GLOBALIZATION AND EXTERNAL IMBALANCES

External current account deficits or surpluses in some major economic areas—notably the United States and Asia—have reached record-high levels, and expectations are that they will stay large or increase for some time. Many observers, including IMF staff, have expressed concern that corrections to sustainable levels will likely require large exchange rate adjustments, especially against the U.S. dollar, with possibly disruptive effects on global financial markets and economic activity.[1] In contrast, other observers are less concerned, arguing that a benign resolution of global imbalances is likely with today's deep economic and financial integration.[2]

Some recent developments suggest that globalization—the increasingly global dimension of economic and financial transactions—has changed the environment for external imbalances and their adjustment. For instance, it may be argued that larger external current account deficits or surpluses are the natural outcome of the increased scope for cross-border trade in financial assets, and that higher trade openness and greater competition worldwide are likely to have facilitated adjustment of global imbalances. However, globalization has also brought new challenges and risks. Larger external positions raise economies' exposure to financial market disturbances, increasing the risks associated with an abrupt realignment in investors' expectations. Finally, the relationship between globalization and external adjustment can be more ambiguous than suggested by casual observation. Some aspects of globalization—including, for example, more specialization in production—may, at least in theory, hinder rather than facilitate adjustment.

Against this background, this chapter will examine implications of globalization for external imbalances and their adjustment. The relationship between globalization and external imbalances is complex and encompasses many aspects. For tractability, the chapter will focus on aspects that are particularly relevant from the perspective of the unwinding of current imbalances, and the related risks. To this end, it is organized in three parts.

- The first part discusses the rapid expansion of two-way capital flows and the corresponding increases in gross external asset and liability positions and then examines the implications. The chapter finds that these developments have contributed to an environment in which large current account surpluses or deficits can emerge and be sustained and argues that this can be helpful insofar as it allows for gradual rebalancing. Moreover, while economies' exposure to market and exchange rate changes has increased with larger gross external positions, these valuation effects can, perhaps paradoxically, to some extent facilitate external adjustment among industrial countries, as they are, in effect, wealth transfers from countries with appreciating currencies to countries with depreciating currencies. The chapter notes, however, that these benefits could turn into a liability if policies are not consistent with a credible medium-term policy framework aimed at external and internal balances, as expectations may not be well anchored. In this case, investor preferences

[1]See "How Worrisome Are External Imbalances?" Chapter II, *World Economic Outlook,* September 2002, and Obstfeld and Rogoff (2001, 2004).

[2]See Cooper (2001, 2004).

may quickly change and the fallout from disruptive financial market turbulence would likely be more elevated than it had been.

- In the second part, the chapter turns to real globalization and examines how a broad fall in trading costs has affected the magnitudes, composition, and direction of trade flows as well as other key determinants of external adjustment. It finds that trade shares have increased and the global distribution of trade flows has become more equal, as emerging markets have become more integrated, but it notes that the empirical evidence on how real globalization has affected price and demand elasticities of trade flows is inconclusive.
- In the third part of the chapter, simulations of the IMF's new multicountry Global Economic Model (GEM) are used to analyze the combined effects of real and financial globalization on the adjustment of external imbalances. The chapter finds that real and financial globalization should generally facilitate global rebalancing, provided financial conditions remain benign, reflecting, among other factors, the better burden sharing implied by the more even distribution of trade flows across the globe. It also shows, however, that globalization has not fundamentally changed the nature of adjustment, nor the magnitudes involved, and that larger net foreign asset positions raise the potential risks associated with unexpected changes in investor preferences.

Overall, the chapter concludes that policymakers need to be very mindful of the risks associated with global imbalances, while at the same time taking advantage of the scope that globalization provides to facilitate adjustment.

At the outset, two points should be noted.

- The chapter adopts a broad notion of globalization, its causes, and its impact. In particular, while using as a starting point the narrow definition of an acceleration in the pace of growth of international trade in goods, services, and financial assets relative to the rate of growth in domestic trade, the chapter also considers phenomena such as the integration of emerging market economies, greater competition, or reduced exchange rate pass-through, which—while related to globalization—also reflect other factors, including more credible monetary policy frameworks.
- The chapter is not intended to cover the specific policies needed for the orderly resolution of current imbalances, which are discussed in Chapter I, or how the current imbalances have emerged (see Chapter II, *World Economic Outlook*, September 2002, and Hunt and Rebucci, 2003, for recent discussions). Moreover, it focuses mostly on industrial and key emerging market countries that are highly integrated and likely to play a major role in the rebalancing.

Financial Globalization

Financial globalization—the global integration of capital markets—has accelerated noticeably since the early 1990s, as illustrated, for example, by the rapid simultaneous increase in many countries' foreign assets and liabilities (Figure 3.1).[3] The trend toward larger external assets and liabilities has been particularly relevant for industrial countries, where, relative to output, both average external assets and liabilities about tripled between 1990 and 2003, reaching levels of more than 200 percent by the end of the period.[4] While the broad trend for emerging market countries has been similar, average increases for these countries have been smaller since the mid-1990s and, on a global scale, their gross external positions remain relatively small compared with those of industrial countries (Table 3.1).

[3]See Lane and Milesi-Ferretti (2003, 2005a). There are other measures of financial globalization, including price-based measures or the correlation between saving and investment. See Obstfeld and Taylor (2004) for empirical evidence based on other measures that suggest similar broad trends.

[4]The data on gross foreign assets and liabilities used in this chapter are taken from the latest version of the database developed by Philip Lane and Gian Maria Milesi-Ferretti (and used in Lane and Milesi-Ferretti, 2005b).

The recent bout of financial globalization is partly associated with the decline in information processing and dissemination costs that have fostered cross-border trade in an expanding variety of financial instruments through decreasing transaction costs (Figure 3.2). Domestic and external financial liberalization have played a major role since the early 1970s when the current era of financial globalization began after a long period of financial disintegration (see Box 3.1 for a comparison of the current era of globalization with earlier ones).[5] Finally, real and financial globalization tend to stimulate each other. Increased trade flows, for example, tend to lead to larger gross capital flows, reflecting trade finance, among other factors.

This section will examine two issues related to the surge in international financial transactions. First, it will analyze whether investors' increased incentives for international portfolio diversification have reduced the extent to which financial markets still restrict net international borrowing (the financing need associated with current account deficits) and net foreign liabilities (the corresponding stock measure). Second, it will investigate the extent to which larger holdings of foreign assets and liabilities expose investors to greater valuation risks and what this means for external adjustment.

While data on external assets and liabilities have greatly improved so that more systematic empirical analysis is possible compared with some 10 years ago, important caveats nevertheless remain (see Box 3.2 on data issues).

Globalization and Net Foreign Assets

Traditionally, investors place the bulk of their financial wealth in domestic assets despite more favorable risk-return profiles—before transaction costs and taxes—of globally diversified portfolios

[5]See, among others, Edey and Hviding (1995) or Williamson and Mahar (1998). The end of the Bretton Woods regime of fixed but adjustable exchange rates also contributed, as trade in foreign exchange and related instruments began to spiral with floating rates.

Figure 3.1. Financial Globalization Trends, 1970–2003
(Percent of GDP)

Global financial market integration has proceeded rapidly, especially in industrial countries, since the early 1990s.
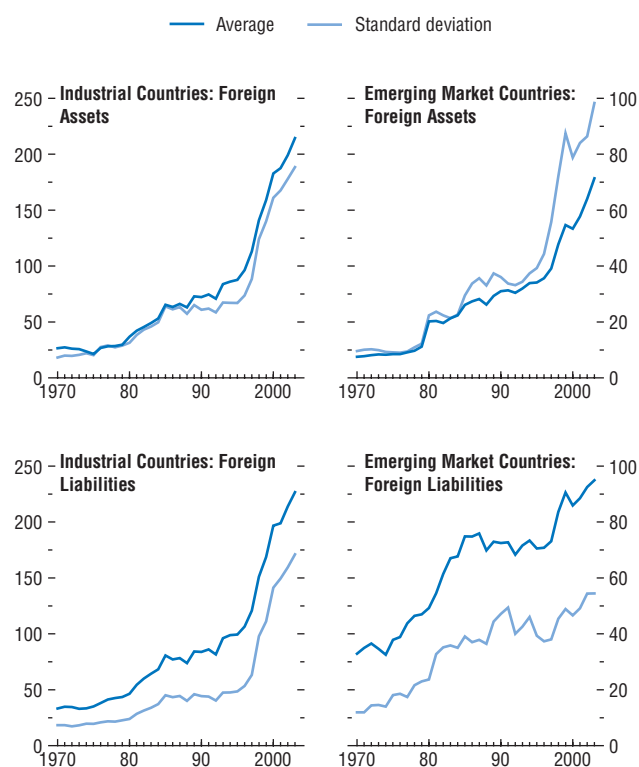
Sources: IMF, *International Financial Statistics;* IMF, *Balance of Payments Statistics;* Lane and Milesi-Ferretti (2005b); and IMF staff calculations.

Table 3.1. Gross Assets and Liabilities, 1980–2003
(Billions of U.S. dollars, excluding foreign assets held by central banks)

	1980	1985	1990	1995	2000	2003
External Assets						
Industrial countries	**2,287**	**3,975**	**9,701**	**15,334**	**26,810**	**36,039**
North America	668	1,310	2,331	4,107	7,914	8,454
United States	584	1,185	2,119	3,754	7,265	7,680
Europe	1,474	2,232	5,522	8,659	16,066	24,311
France	203	265	722	1,292	2,323	3,317
Germany	216	308	1,017	1,579	2,504	3,867
United Kingdom	519	838	1,695	2,342	4,400	6,293
Asia and Pacific	145	433	1,848	2,568	2,830	3,273
Japan	134	410	1,778	2,445	2,605	2,922
Emerging markets and other developing countries	**114**	**193**	**366**	**711**	**1,479**	**1,849**
Emerging Asia	28	72	166	384	948	1,193
China	. . .	18	25	47	225	273
Korea	4	7	17	58	103	127
Malaysia	4	7	5	13	39	53
Thailand	1	2	7	14	22	23
Latin America	55	80	126	214	325	386
Argentina	4	5	6	3	3	2
Brazil	10	19	29	51	74	96
Mexico	9	21	37	50	45	30
Others	31	42	74	113	206	270
External Liabilities						
Industrial countries	**2,485**	**4,186**	**10,531**	**16,139**	**28,419**	**39,039**
North America	708	1,464	2,909	4,849	9,741	11,452
United States	525	1,206	2,459	4,274	8,965	10,476
Europe	1,578	2,311	5,835	9,096	16,386	24,790
France	193	306	845	1,385	2,214	3,247
Germany	224	289	751	1,535	2,534	3,794
United Kingdom	508	755	1,762	2,426	4,497	6,429
Asia and Pacific	198	411	1,787	2,194	2,293	2,797
Japan	147	307	1,529	1,812	1,808	1,979
Emerging markets and other developing countries	**552**	**905**	**1,298**	**2,378**	**3,527**	**4,208**
Emerging Asia	138	284	493	1,125	1,626	2,116
China	. . .	27	77	255	479	659
Korea	33	59	55	147	195	293
Malaysia	12	31	31	81	101	115
Thailand	10	20	41	138	116	111
Latin America	267	395	492	819	1,247	1,310
Argentina	29	54	70	144	236	192
Brazil	90	121	153	241	403	420
Mexico	66	108	134	230	309	362
Others	147	226	313	435	654	782

Sources: Lane and Milesi-Ferretti (2005b); IMF, *International Financial Statistics,* and IMF staff calculations.

(the so-called *home bias* in asset holdings).[6] Clearly, with globalization, opportunities for international diversification have improved, as important obstacles, such as high cross-border transaction and information costs or regulatory barriers, have been reduced.[7] One would therefore expect that the home bias has decreased at the global level.

[6]Since asset returns are only partially correlated across countries, investors may reduce risks that are specific to their home country with international diversification (e.g., Solnik, 1974, or Obstfeld and Rogoff, 1996).

[7]Explanations of the home bias focus on factors reducing the incentives for international diversification, including high transaction costs in cross-border transactions compared with domestic transactions, problems of cross-border information dissemination, differences in regulatory regimes and regulatory barriers (e.g., regulations restricting foreign investment by pension funds), and differences in consumption baskets, owing to the presence of transport costs (nontraded goods), but

The decline in home bias matters for external imbalances and their adjustment because it determines the extent to which desired current account balances[8]—which depend on factors such as productivity growth differentials or demographic changes—are accommodated by international financial markets.[9] If home bias is strong, global demand for foreign assets will be low and price-inelastic. Large issuers of foreign liabilities will thus face high yields; this will discourage net external borrowing, and actual current account balances will likely be smaller than desired ones. On the other hand, if home bias is small, demand for foreign assets will be higher and more price-elastic, and larger net external liabilities will be less costly. That said, net external borrowing will remain limited by solvency considerations: countries need to be able to amortize external liabilities.

Over the past two decades, there is clear evidence that the home bias has declined and that restrictions on net external borrowing have eased.[10]

- Portfolio holdings of foreign bonds and equity in some major industrial countries, such as Canada, Germany, Japan, and the United Kingdom, have clearly increased compared with domestic market capitalization (Table 3.2).
- External current account deficits or surpluses (relative to domestic incomes) have, on

also differences in taste. See, among others, French and Poterba (1991), Tesar (1993), Tesar and Werner (1995), Baxter and Jermann (1997), Baxter, Jermann, and King (1998), or Obstfeld and Rogoff (2001).

[8]Defined as current account balances that would prevail with no restrictions on international capital market access and an infinitely elastic supply of capital.

[9]Financial globalization is a necessary condition for larger current account deficits or surpluses but not necessarily a main cause. For example, international risk diversification alone may not generate net external borrowing or lending: domestic investors can acquire foreign equity with the proceeds from selling domestic equity to foreign residents. Gross capital flows will increase, but inflows are exactly matched by outflows.

[10]Evidence on the degree of remaining restrictions is broadly similar for other measures. See also footnote 3.

Figure 3.2. Determinants of Financial Globalization

Decreasing communication and information costs and reduced restrictions on capital flows have fostered financial globalization.
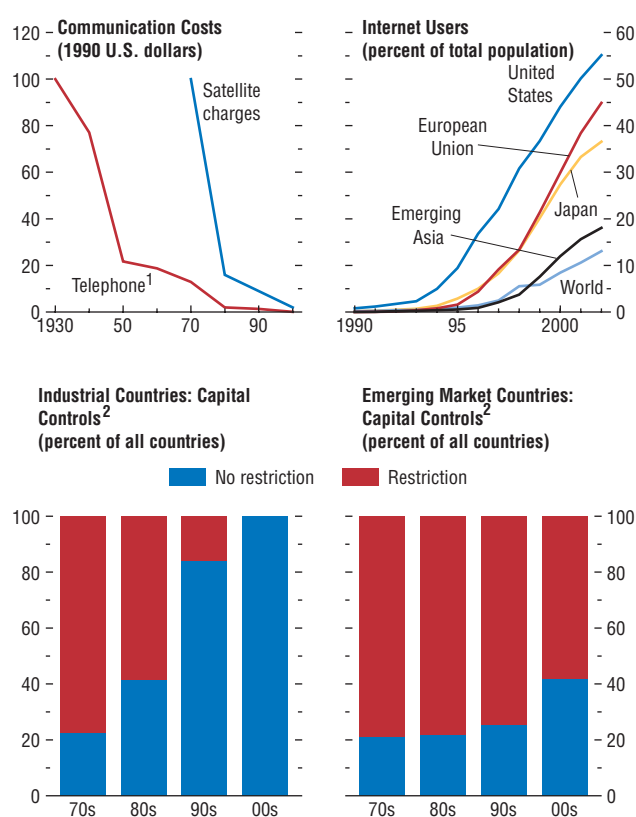
Sources: Busse (2003); IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions* (2004); World Bank, *World Development Indicators;* and IMF staff calculations.
[1]Cost of a three-minute phone call from New York to London.
[2]Restrictions on international financial transactions.

Table 3.2. Overseas Portfolio Investment
(Percent of domestic market capitalization)

	1970	1975	1980	1985	1990	1995	2000	2003
Canada								
Portfolio investment	2.0	1.9	2.1	2.4	6.0	12.9	18.7	14.3
Equity	3.1	3.2	3.6	3.5	9.6	25.4	29.3	21.2
Bonds	0.7	0.6	0.4	1.3	1.9	2.2	3.2	3.6
Germany								
Portfolio investment	4.9	2.4	2.7	5.8	10.2	14.5	30.0	31.1
Equity	. . .	. . .	. . .	. . .	. . .	16.9	37.8	42.1
Bonds	. . .	. . .	. . .	. . .	. . .	13	23.0	25.7
Japan								
Portfolio investment	. . .	1.3	2.0	6.9	10.7	12.1	13.6	16.7
Equity	. . .	. . .	. . .	. . .	2.2	4.0	8.3	9.9
Bonds								
United Kingdom[1]								
Portfolio investment	9.5	8.6	11.4	27.5	34.0	37.1	42.6	48.1
Equity	. . .	. . .	. . .	. . .	33.1	33.5	40.9	52.4
Bonds	. . .	. . .	. . .	. . .	35.6	43.4	46.4	42.1
United States								
Portfolio investment	1.5	2.1	2.3	2.2	3.5	6.4	7.8	7.4
Equity	0.8	1.1	1.3	2.0	5.6	9.3	10.5	12.7
Bonds	2.7	3.1	3.3	2.4	2.1	3.5	3.8	2.3

Sources: Tesar and Werner (1995); Lane and Milesi-Ferretti (2005b); IMF, *Balance of Payments Statistics;* national flow of funds and balance sheet statistics; and IMF staff calculations.

Note: This table extends Table 2 in Tesar and Werner from 1990 to 2003 using similar but not necessarily identical data sources, replacing 1990 values with new data if available.

[1]1991 values rather than 1990.

average, increased while their dispersion across countries has widened in industrial countries and, to a lesser extent, in emerging market countries (Figure 3.3).

- Net external positions have, on average, widened also, as has their dispersion on account of the larger and more persistent current account deficits and surpluses.

A simple way to quantify the decline in home bias is to compare each country's actual share of foreign portfolio assets in its total portfolio asset holdings with the share of other countries' assets in the world total of assets (the world market portfolio). If the former is smaller than the latter, there is a home bias according to the so-called international capital asset pricing model (ICAPM).[11] While some of the underlying assumptions are clearly unrealistic, the model nevertheless provides useful benchmarks. The calculations shown in Table 3.3 suggest that between 1990 and 2003, the home bias in bond and equity portfolio holdings of most major industrial countries—except Japan[12]—has declined but not disappeared. This assessment is obviously tentative, given that the underlying evidence is model-specific and limited to patterns in major industrial countries only. Nevertheless, the broad conclusion is similar to that reached in other recent studies.[13]

[11]The ICAPM implies that investors should allocate their risky assets in proportion to the world market portfolio in equilibrium since other allocations involve idiosyncratic risks for which investors will not be compensated. See, among others, Adler and Dumas (1983), Branson and Henderson (1984), and Harvey (1991).

