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# Introduction

In its essentials, the case for reforming the US system of taxing international business income is a case for meeting the economic challenges of the 21st century. Three major trends capture the evolving position of the United States in the world economy. Together, they promise heightened competition between the United States and other industrial countries, especially emerging powers such as Brazil, Russia, India, and China.

First, the past two decades saw a reversal of fortune between the United States and its industrial peers. During the 1990s and the first half of the 2000s, the United States outperformed every advanced industrial economy in growth, productivity, capital investment, entrepreneurial activity, and fiscal discipline. The challenge ahead, however, is not a resurgent Europe or Japan, but the very rapid ascent of China, India, and other emerging powers.

Second, the United States has now become a prime destination for foreign asset holders—a sharp reversal from its post–World War II status as creditor to the world. At the end of 2005, US ownership of assets abroad amounted to about \$10 trillion, compared with foreign ownership of US assets of about \$12.7 trillion. The stock of inward investment is now approximately equal to annual GDP, and the stock of outward investment is only slightly smaller.

Third, apart from cross-ownership of assets, the US economy has become decidedly more international in other ways. Many more US firms are now exposed to international commerce, and world capital and technology markets are far more closely linked than they were in past decades. Whereas US imports plus exports of goods and services were about 9 percent of GDP in 1960, in 2005 the trade-to-GDP ratio was about 33 percent.

The case for reforming US taxation of international business income is particularly acute in high-technology activities and industries. Those who are content with the US position in the world economy, those who believe that the dominant purpose of tax policy is to raise revenue in a manner that creates the least political stir—or in a manner that is neutral across all forms of economic activity—and those who see only a weak link between tax policy and corporate performance will find little reason to commend this book. Our recommendations are based on the central proposition that the US position in the world economy should be stronger and that, at the margin, tax policy can make a difference. We readily acknowledge that other forces also matter, such as education, workforce skills, innovation, and cultural attitudes. Many of these forces are more important than tax policy, and in combination they have delivered sterling US economic performance since 1990. However, US tax policy was not among the favorable forces, and the defects of international taxation are the focus of our study.

## **The US Role in the World Economy: Five Decades of Change**

The United States emerged from World War II as the world's dominant political and economic power. It took the political and military lead in containing the threat of Soviet expansion, and it took the economic lead through the Marshall Plan and the new international institutions founded at Bretton Woods, rebuilding the world economy along market principles.

During this era the United States was well placed to lead the world economy. In 1960 the US economy accounted for 43 percent of world GDP, 18 percent of world merchandise exports, and about a third or more of world high-technology exports.<sup>1</sup> The United States was also home to most multinational enterprises (MNEs) and accounted for 52 percent of world foreign direct investment (FDI) but hosted only 11 percent of world FDI (table 1.1).

Postwar US reconstruction packages, coupled with the US-led drive toward open markets, enabled Japan and Western Europe to quickly rebuild their economies. Japan saw its real GDP grow at an average annual rate of almost 7 percent between 1960 and 1980. The members of the present-day European Union grew by an average annual rate of 3.5 percent

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1. In the 1960s members of the Organization for Economic Cooperation and Development (OECD) contributed the vast majority of the world's industrial output. Hence, our estimate of the US share of high-technology exports in 1960 is based on total OECD exports; due to data limitations, these are defined as Standard International Trade Classifications (SITC) 5, 7, and 8. By contrast, table 1.1 uses a more refined and recent definition of high technology. National shares are estimated relative to world exports of high technology in table 1.1, but the table covers only the period from 1980 to the present.

**Table 1.1 US, Japanese, and EC/EU shares of world GDP, exports, and foreign direct investment, 1960–2005 (percent of total)**

| Indicator                            | 1960 | 1970 | 1980 | 1990 | 2000 | 2005 |
|--------------------------------------|------|------|------|------|------|------|
| GDP                                  |      |      |      |      |      |      |
| United States                        | 43   | 35   | 25   | 26   | 31   | 28   |
| Japan                                | 4    | 7    | 10   | 14   | 15   | 11   |
| EC/EU-15                             | 24   | 28   | 32   | 32   | 25   | 30   |
| Merchandise exports <sup>a</sup>     |      |      |      |      |      |      |
| United States                        | 18   | 19   | 14   | 16   | 16   | 13   |
| Japan                                | 3    | 8    | 8    | 12   | 10   | 8    |
| EC/EU-15<br>(extraregional only)     | 25   | 18   | 19   | 21   | 17   | 19   |
| High-technology exports <sup>b</sup> |      |      |      |      |      |      |
| United States                        | n.a. | n.a. | 30   | 23   | 18   | 16   |
| Japan                                | n.a. | n.a. | 13   | 17   | 10   | 9    |
| EC/EU (all trade)                    | n.a. | n.a. | 39   | 37   | 31   | 32   |
| Outward stock of FDI                 |      |      |      |      |      |      |
| United States                        | 52   | 55   | 38   | 24   | 21   | 21   |
| Japan                                | 1    | 3    | 3    | 11   | 5    | 4    |
| EC/EU                                | 35   | 28   | 37   | 45   | 50   | 53   |
| Inward stock of FDI                  |      |      |      |      |      |      |
| United States                        | 11   | 10   | 16   | 22   | 22   | 21   |
| Japan                                | n.a. | 1    | 1    | 1    | 1    | 1    |
| EC/EU                                | 14   | 22   | 42   | 43   | 38   | 45   |

EC/EU = European Community/European Union

n.a. = not available

a. Intra-EU trade is excluded from EU exports and world trade.

b. High-technology exports include aerospace; computers and office machinery; communications equipment; pharmaceuticals; and medical, precision, and optical instruments. 2005 data correspond to 2003 data.

Note: Based on indicators measured in current US dollars. EU indicators do not take into account changes to the group but rather are based, for the whole period, on the following 15 members only: Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden, and the United Kingdom.

Sources: National Science Foundation (2006); Energy Information Administration, *Annual Energy Review 2001* and *International Energy Annual 2001*; Organization for Economic Cooperation and Development (OECD), *International Trade by Commodity Statistics*, volumes 2002/1–2002/5; OECD, *Main Economic Indicators*, June 2003, 25, 243; International Monetary Fund, *International Financial Statistics*, 2002, 126; UN Conference on Trade and Development, *World Investment Report*, 2002, table I.1, annex tables B.3 and B.4.

during the same period. Meanwhile the real GDP of the United States grew at a slightly more modest 3.2 percent annually in real terms (OECD 1977, 1990).

Table 1.1 summarizes the changed US position in the world economy. In 2005 the US economy accounted for 28 percent of world GDP, 13 percent of world merchandise exports, and 16 percent of world high-technology exports. US-based multinationals were responsible for 21 percent of world FDI, and in 2005 the United States hosted an equal share (21 percent) of world FDI.

Approximate constancy in two aggregate economic statistics in the 25 years since 1980—the US share of world GDP and the US share of merchandise exports—suggests that the United States reached a condition of rough economic equality with its two major competitors, Europe and Japan. But the recovery of Russia and the rise of Brazil, China, India, Korea, and a handful of other newcomers may portend a different outcome 25 years from now. Perhaps a leading indicator is that the US share of world high-technology exports has continued to fall, from 30 percent in 1980 to 16 percent in 2005.

Worldwide flows and national FDI positions reflect the strength of large MNEs in generating and applying technology and in organizing the global production and distribution of goods and services.<sup>2</sup> Table 1.2 shows the altered fortunes of the United States as a supplier and recipient of FDI. This shifting balance mirrors a relative decline in the competitive position of top US firms.<sup>3</sup> In 1960 the stock of US direct investment abroad exceeded inward FDI by a factor of almost five to one in market-value terms. By 2005, however, the stock of US outward investment exceeded inward investment by only 25 percent in market-value terms (table 1.2).

