THREE ESSAYS ON HOW FINANCIAL MARKETS AFFECT REAL ACTIVITY

This chapter contains three essays on current policy issues associated with debt defaults, wealth effects, and monetary policy, which have a common theme of linking financial, monetary policy, and institutional developments to the real economy. The first essay, for example, discusses why public debt crises have been relatively frequent in Latin America, notwithstanding the fact that the region's total external debt has actually been lower than other regions and that government debt has *not* been particularly high as a fraction of national income. The essay notes that, while the region has made considerable progress in improving underlying macroeconomic conditions over the past decade, three key vulnerabilities remain—namely, relatively low integration with the world economy, the instability of macroeconomic policies, and shallow domestic financial markets. The various channels through which these factors undermine these countries' capacity to repay their external debt are examined, and policy implications drawn.

The second essay discusses how the tremendous wealth creation in industrial countries since the mid-1990s has affected consumption. It puts particular emphasis on the interaction between the wealth effect and financial markets, discussing how the wealth effect has risen over time as financial markets have deepened, been larger in countries whose financial systems are based on direct finance, and become increasingly correlated across countries as financial markets have become more globalized.

The third essay examines the policy challenges of an environment of low inflation. It discusses how better monetary policies since the 1970s—a larger response to inflationary shocks and more predictable policies—led to a more forward-looking wage-price process, creating a virtuous circle that lowered the volatility of both output and inflation. It concludes that, because of the existence of the zero interest bound, central banks' concerns about higher inflation have to be balanced by concerns about deflation. In particular, it notes that the danger of getting into a deflationary spiral increases markedly as inflation targets are lowered below 2 percent and that there are grounds for becoming more proactive with regard to sharp falls in output.

Debt Crises: What's Different About Latin America?[1]

Latin America has a long and turbulent history of external financing crises. Not only have sovereign defaults and reschedulings been far more frequent in Latin America than elsewhere over the past one-and-a-half centuries, but also their recurrence has remained high in recent decades (Figure 2.1). While policy reforms in the 1990s raised expectations of a clear break with this pattern, debt crises have continued to crop up in recent years, albeit at a more moderate rate, including Mexico (1994/95), Ecuador (1999), and Argentina (2001/02). Against this background, and with continuing high sovereign spreads for most of the region, external debt remains a central issue in Latin America.

The causes of sovereign debt crises are complex and multifaceted. They have economic and legal, as well as political roots, a full assessment of which is beyond the scope of this essay. Instead, the aim is to focus on three key factors that have exacerbated the external financing difficulties faced by Latin American emerging markets as a group—namely, the relatively weak trade links with the world economy, the instability of macroeconomic policies, and domestic financial underdevelopment and associated low

[1]The main author of this essay is Luis Catão; Bennet Sutton provided research assistance.

Figure 2.1. Sovereign Defaults and Reschedulings
(Number of events per country in region)

Sovereign defaults and reschedulings have been more frequent in Latin America than in other regions.
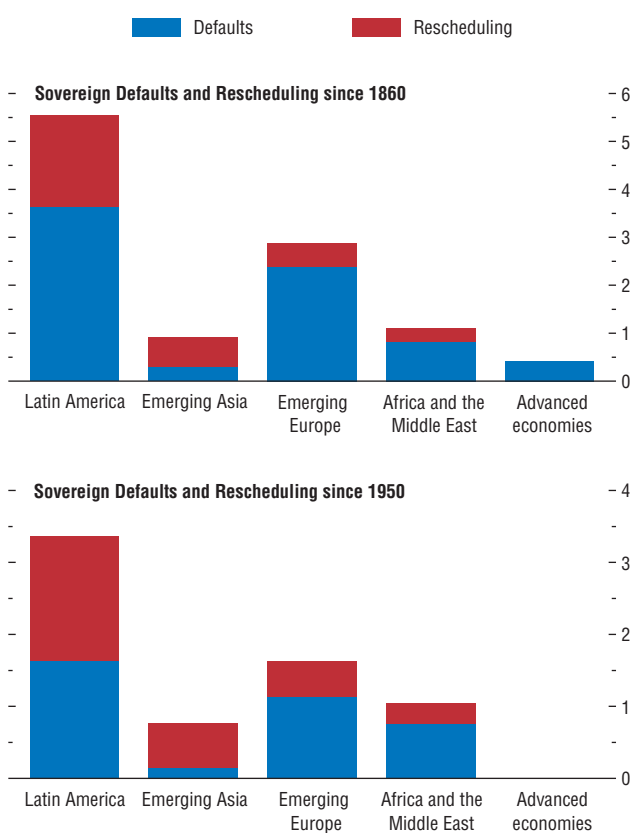
Sources: Lindert and Morton (1989); and Reinhart (2001).

saving rates. As argued below, these factors to-gether help explain apparent paradoxes about Latin American debt crises, such as the fact that debt crises have been more frequent there even though average ratios of debt to GDP have been lower than in other regions and that the coun-tries affected have displayed very distinct fiscal positions at the onset of debt crises.

That said, it should be acknowledged that there are very considerable differences in macro-economic policies and economic fundamentals within Latin America. In a similar vein, notable progress on structural reforms has been made over recent years, although again with significant variation across countries. While a comprehen-sive discussion of particular cases is impossible within the confines of this relatively short essay, progress across a range of issues has been made by Brazil, Chile, and Mexico.

External Debt and Openness

Latin America's external borrowing exhibits three key distinctive features relative to other re-gions. First, total external debt (private plus pub-lic) is not overly high relative to GDP on average (Figure 2.2). Thus, contrary to what is some-times suggested, these economies do not appear to overborrow relative to their income.

Second, most of Latin America's external debt is accounted for by the public sector. This is the case not only for low-income countries but also for virtually all emerging markets in the re-gion—the group of countries on which the re-mainder of this essay will focus. As can be seen from the second panel of Figure 2.2, the share of public and public-guaranteed debt in Latin America has been higher than in Asia, including through the 1997/98 crisis when Asian govern-ments took over a large part of these countries' private sector external debt. The flip side of this heavy participation of sovereigns in Latin America's external borrowing is that financial linkages through borrowing between the re-gion's private sector and world capital markets have been thin. In this context, it is hardly sur-prising that external debt crises in the region

have generally been triggered by governments' financing problems rather than by private sector default on external obligations.

A third but no less significant Latin American singularity is that while external debt is not so high relative to GDP, it is very high relative to exports (see bottom panel of Figure 2.2). This long-standing feature of most countries in the region stems largely from a combination of macroeconomic imbalances and protectionist policies started in the 1930s, which set off an inward-looking development pattern that only recently has begun to be reversed.[2] Although economic liberalization and associated policy reforms over the past decade have helped boost external trade, and export growth did accelerate in the 1990s relative to the 1980s, most Latin American economies still remain far more closed to foreign trade than their Asian counterparts. As Table 2.1 indicates, this is not only because the starting level of openness was low at the onset of the reforms, but also because export growth in many countries is yet to match the strong performance of several Asian emerging markets.

The resulting mismatch between capital account openness and trade openness, and the ensuing high ratio of foreign debt to exports—and in particular of foreign *public* debt to exports—increases a country's vulnerability to debt crises through several channels. First, external solvency requires the country to generate enough foreign exchange through trade surpluses to meet present and future payments on its foreign debt. To the extent that low exports make it more difficult to realize future trade surpluses through depreciations in the exchange rate, they raise concerns about the country's debt repayment capacity. These concerns can be especially troublesome when international liquidity is highly cyclical. Whenever international liquidity

[2]For a discussion of what triggered—as well as the description of those policies that led to—Latin America's gradual closure to foreign trade from the 1930s to the 1980s, see Diaz-Alejandro (1970), Thorp (1984), and Taylor (2000). Prior to the 1930s, even large countries such as Argentina and Brazil were far more open to foreign trade than they are today.

Figure 2.2. External Debt

Latin America's external debt has not been relatively high as a share of GDP but it has been high as a ratio to exports.
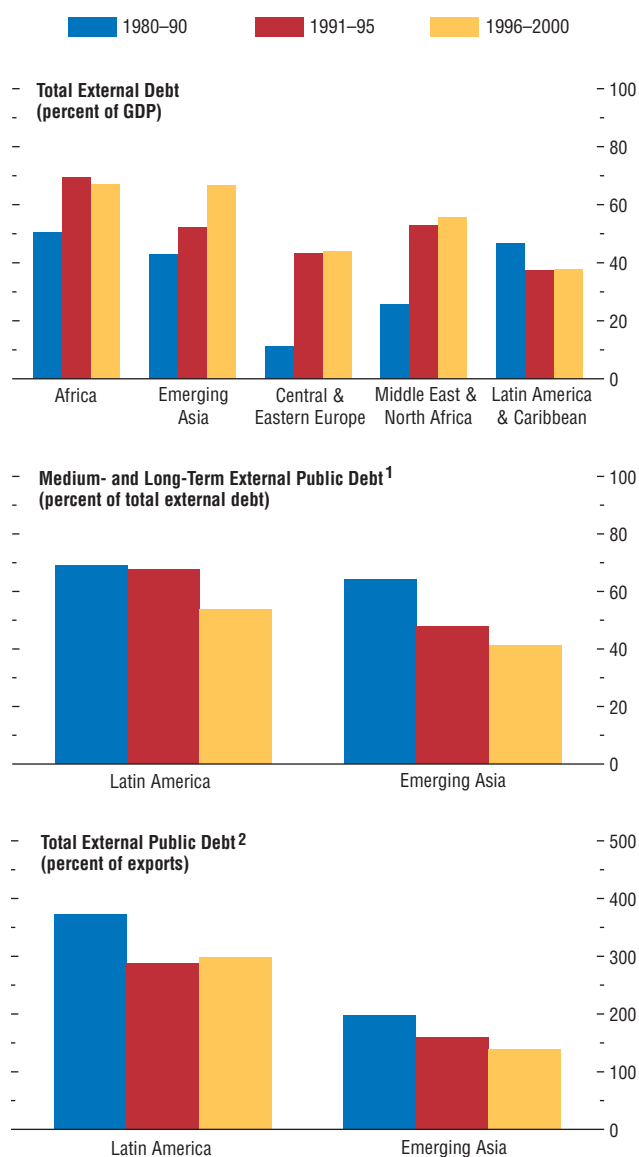
Sources: World Bank, *Global Development Finance;* and IMF staff estimates.
[1]Latin American countries include Argentina, Brazil, Chile, Colombia, Mexico, Peru, Uruguay, and Venezuela. Emerging Asian countries include Indonesia, Korea, Malaysia, the Philippines, and Thailand. Weighted averages using nominal GDP in U.S. dollars.
[2]Latin American countries include Argentina, Brazil, Chile, Colombia, Mexico, Peru, Uruguay, and Venezuela. Emerging Asian countries include India, Indonesia, Korea, Malaysia, the Philippines, Singapore, and Thailand. Weighted averages using nominal GDP in U.S. dollars.

Table 2.1. Export Performance in Latin America and Asia[1]

	Export Volume (annual percent change)		US$ Export Value (annual percent change)		Exports (percent of GDP)	
	1980–90	1990–2000	1980–90	1990–2000	1980–90	1991–2000
Argentina	5.04	6.38	2.84	7.52	8.96	9.05
Brazil	5.59	7.34	4.73	6.41	10.10	9.04
Chile	6.09	9.34	5.43	8.01	27.23	29.54
Colombia	7.37	3.68	5.03	6.08	15.07	17.00
Mexico	7.67	11.36	8.22	9.98	16.96	25.20
Peru	–7.74	8.05	–1.57	7.65	16.74	13.38
Venezuela	2.33	2.41	–0.72	6.28	27.49	27.75
Latin American average[2]	3.76	6.94	3.42	7.42	17.51	18.71
Hong Kong, SAR[3]	13.11	9.22	14.65	9.27	110.70	139.86
Indonesia	1.15	10.44	3.35	8.87	25.06	31.68
Korea	10.87	15.76	13.97	10.86	41.56	34.18
Malaysia	9.65	9.79	8.83	13.10	59.32	96.21
Philippines	3.57	9.25	5.03	13.72	24.17	40.96
Singapore[3]	9.44	10.65	10.77	9.42	179.55	170.17
Thailand	12.39	10.95	14.73	9.93	26.61	46.25
Emerging Asia average[2]	8.60	10.87	10.19	10.74	66.71	79.90
excluding Hong Kong SAR and Singapore	7.53	11.24	9.18	11.30	35.34	49.86

Source: IMF staff estimates.
[1]Exports of goods and non-factor services.
[2]Unweighted averages.
[3]Exports inclusive of re-exports.

becomes abundant (often following monetary loosening and low interest rates in advanced economies), lending booms to emerging markets usually follow, and these tend to be especially marked in Latin America.[3] If the ratio of foreign debt to exports is high to begin with, and rises further during the boom, it is likely that at a certain point foreign lenders will start wondering whether the country is externally insolvent. As discussed elsewhere, such concerns are typically exacerbated by terms-of-trade shocks, hikes in world interest rates, or crises in other emerging markets.[4] Against the background of a rising debt to export ratio, one or more of those adverse shocks can readily raise solvency concerns and trigger a capital outflow precisely at the moment when the international provision of liquidity is most needed to ride out the shock. Debt-servicing problems typically arise at those junctions.

Low trade openness also has a negative bearing on foreign debt repayment through two other channels. First, incentives to debt repayment are lower the more closed the economy, since gains from trade and losses from commercial sanctions following debt repudiation amount to a smaller fraction of GDP.[5] Second, exchange rate devaluations can exacerbate fiscal problems when the economy is highly open on the capital account but relatively closed on the external trade side. This is because when the export to GDP ratio is low, and the bulk of government borrowing is foreign currency–denominated, a devaluation provides a limited boost to real

[3]For evidence that swings in the supply of external finance have been a main determinant of lending booms in emerging markets and Latin America in particular, see Calvo, Reinhart, and Leidermann (1996) and Arora and Cerisola (2001) on the 1990s, and Diaz-Alejandro (1983) and Fishlow (1989) for interesting parallels with the pre–World War II era.

[4]See Catão and Sutton (2002).