[12]In Japan, the home bias has increased despite the increase in the actual share of foreign assets, as the benchmark share implied by the ICAPM has risen even faster because of the relative decline of Japan's share in the world market portfolio.

[13]See, among others, Obstfeld (2004), Lane and Milesi-Ferretti (2004a), and Engel and Matsumoto (2004). In contrast, Heathcote and Perri (2004) argue that the home bias is much smaller than widely thought because their model implies a lower optimal allocation of financial wealth in foreign assets compared with other models.

Table 3.3. Portfolio Diversification: Actual Foreign Shares and Benchmark Foreign Shares Implied by Other Countries' Share in World Market Portfolio
(Percent)

	Equity				Bonds	
	1990	1995	2000	2003	2000	2003
Canada						
Actual	9.0	20.6	25.5	19.3	4.0	4.5
Benchmark	97.4	97.9	97.4	97.5	97.8	98.1
Germany						
Actual	13.2	13.6	23.9	26.3	20.6	22.9
Benchmark	96.2	96.8	96.1	97.1	92.7	92.2
Japan						
Actual	2.2	4.2	9.1	10.6	14.8	15.1
Benchmark	69.0	79.4	90.2	90.9	82.2	83.8
United Kingdom						
Actual	29.5	30.1	38.4	45.7	62.0	69.4
Benchmark	91.0	92.1	92.0	92.0	95.9	95.4
United States						
Actual	5.7	9.1	10.4	12.5	4.6	3.0
Benchmark	67.5	61.4	53.1	52.8	54.4	59.6

Sources: Lane and Milesi-Ferretti (2005b); IMF, *Balance of Payments Statistics Yearbook* and *Global Financial Stability Report,* various issues; national balance sheet statistics; Standard and Poors' *Emerging Markets Factbook,* various issues; and IMF staff calculations.

Note: The home bias can be gauged from the difference between actual shares of foreign assets in total asset holdings and the benchmark shares. Actual foreign shares are calculated as foreign securities held as a share of total securities held by domestic investors in each category. Benchmark foreign shares are based on foreign countries' share in total world market capitalization.

If risk diversification is an important motive for investors, one would expect that diversification across markets will be broad based. According to the ICAPM discussed earlier, investors should allocate their foreign assets across countries according to their shares in the world market portfolio. Table 3.4 compares major industrial countries' actual foreign equity allocations across countries with ICAPM benchmark allocations, taking the overall home bias as given.[14] The results suggest that diversification patterns are indeed broad based. However, as the example of European countries

[14]The results are based on data from the 1997 and 2002 *Coordinated Portfolio Investment Survey* conducted under the auspices of the IMF. The general lack of long time-series data prevents extensive historical analysis. Geographical patterns in holdings of long-term bonds are broadly similar.

Figure 3.3. External Current Account Balances and Net External Positions, 1970–2003
(Percent of GDP; absolute values)

On average, external current accounts and net foreign assets have increased in industrial and emerging market countries, suggesting that restrictions on net external borrowing and lending have eased.
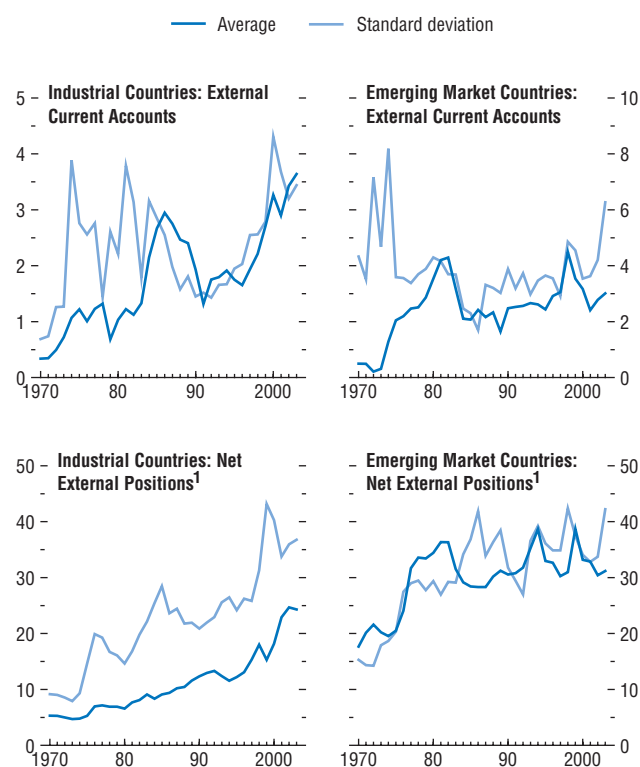
Sources: IMF, *International Financial Statistics;* IMF, *Balance of Payments Statistics;* Lane and Milesi-Ferretti (2005b); and IMF staff calculations.
[1]Net foreign assets as a percent of GDP.

Table 3.4. Geography of Cross-Border Portfolio Equity Holdings
(Percent of total foreign portfolio equity holdings; second row contains benchmark shares implied by international capital asset pricing model)

Destination	United States 1997	United States 2002	Canada 1997	Canada 2002	Japan 1997	Japan 2002	Euro area 2002	Germany 2002	United Kingdom 1997	United Kingdom 2002
							Source			
United States	. . .	. . .	49.3	56.9	54.9	51.5	42.2	14.7	25.5	27.2
	. . .	. . .	50.2	48.4	54.1	52.0	55.3	48.7	53.5	51.3
Canada	5.9	5.0	. . .	. . .	1.5	1.4	0.4	—	0.8	—
	4.8	4.7	. . .	. . .	2.7	2.7	2.9	2.5	2.7	2.7
Japan	11.3	12.2	6.0	6.6	. . .	. . .	6.8	2.3	13.6	10.1
	18.8	17.2	9.8	9.3	. . .	. . .	10.6	9.4	10.5	9.9
Euro area	31.2	26.8	13.5	13.3	16.6	16.0	. . .	64.0	35.4	32.5
	24.9	27.5	13.0	14.9	14.1	16.0	. . .	11.9	13.9	15.8
Germany	5.4	2.9	. . .	. . .	5.5	2.3	. . .	. . .	6.4	4.4
	7.0	5.6	3.7	3.0	3.9	3.2	. . .	. . .	3.9	3.2
United Kingdom	18.0	23.9	1.2	11.0	11.9	12.6	23.0	10.3	. . .	. . .
	16.9	15.1	8.9	8.2	9.6	8.8	9.3	8.2	. . .	. . .
Industrial countries	79.2	78.5	87.5	93.2	91.2	87.3	92.7	97.9	87.7	80.9
	77.3	75.6	88.1	86.8	87.2	85.9	85.0	86.6	87.3	86.0

Sources: French and Poterba (1991); IMF, Coordinated Portfolio Survey database; Standard and Poors' *Emerging Stock Markets Factbook,* various issues; and IMF staff calculations.

Note: U.S. investors' holdings of Canadian equity amounted to 5.9 percent of their total foreign holdings in 1997. The benchmark allocation predicted by the ICAPM for a given total foreign allocation would have been 4.8 percent.

shows, forces of "gravity" are also relevant. Allocations to closely located countries or regions tend to exceed benchmark allocations, reflecting, among other factors, merchandise trade patterns and the fact that shorter distances and cultural similarities appear to facilitate financial transactions, possibly through their effects on transaction costs and information asymmetries.[15]

Despite growing U.S. net external liabilities, European countries tend to hold less U.S. equity than implied by the international capital asset pricing model benchmark. More generally, unlike in the 1980s, the share of U.S. portfolio equity liabilities in total foreign portfolio equity assets of other countries has been somewhat below ICAPM benchmarks in recent years (see also Bertaut and Kole, 2004). These observations suggest that more international financial diversification has led to increased gross capital inflows to the United States (in U.S. dollar terms)—given greater overall flows at the global level—but not to such an extent that investors are now overweight in U.S. equity (or bonds).[16]

[15]The so-called gravity model of international trade suggests that, everything else being equal, neighboring countries tend to have closer trade linkages than more distant countries (see Chapter II, *World Economic Outlook,* September 2002, for a more detailed discussion). Recent research has found that trade-style gravity equations also perform well in explaining bilateral investment patterns if augmented with financial market-specific variables (see Bertaut and Kole, 2004; Faruqee, Li, and Yan, 2004; and Lane and Milesi-Ferretti, 2004a).

[16]This could suggest that the United States has become a relatively less attractive destination for foreign investors for at least two reasons. First, with the weakening of business cycle linkages among major economic areas during the 1990s return correlations declined compared with the 1980s. This, in turn, has made broad-based diversification more attractive (see Heathcote and Perri, 2004). During the 1980s, diversifying internationally with U.S. assets only was perhaps more attractive, given (1) deep and well-developed U.S. markets and (2) smaller benefits of more broad-based diversification because of higher cross-country return correlations. Recently, however, return correlations have again increased. Second, on the supply side, other securities markets have developed rapidly, as manifested in the growth of outstanding issues, notably in the euro area. This has also increased the scope for broad-based diversification.

Naturally, these observations are based on the behavior of portfolio investment flows only, and general conclusions about the future willingness of investors to hold U.S. assets cannot be drawn.

Analyzing the long-run relationship between real interest rates on long-term government debt—a benchmark for rates of return in a country—and overall net external positions provides a useful complementary perspective. With home bias in asset demand, investors should only be willing to increase the share of foreign assets in their wealth if they are compensated with increasing returns. Accordingly, real interest rates in countries with net external liabilities should, on average, be higher than in countries with net external assets, suggesting a negative correlation between real interest rates and net foreign assets.[17] As noted earlier, if the home bias broadly declines, such portfolio balance effects should weaken, and the negative correlation between real interest rates and net foreign positions should decrease in absolute terms. The evidence shown in Figure 3.4 suggests that this has indeed happened. The correlation between the two variables during 1993–2002, while still negative, was clearly smaller than during 1982–92.

Overall, financial globalization has created an environment where net external borrowing and lending are less restricted and where maintaining larger net foreign liabilities appears to involve relatively lower costs. This can be helpful when it comes to external adjustment and global rebalancing. For example, everything else being equal, the United States now appears more likely to be able to sustain larger net foreign liabilities in the long run at a lower cost than, say, some 20 years ago. This could allow for a more gradual adjustment of the same

[17]See Lane and Milesi-Ferretti (2002b) for a recent empirical study presenting similar materials. Real exchange rate changes are another source of return differentials (in the home currency of the investor). See Branson and Henderson (1984) on the portfolio balance approach and the role of home bias therein.

Figure 3.4. Industrial Countries: Long-Term Real Interest Rates and Net Foreign Assets[1]

In industrial countries, during the past decades, the relationship between real interest rates and net foreign assets has weakened, as investors appear more willing to hold foreign assets.
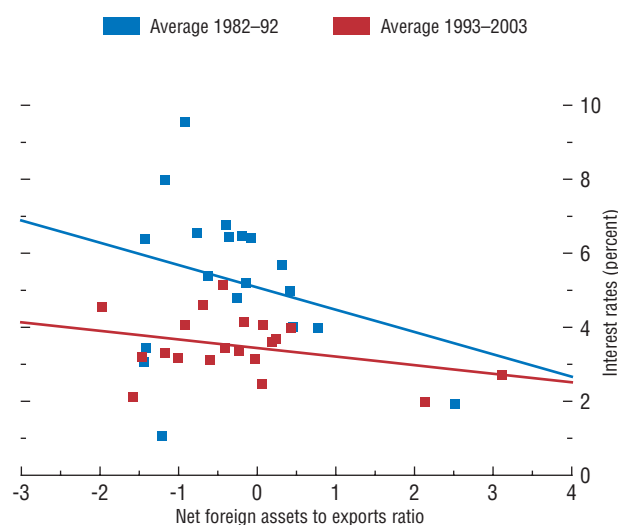
Sources: IMF, *International Financial Statistics;* Lane and Milesi-Ferretti (2005b); and IMF staff calculations.
[1] Real interest rate calculated as nominal long-term interest rate at end of year *t* minus the actual inflation rate at end of year *t* + 1.

Box 3.1. External Imbalances Then and Now

The current environment of globalized financial markets, which began in the 1970s for the advanced countries and in the 1980s for the emerging market countries, had an important precedent in the four decades before 1914—the era of the classical gold standard. Both eras of financial globalization share common features, including large net capital flows, but there are also important differences, including today's much larger two-way capital flows.[1] This box compares salient features of financial globalization during 1870–1914 with those of today, examines whether the large net capital flows in the earlier era represented a global imbalance comparable to that of today, and seeks to establish lessons from the earlier era.

Important common features in both eras of globalization include the following.

• *Large net capital flows and current account deficits and surpluses.* The 50 years before World War I saw massive net private flows of capital from the core countries of Western Europe to recent settlements overseas (mainly the rapidly developing Americas and Australasia). At the peak, the associated current account surpluses in Britain reached 9 percent of GDP and were almost as big in France, Germany, and the Netherlands (see the figure). For the principal capital importers in the late nineteenth century (Argentina, Australia, and Canada),[2] current account deficits exceeded 5 percent of GDP on average. By comparison, over the past two decades, current account surpluses and deficits have been, on average, increasing, as discussed in the main text, but they are still smaller than during the gold standard era, in industrial and emerging market countries alike. Another striking feature of the pre-1914 data is the high persistence in current account imbalances, even when compared with today's relatively persist-
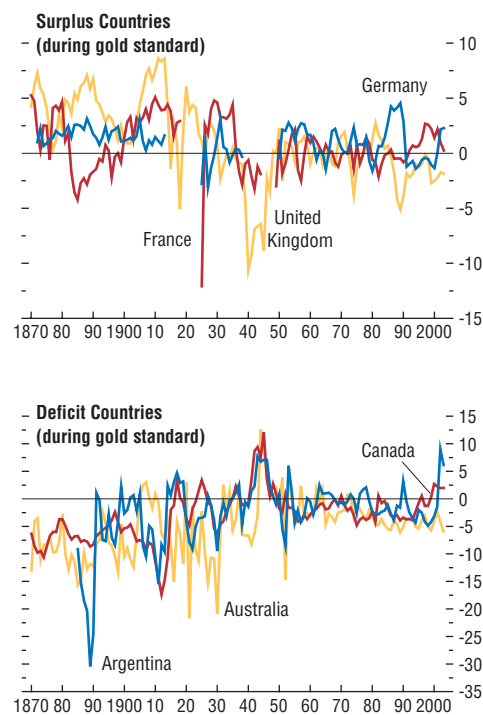
Note: The main author of this box is Michael Bordo.
[1]See Bordo, Eichengreen, and Kim (1998), and Obstfeld and Taylor (2004).
[2]Earlier in the century, the United States experienced similar net inflows but by the end of the nineteenth century, the country began running current account surpluses.

Current Account Balances
(Percent of GDP)

Sources: Obstfeld and Taylor (2004); and IMF staff calculations.

ent ones (Bordo, Eichengreen, and Kim, 1998; and Obstfeld and Taylor, 2004).

• *Current account reversals.* Although current account imbalances were generally more long-lived in the pre-1914 era than in the recent period, they were punctuated in some countries by severe reversals, especially in the crisis-ridden 1890s (Bordo and Eichengreen, 1999). Current account reversals have reemerged in today's era of financial globalization. In fact, Bordo and others (2001) argue that the total incidence of financial crises has been greater during the post–Bretton Woods period than during the earlier period, although the output losses from crises were somewhat larger pre-1914.

There are also important differences between the two eras.

- *Distribution of current account deficits and surpluses.* Under the gold standard, countries of new settlement—the emerging markets of the time—ran current account deficits while the major European economies had surpluses. In the current era, core industrial countries run either persistent deficits or surpluses, with domestic saving-investment imbalances redistributed primarily among industrial countries rather than from the core to the periphery as in the earlier era.
- *Gross external positions are generally larger today.* Gross external positions were very close to net positions before 1914—that is, net creditors had large foreign asset positions whereas net debtors had large liabilities. In contrast, most major industrial countries today are both major creditors and debtors irrespective of their net position. The earlier pattern reflects the prevalence of long-term investment by the core countries in the countries of new settlement, seeking higher returns by financing railroads and other infrastructure as well as budget deficits (especially in the form of bonds but also in the form of foreign direct investment). The substantial growth of two-way flows between advanced countries since 1980 has been associated with both international financial diversification and intertemporal consumption smoothing, as discussed in the main text.
- *The adjustment mechanism is different.* The historical record shows that adjustment to the significant and persistent external imbalances in the pre-1914 era occurred largely through the Humean price-specie-flow mechanism of the classical gold standard (Bordo, 1984). Gold flows ensured that equilibrium was restored through changes in money supplies, the terms of trade, and real exchange rates. In contrast, the global economy is now on a managed floating exchange rate regime, and external adjustment depends no longer on gold flows but on changes in exchange rates and international reserves, along with relative price movements, short-term capital flows, and valuation effects (see Obstfeld, 2004).

Despite the fact that external imbalances were often larger and more persistent before 1914 than they are today, contemporaries in the earlier era did not view this as a problem for two broad reasons. First, they strongly believed that except in extreme situations (e.g., wars) the adjustment mechanism described above would always be stabilizing. Second, the nature of foreign investment was quite different. Most of the long-term flows were to countries with abundant natural resources and land on the one hand, and scarce labor and capital on the other. Returns on labor and capital were thus higher than in the more developed countries, with excellent prospects of sustained rapid long-term growth. The activities financed tended to be those in which information asymmetries could be most easily overcome: railroads and government (Bordo, Eichengreen, and Irwin, 1999). Many recipient countries tended to have sound institutions and sound fiscal fundamentals, further reducing the likelihood of default, and many adhered to the gold standard, which served as a signal of fiscal rectitude ("a Good Housekeeping seal of approval" (Bordo and Rockoff, 1996)). In addition, many recipient countries were part of the British Empire, with a de facto British government guarantee that virtually eliminated country risk. That said, not all of the recipients of foreign capital had such sound fundamentals. Many of the countries of peripheral Europe and Latin America were prone to fiscal and monetary instability. Their record of defaults and currency crises often attenuated the capital flows.

The large gross external asset positions among today's advanced countries with floating exchange rates have little precedence in the past, which suggests that exposure to market and exchange rate risks during external adjustment may be quite different. Nevertheless, with large imbalances in both eras of financial globalization, the earlier era may still provide relevant lessons. Most prominently, the generally remarkably smooth adjustment among the countries adhering to a stable and credible nominal anchor—the gold standard—underscores the important role of well-functioning and credible nominal anchors and sound financial policies in facilitating external adjustment.

Box. 3.2. **Measuring a Country's Net External Position**

The net external position of a country is the difference between the country's external assets—the claims of a country's residents on nonresidents—and its external liabilities—the claims of nonresidents on residents. These claims are divided in broad categories, which correspond to those in balance of payments statistics: foreign direct investment; portfolio equity securities; portfolio debt securities; other assets and liabilities (such as bank loans, trade credits, and currency deposits); and financial derivatives.[1] A country's claims on nonresidents also include the reserve holdings of the central bank, which are classified separately. Gross external debt is given by the sum of portfolio debt liabilities, debt liabilities in the direct investment category, and other liabilities.