Statistics that show the United States' relative decline in high-technology markets and the share of worldwide FDI are reinforced by the changing portrait of the world's top 100 industrial firms (table 1.3). In 1960, 70 US firms filled the ranks of the top 100, followed by the European Community with 27 national champions. Japan had only 2 firms in the top 100. In 2005 only 38 US firms made it to the top 100, while the European Union had 34 firms and Japan 13 firms. Between 1960 and 2000, the number of top 100 firms headquartered outside the traditional "G-3"—the United States, Europe, and Japan—soared from 1 to 15.

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2. Hymer (1976) first advanced the idea that considerations of industrial organization, rather than the more efficient distribution of global capital, provides the dominant impetus behind FDI. Industrial organization arguments are the key rationale for some of the tax reforms recommended in this volume. For a review of the early literature on FDI, see Graham and Krugman (1995).

3. Of course, European and Japanese firms emerged from World War II and decolonization with significantly diminished outward FDI stocks. Hence, part of the loss of competitiveness of US firms in the 1960 and 1970s reflects non-US global firms' reestablishment of their prewar positions.

**Table 1.2 United States: Foreign direct investment position, 1960–2005** (billions of dollars)

| Year | Outward direct investment |                     |                          | Inward direct investment |                     |                          | Ratio of outward to inward FDI <sup>a</sup> |
|------|---------------------------|---------------------|--------------------------|--------------------------|---------------------|--------------------------|---|
|      | Book value                | Market value        |                          | Book value               | Market value        |                          |   |
|      |                           | Commerce Department | Eisner and Pieper (1988) |                          | Commerce Department | Eisner and Pieper (1988) |   |
| 1960 | 32                        | n.a.                | 51                       | 7                        | n.a.                | 11                       | 4.8   |
| 1965 | 49                        | n.a.                | 81                       | 7                        | n.a.                | 18                       | 4.5   |
| 1970 | 75                        | n.a.                | 108                      | 13                       | n.a.                | 20                       | 5.4   |
| 1975 | 124                       | n.a.                | 149                      | 28                       | n.a.                | 27                       | 5.5   |
| 1980 | 215                       | n.a.                | 295                      | 83                       | n.a.                | 75                       | 3.9   |
| 1985 | 230                       | n.a.                | 404                      | 185                      | 228                 | 210                      | 1.9   |
| 1990 | 421                       | 714                 | n.a.                     | 404                      | 530                 | n.a.                     | 1.4   |
| 1995 | 880                       | 1,301               | n.a.                     | 639                      | 1,019               | n.a.                     | 1.4   |
| 2000 | 1,515                     | 2,674               | n.a.                     | 1,375                    | 2,766               | n.a.                     | 1.1   |
| 2005 | 2,454                     | 3,524               | n.a.                     | 1,874                    | 2,797               | n.a.                     | 1.3   |

n.a. = not available

a. Ratio by market value.

Sources: Bureau of Economic Analysis, *Survey of Current Business*, August 2006, International investment position of the United States at year-end 2004 and 2005, table G-1; *Survey of Current Business*, May 2003, International investment position of the United States at year-end 2000 and 2001, table G-1; *Survey of Current Business*, May 1997, International investment position of the United States at year-end 1994–95, table G-1.

**Table 1.3 Headquarter locations of top 100 industrial firms and top 50 commercial banks worldwide, 1960–2005**

| Country/region                | 1960 | 1970 | 1980 | 1990 | 2000 | 2005 |
|-------------------------------|------|------|------|------|------|------|
| Industrial firms <sup>a</sup> |      |      |      |      |      |      |
| United States                 | 70   | 64   | 45   | 33   | 39   | 38   |
| Japan                         | 2    | 8    | 9    | 16   | 21   | 13   |
| EC/EU <sup>b</sup>            | 27   | 26   | 39   | 38   | 30   | 34   |
| Others                        | 1    | 2    | 7    | 13   | 10   | 15   |
| Commercial banks <sup>c</sup> |      |      |      |      |      |      |
| United States                 | n.a. | 15   | 7    | 7    | 7    | 10   |
| Japan                         | n.a. | 11   | 13   | 13   | 6    | 6    |
| EC/EU <sup>b</sup>            | n.a. | 16   | 24   | 24   | 27   | 29   |
| Others                        | n.a. | 8    | 6    | 6    | 10   | 5    |

n.a. = not available

a. As ranked by sales.

b. Includes all firms headquartered in the present (since mid-1993) 25 EU members.

c. As ranked by assets.

Source: *Fortune* magazine, various issues.

## Foreign-Owned Assets in the United States

Large and persistent US current account deficits, popularly labeled as trade deficits, are another cause for concern. Persistent current account deficits are first and foremost a macroeconomic phenomenon that reflects the exchange rate of the dollar, the balance between national savings (public and private) and national investment, and the desire of foreign investors to acquire US assets. As the *2006 Economic Report of the President* (see chapter 6) emphasized, every current account deficit implies a capital account surplus, and an important driver of US current account deficits since 2000 has been world demand for US assets. The level of federal taxation relative to the level of federal spending affects both the current account deficit and the capital account surplus through its effect on national saving.<sup>4</sup> But the composition of federal taxation—how much is personal taxation, how much is business taxation, whether the tax base is income or consumption—exerts second-order effects at best on the current account deficit and the capital account surplus.

4. A recent model-based study by the research staff of the Federal Reserve Board (Erceg, Guerrieri, and Gust 2005) estimates that a \$100 billion increase in the fiscal deficit causes the trade balance to deteriorate by \$20 billion.

That said, certain second-order effects of business taxation are worth noting. The inevitable counterpart of a current account deficit is a capital account surplus, meaning foreign acquisition of US assets, such as shares, bonds, real estate, and firms. When foreign owners acquire US assets, the United States probably benefits to a greater extent when the assets are in corporate equities or inward direct investment rather than US Treasury securities and other debt instruments.<sup>5</sup> There are two reasons for this. First, equity holdings are more likely to support entrepreneurship and innovation than are debt securities, and direct investment is far more likely to convey specialized know-how to the US economy than are purely financial investments.<sup>6</sup> Second, US federal tax collections are far larger on a billion dollars of equity holdings or direct investment than a billion dollars of US Treasury securities or other debt. As chapter 4 emphasizes, US tax collections average less than 2 percent of interest payments to foreign persons. By contrast, US tax collections average nearly 30 percent of US corporate earnings paid out as dividends to parent firms based abroad.

Table 1.4 summarizes the foreign-owned asset position since 1985, distinguishing among three categories: passive assets, mainly debt securities; corporate equities; and inward direct investment. For comparison, table 1.5 contains parallel data for US-owned assets abroad. At this juncture, we do not dwell on US-owned assets abroad since they are the primary focus of our analysis of tax policy in subsequent chapters. However, US portfolio investment abroad—in debt securities and corporate equities—account for about three-quarters of total US-owned assets abroad, while direct investment accounts for about one-quarter of total US-owned assets abroad.

As for inward foreign investment, foreign holdings in all three categories have grown substantially relative to GDP. In 1985 the total was about 30 percent of GDP; now it is above 100 percent. This is the long-term consequence of persistent current account deficits, or put another way, a long-term reflection of foreign eagerness to buy American assets. Passive debt assets, including foreign official assets, remain at nearly 70 percent of the total.

The United States would almost certainly benefit if a greater share of inward foreign investment were in corporate equities rather than debt, and in direct rather than portfolio investment. The burden of US business taxation clearly favors the foreign acquisition of debt securities rather

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5. Whether inward or outward, FDI is defined in terms of control by the US parent corporation. In most cases, the parent corporation owns more than 50 percent (and most often 100 percent) of voting shares in the subsidiary firm. However, other definitions of control are used both for statistical purposes and in the tax laws. Foreign investment that has no control element, and therefore is not direct investment, is considered to be portfolio investment.

