating outside their home countries, relative to home-country production by their parent companies or by home-country firms in general.

### Literature Review

This paper is about the effects on U.S. labor in the service industries of the increased tradability, trade, and international production of services that has been brought about principally by the declines in communication costs and other technical developments and the growth of foreign investment in services. One result of these developments has been the opening of the U.S. market to imports of services that had been thought to be nontradable or barely tradable or to be areas of U.S. comparative advantage. Although this study is about effects on labor in the United States, the phenomenon is worldwide and affects labor and consumers in many countries.

The literature relevant to this subject has concentrated on the issue of “Offshoring”, or imports, with very little attention to exports and very little attention to the provision of services across national boundaries by foreign direct investment, Mode 3 in the terminology of the World Trade Organization (WTO). One of the few to even mention these other aspects of trade in

services was the paper by Bhagwati, Panagariya, and Srinivasan (2004). They pointed out that the decline in communication costs that fostered service imports into the United States also encouraged exports from the United States and production from U.S. FDI as well as imports into the United States.

Among the studies of offshoring, the one closest to this one with respect to the type of data used is the paper by Borga (2005), a description of the BEA data on U.S. parent firms and their affiliates in 1994 and 2002. Since most of what has been learned from these data refers to manufacturing, the comparisons between manufacturing and services provide a valuable context for the analysis of service firms and industries

The 163 parent companies in Borga's service industry panel were much larger, on average, than the 822 in the manufacturing panel in 2002, had grown much faster in employment since 1994, and paid much higher wages, averaging \$82,000 for the year, as compared with \$58,000 in manufacturing. Thus, the service industry parent companies were, on average, employing a much more skilled labor force than the manufacturing parent companies. The majority-owned foreign affiliates of these service firms grew twice as fast in employment as manufacturing affiliates and paid average wages about 50 percent higher than those of manufacturing parents.

The paper is descriptive, for the most part, and contains few conclusions relating to service firms. It is noted that while changes in the use of goods imported from affiliates were associated with changes in parent employment, no significant correlation was found for parent purchases of services from affiliates.

A recent study by Crino (2009) analyzes the employment effects of service offshoring by Italian firms, using propensity score matching. Offshoring is defined simply as the purchase of business or transportation services from abroad, and worker skill is defined as the share of workers with a college degree. The controls include many firm characteristics, including foreign

participation in the firm, but the extent of participation in offshoring is not quantitative. The main conclusion is that service offshoring had no effect on total employment, but shifted the composition of the offshoring firms' employment toward high-skill workers.

Another study, mainly concentrating on IT industries and related particularly to the direction of the shift in skill levels, is a paper by Kierkegaard (2008) that emphasizes the "rapidly deepening skill bias affecting these types of employment" (p. 413) in the United States. The paper expresses some skepticism about the elasticity of supply of highly skilled IT workers, even in India, and suggests that the growth of the most successful service-exporting firms in foreign countries will lead them to expand their own affiliate operations in the United States to take advantage of the highest-skill workers.

Along similar lines is an analysis of the consequences of the growth of service exports on the exporting country by Ahmed (2009) examining the effects of service exports from India. The simulations in that paper project large increases in the wages of skilled workers as a consequence of the growth in the service export sector, confirming Kierkegaard's expectations about wages in the IT sector.

A major trend in the recent literature is to shift the basis for offshoring choices from the firms making the choices or their industries, or the characteristics of the final products or services, as in this paper, to the characteristics of the occupations involved, and from the level of skill involved in the occupation to the nature of the tasks required in different stages of production. The characteristics of the tasks can then be linked to characteristics of the labor force to predict effects of offshoring on different types of workers. One model of this type of offshoring was offered by Grossman and Rossi-Hansberg (2008), emphasizing the distinction between high-skill and low-skill tasks, but the article mentions some suggestions by other writers of ways other than skill levels of distinguishing tasks. The task characteristics various authors have mentioned as determining the likelihood of offshoring include the distinction

between “codifiable” and “tacit” information, between “routine” and “nonroutine” tasks, or interactive or non-interactive tasks.

An example of this shift is the paper by Baumgarten et al. (2010) on the effects of offshoring in manufacturing on German workers in manufacturing. The study finds “modest” effects of offshoring within industries but substantial negative wage effects, especially for low and medium-skill workers, when movements of workers between industries are included. The negative wage effects on low-skill workers performing tasks requiring the lowest level of interactivity, those most readily offshored, were more than four times as large as for low-skill workers performing tasks with the highest level of interactivity.

In an ingenious study aiming to identify vulnerability to offshoring (Jensen and Kletzer, 2006), the authors identified the service activities at risk as those with production geographically concentrated and output extensively traded within the United States. Those activities that are considered not vulnerable are those that are mainly produced where they are consumed, presumably because transport or other costs of moving the service from producer to consumer are too high.

A study of the offshoring of “white-collar employment” in occupations in the United States by Crinò (2010) bases estimates of the tradability of occupations on measures of “...involvement in routine cognitive tasks, dependence on ICT and degree of face-to-face interaction...” (Crinò, p. 596). The paper estimated “labour demand elasticities with respect to service offshoring” for many white collar occupations associated these elasticities with skill levels and degrees of tradability for each occupation. It concluded that the offshoring increased U.S. employment in the more skilled occupations relative to the less-skilled, and that, within skill levels, more tradable occupations were offshored to a greater extent.

The paper on offshoring in manufacturing by Ebenstein, et al. (2009), while it deals mainly with that sector, includes some data from the same sources on workers in service



industries. These show a decline in the number of service industry workers with less than a high school degree, while the numbers in other categories, particularly those with college or advanced degrees increased substantially. They also report that average wages have been consistently lower in services than in manufacturing, a characteristic that does not match the wage levels in the multinationals we examine here.

A broad study of offshoring by the OECD (2007) concluded that there were negative short-term effects on labor in the offshoring country of both offshoring and outward FDI in service industries, but that the effects would be limited by sharp increases in the wages of skilled labor in emerging countries.

A different set of effects of outsourcing of services is proposed in a paper (Gorg and Hanley, 2009) that suggests that outsourcing of service inputs increases innovation. The empirical analysis is based on a set of plant level data for Ireland in 2002-2004 providing information on the domestic and international outsourcing of services and R&D at the plant level. International, but not domestic, outsourcing of services leads to higher profits and higher levels of R&D.

The United States International Trade Commission publishes an annual report on "Recent Trends in U.S. Services Trade" that mostly summarizes information from other U.S. government agencies, but also, in the chapters on individual service industries, includes some information on the main companies involved, information never given in the data from the BEA or the U.S. Treasury Department. The chapter on retailing in the 2010 report, for example, gives the reader an idea of the operations of Wal-Mart in U.S. FDI in retailing and of foreign-owned retail operations in the United States.

The ITC report is at least less one-sided than most of the literature reviewed, in that it is not confined to service offshoring by the United States, but at least acknowledges developments on the U.S. export side as well as the import side and the outward as well as inward side of FDI

in services. The literature in this area in general is narrowly focused on imports and fails to appraise the two sides of the consequences of falling communication costs.

### The Universe Studied

This study is based on a confidential individual firm data set on multinational service industry firms collected by the Bureau of Economic Analysis of the U.S. Department of Commerce. The firms in the data set consist of both U.S. operations (parent data), with information on numbers of workers and their wages for employees in the United States, and their foreign operations, or foreign affiliates, with information on many aspects of their operations, including their output, employment and wages, and trade with the United States. The main analysis is limited to what are referred to as continuing firms, firms operating as service industry multinationals from 1999 through 2004, because the data are most complete and comparable over that period. In addition to the continuing firms, the data set also includes firms disappearing by changing their industries, by closing down, by being acquired by other firms, or by losing their multinational status, and firms entering the industries as multinationals, but these are excluded from the main analysis. Their importance relative to the continuing firms is measured in Appendix A. The dataset also includes information about the operations of foreign firms' service industry affiliates in the United States.

Since the source data are confidential, some tables here suffer from suppression of data when the number of reporters is small or heavily dominated by a small number of reporters. In addition, I do not show any equations based on fewer than 20 firms and do not report constant terms.

Table 1 provides measures of the labor force in the main groups of firms whose operations are studied here. The parent firms cover a little less than a quarter of the U.S. employees in the industries we study and the affiliates of foreign firms a little over 5 percent.

Table 1

## The Number of Employees in the Service Industries (thousands)

|                                  | US Parents |        | US Affiliates of<br>Foreign Parents |         | Foreign Affiliates of<br>US Parents |       | US industry |         |
|----------------------------------|------------|--------|-------------------------------------|---------|-------------------------------------|-------|-------------|---------|
|                                  | 1999       | 2004   | 1999                                | 2004    | 1999                                | 2004  | 1999        | 2004    |
| All service industries           | 13,275     | 12,913 | 3,235                               | 3,309   | 3,820                               | 4,702 | 97,543      | 102,029 |
| Covered industries               | 10,356     | 10,026 | 2,223                               | 2,285   | 2,733                               | 3,231 | 42,956      | 43,475  |
| Wholesale trade                  | 908        | 950    | 527                                 | 579     | 712                                 | 760   | 5,667       | 5,692   |
| Retail trade                     | 3,856      | 3,970  | 740                                 | 695     | 442                                 | 882   | 15,167      | 15,280  |
| Transp. & warehousing            | 1,140      | 944    | 178                                 | 202     | 194                                 | 247   | 4,376       | 4,321   |
| Information <sup>a</sup>         | 1,931      | 1,785  | 344                                 | 290     | 619                                 | 475   | 3,390       | 3,109   |
| Finance & insurance <sup>b</sup> | 1,367      | 1,090  | 264                                 | 267     | 280                                 | 281   | 5,733       | 5,973   |
| Real estate, rental, & leasing   | 140        | 278    | 53                                  | 59      | 55                                  | 63    | 2,073       | 2,164   |
| Prof., sci., & tech. services    | 1,015      | 1,009  | 116                                 | 193     | 432                                 | 524   | 6,550       | 6,936   |
| Arch., eng. & related services   | 112        | 153    | 33                                  | 25 ~ 50 | 51                                  | 42    |             |         |
| Comp. systems design             | 394        | 342    | 36                                  | 63      | 179                                 | 257   | 1,181       | 1,162   |
| Manage., sci. & tech. serv.      | 105        | 63     | 3                                   | 8       | 42                                  | 53    |             |         |

Source: the website of BEA

US Direct Investment Abroad: Revised 2004 Estimates, Revised 1999 Estimates

Foreign Direct Investment in the United States: Revised 2004 Estimates, Revised 1999 Estimates

Gross-Domestic-Product-by-Industry Accounts, Full-time and Part-Time Employees by Industry

Notes: "All service industries" is not a category distinguished in the source, but is the sum of those listed above, plus "Management of nonbank companies and enterprises," "Administration, support, and waste management," "Health care and Social Assistance," "Accommodation and food services," and "Miscellaneous services."