[5]The view that trade losses and commercial sanctions are a key deterrent to debt repudiation was first formalized by Bulow and Rogoff (1989). Rose (2002) provides evidence that this channel has been quite effective in practice. This point does not rule out, of course, the possibility that losses to defaulting countries may extend far beyond the foreign trade area.

activity and hence to government revenues, while the domestic currency value of the debt service will rise in tandem with the devaluation.[6] Thus, external debt crises are more likely to arise when this mismatch exists. This happened, for instance, in several Latin American countries during the 1980s, when export growth following devaluations failed to pull those economies out of recession and automatically generate tax revenues needed to meet external debt payments. Partly as a result, the ratio of external debt service to tariff revenues rose sharply and remained high for years (Figure 2.3). In contrast, the drop was not as dramatic (despite similarly sharp devaluations) and the rebound was much quicker in the more open economies in Asia following the 1997/98 crisis, as rapid export growth helped pull those economies out of recession and raise tax revenues.

In sum, while external debt is not overly high in Latin America as a share of GDP, it is quite high in relation to exports. This appears to be a distinctive source of macroeconomic vulnerability in Latin America, affecting in particular the region's main borrower—the public sector—and the more so when external liquidity and exchange rates are volatile. This point is further elaborated on below.

Macroeconomic Volatility

A key contributing factor for the higher incidence of debt crises in Latin America is macroeconomic volatility. As in the case of an individual with highly variable income and facing a given borrowing constraint, an economy with larger and less predictable macro fluctuations tends to experience liquidity shortfalls that can

Figure 2.3. Debt Service[1]
(Percent of general government revenues)

The ratio of external debt service to government revenues rises sharply following large devaluations.
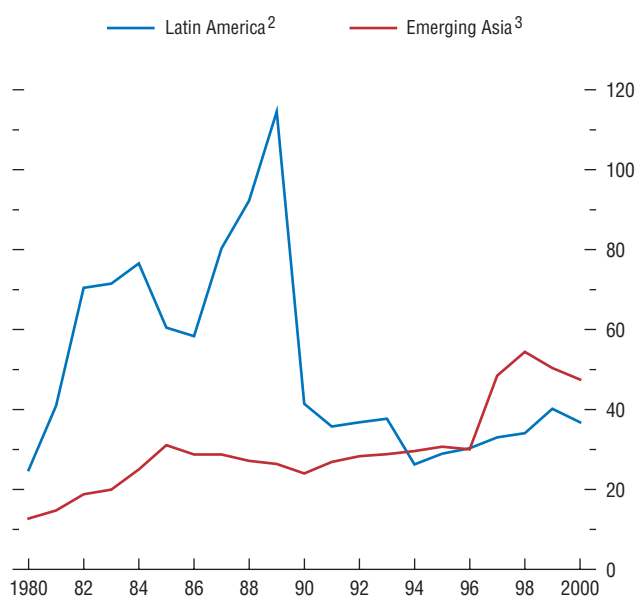
[1]Weighted averages using GDP at market exchange rates.
[2]Latin American countries include Argentina, Brazil, Chile, Colombia, Mexico, Peru, Venezuela, and Uruguay.
[3]Asian countries include India, Indonesia, Malaysia, the Philippines, and Thailand.

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[6]Recent experience indicates that this problem is particularly acute following the collapse of fixed exchange rate regimes, when devaluations tend to be dramatic and immediately preceded by a substantial buildup of external debt. The links between exchange rate regimes and financial crises have been extensively analyzed elsewhere and thus will not be dealt with here. See Mussa and others (2000) and the May 2001 *World Economic Outlook* for useful references.

Table 2.2. Volatility and Sovereign Debt Defaults and Reschedulings[1]

| | | | Standard Deviation | | | | |
Group	Number of Debt Events[2]	Real GDP growth	General government revenues (percent of GDP)[3]	General government expenditures (percent of revenue)	Terms of trade	Real effective exchange rates	Real interest rates
1971–80							
Latin America	0.44	3.79	3.18	13.41	33.63	6.61	8.65
Emerging Asia	0.25	2.91	1.75	8.52	14.16	5.26	5.45
Advanced economies	. . .	2.50	2.58	4.43	17.60	2.51	2.92
1981–90							
Latin America	0.89	4.89	2.81	16.47	27.36	39.24	15,797.41
Emerging Asia	0.13	2.85	1.96	10.28	7.65	24.83	3.32
Advanced economies	. . .	3.09	1.11	5.27	7.20	6.21	2.39
1991–2000							
Latin America	0.33	3.74	2.19	7.94	8.70	18.00	13.18
Emerging Asia	0.25	4.11	1.82	8.29	5.92	8.65	2.52
Advanced economies	. . .	2.09	1.02	7.23	3.73	5.90	2.07

Source: IMF staff estimates.
[1]Volatility of real GDP growth, government revenues, real effective exchange rate, real domestic interest rate, terms of trade, and government expenditures measured by standard deviation over period.
[2]Number defaults or reschedulings per country in group.
[3]General government.

readily lead to debt-servicing problems. While a country's decision to default at the end will depend on a complex weighing of costs and benefits—including the windfall gain from shedding the debt versus the potential cost of being cut off from credit markets, losing reputation and/or suffering commercial retaliation that may hamper future trade gains—higher macroeconomic volatility tends to exacerbate liquidity problems and thus increase default risk in a world of less-than-perfect credit markets.[7]

The higher volatility of real macroeconomic aggregates in Latin America has a long history, and has not gone away in recent years despite the region's impressive success in stabilizing inflation and carrying out important reforms.[8] This point is readily summarized by the (unconditional) standard deviations of variables that have an im-

portant bearing on a country's debt repayment capacity.[9] As shown in Table 2.2, macroeconomic aggregates in Latin America have generally been far more volatile than in advanced countries or emerging Asia despite substantial improvement during the 1990s. And as the decennial averages by country groups in Table 2.2 also indicate, the higher volatility of key variables such as real GDP, real exchange rates, and the ratio of government expenditure to revenue ratios has been closely associated with a higher incidence of defaults and debt reschedulings.

This raises the question of what drives macroeconomic volatility in Latin America. A key difficulty in this connection is to isolate the exogenous factors at play, not only because most of the variables listed in Table 2.2 respond to both external shocks and domestic policy actions, but

[7]A standard view in the literature is that a country will continue servicing its debt until the marginal benefit of defaulting is no higher than that of having open access to external markets and smoothing consumption through external borrowing. In this setting, if income variations are random and an unpredictable succession of bad shocks increases the relative marginal benefit of defaulting, then default risk will turn out to be positively related to volatility under a given credit ceiling. See Eaton and Gersovitz (1981).

[8]The volatility of distinct sets of macroeconomic and financial variables in Latin America has been documented in Gavin and others (1996), Caballero (2000), and Gourinchas, Valdes, and Landerretche (2001).

[9]See Catão and Sutton (2002) for econometric evidence on the relationship between those variables and default probabilities.

also because they feed back on each other. Yet, some causal connections can be discerned. One variable that can be taken as largely exogenous is the terms of trade, since Latin American countries are, generally, price takers in world markets. As shown in Table 2.2, terms of trade have been considerably more volatile in Latin America and typically deteriorate prior to debt crises.[10] Such terms-of-trade volatility partly reflects the heavy weight of a handful of primary commodities in these countries' exports—a long-standing structural feature of these economies with the exception of Brazil and Mexico, where manufactured goods have recently accounted for nearly 60 and 90 percent of total exports, respectively.

Another key "autonomous" source of macroeconomic instability in Latin America is fiscal policy. While the large fluctuations in the ratios of fiscal revenues, expenditures, and deficit to GDP in Latin America reflect the heavy exposure of public sectors to terms of trade and output shocks, these explain only part of the instability of fiscal balances. The proximate magnitude of *autonomous* fiscal policy instability can be gauged from the residual of a regression of primary fiscal balance on real GDP and terms-of-trade cycles and the preceding year's fiscal balance.[11] Staff estimates of the average residual for Latin American emerging markets indicate that such *autonomous* fiscal impulses often range between ±2 percent of GDP but sometimes reach even higher values, thus giving a nonnegligible contribution to macro instability. At the same time, government primary balances in Latin America typically display procyclical behavior—that is, moving into higher surpluses during downswings in economic activity, and rearing into deficits during cyclical upturns. This can be

Table 2.3. Sensitivity of Governments' Primary Deficits to the Business Cycle in Selected Emerging Markets[1]

	Mean	Standard Error	*t*-statistic
Argentina	0.07	0.16	0.47
Brazil*	0.36	0.21	1.74
Chile	0.13	0.10	1.28
Mexico***	0.47	0.16	2.95
Peru	0.06	0.09	0.63
Venezuela***	0.51	0.16	3.24
India	−0.02	0.10	−0.19
Indonesia	0.06	0.10	0.59
Korea**	−0.27	0.10	−2.65
Malaysia	−0.35	0.23	−1.52
Thailand**	−0.39	0.20	−1.96

Source: IMF staff estimates.
Note. One, two, and three asterisks represent statistical significance at 10, 5, and 1 percent, respectively.
[1]Based on an OLS regression of the central government primary deficit (as a ratio to GDP) on the real GDP cycle and the one-year lagged primary fiscal deficit. Annual data for 1970–2000, with the exception of Brazil, for which consistent pre-1985 data are unavailable. Report estimates refer to the coefficient on the real GDP cycle.

gauged from the estimated coefficients on real GDP cycles estimated from the regression methodology described above and reported in Table 2.3.[12] For Latin American emerging markets, these coefficients are positive (and statistically significant for some countries), in contrast with estimates for Asian emerging markets, which point to broadly countercyclical fiscal stances.

This procyclicality of fiscal policy in Latin America is partly due to certain structural features of these countries' tax systems. These include greater reliance on cyclically sensitive revenue sources (such as indirect taxes and transfers from state-owned natural resource industries as in Chile, Mexico, and Venezuela) as well as tax enforcement problems, which tend to become more severe during downswings when the opportunity cost of complying with tax obligations is

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[10]Catão and Sutton (2002) show that this deterioration typically starts in the year preceding sovereign defaults and debt rescheduling events. Using a broader definition of crises (which includes balance of payments as well as banking crises), Kaminsky and Reinhart (1999) also find that terms of trade typically deteriorate in the run-up to crises although their power to "predict" them is weaker when compared to other variables.

[11]A similar method for measuring the *autonomous* component of fiscal policy has been proposed in Gavin and others (1996).

[12]Using other indicators of fiscal position, Gavin and Perotti (1997) and Talvi and Végh (2000) also find that fiscal policy in Latin America has been broadly procyclical. This contrasts with OECD economies, where fiscal policy has been broadly countercyclical, and thus helps mitigate aggregate income fluctuations.

heightened.[13] But such fiscal shocks also appear to emanate from frequent changes in tax rates, as well as from changes in the more "autonomous" components of government expenditure responding to electoral cycle (although the effects of the latter on public spending appear to have been tamed in some countries in recent years). At the root of this fiscal instability problem lies the difficulty of containing government spending and accumulating budget surpluses during cyclical upswings. Among other things, this limits the government's ability to run deficits during recessions without creating inflationary pressure or facing external financing constraints (or a combination of the two). So, during "bad times" governments in the region are often *forced* to adjust, both to shore up policy credibility and to cope with the drying up of external financing. As a result, automatic fiscal stabilizers are seldom allowed to work.

Policy-induced macroeconomic instability in Latin America has not been confined to fiscal policy. Monetary policy, in particular, is well known to have been historically very unstable, although largely reflecting the passive accommodation of fiscal imbalances and inflationary financing of fiscal deficits before the 1990s. But while there is some consensus among researchers that the contribution of "autonomous" monetary shocks to the Latin America business cycle is relatively small and that monetary policy is constrained by the "unpleasant monetarist arithmetic" of fiscal policy in the longer run, monetary policy has not been a perfect island of

stability in the 1990s.[14] One manifestation of this has been changes in interest rates and/or adjustments in the money supply to offset fiscal developments at times or to defend sometimes unsustainable exchange rate pegs. Partly as a result, domestic interest rates have fluctuated widely in the region despite the environment of lower inflation (see Table 2.2).

Two other areas in which economic policy in Latin America has been particularly unstable are trade and capital controls. The latter, in particular, has historically oscillated between liberalization and stringent foreign exchange controls, the amplitude of these policy shifts being far greater than in any other regions (Figure 2.4).[15] In light of the well-documented links between capital account liberalization and lending booms, and the fact that lending booms in Latin America have often been followed by financial crises and sharp recessions, such swings in capital account controls policies have undoubtedly contributed to overall macroeconomic instability.[16] Recent research suggests that it takes a few years before capital account liberalization starts paying off in terms of stabilizing asset prices, implying that these cycles are generally destabilizing.[17]

In sum, external terms of trade, fiscal shocks, and financial liberalization cycles have been key drivers of macroeconomic volatility in Latin America. The causal links between the two latter variables and those that have an important bearing on debt-servicing costs (notably the real exchange rate and interest rates) are sometimes unclear because of endogeneity problems, but

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[13]See Gavin and Perotti (1997) for evidence that structural characteristics of the tax system in Latin America tend to exacerbate the cyclical sensitivity of fiscal revenues. Figures reported in Table 2.5 corroborate this point, showing that the tax revenue/GDP ratio has been more volatile in Latin America relative not only to OECD countries but also to Asian emerging markets.

[14]For evidence that "autonomous" monetary policy shocks account for a relatively small proportion of output fluctuations in the region, see Hoffmaister and Roldós (1997) and Kydland and Zarazaga (1997). Longer-term dependence of monetary stability on fiscal policies is examined in the May 2001 *World Economic Outlook* and in Catão and Terrones (2001).

[15]One way of rationalizing these cycles is through the differential impact that capital account openness has on the distinct social groups. In a closed economy, for instance, workers' income tends to be more protected from the risk of productivity shocks. See Alfaro and Kanczuk (2001) for a model of liberalization cycles along these lines.

[16]The links between financial liberalization, capital inflows, and credit booms and busts in Latin America are discussed in Diaz-Alejandro (1985), Velasco (1987), and Gourinchas, Valdes, and Landerretche (2001), among others.

[17]Kaminsky and Schmuckler (2001) find that financial markets become more volatile in the first years following liberalization but become more stable than the pre-liberalization period after a few years. So, if liberalization policies are reversed in the meantime, the benefit of subsequently lower volatility is lost.

seem, on the whole, to underpin the tight correlation between macroeconomic volatility and frequent debt crises. Frequent debt crises, in turn, are very costly: country risk and hence the debt interest burden have been especially high in Latin America (Table 2.4). By undermining fiscal sustainability, such a high interest burden makes it harder to stabilize fiscal and monetary policies, feeding back into overall policy instability and thus further contributing to higher default risk.

