3

The Economic Effects of Foreign Investment in the United States

As noted in the previous chapter, since the passage of the Exon-Florio Amendment, a number of members of Congress have argued that the Committee on Foreign Investment in the United States (CFIUS) should assess the impact of a foreign acquisition on the "economic security" as well as the "national security" of the United States. These proposals to expand Exon-Florio's criteria seem to presume that foreign direct investment (FDI), or some subset of it, could harm US economic interests. In this chapter, we argue that the vast preponderance of evidence supports the opposite conclusion, that FDI creates benefits for the economy. There might be exceptions to this, but they are rare and difficult to identify. Had the Exon-Florio Amendment required screening measures to protect the "economic security" of the United States, it would most likely have caused, and not prevented, damage to the US economy. We examine the effects of FDI on the US economy, in particular on the US international economic situation overall; US workers; research and development (R&D); long-run US economic growth; and generation of externalities (or "spillovers") that might affect the US economy, either positively or negatively.

Importance of FDI to the US Economy

As mentioned in chapter 1, the effects of FDI on the US economy must be examined in the context of the current international economic position of the United States. The United States is heavily dependent on continuing

Box 3.1 The macroeconomic basis for the US balance of payments deficit on current account

The national income identities are

$$Y = C + I + G + (X - M)$$

where Y is national product on an output basis, C is goods and services produced for consumption, I is goods and services produced for investment, G is goods and services produced for the government, X is exports of goods and services, and M is imports of goods and services; also

$$Y = C + S_{priv} + (T - Tr)$$

where Y again is national product (but on a factor payments basis; but this is the same as national product on an output basis), C is goods and services consumed (again, this must be the same as C in the previous equation), S_{priv} is private savings, T is government revenue, and Tr is net transfers to the public by the government.

Subtract the second of these identities from the first, and note that aggregate national savings S can be defined as $S = S_{priv} - (G - T + Tr)$, to get

$$I = S + (M - X)$$

or, written out more fully,

$$I = S_{priv} - (G - T + Tr) + (M - X)$$

This last identity tells us that domestic investment must be financed by domestic savings (where a government budget deficit counts as a subtraction from this savings) plus a capital inflow or outflow, where the inflow (outflow) is exactly equal to the balance of payments on the current account (essentially, the difference between exports and imports; in practice, this must be adjusted for any net unilateral transfers from the domestic economy to foreign economies).

We can conclude that as long as a nation such as the United States (i) invests more than it generates in private savings and (ii) in net, the government (including federal, state, and local governments) runs a budget deficit, the nation will have to finance the two shortfalls from abroad, and the amount of financing needed from abroad will be equal to the balance of payments on the current account, which will itself be in deficit.

inflows of foreign investment, because US savings, net of the drain on these savings created by public-sector deficits, are insufficient to finance domestic investment. As a consequence, the United States must import savings from abroad, generating net capital inflows—or, equivalently, net foreign investment—into the United States. As shown in box 3.1, the amount of foreign investment required is exactly equal to the US balance of payments deficit. This deficit for 2005 was slightly greater than $800 bil-

Table 3.1 Gross capital inflows into the United States, by type of flow, 2005

Type of inflow	Billions of dollars	Percent of total capital flows
Foreign direct investment in the United States	128.6	9.9
Private foreign purchases of US Treasury securities	196.8	15.2
Private foreign purchases of US securities other than US Treasury securities[a]	489.2	37.8
Increase in liabilities to private foreign persons by nonbanking concerns[b]	62.2	4.8
Increase in US liabilities to private foreign persons by US banks, not reported elsewhere[c]	175.7	13.6
Increase in US currency held by foreign persons	19.4	1.5
Increase in assets held in the US by foreign governments	220.7	17.1
Total	1,292.7	100.0

a. Mostly consist of stocks and bonds issued by US corporations.
b. Mostly increases in accounts payable by US business concerns to foreign creditors.
c. Increases in bank deposits held by foreigners in US banks.

Source: US Bureau of Economic Analysis, US International Transactions, available at www.bea.gov; figures are preliminary.

lion, implying that the United States needed to import in excess of $2 billion per day during 2005 to close the gap between domestic investment and saving. Failing to do so would create the risk of interest rates rising significantly, with the likely consequence of curtailing investment, growth, and productivity.

Capital inflows into the United States take a number of forms, of which FDI is only one. As table 3.1 shows, in 2005, gross foreign investment into the United States was $1.44 trillion, of which FDI was about $128.6 billion or about 9.9 percent of total capital inflow. But also the US government, companies, and individuals expanded their ownership of foreign assets by $801 billion. Thus net foreign investment in the United States was $491.2 billion, not counting a statistical discrepancy of about $9.6 billion, which was the difference between net recorded capital flows and the measured balance of payments on current accounts: As just noted and explained in box 3.1, the balance of payments and net capital flows must be equal.

That the United States is likely to continue to need net foreign investment does not, however, create any guarantee whatsoever that FDI will ac-

tually continue to flow into the country. FDI requires both that there be favorable investment opportunities in the United States for foreign firms, and that US policies toward this investment do not deter it. Given that the gap between US investment and savings is unlikely to disappear any time soon, it would be unwise for the United States to take actions that would unnecessarily deter FDI. Policymakers thus must consider the risk of chilling FDI when contemplating changes to the Exon-Florio Amendment. While the United States must respond to any national security threat that an investment might create, the nation can hardly afford to invent nonexistent threats, and by so doing, quite possibly deter or even drive away a significant amount of investment.

