3

Chinese FDI in the United States

China's emergence as a major player in the international economy cannot help but inspire apprehension as well as awe. The spread of Chinese firms around the globe is no different. However, Chinese foreign direct investment (FDI) in the United States is not only small, but unusually small compared with what might be expected in the future. It is not too early to investigate what the data already show about Chinese FDI in the United States before examining the specific question of when foreign investment—especially foreign investment through acquisition of existing US firms—might pose a national security threat to the United States, and when national security concerns are not plausible.

Outward FDI from less developed and emerging-market economies—from China and others—has been increasing in recent years. China's outward FDI stock in 2010 was $298 billion, about two-thirds as much as Russia, 1.6 times as much as Brazil, and three times as much as India. And while China's outward FDI stock grew by almost 1,000 percent from 2000 to 2010, starting at a baseline of $28 billion, this is nothing compared with the growth rates of FDI from Russia and India, which increased by 2,000 and 5,200 percent over that same time period, starting from baselines of $20 billion and $1.7 billion, respectively. China's outward FDI flows so far place it far below the United States and other Organization for Economic Cooperation and Development (OECD) countries, far above most less developed countries, and in a broad middle range along with Russia, Brazil, and India. As our analysis delves deeper into the causes and consequences of Chinese FDI in the United States, unique characteristics of China and its FDI patterns will be discussed. But it is useful to keep in mind that at least in overall magnitude, Chinese outward FDI occupies the same middle range of a few other large emerging-market economies.

Empirical Issues Related to the Study of Chinese FDI

One difficulty that arises when trying to understand the effect of Chinese FDI in the United States is the lack of comprehensive and current data. There is no single data source that provides detailed real-time information on every aspect of Chinese investment. Data from official government sources take time to collect and compile. Private sources, such as Thomson and Dealogic, provide up-to-date information on individual companies investing in the United States, but problems arise in attempting to aggregate this information. However, there are several useful sources of data. Each has its own weaknesses, but taken together, they can paint a reasonably accurate picture of the state of Chinese FDI in the United States.

Chinese Ministry of Commerce

The Chinese Ministry of Commerce (MOFCOM) reports inward and outward FDI statistics, though a number of China experts have questioned the reliability of its data. Daniel Rosen and Thilo Hanemann (2009, 3) say that "although authorities conform in principle to internationally recognized standards, including the OECD's *Benchmark Definition of Foreign Direct Investment* and the International Monetary Fund's (IMF) *Balance of Payments Manual*, compilation methods are not fully consistent with these standards in practice, and MOFCOM's exact methodology for gathering OFDI [outward FDI] data is opaque." Kevin Cai (1999) reports that from the beginning of China's open door policy to the late 1990s, China's outward FDI flows are estimated by most sources to be between $80 billion and $100 billion, whereas the official statistics report only $15 billion.

United Nations Conference on Trade and Development (UNCTAD)

UNCTAD provides a more reliable picture of FDI stocks and flows using data that the IMF has collected from individual countries. These data are harmonized to allow for comparisons across countries and over time; however, the harmonization is not perfect due to idiosyncratic differences in the ways that individual countries define and measure FDI. In addition, the data are available only at an aggregate level, so they report the total outward FDI from China, but not the amount of that total investment that goes to the United States. This obviously limits their usefulness for understanding Chinese direct investment in the United States.

US Bureau of Economic Analysis (BEA)

The BEA collects firm-level data on affiliates of foreign-owned firms operating in the United States in its annual surveys of FDI. Responding to these surveys is mandatory for all firms located in the United States that have at least a 10 percent foreign ownership share and are above a minimum size threshold.

While firm-level data are not publicly available, the BEA does publish aggregate statistics by country of ownership and industry. These data include many useful balance of payments, financial, and operating statistics such as FDI position, capital inflows, sales, imports, exports, employment, wages, value added, and research and development (R&D) spending. One drawback is that the process of collecting, compiling, and verifying survey data means that they are not immediately available for analysis.

Rhodium Group's China Investment Monitor

Daniel Rosen and Thilo Hanemann of the Rhodium Group and the Peterson Institute for International Economics have recently developed a new dataset to track Chinese FDI in the United States called China Investment Monitor. This dataset compiles information on publicly announced acquisitions and greenfield investment by Chinese-owned firms using commercial databases such as Thomson, Dealogic, International Strategy and Investment (ISI), and fDi Markets, as well as news reports and their personal contacts in China. The greatest benefit of this dataset is that it allows for real-time analysis and is the most up-to-date source of information on Chinese FDI in the United States. However, because it records deals as they are announced, it may not pick up changes in the value or timing of expenditures associated with these deals that occur after the initial announcement. The China Investment Monitor only includes investments made since 2003 and thus does not allow for examination of longer-term trends. The focus on China also does not allow for easy comparisons with investments originating in other countries.

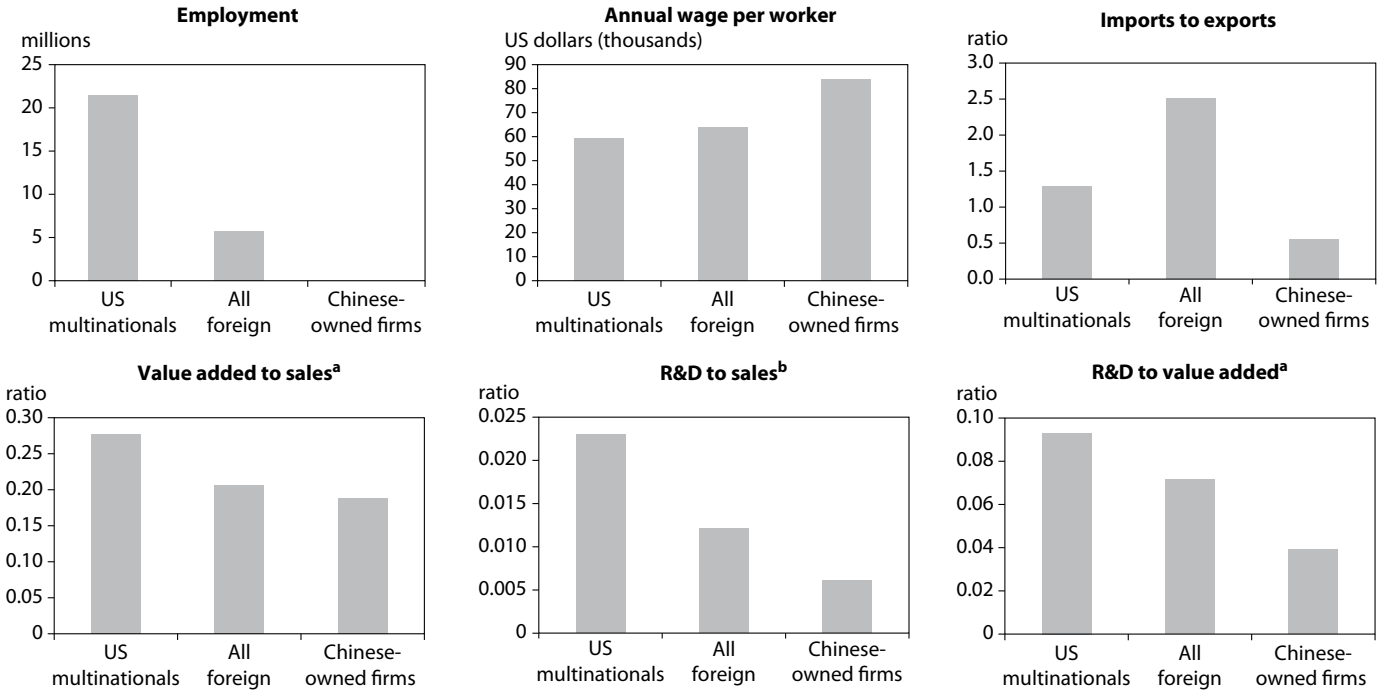
Heritage Foundation's China Global Investment Tracker