## Domestic Debt and Financial Deepening

A third main source of external vulnerability in Latin America is the heavily skewed composition of sovereign debt toward foreign currency–denominated liabilities. While—as seen above—Latin America's total external debt is a low fraction of GDP compared with that in other regions, the ratio of external government debt has been high relative to both GDP and total external debt (Table 2.5). Moreover, if the stock of foreign currency–denominated *domestic* debt is taken into account, the share of foreign currency denominated in Latin American public debt is even higher. In Argentina, for example, foreign currency–denominated debt amounted to about 95 percent of general government debt in the year prior to the recent crisis.[18]

A high share of foreign currency–denominated liabilities in total public debt poses two problems, which have been already mentioned. First, it produces a currency mismatch between the two sides of the government balance sheet. Since most government revenues stem from taxes, which are domestic currency–denominated whereas debt payments will be mostly in dollars, the combination of this mismatch with high exchange rate volatility can suddenly lead to spikes in debt service payments relative to government income. It is therefore no surprise that debt crises in the region have been often associated with large swings in real exchange rates and in particular with

[18]See Figure 1.9, Chapter 1, of the October 2001 *World Economic Outlook* for the respective numbers in other Latin American countries.

Figure 2.4. Foreign Exchange Restriction Index[1]

Capital account and foreign exchange control policies have been especially volatile in Latin America.
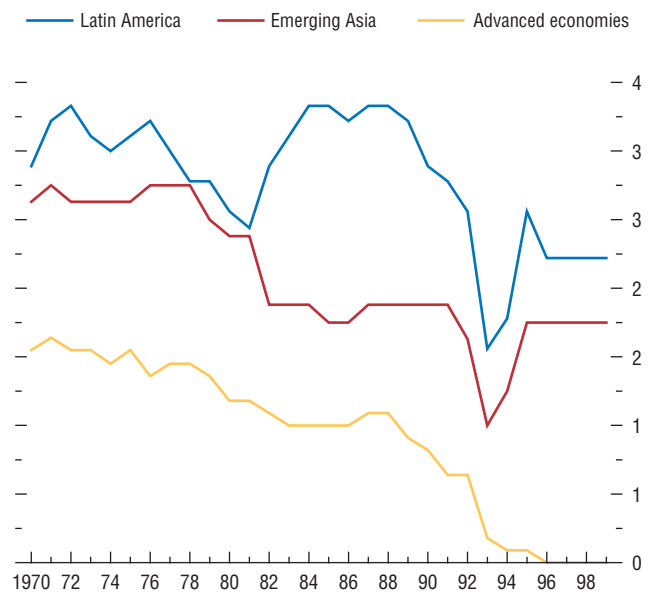
Source: IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions.*
[1]Index comprises 4 types of capital controls: (1) separate exchange rates for some or all capital transactions; (2) restrictions on payments for current transactions; (3) restrictions on payments for capital transactions; and (4) surrender or repatriation requirements for export proceeds. Index for individual countries counts the number of controls in place for each year. Regional index is a simple average of country indices.

Table 2.4. General Government Interest Expenditure: Some International Comparisons

	Percent of GDP			Percent of Government Expenditure[1]			
	1982–90	1991–95	1996–2000	1982–90	1991–95	1996–2000	2001
Argentina	2.0	1.8	2.9	10.6	8.3	10.8	17.4
Brazil	5.0	4.1	8.0	20.1	13.1	20.5	21.5
Chile	1.8	1.4	0.5	6.6	6.3	2.1	. . .
Colombia	2.3	2.1	2.9	11.4	9.4	9.9	. . .
Mexico	14.1	3.8	3.7	37.0	16.0	16.5	. . .
Peru	3.4	3.8	2.1	19.1	17.0	9.1	. . .
Venezuela	2.1	4.7	3.3	16.7	24.7	17.1	. . .
Latin American average[2]	7.0	4.1	5.4	25.0	16.2	17.5	19.9
Indonesia	2.1	2.1	3.0	11.4	12.6	16.0	27.6
Korea	1.0	0.5	1.4	4.9	2.5	4.8	10.2
Malaysia	6.2	4.2	2.6	16.6	13.5	10.1	. . .
Philippines	3.7	5.1	3.7	21.8	26.0	17.9	. . .
Thailand	2.5	0.6	0.6	13.4	5.5	3.1	. . .
East Asian average[2]	2.1	1.5	1.8	9.9	7.8	8.2	15.4

Sources: IMF, *World Economic Outlook, International Financial Statistics,* and staff estimates.
[1]Brazilian and Mexican figures correspond to the ratio of real interest rate payments to real government expenditure.
[2]Weighted by U.S. dollar GDP of each country.

sharp depreciations that usually follow unsustainable pegs, as for instance in Mexico (1994/95) and, more recently, in Argentina. Second, the value of the debt becomes more sensitive to changes in international interest rates if the debt is contracted in floating rate terms, or if the country has to rely on international capital markets for debt rollover (which is bound to be the case if the share of short-term debt in total debt is high). In other words, greater reliance on foreign debt increases the vulnerability of public finances to hikes in external interest rates.

Why, then, do Latin American governments not adjust the composition of their debt toward domestic currency–denominated debt? This could be done, for instance, by issuing external debt denominated in national currency. However, for reasons that are not yet entirely clear to economists, historically only a handful of mature economies have been able to do so. Virtually all emerging market sovereign debt held by foreigners continues to be foreign currency–denominated, a phenomenon that is as striking today as it was a hundred years ago.[19]

There remains, however, the possibility of a larger share of government debt being issued domestically, and thus denominated in domestic currency. One possible reason why this has not been the case is related to the limited capacity of these countries' financial systems to absorb large issuances. One simple measure of the former is the ratio of total public sector debt to domestic credit. As shown in Figure 2.5, this ratio has been much higher in Latin American countries (although rapidly declining with the reactivation of domestic financial intermediation during the 1990s), only approaching that of Asian emerging markets in the immediate aftermath of the 1997/98 crisis. The relative shallowness of financial markets in several Latin American countries is also a factor contributing to the relatively low level of domestic private saving. As shown in Figure 2.6, notwithstanding a recovery from the lows of the early 1990s and some considerable cross-country differences, the average private saving ratio in Latin America remains well below those in emerging Asia.[20] This clearly limits the scope for domestic government borrowing without substantial crowding out of the private sector.

Another reason has to do with time inconsistency: unless the debt is fully indexed to actual inflation and indexation rules are unbreakable,

[19]See Bordo and Flandreau (2001).
[20]Capital flight may also contribute to low saving, as residents transfer their money abroad in a manner that is difficult to capture in official statistics.

Table 2.5. General Government Debt: Percentage Share of External Debt

	External Debt/Total Debt		
	1982–90	1991–2000	End-2000
Argentina	89.7	69.2	58.4
Brazil	61.4	39.8	32.5
Chile	51.9	47.8	43.7
Colombia	85.1	74.0	64.8
Mexico	69.8	70.0	54.5
Peru	95.6	92.7	81.4
Venezuela	82.2	85.3	74.8
Latin American average[1]	76.5	68.4	58.6
India	27.9	29.9	22.0
Indonesia	97.1	87.8	51.3
Korea	49.6	15.1	13.5
Malaysia	41.7	37.1	43.9
Pakistan	60.1	55.2	57.7
Philippines	69.1	55.8	64.0
Thailand	51.8	74.6	66.4
Singapore	1.4	—	—
Asian average[1]	49.8	44.4	39.8
(excluding Singapore)	56.7	50.8	45.5

Sources: World Bank; IMF, *World Economic Outlook*, and IMF staff estimates.
  [1]Arithmetic mean.

issuing domestic liabilities provides governments with an incentive to inflate the debt away. This incentive problem is no doubt exacerbated by the persistence of fiscal imbalances in several countries and a long history of inflationary financing in the region, which has been only partly mitigated by the current low inflation environment and sounder policies in recent years. Partly reflecting these credibility problems and shallower domestic financial markets, domestic debt also tends to have a much shorter maturity than does foreign debt. In this context, replacing longer-term foreign debt by shorter-term domestic debt would help solve the currency mismatch issue but at the expense of shortening the debt maturity. This is unsatisfactory in light of evidence that debt crises partly stem from temporary liquidity shortages.[21]

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[21]Broad cross-country evidence that less liquid countries are more likely to default on their external debt is provided in Detragiache and Spilimbergo (2001) and the references cited therein. In their study, the definition of liquidity comprises international reserves and short-term debt, with allowance being made for the endogeneity of the latter with regard to alternative financing choices.

Figure 2.5. Total Public Debt
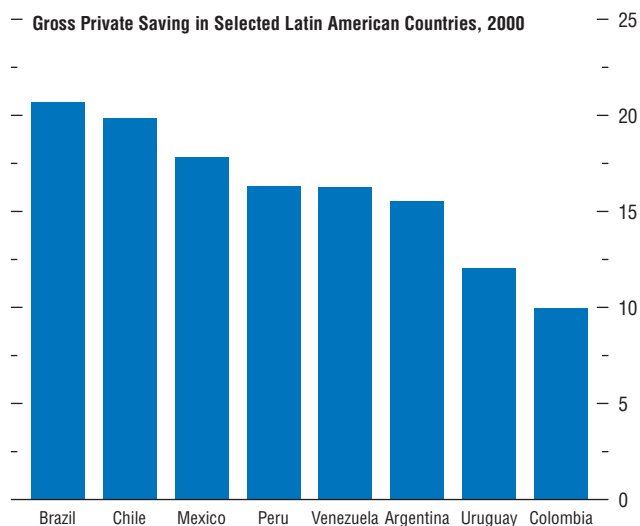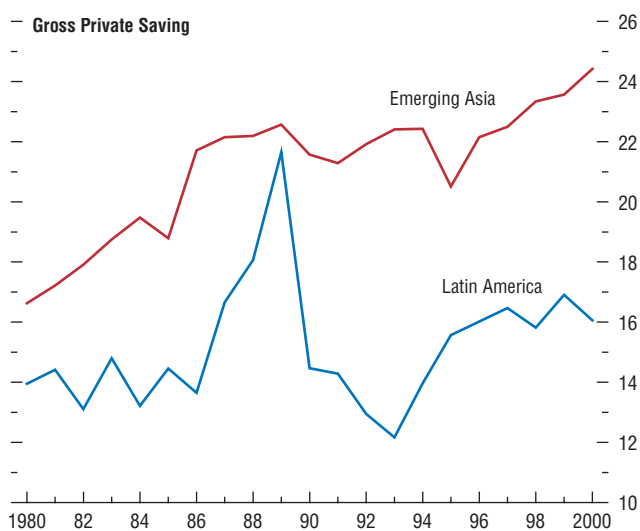*(Percent of domestic private credit)*

Shallower financial markets in Latin America have constrained the share of public debt that can be financed domestically.
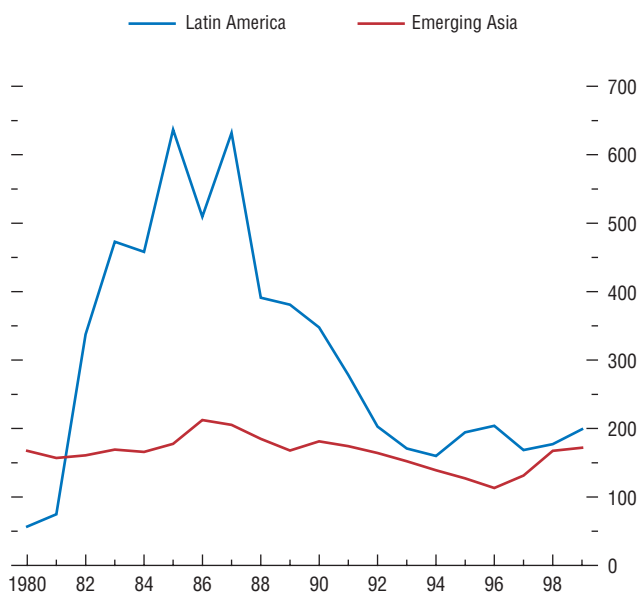
Source: IMF staff estimates.

Figure 2.6. Gross Private Saving
(Percent of GDP)

Lower domestic saving ratios in Latin America reduce the scope for domestic public sector borrowing.

Gross Private Saving

Emerging Asia

Latin America

1980 82 84 86 88 90 92 94 96 98 2000

Gross Private Saving in Selected Latin American Countries, 2000

Brazil   Chile   Mexico   Peru   Venezuela Argentina Uruguay Colombia

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

In sum, while a less skewed debt composition with lower foreign currency–denominated liabilities would be clearly preferable, the combination of domestic financial underdevelopment with the lack of a track record in macroeconomic policies has typically prevented Latin American governments from borrowing long term in domestic currency and skewed the debt composition toward foreign currency liabilities. In this regard, a comparison with Asian emerging markets is interesting in that several of these countries have been generally far more successful in tapping domestic markets for government debt—an important payoff for greater monetary stability and rarer occurrences of debt repudiation or confiscation of residents' assets by the government.

Policy Implications

The higher incidence of sovereign debt crises among Latin American emerging markets is a complex and multifaceted phenomenon, but three contributing factors stand out: (1) relatively low openness entailing higher ratios of foreign debt to exports; (2) high macroeconomic volatility, induced inter alia by domestic policy shocks; (3) heavy concentration of public debt on foreign currency–denominated liabilities and limited capacity to borrow long term in domestic financial markets. While there has been substantial progress on all these fronts in most of the region in the 1990s, it has been uneven, with some countries having moved considerably faster than others in key policy areas. For instance, progress has been made in some countries in limiting macroeconomic instability through the adoption of credible fiscal and monetary reforms (including inflation targeting), most notably in Brazil, Chile and Mexico. (See also Chapter IV of the May 2001 *World Economic Outlook* for a further discussion of monetary reforms.)

