# 4

# Information Technology, Outsourcing, and the New International Trade in Services

Information technology is both a traded product and a product that enhances the tradability of other goods and services. IT enhances the tradability of itself, as well as other goods and services, by enabling firms to fragment the production process and digitize, organize, and codify information. In the presence of appropriate communications infrastructure, firms can manage the fragmented production networks and related information over distances, including across international borders.

Whereas chapter 2 examined the integrated global production platform for IT hardware, this chapter focuses more explicitly on the cross-border trade in IT hardware and services and software. With respect to hardware, the fragmentation of IT production enables US producers to stay internationally competitive by using cheaper intermediate components and retaining higher value-added production steps. The resulting production for both the domestic market and for exports is globally competitive. But while this fragmentation of production of IT hardware has been in place for some time, such fragmentation and international trade in software and IT services is just beginning. So the impact on two-way trade and global competitiveness is still unfolding.

Moving beyond trade in IT products per se, the digitization, organization, and codification of information and tasks facilitated by IT software applications, and which travel over communications networks, vastly increase the actual and potential tradability of many nontechnology services. Thus, IT and communications networks facilitate international trade in a much broader array of business and professional services. Services overall

represent a large share of the US economy and increasingly a larger share of the global economy. Therefore IT and communications together create the potential to expose a significantly greater share of the US economy to the forces of international trade. The accelerated globalization of the US economy is a clear consequence of the rapid pace of technological change embraced by US firms here and abroad.

As outlined in chapter 3 in the context of the US economy, many of the services that are increasingly traded across international borders—including business and professional services, distribution services, financial services, and telecommunications services—play an important role in the domestic economy by increasing the efficiency of domestic production and international trade in goods. Recognizing the increasingly important role for these services, the Uruguay Round of trade negotiations explicitly broached a framework for disciplines on barriers to international trade in services. Negotiations on these disciplines continue in the context of the Doha Development Agenda. In a more narrow context, the role for these services to increase the competitiveness of trade in goods has been taken up in the Doha agenda under the rubric of "trade facilitation." Research on both the broad and narrow assessments shows that liberalization of IT products and telecommunications networks, as well as of other services, is a key factor that enhances economic performance and competitiveness of trade in goods.

For the United States, such multilateral liberalization of services may have the added benefit of reducing the large US trade deficit. Research indicates that the growth elasticity of exports of business and professional services exceeds that of imports, in contrast to what has been estimated for exports and imports of goods.

On the other hand, the notion that fragmentation, digitization, and codification of services will proceed without any stopping point ignores the issues of regulatory jurisdiction and other differences, as well as the importance of local tastes and preferences for face-to-face design, implementation, and delivery. Not all aspects of business and professional services can be globalized.

## US Cross-Border Trade in IT Products

Before discussing the new international trade in business and professional services, it is worthwhile to examine international trade flows and the balance of payments in IT products. As discussed in chapter 2, the well-developed global production network in IT hardware and the predominance of local sales for IT software and services mean that US cross-border trade in IT hardware dominates the value of cross-border trade in IT products overall. That said, it is also the case that it is increasingly difficult to disentangle hardware from software in the international trade

data (appendix 4A). With these data concerns in mind, this section discusses trends in US cross-border trade in IT products, both hardware as well as services and software.

While some of the discussion that follows was presaged in chapter 2, this section hones in on cross-border trade in IT products. For IT hardware, there is an overall trade deficit, whereas for IT services and software there is a trade surplus. International trade within the multinational enterprise (what is called "intrafirm trade" because it is between a multinational parent and affiliate) behaves differently. Intrafirm trade within US multinational IT hardware firms is falling as a share of IT hardware trade, but it is rising for US IT services firms. Finally, although US multinational IT hardware firms run a trade deficit with their affiliates, these net imports of intermediate components appear to support a higher value in total sales abroad to unaffiliated buyers, so on net, the multinational group runs a trade surplus in sales of IT hardware. It is too early to tell whether a similar pattern of trade is developing for IT services.

## Pattern of Trade in IT Hardware

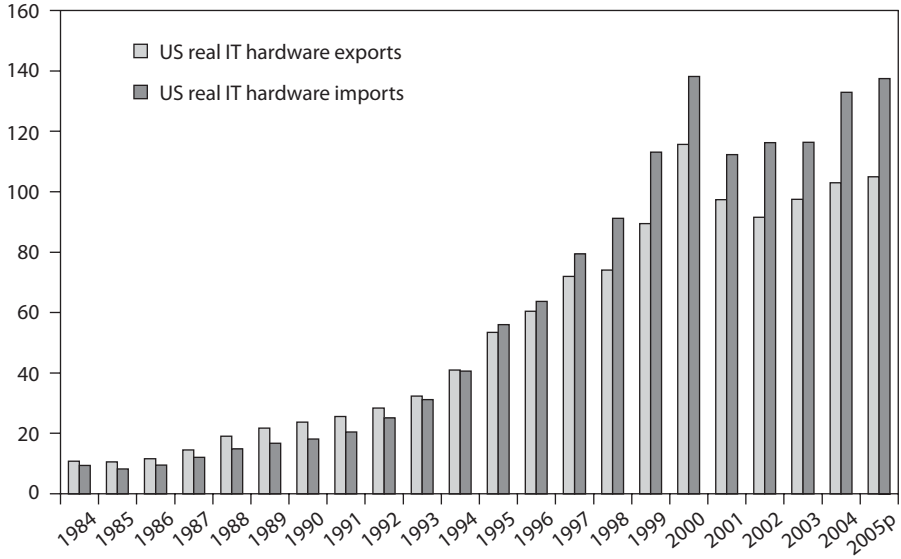
Aggregate trade patterns reveal that real US exports and imports of IT hardware rose dramatically during the 1990s (figure 4.1) hand in hand with the development of global markets and the fragmentation of production, as already discussed. The collapse in 2000 of the technology boom and domestic IT investment then affected both US exports and imports, which declined and remained subdued for several years. Once US domestic IT investment resumed, real imports recovered and by 2004 exceeded their previous peak. Real exports recovered more slowly, but by 2005 were back to technology-boom levels. Despite the continued growth in spending in global markets, as already discussed, IT spending in the industrial-country markets has been much more sluggish. US exports of IT products are concentrated in sales to these more slowly growing markets in part because these richer and more sophisticated users can afford the higher-value US exports.[1]

Intrafirm trade offers another perspective on the implications of the globalization of IT products for the US economy and net exports. Intrafirm trade is an important part of the global activity of IT multinationals, and their pattern of behavior can be observed in the US trade data. The US market is served by US-owned and domiciled firms; foreign-owned but US-domiciled firms (majority-owned US affiliates of foreign parents, or MOUSAs); imports from US-owned firms that are located abroad (majority-owned foreign affiliates, or MOFAs); and imports from unaffiliated parties (also known as " arm's-length" imports). US firms, when they

1. See Mann and Plueck (2005) for more in-depth analysis of US trade by broad product category and region.

**Figure 4.1 US real IT hardware trade, 1984–2005**

billions of US dollars




p = preliminary

*Sources:* Bureau of Economic Analysis, International Transactions Accounts Data, table 2, www.bea.gov; Bureau of Labor Statistics, producer price index, www.bls.gov/ppi/home.htm.

export, can sell to their own affiliates (to their MOFA) or can sell to final buyers (arm's-length exports).

Considering this complex scenario, what can be said about international trade by US IT firms and by foreign players, both intrafirm and at arm's length?[2] Because there is a longer time period of globalization, as well as more data, the initial focus will be on intrafirm trade and overall trade in IT hardware. In sum, it appears that US IT hardware producers are less and less engaged with meeting US demand through imports from affiliate operations abroad. Instead, the US multinational IT firms appear to be relinquishing the lower value-added production to unaffiliated foreign producers while producing and exporting higher value-added IT hardware

2. Data on intrafirm trade are generated from mandatory firm-level surveys of US multinationals. However, the international trade classification system differs from the industry classification system used for these surveys, making detailed product-level comparisons of intrafirm trade to arm's-length trade difficult. Moreover, firm-level detail is only available in public aggregates when no individual company can be identified, which frequently poses significant obstacles in the presentation of IT services data. Discussion of intrafirm trade in the IT sector must therefore proceed cautiously (box 4.1).

products to the world. Moreover, the affiliates of US firms abroad are selling more and more to unaffiliated foreign buyers.