<sup>a</sup>Consisting of Publishing, Motion picture and sound recording, Broadcasting (except internet), Telecommunications, and Internet, data processing, and other information services.

<sup>b</sup>Consisting of Securities, commodity contracts, and other intermediation and related activities, Other finance, except depository institutions, and insurance carriers and related activities.

Employment in the foreign affiliates of U.S. parents was about a third of parent employment and that of U.S. affiliates of foreign parents was 23 percent of U.S. parent employment. The Information industry was much more international than the average. In that industry, U.S. parents accounted for over half of U.S. employment and their overseas affiliates added over a quarter to their parents' employment.

In the Computer systems design industry, employment in overseas affiliates of U.S. parents was about three quarters of parent employment. In this industry, affiliate employment grew and parent employment fell by almost the same number.

Table 2 shows as "wages" the average annual compensation, including payments in kind and employer expenditures for employee benefit plans, in each of the industries we cover, in U.S. parent firms, their foreign affiliates, and U.S. affiliates of foreign firms in 1999 and 2004. We interpret the wage levels as reflecting the average skill levels in each group. Among U.S. parents, the highest wages, and presumably highest skill levels, were in Finance and insurance and Management, scientific and technical services. The highest wages in U.S. affiliates abroad were also in Management, scientific and technical services, where the foreign affiliate average wages were over \$100,000 in 2004, close to the average in the parent firms. Wages, and presumably, skill levels, in U.S. affiliates of foreign parents were high, higher in most industries than those in U.S. parent firms, even though they do not include headquarters personnel.

The extent to which imports of services compete with employment in the corresponding U.S. service industries depends partly on the nature of the local industry's functions. If the function is mainly to provide services ancillary to the sale of goods in the U.S. market, whether by foreign exporters of goods or U.S. goods producers, services imported from other countries may not compete with the U.S. service providers. That is likely to be the case for service industries in which the sales consist mainly of goods. The composition of service-industry sales, between goods and services, is shown in Table 3 for majority-owned nonbank affiliates.

Table 2  
 Industry Average Annual Wage of US Parents and their Affiliates  
 and U.S. Affiliates of Foreign Parents  
 (US dollars)

|                                | US Parents |         | Foreign Affiliates<br>of US Parents |         | US Affiliates<br>of Foreign Parents |         |
|--------------------------------|------------|---------|-------------------------------------|---------|-------------------------------------|---------|
|                                | 1999       | 2004    | 1999                                | 2004    | 1999                                | 2004    |
| All service industries         | 40,235     | 50,393  | 35,265                              | 39,308  | 42,631                              | 55,695  |
| Covered Industries             | 45,232     | 56,111  | 42,022                              | 47,624  | 51,148                              | 68,115  |
| Wholesale trade                | 52,309     | 63,433  | 47,122                              | 55,796  | 58,286                              | 79,769  |
| Retail trade                   | 17,993     | 24,183  | 15,095                              | 16,824  | 22,751                              | 28,381  |
| Transp. & warehousing          | 52,591     | 64,279  | 29,282                              | 30,020  | 37,536                              | 46,432  |
| Information                    | 55,086     | 74,607  | 37,014                              | 59,205  | 62,382                              | 81,756  |
| Finance & insurance            | 82,052     | 112,108 | 68,702                              | 88,311  | 105,670                             | 138,683 |
| Real estate, rental, & leasing | 42,505     | 36,515  | 36,490                              | 38,381  | 50,974                              | 58,193  |
| Prof., sci., & tech. services  | 66,174     | 79,367  | 57,421                              | 64,738  | 63,810                              | 83,587  |
| Arch., eng. & related          | 57,025     | 74,938  | 51,918                              | 62,199  | 60,000                              | (*)     |
| Comp. systems design           | 71,844     | 91,733  | 70,017                              | 68,480  | 72,374                              | 98,744  |
| Manage., sci. & tech. serv.    | 82,490     | 105,197 | 76,916                              | 102,814 | 85,000                              | 102,500 |

Source: the website of BEA

Foreign Direct Investment in the United States: Revised 1999 Estimates  
 Revised 2004 Estimates

(\*) Indicates that the data are suppressed

Average wage is total annual compensation including payments in-kind and employer contributions to employee benefit plans.

Table 3

Distribution of Sales of Goods and Services  
by U.S. Parent Companies, 1999 (Percent)  
(millions of dollars)

|                                | 1999<br>Sales |          |
|--------------------------------|---------------|----------|
|                                | Goods         | Services |
| All Service Industries         | 39.8          | 50.8     |
| Covered Industries             | 42.2          | 47.4     |
| Wholesale trade                | 92.5          | 7.0      |
| Retail trade                   | 99.5          | 0.3      |
| Transp. & warehousing          | (D)           | 95.8     |
| Information                    | 8.5           | 91.2     |
| Finance & insurance            | (D)           | 66.8     |
| Real estate, rental, & leasing | 7.3           | 88.0     |
| Prof., sci., & tech. services  | (D)           | 83.4     |
| Arch., eng. & related          | 15.2          | 84.8     |
| Comp. systems design           | (D)           | 69.8     |
| Manage., sci. & tech. serv.    | (D)           | (D)      |

Source: the website of BEA, U.S. Direct Investment Abroad,  
Revised 1999 Estimates

Note: (D) indicates the data are suppressed.

The sum of sales of goods and services does not equal total sales  
because of “investment income.”

“All service industries” and “covered industries” are the sums  
of the industries for which data are available.

## Questions, hypotheses and assumptions

The United States was a pioneer in the early growth of foreign direct investment (FDI), particularly in manufacturing, even when it was, on balance, a capital importer. The United States has favored international agreements that encouraged an open policy toward inward investment and, in recent years, rules extending more open inward investment policies to service industries, which have been more restricted than manufacturing. The share of service industries in world FDI has been growing, but data on the international operations of service industries outside finance are still scarce.

Despite the success of multinational operations for their owners, there have been persistent questions about impacts on both their home countries and the host countries in which they operate. There is a long literature on multinationals' effect on their home countries' export trade and another literature on their effects on home and host country labor. This paper's questions relate to home country labor effects in U.S. service industries and, in particular, their relation to employment, wage changes, the demand for skills, and the skill composition of industries, as they are affected by the international operations of U.S. multinational firms. The aspects of their operations studied are the location of their production and their trade in and out of the United States.

The analyses here are exploratory: an effort to learn how firms in service industries operate internationally and how particular actions affect their employees in the United States. The limits of the analyses reflect the limits of what we know about service industry firms' structure and production. The industry categories within services in which data are collected are much broader than in manufacturing. Much of production is intangible and output is difficult to measure. Not only production, but inputs also are often intangible, making productivity measures questionable. And the difficulty of measurement extends to exports and imports, because intangibility of output and low communication costs sometimes make the location of production ambiguous (Lipsey, 2007, 2008, and 2010).

Most of the standard theory of production comes from manufacturing and agriculture, and deals with the combination of physical capital and labor. It is much less clear how production takes place in many service industries, what inputs are used, and where the inputs and the production take place. This paper is more an effort to find out how service production and trade take place and what kind of strategies multinational firms use to operate internationally than an attempt to apply an established theory to a clearly measured reality.

There is an underlying trend toward multinational operations that seems to affect almost every country's firms. It is partly driven by the decline of travel, and especially communication, costs that has lowered the cost to a firm of producing outside its home country. That long-term trend was documented in UNCTAD (2001) and has been confirmed in UNCTAD's later World Investment Reports. In more recent years, the fall in communications costs has been one of the factors that have reduced the cost of fragmenting production, building chains of stages of production that take advantage of differences in production costs smaller than those formerly required for the complete relocation of production.<sup>2</sup>

Multinational firms tend to be, within their industries, the higher productivity firms. For firms based in the United States, I associate that higher productivity with a higher average skill level, and my proxy for this is a higher average wage level. Thus, when I divide industries into firms with average wages above the median and below the median for their industry, I interpret the division as being between higher and lower productivity firms.

To the extent that imports are for final consumption, rather than as inputs into production, they would be expected to be negatively related to U.S. employment in the corresponding industries. That could be the case also if the imports were inputs into production, but substituted for what were formerly inputs produced domestically. On the other hand, if the

---

<sup>2</sup> See, for example, Kimura and Ando (2006), on Japanese production networks.



imports were inputs that replaced more expensive domestically produced inputs, they might raise U.S. output, employment, and wages in the industries using them

I ask mainly how the actions of individual service industry parent firms affect these firms' labor forces, and more broadly, the effect of trade and investment in service industries on the demand for skills in the United States. The information I have about the labor forces are the number of employees and the average wage in each parent firm. I take these in cross-sections of firms to be a measure of the average skill level of the firm's workers, and over time to represent changes in average skill, changes in worker pay rates, or some combination of these. The firms' actions I study include increasing or decreasing employment in the firm's own foreign affiliates and increasing or decreasing the parent firm's imports and exports of services. I subdivide the firms' production location strategy into adding or subtracting employment in developing countries and doing so in developed countries, in the expectation that the choice may affect the skill composition of home employment. I also subdivide the firms in each industry into those whose employees earn, on average, above-median wages and those earning below-median wages, as a way of estimating how foreign production and trade affect workers of different skill levels.