Until a few years ago, data on external assets and liabilities (the so-called International Investment Position, or IIP) were reported by most industrial countries and few emerging markets. In recent years the number of reporting countries has increased exponentially and now totals about 100 (even though coverage for newly reporting countries is typically limited to the most recent period). The data used in this chapter, constructed by Lane and Milesi-Ferretti (2001, 2005b), combine country estimates of external assets and liabilities (as reported in their IIP) with estimates from alternative sources (such as the World Bank's debt database for external debt liabilities) or based on cumulative capital flows with appropriate valuation adjustments. The data cover 87 countries, including virtually all advanced

and emerging economies, for the period 1970–2003.[2]

How do valuation adjustments work? For example, in the absence of information on foreigners' holdings of domestic equities, these can be approximated by cumulative net foreign purchases of domestic equity (which can be obtained from the widely available balance of payments data), adjusted each year for the change in the value of existing liabilities due to fluctuations in stock prices and exchange rates. These fluctuations in value, which can be approximated by the variation in a domestic stock price index, are not reported as investment returns in balance of payments statistics, which for equities only record the flow of dividends.[3]

As external assets and liabilities grow, these valuation changes become quantitatively very important—indeed, as discussed in the text, the relationship between the current account and the dynamics of the net external position has substantially weakened in recent years. For example, the U.S. net external position in 2003 was broadly unchanged as a ratio of GDP, since the large current account deficit was offset by a correspondingly large valuation gain, generated by increased dollar values of U.S. foreign assets as the dollar depreciated.

Valuation changes for portfolio equity and FDI can be particularly large. For example, between end-1998 and end-1999 the stock of

Note: The main author of this box is Gian Maria Milesi-Ferretti.

[1]The FDI category reflects a "lasting interest" of an entity resident in one economy in an enterprise resident in another economy (IMF, 1993). This includes greenfield investment as well as significant equity participation (typically set at above 10 percent), while remaining holdings of equity securities are classified under portfolio equity investment. This implies that in certain cases the distinction between these two categories can be blurred.

[2]A significant earlier contribution is Sinn (1990), who constructs estimates of external assets and liabilities for the period 1970–87 for an even larger sample of countries.

[3]Estimating valuation adjustments for the foreign assets of a country is a more complex endeavor. A precise calculation would require information on the geographical and currency distribution of the country's claims, which is available for only a few countries and typically for recent years. In the absence of such information, one can for example assume that the geographical distribution of assets follows the country's trade pattern, or, for stock or bond markets, relative market capitalization in the rest of the world.
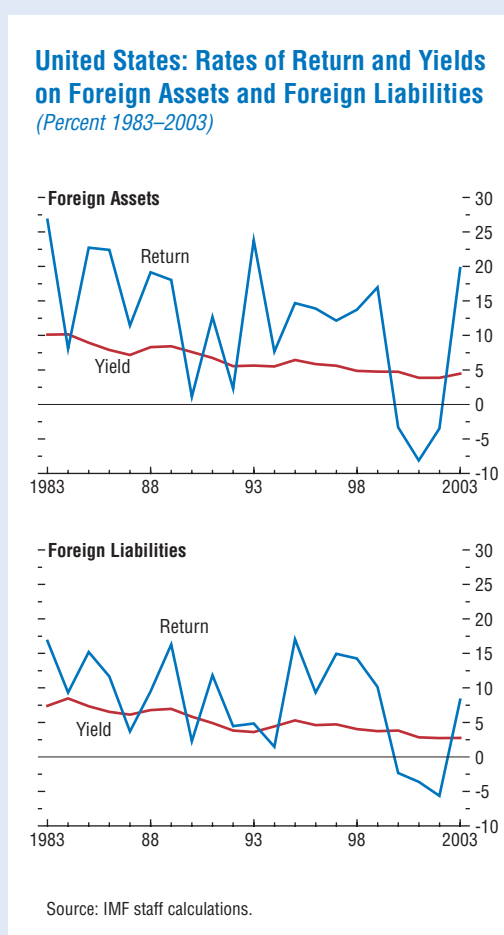
Finnish portfolio equity liabilities increased from about US$80 billion to about US$220 billion, even though net purchases by foreigners during 1999 amounted to only US$10 billion! The underlying cause for this valuation change was the boom in the price of Finnish stocks—particularly Nokia—during 1999.

Particular difficulties are posed by the valuation of foreign direct investment. Most countries report the book value of their direct investment assets and liabilities, while others, such as France, Sweden, and the United States report estimates both at book and at market value. The difference can be significant, especially when corporate valuations change substantially. Finally, coverage of derivatives' contracts in international statistics is still very spotty, thereby limiting our knowledge on the extent of cross-country hedging.

With data on the stocks of external assets and liabilities and the underlying capital flows, it is possible to calculate the rate of return that a country earns on its external assets and pays out on its liabilities. These returns can be calculated by adding the yields on external claims (which are measured as investment income flows in the current account) and the capital gain (which can be approximated by the difference between the change in value of the claim and the underlying capital flow). On average, rates of return are larger and more volatile than yields, reflecting the fact that a significant component of equity returns takes the form of capital gains, rather than dividends (see the figure).

The availability of comprehensive data on external positions has enabled researchers to address a number of important issues in international macroeconomics, including the determinants of long-run net external positions (Lane and Milesi-Ferretti, 2002b), the link between net

United States: Rates of Return and Yields on Foreign Assets and Foreign Liabilities
(Percent 1983–2003)

Source: IMF staff calculations.

external positions and real exchange rates (Lane and Milesi-Ferretti, 2004b), and changes in the extent of international risk sharing (Imbs, 2004; Huizinga and Zhu, 2004). Also, the sum of external assets and liabilities has been used as a volume-based measure of international financial integration when studying the effects of integration on macroeconomic performance (see, for example, Edison and others, 2002; and Prasad and others, 2003).

current account deficit, which could facilitate adjustment in production structures in the United States and other countries and, thereby, reduce the size of the overall exchange rate

adjustment (Obstfeld and Rogoff, 2000). On the other hand, this opportunity could also turn into a liability if macroeconomic policies do not remain consistent with a credible medium-term

Box 3.3. Financial Globalization and the Conduct of Macroeconomic Policies

Macroeconomic policies around the world have improved over the past two decades. The average budget deficit across both industrial and developing countries has declined from approximately 5 percent of GDP during the late 1970s to just over 2 percent of GDP recently. Similarly, with monetary policy increasingly focused on inflation control, inflation rates have been decreasing across the globe.

A widely quoted explanation for these developments is that financial globalization has exerted a disciplinary effect on the conduct of policies, because international capital flows adversely respond to imprudent macroeconomic policies (e.g., Fischer, 1997; or Stiglitz, 2000). This explanation is not universally accepted, however, and some have argued that global financial markets fail to discipline policies (e.g., Rodrik, 2001). Against this background, this box reexamines the foundations of the hypothesis of the disciplinary effects of financial globalization and assesses its empirical merits.

From a theoretical perspective, the incentives for host governments to conduct good policies depend on their rewards and costs. To the extent that good policies attract capital flows that help raise the domestic capital stock, the associated higher output is the reward. The costs of good policies to policymakers are related to political economy considerations. For example, the need to conduct prudent fiscal policy can limit politicians' scope for discretion related to their own narrow interest. If, on balance, the rewards are large enough to offset the costs, globalization will indeed be a disciplinary device. This in turn suggests two conclusions.

- The disciplinary effect of financial globalization may be stronger for some policies and weaker for others. In particular, if prudent fiscal policy exerts higher political economy costs than, say, monetary policy, one would expect the disciplinary effects of globalization to be stronger for monetary policy.

Note: The main author of this box is Irina Tytell.

Financial Globalization and Macroeconomic Policies[1]
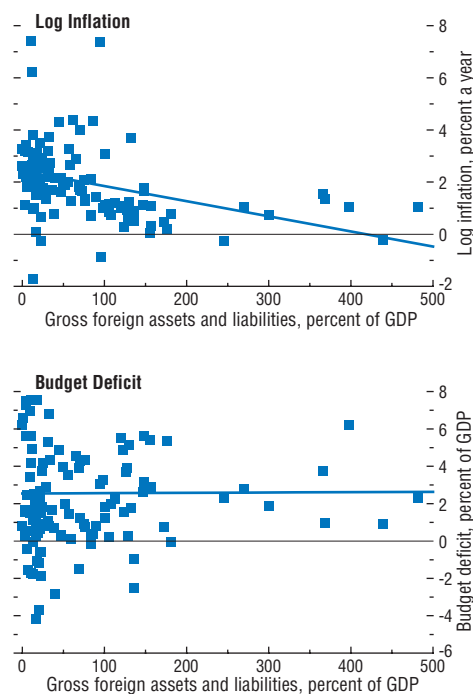
Sources: Tytell and Wei (2004); and IMF staff calculations.
[1]For the period 1990–99.

- A critical issue regarding the benefits of capital flows concerns the possibility of changes in investor sentiments in international capital markets that are reflected in capital flow fluctuations unrelated to policies or developments in the host country. Through their potential to lower the benefits of good policies, they tend to weaken the disciplinary effect on policy conduct.

What does the empirical evidence for the recent era of globalization look like? A simple inspection of the relationship between a measure of financial globalization—the ratio of gross foreign assets and liabilities to GDP—and inflation rates and budget balances suggests the following (see the figure).

- The relationship between inflation and the extent of financial globalization is generally negative.
- The relationship between budget deficits and financial globalization is markedly weaker.

Such bivariate relationships can, of course, be misleading, since they do not control for other determinants of macroeconomic policies or other dimensions of globalization. For a more complete analysis, Tytell and Wei (2004) used two different econometric approaches.[1]

First, inflation rates and budget balances were simultaneously regressed on financial globalization (ratio of foreign assets and liabilities to GDP) and a number of other relevant variables, including indicators of exchange rate flexibility, central bank independence, government fragility and polarization, and trade openness. To isolate the effect of globalization on policies while mitigating problems of reverse causality (and measurement errors), the authors focused on the common component of international capital flows to countries in the same geographic region. The results confirm that the coefficient on financial openness in the inflation equation is negative and statistically significant (although fairly small in magnitude). The same coefficient in the equation for budget balances is statistically insignificant. These results are robust to various alternative specifications, different measures of financial openness, and alternative instrumental variables.

Tytell and Wei also use thresholds to classify policies as "good," "moderate," or "bad," to control for the fact that small fluctuations in inflation rates or budget balances are unlikely to

[1]The study covers a sample of 62 industrial and developing countries, which excludes major oil producers and very small countries.

reflect changes in policymakers' attitudes.[2] This allows an investigation of whether the disciplinary effects differ depending on the economic situation and whether they work by inducing policy shifts between different states rather than affecting policies within a given state. The results lend support to the view that financial globalization has a positive and statistically significant effect on the probability of inflation decreasing from "bad" to "moderate" and from "moderate" to "good" and a negative effect on the probability of inflation increasing from "good" to "moderate." In contrast, the results do not provide support for the view that financial globalization exerts a disciplinary effect on government budgets.

Overall, while plausible from a theoretical perspective, the empirical evidence for the hypothesis that financial globalization exerts a disciplinary effect on the conduct of macroeconomic policies is rather mixed. There does appear to be a significant, albeit small, impact on monetary policy, but little on fiscal policy. This suggests that relying on financial globalization to act as a device for ensuring policy discipline is not enough. It also suggests that other factors must have played a role in the observed improvement of macroeconomic policies, some of which may have been related to globalization, although through channels other than the one discussed here. In this light, Box 3.4 examines the link between globalization and monetary policy from a broader perspective.
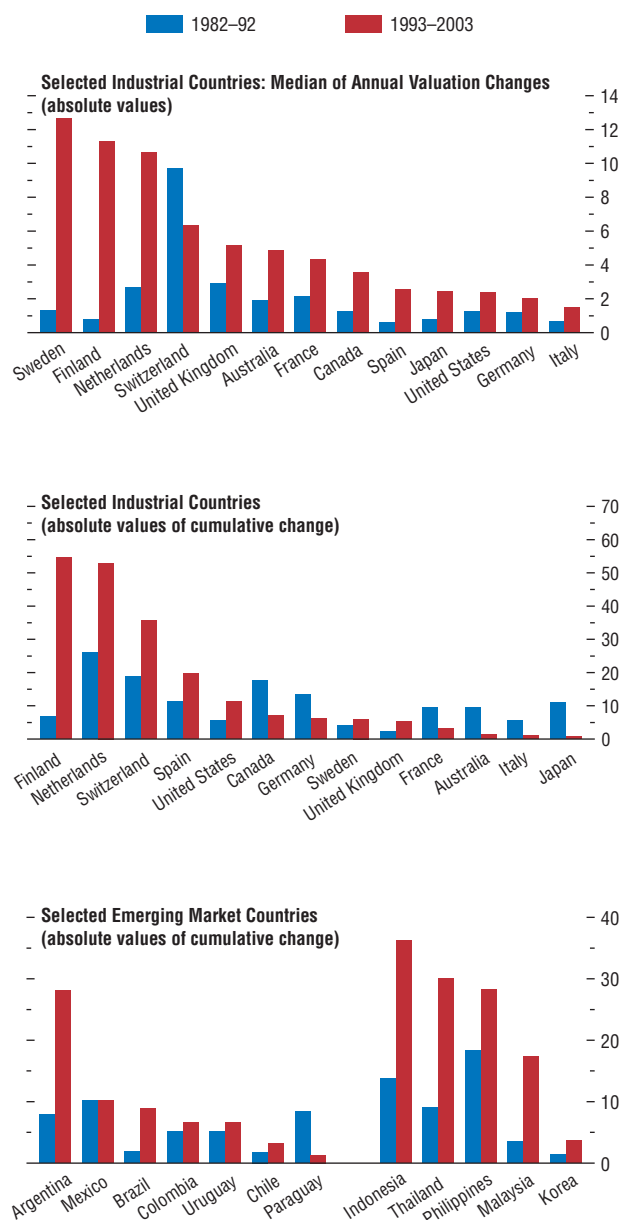
[2]The thresholds are based on the relevant literature. For example, there is some agreement in the growth literature that inflation rates beyond 7 to 11 percent hurt growth in developing countries (e.g., Khan and Senhadji, 2000). Hence, inflation rates of 10 percent or less are classified as reflecting "good" monetary policy while inflation rates above 40 percent—a widely accepted benchmark for high inflation—are classified as "bad" policies.

policy framework aimed at external and internal balance. In this regard, it is important to note that globalization may not be as effective a disciplinary device for the conduct of macroeconomic policies as is widely thought (see Box 3.3 for recent empirical evidence on the disciplinary effects of financial globalization on macroeconomic policies).

Figure 3.5. Valuation Effects on Net Foreign Assets
(Percent of GDP)

For larger industrial countries, annual valuation changes have become greater in the 1990s, even if the cumulative sums shown below tend to be small due to the frequent change in sign. For emerging market countries, magnitudes of valuation effects have generally increased over the past decade.

■ 1982–92   ■ 1993–2003

Selected Industrial Countries: Median of Annual Valuation Changes (absolute values)

Selected Industrial Countries (absolute values of cumulative change)

Selected Emerging Market Countries (absolute values of cumulative change)

Sources: IMF, *Balance of Payments Statistics;* Lane and Milesi-Ferretti (2005b); and IMF staff calculations.

Valuation Effects and External Adjustment

A critical, and often underappreciated, implication of recent financial globalization is that with both foreign assets and foreign liabilities rising sharply, investors—and countries—are much more exposed to capital gains and losses owing to exchange rate and other asset price changes.[18] For example, if all foreign assets are denominated in foreign currency, a 10 percent exchange rate depreciation increases their domestic currency value by 5 percentage points of GDP if the stock of assets is 50 percent of GDP and by 10 percentage points if it is 100 percent. Higher gross positions also tend to generate larger valuation changes in net foreign assets, although structure and relative size of assets and liabilities also matter.

IMF staff estimates of valuation changes in industrial and key emerging market countries confirm that as a percent of GDP, annual and medium-term[19] valuation changes in net foreign assets generally increased in magnitude during the 1990s compared with the 1980s (Figure 3.5). The increase in medium-term valuation changes is particularly noteworthy in some smaller and relatively more open industrial countries that have seen rapid changes in gross or net positions (e.g., Finland, the Netherlands, and Switzerland) and in emerging market countries, particularly those that have faced large, one-off changes in exchange rates (e.g., Asian emerging market countries during the 1997–98 financial crises). In other countries, however, magnitudes have decreased, including in those that experienced larger exchange rate changes in the 1980s compared with the 1990s.

An important implication of persistent valuation changes is that external current account surpluses or deficits could become relatively less important determinants of net foreign asset positions (Obstfeld, 2004), as illustrated by the expe-

[18]See Lane and Milesi-Ferretti (2001, 2005a), Tille (2003, 2004), Gourinchas and Rey (2004), and Obstfeld (2004).
[19]Defined as the cumulative sum over a 10-year period.

rience of a number of industrial and emerging market countries during the 1990s (Figure 3.6). A key question, of course, is whether valuation effects can help in external adjustment. Given the prominent role of exchange rates in this regard, the focus will be on the exchange-rate-related valuation effects. (Historically, valuation effects arising from other asset price changes have also been large in some cases, including during times of sharply reduced asset return correlations.) Two factors are important in this regard. First, the nature of the exchange rate changes matters. If they are unexpected, valuation effects on net foreign assets are lasting, while those associated with anticipated changes are not, because the latter tend to be reflected in asset yields, which, in turn, offset the valuation effects through their impact on current accounts.[20]
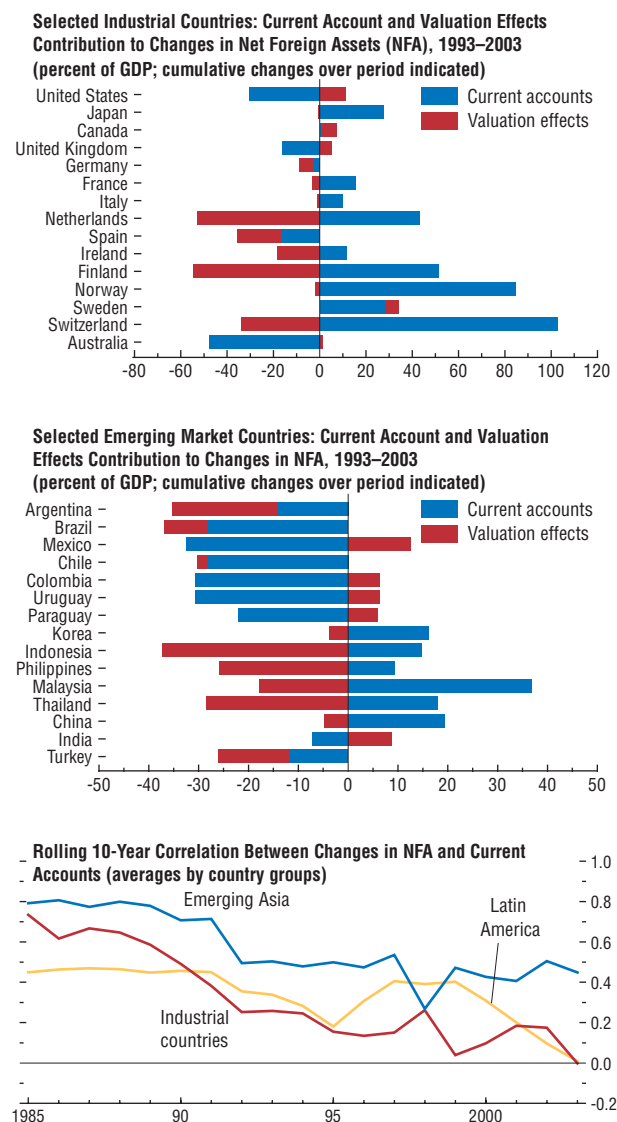
Second, the general structure of external assets and liabilities—especially their currency composition but also the nature of the underlying financial instruments—also plays an important role in determining whether valuation effects contribute to external adjustment.