Figure 4.1 provides the background for this analysis of the role for US IT multinationals. Overall, trade in IT hardware was in surplus at the start of the technology boom period, but then moved into a deficit, which continues. Net cross-border exports (exports minus imports) in IT hardware posted a surplus of about $3 billion in 1989 but switched into deficit in 1992. Widening steadily, by 1995 the net export deficit was about $22 billion. Since 1995, the US technology and investment cycles appear to be the drivers of the overall IT hardware deficit, widening along with the technology boom up until 2000, narrowing with the bust and recession, and then widening again in 2004 and 2005. Is the behavior of US multinationals a major factor in this pattern?

Against this background of overall trade, data for intrafirm trade within the US IT multinationals reveals a positive correlation between parent sales to foreign affiliates and unaffiliated foreign buyers (a proxy for exports) and sales by the affiliate back to the US parent (a proxy for imports). The data show that net multinational sales are positive when viewed from the perspective of the US IT multinational parent (figure 4.2). Thus, the intrafirm pattern of sales offsets the overall trade deficit in IT hardware. To the extent that the positive net intrafirm sales balance is narrowing somewhat, this offset is becoming less advantageous to the US trade balance.

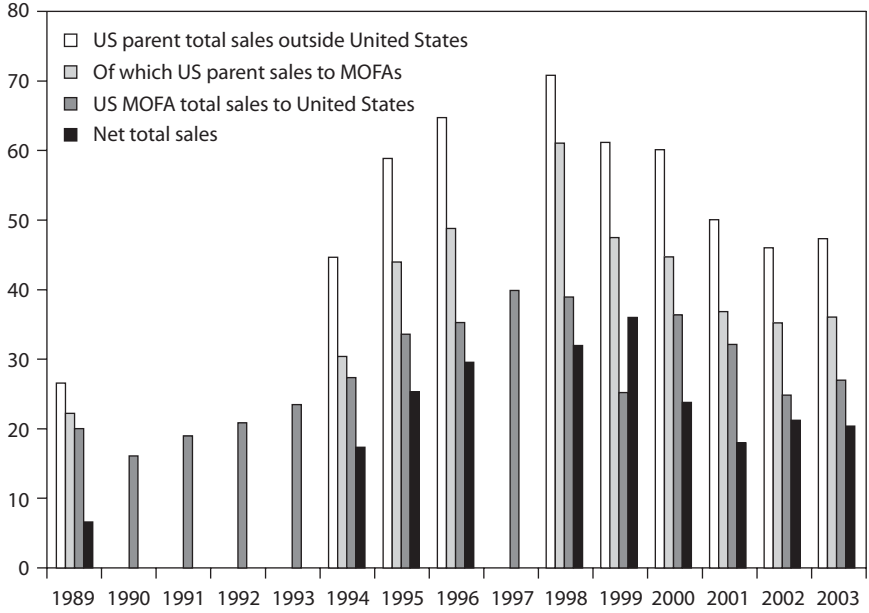
This positive correlation between intrafirm imports and global sales (in conjunction with the multinational compensation data already discussed) suggests that these intrafirm (or affiliate) imports (sometimes called global "outsourced" production) may well be a source of competitive advantage for US IT exports in the global marketplace. Comparing the total US parent sales outside the United States with the intrafirm sales reveals a consistent $10 billion in additional sales to unaffiliated foreign persons.

As a final note, it appears that foreign multinationals' affiliates operating in the United States have a greater dependence on their foreign parent than being the case for US multinationals' affiliates operating abroad. That is, in 2003, the parent dependence of foreign affiliates in the United States was 80 percent and that of US affiliates abroad was just 37 percent. This asymmetric dependence of foreign affiliates in the United States on trade with their foreign parents is true in general for merchandise trade. However, unlike the average for all merchandise trade, where the share of intrafirm trade has fallen only slowly over time,[3] for IT hardware products the dependence of US affiliates abroad on exports from the US parent fell rapidly from 1989 to 2003. In contrast the (foreign) parent dependence

3. From the perspective of the United States as a geographic unit, the share of US total merchandise exports shipped by US multinationals that went to MOFAs was 40 percent in 1989 and 1994, declining slightly to 37 percent in 2003. Meanwhile, US-located MOUSAs relied on the foreign parents for 77 percent of their total merchandise imports in 1989 and 1994,

**Figure 4.2 US multinationals' US trade balance in IT hardware, including sales to others, 1989–2003**

billions of dollars




MOFA = majority-owned foreign affiliate

Note: Data for US parent sales outside the United States suppressed by BEA for years 1990–93 and 1997.

*Source:* Bureau of Economic Analysis, US Direct Investment Abroad: Financial and Operating Data for US Multinational Companies, www.bea.gov (accessed September 30, 2005).

of the affiliate in the United States still stood at 67 percent in 2002. So all in all, US multinationals abroad are becoming less dependent on their US parents and US exports.

The asymmetric parent dependency implies a structural trade imbalance in multinational trade for both US and foreign parent multinationals and their affiliates. As US demand for IT hardware grows, and to the extent that the products are purchased from affiliates of foreign parents in the United States, this will lead to IT hardware imports at a higher rate

rising slightly to 79 percent in 2002. Similarly, total merchandise exports by US parents to their MOFAs in 1989 and 1994 accounted for 25 and 27 percent, respectively, of total US merchandise exports, while merchandise imports to US-located MOUSAs from their foreign parents accounted for 26 and 25 percent of total US merchandise imports, respectively. See Mataloni (2005, table 2), Zeile (2005, table 11), and BEA financial and operating data for 1989.

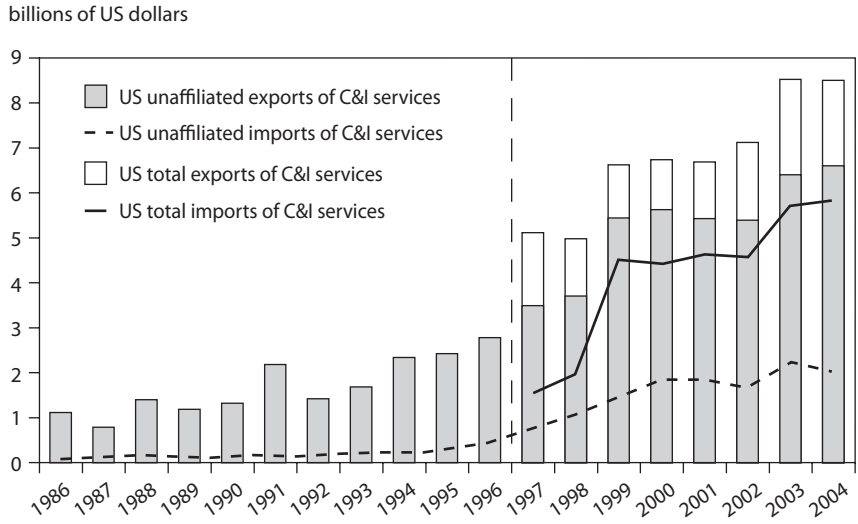
than a similar increase in growth in sales of US affiliates abroad would yield intrafirm sales and IT exports. Taken together, overall trade and intrafirm trade patterns are consistent with a trend that imports from unaffiliated and affiliated foreign producers (the new global entrants) are key for the behavior of the balance of payments deficit in IT hardware. US multinational outsourcing plays a positive but shrinking role in offsetting this trend.