The Heritage Foundation also takes a deal-by-deal approach to tracking Chinese investment in its China Global Investment Tracker. This database contains details on over 400 attempted transactions, both successful and failed, by Chinese firms. It includes activities all over the world, not just in the United States, that occurred between 2005 and 2010 and involved over $100 million in value. This dataset allows for international comparison, but covers a relatively short time period and misses small-value transactions. Perhaps the greatest drawback is that the dataset attempts to capture all types of investment, not only FDI. Thus it combines portfolio flows with FDI data and necessarily misses a great deal of these flows, which are very difficult to track.

What Do the Data Say about Chinese Firms Operating in the United States?

To assess the effect of Chinese FDI in the United States, it is useful to first understand what form that investment takes. Figures 3.1 and 3.2 contain summary statistics on the characteristics of Chinese-owned firms in the

Figure 3.1 Operations of firms located in the United States, all affiliates, 2005

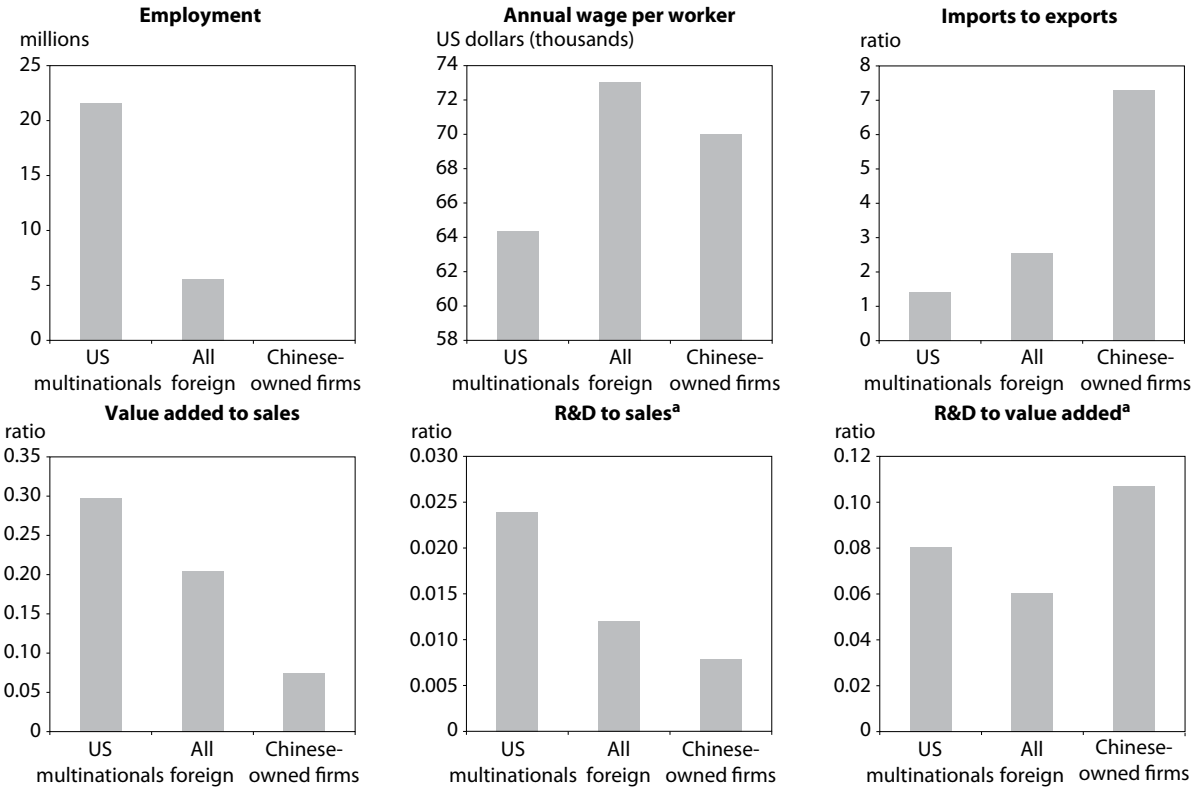


a. Value-added figures are for 2001.
b. Chinese sales and research and development (R&D) figures are for 2004.

Note: Chinese-owned firms are defined as firms for which a Chinese entity has at least 10 percent ownership.

Source: US Bureau of Economic Analysis.

Figure 3.2 Operations of firms located in the United States, majority-owned affiliates, 2007



a. Chinese research and development (R&D) figures are for 2008.

Note: Chinese-owned firms are majority-owned Chinese firms only.

Source: US Bureau of Economic Analysis.

United States, comparing them with the same statistics for US-owned multinationals and other foreign-owned firms operating in the United States in 2005 and 2007. These data come from the BEA annual surveys of FDI in the United States.

Two different ownership thresholds typically are used to measure FDI activity. The first, which applies the standard definition of FDI used for balance-of-payments accounting, treats any domestic company that is at least 10 percent owned by a single foreign investor as a foreign-owned affiliate. The second, which is more commonly used in analyzing multinational company operations, focuses on companies that are majority-owned by foreign direct investors. The availability of data based on these alternative ownership thresholds varies, especially for China and countries like it, which have a relatively small amount of direct investment in the United States. For this reason, the figures in this chapter present data on Chinese FDI in the United States using both approaches.