- In industrial countries, where foreign assets tend to be denominated in foreign currency and liabilities in domestic currency, valuation effects arising from unexpected exchange rate changes—including those related to portfolio preference disturbances—tend to facilitate adjustment because they can provide for burden sharing among countries. In countries with currency depreciation, the domestic currency value of foreign assets increases and—with the value of liabilities unchanged—net foreign assets improve; the reverse takes place in countries with appreciating currencies. If

[20]See Lane and Milesi-Ferretti (2005a) and Obstfeld (2004). Consider, for example, the case of an anticipated depreciation from the perspective of a foreign bond investor. Assuming unchanged risk preferences, the lower value of the principal (in foreign currency) due to the depreciation requires higher yields to preserve the present value of the investment. With anticipated exchange rate changes, return adjustments may be amplified by portfolio reallocation.

Figure 3.6. Valuation Effects, Current Accounts, and Net Foreign Assets

In the 1990s, the contribution of valuation effects to changes in net foreign assets was large relative to current account balances, especially in small open industrial economies and east Asian countries. More generally, the correlation between changes in net foreign assets and current account balances weakened.

Selected Industrial Countries: Current Account and Valuation Effects Contribution to Changes in Net Foreign Assets (NFA), 1993–2003
(percent of GDP; cumulative changes over period indicated)

Selected Emerging Market Countries: Current Account and Valuation Effects Contribution to Changes in NFA, 1993–2003
(percent of GDP; cumulative changes over period indicated)

Rolling 10-Year Correlation Between Changes in NFA and Current Accounts (averages by country groups)

Sources: IMF, *Balance of Payments Statistics;* Lane and Milesi-Ferretti (2005b); and IMF staff calculations.

Figure 3.7. Valuation Changes in Net Foreign Assets and Real Effective Exchange Rates

Valuation effects on net foreign assets facilitated the external adjustment in the mid-1980s (as indicated by the ellipses).
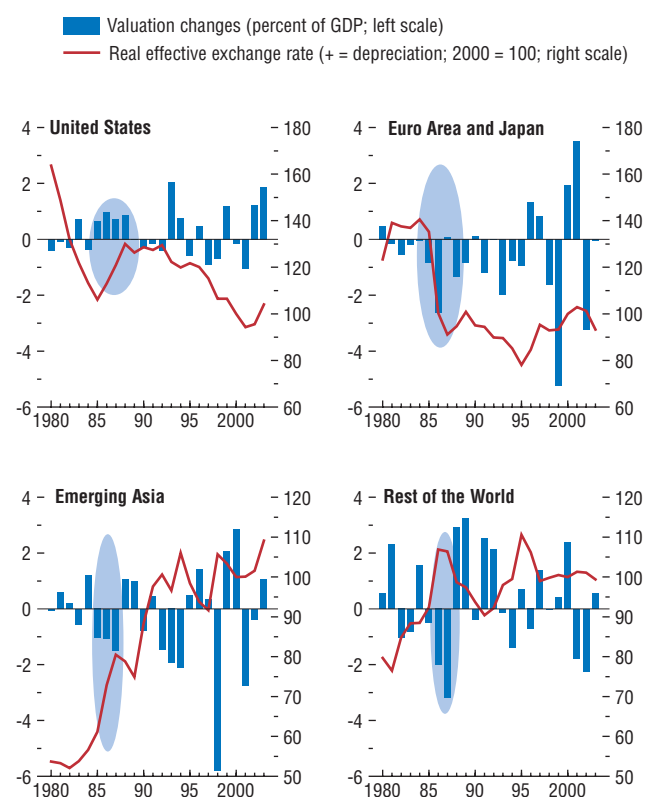
Sources: IMF, *Balance of Payments Statistics;* Lane and Milesi-Ferretti (2005b); and IMF staff calculations.

the direction of exchange rate changes matches that of external adjustment—that is, currency depreciation in countries where external balances have to improve (deficit countries) and appreciation in other countries—this is equivalent to a wealth transfer from surplus to deficit countries, which, everything else being equal, can help reduce the amount of trade adjustment needed (see Appendix 3.1).[21] This mechanism was evident during the U.S. current account correction of 1985–88, when the U.S. dollar depreciated by about 30 percent in real effective terms (Figure 3.7).[22] More recently, the valuation adjustments associated with the U.S dollar depreciation during 2002–03 have offset about three-fourths of the cumulative U.S. current account deficit over the same period.

• In emerging market countries, where some foreign liabilities, especially debt liabilities, tend to be denominated in foreign currency, valuation effects from unexpected exchange rate depreciations are likely to complicate external adjustment, given the increase in the domestic currency value of these liabilities. On the other hand, currency appreciation tends to have positive valuation effects and improve net external positions, as illustrated in Figure 3.8 for selected Latin American and East Asian countries.

For a systematic assessment of the role of the valuation channel in external adjustment, IMF

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[21]It is, of course, possible to hedge at least partly against valuation effects by using financial derivatives, which may reduce the real impact of valuation effects, including those arising from the wealth transfer from surplus to deficit countries. This depends importantly on whether the hedging is undertaken within countries or across countries. In the case of the former, there are no aggregate hedging gains or losses at the country level because the gains from hedging for some residents are offset by hedging losses of other residents, and valuation effects have real aggregate effects. Cross-border hedging activities, however, affect the real impact of valuation changes.

[22]If the currency realignment of the mid-1980s had involved today's larger gross positions, U.S. valuation gains would have been more than twice as large as those in the 1980s, while the losses in Japan and the euro area countries would have been three times as large.
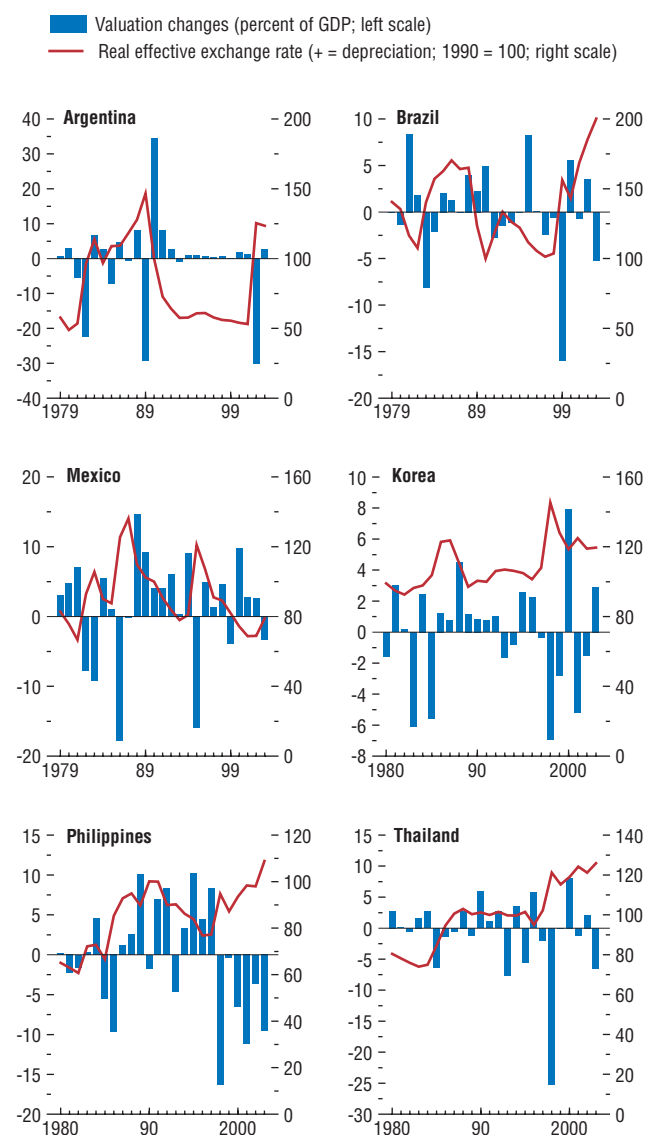
staff undertook an econometric investigation of the recent experience of 49 countries—21 industrial and 28 emerging market and developing countries—for the period 1970–2003 (see Appendix 3.2 for details and documentation of the results). Following Gourinchas and Rey (2004) and Corsetti and Kostantinou (2004), the approach was to examine the dynamic responses of trade balances (defined as the sum of net exports of goods and services) and net foreign assets to external imbalances. The intuition behind this approach is as follows. Because countries must ultimately be able to pay their debts—the so-called intertemporal external budget constraint—trade balances and net foreign assets are tied together in the long run. For example, a debtor country will need to have a trade surplus in the long run that is large enough to cover the cost of its net external liabilities.[23] While trade flows and net foreign assets can deviate from this long-run relationship in the short term, over time that relationship has to be restored through an adjustment in net exports, in net foreign assets (other than the changes arising from the adjustment in net exports), or a combination of both. If a significant part of the adjustment occurs through changes in net foreign assets, this is interpreted as evidence for the valuation channel contributing to external adjustment. The results can be summarized as follows.

• For the majority of emerging market countries, adjustment came entirely through trade (net foreign assets were not found to respond to deviations from the long-run relationship between the trade balance and net foreign assets). This finding does not mean that valuation effects are unimportant in these countries. On the contrary, the results imply, for example, that negative valuation shocks, such as those from a depreciation of the exchange rate, tend to permanently worsen net foreign asset positions in these countries and the

[23]Strictly speaking, the intertemporal budget constraint implies that the net present value of future trade surpluses (including current transfers) must be equal to current net external liabilities (see Appendix 3.1).

Figure 3.8. Selected Emerging Market Countries: Valuation Changes and Real Effective Exchange Rates

Exchange rate depreciations tend to have adverse valuation effects in emerging market countries.

Legend:
■ Valuation changes (percent of GDP; left scale)
— Real effective exchange rate (+ = depreciation; 1990 = 100; right scale)

Sources: IMF, *Balance of Payments Statistics;* Lane and Milesi-Ferretti (2005b); and IMF staff calculations.

Figure 3.9. Determinants of Real Globalization

Declining trading costs and trade liberalization have driven real globalization.

**Transport Costs
(1990 U.S. dollars)**

Sea freight[1]

Air transport[2]

**Trends in Average Tariff Rates
(percent; unweighted)**

Developing countries

Industrial countries

Number of Regional Trade Agreements
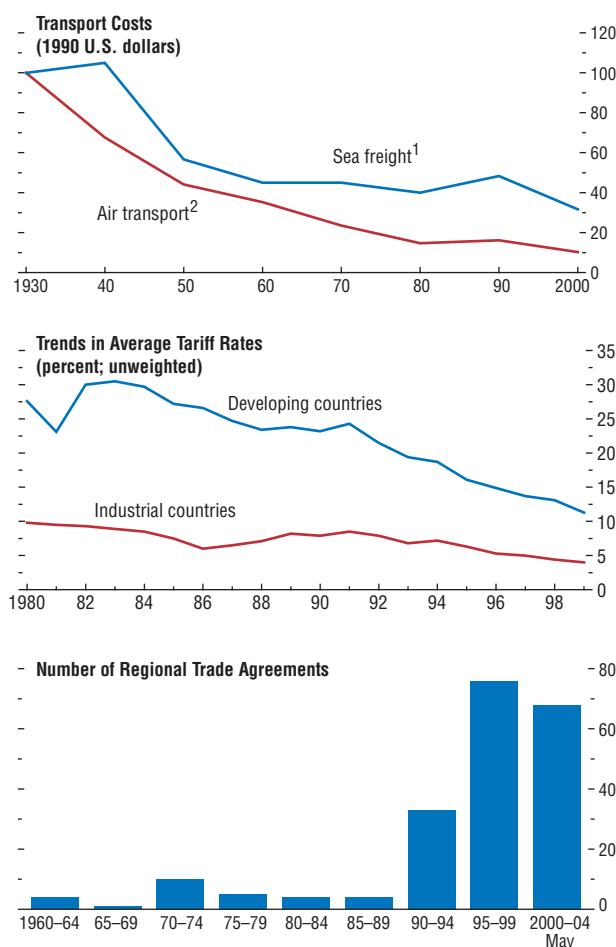
Sources: Busse (2003); World Trade Organization; and IMF staff calculations.
[1] Average ocean freight and port charges per short ton of import and export cargo.
[2] Average air transport revenue per passenger mile.

adjustment has to come from an improvement of net exports.

- In contrast, in a number of industrial countries, particularly the United States and Japan, valuation changes do appear to play a role, with changes in net foreign assets reacting systematically to deviations from the long-run relationship with net exports.

For major industrial countries, using quarterly data, the analysis was refined further by examining the extent to which deviations of trade balances and net foreign assets from their long-run relationship can predict other variables involved in external adjustment, especially net export growth and valuation changes. For all countries, the results show that adjustment came primarily through long-run changes in trade flows, but for the United States the evidence also suggests that valuation changes were helpful in the short term.[24]

Overall, these results suggest that, for all countries, exchange rate changes primarily affect medium- and long-term trade adjustment, although in the short term they appear to generate helpful valuation changes in some industrial countries, particularly the United States.[25] This may reflect the fact that short-run exchange rate changes in industrial countries tend to be unexpected and, hence, can have large valuation effects, whereas persistent exchange rate changes over the medium and long run have a larger anticipated component, with smaller valuation effects.

Naturally, these results are based on a period during most of which gross foreign positions were relatively small compared with exports or imports. One could therefore argue that analysis based on past data likely underestimates the role of valuation effects today.[26] Overall, the results

[24]For the United States, the findings match earlier ones by Gourinchas and Rey (2004) based on another data set.

[25]These results are consistent with—but not necessarily evidence for—the notion that the United States enjoys a reserve currency premium.

[26]In addition, there is the problem of using standard econometric methods in periods of rapid change, as parameters may change.

Table 3.5. Changes in Geographical Trade Patterns
(Extra-regional trade flows as a percent of world GDP; excluding intraregional trade)

| | Origin | | | | | | | | | |
| | Emerging Asia | | Euro area | | Japan | | Rest of world | | United States | |
Destination	1984	2003	1984	2003	1984	2003	1984	2003	1984	2003
Exports										
Emerging Asia	. . .	. . .	0.16	0.40	0.34	0.59	0.49	0.89	0.23	0.37
Euro area	0.18	0.65	. . .	. . .	0.12	0.16	2.37	2.65	0.31	0.31
Japan	0.28	0.45	0.06	0.11	. . .	. . .	0.16	0.21	0.19	0.14
Rest of world	0.27	0.41	2.19	2.96	0.42	0.24	. . .	. . .	1.03	1.18
United States	0.47	0.93	0.38	0.57	0.49	0.32	1.40	1.85	. . .	. . .
Total	**1.20**	**2.44**	**2.79**	**4.04**	**1.37**	**1.31**	**4.42**	**5.60**	**1.75**	**2.00**
Imports										
Emerging Asia	. . .	. . .	0.18	0.65	0.28	0.45	0.27	0.41	0.47	0.93
Euro area	0.16	0.40	. . .	. . .	0.06	0.11	2.19	2.96	0.39	0.53
Japan	0.34	0.59	0.16	0.21	. . .	. . .	0.42	0.24	0.49	0.33
Rest of world	0.49	0.89	2.37	2.65	0.54	0.33	. . .	. . .	1.40	1.80
United States	0.23	0.37	0.38	0.41	0.22	0.11	1.03	1.18	. . .	. . .
Total	**1.22**	**2.25**	**3.08**	**3.92**	**1.10**	**1.06**	**3.91**	**4.79**	**2.74**	**3.60**

Sources: IMF, *Direction of Trade Statistics,* and *International Finance Statistics;* and IMF staff calculations.

provide some evidence for the importance of the valuation channel facilitating short-term external adjustment in industrial countries, but also suggest that trade balance adjustment remains key to restoring external balance in the long term, so that trade balances and current account balances continue to be important as indicators of external balance.

Real Globalization

Besides financial markets, globalization has also profoundly affected markets for goods and services, with global trade[27] as a percent of GDP increasing from some 20 percent in the early 1970s to about 55 percent in 2003. A broad fall in costs of global trading—including declines in transport costs, costs of information gathering and sharing, and continued decreases in government-imposed trade barriers such as tariffs—has been the key driving force behind real globalization (Figure 3.9). Historically, the current era of real globalization began earlier than financial globalization, as liberalization of

external trade regimes started in the 1950s under the umbrella of the General Agreement on Tariffs and Trade (GATT). This section will document these changes and try to shed light on their implications for external adjustment.

Globalization and Changes in Trade Patterns

With the fall in trading costs over the last few decades, global trade patterns have changed markedly. First, geographical patterns of trade have changed (Table 3.5).[28] Arguably, in recent years, the most important feature in this respect has been the growing importance of emerging market economies in world trade, especially—but not only—the fast growing economies of emerging Asia, while trade shares of major industrial countries have decreased in relative terms. An important implication of these changes is that the trade adjustment associated with the resolution of global imbalances will be shared differently. In addition, as globalization has contributed to strong growth in many emerging market economies, relative economic

[27]Defined as the sum of exports and imports of goods and services.

[28]The changes in geographical trade patterns have partly emerged because of new regional trade agreements (e.g., the North American Free Trade Agreement) or the dismantling of old agreements (e.g., the Council for Mutual Economic Assistance, or COMECON).

Table 3.6. Trade Intensity
(Manufacturing trade as a fraction of manufacturing GDP)

	1970	1980	1990	2000–01[1]
United States	0.32	0.51	0.79	1.06
EU-15	0.38	0.50	0.70	0.89
Japan	0.66	0.75	0.66	0.88
Canada	1.36	1.79	2.51	2.93
Mexico	....	....	1.87	2.57
Canada and Mexico	....	....	2.24	2.75

Source: OECD.
[1]For Canada and EU-15 manufacturing GDP is only available through 1999. Ratios in the last column use trade data through 2001 but divide by 1999 value added. EU-15 refers to the member countries of the European Union prior to May 2004 when several eastern European countries joined the European Union.

sizes of major regions have changed, which has helped to spread the spillover of shocks originating in one region to other world regions—with potentially beneficial effects on external adjustment.

Magnitudes and composition of trade have also changed materially, with the following main observable changes.