## Trade Patterns in IT Services

Turning to overall trade and intrafirm trade in IT services, as seen in figure 4.3, a roughly similar pattern of US trade flows emerges, but the trends of the trade balance and intrafirm trade appear to be reversed from those for IT hardware: The overall trade surplus is rising, but the intrafirm trade is in deficit. In terms of overall trade in IT services, both US exports and imports increased rapidly during the 1990s, albeit from values much lower than for IT hardware. Data that detail both affiliated and unaffiliated trade are available only from 1997. Unaffiliated US exports of IT services rose fivefold from a little over $1 billion to more than $7 billion in 2004, while IT services imports rose from virtually nothing prior to 1989 to a little less than $2 billion by 2004. So by 2004 the US unaffiliated trade surplus in IT services was about $5 billion. If the United States has comparative advantage in IT services, why is this figure so small? Recall the earlier data on growth in the United States and in global markets that revealed a slowdown in growth of IT services spending in Japan and other industrial countries even as IT services and software spending continued to rise in other parts of the world (table 2.1 in chapter 2). Moreover, recall that global *sales* of US IT services firms continued to rise (figure 2.3). One way to square the trade data with the global sales data is to remember that IT services are predominantly delivered in the local market rather than through cross-border trade.

The shorter time series of data including intrafirm trade in IT services reveals potentially important behavior within the multinational enterprises. Surveys of such affiliated (intrafirm) trade from 1997 to 2004 show that imports of affiliated IT services (i.e., what US parents buy from their foreign affiliates and what foreign affiliates in the United States buy from their foreign parents) quadrupled over the period from about $800 million to about $5 billion, with the largest increase between 1998 and 1999. On the other hand, affiliated IT services exports (i.e., what US parents sell to their foreign affiliates and what foreign affiliates in the United States sell to their foreign parents) yielded a somewhat different picture. These affiliated transactions rose only modestly, from about $1.6 billion in 1997 to about $2.3 billion in 2004. In other words, affiliated IT services imports rose much faster than affiliated exports, albeit from a lower base. There-

**Figure 4.3 US trade in computer and information (C&I) services, 1986–2004**




Note: Data prior to 1997 include only unaffiliated imports.

*Source:* Bureau of Economic Analysis, *Survey of Current Business*, 2005.

fore this pattern of affiliated trade in IT services is negative, in contrast to the overall positive balance of trade for IT services. This negative net balance of trade within IT services multinationals comes from the fact that the share of import trade through affiliates is much larger than the share of export trade through affiliates (64 percent versus 28 percent, respectively).[4] (Note that this US parent dependency on its affiliates abroad is much higher than in the case of IT hardware.) The higher (and increasing) import share through affiliates may be evidence of "offshoring," or the purchase from abroad of, for example, software development services by the US parent.[5] But data are lacking for sales of services to unaffiliated buyers in third markets (which were seen to be an important part of the puzzle of understanding US hardware multinationals). In addition, the low share of affiliate exports could be a consequence of restrictions relating to the establishment of US investment abroad in IT services.

4. These figures for cross-border trade in computer-related services do not exactly match the categories for affiliate sales in IT services in previous tables. This is a consequence of different classification schemes for trade and affiliates data.

5. The BEA is proposing a new survey of cross-border trade in services, both unaffiliated and affiliated, which will allow more comprehensive analysis of these trends. But data on sales of services to third-country buyers from foreign affiliates may still elude the statistical net.

## IT and International Trade in Business and Professional Services

Just as IT diffusion throughout the US economy has increased productivity growth, IT diffusion into services paves the way for greater exposure of a wide range of these activities to the global forces of technology and competition. Just as our understanding of the role for IT in the domestic economy initially focused on the IT-producing sectors but now has expanded to the role for IT throughout the economy, our analysis of IT and the globalization of services started with IT services but now will be extended to how IT and communications networks facilitate international trade in a broader array of services. This section traces why and how IT globalizes a much wider range of services activities, including business and professional services in finance, advertising, consulting, engineering, legal matters, and other areas. (For analysis and presentation of key data on services, see occasional articles in BEA 2005; see also Borga and Mann 2003, 2004; Nephew et al. 2005)

### Globalization of Services: Why Now and How Important?

There has always been a "services" category in the balance of payments and in direct investment accounts. Transportation and communications services bridge the physical distance between a buyer and seller of a good. Tourists travel to experience new cultures, and temporary workers send money home. However, international trade in a wide range of business and professional services is now an increasingly important part of the global economic landscape. Increased use of IT and international communications networks both in the United States and abroad are key factors underpinning the globalization of this broad range of services.

In the past, business and professional services were termed "nontraded" in economic parlance because, as a matter of fact, international transaction costs (measured in time, distance, or otherwise) prevented the close proximity between a buyer and seller deemed necessary for the service activity to take place. Beyond transportation costs, culture, customs, and regulation often required direct contact between a buyer and seller, which limited the extent to which services could be separated from the main activity of a firm or carried out across international borders. For example, financial, legal, and administrative services have required handshakes, physical presence to sign papers, or professional licensing, examination, and oversight that are unique to a jurisdiction and profession (such as for construction, accounting, or law).

In addition to transaction costs, the "production" of many business and professional services has been functionally integral to an organization's business activity or product and therefore could not be done remotely or separately from the main activity of the firm. For example, reading a ra-

diological image has been done on site as part of a patient examination; drafting a blueprint has been integral to an architect designing a building; mortgage applications have been reviewed by the local bank manager before processing. Similarly, the "consumption" of a service, such as responding to a customer service request or fulfilling a maintenance contract, has been delivered in person by someone employed by the parent organization.

Technological change, as well as changes in customer and business attitudes over time, has eroded these attributes of services—transaction costs and functional integration—that heretofore made them "nontradable." These newly tradable activities are sometimes called information technology–enabled services (ITES). This name acknowledges first that the information and communications technologies—both data transmission (the hardware and telecommunications) and data manipulation, classification, and standardization, which involve software—are what enable these services to be fragmented and codified, and therefore undertaken with distance between the core business, the intermediate supplier, and ultimate customer. Second, it acknowledges that the services activities are not just narrowly IT-related (e.g., computer programming or database administration) but more broadly include accounting, financial analysis, call center services, architectural drafting, and health record transcription, among other business and professional services.

At the same time, new businesses have sprung up to specialize in services tasks that have common attributes across many types of businesses—such as human resource management, customer call centers, and standardized financial analysis. These new businesses enjoy the economies of scale in their particular area of expertise, as discussed in the context of electronics manufacturing services (EMS) firms for IT hardware production. Hence, with the availability of technology and with the specialization of some business tasks, firms in many industries are reassessing which of the many services underneath the corporate umbrella truly are integral to their main business function. Those that are not integral have been outsourced to specialized services providers.

*International* trade in services—sometimes termed offshore sourcing of services—demands not only restructuring by firms in the United States, but also requires that the trading partners have the technology that reduces transaction costs and allows functional fragmentation, and that the foreign workforce has the appropriate skill level for the task. That is, globalization of business and professional services beyond the US border is limited unless both sides of the cross-border transaction have, at least to some degree, embraced technological change. For example, a huge reduction in the telecommunications costs between the United States and India made offshore call centers much more attractively priced; in another example, a sevenfold increase in the penetration of personal computers in the Chinese marketplace networked this production platform

into information- and logistics-based businesses.[6] More generally, comparative research, particularly of emerging markets, finds that, controlling for the level of development, adoption of the Internet is related to capital account controls, trade protection (particularly tariffs on personal computers and telecommunications equipment), cost of telecommunications transmissions, and spending on public education (Knight 2003). So some countries, by virtue of their policies and attributes, are more likely to be leaders in international trade in services.