6. On the benefits of inward direct investment, see Dobson and Hufbauer (2001, chapter 1) and Moran, Graham, and Blomstrom (2005).

**Table 1.4 Foreign-owned assets in the United States, 1985–2005**

| Asset  | 1985              | 1990              | 1995              | 2000              | 2005                |
|--|-------------------|-------------------|-------------------|-------------------|---------------------|
| <b>a. In billions of dollars</b> (percent of GDP in parentheses) |                   |                   |                   |                   |                     |
| Passive assets   | 860.2<br>(20.4)   | 1,697.3<br>(29.2) | 2,753.9<br>(37.2) | 4,644.5<br>(47.3) | 8,712.4<br>(69.9)   |
| Foreign official assets <sup>a</sup>                             | 202.4             | 373.3             | 682.9             | 1,030.7           | 2,216.1             |
| Other  | 657.8             | 1,324.0           | 2,071.0           | 3,613.8           | 6,496.3             |
| Treasury securities  | 88.0              | 152.5             | 327.0             | 381.6             | 704.8               |
| Corporate and other bonds  | 82.3              | 238.9             | 459.1             | 1,068.6           | 2,275.1             |
| US currency  | 46.0              | 85.9              | 169.5             | 256.0             | 352.1               |
| Nonbank liabilities, nes   | 87.0              | 213.4             | 300.4             | 738.9             | 563.7               |
| Bank liabilities, nes  | 354.5             | 633.3             | 815.0             | 1,168.7           | 2,600.6             |
| Corporate equities   | 125.6<br>(3.0)    | 221.7<br>(3.8)    | 510.8<br>(6.9)    | 1,554.4<br>(15.8) | 2,115.5<br>(17.0)   |
| Direct investment  | 184.6<br>(4.4)    | 394.9<br>(6.8)    | 535.6<br>(7.2)    | 1,256.9<br>(12.8) | 1,874.2<br>(15.0)   |
| In nontraded sectors <sup>b</sup>                                | 71.9              | 127.9             | 201.2             | 548.9             | 780.6               |
| In traded sectors <sup>c</sup>                                   | 112.7             | 267.0             | 334.3             | 707.9             | 1,093.6             |
| Total  | 1,170.4<br>(27.7) | 2,313.9<br>(39.9) | 3,800.2<br>(51.4) | 7,455.9<br>(75.9) | 12,702.1<br>(102.0) |
| <b>b. As share of total US-owned assets abroad</b> (percent)     |                   |                   |                   |                   |                     |
| Passive assets   | 73.5              | 73.4              | 72.5              | 62.3              | 68.6                |
| Foreign official assets <sup>a</sup>                             | 17.3              | 16.1              | 18.0              | 13.8              | 17.4                |
| Other  | 56.2              | 57.2              | 54.5              | 48.5              | 51.1                |
| Treasury securities  | 7.5               | 6.6               | 8.6               | 5.1               | 5.6                 |
| Corporate and other bonds  | 7.0               | 10.3              | 12.1              | 14.3              | 17.9                |
| US currency  | 3.9               | 3.7               | 4.5               | 3.4               | 2.8                 |
| Nonbank liabilities, nes   | 7.4               | 9.2               | 7.9               | 9.9               | 4.4                 |
| Bank liabilities, nes  | 30.3              | 27.4              | 21.4              | 15.7              | 20.5                |
| Corporate equities   | 10.7              | 9.6               | 13.4              | 20.8              | 16.7                |
| Direct investment  | 15.8              | 17.1              | 14.1              | 16.9              | 14.8                |
| In nontraded sectors <sup>c</sup>                                | 6.1               | 5.5               | 5.3               | 7.4               | 6.1                 |
| In traded sectors <sup>b</sup>                                   | 9.6               | 11.5              | 8.8               | 9.5               | 8.6                 |
| Total  | 100.0             | 100.0             | 100.0             | 100.0             | 100.0               |
| <i>Memorandum:</i>   |                   |                   |                   |                   |                     |
| Nominal GDP<br>(billions of dollars)                             | 4,220.3           | 5,803.1           | 7,397.7           | 9,817.0           | 12,455.8            |

a. Primarily foreign government holdings of US treasuries.

b. Nontraded sectors include wholesale and retail trade, real estate, holding companies, banking and other finance, health care, accommodation, and food services.

c. Traded sectors include manufacturing, agriculture, mining, construction, information, and services not elsewhere specified (nes).

Note: Direct investment stock is valued at historical cost, as opposed to market value or current cost.

Source: Bureau of Economic Analysis, [www.bea.gov](http://www.bea.gov).

**Table 1.5 US-owned assets abroad, 1985–2005**

| <b>Asset</b>   | <b>1985</b>       | <b>1990</b>       | <b>1995</b>       | <b>2000</b>       | <b>2005</b>        |
|--|-------------------|-------------------|-------------------|-------------------|--------------------|
| <b>a. In billions of dollars</b> (percent of GDP in parentheses) |                   |                   |                   |                   |                    |
| Passive assets   | 872.0<br>(20.7)   | 1,364.7<br>(23.5) | 1,810.2<br>(24.5) | 2,846.8<br>(29.0) | 4,468.2<br>(35.9)  |
| Official reserve assets <sup>a</sup>                             | 117.9             | 174.7             | 176.1             | 128.4             | 188.0              |
| Other government assets  | 89.8              | 84.3              | 85.1              | 85.2              | 77.5               |
| Privately held passive assets                                    | 664.3             | 1,105.7           | 1,549.0           | 2,633.2           | 4,202.7            |
| Foreign bonds (government and corporate)                         | 75.02             | 144.7             | 413.3             | 532.5             | 987.5              |
| Nonbank liabilities  | 141.9             | 265.3             | 367.6             | 836.6             | 784.5              |
| Bank liabilities, nes  | 447.4             | 695.7             | 768.1             | 1,264.1           | 2,430.7            |
| Corporate equities   | 44.4<br>(1.1)     | 197.6<br>(3.4)    | 790.6<br>(10.7)   | 1,852.8<br>(18.9) | 3,086.4<br>(24.8)  |
| Direct investment  | 238.4<br>(5.6)    | 430.5<br>(7.4)    | 699.0<br>(9.4)    | 1,316.2<br>(13.4) | 2,453.9<br>(19.7)  |
| In nontraded sectors <sup>b</sup>                                | 67.9              | 181.0             | 333.9             | 767.5             | 1,516.6            |
| In traded goods sectors <sup>c</sup>                             | 170.4             | 249.5             | 365.1             | 548.8             | 937.3              |
| Total  | 1,154.7<br>(27.4) | 1,992.8<br>(34.3) | 3,299.8<br>(44.6) | 6,015.9<br>(61.3) | 10,008.5<br>(80.4) |
| <b>b. As share of total foreign assets</b> (percent)             |                   |                   |                   |                   |                    |
| Passive assets   | 75.5              | 68.5              | 54.9              | 47.3              | 44.6               |
| Official reserve assets <sup>a</sup>                             | 10.2              | 8.8               | 5.3               | 2.1               | 1.9                |
| Other government assets  | 7.8               | 4.2               | 2.6               | 1.4               | 0.8                |
| Privately held passive assets                                    | 57.5              | 55.5              | 46.9              | 43.8              | 42.0               |
| Foreign bonds (government and corporate)                         | 6.5               | 7.3               | 12.5              | 8.9               | 9.9                |
| Nonbank liabilities  | 12.3              | 13.3              | 11.1              | 13.9              | 7.8                |
| Bank liabilities, nes  | 38.7              | 34.9              | 23.3              | 21.0              | 24.3               |
| Corporate equities   | 3.8               | 9.9               | 24.0              | 30.8              | 30.8               |
| Direct investment  | 20.6              | 21.6              | 21.2              | 21.9              | 24.5               |
| In nontraded sectors <sup>b</sup>                                | 5.9               | 9.1               | 10.1              | 12.8              | 15.2               |
| In traded goods sectors <sup>c</sup>                             | 14.8              | 12.5              | 11.1              | 9.1               | 9.4                |
| Total  | 100.0             | 100.0             | 100.0             | 100.0             | 100.0              |
| <i>Memorandum:</i>   |                   |                   |                   |                   |                    |
| Nominal GDP<br>(billions of dollars)                             | 4,220.3           | 5,803.1           | 7,397.7           | 9,817.0           | 12,455.8           |

a. 59 percent of reserve assets are in gold, 41 percent are claims on international institutions and foreign currencies.

b. Nontraded sectors include wholesale and retail trade, real estate, holding companies, banking, and other finance.

c. Traded sectors include manufacturing, agriculture, mining, construction, information, and services not elsewhere specified (nes).