The BEA does not report information on all measures of interest for all years. Because the data are collected directly from individual firms, to reveal too much detail in a year in which one large firm was particularly active would risk revealing confidential information about that firm. Thus the figures report data from the most recent years in which all key variables are available. When more recent information than that presented in the figures is available for certain measures, such as aggregate employment at Chinese firms in the United States, those more recent numbers are included in the text. Because Chinese FDI in the United States is still a relatively new phenomenon, the figures are simply meant to provide as much information as possible on the investments that have taken place so far and are not meant to precisely predict future trends, though some suggestions can be made.

Each graph in figure 3.1 shows the activities of all affiliates of foreign firms in the United States in the second bar and the activities of all Chinese-owned firms in the United States in the third bar, where foreign ownership is defined as occurring when a foreign resident has at least a 10 percent ownership stake in the affiliate. A limitation with these data, as mentioned above, is the relatively small amount of detail that the BEA has made public for recent years, given its increased emphasis on the data for majority-owned affiliates. Thus the most recent year for which data on most variables are available for Chinese-owned affiliates based on this broader definition is 2005. Figure 3.1 reports these data on the operations of all US affiliates of foreign firms, including Chinese firms, for 2005.

The second above-mentioned definition of FDI activity considers only affiliates in the United States for which a foreign firm controls a majority share. These data are presented in figure 3.2, using information from the BEA's most recent benchmark survey of direct investment in the United States, which covered FDI activity taking place in 2007.[1]

1. For a more in-depth discussion of the alternative definitions of FDI flows, see Lipsey (2001).

Chinese companies account for a very small share of both total US production and the total activities of all foreign firms operating in the United States. In 2005 broadly defined Chinese-owned firms employed only 2,400 workers in the United States, about 0.04 percent of all workers foreign firms employed in the United States in that year. By 2009 broadly defined Chinese-owned firms employed 5,000 to 10,000 US workers, about 1 to 2 percent of all US workers employed by foreign-owned firms and 0.004 to 0.007 percent of the total US labor force. Of these workers, in 2007, about 1,400 of them were employed by majority-owned affiliates of Chinese firms, as opposed to firms in which Chinese owners held a stake of only 10 percent or more. By 2009 this number was 4,300.

In the years for which comprehensive data are available, workers employed by firms with at least 10 percent Chinese ownership earned much higher wages than their counterparts at domestic or other foreign-owned firms. In 2005 the average annual wages and benefits US-owned multinationals paid to their US employees was about $60,000. The average for foreign firms operating in the United States was about $65,000. Chinese-owned firms paid their US employees significantly more than other firms, with average wages and benefits of about $85,000 per worker per year. The 2007 results for Chinese majority-owned firms are not quite as striking, as the wages they paid were higher than those of US-owned firms, but about the same as the wages paid by affiliates of firms headquartered in other foreign countries.

Why did companies with at least 10 percent Chinese ownership pay so much more than domestically owned firms and other foreign companies in 2005, and why did majority-owned Chinese affiliates pay so much more than domestic firms in 2007? The answer is not surprising in light of an assessment of why a Chinese firm would choose to operate in the United States in the first place. One of the primary motivations for FDI is to take advantage of differences across countries in wages, skill levels of workers, and other factors of production. US companies often move some or all of their production to less developed countries where low-skilled labor is abundant and thus production much less costly. However, it would not make sense for a Chinese company to move operations to the United States to hire low-skilled production workers, since these types of workers are much more abundant and receive much lower wages in China. Instead, Chinese companies locate in the United States to hire US workers to do what they do best: perform high-skilled activities, such as management and R&D. This is an important conceptual breakthrough. The instinct to rely on traditional motives for FDI, like relative wage rates or access to capital, clearly do not apply to nonextractive multinational corporations (MNCs) from emerging-market economies. Uphill FDI from poorer to richer countries is motivated by a desire to be near the global frontier in management and research and more affluent final consumers.

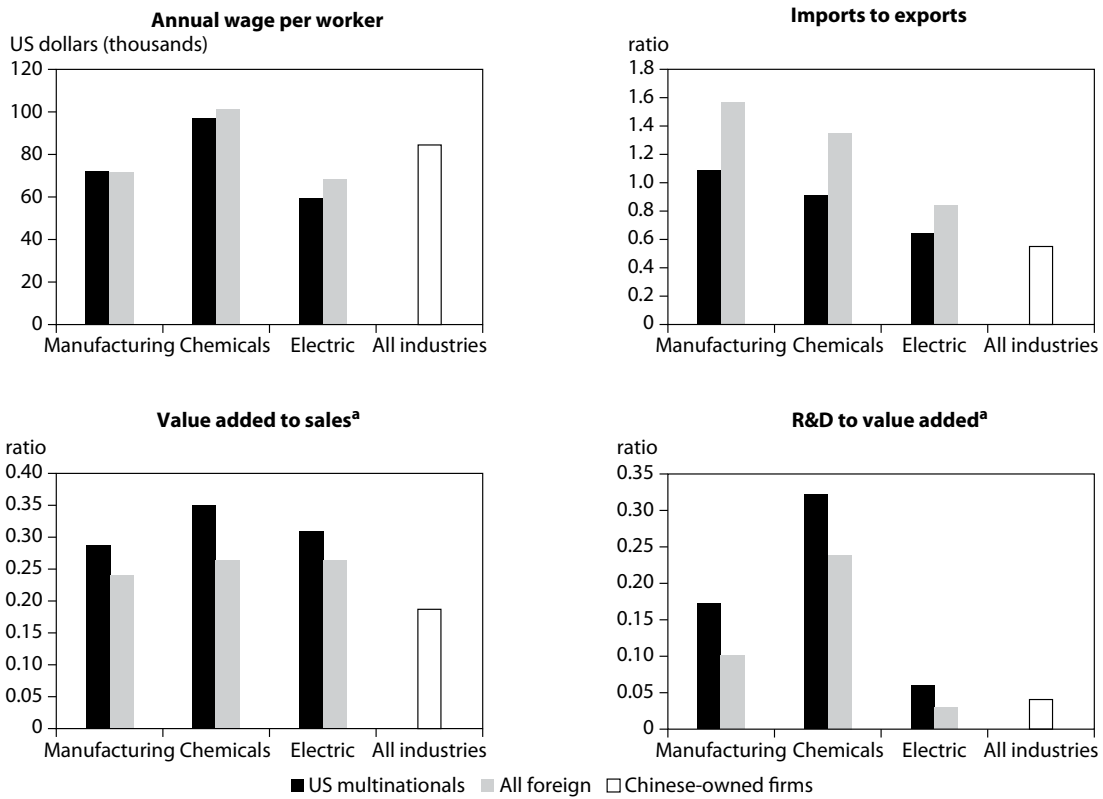
Another concern, as indicated earlier, is that foreign-owned firms may be more likely to source abroad than their domestically owned counterparts, which would negatively affect the US trade balance. This concern may be

particularly acute for China, given the large trade deficit that the United States has with China in manufactured goods. Worry about the US-Chinese bilateral trade deficit as well as the overall US trade deficit arises with considerable regularity, but it is unclear why the level of imports on the part of foreign investors in the United States should be a part of it. As pointed out in chapter 1, the current account by definition is the difference between domestic savings and domestic investment, and FDI cannot affect the overall current account unless it somehow affects the demand for savings or investment. As long as the US government and private sector spend more than they earn, there will be no choice but to finance the difference with credit from abroad. However, given that critics of inward FDI often raise concern about the imports of foreign investors in the United States, it is worthwhile to explore the issue further.