Overall, three issues seem worth singling out. First, to the extent that these emerging economies are more susceptible to large international liquidity shocks, the question arises as to why
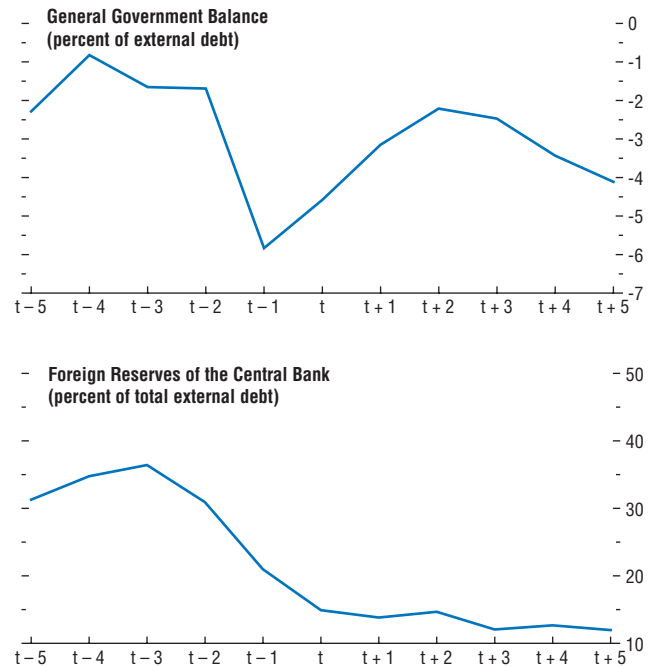
they do not insure themselves better during cyclical upswings against the high probability that "bad" times will lie ahead. Given the well-documented large costs of defaults—both economic and political—this seems a most sensible course of action. And yet, looking at the historical behavior of two basic macro insurance indicators—the ratios of international reserves to debt and of fiscal balances to GDP—one finds that not only are their levels typically low to begin with but they also drop rapidly in the years preceding debt crises (Figure 2.7). While one can think of possible justifications for this underinsurance, the bottom line is that sounder reserve management and less procyclical fiscal policies would be clearly desirable.

Second, policies that foster domestic financial deepening have an important role to play in allowing governments to resort more extensively to domestic financial markets and increase their share of domestic currency–denominated long-term debt. In this respect, several Latin American countries have made remarkable progress in recent years regarding key legal and microeconomic aspects of financial sector reform, and financial systems look far healthier relative to previous decades. For instance, bank capital adequacy ratios and disclosure of financial information have improved markedly in Brazil and Chile, as well as in Argentina before the recent crisis. The main challenge then appears to consist of keeping inflation low and enhancing monetary and fiscal policy credibility, so that these reforms can continue to pay off and bring further financial deepening.

Last but not least, debt to export ratios need to be lowered, preferably through a combination of lower fiscal deficits over the cycle and faster export growth in the longer term. Given the various channels through which trade openness positively affects external repayment capacity, it seems crucial that Latin America become more open to foreign trade. While countries such as Chile and Mexico have made remarkable progress on this front in recent years, heavy external borrowers in the region, such as Argentina and Brazil, continue to have relatively

Figure 2.7. Fiscal Balance and International Reserves in the Run-Up to Sovereign Debt Crises

Fiscal balances and foreign exchange reserves typically display a deterioration in the three year period preceding sovereign defaults.

General Government Balance (percent of external debt)

Foreign Reserves of the Central Bank (percent of total external debt)

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

limited trade links with the rest of the world. Through its positive impact on policy discipline and by raising the macroeconomic costs of default as discussed above, further advances in this key area of globalization can be instrumental in reducing policy volatility and lowering external interest costs, thereby enhancing welfare. To this end, moving forward with broad regional trade agreements, avoiding unsustainable exchange rate pegs that hamper export growth, and eschewing resort to protectionism throughout the continent seem all the more essential.

Is Wealth Increasingly Driving Consumption?[22]

The 1990s saw an unprecedented increase in household net wealth in almost all G-7 countries, driven primarily by higher equity prices. This has been accompanied by a sharp decline in household saving rates, which are now almost all at or below their lowest levels during the past three decades (and which, in the United States, is at or close to zero, which has become an increasing policy concern). This has raised a series of important questions, including the following.

- To what extent has the decline in savings been caused by the rise in household wealth in the 1990s? How will savings be affected by the fall in equity markets since mid-2000? Could the effects be partly offset by increases in other forms of wealth, such as housing?
- Do different types of wealth have different effects on consumption? And do these effects vary across countries, for instance reflecting different types of financial systems?
- More generally, has the impact of wealth on household consumption been increasing over time, and will this trend continue? Looking forward, what are the implications for macroeconomic policymakers?

This essay seeks to provide some additional evidence on these issues, based on a cross-country study undertaken by IMF staff of the effect of changes in wealth on consumption in 16 advanced economies over the past 30 years. After describing recent trends in household wealth and savings, it outlines the channels through which asset price changes affect consumption, and presents the empirical results from the study. It concludes with a discussion of the implications of this analysis for the questions set out above.

Stylized Facts

While household wealth has historically tended to grow relatively slowly, most countries have experienced a rapid increase during the 1990s, largely driven by sharp increases in asset valuations (Figure 2.8). This has generally been associated with a decline in personal saving rates, reflecting both the increase in asset prices and lower inflation (which reduces the need to save to offset inflation-induced losses in real wealth). Among the G-7, there are two main exceptions to these trends. First, in Japan, wealth declined very sharply during the 1990s, reflecting the bursting of the land price bubble in the late 1980s and declining personal savings. Second, while wealth has continued to rise in France, personal savings has remained broadly constant in the latter half of the 1990s.

When reviewing trends in household wealth, it is useful to divide it into three main components: financial assets, which include equities, bonds, bank deposits, and indirect holdings in insurance companies and pension funds; nonfinancial assets, which comprise housing wealth—by far the largest component—other tangible assets, and consumer durables; and financial liabilities, which are dominated by mortgage borrowing. As can be seen from Table 2.6, the composition of household wealth, as a percent of disposable income, has changed very significantly over time. In the 1980s the bulk of G-7 wealth consisted of nonfinancial assets, but during the 1990s has shifted increasingly toward financial wealth, and equity holdings, in particu-

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[22]The main author of this essay is Hali Edison; Bennet Sutton and Yutong Li provided research assistance.

lar.[23] The increase in equity wealth has also varied significantly, being lowest in the United Kingdom and Canada—countries that have market-based financial systems, and where stock wealth has historically been more important—and largest in France and Italy, countries with bank-based financial systems where households have historically had limited participation in the stock market.[24] Equity issuance traditionally has not been an important form of corporate finance in major continental European countries and as a result equity holdings and market capitalization have been small, but this has grown significantly with the rise of privatizations. The surge in the equity wealth was also quite large in the United States, owing to increases in equity prices and the substantial rise in the proportion of households holding equities.

Developments in Japan have been different. During the 1980s, Japan experienced a very rapid increase in net wealth, peaking at 800 percent of disposable income, substantially higher than any other G-7 country at that time. Following the bursting of the asset price bubble and the economic slowdown, the wealth-to-income ratio declined in the 1990s, but remains the highest among the G-7. It is striking that the distribution of Japanese wealth between financial and nonfinancial assets is roughly equal, whereas in the other countries—with the exception of Germany—financial wealth now exceeds nonfinancial wealth. In part, this is due to the relatively high value of land in Japan, but it also reflects the fact that—because Japan has a bank-based financial system—households have traditionally held their wealth in the form of bank deposits, while banks have held equity shares in

[23]The wealth data for Germany begin after 1990, owing to breaks in the series arising from the German unification.

[24]The OECD figures for equity wealth relative to disposable income include only directly held shares. For continental European G-7 countries, this will not make much of a difference as they do not have much in the way of thrift-type pensions, but it does for the United States and the United Kingdom and, to a lesser extent, Canada.

Figure 2.8. Ratio of Net Wealth to Disposable Income and Personal Saving Rate
(Percent of disposable income)

The 1990s saw an unprecedented increase in household net wealth and sharp decline in household saving rates.
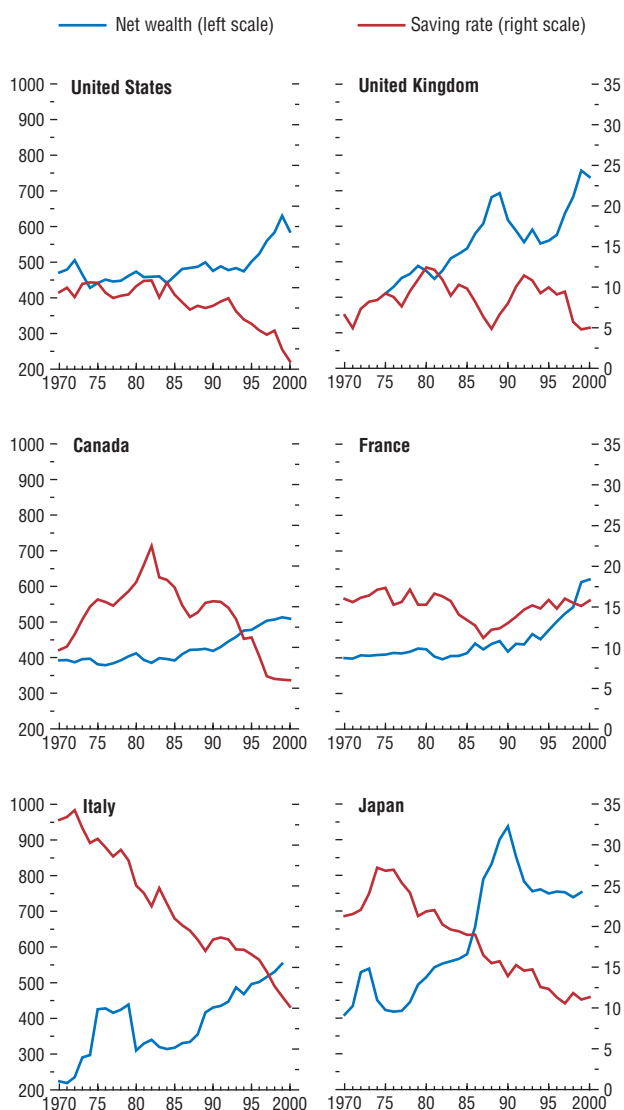
Sources: OECD, *Economic Outlook* and Analytical database.

Table 2.6. Household Wealth and Indebtedness
(Percent of disposable income)

	Canada	France	Germany[1]	Italy	Japan	United Kingdom	United States
Net wealth[2]							
1981–85	393	405	—	324	560	499	456
1986–90	419	433	—	373	823	636	485
1991–95	457	455	533	467	780	569	485
1996–2000	505	560	584	525	749	678	576
Nonfinancial assets							
1981–85	222	315	—	207	409	324	209
1986–90	234	298	—	201	592	413	222
1991–95	248	283	404	249	516	312	202
1996–2000	263	307	427	269	440	320	205
Financial assets							
1981–85	242	153	—	124	238	256	317
1986–90	271	216	—	189	342	333	347
1991–95	307	248	221	248	395	365	373
1996–2000	351	321	267	299	449	458	472
Equity holdings							
1981–85	49	28	—	8	25	27	37
1986–90	55	84	—	29	63	50	52
1991–95	64	102	36	49	40	68	81
1996–2000	91	134	63	104	38	99	146
Financial liabilities							
1981–85	72	63	—	8	86	80	71
1986–90	86	81	—	17	111	109	84
1991–95	98	76	91	30	131	109	90
1996–2000	109	67	110	37	133	111	100

Source: OECD.
[1]The wealth data for Germany are reported after 1990, owing to breaks in the series arising from German unification.
[2]Net wealth equals nonfinancial assets and financial assets minus financial liabilities.

companies. Consequently, the effect of the boom and bust in equity prices in Japan has been absorbed almost entirely by banks rather than households, contributing materially to the financial difficulties of the banks in recent years.

Households can increase their wealth in two ways: directly, through saving, or indirectly as the result of valuation changes in assets they already hold. During the 1990s, changes in wealth were dominated by equity price valuation changes, and—since equity prices were relatively

strongly correlated across advanced countries— the increase in wealth was correspondingly synchronized (see Figure 2.9).[25] House price movements have historically been less correlated across countries, although there is some evidence that this has been changing over time (see Figure 2.10).[26] The increasing correlation of asset prices implies that wealth effects in consumption are also becoming more synchronous, and that consumption may therefore be becoming an increasingly important driver of the international business cycle (see Chapter III on

[25]Stock market valuations have become increasingly more correlated across advanced economies; for instance, the correlation between U.S. and European share prices increased from 0.4 in the mid-1990s to 0.8 in 2000 (see the May 2001 *World Economic Outlook*, pp. 10–11).

[26]For instance, the correlation between U.S. and European house prices increased from 0.4 in the 1980s to 0.6 in the 1990s (and to 0.85 in the latter half of the 1990s). One possible explanation for this increase is that the financial liberalization that occurred primarily in the late 1980s and early 1990s in several European countries has made housing markets more dynamic and more cyclically sensitive, so that with relatively synchronized business cycle across countries, the correlation across countries in housing price movements has increased.

the cross-country synchronization of the business cycle).

How Does Wealth Affect Consumption?

The effect of wealth on private consumption has traditionally been analyzed in the framework of the permanent income hypothesis or the life-cycle model (Friedman, 1957, and Ando and Modigliani, 1963).[27] In this framework, the level of consumption depends on households' current and expected future income stream, plus their stock of wealth. The latter is often separated into different categories, with stock and housing wealth being the most common. Wealth affects private consumption via two main channels. First, households can sell assets to finance consumption. Second, households may be able to borrow against their wealth, which in turn would allow households to raise their spending. Their ability to borrow, however, will depend importantly on the development of financial markets, with deeper markets allowing households greater access.[28]

The impact of wealth changes on consumption is likely to vary according to the type of wealth, for a number of reasons.

- *The liquidity of stock and housing market wealth differs significantly.* Until very recently it has been easier to directly realize equity gains than house price gains, since equities are divisible and traded in very liquid markets. However, it is increasingly easy to borrow against housing wealth through home equity loans. Moreover, rising housing prices may affect consumption not only through higher realized home values, but also by the household's ability to refinance a mortgage or take out (or expand) home equity loans based on higher property values. This may, in fact, bol-

[27]For a concise exposition of life cycle and permanent income models of consumption, see Deaton (1992).

[28]In a recent survey of the literature, Poterba (2000) calibrates a simple model of consumption responses to stock market wealth shocks. The calibrations suggest that a typical household can raise consumption outlays by 5 cents for each one-dollar increase in wealth, with variations in the range of 3 to 10 cents.