After many experiments with different forms of equations, I rely mainly on measuring absolute changes in employment, trade and other variables. However, some relative change equations are included for comparison. They gave more erratic results, probably because there were many changes from small initial numbers.

The most basic empirical specification used in this study is a simple linear regression of the change in affiliate employment, change in imports or change in exports on the change in a parent company's employment level between 1999 and 2004. That is,

$$\Delta PE_{ij} = a + b\Delta AE_{ij}$$

where  $\Delta PE_{ij}$  is the change in parent employment for firm "i" in industry "j" and  $\Delta AE_{ij}$  is the change in affiliate employment for firm "i" in industry "j". I consider separately the impacts of

changes in affiliate employment in developed (AEA) and developing countries (AEB), and also explore the relationship between parent employment and changes in imports and exports of services by parents (denoted  $\Delta PIM$  and  $\Delta PEX$ ). Similar relationships between changes in firm level average wages ( $\Delta W_{ij}$ ) and affiliate employment and parent imports and exports of services are also explored.

### Affiliate and Parent Employment

The analysis begins with the relation of parent employment in the United States to the growth (or decline) of each parent's own affiliate employment in foreign countries, asking first whether there is any simple relationship between them and then whether the characteristics of the locations for overseas production or the initial skill levels of the parent firms affect the relationship. The interpretation of the results for changes in affiliate employment is facilitated by reference to the direction of changes in affiliate employment in the various industries. Employment in affiliates in developed countries rose in every industry except Information, where it declined by 20 percent. However, employment in developing country affiliates declined in Wholesale trade in durables, Transportation and Warehousing, Information, Finance and insurance, and, among Professional and related services, in Architectural, engineering, and related services.

A simple relationship between affiliate employment and parent employment is described in Table 4. Over a quarter of the variance in firm employment growth in the U.S. can be explained by the expansion or contraction of employment abroad. Whatever relationships exist appear to be positive: firms that expanded their employment abroad also expanded their employment in the United States and firms that contracted abroad also contracted in the United States. The relationship was strongest in Retail trade, Finance and insurance, and Architectural, engineering, and related services, and a little weaker, but substantial, in Information and in Management, scientific, and technical consulting services. It should be

Table 4

Relation of Change in a Parent's U.S. Employment (PE)  
to Change in its Affiliate Employment (AE), 1999-2004

$$\Delta PE = a + b\Delta AE$$

| Industry                       | No. obs. | Coefficient | t     | $\bar{R}^2$ |
|--------------------------------|----------|-------------|-------|-------------|
| All service industries         | 1070     | 0.759       | 20.72 | 0.286       |
| Wholesale trade                |          |             |       |             |
| Durable                        | 183      | 0.132       | 0.81  | -0.002      |
| Nondurable                     | 99       | -0.093      | 0.65  | -0.006      |
| Retail trade                   | 70       | 1.037       | 10.52 | 0.614       |
| Transp. & warehousing          | 59       | 0.391       | 1.90  | 0.043       |
| Information                    | 130      | 0.539       | 4.12  | 0.110       |
| Finance & insurance            | 96       | 1.134       | 6.98  | 0.334       |
| Real estate, rental, & leasing | 37       | 0.227       | 0.60  | -0.018      |
| Prof., sci., & tech. services  | 208      | 0.283       | 3.31  | 0.046       |
| Legal                          | 22       | 0.658       | 1.67  | 0.079       |
| Arch., eng. & related          | 36       | 0.800       | 4.05  | 0.306       |
| Comp. systems design           | 53       | 0.169       | 2.05  | 0.058       |
| Manage., sci. & tech. serv.    | 31       | 1.024       | 2.93  | 0.202       |

remembered that In Architecture, etc., and particularly in Information, the changes in foreign affiliate employment were negative on average, and to the extent that they were negative, were associated with declines in parent employment.

These relationships were as frequently positive, but less frequently statistically significant, in the relative change equations summarized in Table 5. My interpretation of these results is that the factors that led a parent to expand or contract employment abroad had the same effect on employment at home. There is no indication here that a parent's expansion abroad was principally in competition with expansion at home.

Since most of the concern about employment effects of a shift of service industry activity abroad centers on competition from developing countries, the foreign affiliate employment is separated into that in developed and that in developing countries in Tables 6, 7, and 8, first examining the two locations for affiliates separately and then combining them.

Changes in affiliate employment in developed countries are consistently and positively related to changes in the same direction in employment by their parent companies (Table 6). The results may simply reflect parallel changes in demand for services between the United States and other developed countries, or they may reflect dependence of home employment on developed country affiliate employment. They do not suggest rivalry between the two types of service production locations.

The story for affiliate employment in developing countries is described in Table 7. The correlation between parent and affiliate employment is less close, more of the coefficients for affiliate employment are statistically insignificant, two of them are negative and statistically significant. In both industries, Transportation and warehousing and Computer systems design, the aggregate data in Table 1 show declines in aggregate U.S. parent employment of 13-17 percent. Employment in the developing country affiliates of Computer systems design parents rose, suggesting a substitution of developing country labor for U.S. labor, but employment in developing country affiliates in Transportation and warehousing fell, suggesting a demand side

Table 5

Relation of Relative Change in a Parent's U.S. Employment (RPE)  
to Relative Change in its Affiliate Employment (RAE), 2004/1999

| Industry                       | No. obs. | Coefficient | t    | $\bar{R}^2$ |
|--------------------------------|----------|-------------|------|-------------|
| All service industries         | 903      | .148        | 6.25 | .040        |
| Wholesale trade                |          |             |      |             |
| Durable                        | 171      | .125        | 2.26 | .023        |
| Nondurable                     | 87       | .100        | 2.42 | .053        |
| Retail trade                   | 65       | .122        | 1.22 | .008        |
| Transp. & warehousing          | 53       | .003        | 0.04 | -.020       |
| Information                    | 122      | .150        | 2.48 | .041        |
| Finance & insurance            | 75       | .300        | 4.22 | .185        |
| Real estate, rental, & leasing | 25       | .493        | 3.00 | .250        |
| Prof., sci., & tech. services  | 185      | .081        | 1.55 | .007        |
| Legal                          | 20       | .053        | 0.26 | -.051       |
| Arch., eng. & related          | 33       | -.082       | 0.67 | .018        |
| Comp. systems design           | 51       | .093        | 1.30 | .013        |
| Manage., sci. & tech. serv.    | 26       | .152        | 0.87 | -.010       |

Table 6

Change in Parent Employment (PE) as a Function of  
 Change in Affiliate Employment in Developed Countries (AEA), 1999-2004  
 $\Delta PE = a + b\Delta AEA$

| Industry                       | No. obs. | $\bar{R}^2$ | Coefficient | t     |
|--------------------------------|----------|-------------|-------------|-------|
| All service industries         | 1052     | 0.257       | 0.86        | 19.11 |
| Wholesale trade                |          |             |             |       |
| Durable                        | 161      | 0.053       | 1.448       | 3.15  |
| Nondurable                     | 102      | 0.153       | 2.332       | 4.38  |
| Retail trade                   | 61       | 0.932       | 1.491       | 28.65 |
| Transp. & warehousing          | 51       | 0.382       | 0.403       | 5.65  |
| Information                    | 149      | 0.157       | 1.888       | 5.34  |
| Finance & insurance            | 103      | 0.392       | 0.824       | 8.18  |
| Real estate, rental, & leasing | 33       | 0.372       | 2.471       | 4.47  |
| Prof., sci., & tech. services  | 209      | 0.044       | 0.287       | 3.24  |
| Arch., eng. & related          | 32       | 0.186       | 1.220       | 2.84  |
| Comp. systems design           | 55       | 0.029       | 0.828       | 1.62  |
| Manage., sci. & tech. serv.    | 29       | 0.072       | 0.200       | 1.78  |

Table 7

Change in Parent Employment (PE) as a Function of  
 Change in Affiliate Employment in Developing Countries (AEB), 1999-2004  
 $\Delta PE = a + b \Delta AEB$

| Industry                      | No. obs. | $\bar{R}^2$ | Coefficient | t     |
|-------------------------------|----------|-------------|-------------|-------|
| All service industries        | 624      | 0.182       | 1.352       | 11.80 |
| Wholesale trade               |          |             |             |       |
| Durable                       | 104      | -0.003      | 0.086       | 0.86  |
| Nondurable                    | 53       | 0.778       | 4.585       | 13.55 |
| Retail trade                  | 43       | 0.695       | 2.897       | 9.83  |
| Transp. & warehousing         | 38       | 0.288       | -0.729      | 4.00  |
| Information                   | 74       | 0.249       | 1.399       | 5.02  |
| Finance & insurance           | 69       | 0.121       | 0.532       | 3.22  |
| Prof., sci., & tech. services | 111      | 0.058       | 0.342       | 2.78  |
| Arch., eng. & related         | 20       | 0.565       | 4.053       | 5.06  |
| Comp. systems design          | 27       | 0.676       | -0.653      | 7.44  |

Table 8

Coefficients for Growth in Affiliate Employment in Developed (AEA) and Developing (AEB) Countries  
in Regressions for Parent Employment Growth (PE), 1999-2004

$$\Delta PE = a + b \Delta AEA + c \Delta AEB$$

| Industry                      | No. obs. | $\bar{R}^2$ | AEA         |      | AEB         |      |
|-------------------------------|----------|-------------|-------------|------|-------------|------|
|                               |          |             | Coefficient | t    | Coefficient | t    |
| All service industries        | 386      | .361        | .983        | 11.7 | .163        | .78  |
| Wholesale trade               |          |             |             |      |             |      |
| Durable                       | 63       | .178        | 1.49        | 3.6  | -.564       | 2.22 |
| Nondurable                    | 34       | .650        | 7.50        | 5.5  | 1.22        | 2.74 |
| Retail trade                  | 27       | .855        | .950        | 1.88 | 1.42        | .500 |
| Information                   | 57       | .093        | .286        | .55  | 1.28        | 1.16 |
| Finance & insurance           | 51       | .096        | .112        | .23  | 1.17        | 2.40 |
| Prof., sci., & tech. services | 81       | .202        | .489        | 2.92 | -.449       | 4.06 |
| Comp. systems design          | 24       | .703        | .682        | 4.49 | -.594       | 6.14 |



effect. In the case of Information, employment fell in both developing country affiliates and parents, producing a positive coefficient.