The United States is likely to remain dependent upon foreign investment continuing to flow into the economy, irrespective of what form that investment takes. In the remaining sections of this chapter, we argue that, especially in light of this dependence, FDI in the United States is a desirable form of investment. It would generate net benefits to the United States even if there were no dependence on it; with this dependence, however, the importance of FDI to the US economy cannot be overstated.

FDI's Effects on US Workers

In 2003, US affiliates of foreign investors employed 5,253,000 workers in the United States.[1] This might suggest that FDI in the United States in 2003 created this number of jobs, but it would be something of a reach to claim that without FDI, there would have been 5,253,000 fewer jobs in the country. The overall number of workers employed in the US economy at any one time is largely determined by macroeconomic and fiscal policy; however, actions of the federal government on fiscal policy, and the Federal Reserve on monetary policy, do not directly determine whether jobs are created by domestic or foreign investment. It is entirely possible that, had there been no FDI in the United States, domestic employers would have created jobs in sufficient numbers to offset the loss of US jobs that currently exist in foreign-controlled firms. When one examines the effects of FDI on US workers, largely at issue is not how many jobs are created by investment, but rather, the quality of those jobs. Above all else, job quality can be measured by compensation to workers. Do foreign investors in the United States pay workers higher or lower compensation than similar domestic investors do?

An earlier study of FDI in the United States by Edward Graham and Paul Krugman (1994) noted that, in the manufacturing sector, foreign investors in the United States on average paid higher wages than all US

1. US Bureau of Economic Analysis, available at www.bea.gov (accessed March 10, 2006).

manufacturing employers did.[2] But this study also noted that this might be due to a "selection bias" in foreign investment, in that it tends to occur disproportionately in activities for which wages paid, whether by domestic US firms or foreign-controlled ones, are higher than the national average (on selection bias, see box 3.2). This possibility has been borne out by subsequent studies based on less aggregated data than the original study (Doms and Jensen 1998). Within the manufacturing sector, foreign-controlled firms are relatively concentrated in the chemical, computer and electronic equipment, and transportation equipment subsectors. These pay higher wages and salaries than average for the entire manufacturing sector, and thus even if foreign-controlled firms were to pay average wage and salary within these subsectors, they would be above average for the manufacturing sector as a whole.

However, within major manufacturing subsectors in which foreign-controlled firms have a significant presence, those firms pay higher annual wages and salaries than the average firms in the subsector do (table 3.2a). Foreign-controlled firms employ at least 100,000 workers in the United States in eight manufacturing subsectors; in seven out of the eight, foreign firms pay more than the overall US average wage and salary within those subsectors. The sole exception is transportation equipment, the dominant component of which is automotive manufacturing—and even within this subsector, wages and salaries paid by foreign-controlled firms are only slightly below average for the subsector.

The gap between the higher wages and salaries paid by foreign-controlled firms and those paid on average in these subsectors could be accounted for by selection bias within the subsector: Foreign-controlled firms might be more heavily concentrated in those activities within subsectors in which wages and salaries are higher than average anyway. It is not entirely clear from the data whether this is so. What is clear is that the higher wages paid by foreign-controlled firms within the manufacturing sector are not explained fully by selection bias across the entire sector. Moreover, the gap between wages and salaries paid by foreign-controlled firms and the average wage and salary does not disappear if one looks beyond the manufacturing sector (see table 3.2b). In every nonmanufacturing subsector in which there is significant participation by foreign-controlled firms, foreign firms pay higher wages on average.

If these differences are not due to industry selection bias, then why do they exist? There could be biases other than industry selection bias in the data. The data on the entire industry are from the Bureau of the Census, which organizes its data on an "establishment" basis—that is, the data are classified by industry for individual facilities or establishments. The data for majority-owned affiliates of foreign investors are from the Bureau of

2. It is appropriate to examine the manufacturing sector because FDI in the United States occurs most heavily in this sector; see chapter 1.

Box 3.2 Selection bias in wage averaging and the distortions it can create

To illustrate what "selection bias" in averaging is, and how this bias can distort results, we use a very simple hypothetical example. Suppose there is a nation (call it "Vidalia") where all manufacturing consists of just two subsectors, "high tech" and "low tech." Suppose that each subsector employs half of the nation's total manufacturing workforce. The average hourly wage in high tech is $30, but in low tech, only $10. Then the average wage in the Vidalian manufacturing industry would be $20 per hour (half the workers make $30 per hour and half make $10 per hour). Low-tech workers cannot easily advance to high-tech jobs because they lack critical technical skills.

Suppose now that a US-based multinational firm acquires a Vidalian firm that operates in high tech and employs half of all high-tech workers. Under US ownership—which, from the Vidalian point of view, is foreign ownership—this firm continues to pay the same wage as under Vidalian ownership.