- *Two-way intra-industry trade.* The bulk of trade now takes place within, not across, industries, as countries tend to specialize in varieties of particular goods, at the level of both final and intermediate goods, rather than in a particular industry. This partly reflects the fact that gains from lower trade barriers arise not only from lower prices, but also from the availability of a wider range of similar goods that better accommodate individual needs of consumers and firms. As a result, trade flows have increased rapidly relative to domestic production—reflected in higher trade shares—and more countries, especially industrial countries, now tend to be both large exporters and large importers within narrow industry categories.

- *Fragmentation in the production of manufactured goods.* With declining trading costs lowering

the costs of producing in multiple locations, firms have begun to divide the production process into multiple steps at different locations to take advantage of location-specific advantages in each step (e.g., low labor costs in the production of labor-intensive parts).[29] Because each step involves imports and re-exports of parts and intermediate goods up to the final assembly, manufacturing trade has increased dramatically compared with manufacturing GDP (Table 3.6).[30]

The ascent of multinational firms has played an important role in overall trade growth and in the changes in the composition of trade.[31] Foreign direct investment (FDI) inflows and outflows are good indicators of the increasingly international nature of firms (Table 3.7). Recently, the acquisition of existing firms in emerging markets, notably in Latin America and Asia, by firms headquartered in industrial countries, has been a prominent feature of FDI developments—mirroring changes in geographical trade patterns discussed earlier.

These changes in magnitudes and composition of trade related to real globalization may have affected external imbalances and their adjustment through a number of channels.

- *Trade shares, trade home biases, and spillovers.* With real globalization, trade shares (trade as a percent of domestic production) have generally been increasing. In many, but not all cases, this has been reflected in a declining share of domestically produced inputs utilized in production, a development sometimes referred to as the reduction of the home bias in production (as opposed to the home bias in international financial markets discussed earlier).[32] As a result, spillover effects from market to market are likely to have become larger, especially for sectoral disturbances, so that any

[29]Many terms are used to describe this phenomenon, including vertical specialization, production sharing, vertical production networks, and outsourcing. Hanson, Mataloni, and Slaughter (2003) find that, in a cross-section of countries, the location of vertical processing networks is sensitive to local labor costs.

[30]See Yi (2003) and Chen and Yi (2003).

[31]See, among others, Burstein, Kurz, and Tesar (2004).

[32]Similar considerations apply to domestic demand for final tradable goods, as the share of such goods produced domestically has generally also fallen (reduction in "consumption home bias").

Table 3.7. Foreign Direct Investment Flows
(Period averages, percent of total, unless otherwise noted)

	Outflows by Area of Origin			Inflows by Area of Destination		
	1970	1980	1990	1970	1980	1990
High-income countries						
United States	45.99	20.98	21.79	11.19	29.90	20.10
Europe	42.33	51.63	44.61	43.79	35.64	38.79
Japan	5.40	13.90	5.41	0.63	0.45	0.57
Oceania	0.91	2.17	1.08	5.97	4.71	2.33
Total	**98.98**	**93.84**	**87.5**	**75.93**	**75.19**	**65.23**
Developing and transition countries						
Latin America	0.32	0.93	2.19	12.66	9.02	11.10
Africa	0.41	1.44	0.50	4.29	2.32	1.75
Asia (excluding Japan)	0.29	3.76	9.34	6.60	13.00	18.66
Oceania	. . .	0.01	0.01	0.45	0.17	0.07
Central/eastern Europe	0.02	0.01	0.27	0.01	0.26	3.05
Total	**1.03**	**6.16**	**12.50**	**24.08**	**24.81**	**34.77**
World (millions of U.S. dollars)	23,678	124,407	523,293	20,956	113,917	530,174

Sources: Barba Navaretti and Venables (2004); and IMF staff calculations.

adjustment will have a magnified effect on trade flows. A contraction in demand for a particular final good, for example, will trigger a contraction in demand for imported intermediate inputs all along the production chain. Thus, trade flows will in general appear more elastic with respect to demand changes. Regarding net exports, however, implications are less clear-cut, partly because both exports and imports are generally affected.[33]

- *Price elasticity of trade flows.* The ability to purchase similar if not identical goods from domestic and foreign sources could raise the substitutability between foreign and domestically produced traded goods, which would tend to make bilateral trade flows more responsive to changes in prices, including those arising from exchange rate changes. For a given adjustment in quantities, relative prices will then have to change less. However, integrated production lines may have made some firms more dependent on particular foreign inputs that have no close substitutes, and their demand for foreign inputs may have become more price-inelastic. Empirically, there is little evidence to date that the elasticity of substitution between foreign and domestically produced traded goods—which determines the price elasticity of trade flows— has changed (e.g., Ruhl, 2003).

- *Tradability and the share of nontradable goods in production.* With declining trading costs, one would expect the tradability of goods and services to have increased and the share of nontradable goods in demand and production to have decreased.[34] This would, everything else being equal, facilitate adjustment, as the required changes in tradables relative to nontradables output would be less and could occur with relatively smaller changes in the relative price of tradables compared to nontradables (the real exchange rate). Empirical evidence based on sectoral input-output tables, however, suggests that, unlike in many emerging market countries, the tradables sector share output in most industrial countries has actually fallen slightly in recent years because of the rapid expansion of service sectors.[35]
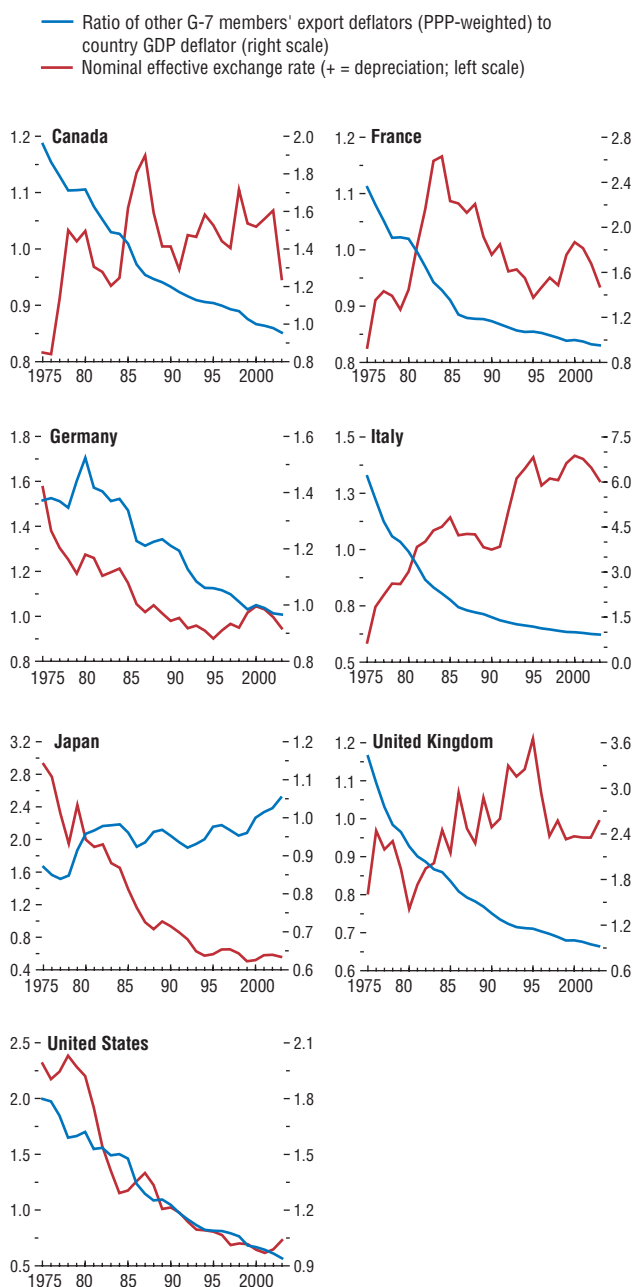
[33]Production-sharing links do not automatically imply tight links among national economies. If the contribution of local value added to the total value of trade is small, changes in trade volume could be large with very little impact on the local economy (see Burstein, Kurz, and Tesar, 2004).

[34]See, for example, Bayoumi and others (2004) or Bravo-Ortega and di Giovanni (2005) for recent studies.

[35]See Batini, Jackson, and Nickell (2002) on the methodology.

Figure 3.10. Degrees of Foreign Competition and Effective Exchange Rates in G-7 Countries

For the G-7 countries, foreign competition seems to have increased over time.

— Ratio of other G-7 members' export deflators (PPP-weighted) to country GDP deflator (right scale)
— Nominal effective exchange rate (+ = depreciation; left scale)

Sources: IMF, *International Financial Statistics;* and IMF staff calculations.

Other Implications of Real Globalization

There are a number of other factors partly linked to greater trade integration that may also affect the way external imbalances adjust. These include the following.

- *Greater international competition and lower markups.* Lower trading costs in recent decades have spurred product market competition by fostering the international supply of final and intermediate goods. At the same time, a wave of merger and acquisition activity, even in services industries (e.g., retailing, insurance, banking, and telecommunications) has brought international cost-cutting techniques and price competition into sectors that used to be isolated from such global pressures. Measuring competition is difficult, but the ratio of world export prices (in local currency terms) to the GDP deflator—a frequently used indicator for foreign competition—has decreased, which is consistent with the notion that foreign competition has intensified in G-7 countries even when changes in effective exchange rates are considered (Figure 3.10).[36] Evidence from sectoral markups partly supports this view (Martins and Scarpetta, 1999) even though the changes over the past two decades have, on average, been relatively small. The ongoing compression of markups puts a cap on global price levels and inflationary pressures from disturbances. This generally facilitates the task of delivering low and stable inflation for monetary policymakers (see Box 3.4).

- *Greater flexibility and lower rigidities.* Structural reforms over the past two decades—partly reflecting pressures from greater international

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[36]World export prices in local currency terms depend on the nominal effective exchange rate by construction (see Bailliu and Fujii, 2004). This implies that the real price of exports can fall exclusively owing to an appreciation of the domestic currency. In the cases of Canada, France, Italy, and the United Kingdom, however, real prices of exports seem to have fallen—signaling an increase in foreign competition—even in the face of constant or depreciating nominal exchange rates. In Figure 3.10, world export prices for each country are approximated by export deflators of other G-7 countries.

competition—have enhanced economic flexibility, including by lowering real and nominal rigidities in product and labor markets, especially in industrial countries (see, for example, Chapter III, *World Economic Outlook,* April 2004). While recent empirical evidence,[37] at both the macroeconomic and the firm level, suggests that rigidities of both kinds are still present in most economies today, preliminary results obtained estimating aggregate pricing equations indicate that in most G-7 countries, nominal or real price rigidities or both have decreased somewhat since 1970 (Appendix 3.3 details these results). Other factors, such as the adoption of "just-in-time" technologies to reduce durables inventories relative to sales, have also contributed to enhancing flexibility. As result, economies are now believed to be in a better position to absorb and rebound from shocks, which would, by implication, also facilitate the rebalancing of global imbalances.

- *Reduced exchange rate pass-through and improved monetary policy credibility.* Empirical evidence suggests that the short-run pass-through of nominal exchange rate movements to domestic final goods prices has declined in many countries in recent years. This in part reflects more credible monetary policies and the associated transition to a lower inflation environment (see Taylor, 2000; Choudhri and Hakura, 2001; Devereux and Yetman, 2002; Gagnon and Ihrig, 2004; Bailliu and Fujii, 2004), as well as changes in pricing practices of firms engaged in trade—such as an increase in the prevalence of local currency pricing (see Devereux, Engel, and Storgaard, 2004). In contrast, the pass-through of exchange rate changes to prices of imports "at the dock" is higher, especially in the long run (e.g., Campa and Goldberg, 2002). While the extent and causes of the decline in the exchange rate pass-through to domestic consumer prices remain subject to debate (see, among others, Obstfeld, 2002), a lower pass-

through can have positive and negative consequences for external positions and their adjustment. On the one hand, it implies that economies are more insulated from external shocks, allowing growth to remain relatively stable in the face of high exchange rate volatility even in very open economies. On the other side, a lower pass-through may reduce the expenditure-switching effects of exchange rate changes, thereby complicating external adjustment. The fact that today a large portion of trade is intrafirm and intra-industry, and that the exchange rate pass-through to the prices of imported intermediates does not, in general, appear to have changed much over time, suggests however that the overall responsiveness of trade to changes in exchange rates may not have shifted dramatically, even if the exchange rate pass-through to final consumer goods prices has declined over the years.

In sum, real globalization has affected external imbalances and adjustment through a number of channels, although the extent and, in some cases, direction are yet to be established. Therefore, the chapter now turns to model simulations for a fuller and more integrated analysis of how real globalization has affected external adjustment.

The Effects of Globalization: An Integrated Perspective

To investigate the implications of globalization for the adjustment of external imbalances, this section uses simulations of the IMF's GEM.[38] GEM incorporates many trade linkages with an explicit microeconomic foundation, and is thus particularly well-suited to analyze the impact of real globalization discussed earlier. Moreover, while financial linkages in GEM are still cursory, the model nevertheless can mimic key aspects of financial globalization such as the apparent increasing willingness of investors

[37]See Angeloni and others (2004).
[38]See Bayoumi (2004) and Laxton and Pesenti (2003).

Box 3.4. Monetary Policy in a Globalized World

This box looks at the implications of globalization for monetary policy. The main conclusion is that although globalization has altered the environment in which central banks operate and made it more difficult to assess and predict economic developments, the objectives and instruments of monetary policy are no different in a more integrated world.

Effects of Globalization on Monetary Policy

Perhaps the most dramatic implication of financial integration and freer capital flows for monetary policy is the fact that it has become harder to simultaneously maintain fixed exchange rates and conduct an independent monetary policy dedicated to domestic objectives. If a country's exchange rate is pegged to the currency of another country, then its interest rates will have to follow closely those of the country to which its currency is pegged: any positive (negative) deviation would, in fact, trigger capital inflows (outflows) putting upward (downward) pressure on the exchange rate parity. The sheer increase in cross-border financial transactions in the past 20 years has made it harder for central banks to counter such pressures, even when they hold significant foreign exchange reserves. Of course, countries can decide to limit capital flows by imposing capital controls, but this implies that they have to forgo the benefits of capital integration, which puts them at a disadvantage relative to countries with floating exchange rates and free capital flows in tapping world saving. The conflicting nature of these policy options—fixed exchange rates, independent monetary policy, and free capital mobility—also known as the "impossible trinity," has pushed many countries in recent years to abandon exchange rate pegs altogether (see Fischer, 2001).

Globalization has also had numerous other important effects on monetary policy.

- *Greater international exposure.* By making economies more open, globalization has made economies more exposed to international shocks, thereby raising the challenges to which monetary policy must respond. For example, the fact that countries now trade more with each other in both final and intermediate goods and that production has become often geographically very fragmented implies that even the smallest demand and supply disturbances in a country can have repercussions for production and profitability in countries elsewhere. In addition, under globalization, financial markets are increasingly integrated with those abroad. Disturbances and policy decisions in one country are reflected swiftly in markets around the world.

- *Changes to the transmission of monetary policy.* There are two main ways in which this happened. First, while central banks can still control short-term interest rates under floating exchange rates with financial globalization (Boivin and Giannoni, 2002, 2003), deeper financial integration has made exchange rates more reactive to changes in interest rate differentials.[1] All things being equal, this means that changes in monetary instruments have a larger impact on exchange rates, reinforcing the exchange rate channel of monetary transmission. Second, globalization has influenced the way exchange rate changes affect aggregate demand, even though the overall direction of such influence on the exchange rate channel is yet unclear. On the one hand, trade globalization has boosted import and export volumes in many countries, and so changes in the exchange rate now affect a greater portion of aggregate demand. On the other hand, globalization may have contributed to weaken the link between exchange rates and the relative price of imports and exports (the third section of this chapter describes this process in more detail).

Note: The main author of this box is Nicoletta Batini.

[1]Average correlations between (quarterly) changes in the U.S. dollar/euro bilateral exchange rate and nominal short-term interest rate U.S.–EU12, for example, have been strengthening since 1970. For a more general discussion, see, among others, Panigirtzoglou (2004) and Barnea and Djivre (2004).

- *Compressed markups and wages.* Globalization has increased international competition, lessening markups and helping contain wage pressures. This has helped central banks attain their goals because it has lowered inflation expectations in many countries, keeping inflation subdued and, at the same time, allowing economies to operate at a higher degree of resource utilization with a lesser threat of rising inflation.
- *A more complex world.* Finally, as globalization has changed the behavior of consumers and firms and altered the nature and number of economic linkages across countries, historical data have become a less reliable yardstick for interpreting the present. On the whole, globalization has thus made it harder to model economies and predict economic developments. Central banks' increasing interest in how to operate under uncertainty, and the boom of analysis in this area in recent years (see Swiss National Bank, 2003) are testament to this fact.

How Should Monetary Policy Account for Globalization?

Does globalization introduce new objectives for monetary policy? Probably not. Although globalization has, in fact, reduced the ability of central banks to pursue inconsistent objectives, as exemplified by the dilemmas now posed by the "impossible trinity," it is generally agreed that central banks should continue using their sole policy instrument to achieve the primary goal of price stability. They should therefore refrain from pursuing additional objectives—for example, external balance or exchange rate stability—that may be perceived as playing a more prominent role in a globalized world but that cannot be directly controlled by monetary policy (Brash, 2001; Stevens, 2004; Greenspan, 2004).

Likewise, globalization does not seem to call for new instruments. As economies are more open, central banks may be tempted to influence demand and prices by making more intensive use of the exchange rate, either by affecting interest rate differentials or by directly buying and selling foreign currency to affect its value.

Clearly, with globalized economies the exchange rate has become a more pivotal indicator of monetary conditions and inflationary pressures. However, trying to control inflation and output by manipulating the exchange rate can be dangerous. Batini and Nelson (2000), for example, show that when uncovered interest parity holds, trying to move the exchange rate reduces exchange rate variability but actually increases the variability of inflation. The difficulties experienced by the Reserve Bank of New Zealand and the Bank of Canada with Monetary Condition Indices[2] (MCIs) are telling in this respect (see Batini and Turnbull, 2002).

On the other hand, monetary policy still needs to adjust to globalization in various ways. First, central banks should continue to work on refining their analytical toolkits to take into proper account developments from deeper financial and trade integration and the economic implications thereof. As discussed above and documented by Rogoff (2003), overall globalization seems to have helped reduce inflationary pressures in many countries, but the precise mechanism and the magnitude of such effect are still far from clear-cut, so more research is needed on this front. Second, when doing policy analysis and economic evaluation, central banks need to continue their efforts to move from models in which parameters depend heavily on historical estimates toward models in which parameters are less likely to change over time (see Sargent, 1999; and Pagan, 2003). Finally, central banks need to persevere in their efforts to exchange information on economic developments and discuss global economic issues within the many international forums that exist today. Given the growing interdependence of national economies and macroeconomic policies, the coordination of such policies has undoubtedly become more important.

[2]MCIs are fixed-weight weighted averages of interest rates and exchange rates. Their use as operating targets implies moving one of the rates or both to bring the average in line with some predetermined equilibrium that is assumed to be consistent with price stability and stable economic growth in the long run.