For those parent firms that owned affiliates in both developed and developing countries, Table 8 shows the relation of parent employment growth to the growth of affiliates in the two regions. In Wholesale trade in durables, growth in employment in developed countries was significantly associated with growth in parent employment while the negative coefficient for affiliates in developing countries, where affiliate employment declined, suggested a substitution of home employment for that in developing country affiliates. In contrast, in Computer systems design and related services, and in the broader group of Professional, scientific and technical services, employment growth in developed country affiliates tended to raise parent employment, while employment growth in developing country affiliates significantly reduced parent employment growth.

The combination of the influences of the choice between developed and developing countries for affiliates and the position of the parent company in its industry's skill ranking is explored in Table 9. Among the parents with higher-skill labor, the significant and marginally significant industry coefficients for affiliate employment in developed countries were positive in five cases, and negative for only one, Wholesale trade in nondurables. The statistically significant coefficients for affiliate employment in developing countries were positive in three out of four cases and negative in one, Management, scientific, and technical services. Thus, for the higher skill parent firms, additions to affiliate employment in both developed and developing countries were mostly accompanied by additions to employment in the United States. Among the lower-skill parent firms, there were two industries, Wholesale trade in durables and Retail trade, in which higher employment in developing countries was significantly associated with lower parent employment, and one, Finance and insurance, in which the relation was positive. In both the industries with negative home employment relations to employment additions in developing countries, employment additions in developed countries went along with higher

Table 9

Coefficients for Changes in Affiliate Employment in Developed and Developing Countries, 1999-2004  
in Equations for Employment by Parents with 1999 Average Wages Above and Equal to or Below Median  
 $\Delta PE = a + b\Delta AEA + c\Delta AEB$

| Industry                       | Parent Average Wage Above or Equal to Median |             |                               |        |       |       | Parent Average Wage Below Median |             |                               |         |       |      |
|--------------------------------|--|-------------|-------------------------------|--------|-------|-------|----------------------------------|-------------|-------------------------------|---------|-------|------|
|                                | No. obs.                                     | $\bar{R}^2$ | Coefficient for Employment in |        | t     |       | No. obs.                         | $\bar{R}^2$ | Coefficient for Employment in |         | t     |      |
|                                |  |             | A                             | B      | A     | B     |                                  |             | A                             | B       | A     | B    |
| All service industries         | 570  | 0.104       | -0.846                        | 0.507  | 7.91  | 3.47  | 500                              | 0.352       | 1.088                         | -0.145  | 13.74 | 0.72 |
| Wholesale trade                |  |             |                               |        |       |       |                                  |             |                               |         |       |      |
| Durable                        | 125  | 0.007       | 1.193                         | -0.063 | 1.70  | 0.29  | 58                               | 0.299       | 2.940                         | -0.799  | 5.05  | 2.13 |
| Nondurable                     | 60   | 0.191       | -1.610                        | 1.049  | 2.13  | 3.43  | 39                               | 0.010       | 0.341                         | -0.274  | 0.75  | 1.28 |
| Retail trade                   | 35   | 0.145       | 3.386                         | -0.329 | 1.85  | 0.21  | 35                               | 0.685       | 3.396                         | -12.180 | 3.80  | 2.43 |
| Transp. & warehousing          | 30   | -0.048      | 1.071                         | -0.899 | 0.71  | 0.37  | 29                               | 0.193       | 0.837                         | -0.157  | 2.67  | 0.44 |
| Information                    | 68   | 0.756       | 2.354                         | 0.091  | 12.03 | 0.44  | 62                               | 0.102       | -0.021                        | 2.148   | 0.03  | 1.22 |
| Finance & insurance            | 51   | 0.027       | 1.049                         | 0.384  | 1.82  | 0.49  | 45                               | 0.380       | 1.001                         | 1.257   | 2.13  | 3.64 |
| Real estate, rental, & leasing | 22   | -0.010      | -0.397                        | 1.048  | 1.20  | 1.30  |                                  |             |                               |         |       |      |
| Prof., sci., & tech. services  | 134  | 0.044       | 0.268                         | 0.633  | 1.35  | 1.47  | 74                               | 0.059       | 0.476                         | -0.044  | 2.39  | 0.22 |
| Arch., eng. & related serv.    | 22   | 0.941       | 2.869                         | 5.177  | 7.66  | 13.22 |                                  |             |                               |         |       |      |
| Comp. systems design           | 45   | 0.280       | 0.198                         | 0.793  | 1.47  | 2.06  |                                  |             |                               |         |       |      |
| Manage., sci. & tech. serv.    | 23   | 0.643       | 1.911                         | -7.626 | 5.66  | 4.05  |                                  |             |                               |         |       |      |

A = Developed countries  
B = Developing countries

home employment and the same was true for those in Transportation and warehousing, Finance and insurance, and Professional, scientific, and technical services.

In general, the results in Tables 4-9 show that affiliate employment growth was in general associated with growth in their parents' employment in the United States. That is the case for all industries with respect to affiliate employment in developed countries, and in most industries in developing countries as well. However, in two industries, Transportation and warehousing and Computer systems design, affiliate employment in developing countries was negatively related to parent employment and may be thought of as competing with it. Some of the same phenomenon appears among firms with affiliates in both types of destination country. In three industries, Wholesale trade in durables, Professional scientific, and technical services, and its subgroup, Computer systems design, affiliate employment in developed countries was positively and significantly related and affiliate employment in developing countries was negatively and significantly related to parent employment.

#### Trade and Parent Employment

The form of competition most commonly associated with declines in home employment is that from imports, possibly offset by the gains in employment from exporting.

The relations of parent employment to imports of services by parents are described in Table 10. Imports appear to have a significant influence on parent employment in most industries. In every industry but one, the effect seems to be positive, although the service imports might be expected to compete with parent service production. The positive relationship

Table 10

Coefficients for Imports of Services by Parents (PIM)  
in Regressions for Parent Employment (PE)  
 $\Delta PE = a + b\Delta(PIM)$

| Industry                       | No. obs. | $\bar{R}^2$ | Coefficient | t     |
|--------------------------------|----------|-------------|-------------|-------|
| All service industries         | 1070     | -0.001      | -0.008      | 0.56  |
| Wholesale trade                |          |             |             |       |
| Durable                        | 183      | -0.004      | 0.009       | 0.49  |
| Nondurable                     | 99       | 0.311       | 0.550       | 6.73  |
| Retail trade                   | 70       | -0.009      | 0.479       | 0.61  |
| Transp. & warehousing          | 59       | 0.330       | 0.364       | 5.43  |
| Information                    | 130      | 0.063       | 0.265       | 3.12  |
| Finance & insurance            | 96       | 0.190       | -0.207      | 4.82  |
| Real estate, rental, & leasing | 37       | 0.897       | 0.331       | 17.77 |
| Prof., sci., & tech. services  | 208      | 0.245       | 0.067       | 2.51  |
| Legal                          | 22       | -0.050      | 0.003       | 0.02  |
| Arch., eng. & related          | 36       | 0.233       | 0.172       | 3.41  |
| Comp. systems design           | 53       | 0.105       | 0.053       | 2.66  |
| Manage., sci. & tech. serv.    | 31       | 0.366       | 0.623       | 4.28  |

is not unexpected for the Wholesale and Retail trade industries, and Transportation and warehousing, which are not primarily engaged in production competing with service imports but in the distribution or servicing of goods imports. The Real estate, rental, and leasing imports may represent services related to foreign-owned property. However, the positive relationships extend to more purely service industries, implying complementarity rather than competition with domestic service production. The one negative coefficient is for Finance and insurance.

Exports of services represent demand for parent labor input, and the expected positive relationship between changes in exports and in employment is exhibited in Table 11. All the significant coefficients are positive.

The effects of the combination of trade and overseas production by parent firms are explored in Table 12.

Changes in affiliate employment in developed countries were positively related to changes in parent employment in every industry, significantly in Wholesale trade in durables, Retail trade, Finance, Computer systems design, and Management, scientific, and technical services. Affiliate employment in developing countries more frequently was negatively related to parent employment, significantly in Wholesale trade in nondurables and in Retail trade, and in several groups of Professional, scientific, and technical services, although the coefficients were never statistically significant.

Parent exports were positively related to parent employment, as expected, whenever the relationships were statistically significant. Parent imports were negatively related to employment in Wholesale trade in durables and Finance and insurance, but positively related to parent employment in five other industries, including Computer systems design and Management, scientific, and technical services, as well as marginally significantly in Information, industries thought to be suffering from import competition.