In one sense, nothing changes. Wages in Vidalia, and in Vidalian high tech, are the same as they were as before the foreign investment. Moreover, the now US-owned firm pays exactly the same wage as Vidalian firms in the same subsector.

But in the foreign-owned portion of the manufacturing sector, the average wage is now $30 per hour, whereas the average wage in all Vidalian manufacturing remains $20. So in Vidalia, foreign-owned firms pay a higher than average wage in the manufacturing sector. Additionally, because the Vidalian high-tech subsector is now only 50 percent domestically owned, the average wage paid by domestically owned manufacturing firms is now $16.67 ($1/3 \times \$30 + 2/3 \times \$10$), so foreign-owned firms on average pay nearly twice the wages domestically owned firms.

These arguably distorted wage averages are then the result of selection bias. In effect, the workers employed by foreign-owned firms are "selected" from a different, and higher paid, subpopulation of workers than the entire population of all manufacturing workers. The distortions disappear when average wages are presented at the relevant subsectoral level. Nonetheless, an overenthusiastic advocate of foreign direct investment in Vidalia might use the averages to claim that foreign-owned enterprises pay better than do domestically owned enterprises.

In chapter 3, we argue that selection bias accounts for some—but not all—of the wage premium that foreign investors apparently pay in the United States. Foreign investors in the United States seem to pay more than do domestic firms, even when operating in the same sectors or activities. However, when selection bias is accounted for, the difference in wages favoring foreign investors is not as great as aggregated averages might suggest.

Table 3.2a Workforce, wages, and salaries of workers by manufacturing subsector, majority-owned affiliates of foreign investors in the United States and entire subsector, 2003

	Majority-owned affiliates of foreign investors in the United States		Entire subsector	
Subsector	**Number of workers** (thousands)	**Average annual wages and salaries per worker** (dollars)	**Number of workers** (thousands)	**Average annual wages and salaries per worker** (dollars)
Food processing	114.7	42,528	1,496.0	31,144
Chemicals	305.4	82,904	841.4	57,680
Plastics and rubber products	120.9	43,011	1,096.6	29,296
Nonmetallic mineral products	153.4	44,902	467.6	38,680
Primary and fabricated metals	144.2	49,570	1,998.0	38,359
Machinery	247.6	54,960	1,129.1	43,392
Computers and electronic products	219.8	67,020	1,189.5	55,976
Transportation equipment (includes autos)	377.1	49,180	1,606.7	49,771

Note: This table includes subsectors where majority-owned affiliates of foreign investors employ 100,000 or more workers.

Sources: Bureau of Economic Analysis, Foreign Affiliate Data, available at www.bea.gov. Entire subsector data from Bureau of the Census, US Employment by Sector, available at censtats.census.gov.

Economic Analysis (BEA), which organizes its data on an "enterprise" basis—that is, the data are classified by industry for affiliates of foreign investors. As a result, the BEA data might include a higher percentage of professional or managerial employees, as opposed to manufacturing production workers, than the Census data do. This makes some sense: If a manufacturing firm has a central headquarters operation, or an R&D facility, separate from its production operations, then on an establishment basis, workers in such an operation would be classified as being in the "professional, scientific, and managerial services" sector rather than in the manufacturing sector. On an enterprise basis, the same workers might be placed in the manufacturing sector. Given that personnel in a central headquarters operation or in an R&D facility are likely to be paid more

Table 3.2b Wages and salaries paid by majority-owned affiliates of foreign firms operating in the United States and average wages and salaries, selected nonmanufacturing sectors, 2003 (annual wages and salaries per worker in dollars)

	Majority-owned affiliates of foreign firms	Entire sector
Wholesale trade	58,333	46,111
Retail trade	23,728	21,487
Information services (includes publishing and telecom)	60,402	56,675
Professional, scientific, and managerial services	65,340	54,244

Sources: Bureau of Economic Analysis, Foreign Affiliate Data, available at www.bea.gov. Entire sector data: Bureau of the Census, available at censtats.census.gov.

than those in a production facility, the data organized on an enterprise basis will show higher wages in the manufacturing sector than do the same data organized on an establishment basis.

But the differences in the way the data are organized by enterprise are not likely to account for all of the differences in wages and salaries. For one thing, some foreign firms have multiple US affiliates. One affiliate might specialize in manufacturing, while another specializes in R&D. Under this example, data generated on an enterprise basis will be comparable with data generated on an establishment basis. As a result, the biases in the data will be reduced. The BEA data for majority-owned affiliates of foreign investors include a large data category for the professional, technical, and managerial services sector. Thus not all of the professional and managerial personnel employed in foreign-controlled manufacturing firms are classified in the manufacturing sector. Likewise, not all such personnel employed by domestically controlled firms will appear in the professional, technical, and managerial services sector, because some of those personnel work inside production facilities.