Table 3.8. Differences in Parameters in Vintage Calibrations, 1980s and 2000s

Description	Emerging Asia 1980s	Emerging Asia 2000s	Japan/Euro Area 1980s	Japan/Euro Area 2000s	Rest of World 1980s	Rest of World 2000s	United States 1980s	United States 2000s
Home biases (percent)[1]								
Consumption goods	5	5	66	65	30	10	94	96
Investment goods	7	4	74	87	33	10	95	97
Tradable sector output (percent of total output)	57	61	33	30	35	42	32	32
Markups (percent)								
Tradables sector	15.4	14.3	23.5	21.3	19.0	17.5	16.7	15.0
Nontradables sector	28.6	26.7	41.7	40.0	34.5	32.9	31.3	27.9
Nominal rigidities (quarters)								
Average price contract lengths	4	4	5	4	5	4	5	4
Monetary policy reaction function Feedback parameters:								
Lagged interest rate	1.00	1.00	0.75	0.81	0.75	0.81	0.75	0.81
Inflation gap	—	—	0.44	0.52	0.44	0.52	0.44	0.52
Output gap level	—	—	0.19	0.10	0.19	0.10	1.19	0.10
Real growth	—	—	0.14	0.51	0.14	0.51	0.14	0.51

Source: IMF staff calculations.
[1]Weights of domestically produced tradable goods in the total input of tradable goods in the production of consumption or investment goods.

to hold foreign assets, and the connection between growing net foreign asset positions and risk premia.[39]

To conduct the simulations, a new four-bloc version of GEM was developed. The four-bloc partitioning, which involves (1) the United States; (2) the euro area plus Japan; (3) emerging Asia; and (4) the rest of the world, mirrors the geographical constellation of the current imbalances. In the simulation experiments, two versions of the model are used. One version replicates an environment of "low economic integration" based on data from the 1980s, while the second version portrays a "high economic integration" environment based on 2000 data. Key differences in the two model versions, resulting from or connected to globalization are summarized in Table 3.8 and Figure 3.11.[40] Compared with the "low economic integration" version, the "high economic integration" version (2000 calibration) portrays a generally more competitive and more flexible world economy

where, as discussed in the previous section, (1) trade flows are more evenly distributed across blocs; (2) trade shares are greater and home biases in consumption and production are generally smaller; (3) tradable sectors are larger in the rest of the world and emerging Asia and smaller in industrial countries; (4) mark-ups and nominal rigidities are somewhat lower; and, (5) the implications of exchange rate shocks for domestic inflation are smaller on account of more determined policy efforts to control inflation. Price and income elasticities in trade equations, however, are identical in the two calibrations, reflecting the unclear net overall effect of globalization on trade elasticities, as discussed earlier.

The simulations are illustrative in nature and should not be interpreted as forecasts by IMF staff of the resolution of actual imbalances. Their main purpose is to help explore the effects of globalization on external adjustment in the context of imbalances similar to the cur-

[39]These aspects of financial globalization are modeled broadly along the lines of Hunt and Rebucci (2003) and Ghironi, İşcan, and Rebucci (2005).
[40]Throughout, size is predicated on the value of nominal GDP in U.S. dollars given the difficulties in constructing world trade matrices with PPP exchange rates or other weights. Blocs are assumed to grow in real terms at different speeds, roughly reflecting growth assumptions for these blocs from the latest WEO forecast.

rent ones, assuming for simplicity that these are the result of a few stylized shocks and that policies follow simple, mechanical rules that do not respond directly to imbalances.[41] In this sense, the experiments below are meant to throw light on specific issues about the resolution of global imbalances—such as the implications of alternative financial market conditions for the adjustment—but are by no means an exhaustive analysis of possible resolution scenarios and policy options.

## How Does Real Globalization Affect External Adjustment?

A first set of simulations looks at the effects of real sector globalization on external adjustment under the assumption that global investors continue to accumulate claims on the United States for a significant period. In this scenario, which also involves a moderate fiscal adjustment about the size proposed by the administration, U.S. net external liabilities stabilize at about 60 percent of GDP in the long run, well above current levels, and the U.S. current account deficit falls to a new long-run level of about 2.5 percent of GDP. The narrowing of the U.S. current account deficit is the result of a combination of higher U.S. real interest rates and higher U.S. saving ratios—hampering domestic demand—on the one hand, and a significantly weaker U.S. dollar—boosting net exports—on the other hand. In the short run, the net effect is a decline in output growth below trend. During the adjustment, the U.S. trade balance gradually goes into surplus to meet the additional costs of the higher long-run net foreign liabilities.

In the other blocs, the rebalancing involves opposite adjustment patterns. While the U.S.

[41]The simulations assume that in every bloc—excluding emerging Asia, which in the first set of simulations pegs its exchange rate to the U.S. dollar—monetary policy is implemented through an interest rate rule where rates are set in response to the extent to which inflation deviates from target and output deviates from potential. The exact specification of this monetary policy rule is described in Appendix 3.3.

Figure 3.11. Economies' Relative Sizes and Trade Patterns
(Percent of world GDP)

Economies in emerging Asia and the euro area and Japan are relatively larger in 2003 than they were in 1984, whereas the U.S. economy and economies in the rest of the world have become smaller over time.
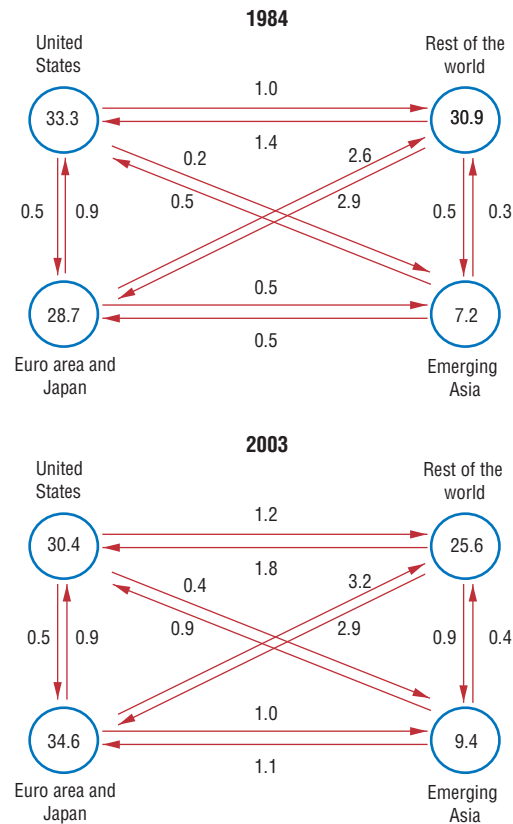
Sources: IMF, *International Financial Statistics;* IMF, *Direction of Trade Statistics;* and IMF staff calculations.

dollar depreciates, currencies elsewhere appreciate in real terms, and net export growth declines. At the same time, domestic demand in the other blocs strengthens, partly reflecting relatively lower real interest rates and higher income from larger net foreign assets. In the long run, the other blocs see their current account weaken in GDP terms (in the long run, in emerging Asia the current account to GDP ratio falls by about 4 percentage points; in Japan and the euro area it falls by about 1 percentage point). With the investment income from permanently larger net foreign asset positions, these blocs can afford to run small long-run trade deficits.

These fundamental adjustment patterns do not depend on the state of globalization; they follow from a country's long-run external budget constraint that ties trade balances and net foreign assets together. However, real sector globalization affects adjustment paths in this rebalancing scenario, as illustrated by the differences between the rebalancing responses of some key variables in the low- and high-integration versions of the model in Figure 3.12. The key results are as follows.

- With globalization, external adjustment can be achieved with a smaller real depreciation of the U.S. dollar and more contained real appreciations in the other blocs. Globalization also implies smaller increases in real interest rates in the United States and in other blocs during the adjustment.

- As a result, globalization also allows the adjustment to occur with smaller short-run declines in output growth in all blocs, apart from emerging Asia.

- The impact of globalization seems largest for the adjustment in emerging Asia, where output growth during the rebalancing is not as strong as in the absence of globalization.

The simulation results, therefore, suggest that real sector globalization broadly facilitates external adjustment. Which aspects of globalization matter most for this result?

- *Direction of trade and trade shares.* Trade today is more evenly distributed across blocs, helping

to spread the adjustment in the U.S. current account deficit more evenly to other world regions. The positive effects of this, of course, vary among blocs. Today blocs other than emerging Asia, for example, are relatively less affected by negative U.S. developments compared with the 1980s while, at the same time, they benefit more from positive developments in emerging Asia, such as the region's strong growth. Emerging Asia, however, is now more internationally exposed with its higher trade share, so that the slowdown in growth necessary for the U.S. current account to rebalance has a correspondingly larger impact on this region compared with the 1980s.

- *Economic size of the various blocs.* In the 1980s, the relative economic size of the United States was bigger, while the economic sizes of emerging Asia, the euro area, and Japan were smaller, making it harder for them to absorb the same amount of U.S. assets. Given the increased economic size of emerging Asia, the euro area, and Japan in the high-integration version, an equal-sized increase in U.S. net foreign liabilities (as a percent of U.S. GDP) generates smaller increases in net foreign asset to GDP ratios in these blocs, other things being equal. In turn, these entail smaller external surpluses—that is, relatively smaller saving-investment balances, which can be attained through more limited real exchange rate changes and, especially in the short term, real interest rate changes, thereby allowing for higher growth, except in the case of emerging Asia, mostly for reasons noted above.

In addition, the results depend significantly on *differences in monetary policy strategies across time* (see Box 3.4 for a more detailed discussion of the links between globalization and monetary policy). Monetary policies today are more effective and credible, and thus require smaller interest rate changes to stabilize inflation following demand shocks and during adjustment, partly because of the lower exchange rate pass-through, as discussed earlier.

In contrast, other key elements, especially greater flexibility and greater international com-

Figure 3.12. Global Rebalancing Under Benign Financial Market Conditions
(Deviations between baseline responses in GEM 2000 and GEM 1980 calibrations; percentage points; x-axis in calendar quarters, 0 represents 2005Q1)

When financial market conditions are benign, globalization facilitates external adjustment, as this can now be achieved with smaller exchange rate changes and smaller increases in real interest rates. Under globalization, output losses are also smaller in the short run, except in emerging Asia.

| United States | Emerging Asia | Euro Area and Japan | Rest of the World |

Output Growth

Trade Balance (percent of GDP)

Real Interest Rate

Real Effective Exchange Rate (+ = depreciation)
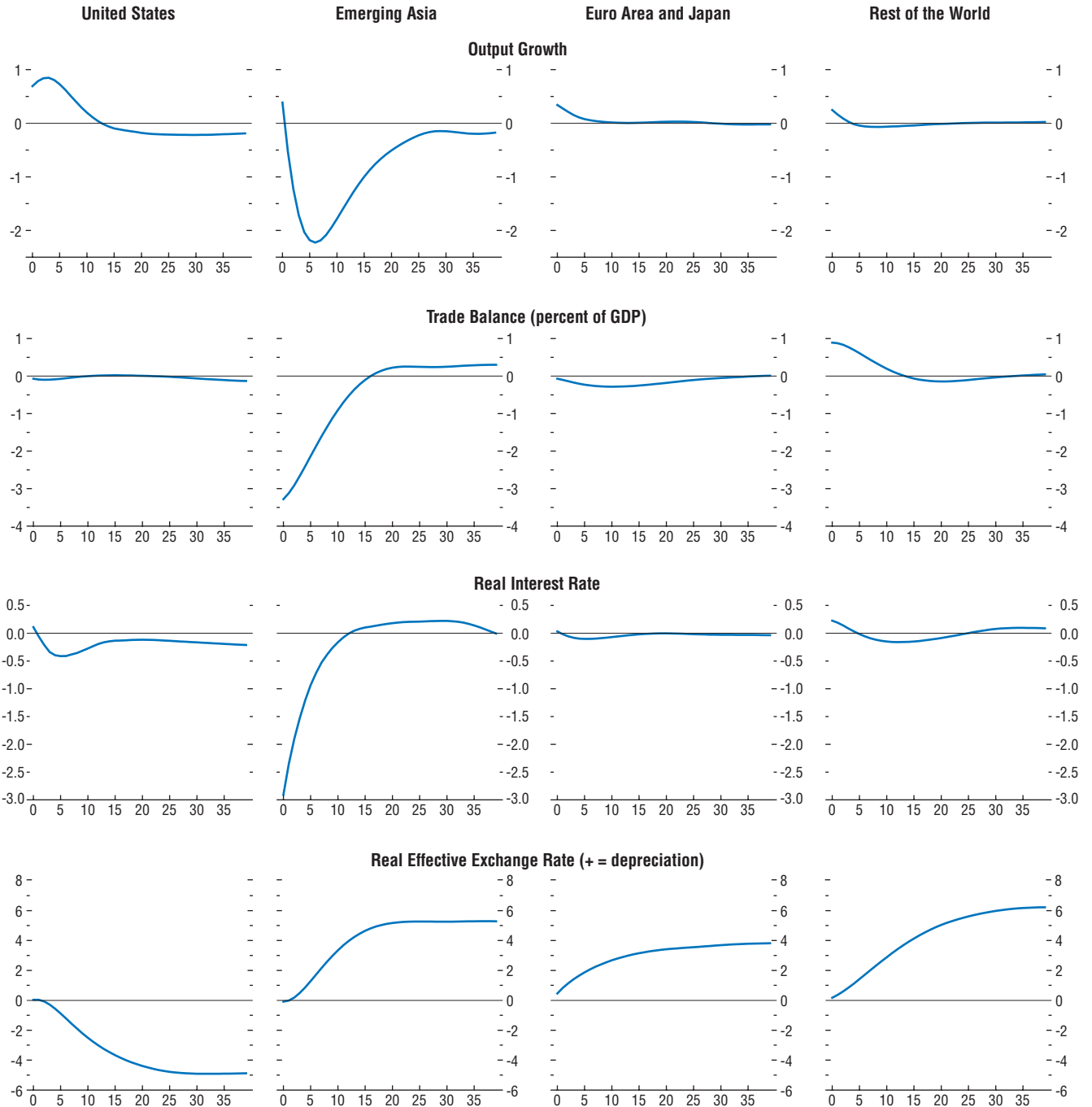
Source: IMF staff calculations.

petition, seem to play a minor role in explaining the result (see Appendix 3.3 for details).[42] This finding reflects two facts. First, given empirical evidence discussed earlier, mark-ups and rigidities differ only marginally across the two globalization environments, which is reflected in the two versions of the model. For example, as noted in Table 3.8, markups generally fell by less than 2 percentage points, implying relatively minor changes in price levels. Second, because empirical evidence suggests similar relative gains in flexibility and competition across blocs (although levels of competition and flexibility still differ), the related changes in price levels between the two globalization environments are similar also and, accordingly, changes in relative prices between blocs are minor. Hence, while greater competition and lower rigidities can facilitate adjustment from a unilateral perspective, they appear to have made less of difference so far from a global perspective.

What Are the Implications of Changes in Investor Preferences?

So far, the simulations have assumed—perhaps rather optimistically—that investors continue to accumulate U.S. assets for a considerable period. In practice, investor preferences can be highly volatile, arguably a greater concern in a globalized world where gross and net external positions are large and where large portions of foreign assets are often purchased and held by official investors for motives other than pure portfolio optimization. To explore the potential impact of a change in investor preferences, two alternative scenarios are considered, using the 2000 calibration of GEM.
- In the first scenario, investors in the euro area, Japan, and the rest of the world are unwilling to continue accumulating U.S. assets and begin to gradually reduce their desired

holdings of U.S. assets (back to 2001 levels by 2010). However, investment behavior in emerging Asia does not change, and currencies in the region remain closely linked to the U.S. dollar.
- In the second scenario, it is assumed that all investors outside the United States, including emerging Asia, gradually reduce their desired holdings of U.S. assets (back to 2001 levels by 2010). This scenario also assumes—for illustrative purposes only—that emerging Asia moves immediately to a floating exchange rate regime, with monetary policy determined by an interest rate rule broadly similar to that assumed for the other blocs.

Such changes in investor preferences clearly complicate global rebalancing. Compared with the previous scenario (2000 calibration), the key results are as follows (see Figure 3.13).
- Capital flows to the United States slow sharply, requiring a more abrupt adjustment in the U.S. current account. Correspondingly, U.S. interest rates rise relative to the baseline scenario, the U.S. dollar has to depreciate sooner and more sharply, and U.S. output slows more markedly. Unsurprisingly, all these effects are larger in the case where demand for U.S. assets falls in all regions.
- The depreciation of the U.S. dollar is matched by an appreciation of exchange rates—and lower trade and current account balances—in blocs with flexible exchange rates (Japan, the euro area, and the rest of the world). In emerging Asia, however, developments vary substantially across the two scenarios. In the former, the real exchange rate appreciates relatively less as the Asian currencies move down with the U.S. dollar. In contrast, when Asian currencies float, the exchange rate appreciates sharply. In this latter case, the appreciation in the other two blocs is somewhat less than under the first scenario, as the decline in
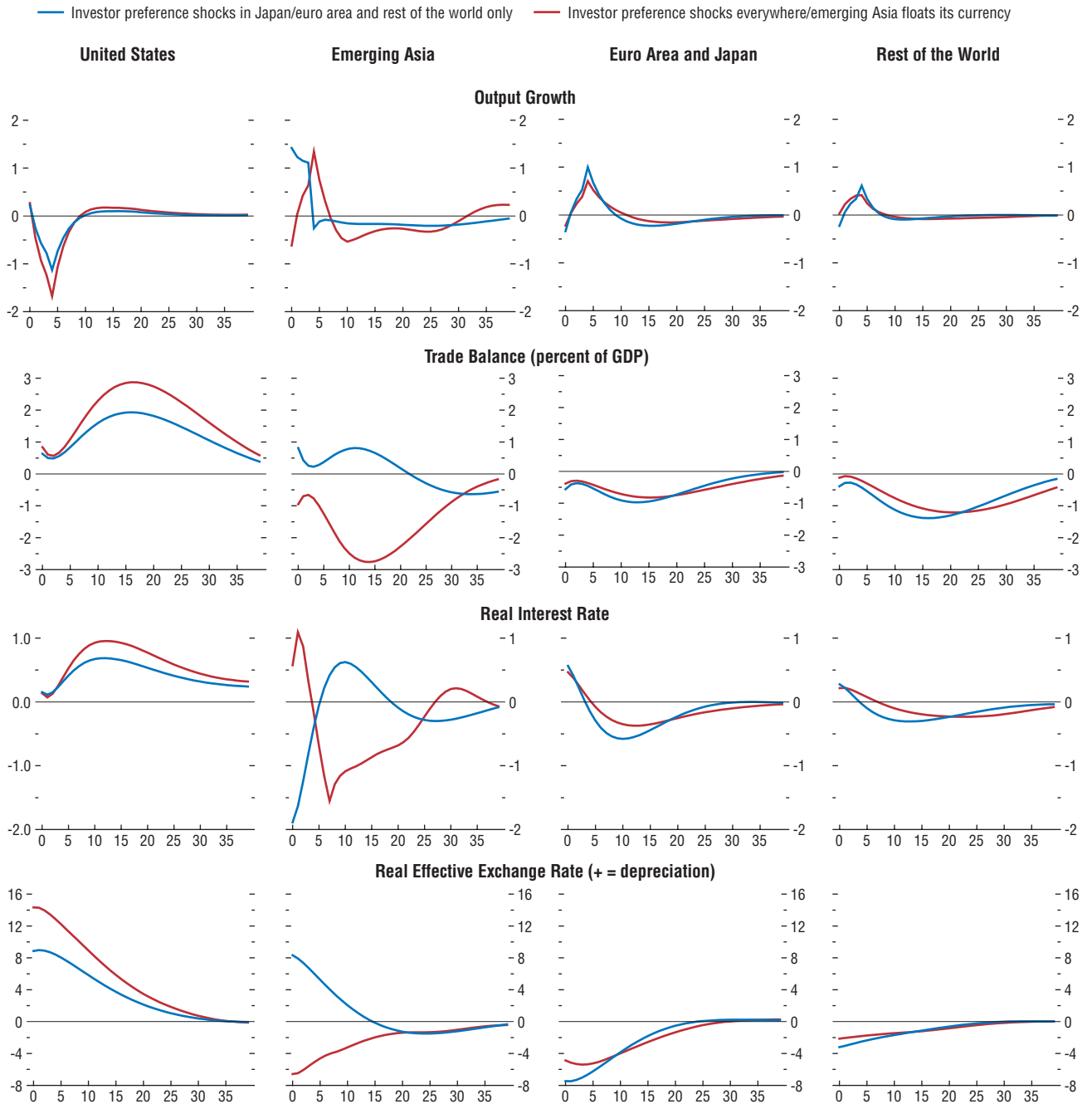
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[42]Greater flexibility, competition, and lower pass-through (through a more credible monetary policy) generally tend to facilitate external adjustment in the sense that they push key variables in the direction required by the adjustment. The exception is emerging Asia, where, contrary to other blocs, monetary policy is assumed to have stayed the same between the 1980s and the 2000s.