What is striking about the evidence in figure 3.1 is that, unlike US multinationals and other foreign companies, firms with at least a 10 percent Chinese ownership share located in the United States actually export almost twice as much as they import. This suggests that Chinese firms are using their operations in the United States not only to serve US customers but also to export to customers in other countries, possibly even China itself. In this sense, this type of Chinese FDI in the United States may reduce the bilateral trade deficit between the United States and China. Thus, in addition to the role of FDI in substituting for imports described above, there could be a direct net positive trade balance effect of Chinese firms operating in the United States. However, the pattern only holds for firms with a 10 percent or greater Chinese ownership share in 2005, not for majority-owned Chinese firms in 2007. Also, import and export data for Chinese firms operating in the United States are not available for a very large number of years, so these flows may or may not indicate an enduring trend.

What can explain the different behaviors of affiliates of Chinese firms relative to those of other foreign firms, as well as the differences across years? One possible explanation is that Chinese multinationals operate in only a few main industries, and their behavior is consistent with firms of other nationalities operating in these industries. Chinese FDI activity in the United States is concentrated in chemicals and electrical equipment. If those industries pay higher wages and export more than others do, then some of the behavior of Chinese-owned firms in the United States could be explained by an industry composition effect. Figure 3.3 breaks down the summary statistics discussed above by sector. It does not report the breakdown of wages, employment, or trade for Chinese firms by industry. The BEA does not report all this information by detailed country and industry because there are so few Chinese firms operating in the United States in any given industry that revealing industry-level information on Chinese FDI risks revealing confidential information about individual firms. However, the data for US multinationals and aggregate totals for all other foreign firms confirm that in general, the industries that Chinese firms operate in most often do pay higher wages and have higher levels of exports relative to imports than the average for all industries, or even other manufacturing industries.

Figure 3.3 Operations of firms located in the United States, by sector, 2005



a. Value added figures are for 2001. Chinese sales and research and development (R&D) figures are for 2004.

Source: US Bureau of Economic Analysis.

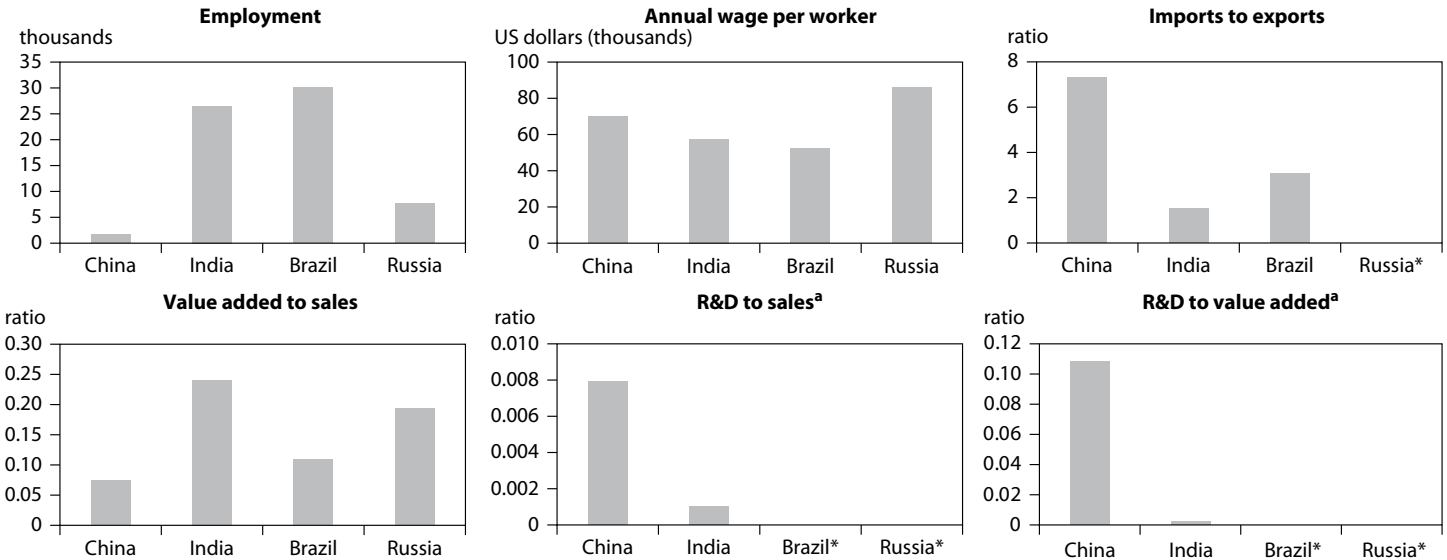
Chinese firms in the United States spend less on R&D than US-owned firms do. However, this is to be expected of firms that are new to direct investment in the United States. R&D spending at US affiliates of Japanese firms was also very low in the early years of their FDI, but grew rapidly as Japanese investment in the United States grew (see figure 1.6 in chapter 1). As is discussed below, Chinese firms' R&D in the United States is already higher than that of firms headquartered in other emerging-market economies and can be expected to continue to grow.

Chinese FDI in the United States also differs from that of other firms in the BRIC countries (Brazil, Russia, India, and China). Figure 3.4 compares Chinese-owned firms with those headquartered in Brazil, India, and Russia. First, Chinese FDI in the United States is much smaller in magnitude than that from other BRIC countries, and Chinese firms in the United States employ a fraction of the number of workers employed by firms headquartered in other BRIC countries. This is surprising considering that China's total global outward FDI is larger than that of Brazil, Russia, or India. It suggests that investment in the United States is a much smaller share of total outbound FDI for China than for other emerging-market economies. This is likely because much of China's global FDI strategy focuses on natural resource extraction and thus targets Africa, Latin America, and other low-cost, resource-rich regions rather than the United States. However, Chinese companies operating in the United States pay higher wages than do Indian and Brazilian firms.