Another possibility to explain the wage and salary difference noted in tables 3.2a and 3.2b above is simply that, within the United States, even controlling for distribution of activity by sector or subsector, multinational firms pay higher wages on average than nonmultinational firms do, regardless of whether those firms are ultimately under foreign or domestic control. We can explore empirically whether this bias exists, as the BEA produces the relevant data for the parent firms of US-controlled multinationals. These data are organized on an enterprise basis, as are data for majority-owned affiliates of foreign investors. One would expect the lat-

Table 3.2c Compensation per employee, by manufacturing subsector, US parents of US-controlled multinational firms versus majority-owned affiliates of foreign investors operating in the United States, 2003 (average compensation per employee in dollars)

Subsector	US parents of US-controlled multinational firms	Majority-owned affiliates of foreign investors in the United States
Food products	46,565	57,035
Chemicals	86,652	102,551
Plastics and rubber products	54,623	58,371
Nonmetallic mineral products	55,940	58,904
Primary and fabricated metals	53,841	64,487
Machinery	66,357	68,700
Computers and electronic products	74,723	82,803
Transportation equipment	66,177	64,163

Source: Bureau of Economic Analysis, available at www.bea.gov.

ter to pay lower wages than US parents of multinational firms do, because the parents of US-controlled multinationals would be expected to have a higher percentage of their worldwide managerial and technical persons located in the United States than would foreign-controlled multinationals. But the data show the opposite to be the case.

Table 3.2c presents relevant data. Measures used in this table are no longer average wages and salaries paid to employees, but rather average compensation, which includes wages, salaries, and fringe benefits.[3] These data, however, show almost the same results as the data in table 3.2a: Controlling for industry, affiliates of foreign-controlled firms in the United States pay more than the average compensation paid by US parents of multinationals.

While it is unclear whether domestic investment would replace jobs supported by foreign investment if foreign investment were withdrawn, it is clear that FDI creates desirable US jobs at very good wages. Wages paid by foreign affiliates tend to be at the top of the scale for the sector in which the investment is located, particularly in manufacturing. In a sense,

3. Why this difference? The answer lies in the underlying data; in the Bureau of the Census data, we could find information only on wages and salaries, whereas in the BEA data for US multinational parent firms, we could find information only on compensation. Fortunately, for the majority-owned affiliates of foreign investors, we could find data for compensation in wages and salaries.

then, one of the ways to slow the decline in the US manufacturing base would be to attract additional foreign investment.

FDI and US Research and Development

Economists largely agree that the major long-run driver of per capita economic growth is technological progress, which enables goods and services to be produced more efficiently, driving real price reductions. Technological progress also leads to product improvements and new product innovation that, in turn, improve peoples' lives. Does anyone want to go back to driving the automobiles of the 1950s, watch television on receivers of that era, or be limited to 1950s telephone technology or prices?

Corporate R&D is a major source of technological progress, although it is far from being the only such source;[4] the case can be made that technological progress benefits an economy irrespective of where that progress is first achieved, because new technologies diffuse rapidly across the globe. This is particularly true when multinational firms create new technologies, because the firms are capable of very rapid international intrafirm technology transfer. From a US national interest perspective, an important question is whether or not foreign firms that invest in the United States are innovators of new technologies. To a very large extent, the answer to this question rests on the global capabilities of these firms, and not whether or not the underlying R&D is actually performed in the United States.

Recognizing that the United States benefits from technology created overseas, we focus here primarily on how much, and how often, foreign-based multinational firms perform R&D inside the United States. The extent to which this happens might not be as relevant to the long-run economic interest of the United States as the amount of R&D these same firms perform globally. Even so, important benefits are associated with US-based R&D activity. Many economists believe that privately performed R&D creates "spillover" effects—positive effects that are not captured by the firm that performs the R&D, but rather by the community in which the R&D is performed. Scientists or researchers could be part of a team that undertakes important R&D work for a private entity. Those scientists could either move to other firms, bringing their technical knowledge and skills with them, or they could share knowledge with other scientists through formal or informal means of communication. Because of this spillover effect, evidence suggests that large "clusters" of R&D activity that are concentrated in a particular location are more productive than an equal amount of R&D activity spread over a large geographic territory. Thus to the extent that foreign investors perform R&D in the United

4. Other sources include universities and government laboratories, and some technological progress is created in private, for-profit corporations, but not in formal R&D facilities.

Table 3.3a R&D expenditures by majority-owned affiliates of foreign investors in the United States, and by US parents of US-based multinational firms, by sector or subsector, 2003
(billions of dollars)

Sector or subsector	Majority-owned US affiliates of foreign investors	US parents of US-based multinational firms
All sectors	29.52	140.10
All manufacturing	22.02	112.94
Chemicals	9.41	34.65
Of which: Pharmaceuticals	7.97	25.58
Machinery	1.56	8.09
Computers and electronics	5.12	33.52
Of which:		
Computers	0.76	7.06
Communications equipment	1.77	10.34
Semiconductors	0.43	11.52
Transportation equipment	3.52	23.78
Of which: Autos	3.26	17.26
Wholesale trade	5.14	2.72
Information services	0.85	9.91
Professional, scientific, and technical services	1.13	10.74
Of which: Computer systems design	0.19	9.00

Sources: Bureau of Economic Analysis, available at www.bea.gov.

States, they are quite likely to place their facilities in existing clusters and, by doing so, enhance the aggregate output of these clusters.

From a national security perspective, it also matters in certain circumstances where R&D takes place, because if hostilities occur and connections are broken among the component organizations of a large, multinational firm, it may be important to be able to access the R&D capability of that firm. Such access is most assured, of course, if those capabilities are in the United States, and not abroad.