Table 11

Coefficients for Exports of Services by Parents (PEX)  
in Regressions for Parent Employment (PE)  
 $\Delta PE = a + b\Delta(PEX)$

| Industry                       | No. obs. | $\bar{R}^2$ | Coefficient | t     |
|--------------------------------|----------|-------------|-------------|-------|
| All service industries         | 1070     | .038        | .168        | 6.56  |
| Wholesale trade                |          |             |             |       |
| Durable                        | 183      | .545        | .192        | 14.79 |
| Nondurable                     | 99       | .225        | .479        | 5.43  |
| Retail trade                   | 70       | .269        | 2.615       | 5.14  |
| Transp. & warehousing          | 59       | .185        | .461        | 3.77  |
| Information                    | 130      | .190        | .199        | 5.59  |
| Finance & insurance            | 96       | .073        | .035        | 2.9   |
| Real estate, rental, & leasing | 37       | -.006       | .358        | 0.89  |
| Prof., sci., & tech. services  | 208      | .127        | .027        | 5.57  |
| Legal                          | 22       | .080        | .004        | 1.68  |
| Arch., eng. & related          | 36       | .632        | .071        | 7.82  |
| Comp. systems design           | 53       | .050        | .003        | 1.94  |
| Manage., sci. & tech. serv.    | 31       | .117        | .030        | 2.23  |

Table 12

Coefficients for Parent Exports (PEX) and Parent Imports (PIM) of Services  
and for Affiliate Employment in Developed (AEA) and Developing (AEB) Countries  
in Regressions for Parent Employment (PE), 1999-2004

| Industry                       | No.<br>obs. | $\bar{R}^2$ | Affiliate Employment   |       |                         |      | Parent      |      |             |       |
|--------------------------------|-------------|-------------|------------------------|-------|-------------------------|------|-------------|------|-------------|-------|
|                                |             |             | Developed<br>Countries |       | Developing<br>Countries |      | Exports     |      | Imports     |       |
|                                |             |             | Coefficient            | t     | Coefficient             | t    | Coefficient | t    | Coefficient | t     |
| All service industries         | 1070        | .324        | .972                   | 17.59 | .004                    | .03  | .112        | 5.16 | -.015       | 1.32  |
| Wholesale trade                |             |             |                        |       |                         |      |             |      |             |       |
| Durable                        | 183         | .578        | 1.17                   | 3.42  | -.119                   | .97  | .194        | 15.1 | -.030       | 2.43  |
| Nondurable                     | 99          | .342        | .259                   | 0.95  | -.295                   | 2.34 | .116        | .83  | .496        | 3.80  |
| Retail trade                   | 70          | .640        | 2.64                   | 4.51  | -6.64                   | 2.34 | -1.106      | 1.79 | .336        | 0.66  |
| Transp. & warehousing          | 59          | .334        | .744                   | 1.73  | -.514                   | 1.14 | -.080       | .43  | .377        | 3.94  |
| Information                    | 130         | .268        | .265                   | .64   | .924                    | .85  | .147        | 3.97 | .171        | 1.95  |
| Finance & insurance            | 96          | .416        | 1.03                   | 3.28  | .891                    | 3.33 | .017        | 1.66 | -.121       | 2.79  |
| Real estate, rental, & leasing | 37          | .892        | .024                   | .05   | -.039                   | .04  | .148        | 1.12 | .329        | 16.92 |
| Prof., sci., & tech. services  | 208         | .161        | .369                   | 2.81  | .046                    | .26  | .024        | 4.83 | .025        | 0.97  |
| Legal services                 | 22          | .098        | 1.13                   | 1.74  | -2.34                   | 1.27 | .005        | 1.59 | -.033       | 0.20  |
| Arch., eng. & related          | 36          | .740        | .241                   | .67   | .611                    | 3.61 | .068        | 6.40 | -.031       | 0.80  |
| Comp. systems design           | 53          | .271        | .414                   | 3.41  | -.295                   | 1.53 | .002        | 1.48 | .040        | 2.13  |
| Manage., sci. & tech. serv.    | 31          | .601        | .985                   | 3.00  | -.609                   | 1.20 | .028        | 2.99 | .333        | 2.31  |

## FDI, Trade, and U.S. Wages

Aside from effects on employment, imports of services may also tend to reduce, or prevent increases in, wages in U.S. service industries, if they competed mainly with the more skilled domestic operations, or they might raise average domestic wages if they tended to substitute mainly for lower-skill domestic production. The alternative possibilities are tested in Table 13, which relates changes in service industry parent wages to parent imports.

In a way a negative effect of imports on average wages is confirmed. In every service industry but three, a rise in imports is associated with a fall in average wage levels. However, with one exception, the coefficients are mostly far from statistical significance.

The main exception, the only significant positive coefficient, and in fact the only significant coefficient at all, is for Retail trade, Retail trade is the largest employer among parent firms in service industries, accounting for almost 40 percent of employment in the industries covered in our analysis. Retail trade is also, and by far, the lowest paying industry, with average compensation less than half that in all covered service industry firms. One reason for that exception in the sign may be that the service imports by the retail trade parents are mostly not competitive with parent employment, but are services associated with purchases of goods for resale, and are therefore complementary to parent employment in retail trade (In 2004, for example, of total sales of \$9.830 million by affiliates to parents in retail trade, \$9,202 million were of goods (U.S., Bureau of Economic Analysis, 2008, Table III.F21, p. 159).

Parent firm wages are related to parent exports of services in Table 14. A positive relationship might be expected on the ground that a rise in exports represents a rise in the demand for labor in the parent firms. However, there are no significant coefficients, except a marginally significant one in Wholesale trade in durables, and the insignificant ones are more often negative than positive, suggesting some shift toward exporting services produced by less-skilled labor.



Table 13

Coefficients for Change in Parent Imports of Services (PI) in Equations for  
Change in Parent Average Wage (PW), 1999-2004  
 $PW = a + b (PIM)$

| Industry                       | No. obs. | Coefficient | t    | $\bar{R}^2$ |
|--------------------------------|----------|-------------|------|-------------|
| All service industries         | 983      | -0.019      | 0.33 | -0.001      |
| Wholesale trade                |          |             |      |             |
| Durable                        | 182      | -0.132      | 0.88 | -0.001      |
| Nondurable                     | 95       | -0.631      | 0.40 | -0.009      |
| Retail trade                   | 70       | 0.736       | 2.46 | 0.068       |
| Transp. & warehousing          | 57       | -0.601      | 0.99 | -0.000      |
| Information                    | 129      | -0.038      | 0.20 | -0.008      |
| Finance & insurance            | 89       | 0.092       | 0.06 | -0.011      |
| Real estate, rental, & leasing | 30       | -0.940      | 1.24 | 0.018       |
| Prof., sci., & tech. services  | 198      | -0.049      | 0.13 | -0.005      |
| Legal serv.                    | 22       | -0.889      | 0.07 | -0.050      |
| Arch., eng. & related          | 35       | -0.232      | 0.63 | -0.018      |
| Comp. systems design           | 53       | -0.227      | 0.60 | -0.012      |
| Manage., sci. & tech. serv.    | 29       | -1.127      | 0.13 | -0.036      |

Table 14

Coefficients for Change in Parent Exports of Services (PEX),  
 In Equations for Change in Parent Average Wage (PW)  
 1999-2004  
 $\Delta PW = a + b\Delta(PEX)$

| Industry                       | No. obs. | $\bar{R}^2$ | Coefficient | t    |
|--------------------------------|----------|-------------|-------------|------|
| All service industries         | 983      | -.001       | -.072       | .69  |
| Wholesale trade                |          |             |             |      |
| Durable                        | 182      | .013        | -.292       | 1.84 |
| Nondurable                     | 95       | -.007       | -.913       | .57  |
| Retail trade                   | 70       | -.001       | .229        | .97  |
| Transp. & warehousing          | 57       | .012        | -1.308      | 1.31 |
| Information                    | 129      | -.001       | -.078       | .90  |
| Finance & insurance            | 89       | -.004       | -.316       | .80  |
| Real estate, rental, & leasing | 30       | -.035       | -.922       | .17  |
| Prof., sci., & tech. services  | 198      | .001        | .081        | 1.10 |
| Legal serv.                    | 22       | -.049       | -.022       | .11  |
| Arch., eng. & related          | 35       | -.016       | -.065       | .68  |
| Comp. systems design           | 53       | -.019       | .003        | .11  |
| Manage., sci. & tech. serv.    | 29       | -.033       | .199        | .34  |

The combined effect of exports and imports on parent wages is examined in Table 15. The one significant coefficient, for parent imports, is for parents in retail trade. It is a positive one, suggesting a shift toward higher average skill, presumably complementary with the services imported with the goods imported for resale. For wholesale trade in durables, there is a negative and almost significant coefficient for parent exports. As in the separate equations for exports and imports of services, negative coefficients were predominant, but not statistically significant.

In Table 16, the relationship with parent imports and exports is examined for low-skill and high-skill parent firms separately. There are very few significant impacts of trade on parent wages to describe. One is in higher-skill firms in Architectural, engineering, and related services, where both imports of services are associated with significant decreases in average parent wages. Since both import and export growth are associated with higher employment in this industry (Tables 10 and 11), it appears that the employment growth in this industry favored lower-skilled workers, at least in the higher-skill firms. Growth in imports apparently favored lower-skill workers also in Wholesale trade in nondurables among relatively low-wage firms, while it led to higher employment overall, and growth in exports was associated with average parent wage declines in Wholesale trade in durables. However, the most typical result is of no significant effect of increases in exports or imports of services on average parent wage levels.