Figure 2.9. Ratio of Net Wealth to Disposable Income and Stock Price
(Net wealth in percent of disposable income; stock price 1990 = 100)

During the 1990s, changes in wealth were dominated by stock price changes.
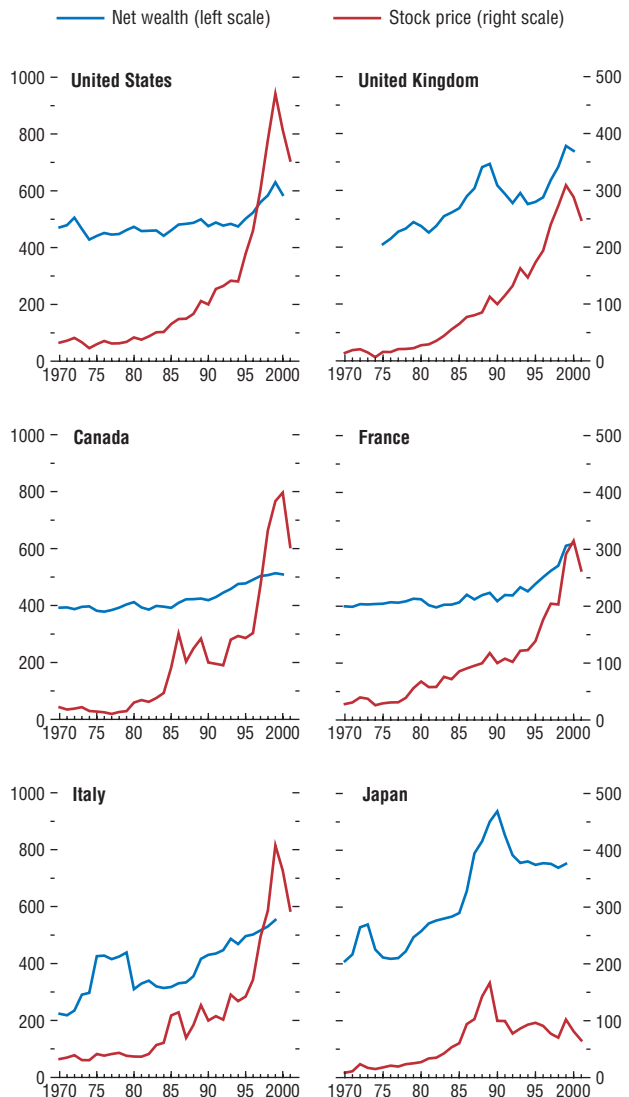
Sources: OECD, *Economic Outlook* and Analytical database; and Thomson Financial, Datastream.

Figure 2.10. Selected Advanced Economies: Housing Prices and Market Capitalization
(Housing price index 1995 = 100; market capitalization in percent of GDP)

Equity and house prices have become increasingly correlated across advanced economies.
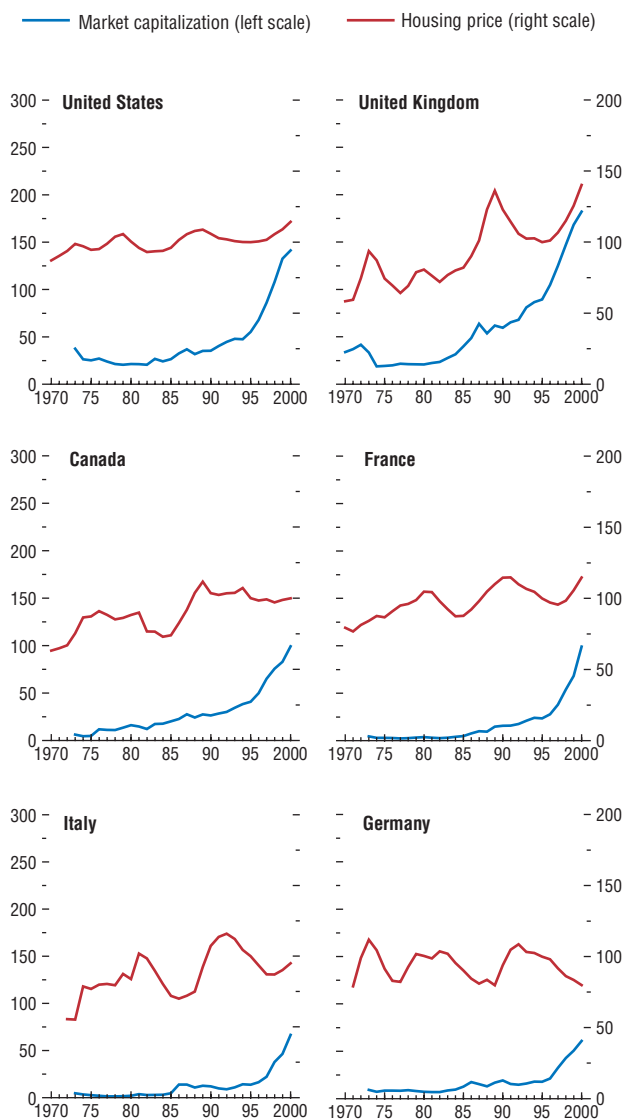
ster the sensitivity of consumption to housing price movements.[29]

- *Since equity prices are more volatile than house prices, households may find it more difficult to assess whether a change in stock wealth is permanent or temporary.* Therefore, they are likely to be more cautious borrowing against increases in stock wealth than housing wealth, suggesting a higher impact of increases in housing wealth on consumption.

- *House purchases are generally largely financed with borrowed money, while equity purchases are not.* Consequently, a rise in house prices is likely to confer a larger net return on investment to households than would a corresponding increase in equity prices, again implying that changes in housing wealth have a larger effect on consumption.[30]

The impact of the wealth effect may also vary according to the nature of the financial system in individual countries. Financial systems are generally divided between those that are based on bank loans (bank-based) and those where the role of the financial market is dominant (market-based).[31] There are two main differences between these systems.

- First, households in the market-based group tend to hold a greater share of their wealth in

[29]Another difference between housing wealth and stock wealth is that housing acts not only as a store of wealth but also provides a service—shelter. Housing services are included as part of consumption, so as house prices increase so will nominal consumption, but real consumption may not necessarily adjust. That is, an increase in house prices may or may not make the household sector better off because the positive effect for homeowners must be offset by the negative impact on renters.

[30]For instance, suppose a household invests $10,000 in a $100,000 house, financing the rest with a mortgage of $90,000. If house prices increase by 10 percent, the gain of $10,000 represents a 100 percent rate of return on the underlying investment. By contrast, suppose a household invests $10,000 in stocks and stock prices increased by the same 10 percent; the gain from this price increase would only be $1,000.

[31]Allen and Gale (2000) comprehensively review the vast literature on comparative financial systems. Empirical research on the comparative merits of bank-based and market-based financial systems has centered on Germany and Japan as bank-based systems and the United States and the United Kingdom as market-based systems.

financial assets, especially equities, relative to those households in the bank-based group (as noted above, for example, in the case of Japan). As a result, the distribution and own-ership of equities and property tends to be wider in market-based economies.

- Second, it is generally easier for households to borrow against their assets in market-based economies since home equity loans—and the-infrastructure to support them, such as mar-kets for mortgage-backed securities—are more readily available, owing in part to earlier and more widespread financial deregulation.

Therefore, it has been argued that housing wealth effects may be larger than stock market ef-fects, especially in countries that have a more market-based financial system. It has also been suggested that the strength of stock wealth effects will be stronger in market-based systems, not only because household stock wealth is generally larger (relative to GDP), but also because con-sumers have access to deeper financial systems with more instruments that can provide greater access to their wealth.[32] A corollary of this argu-ment is that the marginal propensity to consume out of wealth is likely to rise over time as finan-cial systems become deeper, and that this effect may be particularly marked in bank-based finan-cial systems, which have historically had relatively undeveloped financial markets.

Empirical Evidence

There is a large body of empirical work that suggests that changes in housing and equity prices have significant effects on private consumption in most advanced economies.[33]

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[32]See, for example, Edison and Sløk (2001a, 2001b) and Ludwig and Sløk (2002).

[33]Nonetheless, controversies remain. Some researchers argue that the observed correlation between asset prices and consumption arise because they both react to some unidentified common economic factors (see, for exam-ple, Poterba and Samwick, 1995; Ludvigson and Steindel, 1999; and Kiley, 2000). However, the majority view is that it stems from real wealth effects, a view strongly supported by recent work using highly disaggregate data based on household-level data (Maki and Palumbo, 2001; and Dynan and Maki, 2001).

Figure 2.10 *(concluded)*
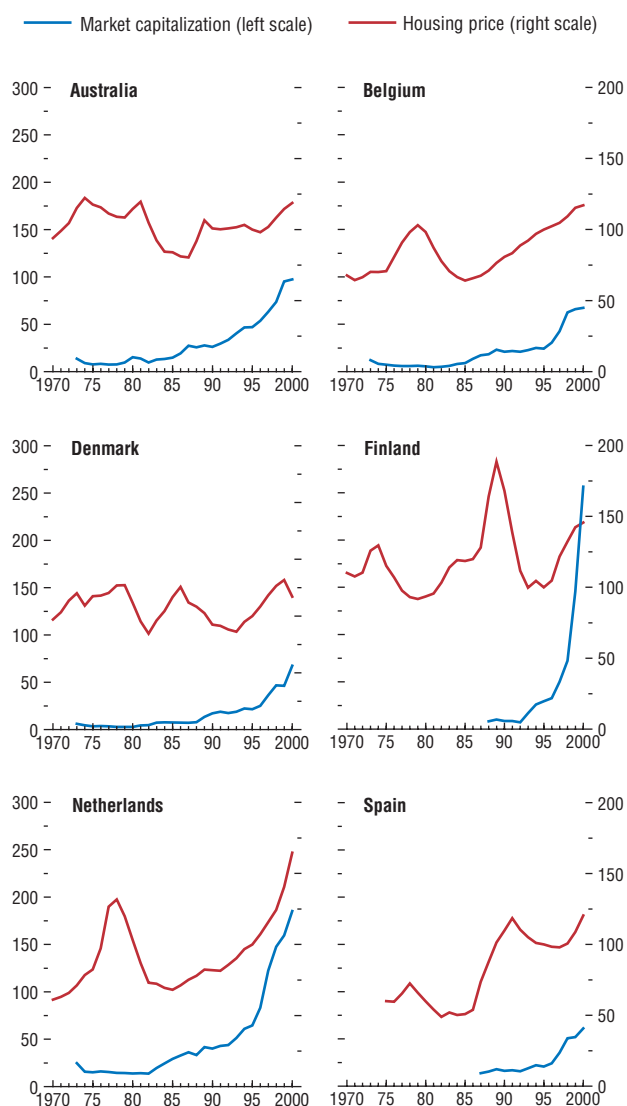
Sources: Bank for International Settlements; and Thomson Financial, Datastream.

Estimates of the magnitude of this effect vary considerably across countries, however, and are sometimes dependent on the type of asset in question.[34] Much of the existing literature focuses on the United States, where the effects of equity prices on consumption are in the range of 3–5 cents per dollar, with the effect taking one to three years to materialize. Spending out of housing wealth is somewhat higher, close to 4–6 cents per dollar, also taking one to three years to materialize.

The evidence for other advanced countries has been mixed. Many country-specific studies have focused specifically on the effects of equity prices on private consumption, finding significant wealth effects but somewhat smaller effects than those reported for the United States. For example, studies on the effect of equity prices on private consumption for Canada, Germany, Japan, the Netherlands, and the United Kingdom report estimates of the marginal propensities to consume out of wealth from about 1 cent up to about 3.5 cents.[35] This difference appears to reflect the small share of equity ownership relative to other financial assets in these countries as well as the more concentrated distribution of equity ownership across households in continental Europe when compared with the United States.

Other country-specific studies have focused on the impact of housing wealth, and these results have also varied between countries. For instance, in the United Kingdom a 10 percent increase in housing wealth would boost consumption between 0.2 and 0.8 percent within a year; in the Netherlands 0.7 percent over two years, and in Japan 0.6–1.0 percent. In contrast, there is little empirical evidence of a housing wealth effect in either France or Italy.[36]

A growing number of studies have examined the wealth effect using a panel of advanced economies rather than studying a specific country, and investigate the relative importance of the two wealth components—housing and stock market. Again, the results for these studies have been mixed. Several of these studies found the marginal propensity to consume out of stock wealth for the market-based economies to be roughly 4 cents per dollar, while they found a small stock wealth effect for the bank-based economies.[37] One study uncovered no stock wealth effect but a statistically significant and rather large effect of housing wealth upon household consumption with an elasticity of about 10 percent.[38]

To disentangle and clarify the effects of different types of wealth on consumption, the IMF staff undertook a new study focusing on a panel of 16 advanced economies over the period 1970–2000 using a conventional specification, with wealth split into stock wealth (proxied by stock market capitalization as a ratio to GDP) and house wealth (proxied by house prices since data on housing wealth were not generally available).[39] To examine differences in behavior over time and across financial systems, the equations were estimated over different time periods and the countries were split into two groups—market-based and bank-based economies—using a measure of stock market activity relative to bank

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[34]For instance, Edison and Sløk (2001a) find significant differences between the effect of changes in the value of technology, media, and telecommunications (TMT) and non-TMT assets on consumption and investment in continental Europe (though not in the United States).

[35]See, for example, Boone, Giorno, and Richardson (1998) for recent evidence.

[36]For a review of recent evidence, see Girouard and Blöndal (2001).

[37]See, for example, Ludwig and Sløk (2002); Boone, Giorno, and Richardson (1998); Girouard and Blöndal (2001); and Boone, Girouard, and Wanner (2001).

[38]See Case, Quigley, and Shiller (2001).

[39]There is an important issue having to do with whether wealth effects are estimated in terms of cents per dollar change in wealth or percentage increase in wealth (that is, an elasticity). While the two approaches provide similar results when wealth is a relatively stable proportion of income, given the huge amount of wealth creation in equity markets in the 1990s, the elasticity approach implies an implausible fall in the impact of a dollar of wealth creation. Hence, at least for equities, the cents per dollar method is probably preferable.