Note: Direct investment stock is valued at historical cost, as opposed to market value or current cost.

Source: Bureau of Economic Analysis, [www.bea.gov](http://www.bea.gov).

than corporate equities or inward direct investment, but the taxation of foreigners who acquire US assets is not a topic we explore at length.<sup>7</sup>

## Internationalization of the US Economy

The third major postwar trend has been the gradual internationalization of the US economy, to the point that globalization is now an accepted and often condemned descriptor. Two-way investment is a large part of the story, but many other forces play a role. Container ships, cargo aircraft, and other innovations have progressively reduced real transportation costs since the 1950s. Improvements in information and communications technology have tightly linked the US economy to other countries. Compared with the 1960s, the openness of the US economy has increased sharply by several measures (table 1.6). US merchandise exports accounted for less than 4 percent of GNP in 1960 but over 10 percent in 2005; meanwhile US merchandise imports increased from about 3 percent to more than 16 percent of GNP.

US-based MNEs have propelled the growing internationalization of the US economy. In 2004 merchandise exports associated with US MNEs accounted for 52 percent of US merchandise exports and 34 percent of US merchandise imports. Much of the commerce was conducted among affiliates of the same corporate group. In 2004 intrafirm merchandise exports of US multinationals accounted for 20 percent of total US merchandise exports, and intrafirm merchandise imports accounted for 14 percent of US merchandise imports (table 1.7).

Reflecting the internationalization of the US economy was the “who is us?” debate in the United States at the beginning of the 1990s, popularized by Robert B. Reich (1991).<sup>8</sup> Discussions of the question typically in-

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7. Chapter 4 on portfolio investment addresses the question, but our recommendations on inward portfolio investment are aligned with current US practice. Mutti and Grubert (1985) create a model inspired by Arnold Harberger that sheds light on tax reasons for foreign asset holders to favor US debt, whereas US asset holders favor direct investment and corporate equity.

8. In the 1950s the distinction between a US and a foreign MNE was clear. A US-based MNE was managed and had most of its operations in the United States, raised most of its capital in the United States, and derived most of its income from sales in the United States; the same was true for the foreign factors of a foreign-based MNE. In that context it was indeed plausible to state that “what is good for GM [General Motors] is good for America.” Today it is harder to distinguish US-based and foreign-based MNEs on the basis of where their capital is raised (both issue shares and borrow at home and overseas), where their production operations are (all over the world), and where their customers are located (frequently overseas) (see Avi-Yonah 2002b). Moreover, General Agreement on Tariffs and Trade (GATT) and World Trade Organization (WTO) rules and bilateral investment treaties (BITs) somewhat constrain policymaking that discriminates between domestic and foreign firms.

**Table 1.6 United States: Selected measures of openness to international trade and investment, 1960–2005** (percent of GNP)

| Measure  | 1960 | 1970 | 1980 | 1990 | 2000 | 2005 |
|--|------|------|------|------|------|------|
| Merchandise                                      |      |      |      |      |      |      |
| Exports  | 3.8  | 4.2  | 8.2  | 7.1  | 11.2 | 10.7 |
| Imports  | 2.9  | 3.9  | 9.1  | 9.0  | 14.9 | 16.4 |
| Services   |      |      |      |      |      |      |
| Exports  | 1.2  | 1.4  | 1.7  | 2.5  | 3.0  | 3.1  |
| Imports  | 1.5  | 1.4  | 1.5  | 2.0  | 2.3  | 2.5  |
| US assets abroad <sup>a</sup>                    |      |      |      |      |      |      |
| Direct investment <sup>a</sup>                   | 6.2  | 7.4  | 7.4  | 8.6  | 15.5 | 22.0 |
| Portfolio investment <sup>b</sup>                | 1.9  | 2.1  | 1.2  | 4.8  | 24.6 | 36.5 |
| Other <sup>c</sup>                               | n.a. | 2.2  | 4.6  | 13.4 | 21.0 | 28.8 |
| Total  | 8.1  | 11.7 | 13.2 | 26.8 | 61.1 | 87.3 |
| Foreign assets in the United States <sup>a</sup> |      |      |      |      |      |      |
| Direct investment <sup>a</sup>                   | 1.3  | 1.3  | 2.4  | 7.1  | 14.4 | 16.8 |
| Portfolio investment <sup>b</sup>                | 1.9  | 3.6  | 1.7  | 8.6  | 30.5 | 45.6 |
| Other <sup>c</sup>                               | n.a. | 3.2  | 3.4  | 13.0 | 22.0 | 31.5 |
| Total  | 3.2  | 8.1  | 7.5  | 28.7 | 66.9 | 93.9 |

n.a. = not available

a. At book value.

b. US (foreign) private-owned foreign (US) securities including stocks and bonds. US (foreign) government-owned assets abroad (in the United States) are excluded.

c. Includes claims reported by banks and other nonbanking concerns not included elsewhere (including US currency).

Sources: Bureau of Economic Analysis (BEA), *Survey of Current Business*, May 2003, tables G.1, F.1, and 1.9; May 2002, tables F.1 and 1.9; and interactive tables on the BEA website, [www.bea.gov](http://www.bea.gov).

voke the concept of the stateless MNE.<sup>9</sup> Those who see stateless firms roaming the world are not far off regarding traditional production activities. Many firms are busy rationalizing their production activities to slice up the value-added chain and minimize the cost of inputs and transportation between various markets.<sup>10</sup> General Electric (GE) announced its intention to raise the proportion of its overseas production from 41 to

9. See Avi-Yonah (2002b); *Business Week*, November 20, 2000, 68 (with respect to “stateless startups”); *Business Week*, May 14, 1990, 98–104.

10. The World Bank (2003) reports that globalization among developing countries has progressed to the extent that it can be difficult to identify a unique nationality for some products.

**Table 1.7 US merchandise trade associated with US multinational enterprises (MNEs), selected years**

| Year                      | Total MNE-associated merchandise trade |   | Intra-MNE trade <sup>a</sup> |   |
|---------------------------|--|---|------------------------------|---|
|                           | Billions of US dollars                 | Percent of total US merchandise exports/imports | Billions of US dollars       | Percent of total US merchandise exports/imports |
| MNE-associated US exports |  |   |                              |   |
| 1966                      | 18                                     | 61  | 6                            | 22  |
| 1977                      | 94                                     | 77  | 32                           | 27  |
| 1982                      | 151                                    | 71  | 44                           | 21  |
| 1989                      | 228                                    | 63  | 86                           | 24  |
| 2000                      | 421                                    | 55  | 182                          | 24  |
| 2004                      | 429                                    | 52  | 165                          | 20  |
| MNE-associated US imports |  |   |                              |   |
| 1966                      | 9                                      | 36  | 4                            | 15  |
| 1977                      | 78                                     | 51  | 33                           | 21  |
| 1982                      | 108                                    | 44  | 39                           | 16  |
| 1989                      | 175                                    | 37  | 72                           | 15  |
| 2000                      | 412                                    | 34  | 191                          | 16  |
| 2004                      | 503                                    | 34  | 209                          | 14  |

a. Intra-MNE trade consists of all trade between US parent companies and their foreign affiliates.