International trade in business services is a reality and much bigger than IT services alone (table 4.1). The United States is the global leader in business services, although not in computer and information services.[7] Does the IT sector (hardware and services, domestic and traded) support the leadership of the United States in international trade in business services? Consider detailed data on US trade in services, focusing on the sectors that use IT intensively and thus might be most prone to rapidly increased two-way trade on account of both the United States and other countries embracing the enabling technology (figure 4.4a). Two important facts are yielded by the US trade data for these services: trade growth is robust, and the US trade balance remains solidly in surplus (figure 4.4b).

For trade in categories such as "finance," "overall business, professional and technical," and "other" categories, aggregate data clearly indicate the United States' competitive position. Recall that these were leaders in investment in IT and in contributing to productivity growth.[8] Moreover, consider that the main markets for US services exports are in Western Europe and Japan, which have been experiencing a synchronized economic slowdown. The stable positive net export balance suggests that the

6. Both quantitative examples are based on World Bank data for 1996 compared with data for 2001.

7. A note of caution on the export data for Ireland and India: The Indian data were subsequently revised downward substantially. See appendix A.

8. Two categories of services trade are not shown because their evolution has little to do with either technological change or economic activity: telecommunications and insurance, which together have a deficit of some $22 billion. With regard to the insurance deficit, much of this is due to increasingly higher premiums charged by foreign reinsurance firms to cover past losses and higher rates associated with hurricane and terrorism-related insurance coverage. The accounting framework makes this category highly influenced by geopolitical/terror and weather risks, and conclusions drawn from these data should reflect this, rather than competitiveness per se. With regard to telecommunications, the data show vestiges of an idiosyncratic accounting system, which is being phased out, rather than the underlying state of the international competitiveness of US telecommunications companies.

Cross-border trade in telecommunications is determined by a system of bilaterally negotiated accounting rates for carrying international calls measured in minutes. Calls are billed in the originating country, so a carrier whose outbound calling minutes exceed its inbound calling minutes makes a net payment to its foreign counterpart "delivering the calls." Net settlement payments by US carriers to foreign carriers are subsequently recorded as imports, while net settlement receipts from foreign carriers to US carriers are recorded as exports. The

**Table 4.1** **World's largest business and computer and information services importers and exporters, 2003**
(billions of US dollars)

| | **Exports** (insourcing) | | | | **Imports** (outsourcing) | | | |
|---|---|---|---|---|---|---|---|---|
| **Rank** | **Business services** | | **Computer and information services** | | **Business services** | | **Computer and information services** | |
| 1 | United States | 64.1 | Ireland | 14.4 | United States | 44.2 | Germany | 7.2 |
| 2 | Britain | 44.8 | India | 12.5 | Germany | 40.4 | Britain | 2.9 |
| 3 | Germany | 31.8 | Britain | 7.0 | Italy | 24.6 | Japan | 2.1 |
| 4 | France | 24.1 | Germany | 6.6 | Netherlands | 24.6 | Spain | 1.7 |
| 5 | Netherlands | 22.0 | United States | 5.4 | Japan | 23.2 | Belgium | 1.6 |
| 6 | Italy | 21.0 | Israel | 3.7 | Ireland | 22.3 | United States | 1.5 |
| 7 | Japan | 18.0 | Spain | 2.9 | Britain | 20.1 | Netherlands | 1.5 |
| 8 | India | 17.5 | Canada | 2.3 | Austria | 19.1 | France | 1.2 |
| 9 | China | 17.4 | Belgium | 2.1 | Spain | 15.3 | Sweden | 1.2 |
| 10 | Austria | 15.9 | Netherlands | 2.1 | Belgium | 12.3 | Brazil | 1.1 |
| 11 | Belgium | 14.8 | Sweden | 2.0 | Korea | 11.2 | Italy | 1.1 |
| 12 | Spain | 13.5 | France | 1.3 | Sweden | 10.7 | China | 1.0 |
| 13 | Denmark | 12.4 | Luxembourg | 1.1 | India | 10.5 | Canada | 1.0 |
| 14 | Singapore | 11.4 | China | 1.1 | Canada | 10.4 | Australia | .7 |
| 15 | Canada | 11.3 | Japan | 1.1 | China | 10.4 | Norway | .5 |
| 16 | Sweden | 11.1 | Australia | .7 | Denmark | 9.6 | Finland | .5 |
| 17 | Ireland | 6.7 | Finland | .6 | Indonesia | 8.8 | Russia | .5 |

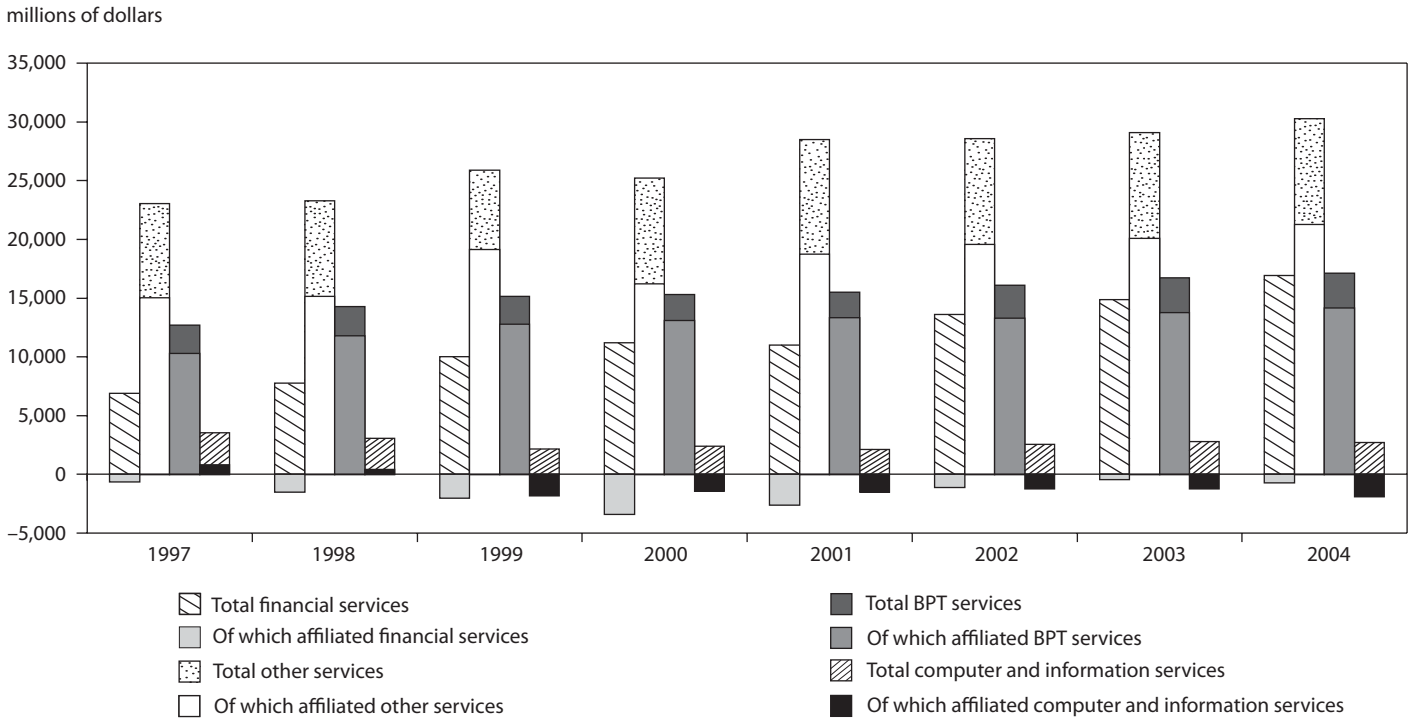
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18 | Korea | 6.7 | Italy | .5 | Singapore | 5.1 | Ireland | .4 |
| 19 | Switzerland | 6.6 | Norway | .4 | Russia | 5.1 | Austria | .4 |
| 20 | Saudi Arabia | 5.3 | Singapore | .3 | Saudi Arabia | 4.8 | Luxembourg | .4 |
| 21 | Norway | 4.5 | Hungary | .2 | Switzerland | 4.8 | Poland | .4 |
| 22 | Brazil | 4.1 | Malaysia | .2 | Brazil | 4.4 | Hungary | .2 |
| 23 | Thailand | 3.9 | Austria | .2 | Thailand | 3.9 | Portugal | .2 |
| 24 | Israel | 3.1 | Russia | .2 | Norway | 3.8 | Singapore | .2 |
| 25 | Russia | 3.0 | Costa Rica | .2 | Israel | 3.6 | Malaysia | .2 |
| 26 | Luxembourg | 2.4 | Greece | .1 | Malaysia | 3.1 | Greece | .2 |
| 27 | Australia | 2.3 | Poland | .1 | Finland | 2.9 | Czech Republic | .2 |
| 28 | Finland | 2.1 | Argentina | .1 | Poland | 2.5 | Korea | .1 |
| 29 | Egypt | 2.1 | Portugal | .1 | Australia | 2.4 | Slovak Republic | .1 |
| 30 | Malaysia | 1.9 | Romania | .1 | Czech Republic | 2.3 | Syria | .1 |
| Total value of trade (and number of countries reporting data) | | 427.9 (114) | | 70.7 (83) | | 396.1 (117) | | 31.4[a] (85) |