Given its national security importance, it is reassuring that foreign-controlled firms perform a significant amount of R&D in the United States. Table 3.3a indicates, by sector and subsector, total expenditures for R&D by majority-owned US affiliates of foreign investors during 2003, comparing them with similar expenditures by the US parents of US-based multinational firms. The data include those sectors and subsectors that are the most R&D intensive. US parents of US-based multinational firms spent massively on R&D in the United States ($141.1 billion), but majority-owned affiliates of foreign investors spent very large amounts as well ($29.5 billion). In both cases, the amount of R&D performed by companies

operating in the manufacturing sector predominates. Parents classified as operating in the manufacturing sector account for 80 percent of all R&D performed by US parents of multinationals. Similarly, 75 percent of all R&D performed by US affiliates of foreign investors is accounted for by affiliates in the manufacturing sector. However, for US affiliates of foreign investors, some $5.1 billion of R&D is listed as being performed in the wholesale trade sector, almost surely by certain large foreign automotive firms, the activities of which include both manufacturing and importing vehicles. Because these data are classified on an enterprise basis, all data are put into the sector category pertaining to the primary activity of the firm, which for certain automotive firms is importing autos (a subset of wholesale trade), even though these same firms also manufacture finished vehicles in the United States. Arguably, the R&D data for these firms would be more properly placed in the manufacturing sector: Assuming that all R&D listed for US affiliates of foreign investors appearing in the wholesale trade category is in fact performed by these automotive firms, if this R&D were to be properly placed in manufacturing, that sector would account for almost 92 percent of all R&D done by US affiliates of foreign investors in the United States.

Although the amount of R&D undertaken in the United States by foreign-controlled firms is very large, as the data show, it is not nearly as large as the amount performed by US-based firms. But the aggregate size of foreign-controlled operations in the United States is also significantly smaller than domestic operations under the control of US-based multinationals. How then, does the amount of R&D performed by foreign-controlled firms in the United States compare with R&D undertaken by US-based multinationals in this country, controlling for overall size of operations? Table 3.3b compares, for the same sectors and subsectors, the amount of R&D performed by each type of firm, divided by US value added by those firms. The value added is the contribution of the firms to US GDP. Normalizing by value added produces what we think is a valid comparison.

Table 3.3b indicates that US parents of US-based multinational firms invest slightly more in R&D as a percentage of overall contribution to US GDP. US firms spend about 7.1 percent of value added on R&D, whereas the majority-owned affiliates of foreign investors spend about 6.1 percent of value added on R&D. A difference exists, but the affiliates of foreign investors do not lag behind parents of US multinationals by very much. It is, in fact, rather surprising that foreign investors' R&D spending as a percentage of value added approximates R&D spending by the parents of US-based multinationals at all, given that most firms tend to concentrate their R&D activities close to their worldwide headquarters, which are typically located in a company's home country. In manufacturing, the gap between R&D divided by value added is somewhat greater than it is in other sectors. US parents spend about 13 percent of value added on R&D, whereas

Table 3.3b R&D expenditures by majority-owned affiliates of foreign investors in the United States, and by US parents of US-based multinational firms, by sector or subsector, divided by value added, 2003 (ratio)

Sector or subsector	Majority-owned US affiliates of foreign investors	US parents of US-based multinational firms
All sectors	0.061	0.071
All manufacturing	0.097	0.130
Chemicals	0.188	0.251
Of which: Pharmaceuticals	0.283	0.372
Machinery	0.079	0.113
Computers and electronics	0.281	0.301
Of which:		
Computers	0.334	0.294
Communications equipment	0.392	0.346
Semiconductors	0.206	0.376
Transportation equipment	0.100	0.165
Of which: Autos	0.102	0.206
Wholesale trade	0.061	0.029
Information services	0.032	0.038
Professional, scientific, and technical services	0.063	0.106
Of which: computer systems design	0.065	0.210

Source: Bureau of Economic Analysis, available at www.bea.gov.

majority-owned affiliates of foreign investors spend about 10 percent. However, in some subsectors of manufacturing, the results are reversed. In the computer manufacturing and communications equipment subsectors, which include telecommunications equipment, the affiliates of foreign firms spend a greater portion of value added on R&D than US parents do.

In addition, majority-owned affiliates of foreign investors in the United States spend more on R&D, both as an absolute amount and as a percent of value added, than do affiliates of US multinational firms operating abroad. Some relevant figures are contained in table 3.3c.