Table 17 shifts attention to the impact of employment abroad by affiliates of U.S. multinational service firms on the parent firms' average wages at home. For parent firms in Wholesale trade in durables, expansions in developing countries moved parents to higher average wages at home, presumably reflecting a shift toward higher skill, but expansions in developed countries were associated, in a marginally significant fashion, with lower wages, and presumably less skilled labor forces, at home. The only other significant relationship was for firms in Architectural, engineering, and related services. In that industry, affiliate employment

Table 15

Coefficients for Change in Parent Imports (PI) and Exports (PEX) of Services  
in Equations for Change in Average Parent Wage Change (PW)  
1999-2004  
 $\Delta PW = a + b(\Delta PIM) + c\Delta(PEX)$

| Industry                       | No. Obs. | $\bar{R}^2$ | Parent Imports |      | Parent Exports |      |
|--------------------------------|----------|-------------|----------------|------|----------------|------|
|                                |          |             | Coefficient    | t    | Coefficient    | t    |
| All service industries         | 983      | -.002       | -.017          | .30  | -.071          | .67  |
| Wholesale trade                |          |             |                |      |                |      |
| Durable                        | 182      | .009        | -.081          | .53  | -.275          | 1.70 |
| Nondurable                     | 95       | -.018       | .189           | .07  | -1.064         | .41  |
| Retail trade                   | 70       | .055        | .712           | 2.24 | .059           | .25  |
| Transp. & warehousing          | 57       | -.006       | -.120          | .14  | -1.173         | .85  |
| Information                    | 129      | -.009       | .015           | .07  | -.080          | .88  |
| Finance & insurance            | 89       | -.015       | -.325          | .21  | -.344          | .82  |
| Real estate, rental, & leasing | 30       | -.018       | -.936          | 1.20 | -.344          | .06  |
| Prof., sci., & tech. services  | 198      | -.003       | -.203          | .50  | .093           | 1.20 |
| Legal services                 | 22       | -.105       | -.608          | .05  | -.020          | .10  |
| Arch., eng. & related          | 35       | -.046       | -.123          | .26  | -.045          | .36  |
| Comp. systems design           | 53       | -.032       | -.242          | .63  | .006           | .22  |
| Manage., sci. & tech. serv.    | 29       | -.071       | -1.497         | .17  | .211           | .35  |

Table 16

Coefficients for Change in Parent Imports (PI) and Exports (PEX) of Services  
in Equations for Change in Average Parent Wage (PW),  
for High-Wage and Low-Wage Parents,  
 $\Delta(PW) = a + b\Delta(PI) + c\Delta(PEX)$

| High-Wage Parents (Average at Median or Above) |          |             |             |      |             |      |
|--|----------|-------------|-------------|------|-------------|------|
| Industry                                       | No. Obs. | $\bar{R}^2$ | Imports     |      | Exports     |      |
|  |          |             | Coefficient | t    | Coefficient | t    |
| All service industries                         | 489      | -0.004      | 0.003       | 0.03 | -.068       | 0.44 |
| Wholesale trade                                |          |             |             |      |             |      |
| Durable  | 124      | 0.027       | -0.104      | 0.72 | -0.348      | 2.09 |
| Nondurable                                     | 56       | -0.020      | 6.185       | 0.93 | -7.588      | 0.96 |
| Retail trade                                   | 35       | 0.103       | 1.141       | 1.85 | 0.082       | 0.12 |
| Transp. & warehousing                          | 29       | 0.000       | 0.063       | 0.05 | -3.033      | 1.20 |
| Information                                    | 67       | -0.028      | 0.117       | 0.25 | -0.057      | 0.42 |
| Finance & insurance                            | 44       | -0.041      | -1.152      | 0.33 | -0.372      | 0.56 |
| Prof., sci., & tech. services                  | 124      | -0.001      | -0.102      | 0.22 | 0.129       | 1.39 |
| Arch., eng. & related                          | 21       | 0.212       | -17.761     | 2.62 | -9.316      | 2.65 |
| Comp. systems design                           | 45       | -0.038      | -0.211      | 0.55 | 0.011       | 0.39 |
| Manage., sci. & tech. serv.                    | 21       | -0.100      | -2.057      | 0.21 | 0.264       | 0.39 |
| Low-Wage Parents (Average Below Median)        |          |             |             |      |             |      |
| All service industries                         | 494      | -0.001      | -0.123      | 1.13 | -0.072      | 0.54 |
| Wholesale trade                                |          |             |             |      |             |      |
| Durable  | 58       | -0.014      | 0.694       | 0.98 | -0.440      | 0.99 |
| Nondurable                                     | 39       | 0.164       | -5.444      | 2.81 | -0.188      | 0.17 |
| Retail trade                                   | 35       | -0.042      | -0.163      | 0.70 | -0.041      | 0.33 |
| Transp. & warehousing                          | 28       | -0.009      | -0.905      | 1.32 | 1.004       | 1.14 |
| Information                                    | 62       | -0.016      | -0.031      | 0.16 | -0.101      | 0.88 |
| Finance & insurance                            | 45       | -0.014      | -0.008      | 0.02 | -0.466      | 1.03 |
| Prof., sci., & tech. services                  | 74       | -0.022      | 0.551       | 0.59 | -0.026      | 0.17 |

Table 17

Coefficients for Change in Affiliate Employment in Developed and Developing Countries  
in Equations for Average Parent Wage Change

| Industry                       | No.<br>obs. | $\bar{R}^2$ | Affiliate Employment   |      |                         |      |
|--------------------------------|-------------|-------------|------------------------|------|-------------------------|------|
|                                |             |             | Developed<br>Countries |      | Developing<br>Countries |      |
|                                |             |             | Coefficient            | t    | Coefficient             | t    |
| All service industries         | 983         | -.002       | -.016                  | .06  | -.029                   | .31  |
| Wholesale trade                |             |             |                        |      |                         |      |
| Durable                        | 182         | .029        | -8.174                 | 1.91 | 3.382                   | 2.25 |
| Nondurable                     | 95          | -.022       | .682                   | .13  | .241                    | .10  |
| Retail trade                   | 70          | -.009       | -.343                  | 1.13 | 1.948                   | 1.17 |
| Transp. & warehousing          | 57          | -.035       | .692                   | .21  | -1.258                  | .31  |
| Information                    | 129         | -.009       | -.850                  | .89  | 2.238                   | .88  |
| Finance & insurance            | 89          | -.023       | 2.199                  | .17  | -1.196                  | .12  |
| Real estate, rental, & leasing | 30          | -.068       | -3.915                 | .21  | 14.165                  | .33  |
| Prof., sci., & tech. services  | 198         | -.010       | .229                   | .11  | .522                    | .19  |
| Legal services                 | 22          | -.099       | -16.391                | .29  | 40.079                  | .31  |
| Arch., eng. & related          | 35          | .131        | 10.105                 | 2.60 | -.657                   | .35  |
| Comp. systems design           | 53          | -.026       | -.026                  | .01  | -2.855                  | .71  |
| Manage., sci. & tech. serv.    | 29          | -.062       | 10.606                 | .61  | 2.702                   | .06  |

contracted, on average, and contractions of employment in developed countries were associated with skill downgrading in parents at home, as reflected in lower average wages.

The relations of parent wages to the combination of changes in trade and in employment in affiliates is examined in Table 18. Imports of services are associated with increases in average wages in Retail trade, but there are no other significant relationships. Exports of services appear to be associated mainly with declines in average wages, but none of these relationships is statistically significant. Increases in affiliate employment in developed countries in Retail trade and, marginally significantly, in Wholesale trade in durables, are associated with declines in parent average wages, while in Architectural, engineering, and related services, growth in affiliate employment is accompanied by higher average parent wages.

The nature of the overseas expansions of employment is examined separately for higher-skill firms and lower-skill firms, distinguished by their wage levels in 1999 relative to industry medians, in Table 19. A significant relation observed for the high-skill parent firms is in the Information industry. In that industry, parent expansions in developed countries were associated with increases in average parent wages. Expansions in developing, presumably low-wage countries led to reductions in average parent wage rates, although the coefficient is not statistically significant. In Computer systems design, there is also a negative effect on parent wages from expansions in low income countries. In Retail trade, expansions in both types of countries were associated with low wage changes. Among low-wage parents, the only significant coefficient was for those in Professional, scientific, and technical services, who had above average wage gains from increases in employment in developed countries.

The clearest relations to wage gains were in Information and Computer systems design, where, for relatively high-wage employers, expansion in developed countries was associated with upward movements in average wages and expansions in developing countries with downward or slower upward average wage changes. The associations may have been in the selection among investing firms, with those upgrading their labor forces expanding in developed

Table 18

Coefficients for Changes in Affiliate Employment in Developed ( $\Delta AEA$ ) and Developing ( $\Delta AEB$ ) Countries and Change in Parent Exports ( $\Delta PEX$ ) and Imports ( $\Delta PIM$ ) of Services in Equations for Change in Average Parent Wage ( $\Delta PW$ )  
 $\Delta PW = a + b(\Delta AEA) + c(\Delta AEB) + d(\Delta PEX) + e(\Delta PIM)$

| Industry                       | No. obs. | $\bar{R}^2$ | Affiliate Employment |      |             |      |             |      |             |      |
|--------------------------------|----------|-------------|----------------------|------|-------------|------|-------------|------|-------------|------|
|                                |          |             | Imports              |      | Exports     |      | Developed   |      | Developing  |      |
|                                |          |             | Coefficient          | t    | Coefficient | t    | Coefficient | t    | Coefficient | t    |
| All service industries         | 983      | -.003       | -.014                | .25  | -.068       | .64  | -.006       | .02  | -.167       | .25  |
| Wholesale trade                |          |             |                      |      |             |      |             |      |             |      |
| Durable                        | 182      | .033        | -.020                | .13  | -.251       | 1.56 | -7.418      | 1.72 | 3.234       | 2.12 |
| Nondurable                     | 95       | -.040       | .264                 | .10  | -1.206      | .45  | 1.040       | .19  | .514        | .20  |
| Retail trade                   | 70       | .087        | .638                 | 1.99 | .545        | 1.40 | -.773       | 2.09 | 3.638       | 2.03 |
| Transp. & warehousing          | 57       | -.025       | .147                 | .17  | -2.154      | 1.26 | 3.884       | .98  | -1.896      | .46  |
| Information                    | 129      | -.018       | -.071                | .31  | -.069       | .72  | -.929       | .87  | 2.639       | .95  |
| Finance & insurance            | 89       | -.038       | -.539                | .30  | -.383       | .88  | 4.772       | .35  | -2.856      | .26  |
| Real estate, rental, & leasing | 30       | -.092       | -.953                | 1.17 | -.295       | .05  | -.782       | .04  | 8.719       | .20  |
| Prof., sci., & tech. services  | 198      | -.013       | -.205                | .50  | .093        | 1.19 | -.326       | .16  | .353        | .13  |
| Legal services                 | 22       | -.222       | .038                 | .00  | -.078       | .26  | -17.281     | .29  | 66.871      | .39  |
| Arch., eng. & related          | 35       | .173        | .062                 | .14  | -.187       | 1.56 | 12.768      | 3.11 | -.481       | .25  |
| Comp. systems design           | 53       | -.057       | -.287                | .72  | .007        | .23  | .200        | .08  | -3.331      | .81  |
| Manage., sci. & tech. serv.    | 29       | -.112       | -10.306              | .82  | .348        | .56  | 25.065      | 1.02 | 9.857       | .78  |