a. The very large discrepancy between the total value of reported computer and information services exports and imports is testament to the continued serious statistical problems concerning gathering of these data. See box 2.1.

Notes: Data for China exclude Hong Kong and Macau. Indian business services data from 2002.

*Source:* IMF's Balance of Payments Statistics, June 2005, www.indiastat.com (accessed March 28, 2006). Data on Indian exports of computer and information services are from the Indian statistical agency, Datanet India, for fiscal year 2003 (April 2003–March 2004).

**Figure 4.4a US trade balance in IT-enabled services, affiliated and unaffiliated, selected categories, 1997–2004**

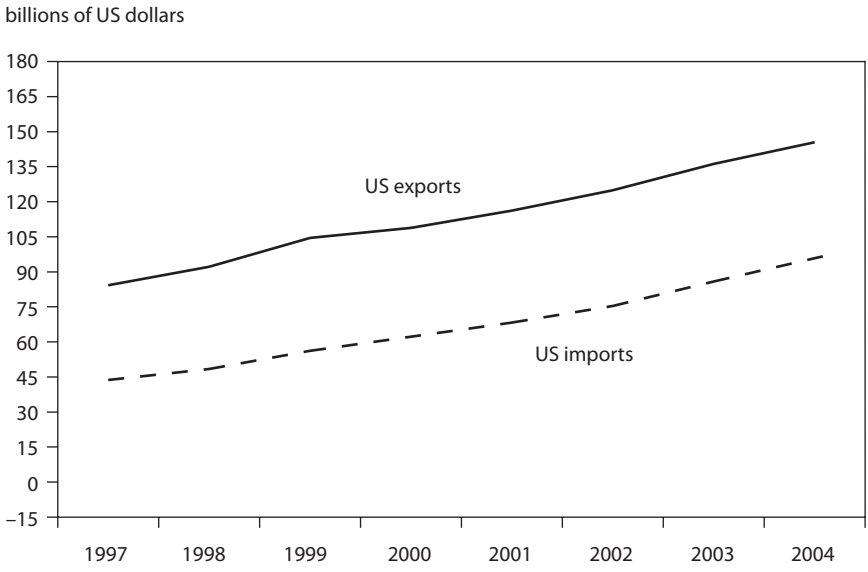



BPT = business, professional, and technical

Note: The "affiliated" and "unaffiliated" trade shown varies between categories. The category "other services" includes any service that is not an education, financial, insurance, telecommunications, business, professional, or technical service.

*Source:* Bureau of Economic Analysis, *Survey of Current Business,* 2005.

**Figure 4.4b US exports and imports of other private services, 1997–2004**




*Source:* Bureau of Economic Analysis, *Survey of Current Business*, 2005.

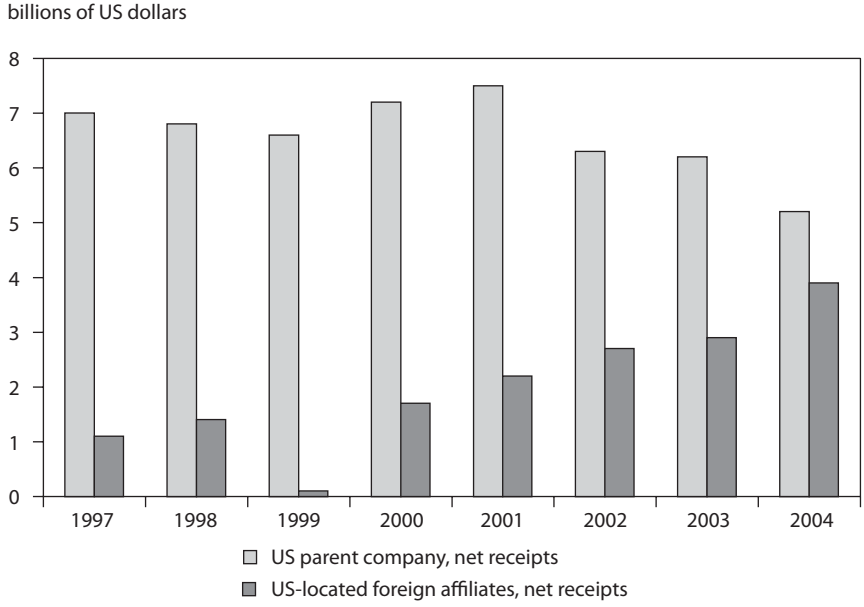
competitive US position in IT-enabled services persists, even as more countries engage in cross-border trade in services.[9]

In the narrow category of computer and information services, affiliated trade is in deficit, and the United States is not the global leader in computer services trade (figure 4.4a). However, this negative balance may contribute to the lower costs and international competitiveness of IT-enabled services such as finance and business, professional, and technical services, just as imported IT hardware has contributed to overall cost reductions and productivity growth for the US economy overall.

high level of international calls originating in the United States up until 2002 caused a chronic US telecommunications trade deficit, but the Federal Communications Commission mandated reductions in the accounting rates after 1997 and technological innovations such as Internet protocol telephony have served to improve the US sectoral balance. Since 2002, it has been in modest surplus (less than $1 billion).

9. The United States maintains an "other private services" surplus with all regions of the world, again indicating a strong competitive position. For detailed data, see Bureau of Economic Analysis, international transactions table 11 at www.bea.gov. In addition, Mann (2004) indicates that a slowdown in growth in major export markets has a greater than one-to-one effect on slowing export growth of business and professional services. (Of course, as growth resumes, this has a more than one-to-one effect on raising exports.)

**Figure 4.5 Headquarters trade: US intrafirm trade in business, professional, and technical services, 1997–2004**




*Source:* Bureau of Economic Analysis, *Survey of Current Business,* October 2005, 33 (table E).

The competitive advantage of the US environment in business and professional and technical services is corroborated by data on where multinational corporations conduct their "headquarters" services (figure 4.5). In the figure, "US parent, net receipts" represents the payments made to US-located parent companies from their overseas affiliates, minus payments from US-located parents to their overseas foreign affiliates. An example would be the transactions between IBM in the United States and IBM's subsidiary in India. "US affiliates, net receipts" refers to the payments received by US-located subsidiaries of foreign multinationals from their foreign parent companies, subtracting payments made by the US-located subsidiaries to their foreign parent. Here an example would be transactions between Deutsche Bank in New York and the Deutsche Bank headquarters in Frankfurt. Box 4.1 discusses the decision of whether to keep services under the corporate umbrella or not.