The data thus show that while majority-owned affiliates of foreign investors spend about $29.5 billion on R&D in the United States, overseas affiliates of US multinationals spend about $22.3 billion. And though R&D expenditure made by US-based firms abroad does not lag behind R&D expenditure by foreign-based firms in the United States by much, the US economy accounts for approximately one-fifth of the global economy. In other words, the United States accounts for a disproportionate amount of R&D activity, further demonstrated by the fact that the R&D expenditures of majority-owned affiliates of foreign investors measured as a fraction of value added (0.061) is about double that of the affiliates of US multina-

Table 3.3c R&D expenditures by majority-owned affiliates of foreign investors in the United States and by affiliates of US multinationals abroad, 2003

Sector or subsector	Majority-owned affiliates of foreign investors		Affiliates of US multinationals abroad	
	Gross expenditure on R&D (billions of dollars)	R&D as fraction of value added	Gross expenditure on R&D (billions of dollars)	R&D as fraction of value added
All sectors	29.52	0.061	22.33	0.032
Manufacturing	22.02	0.097	19.90	0.057
Of which:				
Chemicals	9.41	0.188	5.07	0.068
Pharmaceuticals	7.97	0.283	4.26	0.113
Computers and electronics	5.12	0.281	4.73	0.134
Transportation equipment	3.52	0.100	6.48	0.131
Wholesale trade	5.14	0.061	0.18	0.002
Information services	0.85	0.032	0.75	0.026
Professional, scientific, and technical services	1.13	0.063	1.04	0.028

Source: Bureau of Economic Analysis, available at www.bea.gov.

tionals abroad (0.032). Moreover, in 2003, total worldwide R&D expenditures of US-based multinationals was about $162.4 billion, including those of US parents and their overseas affiliates. Of this amount, over 86 percent was spent in the United States.

How do other nations fare with respect to R&D done in their territories by foreign-based firms, and R&D done in their territories by US-based firms in particular? It is hard to say, because international data are sparse. However, some relevant, albeit incomplete, data have been published in the most recent United Nations Conference on Trade and Development's *World Investment Report 2005* (UNCTAD 2005, annex table A.IV.1). UNCTAD estimates that in 2002, the amount of R&D expenditures in advanced nations by firms not based in these nations was about $62 billion, or about 15.7 percent of all R&D expenditures in those nations. In that year, foreign-controlled firms spent about $27.5 billion on R&D in the United States; in other words, about 44 percent of the total of such expenditures in advanced nations by nonlocally based firms seemed to take place in the United States. In developing nations, nonlocally based firms expended about $4.1 billion on R&D in 2002, or about 18 percent of all such expenditure in these nations. Worldwide, but excluding the United States, expenditures on R&D by nonlocally based firms was $39.4 billion. This suggests that US-based firms' R&D expenditures outside the United States

account for as much as three-fourths of the total of such expenditures worldwide by nonlocally based firms. But, again, one must realize that all of the numbers cited in this paragraph are based on imperfect data, and thus must be interpreted with caution and even skepticism.

FDI and Economic Growth

We have shown that foreign investors pay high wages and salaries, and that foreign-controlled firms contribute significantly to US R&D. We now turn to the question of whether FDI in the United States has a measurable positive effect on US economic growth in the long run. While the preponderance of research on this issue demonstrates a positive link between FDI and long-term growth, there have not been studies on the specific effects of foreign investment on US growth, and for good reason. For technical reasons, it is difficult to measure precisely the effect on growth of the most important determinants of economic growth, and even more difficult to measure precisely the effect of FDI on growth, because economists consider foreign investment to be a minor determinant of growth. Most economists who study the issue agree that the major determinants of long-run economic growth are the total amount of capital available for production; the rate at which this capital stock is augmented; the vintage, quality, and sectoral distribution of capital stock; the levels and composition of the skills of the workforce, including at the technical and managerial levels; the rate at which new workers enter the workforce and old workers exit it; and the rate and direction in which new technology enters the economy. FDI is less important than any of these determinants. In addition, foreign investment can affect several of these determinants to some extent, but is not a dominant force behind any of them. As noted in the previous section, foreign-controlled firms conduct a significant amount of R&D in the United States. These firms are easily able to transfer new technologies developed outside the country into their US operations. Thus the rate and direction of new technology into or out of the US economy is to some extent affected by FDI. As a result, FDI almost surely exerts some positive effect on US growth through technology. But purely domestic sources of new technology are more important determinants of growth than are FDI-related sources. Alas, it is difficult, again for technical reasons, to measure precisely even the exact contribution of all technological advances on economic growth, and virtually impossible to isolate the contribution of foreign-source technology.[5]

5. To measure the contribution of technology to economic growth, one must specify a production function for the US economy. There are a number of ways to specify such a function, all of which would be acceptable to an econometrician, and different specifications yield somewhat different results for this contribution. Thus while it is possible to determine a "ballpark" figure for this contribution, we cannot with confidence estimate a very precise figure.

Although we cannot precisely measure the effect of FDI on growth, we should not abandon the question entirely as to whether FDI in the United States helps to generate growth. The question has long been debated by economists, though considerable, but not unequivocal, evidence suggests that there is a positive link. To begin, FDI is associated with higher international trade, which in turn leads to increased efficiency, enhanced competition, and positive externalities, all of which tend to accelerate economic growth. Moreover, a number of studies have appeared in the recent literature on the empirical relationship between FDI and economic growth using various methodologies and datasets. Most of these studies indicate a positive and significant relationship, though a number of the results must be qualified, and one important study concludes that a positive and significant such relationship does not exist (Carkovic and Levine 2005).