Table 19

Coefficients for Changes in Affiliate Employment in Developed ( $\Delta AEA$ ) and Developing ( $\Delta AEB$ ) Countries, 1999-2004,  
in Equations for Change in Average Wage ( $\Delta PW$ ) for Parents Above and Below Median Wage  
 $\Delta PW = a + b(\Delta AEA) + c(\Delta AEB)$

| Industry                      | Parent 1999 Average Wage Above or Equal Median |             |                               |         |      |      | Parent 1999 Average Wage Below Median |             |                               |        |      |      |
|-------------------------------|--|-------------|-------------------------------|---------|------|------|---------------------------------------|-------------|-------------------------------|--------|------|------|
|                               | No. obs.                                       | $\bar{R}^2$ | Coefficient for Employment in |         | t    |      | No. obs.                              | $\bar{R}^2$ | Coefficient for Employment in |        | t    |      |
|                               |  |             | A                             | B       | A    | B    |                                       |             | A                             | B      | A    | B    |
| All service industries        | 489  | -0.001      | 2.578                         | 0.439   | 1.24 | 0.19 | 494                                   | -0.002      | -0.060                        | -0.309 | 0.32 | 0.64 |
| Wholesale trade               |  |             |                               |         |      |      |                                       |             |                               |        |      |      |
| Durable                       | 124  | -0.003      | -5.748                        | 1.134   | 1.17 | 0.76 | 58                                    | 0.245       | -11.687                       | 21.039 | 1.61 | 4.49 |
| Nondurable                    | 56   | -0.030      | -6.503                        | -5.314  | 0.27 | 0.55 | 39                                    | -0.031      | 1.463                         | 0.801  | 0.63 | 0.73 |
| Retail trade                  | 35   | -0.050      | -0.149                        | 1.818   | 0.03 | 0.40 | 35                                    | 0.041       | -0.339                        | 1.933  | 1.82 | 1.86 |
| Transp. & warehousing         | 29   | -0.070      | -4.126                        | 8.362   | 0.32 | 0.40 | 28                                    | 0.004       | 1.101                         | -2.059 | 0.88 | 1.45 |
| Information                   | 67   | 0.300       | 28.407                        | -6.848  | 5.18 | 1.18 | 62                                    | -0.001      | -1.147                        | 2.744  | 1.40 | 1.24 |
| Finance & insurance           | 44   | -0.048      | -5.652                        | -5.575  | 0.10 | 0.09 | 45                                    | -0.044      | -0.535                        | 0.642  | 0.23 | 0.37 |
| Prof., sci., & tech. services | 124  | -0.009      | -1.294                        | 5.785   | 0.46 | 0.96 | 74                                    | -0.027      | -0.490                        | -0.378 | 0.16 | 0.13 |
| Arch., eng. & related         | 21   | 0.345       | -1.444                        | -20.707 | 0.24 | 3.26 |                                       |             |                               |        |      |      |
| Computer systems design       | 45   | -0.044      | 0.488                         | -3.047  | 0.16 | 0.36 |                                       |             |                               |        |      |      |
| Manage., sci. & tech. serv.   | 21   | -0.110      | -2.624                        | 5.983   | 0.11 | 0.05 |                                       |             |                               |        |      |      |

A = Developed countries  
B = Developing countries

countries and those reducing skill levels expanding in low-income countries, or the different types of expansion may have required different complementary employment needs at home. In any case, few of the employment expansions outside of the computer-related services produced significant wage movements.

### Concluding Remarks

The category of service industry firms is a very broad one, ranging from firms selling principally goods, in the Wholesale and Retail trade and Transportation and warehousing industries, to firms in the Information and Computer systems design sectors, selling mostly services, where the location of production and the nature of exports and imports is ambiguous and much of production and trade are intangible. It is not likely that there will be any uniform response of employment and wages among such a varied group of industries, and for that reason, the emphasis here has been on the variety of experience rather than a single summary. However, since there has been concern about the prospects for service industries as a whole, a summary of the aggregate findings is of some interest.

With respect to changes in employment in service industry multinationals as a whole, expansions in employment in foreign affiliates of U.S. multinationals have been accompanied by expansions in employment in the United States, with the one exception that growth in employment in developed countries among affiliates of firms paying relatively high wages in the United States was negatively related to growth at home, while growth in employment in developing countries went along with growth in employment at home. Growth in parent exports was associated with growth in home employment, while there was no relationship with growth in imports.

With respect to impacts on parent average wages, no combination of variables produced any significant relationship suggesting an effect on the skill composition of firms' labor forces.

Looking across individual service industries, one finds almost no negative relations of parent employment to the growth of foreign operations among the higher wage service industries: Information, Professional scientific, and related services, and Finance and insurance, except one showing a negative coefficient for the Professional services of expansions in developing countries, while there was a positive coefficient for affiliate expansions in developed countries. The effects of foreign affiliate employment growth on parent employment were mostly positive also among the lower-wage industries, although there were a few negative relations with overseas growth in Wholesale trade. Growth in both exports and imports was associated with growth in home employment among the higher –wage industries, with the exception of Finance and Insurance, in which the growth of imports was associated with declines in home employment. Among the lower-wage industries, while there were more positive than negative associations between imports and employment, there were several negative coefficients for exports in Retail trade and a couple for imports or affiliate expansion in Wholesale trade.

Effects on parent wages, which are interpreted as changes in the skill composition of employment, since the data used here do not permit following individual workers over time, are mostly insignificant among the higher-wage service industries. One exception is in the sub-industry, Architectural, engineering, and related services, which reported negative relations between both imports and exports and changes in parent wages, and negative effects on high-wage firms in the industry of expansions in developing countries. Among the relatively low-wage industries, there were very few significant coefficients relating parent wages to affiliate employment or trade, but in Wholesale trade, most of the marginally significant coefficients were negative, indicating shifts toward lower average skill. That result matches the fact that the Wholesale trade had one of the lowest increases in average industry wage among the industries in this study.

It is in two intangible services, Information and Computer systems design that the effects of trade and international investment seem the clearest. The two industries changed differently in the five years with the Information industry contracting in the U.S. and as an object for investments by foreign firms in the United States and U.S. investment abroad, possibly from contraction in the Broadcasting part of the industry. Computer systems design employment among U.S. parents and in U.S. industry as a whole also declined, but employment abroad by U.S. firms and employment in the United States by foreign firms both rose by more than 50 percent, signaling some international diffusion of the knowledge basis of the industry. Both industries' firms added to U.S. employment in developed countries, but in Computer systems design employment contracted in firms expanding in low-income countries. In both industries, larger parent imports were associated with higher parent employment. In Information, high-wage parent that invested in high-income countries grew in grew in the United States, while low-wage firms grew faster if they invested in low-wage countries. In both industries, larger parent employee wage gains were associated with investment in developed countries and smaller ones with investments in developing countries.

Other industries did not follow such consistent paths. The responses of Wholesale and Retail trade firms reflected their heavy involvement in trade in goods, rather than services. In general larger increases in foreign employment were associated with larger increases in domestic employment, a little more consistently for growth in developed countries than for expansions in developing countries.

Wage effects of foreign involvement were less favorable to employees than the employment effects. A high proportion of wage effects of foreign expansion were negative, although few were statistically significant. Two that were significant took place in firms with above average wage levels investing in developed countries, in Retail trade and Information and for Computer design firms investing in low-income countries, and for firms with low wage levels in Professional, etc. industries investing in low-income countries.

The failure to observe many strong associations between changes in various forms of foreign activity and changes in employment and wages is not uncommon, although few studies have much information on service industries and their investment abroad and trade. The multi-country OECD study (OECD, 2007), ended with a list of difficulties, rather than a finding, citing the lack of data in many countries, the difficulty of measuring positive effects of imports, and translation of the benefits of imports into effects on employment. I would add the vagueness of the definition and measurement of trade in services, the high intangible content of production, and the difficulty of knowing where production is taking place, in a world of cheap and rapid communication.

To a somewhat surprising degree, the results here for service industries mirror the findings for the effects of imports and exports and foreign affiliates' operations on wages and employment of workers in various occupations in manufacturing industries in Ebenstein et al. (2009), although that study deals with manufacturing, rather than services, with workers classified by occupation, rather than by industry of employer, with a longer period, 1982-2002, rather than 1999-2004, and with a much more sophisticated model of wage determination. The parallels include a stronger effect of trade with or operations in developing, as compared with developing countries, and effects of exports similar to those of imports, and the bias of change in favor of more educated workers.