An initial observation is that, although US multinationals are expanding overseas and integrating their operations globally, this has not been associated with a deterioration of the US "headquarters" services trade balance. Even though US multinationals do send some back-office and administrative work overseas to be done by affiliates, on balance, the

### Box 4.1 From affiliated services to arm's-length trade: Where General Electric goes, will other companies follow?

For confidentiality reasons, the most recent data for foreign affiliates of US information technology services firms are not disclosed by the US Commerce Department's Bureau of Economic Analysis. However, an examination of recent individual company transactions in the largest provider country of IT services (India) may give insight into possible trends.

In November 2004, General Electric sold its wholly owned Indian affiliate GE Capital Information Services (GECIS) to two US private equity groups (General Atlantic Partners and Oak Hill Capital Partners) for $500 million, while retaining a minority 40 percent stake. GE was one of the pioneers of offshore outsourcing in India, establishing GECIS in 1997 to provide internal business support for GE's other businesses. At the time of the sale, GECIS supported nearly 1,000 business processes across GE's different business units, including finance, accounting, supply-chain management, customer service support, software development, data modeling, and analytical activities. GECIS operated facilities in India, Mexico, Hungary, and China, conducted business in 19 languages, and employed 17,000 people, of whom 12,000 were in India.[1]

In many ways, the growth of GECIS since 1997 into a billion-dollar business has mirrored the rise of the entire Indian IT services industry, which even today remains heavily influenced by US companies. India's National Association of Software and Services Companies (NASSCOM) estimates that in 2004, one-third of the Indian IT services industry was owned by multinational companies, the vast majority US-owned.[2] Does the sale of GECIS portend a trend? Are other US multinationals in the process of selling their captive Indian offshore operations? If so, this would indicate a trend from intrafirm offshoring to arm's-length offshoring—i.e., from sourcing from a majority-owned Indian affiliate of a US company to sourcing from an Indian third party by US multinationals.

A related development is the ongoing consolidation of the Indian IT services industry. In 2004, the top five domestic companies accounted for 44 percent of the entire industry. Should this consolidation continue, it could have significant implications for the presence of US multinationals in the Indian IT services sector, as these US firms might be increasingly likely to sell their facilities to local Indian third-party providers with the sufficient scale to achieve profitability—much like the trend toward consolidation of commodity hardware production in electronics manufacturing services (EMS) companies.

Concerns over access to proprietary company information may color the decision by some multinationals to sell their captive Indian affiliates. For example,

*(box continues next page)*

**Box 4.1 From affiliated services to arm's-length trade: Where General Electric goes, will other companies follow?** *(continued)*

in April 2005 IBM purchased Daksh e-services for somewhere between $100 million and $150 million, and Citigroup Inc. in August 2004 paid $112 million for e-Serve International Ltd. So even as GE sold its Indian subsidiary, other US multinationals are buying Indian services firms and bringing their activities "in-house."

1. GE press release, "General Electric Partners with Leading Investors to Transform GECIS, Its Global Business Processing Operation, into an Independent Company," November 8, 2004.
2. NASSCOM Indian IT Industry Fact Sheet 2005, available at www.nasscom.org (accessed October 1, 2005).

affiliates import more of these services from the parent. A second observation is that foreign multinationals with subsidiaries in the United States also increasingly do their internal "headquarters" services transactions in the United States. This contrasts with the behavior on the merchandise account and suggests that the United States has maintained a strong competitive position in the services transactions that take place within foreign multinational companies.[10]

To a great degree, the forces promoting tradability and hence the globalization of business and professional services—reduced transaction costs and the functional and physical separation of business functions—are the same forces that underpin the globalization of goods. In what ways is the globalization of business and professional services different from the globalization of goods, and what are the implications for the globalization of America?

First, reducing the cost of network infrastructure in the United States and abroad has quickened the pace of globalization of business and professional services both here and around the world. Global international trade in what are categorized as "other commercial services" (i.e., excluding government services, travel, and transport services) doubled from 1995 to 2004 to $950 billion, and accounts for about 8 percent of global international trade.[11] In the United States, exports of business and

10. Some US firms have moved their headquarters to low-tax jurisdictions, such as Bermuda. When firms do this, what had been recorded as a services export may now be eliminated from the trade balance or be recorded as a services import.

11. World Trade Organization (WTO) online international trade database at www.wto.org (accessed October 1, 2005). All data are for 2004 and include the entire world as reporter and partner. "Trade" is defined as the average of imports and exports. Total global trade is the sum of trade in merchandise and total commercial services trade.

professional services (what are called "other private services" in the US balance of payments accounts) are growing more than three times as fast as exports of goods, and imports of business and professional services are growing about 80 percent faster (1995 to 2004). These services account for about 10 percent of total exports and about 7 percent of total imports.

A second factor that differentiates the globalization of goods from the globalization of services is that the two may differ in how easily firms can change the location of their activities to take advantage of better capabilities in another country. Certainly foreign direct investment (FDI) in services has been growing, with about one-third of the inward and outward stock of US FDI in 2003 attributed to these kinds of activities. Digitized and standardized services require little complementary capital compared with producing goods in a factory (although infrastructure investment in communications, for example, is crucial). Firms that focus on an intermediate segment of the international value chain in services production (and do not serve the domestic market) are likely to be more footloose than factories because their links to the local economy are fewer and physical investment is low.

A third factor is that the globalization of services, in the context of global GDP growth, appears to differentially contribute positively to the US balance of payments. Research shows that the global elasticity of demand for US services exports (particularly BPT) exceeds the US elasticity of demand for services imports (Mann 2004, Marquez 2005). This elasticity "asymmetry" is opposite to that observed for trade in goods. Therefore as global GDP expands, the US balance of payments surplus in services tends to expand as well, offsetting to some degree the balance of payments deficit in goods.

To the extent that both trade and direct investment in services continue to grow both in the United States and around the world, the share of global production exposed to international market forces rises. In industrial countries, where services account for the majority of output and employment, rapid globalization of services means that a large and increasing share of the labor force and the productive economy faces international competition. At the same time, in developing countries, more workers are being drawn into the services sector, due in part to globalization and in part to the developmental transition from agriculture to manufacturing to services. Consequently, an increasing share of the global labor force is engaged in activities that are exposed to technological change and will need to respond to global competition and the resulting international division of labor. In contrast, the shares of agricultural and manufacturing employment have been declining in both industrial and developing countries as technological change increases productivity in these sectors and the share of labor falls.

## Prospects for Further Trade in Services

The previous sections have addressed the potential tradability of services. To the extent that the main motivator propelling international trade in services is technology itself, along with lower wages in developing countries and a narrowing education gap, is there no end to the potential fragmentation of services activities, their tradability, and the potential for job changes in the United States? On the other hand, research indicates that the US balance of payments would differentially benefit from faster trade growth and more internationalization of the globally competitive services. So what are the prospects for international trade in services?

### Limits to International Trade in Services

There are several limitations on international trade in services. First, not all services are or will be tradable either domestically or internationally—technological change, while powerful, cannot drive transaction costs to zero and divorce all activities from within the firm. Second, substantial variations in customer taste and culture, firm size, management attitude, domestic regulations, and government interventions differentiate markets for the delivery of services and lead to different degrees of functional and physical separation of business functions, depending on locale. Third, there are substantial impediments to international trade in services related to the domestic climate of services provision—such as in the finance and telecommunications sectors, both of which are major IT users and, more importantly, support economywide investment in IT and diffusion of it. In these sectors, as well as other services sectors, domestic and trade liberalization efforts are making only slow progress.

Even as international services trade increases, several factors point as well to a sustained increase in services activities in domestic markets (with attendant job increases). As noted, services as a share of economywide production increases with the level of economic development—the elasticity of the demand for services with respect to GDP is greater than one. Not all services activities can be codified and digitized. Face-to-face interaction is still required at many points in product development, marketing, delivery, and maintenance. Local knowledge is critical, for example, to understand the thicket of healthcare regulations or legal codes. Businesses of a certain size (generally small and medium-sized enterprises) need tailored delivery and demand proximity of the services provider.