Figure 3.13. Global Rebalancing Under Adverse Financial Market Conditions

(Shock minus control, where "shock" is adverse scenario and "control" is 2000 baseline under benign scenario; percentage points; x-axis in calendar quarter, 0 represents 2005Q1)

The effects of globalization when financial market conditions are adverse are more mixed. As capital flows to the United States dry up, the United States can only rebalance its external position through a sharper contraction and a bigger U.S. dollar depreciation. Other blocs largely benefit, as their saving need not rise to pay for additional purchases of U.S. assets.

—— Investor preference shocks in Japan/euro area and rest of the world only   —— Investor preference shocks everywhere/emerging Asia floats its currency

| United States | Emerging Asia | Euro Area and Japan | Rest of the World |

Output Growth

Trade Balance (percent of GDP)

Real Interest Rate

Real Effective Exchange Rate (+ = depreciation)

Source: IMF staff calculations.

141

emerging Asia's desire for foreign assets is accompanied by relatively faster domestic demand growth, which, unlike in the first scenario, contributes to the absorption of higher U.S. net exports.

- In both scenarios, real interest rates outside the United States fall, and—despite slower U.S. growth—GDP growth in the rest of the world rises moderately (or in emerging Asia stays broadly flat relative to the baseline in the first scenario). This rather benign outcome partly reflects the specification of the shift in investor preferences, as the decline in desired asset holdings in the rest of the world is accompanied by a reduction in desired savings, which boosts consumption.[43] In practice, demand outside the United States could fail to pick up—for example, because of adverse confidence effects—and GDP growth would correspondingly be weaker.

Overall, the simulations underscore the potential risks attendant on a reversal of investor preferences and of an abrupt, as opposed to a gradual, change in central bank behavior in Asia. Moreover, while the simulations do not take full account of some mitigating factors—notably positive valuation effects for the United States from a depreciating U.S. dollar, as discussed earlier[44]—on balance they probably underestimate the risks for a number of reasons. First, as noted above, growth in the rest of the world could well be weaker than suggested by the model. Second, large exchange rate changes may induce financial market turbulence, especially since investors may not always have the perfect foresight assumed in the model. Finally, GEM does not fully incorporate the effects of higher risk premia (since it only distinguishes

net foreign asset positions, not the underlying gross asset and liability positions). At current levels of U.S. external liabilities, a permanent 100 basis points increase in the risk premium on U.S. assets raises the required long-run trade surplus in the United States by 0.7 percentage point of GDP (Table 3.9), which would require a substantially larger depreciation of the U.S. dollar (and, of course, greater appreciations elsewhere). In contrast, the risk premium effect is less than half this size in the less globalized world of the 1980s, highlighting the importance of the buildup of gross assets and liabilities in recent years.

Summary and Policy Implications

Against the background of concerns about current global imbalances, the multidimensional relationship among globalization, external imbalances, and international adjustment has become of increasing interest to policymakers. Recent empirical evidence and theoretical considerations alike suggest that financial globalization has contributed to an environment in which large current account surpluses or deficits emerge and are sustained, partly reflecting the revealed willingness of investors to hold larger shares of foreign assets in their portfolios. Real sector globalization has clearly reshaped the magnitudes, composition, and direction of trade flows in the global economy. However, empirical evidence to date is ambiguous as to whether this has increased the sensitivity of the demand for traded goods and services to changes in relative prices or demand conditions.

As the simulations and related analysis above show, real and financial globalization should

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[43]Simulation results from scenarios where the shift in investor preferences is reflected in a persistently higher risk premium on U.S. assets rather than in changes in desired net foreign asset positions suggest similar growth patterns during adjustment. In particular, the increase in the risk premium on U.S. assets leads to relatively lower real interest rates elsewhere, as capital leaves the United States and is invested elsewhere. This provides a boost to domestic demand that more than offsets the adverse growth impact of lower net export growth.

[44]In GEM, there is only one international bond, which is denominated in U.S. dollars. Hence, while emerging Asia, the euro area, Japan, and the rest of the world experience adverse valuation shocks when the U.S. dollar depreciates, there are no gains for the United States. Moreover, in GEM the valuation effects arise only on net foreign asset positions and not on gross positions.

Table 3.9. Impact of Risk Premium Shocks on Long-Run Trade Balances[1]

	Gross Foreign Assets (percent of GDP)	Changes in Long-Run Trade Balances (percent of GDP) After a Risk Premium Shock (in bps)[2]			
		$\rho = 100$	$\rho = 200$	$\rho = 300$	$\rho = 400$
United States					
Low integration (1984)	26.6	0.3	0.5	0.8	1.0
High integration (2003)	70.5	0.7	1.4	2.1	2.8
Emerging Asia					
Low integration (1984)	12.4	0.1	0.2	0.4	0.5
High integration (2003)	56.7	0.6	1.1	1.7	2.2
Japan and Europe					
Low integration (1984)	35.9	0.4	0.7	1.1	1.4
High integration (2003)	147.8	1.4	2.9	4.3	5.8

[1]In the long run, sustainable trade balances (i.e., trade balances consistent with stable ratio of net foreign assets to GDP) are obtained by adding to the long-run trade balances from GEM a term that captures the effect on the trade balance of changes in the value of gross foreign assets. This, in turn, depends proportionately on the interest rate differential (r^N) and the risk premium on those assets (ρ), as shown in (1) below:

$$tb = tb_{GEM} - \left(\frac{r^N - \rho}{1 + g}\right)\bar{a}, \tag{1}$$

where a is gross foreign assets (as a share of GDP) and g is the rate of output growth (see Appendix 3.1 for details). The gross asset positions used to calculate the trade balances in the two scenarios are the historical values reported in the table. In both scenarios, net foreign returns r^N are calculated as the averages for the period 1990–2003, and the long-run rate of output growth is taken to be 2 percent.

[2]Results reported in the table show how long-run trade balances change with different values for the risk premium in the two scenarios. For example, if net foreign returns for the United States decline (rise) by 400 bps in the high integration scenario, the trade balance required to stabilize U.S. net foreign assets increases (falls) by 2.8 percentage points of GDP. By contrast, in the low integration scenario, a similar fall in net foreign returns increases the long-run trade balance by 1 percent of GDP.

generally facilitate global rebalancing, provided financial conditions remain benign. With output levels in major economic blocs now more equal in size, the financing of the U.S. deficit requires relatively smaller surpluses elsewhere; the more even distribution of trade flows across the world contributes to better burden sharing among countries; and more credible monetary policies reduce the output cost of adjusting to shocks. That said, globalization has fundamentally changed neither the nature of adjustment nor the magnitudes involved: ultimately exchange rates and trade balances will need to adjust, and adjust substantially.

The analysis also suggests that while home bias in investor preferences and restrictions to net international borrowing have decreased, they have not disappeared. Accordingly, the accommodation of further increases in U.S. net external liabilities should not be taken for granted. If financial market conditions prove to be less benign, with only limited or perhaps temporary scope for further increases in U.S. net external liabilities, global rebalancing is

likely to involve greater risks. In particular, initial changes in real exchange and interest rates would be much larger, and the short-term output costs of a global rebalancing clearly higher, particularly in the United States. In an environment where gross assets and liabilities are substantially higher than they were in the past—a feature not fully captured in the simulations—the potential for large changes in exchange rates, interest rates, and risk premia to lead to disruptive financial market turbulence in the short term must be correspondingly elevated.

In sum, the central message of the chapter is that policy makers need to take advantage of the scope that globalization provides to facilitate adjustment, while remaining mindful that this adjustment must eventually take place, and of the potential risks associated with unexpected changes in investor preferences along the way. These simultaneous objectives would appear most likely to be achieved by the adoption of a credible medium-term policy framework consistent with achieving external and internal

balance within a reasonable period of time, thereby anchoring expectations and reducing risks of reversals in investor preferences. This underscores the importance of implementing the cooperative strategy to address imbalances recommended by IMF Governors at the last IMFC meeting in October 2004. Unfortunately, as discussed in Chapter I, to date only moderate progress has been made.

Appendix 3.1. Net Foreign Assets, Valuation, and Adjustment: A Glossary of Terms

The main author of this appendix is Roberto Cardarelli.

Accounting for Changes in Net Foreign Assets

Changes in a country's net foreign asset position (NFA) are, by definition, described by the following accounting identity:

$$NFA_t - NFA_{t-1} \equiv NX_t + CT_t + IA_t + KA_t + EO_t + KG_t,$$

where *NX* denotes net exports of goods and services; *CT,* current transfers; *IA,* the investment income balance (with the sum of the three being the current account balance); *KA,* capital transfers; *EO,* errors and omissions; and *KG,* net capital gains (losses if negative).

Valuation Effects

Using lowercase letters to show net foreign assets and net exports as a share of GDP, excluding current and capital transfers on account of their relatively small size, ignoring errors and omissions, and assuming that returns on foreign assets are equal to returns on foreign liabilities, the accounting identity can be expressed as follows:

$$nfa_t - nfa_{t-1} \equiv nx_t + \frac{i_t - \gamma_t}{1 + \gamma_t} \, nfa_{t-1} + \frac{k_t}{1 + \gamma_t} \, nfa_{t-1},$$

where γ is the country's rate of nominal growth, *i* is the yield rate, and *k* is the rate of capital gain on external assets and liabilities. The last term on the right-hand side defines the *valua-*

tion effect shown in figures and tables in this chapter.

External Solvency

Because the accounting identity for net foreign assets holds in every period, it can be expressed on a cumulative basis—the so-called intertemporal budget constraint for a country—leading to the well-known proposition that a debtor country is *solvent* if the net present value of its future net exports equals the current period value of its net foreign liabilities.

External Sustainability and Imbalances

The intertemporal solvency condition serves only to exclude cases in which a country indulges in perpetual debt refinancing of its external imbalances (a so-called Ponzi game), but is otherwise consistent with many patterns for future net foreign assets, including one in which they increase exponentially at a rate lower than the difference between the yield on net external liabilities and the growth rate. A more operational definition of *sustainable* net exports consists in imposing that they *stabilize* the ratio of net foreign assets to GDP to a certain level. This could be its current level, or a level that is considered consistent with the international investors' willingness to lend to the country (which, in turn, may relate to their perception of the country's willingness and ability to meet its external obligations), or a level consistent with some optimal, theoretically predicted, benchmark. In this case, the level of net exports that a country needs to sustain in the long run to keep the ratio of net foreign assets to GDP constant at a level denoted with $\overline{nfa}$ can be written as

$$nx_t^* = \frac{r - g}{1 + g} \, \overline{nfa},$$

where *r* is the total real return (yield plus capital gains) on net foreign assets and *g* is the country's rate of real growth. In this framework, the difference between the current level of net

exports and nx^* can be interpreted as a measure of the degree of external imbalances.

Financial Integration and External Adjustment

Introducing different rates of return on foreign assets and liabilities, the accumulation identity for net foreign assets can be written as

$$nfa_t - nfa_{t-1} \equiv nx_t + \frac{r_t^L - g_t}{1 + g_t}\, nfa_{t-1} + \frac{r_t^A - r_t^L}{1 + g_t}\, a_{t-1},$$

where r^L is the total real return (yield plus capital gains) on foreign liabilities, r^A is the total real return on foreign assets, and a denotes gross foreign assets (as a share of GDP). *Sustainable* net export levels can then be defined as

$$nx^* = \frac{r^L - g}{1 + g}\, \overline{nfa} - \frac{r^A - r^L}{1 + g}\, \overline{a}.$$

This expression shows that a larger (steady-state) stock of gross foreign assets imposes a bigger trade adjustment if the return differential $r^A - r^L$ is negative, highlighting the greater exposure arising from larger external positions. A numerical example of this effect is shown in Table 3.9, where the steady-state net exports derived from GEM are equal to the first term on the right-hand side of the expression above. Sustainable net export levels after a risk premium shock—modeled as increases in r^L while keeping r^A unchanged—are then obtained by adding the second term, taking the level in the year underlying the calibration as the steady-state ratio of gross foreign assets to GDP $\overline{a}$.

Appendix 3.2. Econometric Evidence on the Valuation Channel

The main author of this appendix is Roberto Cardarelli.

This appendix provides details on the econometric evidence discussed in the main text about the role of the valuation channel in external adjustment.

Modeling and Econometric Strategy

The role of the valuation channel in the process of adjustment of external imbalances is assessed empirically by examining the dynamic responses of net exports and net foreign assets to shocks that move the two variables away from their long-run relationship implied by a country's intertemporal budget constraint. The latter is given by

$$NFA_t = \sum_{i=0}^{\infty} R_{t,t+i}(X_{t+i} - M_{t+i}), \qquad (1)$$

where NFA_t represents the real (based on GDP deflator) level of net foreign assets; X_t and M_t, the volumes of export and imports of goods and services, and $R_{t,s}$—the discount factor for period s net exports—is a function of the real returns on net foreign assets r_t (see also Appendix 3.1).[45]

Following Gourinchas and Rey (2004) and Corsetti and Konstantinou (2004), it is possible to derive the following log-linear approximation of equation (1):

$$x_t - \gamma m_t + (\gamma - 1)\, nfa_t$$
$$= \sum_{i=1}^{\infty} \rho^i [\Delta x_{t+i} - \gamma \Delta m_{t+i} + (\gamma - 1)\, r_{t+i}], \qquad (2)$$

where lowercase letters denote logarithms.[46] Under the assumptions that r_t, Δx_t, and Δm_t are stationary, expression (2) implies that x, m, and nfa should be cointegrated, and the left-hand side (the cointegration residual) represents deviations from the long-run relationship among the three variables. Expression (2) also implies that if the cointegrating residual is not a constant, it has to *predict* either changes in the future net exports or in net foreign returns or both. For example, if a country develops a larger trade deficit relative to what is consistent with its steady-state net foreign assets position, the deviation from the long-run relationship has to be

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[45]In particular, $R_{t,s} = \prod_{i=0}^{s} \dfrac{1}{(1 + r_{t+i})}$.

[46]In expression (2), γ and ρ are constants related to the log-linearization of the country's intertemporal budget constraint (see Corsetti and Konstantinou, 2004).

corrected either by an increase in future net exports or by a future increase in net returns on the stock of its foreign assets and liabilities, or a combination of the two.

Based on this framework, the relevance of a valuation channel in the process of adjustment of external imbalances is assessed in two different ways.

- Using annual data from 1970 to 2003,[47] the following vector error correction model (VECM) representation of the three variables $Y = [x, m, nfa]$ was estimated for 21 industrial countries and 28 emerging market countries:[48]

$$\Delta Y_t = c + \alpha \beta' Y_{t-1} + \Gamma(L)\Delta Y_{t-1} + e_t,$$

where ΔY_t is the first difference of the vector Y_t; Γ is a coefficient matrix, $\beta' Y_{t-1}$ is the last period's deviation from the long-run relationship (cointegrating residual in period $t-1$), L is the lag operator, and α is a vector of adjustment coefficients that determines how each variable adjusts to restore the long-run relationship if the cointegration residual signals a deviation from that relationship.

If the coefficient α in the equation for net foreign assets is statistically significant, this implies that changes in net foreign assets play a role in the adjustment to restore the long-run relationship among the three variables x, m, and nfa (see Lettau and Ludvigson, 2004, and Corsetti and Konstantinou, 2004). In fact, that role varies with the value of α. The larger the value of α in the equation for net foreign assets, the bigger the role played by changes in that variable in the overall adjustment. Moreover, using cointegration results (and assuming orthogonality between shocks), one can distinguish between permanent and transitory

shocks on the variables in Y.[49] In particular, it has been shown that variables that participate significantly in the adjustment are assigned a relatively large (small) weight in the transitory (permanent) innovations. A large value of α in the equation for net foreign assets, therefore, implies that a significant share of the variation in net foreign assets is explained by transitory movements. These, in turn, can be interpreted as exchange-rate- or asset-price-related valuation effects that force the stock of net foreign assets to temporarily deviate from its trend to help restore the long-run relationship with net exports.

If, on the other hand, the coefficient α in the equation for net foreign assets is not significantly different from zero, net foreign assets do not play a role in the adjustment process. In this case, the adjustment has to come exclusively from trade flows and any shock has permanent effects on net foreign assets, which will follow a random walk process. This, in turn, is interpreted as evidence against the notion that the valuation channel facilitates the adjustment of external imbalances.

- Using quarterly data on net foreign assets and returns, the implication that deviations from the long-run relationship may predict future changes in net foreign returns was formally tested for G-7 countries. In particular, in-sample forecasts were performed by regressing the changes between t and $t + k$ of export, import, net foreign returns, and real exchange rates on the estimated cointegrating residuals (see Gourinchas and Rey, 2004). For example, the regression for export growth between t and $t + k$ ahead takes the form

$$X_{t+k} - X_t = c + \delta(\hat{\beta}' Y_{t-1}) + e_t.$$

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[47]For some countries, the sample period is slightly shorter, especially for emerging market countries, where data tend to start from the mid-1970s.