In addition to differences in magnitude, the data also suggest qualitative differences in the activities of Chinese-owned firms operating in the United States relative to firms based in other emerging-market economies. While Chinese R&D spending is lower than that of US multinationals and affiliates of other foreign firms in general, it is much higher than the R&D spending of other emerging-market firms operating in the United States. In 2007 Chinese firms spent $17 million on R&D at their US affiliates, while Brazilian, Indian, and Russian firms spent almost nothing. Even though Chinese direct investment in the United States is still relatively new, case study evidence suggests that the R&D spending of Chinese MNCs could be extremely large. Chinese telecommunications firm Huawei has invested in the United States in the past and has signaled a desire to continue doing so. According to Huawei's 2010 annual report, the firm has 20 research institutes globally, 46 percent of its employees are engaged in R&D activities, the annual research budget is $2.5 billion, and the firm has the largest number of patent applications in the world. The firm also claims to be a fierce defender of intellectual property rights around the world, as evidenced by its emphasis on patent applications. In 2010 Huawei reported employing 1,500 individuals in the United States, mostly engineers and managers working at labs and R&D facilities.

The Chinese appliance firm Haier similarly exemplifies the ramping up of R&D spending in the United States (box 3.1). According to business intelligence firm Euromonitor International, Haier is one of the top brands in the world for refrigeration and home laundry appliances. Haier first invested in

Figure 3.4 Employment, wages, and foreign trade of majority-owned affiliates of Chinese, Indian, Brazilian, and Russian firms operating in the United States, 2007



* = Suppressed to avoid disclosure of data on individual companies

a. Chinese research and development (R&D) figures are for 2008.

Source: US Bureau of Economic Analysis.

Box 3.1 Case study: Haier

Haier is a Chinese-owned appliance company with manufacturing operations in the United States, Europe, Asia, the Middle East, and Africa, and with R&D centers in the United States, Germany, Japan, and Korea. Haier had $20 billion in worldwide sales in 2010 and has sold over 40 million products in the Americas since 1999.

The evolution of Haier's US investments follows the expected pattern of FDI by emerging-market firms. As with many Japanese firms in earlier decades, Haier's initial US investments consisted of basic manufacturing, but over time the firm added increasingly higher-value activities, such as finance and engineering, to its US portfolio.

Timeline

1999: Haier America is founded with the development of a manufacturing facility in Camden, South Carolina.

2002: North American headquarters open in New York. Located in midtown Manhattan, the offices house executive staff. Administrative functions include branding, marketing, finance, and product innovations and engineering.

2004: New warehouse opens in Edison, New Jersey.

2005: Haier attempts to acquire Maytag but loses out to Whirlpool.

2006: Marketing partnership signed with the National Basketball Association.

US Locations

Headquarters: New York

Sales offices: Arkansas, California, Georgia, Iowa, Louisiana, Massachusetts, Miami, Mississippi, New Jersey, New York, North Carolina, Ohio, and Oregon

Factory: South Carolina

Warehouses: California, New Jersey, and South Carolina

Regional field service offices: Florida, Illinois, New York, and North Carolina

Source: Haier corporate website, www.haieramerica.com (accessed on December 13, 2012).

the United States in 1999 when it opened a manufacturing plant in Camden, South Carolina. That led to the opening of its US headquarters in New York City—which houses executive staff and administrative functions including branding, marketing, finance, product innovations, and engineering—and

eventually to the opening of a design, research, and development center in Los Angeles. The Haier Group commits 5 percent of its revenue to R&D, which results in the company applying for hundreds of patents each year. The firm has eight R&D centers in the United States, Germany, Japan, and Korea. Chinese solar panel maker Suntech, which has its US headquarters in San Francisco, offers another example: Its R&D spending grew from $15 million in 2008 to over $40 million in 2010 (box 3.2).

The case study evidence, as well as the already relatively high level of Chinese firms' R&D spending in the United States, suggest that future growth in Chinese direct investment in the United States will be accompanied by increasing investment in R&D and other high value activities (see also box 3.3).

New Evidence on FDI Spillovers in the United States from Developing-Country Investment

Chapter 2 offers an updated assessment of spillovers from foreign investors to firms in the United States. This chapter expands that analysis to test for evidence of spillovers from less developed countries to US firms, using data for the years 1987 through 2007. As in chapter 2, the dependent variable in the analysis is firm-level total factor productivity (TFP) of US firms, which essentially captures how efficiently firms use a given set of inputs. TFP was computed using firm-level data from the Compustat database following the method in Olley and Pakes (1996), which allows for firm entry and exit and controls for the simultaneity of input choice and productivity. TFP, or how efficiently a firm i uses a given set of inputs at time t, is calculated as

$$tfp_{it} = y_{it} - \beta_k^{OP} k_{it} - \beta_l^{OP} l_{it} - \beta_m^{OP} m_{it} \tag{3.1}$$

where y_{it} is the log of output and k_{it}, l_{it}, and m_{it} are the firm's log of capital, labor, and material inputs. β_k^{OP}, β_l^{OP}, and β_m^{OP} are the Olley-Pakes estimates of the capital, labor, and materials production function elasticities. Conceptually, this measure of TFP is simply the difference between the actual output of a firm and its expected output given the firm's capital, labor, and material inputs, where the expected effect of each input is calculated controlling for the endogeneity of productivity and input choice (as discussed earlier) as well as the possibility of firm exit. The effect of FDI on the productivity of US firms is estimated using the following equation:

$$\Delta tfp_{ijt} = \beta_0 + \beta_1 \Delta fdi_{jt-1} + \beta_2 \Delta fdi_{jt-2} + \sum_n \gamma_n X_{ijt} + \delta_j + \delta_t + \varepsilon_{ijt} \tag{3.2}$$

The independent variable of interest, Δfdi, is the change in the share of employment at US affiliates of foreign firms in total US employment by industry and year. This measure of FDI employment shares is lagged by one and two years (denoted $t - 1$ and $t - 2$). Lagging the change in FDI share is important because it may take time for the spillover effects of FDI on

Box 3.2 Case study: Suntech

Suntech Power Holdings Co., Ltd. was founded in 2001 by Dr. Zhengrong Shi and is the largest supplier of solar panels worldwide. In 2010 over 15 million Suntech panels were installed in more than 80 countries. Suntech has offices in 13 countries, including regional headquarters in San Francisco, California; Schaffhausen, Switzerland; and Wuxi, China. Suntech has manufacturing sites in China, Japan, and the United States

Suntech is an example of a Chinese company that was attracted by the US research climate. Solar panel development relies heavily on R&D, so it is not surprising that Suntech chose to locate its US headquarters in the San Francisco Bay Area research hub. As the company expands, its investments in high-value activities in the United States are likely to grow as well. Suntech's R&D spending has already grown from $15 million in 2008 to over $40 million in 2010.

Timeline

2001: Suntech is founded by Dr. Zhengrong Shi in Wuxi, China.

2005: Initial public offering on the New York Stock Exchange.