Table 2.7. Equity and Housing Wealth Effects[1]

	Equity Effects (Cents per dollar)		House Effects (Elasticity × 100)		Speed of Adjustment (Average lag in years)	
	1970–2000	1984–2000	1970–2000	1984–2000	1970–2000	1984–2000
Marked-based	3.0	4.3	2.7	7.0	4.2	2.2
Bank-based	−0.2	0.9	4.5	4.3	9.1	6.3
Full sample	0.9	2.0	2.8	5.3	6.7	4.8

Source: IMF staff estimates.

[1]The relationship between consumption and wealth was estimated using a two-step procedure. The coefficients on equity wealth and house prices represent the long-run coefficients, whereas the speed of adjustment reflects the coefficient on the error correction term. See Box 2.1 for details.

activity.[40] Details of the approach are described in Box 2.1.

The results, reported in Table 2.7, can be summarized as follows.

- *The general impact of changes in wealth tends to be higher for the market-based group than the bank-based group, as expected.* For example, in a market-based economy a one-dollar increase in stock wealth would lead to a 4½ cent boost in consumption, whereas in a bank-based economy it would augment consumption by only 1 cent.

- *The speed of adjustment of consumption to the desired or targeted level of consumption is higher for the market-based group than the bank-based group.* The coefficients on the adjustment term indicate that when consumption deviates from its desired level, one-fourth to one-half of the adjustment will take place within the first year. Again, this conforms to prior expectations since it is likely to be easier to borrow against increases in wealth in market-based financial systems.

- *An increase in housing wealth has a bigger impact on consumption than a similar increase in stock wealth.* (See Box 2.2.) Using the sample estimates from 1984–2000 for the market-based group and focusing on the United States, the study finds that for every dollar increase in housing, wealth consumption increases by 7

cents, whereas a one-dollar increase in stock wealth would lead to a 4½ cent increase in consumption. For the bank-based group, the stock wealth effect is smaller; a dollar increase in wealth would lead to slightly less than a 1 cent increase in consumption, while housing wealth appears to have had a fairly consistent elasticity of about 4 percent.[41]

- *The impact of changes in wealth on consumption has increased over time in both groups of countries.* The coefficient estimates on the stock wealth and on the speed of adjustment rise over the later part of the sample for both groups, suggesting that the responsiveness of consumption to these changes has increased, possibly because financial markets have become deeper and more liquid. For example, as bank-based households increased their equity holdings they have increased their consumption out of this wealth and adjusted more quickly to these changes, although admittedly more slowly than the market-based group.

Conclusions

The second half of the 1990s has seen substantial increases in the wealth of households in advanced economies, primarily owing to devel-

[40]The method used to classify countries comes from Levine (2001). It is the ratio of the value of domestic equities traded on the domestic exchange divided by GDP divided by the value of deposit money bank credits to the private sector as a share of GDP. Larger values of this ratio imply a more market-based financial system. Market-based economies are Australia, Canada, Ireland, the Netherlands, Sweden, the United Kingdom, and the United States. Bank-based economies are Belgium, Denmark, Finland, France, Germany, Italy, Japan, Norway, and Spain.

[41]The results are not inconsistent with those in Ludwig and Sløk (2002), who find that the elasticity on stock wealth has a larger effect than the elasticity on housing wealth. The results reported above refer to the marginal propensity to consume and are in cents per dollar. Thus, for comparison to Ludwig and Sløk, these results would have to be scaled by the ratio of consumption to wealth.

Box 2.1 How Important Is the Wealth Effect on Consumption?

The background study uses a standard consumption model to estimate the wealth effect of the form:[1]

$$C_t = \alpha + \beta YP_t + \delta W_t + \varepsilon_t,$$

where C is real household consumer spending, YP is real disposable income, W is real household wealth, and ε is the error term. The derivations of such a relationship can be traced to the theory of consumer behavior as described by Friedman (1957) and Ando and Modigliani (1963).

The standard interpretation is that the coefficient δ is the marginal propensity to consume out of wealth—i.e., the increase in consumer spending associated with an increase in wealth. It is common practice to separate wealth into different categories, with equity market and housing wealth being the two most typical components. The coefficients on the two wealth components may differ because of liquidity, volatility, and leverage differences as well as differences in the distribution of ownership (see Box 2.2).

A general assumption, at least for the United States, is that the marginal propensity to consume is about 0.04 out of stock wealth and somewhat higher out of housing wealth.[2] These results suggest that four to seven cents of each dollar of an increase in wealth are spent after the dollar is earned. Given the large stock of wealth, such a propensity is large enough to have a significant bearing on the behavior of consumption over time.

In the background study the relationship between consumption and wealth was investigated for a sample of 16 OECD countries using panel data techniques.[3] In particular, the relationship was estimated using a two-step procedure. In the first stage, the long-run relationship between consumption and wealth was estimated. These results were then incorporated into a dynamic

specification as an "error correction mechanism." Consumption, disposable income, and equity wealth are all measured as a ratio of trend real GDP. As a result, the coefficient on wealth represents the marginal effects—that is, the cents per dollar (or cents per euro) impact of equity wealth—and can, therefore, capture the larger impact of the tremendous wealth creation of the late 1990s. Housing wealth was proxied by real house prices because of the lack of availability of comparable data on the stock of housing across all countries and, consequently, the estimated coefficient represents an elasticity.

The table shows that both types of wealth are statistically significant in the long run as well as in the short run. Building upon this general result, three aspects of the relationship between wealth and consumption were examined in more detail.

- *Does the wealth effect vary between countries with different domestic financial structures?* To examine this question the 16 countries were split into two groups—market-based and bank-based economies—and the model was estimated for each group separately.[4] Systematic differences in the results emerged, with the coefficient on equity wealth being consistently larger for the market-based group than the bank-based group.
- *Does the impact of wealth changes vary according to the type of wealth?* The estimated coefficients on equity wealth and housing wealth varied between the asset types. Comparisons are complicated by the fact that the equity coefficient is measured in cents to dollar while the coefficient on housing is an elasticity. However, comparing estimates for those countries that have data on the stock of housing wealth, as well as alternative specifications in which the

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The main author is Hali J. Edison.

[1]See also Boone, Giorno, and Richardson (1998), Ludvigson and Steindel (1999), and Bertaut (2002).

[2]See, for example, Greenspan (1999, 2001).

[3]To determine the appropriate estimation procedure, tests for nonstationarity and cointegration were considered prior to estimating the error-correction model.

[4]Market-based economies are Australia, Canada, Ireland, the Netherlands, Sweden, the United Kingdom, and the United States. Bank-based economies are Belgium, Denmark, Finland, France, Germany, Italy, Japan, Norway, and Spain. This classification stems from ranking countries using indicators of financial structure based on relative size and activity as described in Levine (2001).

Consumption and Wealth Effects

	1970–2000			1984–2000		
	All[1]	Market-based[2]	Bank-based[3]	All[1]	Market-based[2]	Bank-based[3]
Long-run relationship						
Income	0.58*	0.57*	0.58*	0.52*	0.4*	0.58*
Equity wealth	0.009*	0.03*	−0.002	0.02*	0.043*	0.009
House wealth	0.042*	0.035*	0.046*	0.067*	0.096*	0.055*
House wealth x trend	−0.00009	−0.00026*	−0.00004	−0.00046*	−0.00083*	−0.00038*
Short-run relationship						
Change in income	0.52*	0.49*	0.53*	0.46*	0.3*	0.53*
Change in equity wealth	0.009*	0.011	0.009	0.006*	0.01	0.007
Change in housing wealth	0.06*	0.07*	0.04*	0.077*	0.01*	0.06*
Inflation	−0.04*	−0.05*	−0.02	−0.07*	−0.06	−0.06
Adjustment to long run	−0.15*	−0.24	−0.11*	−0.21*	−0.46*	−0.16*

Note: Regressions based on fixed-effects model. Asterisk indicates significance at the 5 percent level.
[1]The entire sample includes Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Spain, Sweden, the United Kingdom, and the United States.
[2]Market-based economies are Australia, Canada, Ireland, the Netherlands, Sweden, the United Kingdom, and the United States.
[3]Bank-based economies are Belgium, Denmark, Finland, France, Germany, Italy, Japan, Norway, and Spain.

coefficient on equity wealth was calculated as an elasticity, indicates that the marginal propensity to consume out of housing is larger than that out of equity wealth.

• *Has the wealth effect been rising over time?* The standard model for each financial market group was estimated over two different periods: 1970–2000 and 1984–2000. Comparison of the estimated coefficients indicates that the coefficients on wealth have been generally rising over time, particularly for the market-based financial systems.

opments in the stock market. As part of this change, the aggregate value of household sector equity holdings increased and financial markets deepened across all countries. These enormous swings in wealth have had major implications for household savings, because as households become wealthier they tend to spend more on goods and services. The impact can be illustrated by using the econometric results derived above to conduct two counterfactual experiments: first, what would have happened to private savings had equity wealth remained at its 1994 level (as a percentage of private disposable income); and, second, what would have happened if, in addition, housing prices had remained constant (relative to the consumer price index). For the countries with market-based financial systems, the rise in stock market wealth is estimated to have reduced the saving rate by
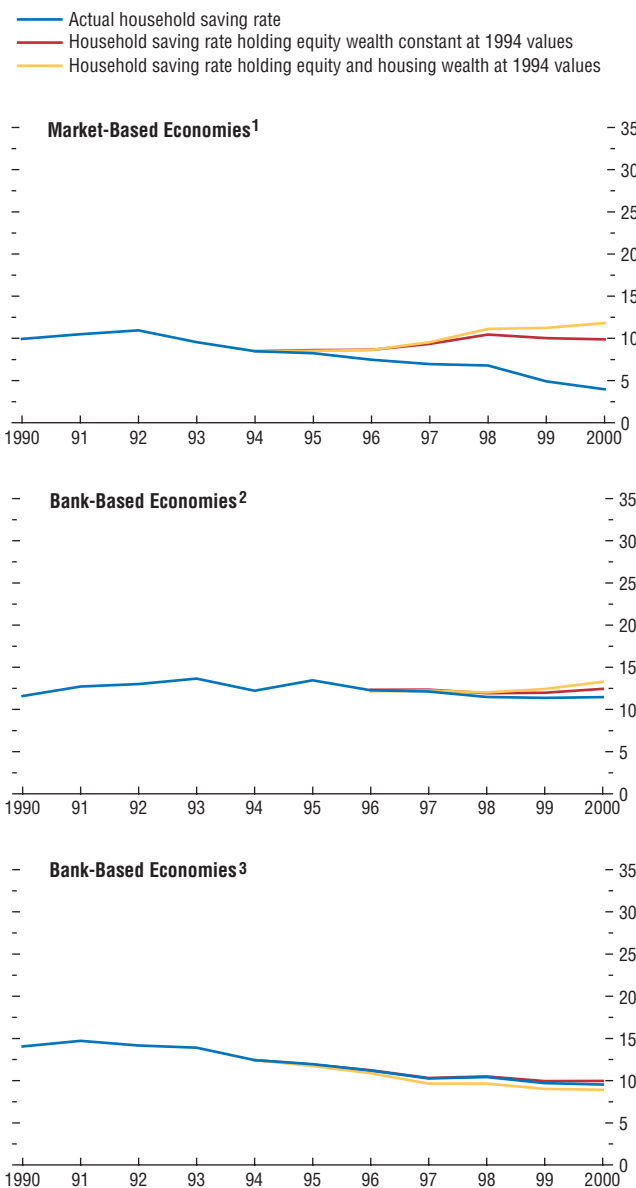
over 6 percentage points by 2000 (Figure 2.11), and by 8 percentage points when higher house prices are taken into account. In contrast, in countries with bank-based financial systems, saving behavior is not affected much by changes in equity wealth.

However, in those countries where house prices increased, saving rates were reduced on average by 1.5 percentage points (third panel of Figure 2.11). Correspondingly, the fall in equity prices since March 2000 can be expected to raise the saving rate roughly ½–1½ percent in the G-7 countries. However, particularly in the United States and United Kingdom, the impact has so far been offset partly or wholly by higher housing prices, which rose by at least 15 percent over the corresponding period (Table 2.8).

The empirical results presented in this essay suggest that asset prices have become more im-

Figure 2.11. Saving Rate Behavior in Response to Asset Price Changes

The change in asset prices has had a substantial impact on market-based economies, but a modest impact on the bank-based economies.

— Actual household saving rate
— Household saving rate holding equity wealth constant at 1994 values
— Household saving rate holding equity and housing wealth at 1994 values

Market-Based Economies[1]

Bank-Based Economies[2]

Bank-Based Economies[3]

Sources: OECD, *Economic Outlook* and Analytical database; and Thomson Financial, Datastream.
[1]Countries include Australia, Canada, Ireland, Netherlands, Sweden, the United Kingdom, and the United States.
[2]Countries include Belgium, Denmark, France, Finland, Norway, and Spain.
[3]Countries include Germany, Italy, and Japan.

Table 2.8. Estimated Impact of Change in Asset Value on Real Consumer Spending, 2000Q1–2001Q3
(Percentage terms of 2001Q3 consumer spending)

	United States	United Kingdom
Impact of equity wealth[1]	−1.9	−2.4
Impact of housing wealth[2]	1.6	4.5
Total impact of wealth effect[3]	−0.3	2.2
Actual change in real consumer spending	2.7	6.1

Source: IMF staff estimates.
[1]Estimate taken by applying the marginal propensity to consume from equity wealth to the fall in total stock market capitalization.
[2]Estimate taken by applying the house price elasticity, adjusted by the ratio of GDP to housing wealth, to the rise in household housing wealth.
[3]Estimate taken as sum of the two components.

portant over time as a determinant of consumer spending, a result that holds true for all countries regardless of their financial structure. Together with the increased correlation across countries, this suggests that asset prices have become increasingly more important in the transmission of domestic and global business cycles. Notwithstanding the correction in asset prices that is now under way, it appears likely that this trend will continue over the longer term. With bank-based systems—those countries where the role of banks dominates the financial system—continuing to evolve, households in these countries are likely both to hold an increasing part of their wealth as equities and to find it increasingly easy to borrow against wealth to finance consumption. The aging of populations across the industrialized world will also mean that consumption in an increasing proportion of households will be significantly dependent on asset holdings. Finally, the globalization of financial markets appears likely to continue, driven by deregulation and technological progress.