Note: US merchandise trade associated with US MNEs consists of all trade involving US parent companies or their foreign affiliates.

Sources: Bureau of Economic Analysis (BEA), US Direct Investment Abroad, 2002, tables II.T.1. and II.T.4.; BEA, *Survey of Current Business*, May 2002, tables G.3, F.1; *Survey of Current Business*, November 2006, table 11, p. 53.

over 50 percent by 2009.<sup>11</sup> Yet according to recent statistics, though US-headquartered MNEs operate in a record number of countries worldwide, the bulk of their revenue, investment, and employment is still located in the United States. Similarly, though a slow decline is evident in the US share, in 2004 US parent companies still accounted for more than two-thirds of US-based MNEs' sales, capital expenditure, and employment.<sup>12</sup> For the

11. GE executives cited the high cost and limited availability of US engineers compared with their counterparts in China and India as a key factor in their decision ("GE to Shift Output from US," *Financial Times*, July 27, 2006, 15).

12. Home bias varies considerably across industries. The share of the domestic market in total revenues for industries producing highly tradable products (e.g., pharmaceuticals,

top 100 European MNEs, the EU-wide bias is similar to the US home bias of US firms in terms of revenues and employment (Véron 2006). However, the rising importance of global markets is striking in locating corporate profits: In 1970 profits from “receipts from the rest of the world” were only 10 percent of total US corporate profits; by 2005 the figure had risen to about 25 percent.<sup>13</sup>

## The Rise of High Technology

In the arena of global competition, the high-technology sector attracts the most attention, as it lies at the intersection of several hot-button issues, from national security and export controls to the increasing power and reach of multinational firms.<sup>14</sup> During the information technology (IT) revolution of the 1990s, the commercial Internet emerged, computers became increasingly powerful, communications networks became far faster and cheaper, and firms developed the organizational capability to translate new technologies into performance gains.<sup>15</sup> This made it easier for business firms everywhere to go global by reducing the cost of establishing

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chemicals, and consumer products) is below the US average, though the opposite is observed for more regulated firms, such as utilities, insurance, telecommunications, and retail and logistics (Véron 2006).

13. US Department of Commerce, Bureau of Economic Analysis, national income and product account tables 6.16 B, C, and D, available at [www.bea.gov](http://www.bea.gov).

14. For years before 1997, this study adopts the US Department of Commerce definition of high technology, which includes all products that have a significantly higher ratio of direct and indirect research, development, and experimentation (RD&E) expenditures to shipments than other products. By Standard Industrial Classification (SIC) category, such products include guided missiles and spacecraft (SIC 376); communication equipment and electronic components (SICs 365–367); aircraft and parts (SIC 372); office, computing, and accounting machines (SIC 357); ordnance and accessories (SIC 348); drugs and medicines (SIC 283); industrial inorganic chemicals (SIC 28 excluding 3825); engines, turbines, and parts (SIC 351); and plastic materials and synthetic resins, rubber, and fibers (SIC 282).

15. One of the more dramatic illustrations comes from successive generations of dynamic random access memories (DRAMs), an important component of many computers. DRAMs became commercially available during the 1970s and 1980s at a startlingly rapid pace: The first 4K DRAMs were introduced in 1973; these were followed by 16K DRAMs in 1975, 64K DRAMs in 1978, 256K DRAMs in 1982, 1-megabyte DRAMs in 1986, 4-megabyte DRAMs in 1989, 16-megabyte DRAMs in 1992; and the 512-megabyte DRAM introduced in 2000. The DRAM story is the classic illustration of Moore’s Law, which dictates a doubling of capacity every 18 months; *The Economist*, February 23, 1991, 64–66; *Taipei Times*, online edition, April 28, 2001). Likewise, since 1980 the speed of microprocessors used in personal computers has increased more than a hundredfold, and the cost of performing 1 million instructions per second (mips) fell from over 100 dollars in 1980 to less than 20 cents in 2001 (*2001 Economic Report of the President*).

an international presence.<sup>16</sup> The same developments enlarged the number of competitors in individual markets, compelling US firms and others to improve their productive efficiency. It is also worth noting that the rise of high technology has fostered rapid growth in “electronic commerce” (or e-commerce): The world internet economy reached almost \$7 trillion in sales in 2004. Due to the nature of borderless transactions, e-commerce has generated complicated tax issues, involving income sourcing, income characterization, and the permanent establishment (PE) concept, summarized in appendix E.

The high-technology sector has several special characteristics. Compared with other economic activities, high-technology industries create interesting and well-paid professional and technical jobs (National Science Foundation 2002). Almost by definition, high-technology firms are associated with innovation, and firms that innovate tend to gain market share at home and abroad, create new products, and spin off subsidiary firms that compete with their parents and invent altogether different products (National Research Council 1996). Technological change is estimated to be directly or indirectly responsible for two-thirds to four-fifths of US productivity growth since the Great Depression.<sup>17</sup> The United States has

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16. The World Bank (2003) reports that technological progress in transport, communications, and data processing in the past two decades fueled the growth of cross-border production networks. In these networks, MNEs break down the production process leading to final goods into multiple stages that vary in the intensity of capital, skilled labor, unskilled labor, and other input requirements. Multinationals try to produce each stage where it can be done at the lowest cost. The decline in sea freight costs by nearly 70 percent between the early 1980s and the mid-1990s and the increased use of air shipments both facilitated the shipment of components between locations. In addition, the low cost of long-distance telephone rates and the advent of the Internet made it easier for multinationals to closely coordinate production at dispersed locations. Electronic data interchange (EDI) greatly reduced the costs of procurement and improved the coordination of production across dispersed factories (Chen 1996). According to a detailed study of US firms operating in Canada, most of the expansion of intrafirm trade between 1983 and 1996 can be attributed to just-in-time (JIT) manufacturing techniques adopted from Japan, rather than lower tariffs resulting from the Canada-US Free Trade Agreement (implemented in 1989).

17. See “Effectiveness of the Research and Experimentation Tax Credit,” testimony by Laura P. Allbritten before the Committee on Science, United States House of Representatives, July 1, 1999; and Council on Competitiveness (1998). The President’s Council of Advisers on Science and Technology (2002) reports that about two-thirds of the 80 percent gain in economic productivity since 1995 can be attributed to information technology. The National Institute of Economic Review (2003) notes that productivity growth in the United States, measured as GDP per hour worked, accelerated from 1.3 percent during the 1980s and the first half of the 1990s to 1.9 percent during the second half of the decade, suggesting that most US productivity growth can be traced to industries that either produce or use information and communication technology. Since 2000, US private-sector productivity growth has been high, averaging 3 percent annually. See US Department of Labor, Bureau of Labor Statistics, Major Sector Productivity and Costs Index: Business Output per Hour, available at [www.bls.gov](http://www.bls.gov) (accessed on February 7, 2007).

relied increasingly on technology-based production in the fast-growing elements of the service sector, and the share of value added derived from high technology–dependent services, such as telecommunications, finance, insurance, real estate, and business services, has risen from 20 percent of GDP in 1990 to almost 25 percent in 2003 (OECD STAN database).<sup>18</sup>

Turning to trade statistics, in 2003 high- and medium high–technology products accounted for 67 percent of US merchandise exports and 52 percent of US merchandise imports (OECD STAN database). The rapid productivity growth associated with high-technology industries is closely related to their large investments in research, development, and experimentation (RD&E), the benefits of which fall into two broad categories. First, productivity generally rises in firms and industries that perform the research and related activity. Second, the widespread application of IT, together with a surge of related innovations during the second half of the 1990s, stimulated remarkable improvements in production processes throughout the manufacturing sector, which translated into rapid productivity growth.