2006: Suntech's direct investments in the United States begin.

2010: Suntech announces first US production line in Goodyear, Arizona.

US Locations

Regional headquarters: San Francisco

Manufacturing location: Goodyear, Arizona

Source: Suntech, *Suntech Power Holdings Co., Ltd. 2010 Corporate Report,* www.corporate-ir.net/Media_Files/IROL/19/192654/Suntech_2010_Corporate_Report.pdf (accessed on December 13, 2012).

domestic firms to materialize. Also, if FDI is attracted to industries in which firms exhibit the highest productivity growth, it is difficult to determine which direction the causality moves in: the presence of foreign firms leading to greater productivity among domestic firms or the existence of highly productive domestic firms attracting FDI. Including lagged variables helps sort this out by examining the effect of FDI in one year on the productivity of firms in that industry a year or two later. As mentioned in chapter 2, this method does not completely eliminate all potential endogeneity, as it assumes that firms cannot perfectly predict future productivity growth. However, it does remove at least some portion of the potential endogeneity. The regressions also control for a number of other factors, X_{ijt}, that will likely affect TFP changes, including the firm's capacity utilization, R&D spending, markups

Box 3.3 Case study: Wanxiang

Auto parts manufacturer Wanxiang Group Co., headquartered in Xiaoshan City, is China's second largest non-state-owned company.

Timeline

1994: US operations begin with the opening of Wanxiang America Corporation outside of Chicago.

1998: Partnership with Driveline Systems LLC.

2001: Acquires a 21 percent stake in Universal Automotive Industries Inc., a brake manufacturer.

2009: Receives a $2 million investment package from the state of Illinois to build a solar panel assembly plant in Rockford, Illinois.

2010: Employs 4,100 people in the United States.

US Locations

Regional headquarters: Elgin, Illinois. Responsible for engineering, logistics, quality assurance, marketing, and sales.

Source: Wanxiang America Corporation website, www.wanxiang.com (accessed on December 13, 2012).

above marginal cost, market share, and capital expenditures. Data on these firm-level characteristics are from Compustat. As explained in chapter 2, industry-level fixed effects are included to control for unobservable industry characteristics and year fixed effects are included to control for macroeconomic factors. These fixed effects control for everything that is constant, or fixed, about a given industry or year and thus affects all firms equally in that industry and at that time.

The results in table 3.1 offer very strong evidence of positive spillovers from direct investment in the United States—FDI from both developed countries and less developed countries such as China. The first column gives the results using FDI from all the countries presented in chapter 2. An increase in the share of US employment accounted for by foreign firms in a given industry is positively and significantly associated with growth in TFP, or how efficiently US firms use inputs in that industry. In other words, the presence of foreign firms makes domestic US firms more productive. The aggregate results, however, may mask important differences between the source countries providing the investment. It is not surprising that FDI from a highly developed country with firms producing cutting-edge technology spurs productivity growth among US firms. But does the same result hold for investment

Table 3.1 Spillover effects of a change in the industry-level FDI employment share on total factor productivity of domestic firms, by FDI source country

Variable	Model 1	Model 2	Model 3	Model 4
ΔFDI, *t–1*	80.53***	84.72***	–15.76**	33.01
	(30.28)	(30.56)	(6.19)	(74.63)
ΔFDI, *t–2*	274.59***	277.00***	15.14**	–23.75
	(29.67)	(29.92)	(5.95)	(73.09)
Capacity utilization	–0.21***	–0.21***	–0.28***	–0.29***
	(0.07)	(0.07)	(0.07)	(0.07)
Research and development	0.22***	0.22***	0.22***	0.22***
	(0.01)	(0.01)	(0.01)	(0.01)
Markup	6.09*	6.10*	5.94*	5.97*
	(3.19)	(3.19)	(3.20)	(3.20)
Market share	371.73***	372.05***	372.57***	373.07***
	(36.35)	(36.35)	(36.40)	(36.41)
Capx	–0.13***	–0.13***	–0.13***	–0.13***
	(0.003)	(0.003)	(0.003)	(0.003)
Industry fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
R-squared	0.03	0.03	0.03	0.03
Number of observations	24,311	24,311	24,311	24,311
Dependent variable	Δ*tfp*	Δ*tfp*	Δ*tfp*	Δ*tfp*
Sample	All countries	High income	Low income	China

Notes: *, **, and *** indicate significance at the 10, 5, and 1 percent levels, respectively. Standard errors clustered by industry year are in parentheses.

Source: See text for the methods used to compute these results.

from developing countries such as China? Based on the results presented below, the answer is yes.

Column 2 of table 3.1 gives the results of the spillover analysis using only the share of total US employment accounted for by FDI from what the World Bank defines as high-income countries. These results are both qualitatively and quantitatively similar to the results using FDI from all countries, which is not surprising. Column 3 reports results using FDI from countries the World Bank classifies as low or middle income. These results show that productivity spillovers exist even when the investment is from a less developed country. For this type of FDI, the effect of foreign employment shares lagged one period is negatively associated with the productivity growth of domestic firms. However, the effect is positive after a two-year lag. This suggests that the spillover effects of FDI from low- to middle-income countries take longer to materialize than those of high-income countries. But there is every reason to expect positive spillover effects of FDI from all source countries, even those with incomes considerably less than the United States.

Column 4 considers only employment at affiliates of Chinese-owned firms. When the investigation is limited solely to FDI from China, the data show the presence of positive spillovers from Chinese investors, but the correlation is not statistically significant—that is, statistically strong enough to be

certain that one will always find this outcome. This is not surprising because limiting the analysis to FDI from only one country necessarily reduces the statistical power of the results. The BEA collects FDI data through surveys of firms, which can then be aggregated up to the country and industry level. Examining only one country, especially one such as China, which has very little FDI in the United States, involves fewer firms in each industry, and thus any errors in reporting by a single firm will create more noise than aggregations using firms from a large number of countries. Looking at the results for the larger set of emerging-market economies presented in column 3 of table 3.1 actually provides better insights into the effect of Chinese FDI in the United States, and especially the potential future effect as Chinese FDI in the United States expands, due to the superior coverage of these data. The results indicate that FDI from China, like other emerging-market economies, will likely have positive spillover effects on the US economy.

The results should not be surprising. The spillover effects from manufacturing FDI into the United States from other developed countries are quite large, especially in US high-technology sectors, such as chemicals, computers and office equipment, electronic components, scientific instruments, and medical instruments. There is every reason to expect positive spillover effects from inward FDI from developing countries as well, including China—all the more so to the extent that such FDI takes place in high-tech sectors such as information technology and computers. That the earlier evidence shows Chinese FDI to be an outlier in undertaking R&D in the United States compared with other developing countries' FDI leads one to expect that spillovers from Chinese FDI to the US domestic economy will be disproportionately large in similar fashion.