Looking forward, it seems clear that developments in asset prices are likely to become increasingly important for policymakers, both because of their direct impact on demand and—given their synchronization across countries—their role in the transmission mechanism of business cycle movements. While this does not mean that policymakers should target asset

prices, it is clear that asset price developments both in an individual country and in the rest of the world will become an increasingly important input in the assessment of demand conditions, and therefore policy decisions.[42] Within this, as Federal Reserve Chairman Greenspan has pointed out, it is particularly important to focus on the differences within asset classes.[43] As noted in this essay, the impact of housing and stock wealth on consumption varies significantly, and this may also be true for their components.

## Monetary Policy in a Low Inflation Era[44]

One of the most remarkable economic developments of recent decades has been the industrial countries' success in restoring low inflation. Following the great inflation of the 1970s, price increases have moderated and have been consistently below 3 percent since 1993 in the industrial countries as a whole and in the main industrial regions (North America, the European Union, and Japan), levels not experienced since the late 1950s (Figure 2.12). While this success was aided by a variety of factors—including more prudent fiscal policies, structural reforms, and declining oil and commodity prices—there is a widespread consensus that changes in the conduct of monetary policy have played a central role.[45]

Accordingly, this essay focuses on the role of monetary policy in achieving low and stable inflation, how this has affected the behavior of the private sector and the nature of the inflation process, and the new challenges that confront policymakers. Two key conclusions are that, because of the existence of the zero interest rate bound, the danger of getting into a deflationary

Figure 2.12. Inflation in Selected Advanced Economies
(Annual percent change)

From 1993 onward, inflation reached rates below 3 percent, levels not experienced since the late 1950s.
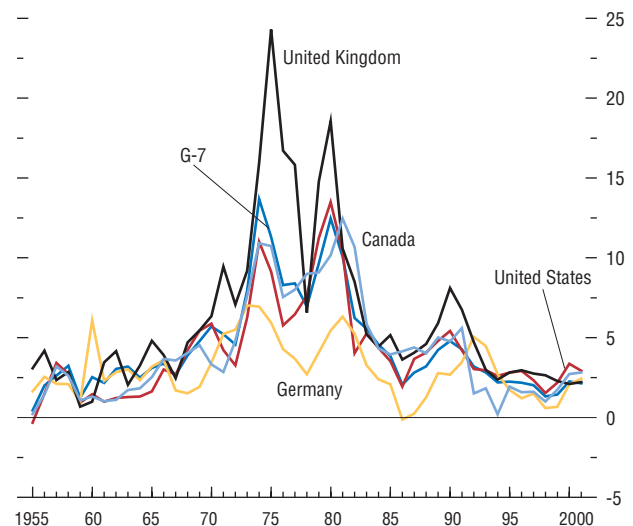
[42]See, for example, the May 2000 *World Economic Outlook* and Mishkin (2001).

[43]See Greenspan (1999 and 2001).

[44]The main authors of this essay are Marco Terrones and Silvia Sgherri; Bennet Sutton provided research assistance.

[45]See Chapter IV of the October 1999 *World Economic Outlook*. The improvement in fiscal policies is discussed in Chapter III of the May 2001 *World Economic Outlook*.

## Box 2.2. A Household Perspective on the Wealth Effect

A growing literature explores the magnitude of the wealth effect from the stock market relative to other assets, notably housing. Some papers in this literature conclude that the stock market wealth effect, while significant at 3 to 5 cents out of every dollar, is smaller than the wealth effect from housing, which is estimated to be somewhat larger. A common explanation for this difference in magnitude is that house prices are less volatile than the stock market, so that gains in stock holdings are seen as less certain. This box offers an additional explanation based on recent work on the United States. Using recent household survey data, it finds that stock holdings are far more skewed toward the upper tail of the income distribution than is ownership of housing. Together with empirical evidence that the marginal propensity to consume may be declining in income, this is consistent with the view that, at the aggregate level, the wealth effect from housing is more important than the effect from the stock market.

The stock market boom during the 1990s has encouraged the view that corporate equity holdings are now the primary asset for a broad spectrum of households. Indeed, information from the flow of funds accounts indicate that, for the household sector in aggregate, equity wealth has been larger than housing wealth since 1996, and remains so even after the stock market decline in 2000 (upper panel of the figure). However, it remains true that ownership of housing is much more evenly spread across the income distribution than are holdings of corporate equities. The lower panel of the figure plots median equity holdings (direct and indirect) and housing wealth as ratios of income by decile of the income distribution, using data from the 1998 Survey of Consumer Finances;[1]

Residential and Equity Holdings in the United States
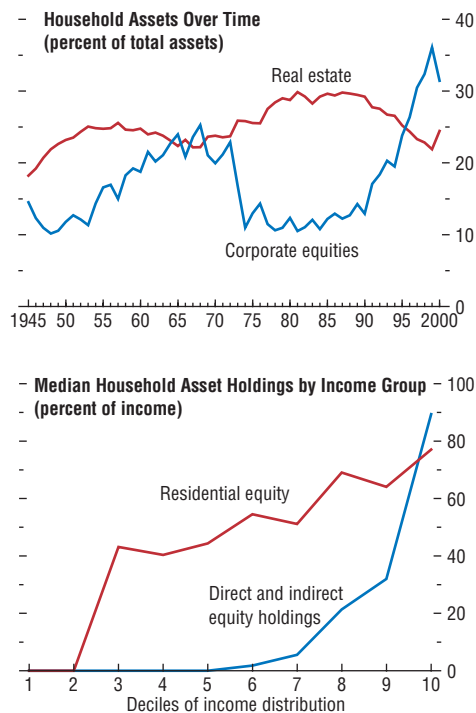
Sources: Federal Reserve Board, *Flow of Funds Accounts* and *1998 Survey of Consumer Finances;* and IMF staff estimates.

it shows that holdings of stocks are confined to the upper tiers of the income distribution and surpass housing in importance only in the upper decile.

The fact that equity holdings are so concentrated has been widely noted. Indeed, Maki and Palumbo (2001) show that the rise in consumer spending in the latter half of the 1990s can be explained largely by higher consumption among the richest households. The fact that equity holdings are more prevalent among the rich may, however, help explain why the

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The main author is Robin Brooks.

[1]The Survey of Consumer Finances surveyed about 4,300 households in 1998 and oversampled relatively wealthy families to get an accurate picture of saving and portfolio behavior among this small segment of the population. The median estimates in the lower

panel of the figure are weighted by the probability that a household is selected into the sample. For details on the survey, see Bertaut and Starr-McCluer (2002).

wealth effect from the stock market is estimated to be smaller than that from housing. Recent empirical evidence by Dynan and Maki (2001) suggests that the marginal propensity to consume falls as income rises.[2] Most likely, this reflects the fact that wealth-to-income ratios are much higher in the upper tail of the income distribution—rising from a weighted median of 53 percent in the lowest decile to 350 percent

in the highest.[3] As a result, the impact of changes in wealth on consumption is likely to be lower.

The fact that housing ownership is more evenly distributed across the income distribution, together with the fact that lower-income households have a larger propensity to consume, may therefore be an additional reason for the greater estimated magnitude of the wealth effect from housing.

[2]The marginal propensity to consume out of changes in stock market wealth is estimated at between 5 and 15 cents to the dollar for households with security holdings below $100,000, while for households with securities in excess of $100,000 it is estimated to lie between 1 and 5 cents.

[3]It could also reflect longer planning horizons among the rich, for example, because they are more likely to leave bequests. See also Bernheim, Shleifer, and Summers (1985).

spiral increases markedly as inflation targets are lowered below 2 percent and that there is a case for becoming more proactive with regard to sharp falls in activity. Much of the analysis focuses on the experience of four major countries with relatively independent monetary policy stance over the period since 1970—Canada, Germany, the United Kingdom, and the United States—but the lessons are equally valid for other industrial countries as well as many emerging market countries.[46]

How Was Inflation Brought Down, and What Were the Effects?

The main factor behind the achievement of low inflation in the 1990s was a widespread shift of central banks, including significant institutional changes, toward a more focused attitude

on inflation compared to the 1970s. Indeed, there has been an institutional sea change with the generalized adoption of independent central banks and the appointment of conservative central bankers, with low inflation as the first policy priority.[47] This largely reflected the recognition by the public and politicians that high inflation was associated with bad economic performance, as well as the recognition by central bankers that policies aimed at systematically exploiting the short-run output/inflation trade-off to increase output beyond potential were ineffective and self-defeating (Fischer, 1996, and Viñals, 2001).[48]

The shift in priorities can be illustrated by estimating monetary policy reaction functions that relate the short-term interest rates to inflation and the output gap.[49] Such functions provide a useful summary of central bank actions, and are

[46]The disinflation experience of emerging market countries, which reflects in part trends in the industrial countries, is discussed in Chapter IV of the May 2001 *World Economic Outlook.*
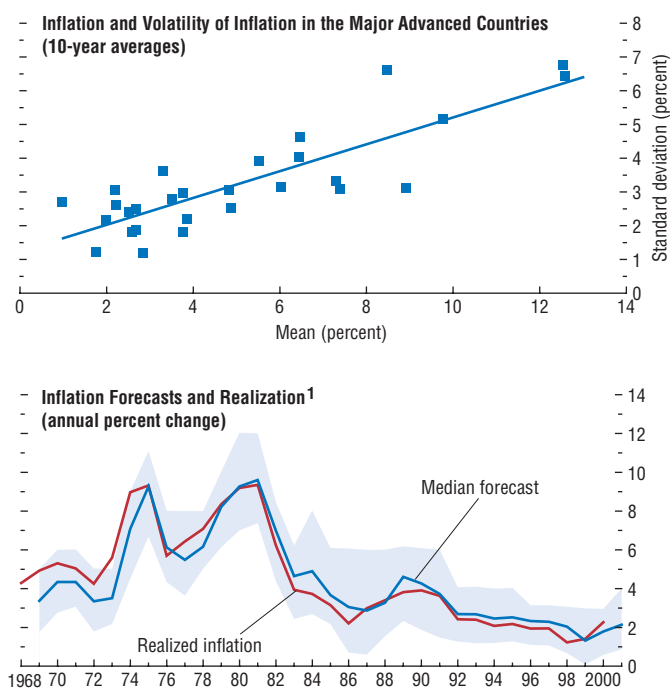
[47]For instance, independent central banks were created in the 1990s in France, Italy, Japan, New Zealand, the United Kingdom, and for the euro area.

[48]Barro and Gordon (1983) highlighted the possibility of higher inflation than desired as policymakers overstimulate the economy in an attempt to raise output above potential. This bias can be mitigated, however, by creating independent central banks with appropriate incentives and structure, including the appointment of conservative management (Rogoff, 1985; Walsh, 1995; and Svensson, 1997).

[49]See, for instance, Taylor (1993).

Figure 2.13. Inflation Has Become Less Volatile and More Predictable

As inflation has fallen, inflation volatility has declined and the spread of private sector forecasts has decreased.

Inflation and Volatility of Inflation in the Major Advanced Countries (10-year averages)

Inflation Forecasts and Realization[1] (annual percent change)

Median forecast

Realized inflation

Sources: *Survey of Professional Forecasters*, Federal Reserve Bank of Philadelphia; and IMF staff estimates.

[1] Inflation density forecasts are represented by shaded region. The lower and upper bounds of the region represent the 5th and 95th percentile, respectively. The solid line represents the median forecast.

essential for some types of analysis, although it should be recognized that they reflect a stylized version of the policymaking process.[50] Empirical estimates of such functions for Canada, Germany, the United Kingdom, and the United States are reported in Appendix 2.1. They indicate that, compared with the 1970s, policy in the 1980s and 1990s became more responsive to changes in inflation and less responsive to output gaps and, in addition, central banks also changed interest rates in a smoother manner, thereby making policy more predictable.[51] These policy changes helped central banks build credibility with associated benefits for the private sector—in particular, a greater smoothing of target rates, known as gradualism, reduced policy uncertainty, and increased private sector confidence about the direction of policy.[52]

The return to low inflation has changed the nature of the inflationary process in three important ways.

- *Inflation has become less volatile*. The existence of a positive association between the average level of inflation and its volatility, both across countries and within each country, has long been recognized (Friedman, 1977, and Taylor, 1981). The correlation between mean and standard deviation of inflation for the G-7 countries has averaged 0.4 during the past 40 years (Figure 2.13, top panel). Consistent with this, as inflation has declined, its volatility has fallen by an average of one-third between the 1980s and the 1990s, with particularly striking

[50]In practice, central banks have access to a much wider range of information than estimates of the output gap and of expected inflation, and, given the importance of market responses in transmitting policy actions to the economy, central banking remains "as much an art as a science" (Blinder, 1997).

[51]As the output gap is an unobserved variable, it is measured with error. Indeed, systematic errors in estimating these gaps in the 1970s contributed to policy mistakes (Orphanides, 1998, and McCallum, 2001b).

[52]One consequence is that long-term interest rate movements often anticipate monetary policy actions, reducing the contemporaneous impact between short- and long-term interest rates.

reductions in France, Italy, and the United States.

- *Inflation has become more predictable.* As inflation volatility has fallen, it has—unsurprisingly—become easier to predict future inflation. For example, Diebold, Tay, and Wallis (1999), using information from the U.S. Survey of Professional Forecasters, found that the spread of private sector forecasts of inflation has decreased in the past decade in direct relation with the fall in inflation (Figure 2.13, bottom panel) and perhaps other factors such as more benign shocks to the economy. Similarly, the accuracy of econometric models of inflation has risen. For example, following the approach of Taylor (1981), staff estimates indicate that the standard errors of simple time-series models of inflation and conventional Phillips curves, which include past inflation and output gap, have generally fallen significantly since the 1970s for Canada, Germany, the United Kingdom, and the United States.

- *Inflation has become less persistent.* Simple tests indicate that inflation persistence has fallen as countries move from high to low inflation. For example, the time-series models referred to in the previous paragraph indicate that past inflation is becoming a less important factor in explaining its current level. One way of quantifying this change is to calculate how long it takes for a shock to inflation to dissipate. The half-life of a shock to inflation (i.e., the time it takes for half of a shock to inflation to be eroded) has been falling—in the United States it has been reduced by two-thirds since the 1970s. (On this issue, see also Cogley and Sargent, 2002, and the comments by Stock, 2002.)