[48]The industrial countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The emerging market countries are Argentina, Brazil, Chile, People's Republic of China, Colombia, Costa Rica, Côte d'Ivoire, Ecuador, Egypt, Hungary, India, Indonesia, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, the Philippines, Poland, Singapore, South Africa, Taiwan Province of China, Thailand, Turkey, Uruguay, and Venezuela.

[49]Methodologies to decompose transitory and permanent components based on the cointegration results have been described by King and others (1991), Gonzalo and Granger (1995), Gonzalo and Ng (2001), and Warne (1993).

Results

For each of the 49 countries considered, the existence of cointegration among the logarithm of real exports, imports, and net foreign assets was tested using Johansen's trace test.[50] For the vast majority of countries (37), the results supported the null hypothesis of one cointegrating relationship among the three variables at a 5 percent confidence level. However, since the intertemporal budget constraint is an identity that needs to hold in the long run, cointegration was imposed for all countries in the subsequent analysis, as was the condition that the cointegrating vector is of the form $\beta = [1, -\gamma, (\gamma - 1)]$ (formal tests suggested rejection of that restriction in about one-half of the countries).

The subsequent estimates of the VECM show that the adjustment coefficient α in the equation for Δnfa_t was significantly different from zero for a number of industrial countries (8 out of 21), including Japan and the United States, for which about one-half of the variation in net foreign assets was explained by transitory shocks. On the contrary, the adjustment coefficient in the equation of net foreign assets was statistically significant for only 4 of the 28 emerging market and developing countries (net foreign assets were found weakly exogenous to the system for all other countries).

The difference between the two sets of countries emerges from Table 3.10, showing the arithmetic average of the countries' variance decompositions (mean group estimator).[51] On average, the share of the variation in net foreign assets explained by transitory shocks at a one-year horizon is about twice for the 21 industrial countries as much as that for the 28 emerging market countries considered.

The ability of deviations from trend to predict future changes in net foreign returns was assessed through in-sample forecasts only for the G-7 countries, for which quarterly series on net foreign assets and net foreign returns were constructed (see below). Evidence of cointegration was found only for Canada, Germany, Japan, and the United States, so Table 3.11 shows the results only for these countries. In all four countries, cointegrating residuals have substantial predictive power (reflected in a high relative value of the R^2 of the regressions) for export and/or import growth over relatively long horizons. The coefficients generally have the expected sign (negative for export growth and positive for import growth), and tend to be statistically significant for long horizons. By contrast, cointegrating residuals do not seem to have the same general ability to predict future net foreign returns. In these regressions,

Table 3.10. Panel VECM: Forecast Variance Decomposition[1]
(Percent)

	Industrial Countries					
	X		M		NFA	
Horizon	P	T	P	T	P	T
1	86	14	70	30	79	21
2	87	13	74	26	81	19
3	89	11	79	21	83	17
4	89	11	84	16	85	15
10	95	5	92	8	90	10

	Emerging Markets					
	X		M		NFA	
Horizon	P	T	P	T	P	T
1	82	18	48	52	90	10
2	85	15	58	42	93	7
3	87	13	65	35	95	5
4	90	10	70	30	96	4
10	96	4	85	15	99	1

Source: IMF staff calculations.
[1]Fraction of the variance of the h-year ahead forecasts error of exports (X), imports (M), and net foreign assets (NFA) that is explained by the two permanent (P) shocks combined and the single transitory (T) shock. Values reported are the averages across countries.

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[50]The number of lags in the VECM specification was chosen in accordance with standard lag order selection criteria (such as the Akaike and Hannan-Quinn information criteria). However, given the limited number of time-series observations available, a more parsimonious choice was often preferred, as long as it resulted in normally distributed and serially uncorrelated errors.

[51]See Pesaran and Smith (1995) and Rebucci (2003), for a description of the properties of this estimator.

Table 3.11. Predictive Ability of Cointegrating Residuals

	Forecast Horizon (quarter)											
	United States						Japan					
	1	2	4	8	12	24	1	2	4	8	12	24
	Real Export Growth						Real Export Growth					
	0.00	0.00	−0.02	−0.05	−0.12	**−0.38**	**−0.07**	**−0.16**	**−0.35**	**−0.50**	**−0.43**	**−0.59**
R^2	0.00	0.00	0.01	0.02	0.03	0.13	0.08	0.16	0.32	0.39	0.32	0.53
	Real Import Growth						Real Import Growth					
	0.00	0.00	0.01	0.11	**0.24**	0.24	−0.01	−0.02	0.00	0.26	**0.63**	**1.14**
R^2	0.00	0.00	0.00	0.04	0.12	0.05	0.00	0.00	0.00	0.06	0.23	0.56
	Real Net Foreign Return						Real Net Foreign Return					
	−0.02	**−0.02**	**−0.02**	**−0.01**	−0.01	0.00	0.01	0.01	0.00	−0.01	−0.02	−0.01
R^2	0.04	0.07	0.08	0.06	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.01
	Real Effective Exchange Rate (+ = appreciation)						Real Effective Exchange Rate (+ = appreciation)					
	0.02	0.04	0.08	0.15	0.20	0.26	0.06	0.11	0.25	**0.64**	**0.81**	**0.71**
R^2	0.04	0.05	0.09	0.11	0.08	0.04	0.01	0.02	0.04	0.15	0.16	0.12
	Germany						Canada					
	1	2	4	8	12	24	1	2	4	8	12	24
	Real Export Growth						Real Export Growth					
	−0.06	−0.12	−0.19	−0.30	**−0.39**	**−0.90**	0.00	0.02	−0.01	−0.23	**−0.51**	**−0.59**
R^2	0.02	0.04	0.05	0.08	0.11	0.41	0.00	0.00	0.00	0.04	0.16	0.23
	Real Import Growth						Real Import Growth					
	0.01	0.01	0.08	0.21	0.17	0.18	**0.10**	**0.22**	**0.42**	**0.46**	**0.45**	0.26
R^2	0.00	0.00	0.02	0.05	0.02	0.02	0.07	0.13	0.19	0.14	0.12	0.03
	Real Net Foreign Return						Real Net Foreign Return					
	0.03	0.03	0.03	0.03	0.02	−0.02	−0.02	−0.02	0.00	0.05	0.07	0.04
R^2	0.01	0.01	0.01	0.03	0.01	0.02	0.00	0.00	0.00	0.04	0.12	0.10
	Real Effective Exchange Rate (+ = appreciation)						Real Effective Exchange Rate (+ = appreciation)					
	0.00	0.01	0.03	0.12	0.18	**0.51**	0.02	0.04	0.07	0.14	0.36	**0.46**
R^2	0.00	0.00	0.00	0.02	0.06	0.24	0.00	0.01	0.01	0.02	0.10	0.15

Source: IMF staff calculations.
Note: For each variable, the table shows (1) the coefficient δ of regressions of the form: $Y_{t+k} - Y_t = c + \delta(\hat{\beta}Y_{t-1}) + e_t$, where the left-hand side denotes the change in the variable between $t + k$ and t, and the independent variable is the deviation of net exports and net foreign assets from their long-run relationship (cointegration residual) and (2) the R^2 of the regression. Bold values denote coefficients that are significant at a 5 percent level (based on Newey-West robust standard errors).

the coefficients have the expected negative sign and are statistically significant only for the United States. Finally, deviations from trend seem to have some predictive power for real exchange rates only for medium and long horizons, when coefficients are generally found to be statistically significant (the United States again being the exception). This is consistent with the adjustment taking place more through long-term (exchange-rate-related) realignments of trade flows, rather than through short-term valuation changes in the stock of foreign assets.

Data

Exports and imports: Annual and quarterly data from the OECD (*Economic Outlook*).

Net foreign assets: Annual data from Lane and Milesi-Ferretti (2005b). Quarterly data on the stocks of foreign assets and liabilities were obtained by interpolating the Lane and

Milesi-Ferretti annual data, using the quarterly path of capital inflows and outflows (from the IMF's *International Financial Statistics*).

Quarterly returns on foreign assets and liabilities: Following the methodology adopted by Gourinchas and Rey (2004) to estimate the returns on foreign assets and liabilities for the United States, quarterly rates of return of foreign assets and liabilities were constructed for the G-7 countries as weighted averages of the returns on four different subcategories of the financial accounts (equity, FDI, debt, and other assets and liabilities), with weights given by their relative shares in the total stock of assets and liabilities.

Returns were estimated as follows. For equity assets, returns were calculated as the weighted average of quarterly (dollar) returns on the Morgan Stanley Capital International (MSCI) indexes for the major countries of nonresident issuers, with weights from the geographical allocation of foreign equity assets as reported in the IMF's 2001 *Coordinated Portfolio Investment Survey* (CPIS). For FDI assets, the same returns were used but the weights reflected the geographical allocation of FDI assets, as reported by the OECD's *International Direct Investment* database. For debt assets, the returns were calculated as a weighted average of the (dollar) long-term interest rates on government bonds (from the OECD's *Economic Outlook*), with weights derived from the geographical allocation of long-term debt assets reported in the 2001 CPIS. For other assets, the returns were calculated as a weighted average of the (dollar) short-term interest rates (from the OECD's, *Economic Outlook*), with weights from the 2001 CPIS foreign geographical allocation of short-term debt assets. For each country, the returns on equity and FDI liabilities were estimated as the return on their MSCI indexes (in U.S. dollars), while returns on debt and other liabilities were estimated as the national long- and short-term interest rates (in U.S. dollars). Conversion into U.S. dollars was obtained using end-of-period exchange rates from the OECD's *Main Economic Indicators.* Nominal returns were then deflated using the U.S. GDP deflators, and converted into local currencies using bilateral real exchange rates against the U.S. dollar.

Appendix 3.3. Details on Rigidities and Monetary Policy Rule Used in the GEM Simulation

The author of this appendix is Nicoletta Batini.

Preliminary Estimates of Nominal and Real Rigidities

To examine whether nominal and real rigidities have changed in the past three decades, IMF staff estimated structural equations for inflation using data from G-7 countries. These equations, known in the literature as New Keynesian Phillips Curves (NKPC) (see Sbordone, 2005), describe the evolution of aggregate inflation with respect to marginal costs faced by firms in the production of goods and services, and capture the fact that prices are set in a forward-looking way. The extent of nominal and real rigidities can be gauged by looking at reduced-form parameter estimates that, in turn, depend nonlinearly on structural parameters in the equations.

For the standard specification of the NKPC, it is assumed that steady-state inflation is zero, and that the world is "hybrid" in the sense that a fraction of firms are forward-looking and set prices in a staggered fashion as in Calvo (1983) while the rest are myopic and set their prices equal to the average price in the previous period. The NKPC can then be written as follows (variables are expressed in log deviation from their steady-state values):

$$\pi_t = \lambda mc_t + \gamma_f E_t\{\pi_{t+1}\} + \gamma_b \pi_{t-1}, \qquad (1)$$

where π_t is inflation, mc_t is the real marginal cost, and E_t is the expectational operator based on information at time t. The marginal cost is unobservable and, thus, it is usually proxied by an appropriate measure of the unit labor cost. The parameters λ, γ_f, and γ_b are functions of the probability faced by firms of resetting their

Table 3.12. Estimates of Nominal and Real Rigidities in an Earlier and a Later Sample

	Degree of Nominal Rigidity (D)		Degree of Real Rigidity (λ)	
	Earlier sample	Later sample	Earlier sample	Later sample
Canada	9.92	3.12	0.25	0.09
France	2.31	12.50	0.01	0.00
Germany	3.12	3.84	0.25	0.18
Italy	1.47	11.00	0.45	0.06
Japan	10.45	9.00	0.009	0.009
United Kingdom	2.81	2.17	0.23	0.00
United States	3.41	2.86	0.16	0.00

Source: IMF staff calculations.

prices in each period $(1 - \theta)$, the fraction of myopic firms (ω), and the discount rate (β).

The degree of nominal rigidity, or price inertia, is typically captured by $D = (1/1 - \theta)(1/1 - \omega)$, which measures the average duration of price contracts when a fraction of firms are myopic (see Galí, Gertler, and López-Salido, 2001). The degree of real rigidity is usually captured by λ, where $\lambda \equiv (1 - \omega)(1 - \theta)(1 - \beta\theta)\phi^{-1}$, and where, in turn, $\phi \equiv \theta + \omega[1 - \theta(1 - \beta)]$ (see Coenen and Levin, 2004).

Table 3.12 reports values of D and λ from preliminary results obtained by estimating equation (1) for a group of G-7 countries with the General Method of Moments, using quarterly data over two different samples: an earlier sample covering the 1970s up to the mid-1980s, and a later sample covering the second half of the 1980s to the present.[52] Results indicate that real rigidities seem to have diminished over time, while the direction of nominal rigidities has been more mixed, especially in the case of European countries, in line with findings in Batini (2002) and Khan (2004).

Monetary Policy Rule Used in the Simulations

The simulations shown in the chapter use the same specification for the monetary policy rule for the interest rate as that of a policy rule esti-mated by Orphanides (2003) for the United States. The properties of inflation-forecast-based rules like this, with and without output terms, are discussed in Batini and Haldane (1999). The exact specification used in the chapter is as follows:

$$i_t = \theta_0 + \theta_i i_{t-1} + \theta_\pi i_{t+3}^a + \theta_{\Delta y}\Delta^\alpha y_{t+3} + \theta_y y_{t-1}, \quad (2)$$

where i_t is the short-term nominal interest rate; $\pi_{t+3}^a = [(p_{t+3} - p_{t+1}) - \pi_t^T$ is the one-year-ahead forecast of inflation starting at $t - 1$; $y_{t-1} = q_{t-1} - q_{t-1}^*$ is the output gap in period $t - 1$; and $\Delta^\alpha y_{t+3} = y_{t+3} - y_{t+1} = \Delta^\alpha q_{t+3} - \Delta^\alpha q_{t+3}^*$ is the one-year-ahead growth forecast relative to potential growth. In the model simulations, price inflation used in the rule is taken to be consumer price inflation.

π_t^T is the annual inflation target. This is set to 2½ percent for the United States and 2 percent for Japan and the euro area and the rest of the world. In the simulation with adverse global financial market conditions (Figure 3.13), emerging Asia is assumed to float its currency and move to a rule like (2), with an inflation target that is gradually reduced to 2½ percent by 2007. Details of the remaining parameters used in the rule in the two vintage model calibrations of GEM are given in Table 3.8 in the main text.

Decomposition of Differences in Two GEM Calibrations

Table 3.13 shows a breakdown of the contribution by various groups of parameters to the differences in the response paths of output growth, inflation and interest rates, and real exchange rates at various horizons between the less globalized and more globalized environment. The table illustrates that while the economic size of various blocs, a more equal distribution of trade, and differences in monetary policy are key in explaining differences across simulations between the "low integration" and the "high integration" worlds, greater flexibility and greater international competition seem to play a

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[52]Exact sample periods are slightly different for each country to maximize individual fits.

Table 3.13. Decomposition of Differences in Response Paths by Parameter Groups
(Differences in percentage points)

	Total	Trade	Markups	Flexibility Contracting[1]	Monetary Policies	Cross Effects
Decomposition for emerging Asia						
First two years						
Output growth	−2.11	−2.46	0.02	−0.26	0.28	0.30
Year-on-year inflation	0.16	−0.74	−0.03	−0.30	1.15	0.08
Real short-term interest rate	−0.44	0.92	0.24	1.28	−2.49	−0.39
Real effective exchange rate	0.82	0.82	0.06	0.39	−0.13	−0.32
First five years						
Output growth	−1.46	−1.56	0.01	−0.00	0.01	0.09
Year-on-year inflation	−0.74	−1.34	−0.05	−0.06	0.70	0.02
Real short-term interest rate	1.85	2.97	0.19	0.31	−1.58	−0.05
Real effective exchange rate	2.72	3.27	0.19	0.31	−0.36	−0.68
Long run						
Output growth	−0.02	−0.03	−0.00	0.02	0.00	−0.01
Year-on-year inflation	−0.01	−0.01	0.00	0.01	0.00	−0.00
Real short-term interest rate	−0.05	−0.03	−0.00	−0.01	−0.01	0.01
Real effective exchange rate	6.04	7.79	0.69	−0.21	−1.12	−1.12
Decomposition for Japan/euro area						
First two years						
Output growth	0.07	0.06	−0.01	−0.00	0.05	−0.03
Year-on-year inflation	−0.09	−0.08	−0.01	0.01	0.01	−0.02
Real short-term interest rate	0.20	0.18	0.02	−0.01	−0.06	0.06
Real effective exchange rate	1.44	1.56	−0.03	−0.13	−0.09	0.13
First five years						
Output growth	0.03	0.05	−0.01	−0.02	0.00	0.00
Year-on-year inflation	−0.09	−0.08	−0.00	0.01	−0.01	−0.00
Real short-term interest rate	0.20	0.21	0.01	−0.04	0.01	0.02
Real effective exchange rate	2.31	2.29	−0.06	−0.07	−0.05	0.20
Long run						
Output growth	−0.00	−0.00	0.00	0.00	0.00	−0.00
Year-on-year inflation	−0.00	−0.00	−0.00	−0.00	0.00	−0.00
Real short-term interest rate	−0.02	−0.01	0.00	−0.00	−0.01	0.00
Real effective exchange rate	3.55	3.04	−0.12	0.08	0.30	0.25
Decomposition for the United States						
First two years						
Output growth	0.66	0.11	0.00	0.02	0.50	0.02
Year-on-year inflation	0.97	0.11	−0.01	0.01	1.01	−0.15
Real short-term interest rate	−2.93	−0.33	0.00	0.05	−3.04	0.39
Real effective exchange rate	−0.57	−0.55	−0.03	−0.12	0.02	0.12
First five years						
Output growth	0.18	0.09	0.01	0.03	0.08	−0.02
Year-on-year inflation	0.54	0.04	−0.00	−0.04	0.68	−0.13
Real short-term interest rate	−1.69	−0.14	0.01	0.13	−2.04	0.35
Real effective exchange rate	−2.25	−1.90	−0.05	−0.14	−0.26	0.10
Long run						
Output growth	0.01	0.01	−0.00	0.00	0.00	−0.00
Year-on-year inflation	0.00	0.00	0.00	0.00	−0.00	−0.00
Real short-term interest rate	−0.12	−0.11	−0.00	−0.00	−0.00	0.00
Real effective exchange rate	−4.59	−2.92	−0.20	−0.17	−1.16	−0.14

Source: IMF staff calculations.
Note: The table shows the approximate differences between response paths of output growth, inflation, real interest rates, and real exchange rates at three time horizons. The values shown in the first column reflect the total difference between the response paths in the high integration version (2003 calibration) and response paths in the low integration version (1984 calibration). Values in the second to the fifth columns show differences attributable to changes in each parameter group for all four blocks (holding all other parameters constant).
[1]Difference in average contract length.

minor role. This finding reflects two facts: first, the calibrations allow for similar gains in flexibility and competition in all blocs, dampening the relative effect of these changes in parameters across the versions of the model; and second, empirical evidence suggests that in fact mark-ups and rigidities differ only marginally across the two globalization environments (see also Table 3.8 in the main text).

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