Is There a High Level of Chinese FDI in the United States?

Whether or not there already is a high level of Chinese FDI in the United States might seem like a simple question that should be easy to answer by looking at the data. However, the reality is much more nuanced. Some high-profile cases of concern about Chinese FDI and US national security—analyzed in detail in chapter 4—may lead to the impression that Chinese FDI in the United States is already of large magnitude, as might instances in which US state or municipal governments tout the amounts of inward foreign investment and the numbers of jobs created in their communities. Yet analysts familiar with China's investment in other countries see Chinese direct investment in the United States as a small phenomenon relative to overall global activity. China's US FDI is also a small fraction of the FDI from more developed countries and even other emerging-market economies. Whether the volume of Chinese investment in the United States seems large or small depends on prior expectations about what that amount of investment should be.

A careful evaluation of the volume of Chinese FDI in the United States requires a framework for establishing some baseline expectation of FDI flows. One such framework is known as a gravity model. Gravity models were

originally developed to explain trade flows between countries, but the principle has been shown to apply to FDI as well. The term *gravity* is borrowed from physics: Physical bodies are attracted to each other with a force proportional to their mass and distance from each other. The same is true of bilateral trade or FDI flows between countries, which are higher when the two countries are closer together and have larger GDPs. This finding is one of the strongest in empirical international economics and has been demonstrated repeatedly using a variety of datasets and time periods. When applied to a large dataset, the gravity model tells us the fundamental relation between factors such as GDP and trade. These fundamental relations then can be used to compare expectations based on country characteristics with actual levels of trade or FDI. If two countries are very close to each other geographically, or share a common border, one can expect large flows of trade and investment between them. If a country has a high GDP, one can expect that it will create a lot of products for export, consume a lot of imports, and be both a large recipient and a large provider of FDI. A common language also plays an important role. The gravity model puts numbers on the expected magnitude of these effects.

Table 3.2 presents the results for a simple gravity model of FDI. The numbers in the table represent the size of the relation between each variable and total FDI—say, how much FDI would be expected to increase or decrease with a change in GDP. These relations were estimated using data on FDI in the United States for about 50 countries over the years 1988 through 2007 from the BEA. The coefficient values for GDP, GDP per capita, and a variable indicating whether or not English is the official language of a given country are positive. This means that countries with higher GDP and GDP per capita, as well as countries that speak English, have a higher level of FDI in the United States, measured by both the total employment at US affiliates of firms headquartered in that country and the total sales of their US affiliates. The numbers in parentheses under the coefficient values are the standard errors of these estimates, indicating how confident one can be in their statistical significance. The errors are very small for all the variables, suggesting a high level of accuracy for the estimates.

The coefficient values for distance presented in table 3.2 are both negative, implying that greater distance from the United States is associated with lower volumes of both measures of FDI. The regressions were run in logarithms, which means that the coefficients can be interpreted as percentage changes. A 1 percent increase in the GDP of a country is associated with an increase in employment at US affiliates of firms from that country of 0.88 percent and results in affiliate sales that are about 1.1 percent higher. A 1 percent increase in GDP per capita leads to employment at US affiliates of firms from that country of 0.99 percent and results in 0.94 higher sales. A 1 percent increase in distance from the United States decreases FDI employment at firms from that country by 0.29 percent and decreases sales by 0.62 percent. Finally, countries where English is an official language have 290 percent higher employment at and 156 percent higher sales by their US affiliates than affiliates of firms from

Table 3.2 Determinants of employment and sales of US affiliates of foreign-owned firms

Variable	Employment	Sales
GDP	0.88***	1.10***
	(0.04)	(0.04)
GDP per capita	0.99***	0.94***
	(0.06)	(0.06)
Distance between countries	–0.29***	–0.62***
	(0.11)	(0.11)
English	1.36***	0.94***
	(0.16)	(0.17)
Number of observations	785	849
R-squared	0.67	0.65

Notes: *** indicates significance at the 1 percent level. Standard errors are in parentheses.

Source: See text for the methods used to compute these results.

non-English-speaking countries.[2] These relations are all very strong in both overall magnitude and statistical significance.

The gravity model creates a basis for what to expect would be normal levels of FDI from any given foreign country, so it is possible to use the coefficient estimates to predict the expected value of FDI employment and sales of Chinese firms in the United States for the years 1988 to 2007 and then compare the predicted values with the actual FDI levels. This comparison essentially captures how actual FDI by Chinese firms in the United States stacks up against what would be expected based on observations of the past behavior of firms from many countries with similar characteristics over many years. As shown in table 3.3, for all years of the sample, actual Chinese investment was about 50 percent lower than what the gravity model predicts. In 2007 there were 527,110 fewer Americans employed at Chinese firms operating in the United States than would be expected based on the characteristics of China's economy, location, and non-English-speaking society. These expectations are primarily driven by China's GDP. The results thus can be interpreted as saying that Chinese firms have done much less investing in the United States than one would expect from a country of its size, even when controlling for language, distance, and per capita income. How should one interpret the evidence that Chinese FDI in the United States is lower than that predicted by a simple gravity model? As mentioned, the extremely high predictions for Chinese FDI

2. The formula used to translate a dichotomous variable into an expected percentage increase is: 100*[exp(b) – 1], where b is the coefficient estimate. Thus the additional percentages in employment and sales at foreign firms from English-speaking countries relative to those from non-English-speaking countries are 100*[exp(1.36) – 1] = 290 and 100*[exp(0.94) – 1] = 156, respectively.

Table 3.3 Actual versus predicted FDI from China, 1988–2007

Year	Actual – predicted employment (thousands)	Actual – predicted sales (thousands of US dollars)
1988	–8.33	–10,100
1989	–15.42	–12,800
1990	–4.77	–7,646
1991	–8.08	–8,863
1992	–21.36	–15,100
1993	–42.30	–24,700
1994	–33.30	–20,600
1995	–61.26	–33,000
1996	–82.57	–43,200
1997	–99.28	–50,500
1998	–109.93	–55,800
1999	–120.56	–60,800
2000	–139.87	–69,900
2001	–158.74	–78,800
2002	–181.64	–88,600
2003	–213.81	*
2004	–262.22	–125,000
2005	–318.51	*
2006	–395.86	*
2007	–527.11	*