More generally, an important constraint to the globalization of services that might otherwise have the potential to be delivered internationally via IT is the interface between the global marketplace and the local jurisdiction of policy and regulation. For example, there are no global rules specifying how cross-border transactions of data should be treated with re-

spect to privacy or intellectual property rules. Consumer and business attitudes toward the balance between market-oriented and government-legislated solutions in these areas are not homogeneous across countries, nor even within a country (Mann 2001, 2002). Professional licensure and regulatory standards vary across jurisdictions. (This is true even in the United States, for example, for lawyers and some engineers.) The best that is likely to be achieved in the long run is mutual recognition agreements, yet in general, these agreements for standards of professional licensure do not yet exist, particularly across country borders. With differing rules across countries, globalization of some business, professional, and technical services will proceed slowly.

## Potential for Services Negotiations

A related constraint to greater cross-border international trade in services is that international trade negotiations have made little headway in agreeing on a more liberal trade regime for many of the services that can be done internationally—including those in which the United States has a comparative advantage. By the same token, potential growth around the world, which would tend to augment the demand for products, services, and labor in the United States, is lower than it otherwise would be because services that enable IT to work effectively in an economy—low-cost telecommunications, financial intermediaries that can move money electronically, and delivery logistics that can move products expeditiously—have not been deployed (Mann and Rosen 2001; Mann, Eckert, and Knight 2000).

But does it make sense to focus attention on services trade negotiations when there is so much unfinished business in agriculture and manufacturing liberalization? As it turns out, the various researchers who consider the implications of different multilateral trade negotiation scenarios for global and individual economy GDP find that the gains from services sector liberalization alone could be about one-half of the total gain to global GDP of liberalization of agriculture, manufacturing, and services together (table 4.2) (Brown, Deardorff, and Stern 2001; Dee and Hanslow 2001). Who gains from increased cross-border trade in services? Industrial-country exporters of services, including the United States, gain from liberalized trade in services. For many developing economies, the increased GDP from improvements in domestic services sectors that come from trade liberalization is nearly as large as (and in some cases larger than) the gains to GDP that come from trade liberalization in manufactured and agricultural exports. The reason is because domestic services are an input to all other sectors, whether domestic-focused or export-focused. Poor services are a tax on domestic GDP growth and undermine export competitiveness in all sectors. All told, the welfare gains throughout an economy from improving the performance of the domestic services sector are dra-

**Table 4.2 Estimated gains from trade and investment liberalization, selected countries**

| | All sectors[a] | | Manufacturing only | | Services only[b] | |
|---|---|---|---|---|---|---|
| Country | Percent of GDP | Billions of US dollars | Percent of GDP | Billions of US dollars | Percent of GDP | Billions of US dollars |
| World | | 613.00 | | 211.00 | | 390.00 |
| United States | 1.95 | 177.30 | 0.34 | 31.30 | 1.65 | 150.00 |
| Japan | 1.90 | 123.70 | 0.89 | 57.80 | 0.95 | 61.60 |
| EU/EFTA | 1.54 | 168.90 | 0.58 | 63.30 | 0.94 | 103.40 |
| China | 1.50 | 13.60 | 0.54 | 4.90 | 0.79 | 7.10 |
| Korea | 2.84 | 14.10 | 1.40 | 8.00 | 0.91 | 5.20 |
| Malaysia | 2.81 | 3.40 | 1.99 | 2.40 | 0.54 | 0.60 |
| Chile | 2.40 | 1.90 | 1.29 | 1.00 | 1.17 | 0.90 |
| Mexico | 1.84 | 6.50 | 0.32 | 1.10 | 1.49 | 5.20 |

EU/EFTA = European Union/European Free Trade Association

a. Agriculture, manufacturing, and services.

b. Services coverage includes construction, trade and transport, other private services, and government services. Protection measured by excess operating profits of firms listed on stock markets.

Note: Scenario shows liberalization of implied protection of 33 percent for three sectors (agriculture, manufacturing, and services).

*Source:* Brown, Deardorff, and Stern (2001, table 2, 25); Dee and Hanslow (2001).

matic. Consequently, liberalizing key services sectors should be a focus of bilateral, General Agreement on Trade in Services (GATS), and Doha negotiations.[12]

Other research and analysis using different econometric models quantifies the potential macroeconomic benefits associated with broad-based trade and investment liberalization, diffusion of networked technologies into business, and domestic policy reforms that ensure that resource reallocations can take place. The approaches are different, but the conclusions are the same: The potential gain to economic well-being is huge from policy reforms that create a favorable environment for IT to take hold. For example, the United Nations Conference on Trade and Development (UNCTAD) considers the long-run effect on GDP of IT, networks, and associated facilitating policies. UNCTAD's simulations with survey data on business costs suggest that the effective use of IT could increase GDP in the industrial world by almost 5 percent (about $1 trillion) in the long run.[13]

12. For more on IT issues in multilateral WTO negotiations, see Mann (2000) and Mann and Knight (2000).

13. See Mann and Rosen (2001, 30–35) for a more extensive discussion of the UNCTAD method and adjustments to it.

**Table 4.3 Trade and trade facilitation**

| Variable | Full sample (1) | Developing to industrial country trade (2) | Developing to developing country trade (3) |
|---|---|---|---|
| Tariff rates | –1.555*** | –1.512 | –1.500*** |
| Port efficiency of importing country | 0.307* | 0.344 | –0.283 |
| Port efficiency of exporting country | 0.924*** | 0.845*** | 0.949*** |
| Customs environment of importing country | 0.472** | 1.041 | 0.202 |
| Regulatory environment of importing country | 0.281* | –1.120* | 0.816*** |
| Regulatory environment of exporting country | 0.620*** | 2.437*** | 0.827*** |
| Services sector infrastructure of importing country | 0.729*** | 2.134*** | 0.866 |
| Services sector infrastructure of exporting country | 1.943*** | 2.124*** | 3.133*** |
| Adjusted R-squared | 0.758 | 0.702 | 0.649 |
| Number of observations | 7,904 | 2,188 | 3,094 |

Note: The significance levels are denoted as * for 10 percent, ** for 5 percent, and *** for 1 percent.

*Source:* Wilson, Mann, and Otsuki (2005).

Finally, new research in the area of trade facilitation shows the importance of services for increasing trade flows (Wilson, Mann, and Otsuki 2003, 2005). As tariffs on trade in goods have come down, more interest has focused on the role that services play in fostering international trade. Research indicates that both imports and exports for a country—and for the world—would increase with improvements in trade facilitation as measured by country-specific proxies for port infrastructure (air and maritime), the customs environment, regulatory environments, and services infrastructures (finance, telecoms, logistics). Table 4.3 reports results from this research, while box 4.2 gives a specific example. Increased trade in manufactured goods from trade facilitation improvements in all four areas yields increases in both exports and imports (column 1 in table 4.3). The most important ingredient in achieving these gains is a country's own trade facilitation reform efforts. (To see this, compare the coefficients in the table on the "importing country" versus the "exporting country"). Moreover, among these trade facilitation measures, improved services infrastructure has the greatest impact on trade. Comparing the results for direction of trade (developing countries to the industrial countries, or developing countries to other developing countries) reveals the greater importance of improved infrastructure for services in increasing trade

### Box 4.2 The role of services infrastructure in locating a new US multinational plant

Intel Corp. is the premier chipmaker in the world, with its products including chips, boards, and other semiconductor components that are the building blocks integral to computers, servers, and networking and communications products.

As market leader, Intel is always in the process of positioning assets for a global fit for its business strategy. On the one hand, the time from fabrication to assembly and testing and to the finished product for market demand is long. On the other, sufficient capacity must be up and running when demand hits. So Intel is identifying worldwide trends and determining where it will build its next set of facilities even before the next chip exists.