Most of the studies use panel data to compare results across both countries and time. Until very recently, such studies were performed using ordinary least squares estimators, a technical matter touched upon below. Blomström, Lipsey, and Zejan (1994), prominent international economics professors at the Stockholm (Sweden) School of Economics, Queens University New York, and the International Monetary Fund, find that FDI positively affects growth if and only if a national wealth threshold is reached. In other words, FDI does not positively affect growth if a country is quite poor. Balasubramanyam, Salisu, and Sapsford (1996), three researchers at the International Monetary Fund, also find a positive relationship, but only if the country is open to international trade. This result is not inconsistent with the results of Blomström et al. (1994) because in recent history poorer countries have tended to be less open to trade than richer countries have. Borensztein, de Gregorio, and Lee (1998), also at the International Monetary Fund, find a positive relationship as well, but only if a country meets a threshold level of education. Again, this finding is generally consistent with the earlier results, as poorer countries tend to have less well-educated populations than do richer ones—although Blomström et al. (1994) consider education as a conditioning variable and do not find it to be significant. Alfaro et al. (2003), researchers at the World Bank, also find a positive relationship but only in countries with well-developed financial markets; again, this is roughly consistent with earlier findings because richer countries have better-developed financial markets than poorer ones do.

Finally, using a later and larger data set than Blomström et al. (1994), Blonigen and Wang (2005), both researchers at the US National Bureau of Economic Research, find that FDI affects growth more in developing (poorer) countries than in developed (richer) ones. This last finding is not wholly consistent with the others, and might be explained by a number of factors, including that the data are more recent, and hence strongly affected by economic growth in China, where there has been considerable FDI. Also, much recent FDI among developed nations, in contrast to ear-

lier times, has taken the form of cross-border mergers and acquisitions (M&As). Blonigen and Wang (2005) speculate that M&As might have a weaker effect on growth than greenfield FDI, discussed in chapter 1. Kumar and Pradhan (2005) use new panel data estimation techniques to adjust for certain shortcomings of ordinary least squares estimators to test whether FDI has had a positive and significant effect on economic growth in the countries of South Asia. They conclude in the affirmative.

However, Carkovic and Levine (2005) find that while FDI has a positive effect on growth, it is not significant. They use the same estimator that Kumar and Pradhan use, but apply it to a larger set of countries. It is possible that the effect of FDI on growth is positive for those countries tested by Kumar and Pradhan, but that this effect disappears when the same estimator is applied to a broader set; the Carkovic-Levine results are of particular importance precisely because they use an improved technique on a broad set of countries. Given this, however, whether or not they actually reach the right conclusion from their own analysis is open to some question. In their analysis, they at one point include an FDI variable in their set of conditioning variables, the set of variables meant to explain economic growth. This variable is positive and significant, which suggests that FDI is in fact a robust explanatory variable. But then they add to the set of conditioning variables a variable to account for openness to international trade. When they do so, FDI, while remaining positive, ceases to be statistically significant.

What can we make of this? The authors themselves conclude that FDI is not a robust determinant of growth. However, Melitz (2005), commenting on Carkovic and Levine (2005), notes that if international trade and FDI are jointly determined and if these two variables move together, then a joint link remains between economic growth and increased trade and investment. Thus Melitz argues that by linking the effects of FDI and international trade, even the Carkovic and Levine results show a positive and statistically significant effect of FDI on growth, consistent with the other six studies mentioned above.

Even leaving econometric matters not wholly resolved, it is safe to say that the majority of empirical studies support a positive link between FDI and economic growth, especially when one considers that FDI in many countries (e.g., China) has led to export growth. As suggested at the outset, and reinforced by Melitz, these gains might owe in part to efficiencies that result from joint interaction between increased trade and FDI. Economists classically see such efficiencies as having three root causes. First, openness to investment and trade enables countries increasingly to specialize in the economic areas in which they have an advantage, and to benefit from importing goods, services, and knowledge in areas in which other countries have an advantage. Second, with open investment and trade policies, countries can focus on producing a narrower range but larger output of goods and services, making production in those goods and services more

Table 3.4 Imports and exports of majority-owned affiliates of foreign investors in the United States, 2003

Sector or subsector	Imports		Exports	
	Billions of dollars	Fraction of value added by affiliates	Billions of dollars	Fraction of value added by affiliates
All sectors	356.66	0.733	150.82	0.310
Manufacturing	138.97	0.610	93.26	0.410
Of which:				
Food	2.05	0.220	7.40	0.795
Chemicals	21.08	0.422	16.07	0.322
Pharmaceuticals	13.21	0.469	6.34	0.225
Plastics and rubber products	4.74	0.527	2.53	0.281
Primary and fabricated metals	6.78	0.550	3.71	0.301
Machinery	9.25	0.466	8.65	0.435
Computers and electronic	24.22	1.060	13.99	0.612
Wholesale trade	206.50	2.463	53.11	0.633
Information	1.06	0.039	1.01	0.038
All other sectors	5.82	0.087	2.24	0.034

Source: Bureau of Economic Analysis, available at www.bea.gov.

efficient though increased economies of scale. Third, increased trade and more open investment policies lead to increases in effective competition, forcing firms to price competitively, thus creating incentives for these firms to reduce costs and improve product quality. Importantly, these benefits are generated by increased trade (both imports and exports) and not by increased exports alone.