There is strong consensus that RD&E expenditures abet productivity growth, but researchers disagree about the extent of the contribution. A literature review by the Congressional Budget Office (CBO 2005a) reports central estimates, from cross-sectional studies at the industry level, that a 10 percent increase in RD&E expenditure correlates with a 1 or 2 percent increase in productivity growth.<sup>19</sup> RD&E often benefits sponsoring firms handsomely—Microsoft, Genentech, and Google being contemporary examples—and the benefits usually extend to society as a whole. Innovations enhance the productivity of industries downstream that use the innovations in their production processes. Beneficiaries include users of telecommunications, computers, advanced ceramics, and medical instruments.

As a rough illustration, the annual growth of labor productivity in the US manufacturing sector from 1988 to 1994 was around 2.5 percent; the figure rose to 4.4 percent for 1995 to 2005. Most of the economywide productivity gains reflect the scope and speed of the diffusion of key discoveries rather than gains in the sectors responsible for the discovery, a point highlighted by Ben Bernanke, the chairman of the board of the

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18. During this period, the share of value added derived from high- and medium high–technology manufactures (e.g., pharmaceuticals, office machinery, communication equipment, aircraft, chemicals, and transportation equipment) fell from 8.0 percent of GDP in 1991 to 6.0 percent in 2003. This trend is in line with the overall decline in manufacturing from 17.4 percent of GDP in 1991 to 13.8 percent in 2003 (OECD 2004b, table 31).

19. The CBO reports, however, that other studies based on time-series or economy-wide data either show a lower elasticity or lack statistical significance. Also see Baily and Lawrence (1987).

Federal Reserve.<sup>20</sup> Because RD&E benefits accrue to downstream firms that did not pay for the research, RD&E has a social return not captured by traditional financial measures.<sup>21</sup>

At one time it was claimed that the United States held a comparative advantage in high-technology industries because of the exceptional creativity of US scientists and engineers. This notion was always suspect, both because of Europe's demonstrated technical leadership before World War II and because many leading scientists and engineers working in US laboratories were born and educated abroad. At the beginning of the 21st century, however, the United States finds itself in a rapidly changing environment that threatens its traditional leadership position in goods and services innovation (Destler 2005). The challenge is posed not only by the traditional industrial creativity of Japanese and European firms but also by the emergence of new competitors in Asia, especially China, India, and Korea, that take advantage of significantly lower labor costs to attract manufacturing firms, together with supply chains and ultimately their RD&E centers.<sup>22</sup>

A country's technological position is often measured by its exports of high-technology goods. In 1980 the United States accounted for 30 percent of OECD high-technology exports, the 15 members of the European Union accounted for 39 percent, and Japan for 13 percent. By 2003 the US share had dropped to 16 percent, the EU-15 share had fallen to 32 percent, and the Japanese share had declined to 9 percent (table 1.1).<sup>23</sup> As recently as 1980 the United States enjoyed a two-to-one trade surplus in

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20. Bernanke (2005) traced the gap between the United States and Europe in economywide productivity gains after 1995 to slower rates of IT appropriation by IT-using sectors in Europe rather than a lag by European IT-producing sectors.

21. Moreover, RD&E has long played a major role in national security, which explains why the Department of Defense is a leading sponsor. Since September 11, 2001, RD&E has been perceived as a vital tool to combat terrorism.

22. See the House of Representatives' panel held by the Committee of Science regarding RD&E and the future of the manufacturing sector, June 5, 2003 (Serial No. 108-11, 108th Congress, available at <http://frwebgate.access.gpo.gov>). Chairman Vernon Ehlers (R-MI) of the Environment, Technology, and Standards Subcommittee noted that "The global challenge to US manufacturing has come partly as a result of other nations achieving technological parity with the US; they have been investing specifically to build themselves into manufacturing powerhouses and sell their products here. We are in a potentially worrisome situation today, with the prospect of losing many different industries to foreign competition, together with their supply chains, and ultimately, our RD&E." Participants in the panel cautioned that the United States would not be able to compete with the wage levels being set by other countries. Instead, the United States needed to focus on innovation, efficiency, and quality. Participants also agreed with committee members that, while US support for RD&E is high in general, neither companies nor the federal government spend nearly enough on RD&E. As if to reinforce the worried tone of the committee's hearing, in 2006, Samuel Palmisano (2006), chief executive officer of IBM, essentially declared that IBM would locate much of its RD&E activity outside the United States in the future.

23. Intraregional trade of EU members is counted in calculating these estimates.

high-technology goods, with exports of \$54 billion against imports of \$27 billion. By 2003 the United States faced a high-technology trade deficit of about \$35 billion, out of a total trade deficit of \$437 billion in harmonized system (HS) chapters 28–97.<sup>24</sup> In that year, US high-technology exports were about \$201 billion and imports were about \$238 billion.

Two other measures of high-technology leadership are the number of patents filed and royalties and fees paid to and received from unaffiliated firms. From 1980 to 2003, the share of US patents granted to US firms and inventors dropped from 65 percent to 52 percent; conversely, the share granted to foreign firms and inventors rose from 35 percent to 48 percent. From 1987 to 2003, US payments of royalties and fees to unaffiliated firms abroad increased by more than sixfold, from \$0.6 billion to \$3.3 billion. Over the same period, US receipts of royalties and fees from unrelated firms increased fivefold, from \$2.3 billion to \$12.3 billion.<sup>25</sup> By these figures, the United States has lost some ground, but not much.

In recent testimony, however, Lawrence Summers (2007), former secretary of the Treasury and president of Harvard University, sounded this alarm:

[O]ur investments in research and development, after increasing rapidly since the nineteen-nineties, have lagged. In a time when the world stands on the brink of revolutionary progress in the life sciences, it cannot be rational for the NIH [National Institutes of Health] budget to decline as it did in this past year for the first time in nearly forty years. If one looks at funding levels adjusted for inflation the decline in our national commitment to basic research is even more remarkable.

Leadership in high technology requires large doses of creativity and an enabling environment, including appropriate policies and, in some instances, vast amounts of money. In 2003 the United States still spent more than any other country on RD&E in absolute terms, but Japan had outpaced the United States in RD&E spending as a proportion of GNP: Japan spent 3.1 percent of GNP on RD&E, the United States spent 2.6 percent, and Germany spent 2.5 percent.<sup>26</sup> US federal RD&E funding as a share of GDP continues to decline.<sup>27</sup> Moreover, US public funding has traditionally focused on military rather than commercial RD&E. In 2004 the United

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24. The referenced HS chapters exclude oil, minerals, agricultural commodities, and food, but they include base metals in an unprocessed state and all other manufactured products.

25. These comparisons come from the National Science Foundation, (2006, table 6.12).

26. National Science Foundation (2006, appendix table 4-40).

27. During the late 1970s, federal government funding for RD&E exceeded that of private industry, but the reverse is true today. RD&E investment by the federal government fell from 1.75 percent of GDP in 1965 to about 0.75 percent of GDP in 2004 (CBO 2005a). In his 2006 state of the union address, President Bush proposed to increase federal RD&E spending to \$137 billion in 2007, about 1 percent of 2006 GDP.