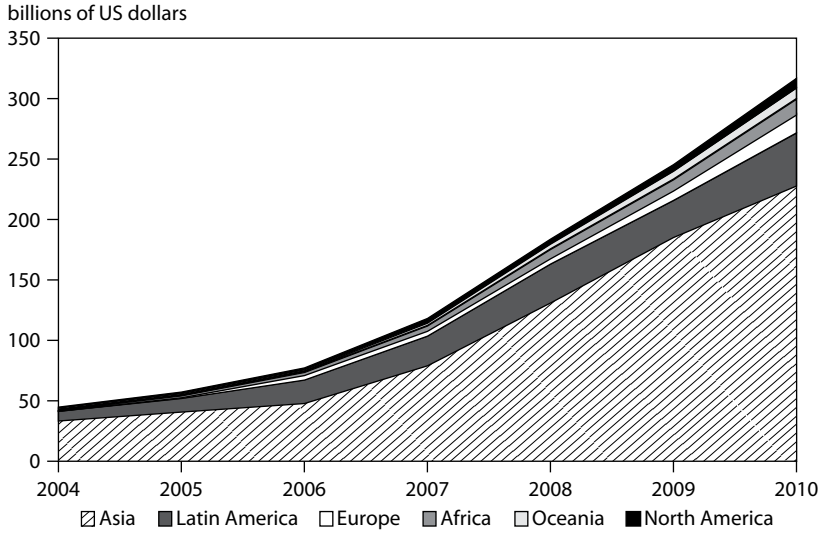
* = Values for certain years are suppressed to avoid revealing confidential firm-level information.
Source: US Bureau of Economic Analysis.

in the United States are based primarily on China's GDP. The model leaves out some important factors. China differs in many ways from other countries with similar GDP levels, primarily in its history and the speed at which it achieved such a high level of income. Given China's ongoing emergence from a state-controlled communist economy, the comparatively weak record of Chinese FDI in the United States in past years is not surprising. Looking to the future, however, an appreciation of China's low levels of FDI in the United States acquires greater significance. The most plausible expectation is that Chinese FDI in the United States is likely to expand by large amounts. To further investigate this expectation, it is useful to consider other benchmarks as well.

Rosen and Hanemann Measures of Chinese FDI in the United States

Daniel Rosen and Thilo Hanemann of the Rhodium Group and the Peterson Institute for International Economics have compiled information on recent acquisitions and new investments by Chinese firms. They begin by looking at China's outbound FDI to all destinations in the world and point out that China's current FDI stock of $230 billion accounts for only 1.2 percent of the total global FDI stock, about the same as Denmark and slightly higher than Taiwan. China's outward FDI to GDP ratio is only 5 percent compared with a global average of 33 percent and a transitional economy average of 16 percent. However, given China's rapid growth and outward focus, Rosen and Hanemann

Figure 3.5 Chinese FDI stock by region, 2004–10



Source: Chinese Ministry of Commerce (MOFCOM).

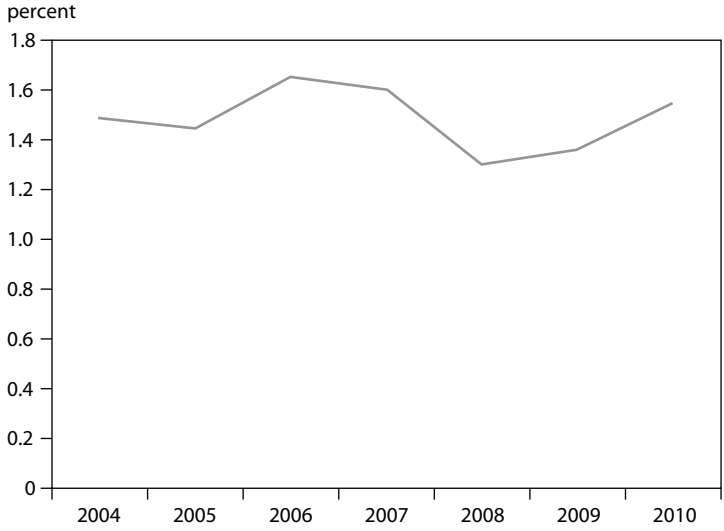
project that China's total outward FDI will reach $1 trillion to $2 trillion by 2020 (Rosen and Hanemann 2011, 28).

Rosen and Hanemann also compile a new dataset of recent Chinese direct investments in the United States, called the China Investment Monitor. Based on these data, they conclude that "the Chinese FDI takeoff is under way, and Chinese investment in the United States is much greater than the official data suggest." From 2003 to 2007, the number of new Chinese FDI deals was roughly flat, with about 5 greenfield investments and 10 acquisitions per year. Rosen and Hanemann document a sharp upward trend after 2007, however: In 2010 Chinese FDI deals had increased to 25 greenfield projects and 34 acquisitions, together worth more than $5.4 billion and spanning a number of industries. But unlike FDI in earlier years, most of the new investments since 2008 have taken place in manufacturing industries such as consumer electronics, machinery, auto parts, steel, and technology. Investment in higher value services such as finance is also expected to grow. Thus, Rosen and Hanemann's assertion about FDI takeoff by Chinese firms in the United States reinforces the gravity model's prediction in the preceding section.

How Does Chinese FDI in the United States Compare with Chinese FDI in Other Countries?

Another useful benchmark for examining Chinese FDI in the United States is to compare it with China's FDI in other countries. Chinese FDI in the United States has been increasing rapidly in recent years, but this pattern is not unique to the United States: China's total global outward FDI has been increasing as well, and the US share of total Chinese direct investment is not very large, as

Figure 3.6 US share in China´s total outward FDI stock, 2004–10



Source: Chinese Ministry of Commerce (MOFCOM).

figure 3.5 shows. The vast majority of Chinese outward FDI goes to other countries in Asia, and all other regions, including Europe, Latin America, and Oceania (primarily Australia and New Zealand), receive more Chinese direct investment than the United States does.

Figure 3.6 looks at the US share in total Chinese outward FDI. While total Chinese direct investment in the United States appears to be increasing rapidly in terms of pure dollar values, as a share of total Chinese investment, the United States remains a relatively tiny recipient. The share has fluctuated somewhat, but has remained at about 1.5 percent of total Chinese outward FDI. Much of China's outward FDI has focused on natural resource extraction and has thus been focused more on resource-rich regions with low-cost labor, such as Africa and Latin America, explaining at least part of the FDI pattern. Also, the data used to construct the figures are from MOFCOM and have a few shortcomings. They exclude financial sector investments and likely overstate the importance of Asia as a destination for Chinese FDI: Many investments ultimately destined for other locations first pass through Hong Kong, including some round tripping for investment back in China, and it is impossible to separate out the exact dollar value of these circuitous investments. However, even with these caveats, the data suggest very strongly that, in dollar values, Chinese FDI in the United States is a small drop in a very large bucket. This and the above analyses illustrate that levels of Chinese FDI in the United States are extremely low relative to a number of different benchmarks—though the trend for Chinese FDI in the United States is likely to turn upward sharply in the future.