Is there a link between FDI in the United States and increased trade? As table 3.4 shows, in both the manufacturing and nonmanufacturing sectors, majority-owned affiliates of foreign investors create substantial exports and imports. The table contains both quantities of imports and exports accounted by these affiliates, and exports and imports as a percent of value added created by the affiliates.

As can be seen, manufacturing affiliates of foreign investors are particularly active in exports and imports. They import goods and services equal to about 61 percent of their domestic value added, and export goods and services equal to about 41 percent of their domestic value added.[6] Both imports and exports of these foreign-controlled firms contribute to US eco-

6. For purposes of comparison, for the economy as a whole, the value of imports of manufactured goods is equal to about 83 percent of value added in the US manufacturing sector, while the value of exports of manufactured goods is equal to about 44 percent of value added in this sector.

nomic efficiency and growth: As is also the case with US multinational firms, foreign-based firms tend to manufacture goods where it is most economical to do so. Thus substantial portions of foreign-controlled firms' imports are of parts, subassemblies, and other inputs used in US manufacturing operations. The result of this is that the overall efficiency, and hence overall cost, of the final product is reduced from what would have been the case if the final product had consisted entirely of local content. In some cases, importing inputs is complemented by importing finished goods for which US manufacture would be uneconomically inefficient. But at the same time, these firms are engaged in US production—with substantial US value added—and often, US production is more economical than overseas production is, as the very substantial exports of these firms reflect.

FDI and Spillovers

As noted in the introduction to this chapter, one way FDI can contribute to overall economic growth is by creating beneficial "spillovers" into the economy, the most important of which is technology transfer to external agents resulting from FDI. This spillover of technology can occur in a number of ways. A foreign firm may introduce new technologies or methods of business to local employees, who take the knowledge with them when they leave the foreign firm's employment. A foreign firm also may share new technology or business methods with local companies, which then may use it to serve other companies, including the foreign firm's rivals. Alternatively, the domestic employees of the foreign firm may simply leak the new technology or business method, ultimately benefiting domestic rivals.

In addition to technology transfer, localized R&D can result in important positive externalities. To create a successful R&D operation, it may be advantageous for a foreign firm to locate its operations in close proximity to similar, established operations, to access personnel with the talents and skills that it needs for its R&D activities. Such clusters of innovative activity are often found quite near major universities that supply graduates (or, in some cases, dropouts) who have the necessary talents and skills. The clustering of the R&D activity, coupled perhaps with the local university, creates externalities: R&D specialists, even if employed by different firms or nonprofit organizations, tend to talk to one another in a way that leads to a virtuous and continual exchange of ideas, permitting the firms in the area to partake of and benefit from the ideas that each generates. Silicon Valley, south of San Francisco, is an example of such a cluster, where Stanford University is the premier university.

Spillovers from clustered activities are not necessarily limited to R&D. The clustering of financial institutions in New York has almost surely created an external scale economy that generates positive externalities in the form of financial innovation. In both cases, the generation of positive

externalities is doubtlessly enhanced by the fact that a well-established cluster of innovative activity tends to attract many of the best-qualified persons in the relevant field, who seek to live and work near the clusters to maintain close contact with other top specialists in the field. By locating in the cluster, foreign firms can contribute their own ideas and best-qualified people, and possibly facilitate an inward transfer of technology that the firm developed elsewhere, thereby further enhancing the positive externalities associated with the cluster.

Is there any strong evidence that US domestic activity has benefited from positive spillovers created by FDI? The best evidence that we know of comes from the automotive sector. Baily et al. (2005) examine the labor productivity gap between US-owned and foreign-owned firms from the late 1980s, when FDI began to create the so-called transplant operations in the United States of foreign auto producers, to 2002. As recently as 10 years ago, this gap was substantial and favored foreign-owned firms. By 2002, however, the gap had narrowed very considerably, such that now there is very little gap at all. Baily et al. (2005) attribute the near-closing of the gap to new technologies and managerial techniques introduced into US-owned facilities by foreign-owned facilities, especially those of Japanese-owned firms.

International evidence on whether FDI generates spillovers is mixed: Some studies show evidence of it, but others do not. In a recent survey of the literature on this subject, Lipsey and Sjöholm (2005) find that newer studies confirm spillovers more often than older ones do. Two possibilities suggest themselves: Either statistical techniques, along with the needed data, have improved with time, in which case it is possible that the spillovers have been out there for a long time but not properly recorded, or the advance of technology or a more rapid rate of its diffusion has caused an increase over time in the incidence of measurable spillovers. Either way, the evidence seems to support that spillovers occur, and we suspect that additional microanalysis in the United States of sectors other than autos will reveal their existence.

Given that FDI in the United States seems to benefit the US economy, it would follow that the United States should try to limit it to the smaller extent possible. Yet national security issues do not arise from increased levels of FDI generally, but rather when it comes from specific countries or companies that already raise concerns for the US government. As chapter 1 discussed, the United States in the past has sought to protect itself from FDI originating in Germany and Japan. Today similar sentiments are harbored toward Middle Eastern countries for their supposed links to terrorist activities, but more importantly, toward China, which, as a vast and growing economy, could one day challenge the United States in economic might. The implications associated with FDI from China for national security are thus both more fundamental and more complex than FDI from most other nations, and it thus is to China that the next chapter turns.