## References

- Ahmed, S. Amer (2009), "The Impact of Trade in Services on Factor Incomes: Results from a Global Simulation Model," Policy Research Working Paper 5155, Washington, DC, The World Bank Development Research Group, Trade and Integration Team, December.
- Baumgarten, Daniel, Ingo Geishecker, and Holger Görg (2010), "Offshoring, Tasks, and the Skill-Wage Pattern," Bonn, Germany, IZA Discussion Paper No. 4828, March.
- Bhagwati, Jagdish, Arvind Panagariya, and T.N. Srinivasan (2004), "The Muddles over Outsourcing," Journal of Economic Perspectives, Vol. 18, No. 4, Fall, pp.93-114.
- Borga, Maria (2006), "Trends in Employment at U.S. Multinational Companies: Evidence from Firm Level Data," Brookings Trade Forum, 2005, pp. 135-164.
- Crino, Rosario (2009), "Employment Effects of Service Offshoring: Evidence from Matched Firms," Centro Studi Luca D'agliano Development Studies Working Papers, No. 286, December.
- \_\_\_\_\_ (2010), "Service Offshoring and White-Collar Employment," Review of Economic Studies, Vol. 77, pp. 595-632.
- Ebenstein, Avraham, Ann Harrison, Margaret McMillan, and Shannon, Phillips (2009), "Estimating the Impact of Trade and Offshoring on American Workers Using the Current Population Survey", Cambridge, MA, NBER Working Paper No. 15107.
- Görg, Holger, and Aoife Hanley (2009), "Services Outsourcing and Innovation: An Empirical Investigation," IZA Discussion Paper 4404, Bonn, Germany, September.
- Jensen, J. Bradford, and Lori G. Kletzer (2006), "Tradable Services: Understanding the Scope and Impact of Services Offshoring, in Susan M. Collins and Lael Brainard, Editors, " Brookings Trade Forum: 2005: Offshoring White-Collar Work
- Kirkegaard, Jacob F. (2008), "Offshoring, Outsourcing, and Production Relocation-Labor Market Effects in the OECD and Developing Asia," The Singapore Economic Review, Vol. 53, No. 3, pp. 371-418.

- Kimura, Fukunari, and Mitsuyo Ando (2006), "Japanese Manufacturing FDI and International Production and Distribution Networks," in Shujiro Urata, Chia Siow Yue, and Fukunari Kimura, Editors, Multinationals and Economic Growth in East Asia, Routledge International Business in Asia Series 3, New York, Routledge.
- Lipsey, Robert E. (2007), "Defining and Measuring the Location of FDI Output," Cambridge, MA, NBER Working Paper 12996.
- \_\_\_\_\_ (2008), "Measuring International Trade in Services," in Marshall Reinsdorf and Matthew J. Slaughter, International Trade in Services and Intangibles in the Era of Globalization, Studies in Income and Wealth, Vol. 69, Chicago, University of Chicago Press, 2008, pp. 27-70.
- \_\_\_\_\_ (2010), "Measuring the Location of Production in a World of Intangible Productive Assets, FDI, and Intrafirm Trade," The Review of Income and Wealth, Special Issue 1, June, pp. S99-S110.
- OECD (Organisation for Economic Co-operation and Development (2007), Offshoring and Employment: Trends and Impacts, OECD, Paris.
- UNCTAD (United Nations Conference on Trade and Development)), (2001), Measures of the Transnationalization of Economic Activity, United Nations, New York and Geneva.
- U.S., Bureau of Economic Analysis (2008), U.S. Direct Investment Abroad: 2004 Final Benchmark Data , Washington, DC, Bureau of Economic Analysis, November.
- U.S. International Trade Commission (2010), Recent Trends in U.S. Service Trade, 2010 Annual Report, Publication No. 4163, Washington, DC, U.S. International Trade Commission, June.

## APPENDIX A

### Exits and Entrances

Following the employment changes in a fixed set of firms, as we do here, omits changes that take place from the exits of firms in existence at the beginning of the period observed, and from the entrance of new firms. It is plausible that the firms that survive, especially if the period is long, are not typical of either group, and that their employees' experience is also not typical.

In Table A1, we compare the number and U.S. operations of exiting firms with those of the universe of surviving ones. 37 percent of the firms that were in each industry in 1999 exited in the five following years, although the shares was a bit under a third if firms that merged with continuing ones are not treated as exits. That would seem to be the appropriate measure since the firms and their employees remained in the sample being studied. The shares of exiting firms were much smaller, under 10 percent overall, if measured by employment or sales, indicating that it was the smaller firms that accounted for the majority of exits. However, the exiting shares varied among industries; those in most groups, excluding those preserved in the panel by mergers, were 5-7 percent, but in Professional, scientific, and technical services they were 19 percent for employment and 16 percent for sales.

Table A2 shows that the number of entering firms was about equal to the number exiting, relative to the total number in 2004. The entering firms in most of the industries were smaller than the continuing firms, but not by as much as the exiting firms. However, in Finance, insurance, and real estate, the entering firms were larger, as measured by employment, than the continuing firms.

Measured by the activities of their foreign affiliates, exiting firms were less important than they appeared measured by parent activities, as can be seen in Table A-3. Exiting parent firms, which were 32 percent of the number of parents, held about 5 percent of the number of foreign affiliates and accounted for about 5 percent of the affiliates' employment. Entering firms,



described in Appendix Table A-4, added 9 percent to the population of foreign affiliates and 11 percent to their affiliate employment, up to as high as 33 per cent in Finance, insurance, and real estate.

Table A1

Exiting U.S. Service Industry Parents, 1999-2004, as Percent of Surviving Parents, 1999

| Industry*                       | Number | Empl.  | Sales  |         |        |        |          |
|---------------------------------|--------|--------|--------|---------|--------|--------|----------|
|                                 |        |        | Total  | In U.S. | Abroad | Goods  | Services |
| All service industries          | 37(32) | 14(9)  | 13(7)  | 12(7)   | 18(13) | 9(7)   | 16(9)    |
| Trade, Transp., & warehousing   | 33(29) | 10(7)  | 12(9)  | 11(9)   | 22(19) | 9(7)   | 26(22)   |
| Information                     | 44(36) | 18(5)  | 19(4)  | 19(4)   | 18(3)  | 2(6)   | 19(4)    |
| Finance, insurance, & real est. | 33(28) | 13(5)  | 9(3)   | 9(3)    | 12(8)  | 4(12)  | 10(4)    |
| Prof., sci. & tech. services    | 41(37) | 24(19) | 21(16) | 22(17)  | 16(10) | 4(2)   | 26(21)   |
| Manage., Admin., & Support      | 37(34) | 15(14) | 13(9)  | 12(9)   | 2(0)   | 0(2)   | 12(10)   |
| Other services                  | 40(37) | 15(12) | 9(6)   | 9(6)    | 7(6)   | 10(13) | 9(6)     |

Figures in parentheses omit firms that exited via mergers with surviving firms.

Table A2

Entering U.S. Service Industry Parents, 1999-2004, as Percent of Surviving Parents, 2004

| Industry                        | Number | Empl.  | Sales  |         |        |        |          |
|---------------------------------|--------|--------|--------|---------|--------|--------|----------|
|                                 |        |        | Total  | In U.S. | Abroad | Goods  | Services |
| All service industries          | 33(32) | 19(17) | 19(17) | 18(16)  | 31(25) | 11(10) | 15(13)   |
| Trade, Transp. & warehousing    | 21(19) | 10(10) | 12(12) | 12(12)  | 21(19) | 11(10) | 23(22)   |
| Information                     | 42(41) | 13(13) | 12(11) | 12(10)  | 19(14) | 19(9)  | 11(11)   |
| Finance, insurance, & real est. | 45(44) | 51(43) | 34(29) | 33(29)  | 40(32) | 18(18) | 15(13)   |
| Prof., sci. & tech. services    | 38(36) | 22(18) | 18(15) | 18(16)  | 12(9)  | 2(2)   | 20(17)   |
| Manage., Admin., & Support      | 32(31) | 10(10) | 7(7)   | 7(7)    | 7(7)   | 0(0)   | 7(7)     |
| Other services                  | 32(29) | 10(8)  | 9(7)   | 9(7)    | 8(6)   | 7(2)   | 9(8)     |

Figures in parentheses exclude firms that entered by merger with an existing or exiting firm.

Table A3

Foreign Affiliates of Exiting Service Industry Parents, 1999-2004,  
as Percent of Affiliates of Surviving Parents in 2004

| Industry                        | Sales              |        |          | Employment | Value Added |
|---------------------------------|--------------------|--------|----------|------------|-------------|
|                                 | Total              | Goods  | Services |            |             |
| All service industries          | 10(5) <sup>b</sup> | 11(7)  | 9(4)     | 11(5)      | 8(4)        |
| Trade, Transp. & warehousing    | 13(9)              | 13(10) | 10(4)    | 9(5)       | 12(5)       |
| Information                     | 11(1)              | 3(0)   | 12(1)    | 16(1)      | 11(1)       |
| Finance, insurance, & real est. | 6(1)               | 5(3)   | 4(1)     | 9(2)       | 0(1)        |
| Prof., sci. & tech. services    | 7(4)               | 0(0)   | 11(7)    | 11(6)      | 8(5)        |
| Manage., Admin., & Support      | 10(7)              | 11(5)  | 10(8)    | 14(12)     | 8(7)        |
| Other services                  | 11(3)              | 69(18) | 5(2)     | 5(2)       | 9(3)        |

<sup>b</sup> Figures in parentheses omit firms that exited via mergers with surviving firms.

Table A4

Foreign Affiliates of Entering Service Industry Parents, 1999-2004,  
as Percent of Affiliates of Surviving Parents in 2004

| Industry                        | Sales              |        |          | Employment | Value Added |
|---------------------------------|--------------------|--------|----------|------------|-------------|
|                                 | Total              | Goods  | Services |            |             |
| All service industries          | 13(9) <sup>b</sup> | 8(7)   | 11(9)    | 13(11)     | 8(7)        |
| Trade, Transp. & warehousing    | 8(7)               | 7(6)   | 13(10)   | 7(6)       | 7(6)        |
| Information                     | 13(10)             | 11(11) | 15(10)   | 16(13)     | 16(9)       |
| Finance, insurance, & real est. | 23(13)             | 55(41) | 14(11)   | 39(33)     | 8(8)        |
| Prof., sci. & tech. services    | 6(5)               | 1(1)   | 9(8)     | 11(9)      | 7(6)        |
| Manage., Admin., & Support      | 6(6)               | 12(12) | 4(4)     | 8(8)       | 6(6)        |
| Other services                  | 8(7)               | 21(14) | 7(6)     | 5(2)       | 4(3)        |

<sup>b</sup> Figures in parentheses omit firms that entered via mergers with surviving or exiting parents.