What is Intel looking for (and what will it help to create under the right circumstances)? Common to all types of facilities, Intel first considers the site and infrastructure, the operating environment, and the community. Here the factors that matter include a hub airport, connectivity, and value-chain partners; the quality and quantity of the technical workforce and the nature of intellectual property protection; and whether the overall environment is conducive to a highly educated workforce. Intel works on an ongoing basis with governments to help develop the total package that will be attractive not only to Intel but to other companies as well.

Once through these initial considerations, the site selection process diverges somewhat depending on the nature of the facility. For fabrication facilities, site size, infrastructure, legal issues, and quality and quantity of engineering and technical personnel matter the most. For assembly and testing, the objective is to maintain engineering quality, but at the lowest cost and quickest throughput. So locations with airports and those with tariff- and tax-advantaged privileges are key. For data centers, connectivity, English language proficiency, and amenities are important.

Intel and others are following a pattern of globalization with two key drivers: market access and global production. For the first, heterogeneity matters, with regional headquarters, customer support centers, and research and development located near the target marketplace. For the second, cost sensitivity drives location, with taxes and subsidies playing a role in the selection of a production location where scale economies are important.

particularly from developing to industrial countries (column 2 in table 4.3) and among the developing countries (column 3 in table 4.3).

Collectively, this research makes clear that the developing world has much to gain from broad-based liberalization of trade and investment in the services sectors of finance and banking, telecommunications, and dis-

tribution and delivery. This global engagement, in conjunction with a macroeconomic environment of fiscal efficiency and where domestic competition and sufficient education ensure that domestic labor and capital adjust to new opportunities, has great potential to help poorer nations reap the full gains of global engagement and IT.

From the standpoint of the United States, as a net exporter of services and with a positive balance of trade in many services, expanding global opportunities for trade and investment would likely expand the global marketplace for these activities. If, in addition, such globalization of services increases the level of economic development, then the United States stands to gain even more in trade, since consumption of services tends to increase as a share of GDP as per capita GDP increases.

In sum, since domestic services are an input to all other sectors, whether focused domestically or on exports, the liberalization of trade in services can play a role in creating a virtuous circle that would enhance GDP growth and balanced trade in both the United States and the developing world.

## Appendix 4A
## Challenges of International Trade Data for IT Products

Statisticians face three main hurdles in measuring patterns of international trade in information technology products: distinguishing IT products from other products, determining what crosses international borders, and ascertaining the prices of these traded IT goods and services.

Distinguishing IT products from other products is a challenge because of the rapid pace of innovation in the IT sector. New IT products merge communications (personal digital assistants or PDAs), entertainment (game consoles with Internet access), and "traditional" computer hardware, software, and services. Statistical classification cannot keep up, and, in any case, constant changes in classifications hinder long time series of data. Balancing the desire for up-to-date classification with the desire for time-series consistency implies that statistical classification of the IT sector will lag real-world developments to a greater extent than in other parts of the economy.

The enormous rise in IT services presents another hurdle, as part of the more general challenge, of how best to account for the growing importance of services activities. The reclassification of data from the US Standard Industrial Classification System (SIC) to the North American Industry Classification System (NAICS) in 1997 was partly designed to more validly capture services and new advanced technology sectors. NAICS classifies together economic units according to the processes used to produce goods and services and as such is far better able to capture services in the high-tech sectors.[14]

NAICS created a new sector, "51 Information," which comprises establishments engaged in the following processes: (1) producing and distributing information and cultural products, (2) providing the means to transmit or distribute these products as well as data or communications, and (3) processing data. NAICS's new "computer and electronic product manufacturing category" (NAICS 334) was designed to include only IT manufacturers.[15] So NAICS both captures IT hardware, services, and software, and distinguishes between these categories in trade and production.

The second statistical task is to determine when IT products cross international borders. For IT goods such as semiconductors or laptop personal

14. These North American efforts to improve statistical capture of the services sectors have been mirrored internationally since 2002 by the *Manual of Statistics on International Trade in Services*, published jointly by the European Commission, International Monetary Fund, Organization for Economic Cooperation and Development, United Nations Conference on Trade and Development, and the World Trade Organization (UNCTAD 2002).

15. The US Census Bureau definition is from www.census.gov/epcd/ec97/def/51.txt and www.census.gov/epcd/ec97/def/334.txt (accessed March 15, 2006).

computers, this presents no new challenges, as existing administrative systems based on customs collection or export survey for measurement can be used, although the growing fragmentation of production implies a need for increasingly detailed data. For IT services, however, most of which are only recently internationally tradable, experiencing rapid growth, and often intangible, the task of measuring international trade is far more complicated.

IT services are frequently difficult to define and may constitute abstract concepts rather than a physical good, attribute, or function, and very rarely require a physical package (with an inventory description) to cross borders. Hence, contrary to IT goods data, IT services trade data are collected predominantly through surveys of IT businesses, administrative sources, and numerical estimations by statistical agencies. During this collection process, practical considerations of data confidentiality (statistical agencies agree to protect individual corporate data) as well as respondent burden (there are limits to how many surveys businesses can reasonably be expected to fill out) must be weighed against the demand from data users for more detail and validity. Moreover, collecting trade data requires a high degree of "common understanding" of the precise definitions of complicated concepts across different countries' statistical agencies, and also broadly among the players in the IT services industry.

A specific example of such differing interpretations of concepts is revealed by the valuation of US-India trade in "computer and information services." In 2003, the US Commerce Department's Bureau of Economic Analysis (BEA) reported US imports from India as less than a tenth of similar exports to the United States reported by India's National Association of Software and Services Companies (NASSCOM) (Baily and Lawrence 2004). This large discrepancy arose for several reasons. The Indian source included the value of work carried out by company employees on location in the United States, whereas the BEA data, in accordance with the standard balance of payments accounting standards used by the International Monetary Fund, classifies such "wage earnings" not as "trade imports" but as compensation of employees ("worker remittances") in US international transactions tables. Moreover, if the employees in question are in the United States for more than one year, domestic and international accounting standards classify the wages of these employees in the US GDP statistics, not in imports at all. The statistical responsibility for valuating "computer and information services" has since been transferred from NASSCOM to the Reserve Bank of India, and measures of bilateral trade are now comparable.

Many IT services transactions are conducted across international borders but within the same firm as intrafirm trade. Statistical coverage of the scope of transactions within companies is murky—both as to whether a transaction has taken place and at what price—even though US statistical

agencies maintain the most comprehensive data collection effort in the world on intrafirm trade. BEA's new surveys of services transactions will significantly improve the coverage of intrafirm trade.

Even when the statistics correctly demarcate the IT products and determine when they cross international borders, the next question is the price at which such international transactions take place. Price declines among IT goods, especially semiconductors and memory chips, have been unprecedented, and rapid innovation means that the product yesterday at price $P$ is not the same product sold today at price $p$. As the pace of innovation and functionality speeds up, the statistical strategy of "matching models" in the marketplace to link together and create a single price index for a rapidly changing product becomes increasingly challenging.

Pricing of IT products is also complicated by the more pervasive "packaging" of IT hardware, software, and services together. It is becoming more difficult to separate and price the parts of this package, such as for instance the actual value of the "bundled software" preinstalled on personal computers (box 3.1 in chapter 3). At the same time, such "IT packages" are increasingly customized to individual specifications, meaning they contain increasingly disparate amounts of IT hardware, software, and services, adding a further layer of complexity to determining their price.

Finally, many transactions occur within a company itself, making trade pricing vulnerable to transfer pricing by multinational firms. Not unique to the IT sector, it is well documented that multinationals tend to set the level of transfer prices within the company so as to maximize profits in low-tax subsidiaries, rather than at a level that reflects the true value of transacted items (Hines 1996, 1997, and 2000; Desai, Foley, and Hines 2002; Clausing 1998).

The challenges of classification clarity and data integrity are well known to US statistical agencies, which are working with private firms, researchers, and their own staffs to improve the data to better support descriptive insight and policy decision making. Ensuring adequate resources to track this increasingly important sector is critical.