**Table 1.8 RD&E spending by the United States, Japan, and Germany, 1961–2004** (percent of GDP)

| Year | United States |            | Japan |            | Germany |            |
|------|---------------|------------|-------|------------|---------|------------|
|      | Total         | Nondefense | Total | Nondefense | Total   | Nondefense |
| 1961 | 2.7           | n.a.       | 1.3   | n.a.       | 0.9     | n.a.       |
| 1965 | 2.8           | n.a.       | 1.6   | n.a.       | 1.7     | n.a.       |
| 1970 | 2.6           | 1.7        | 1.9   | 1.9        | 2.1     | 2.0        |
| 1975 | 2.2           | 1.6        | 2.0   | 2.0        | 2.2     | 2.1        |
| 1980 | 2.3           | 1.7        | 2.2   | 2.2        | 2.4     | 2.3        |
| 1985 | 2.8           | 2.0        | 2.8   | 2.8        | 2.8     | 2.7        |
| 1990 | 2.6           | 2.0        | 2.9   | 2.8        | 2.8     | 2.6        |
| 1995 | 2.5           | 2.0        | 2.8   | 2.7        | 2.3     | 2.2        |
| 2000 | 2.7           | 2.4        | 3.0   | 3.0        | 2.5     | 2.4        |
| 2003 | 2.6           | 2.2        | 3.1   | 3.1        | 2.5     | 2.5        |
| 2004 | 2.7           | n.a.       | n.a.  | n.a.       | 2.5     | n.a.       |

n.a. = not available

RD&E = research, development, and experimentation

Source: National Science Foundation (2006, appendix tables 4-42 and 4-43).

States appropriated 55.8 percent of its public RD&E budget to defense, compared with 6.1 percent by Germany and 4.5 percent by Japan (National Science Foundation 2006, appendix table 4-47).<sup>28</sup> All told, in 2003 the United States spent only about 2.2 percent of its GNP on commercial RD&E, while Germany spent 2.5 percent and Japan about 3.1 percent (table 1.8). There is also public support for RD&E at the state and local level within the United States, but it usually takes the form of local tax relief, university support, and infrastructure subsidies, rather than continuing grants for RD&E personnel and equipment.

More broadly, as table 1.9 illustrates, traditional world leaders in RD&E—the United States, the European Union, and Japan—have seen their expenditures on RD&E as a share of GDP remain constant over the past 20 years. By contrast, newcomers such as Finland, Sweden, Korea, and China have increased the percentage of GDP devoted to RD&E expenditures substantially over the same period.

In 2000, US firms with more than 500 employees were responsible for more than 82 percent of the total RD&E expenditure spent by US firms,

28. In 2004 the US public RD&E budget for defense was 4.5 times larger than the combined public RD&E budgets for defense of Japan, Germany, France, the United Kingdom, Russia, South Korea, Italy, and Canada. By contrast the total US public RD&E budget was only 18 percent larger than the combined total public RD&E budgets of those countries.

**Table 1.9 RD&E expenditures as percent of GDP, selected high-technology countries**

| Country/region           | 1985 | 1990 | 1995 | 2000 | 2004 | 2005 |
|--------------------------|------|------|------|------|------|------|
| Traditional RD&E leaders |      |      |      |      |      |      |
| United States            | 2.8  | 2.7  | 2.5  | 2.7  | 2.6  | 2.6  |
| Japan                    | 2.8  | 3.0  | 2.9  | 3.0  | 3.2  | 3.3  |
| Germany                  | 2.6  | 2.6  | 2.2  | 2.5  | 2.5  | 2.5  |
| France                   | 2.2  | 2.3  | 2.3  | 2.2  | 2.1  | 2.1  |
| Switzerland              | 2.8  | 2.7  | 2.7  | 2.6  | 2.9  | n.a. |
| Total OECD               | 2.2  | 2.3  | 2.1  | 2.2  | 2.3  | 2.3  |
| EU-27                    | 1.8  | 1.9  | 1.7  | 1.8  | 1.7  | 1.7  |
| Newcomers in RD&E        |      |      |      |      |      |      |
| Finland                  | 1.5  | 1.8  | 2.3  | 3.3  | 3.5  | 3.5  |
| Sweden                   | 2.8  | 2.7  | 3.3  | 4.3  | 3.7  | 3.9  |
| Korea                    | n.a. | 1.8  | 2.4  | 2.4  | 2.9  | 3.0  |
| China                    | n.a. | 0.7  | 0.6  | 0.9  | 1.2  | 1.3  |
| Singapore                | n.a. | n.a. | 1.2  | 1.9  | 2.3  | 2.4  |
| Israel                   | n.a. | 2.4  | 2.6  | 4.5  | 4.4  | 3.7  |

n.a. = not available

Source: OECD, *Main Science and Technology Indicators*, 2006 and 2007.

reflecting an average annual RD&E expenditure of \$51.5 million per company, which in turn reflects a research budget of 3 percent of sales (National Science Foundation 2002, appendix tables 6-13 and 6-15). RD&E expenditures may be a mediocre proxy for RD&E achievements, but they indicate nonetheless the commitment that individual firms make to technological leadership.<sup>29</sup>

The entire RD&E process today may be moving toward a decentralized model involving more small-firm RD&E and increasing collaboration between firms (2001 *Economic Report of the President*, pp. 37 and 110). Nevertheless, the role of large firms remains decisive. In 2000 the 20 largest RD&E spenders accounted for 34 percent of US industrial RD&E spending, and the 100 largest RD&E spenders accounted for 58 percent (table 1.10). With RD&E spending thus apparently dependent on firm size, and with foreign firms increasingly occupying the lists of the largest 100 firms worldwide (table 1.3), the ability to spend on RD&E seems to be shifting abroad.

29. The RD&E cost of developing a completely new medicine is now estimated at nearly \$900 million, compared with \$230 million in 1991 and only \$60 million in 1976. See *Boston Business Journal*, May 13, 2003, based on a report released by the Tufts Center for the Study of Drug Development; Afonsky and Shannon (1991, figure 1).

**Table 1.10 The 40 largest US RD&E firms, by outlay, 2004–05**

| <b>Grouping/company</b>                  | <b>Global<br/>RD&amp;E rank<br/>in 2004–05</b> | <b>Billions of<br/>dollars</b> | <b>Percent<br/>of total</b> |
|--|--|--------------------------------|-----------------------------|
| Total industry RD&E outlays <sup>a</sup> | —  | 195.7                          | 100.0                       |
| Top 20                                   | —  | 73.8                           | 37.7                        |
| Total top 40                             | —  | 95.3                           | 48.7                        |
| Total top 100                            | —  | 119.9                          | 61.3                        |
| All firms (RD&E > \$100 million)         | —  | 138.7                          | 70.9                        |
| Pfizer                                   | 2  | 7.3                            | 3.7                         |
| Ford Motor                               | 3  | 7.0                            | 3.6                         |
| General Motors                           | 6  | 6.2                            | 3.1                         |
| Microsoft                                | 7  | 5.9                            | 3.0                         |
| IBM                                      | 9  | 5.4                            | 2.7                         |
| Johnson & Johnson                        | 14   | 4.9                            | 2.5                         |
| Intel                                    | 16   | 4.5                            | 2.3                         |
| Merck                                    | 21   | 3.8                            | 1.9                         |
| Hewlett-Packard                          | 26   | 3.3                            | 1.7                         |
| Cisco Systems                            | 32   | 3.0                            | 1.5                         |
| General Electric                         | 35   | 2.9                            | 1.5                         |
| Motorola                                 | 36   | 2.9                            | 1.5                         |
| Eli Lilly                                | 38   | 2.6                            | 1.3                         |
| Bristol-Myers Squibb                     | 42   | 2.4                            | 1.2                         |
| Wyeth                                    | 44   | 2.3                            | 1.2                         |
| Delphi                                   | 48   | 2.0                            | 1.0                         |
| Amgen                                    | 50   | 1.9                            | 1.0                         |
| Texas Instruments                        | 51   | 1.9                            | 1.0                         |
| Sun Microsystems                         | 54   | 1.8                            | 0.9                         |
| Boeing                                   | 55   | 1.8                            | 0.9                         |
| Procter & Gamble                         | 57   | 1.7                            | 0.9                         |
| Abbott Laboratories                      | 58   | 1.6                            | 0.8                         |
| Schering-Plough                          | 62   | 1.5                            | 0.8                         |
| Oracle                                   | 64   | 1.4                            | 0.7                         |
| El du Pont de Nemours                    | 72   | 1.3                            | 0.6                         |
| Lucent Technologies                      | 73   | 1.2                            | 0.6                         |
| United Technologies                      | 76   | 1.2                            | 0.6                         |
| Dow Chemical                             | 85   | 1.0                            | 0.5                         |
| EMC                                      | 86   | 1.0                            | 0.5                         |
| Applied Materials                        | 87   | 0.9                            | 0.5                         |
| Freescall Semiconductor                  | 89   | 0.9                            | 0.5                         |
| Lockheed Martin                          | 90   | 0.9                            | 0.5                         |
| Medtronic                                | 91   | 0.9                            | 0.5                         |
| Advanced Micro Devices                   | 92   | 0.9                            | 0.5                         |
| Agilent Technologies                     | 93   | 0.9                            | 0.5                         |

*(table continues next page)*

**Table 1.10** (continued)

| <b>Grouping/company</b> | <b>Global<br/>RD&amp;E rank<br/>in 2004–05</b> | <b>Billions of<br/>dollars</b> | <b>Percent<br/>of total</b> |
|-------------------------|--|--------------------------------|-----------------------------|
| Caterpillar             | 94   | 0.9                            | 0.4                         |
| Honeywell               | 95   | 0.9                            | 0.4                         |
| Visteon                 | 97   | 0.8                            | 0.4                         |
| Eastman Kodak           | 102  | 0.8                            | 0.4                         |
| Altria                  | 105  | 0.8                            | 0.4                         |

a. Data on industry RD&E outlays are listed in US dollars by original source (National Science Foundation). All other data were listed in British pounds and were converted into US dollars at annual exchange rate listed by the Federal Reserve for 2005.

Sources: UK Department for Business Enterprise and Regulatory Reform, [www.innovation.gov.uk](http://www.innovation.gov.uk); National Science Foundation (2006).

Overall, US firms are still competitive in high technology, but they are no longer leagues ahead of European and Japanese firms. Moreover, China appears determined to eventually join the club of high-technology producers and exporters and is willing to devote relatively large amounts to RD&E for a country with a low per capita income level.<sup>30</sup> Several years ago, the Council on Competitiveness (1998, 9) noted that

sustaining our economic growth and technological edge in a new world and a new century is vital to our democracy—and to our national security. Now, more than at any time in recent history, we must identify, cultivate, and support innovation in all levels of our economy...the United States remains the world's innovation powerhouse, bringing a unique combination of strengths to the table: the excellence of its RD&E enterprise, a risk-taking entrepreneurial culture, efficient capital networks, and strong consumer demand for new products and services. Yet, globalization is leveling the playing field, changing the rules of international competitiveness, and collapsing the margins of technological leadership. Our members are not convinced that the United States is preparing for success in a world in which many more countries will acquire a capacity to innovate.

## Headquarters for MNEs

Where a firm places its headquarters influences how much a country benefits from the firm's domestic and international operations, and the headquarters activities of an MNE—its corporate policymaking, financial

30. In 2005 the share of RD&E expenditure in China's GDP stood at 1.3 percent, approaching the analogous figure for EU-27 (see table 1.9). The Index of Technological Competitiveness, estimated by the National Science Foundation, shows that a few East Asian countries, particularly China, are rapidly catching up with the levels of technological competitiveness prevailing in many OECD countries, including France, the Netherlands, Canada, and Australia (National Science Foundation 2006).

operations, RD&E, and the like—are still closely identified with the home country. The practice known as “corporate inversion” is still uncommon: Some US-based corporations, such as Tyco International and Ingersoll-Rand, have shifted their nominal headquarters to tax-haven countries (usually Bermuda) to minimize federal income taxes, but so far there has been no stampede.<sup>31</sup> Even in cases of corporate inversion, nearly all headquarters employees and functions have remained in the United States. Some activities traditionally associated with the headquarters will be outsourced over the next decade, but close identification of MNEs with their home country seems likely to persist. Maintaining this identification, rather than taking it for granted, crucially underlies many of the tax-reform recommendations proposed in this study.

Global communications today are sophisticated enough to allow a far-flung enterprise to be managed from a single location, and home-country nationals almost always dominate senior management.<sup>32</sup> Nearly all US MNEs are headquartered in New York, Los Angeles, or other major US cities, and their directors, top managers, skilled engineers, and research personnel are predominantly US citizens. The nationality-neutral global firm is a vision for the mid-21st century, not a reality today.

What is the link between headquarters location and RD&E expenditures? From a US vantage point, the question has become more relevant in light of the dominant role of MNEs in funding private RD&E.<sup>33</sup> The record indicates that RD&E spending of OECD-based MNEs is becoming more international.<sup>34</sup> However, outlays by US MNEs for RD&E per-

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31. Inversions typically involve only a change of form with no significant change in the operational or managerial functions of the inverted group. See appendix A5 and Hufbauer and Assa (2003).

32. The nomination of three foreigners to the board of Samsung Electronics in 2002 was “mainly to imply an acceptance of international financial standards and practices and to make itself look and operate like a Western-style multinational” (*Fortune*, April 1, 2002, 89–92). See also *Los Angeles Times*, June 2, 1994, 1, reporting that only a handful of Japanese companies then had foreigners on their management committees. Sony had Americans, but NEC, Matsushita, Toyota, and dozens of other Japanese companies that depend on the US marketplace made it clear to their foreign nationals in the 1990s that a glass ceiling limited their advancement to top slots. This attitude is gradually changing; for example, Carlos Ghosn, a French-educated Brazilian born to Lebanese parents, has headed Nissan since 2001.

33. In the 1960s and early 1970s, the US federal government funded between three-fifths and two-thirds of RD&E spending in the United States. Private RD&E spending exceeded federal spending around 1979 and now constitutes about two-thirds of total RD&E spending in the United States.

34. RD&E is still highly concentrated geographically in large countries with high levels of per-capita income and a deep reservoir of technological competence, such as the United States, the United Kingdom, France, and Japan. China and India are exceptions among developing countries. The United States is the leading destination for off-shore RD&E, and as

formed abroad are only 3.5 percentage points higher than their share in 1975 (table 5.4). The so-called outsourcing of RD&E is also far less impressive than the increase in RD&E performed in the United States by US affiliates of foreign firms: In 2004, US MNEs devoted about \$27.5 billion to RD&E expenditures abroad, but US affiliates of foreign parents managed a \$33 billion budget for RD&E expenses in the United States, almost 15 percent of total US private RD&E expenditures conducted within the United States and abroad.

Firms that outsource RD&E often face a trade-off between lower costs and better relations with foreign governments on one hand and greater concern over the protection of intellectual property on the other. Consequently, many managers take a selective approach to RD&E outsourcing to keep sensitive areas of RD&E at home.<sup>35</sup> The global spread of RD&E facilities may gather steam, as suggested by UNCTAD (2005), but right now it seems like a slow evolution.<sup>36</sup> Sustaining US leadership in RD&E over the long term, however, requires efforts to prop up enrollments in graduate science and engineering programs, plus ample visas for foreign scientists and engineers to enter the United States and easy green cards for them to stay. It also requires, we think, a more friendly tax climate in the United States for RD&E—a core concern of this book.

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a result it has emerged as a net recipient of RD&E expenditure performed abroad by all MNEs. In 1987 RD&E performed by US affiliates of foreign firms accounted for about 7 percent of all RD&E financed and performed in the United States; in 2004 that figure had increased to almost 15 percent (see chapter 5, table 5.4).

35. The pharmaceutical industry illustrates the dynamics of RD&E outsourcing in an industry sensitive to intellectual property rights. Leading firms have already established RD&E centers in China and India, but these centers are often engaged in routine activities rather than path-breaking science.

36. UNCTAD (2005) notes that RD&E activity abroad is moving beyond mere adaptation of products for the local market to more challenging quests.