Lower and less volatile inflation, by creating a more stable environment, is generally expected to result in better economic performance (Fischer, 1996). For example, it reduces the uncertainty of relative price signals, thereby making economic decisions more transparent. As a result, a reduction in inflation volatility should be associated with a reduction in output fluctuations.[53] As can be seen in Figure 2.14, this does indeed appear to be the case for the G-7 countries, with the correlation being particularly marked in the United Kingdom and the United States (Lucas, 1973; and Cecchetti, Flores-Lagunes, and Krause, 2001, document this effect across a wider range of countries).[54] Furthermore, recent research indicates that inflation volatility is one of the most important causes of output volatility, suggesting that the dampening of economic fluctuations during the 1980s and 1990s owes much to the fall in inflation volatility associated with reduction in the level of inflation, not simply a more benign underlying environment (Blanchard and Simon, 2001).

## How Has Low Inflation Affected Private Sector Behavior?

The decline in inflation has had significant effects on private sector behavior. As inflation becomes low and more predictable, workers are more willing to increase the length of their labor contracts, as they are less concerned that their wages will be eroded by unexpectedly high inflation. Indeed, studies for the United States and other advanced economies have found that the average duration for wage contracts and the frequency of wage adjustment are inversely related to the level of inflation (Taylor, 1999). Second,

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[53]A fall in inflation should also have a positive effect on economic growth. Empirical work confirms a negative association between inflation and output growth (see, for instance, Fischer, 1993; Barro, 1997; and Judson and Orphanides, 1996). The situation is more complex at low inflation rates. For instance, Khan and Senhadji (2001) found no relationship between inflation and output growth at low levels of inflation (0–3 percent in the case of industrial countries) but a robust negative association beyond this threshold.

[54]In Germany during the late 1980s, inflation volatility rose with no visible effect on output volatility; this suggests that the uncertainties surrounding the process of the German unification had an effect on prices, perhaps reflecting the private sector uncertainty about the future course of monetary policy.

Figure 2.14. Volatility in Output and Inflation
(Rolling 5-year standard deviation of quarterly growth rates)

Output volatility and inflation volatility are highly correlated, particularly in the United Kingdom and the United States.
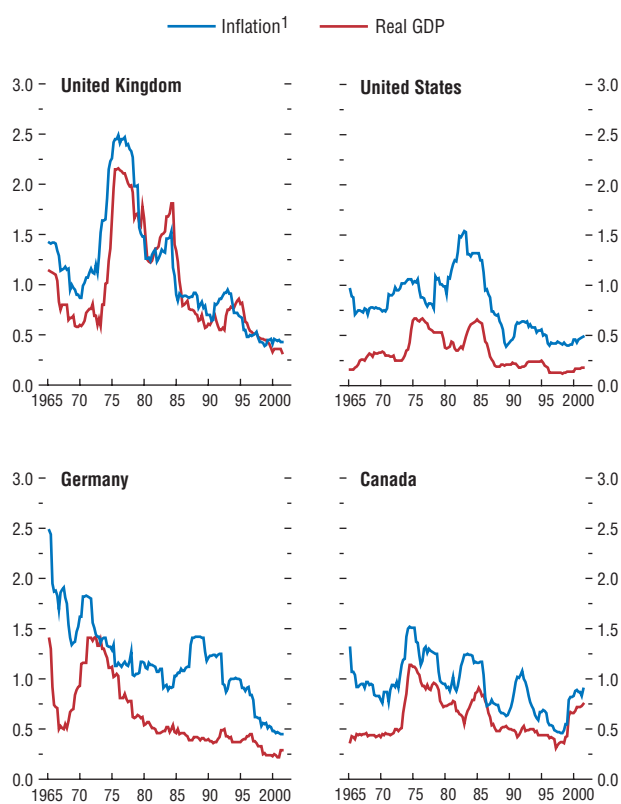
Sources: IMF, *International Financial Statistics;* and IMF staff estimates.
[1] GDP deflator.

private agents are willing to engage in longer-term financial contracts and hold longer-term financial assets, as the risks of unexpected wealth redistribution between debtors and creditors on fixed-rate contracts falls. Third, firms' pricing power has declined. In a low inflation environment firms are less able to pass through changes in their costs—including those linked to exchange rate fluctuations—to prices (McCarthy, 2000). One consequence of longer contracts is that the inflationary response to monetary policies might become more elongated. The decline in inflation has also helped mitigate the distortionary effects resulting from nominal rigidities in the tax system.

In addition, as central banks have become more credible and more predictable, private sector behavior seems to have become more forward looking in both labor and product markets. For example, despite the lengthening of contracts, several trends suggest that compensation schemes have become more flexible, sophisticated, and forward looking, particularly in relatively deregulated economies such as the United States, where the size of unionized labor has been in decline for several years. Labor contracts have also become more homogenous over time, both across firms and industries, and often include compensation provisions, such as annual bonuses paid at the end of the year. Finally, the number of companies that include forward-looking compensation schemes has grown large.

One way of measuring this change in behavior is to look at shifts in the weight given to inflationary expectations in an expectation-augmented Phillips curve—which is vertical in the long run—where current inflation depends on past and expected inflation (with weights that sum to unity) as well as the output gap.[55] Results reported in Appendix 2.1 indicate that price setting has indeed become more forward looking over time across a range of countries. Other

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[55]Such a model is widely used and can be derived from particular forms of staggered wage/price contracts, particularly in the context of the slow diffusion of information (Mankiw and Reis, 2001).

studies suggest that the reduced weight on past inflation is linked to greater central bank credibility (Laxton and N'Diaye, 2002). More forward-looking private sector behavior, in turn, increases the effectiveness of monetary policy. This is because workers and firms become more responsive to anticipated changes in policy, which magnify the impact of current adjustments in the policy stance—an effect often described as the expectations channel of monetary policy. In sum, a virtuous circle was created in which as central banks became more concerned about inflation and, therefore, more predictable and credible, this led to more forward-looking behavior by the private sector, which in turn made monetary policy effects through the expectations channel faster and more effective.

This virtuous circle can be illustrated by looking at the results from a small macroeconomic model of the type often used in analysis of monetary policy.[56] Appendix 2.1 describes a three-equation model estimated by the IMF staff for Canada, Germany, the United Kingdom, and the United States. In addition to the monetary policy reaction function and expectation-augmented Phillips curve already discussed, the model comprises an aggregate demand curve, which relates the output gap to the real interest rate (a relationship that appears to have been broadly stable since 1970). While the relatively simple structure of such models does not take explicit account of many real-life transmission mechanisms—such as asset prices, balance sheet effects, fiscal policy, the role of the exchange rate, and external demand—their flexibility, sophisticated forward-looking dynamics, and transparency make them useful analytic tools.[57] In particular, the structure highlights the importance of two of the main monetary transmission channels: a conventional

real interest rate channel, through which central banks affect the spending decisions of the private sector; and an expectation channel, through which central banks influence the private sector's inflationary expectations by conveying information about the future course of monetary policy.

The results from the model illustrate the benefits from the positive feedback between changes in the monetary policy rule and private sector behavior. Figure 2.14 reports the impact of changing the value of some of the key parameters of the model on inflation and output volatility, calculated using stochastic simulations in which the model is subjected to "typical" underlying shocks. The top left panel, for example, traces out the impact of changing the degree of forward-looking behavior in the Phillips curve on the volatility of inflation (assuming the other coefficients in the model remain at their estimated U.S. values since 1982),[58] while the top right panel reports the same relationship for output volatility. The lower panels repeat the exercise using the three parameters in the monetary reaction function, the coefficient on inflation, the coefficient on the output gap, and the smoothing parameter, respectively. To give a sense of the impact of changes in behavior over time, estimated parameter values for the 1970s and 1982 onward for the United States are identified. The results suggest that the large reductions in the variability of inflation and output since the 1970s were achieved through the increased responsiveness of the monetary authorities to inflation and the resulting increase in the forward-looking behavior of the private sector, as can be seen in the top half of Figure 2.15. The bottom two panels also indicate that interest rate smoothing has also

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[56]See, for instance, Clarida, Galí, and Gertler (1999); Rudebusch and Svensson (1999); and King (2000).

[57]Ball (1999) and Svensson (2000a) both argue that even in small open economies these monetary policy rules are effective, as the exchange rate response increases the effect of changes in the interest rates. In a similar vein, Mishkin (2001) argues that although monetary policy works through a series of channels, including real estate prices, equity prices, and exchange rates, these assets are inappropriate targets for policies (see also Chapter III of the May 2000 *World Economic Outlook*).

[58]The impact on inflation volatility is generally much larger if several parameters are returned to their 1970s values at the same time, reflecting the relative instability of the monetary rule from that period.

Figure 2.15. Improving Monetary Policy Effectiveness[1]

Ceteris paribus, as private agents become more forward looking, and monetary policy becomes more responsive to inflation and more gradualist, both inflation and output volatility can be reduced.
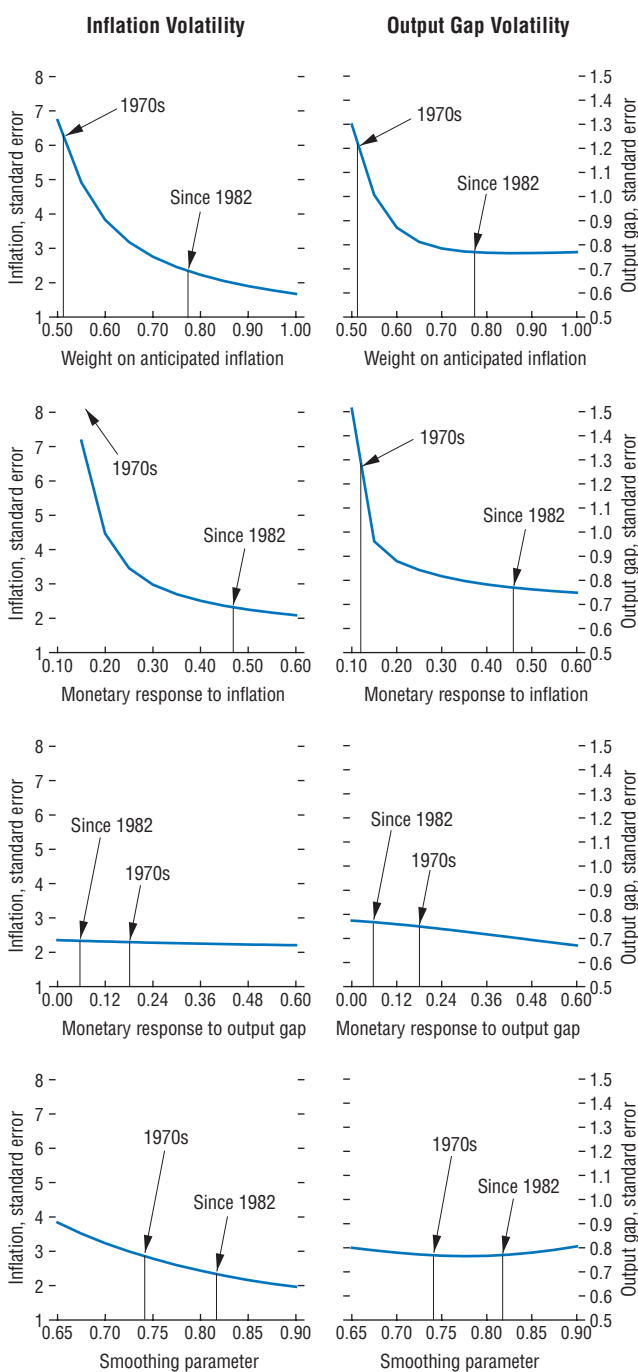
Source: IMF staff estimates.
[1]Each panel of this figure is drawn under the assumption that the other coefficients in the model remain at their 1982–2000 values.

played a role, particularly in the reduction in inflation volatility.

The results also suggest, however, that the benefits from movements in these three parameters are becoming more limited over time. Further increasing the monetary response to inflationary disturbances, the smoothing parameter, or the forward-looking coefficient in the Phillips curve appears likely to produce smaller results than in the past, particularly with regard to output volatility.

The Road Ahead

What are the new policy challenges for central banks now that monetary policymakers have succeeded in attaining relatively low and stable inflation across the industrialized world? The most obvious change is that central banks' objectives are becoming more symmetric, as concerns about higher inflation in the future have begun to be counterbalanced by concerns about deflation and the zero nominal interest floor. Deflation blunts the effectiveness of monetary policy and can lead to a downward spiral of activity in part through balance sheet effects on the financial system, as the example of Japan vividly indicates (DeLong, 2000). As a result, central banks can no longer be primarily focused on concerns about increases in inflation. Indeed, analysis suggests that the danger of getting into a deflationary spiral increases markedly as inflation targets are lowered below 2 percent (Box 2.3).

Concerns about deflation also suggest that central banks need to be more proactive in responding to sharp downward shocks to activity. In the 1980s and 1990s, monetary policy improved its efficiency through greater smoothing of interest rate changes—often referred to as gradualism—and credibility. These changes provided substantial benefits, most notably in reducing economic fluctuations (Sack and Wieland, 1999). However, with inflation low, gradualism may not be the best policy to follow in the face of sharp downward fluctuations in activity. A drawn out policy response runs the risk that inflation will continue to fall and may even turn

Box 2.3. Can Inflation Be Too Low?

One consequence of the achievement of low inflation in the 1990s has been a debate about whether inflation can be too low given the existence of a zero floor on interest rates.[1] In particular, it has been argued that the scope for adjusting the stance of monetary policy could become severely constrained if central bankers pursued a very low inflation target because such a choice would result in a low average level of nominal interest rates, significantly reducing the monetary authority's scope for reducing real interest rates when its output and inflation stabilization objectives were threatened by adverse deflationary shocks to the economy. The performance of the Japanese economy over the past decade has illustrated just how important this problem can be. This box summarizes some results from a recent study on Japan that uses the IMF's macroeconomic model MULTIMOD to assess how the zero-interest-rate floor (ZIF) can reduce the effectiveness of monetary policy.[2]

In the face of a negative demand shock similar in magnitude to that experienced by Japan in the late 1990s, the figure shows how the ZIF and the choice of target inflation can limit the effectiveness of monetary policy. The monetary authority is assumed to adjust the short-term interest rate according to a "Taylor-type" policy rule with a response coefficient on the inflation gap of 1.0 and a response coefficient on the output gap of 0.5.[3] The impact of the ZIF under the zero percent inflation target on the monetary authority's control over real interest rates is striking. Under the zero inflation target, the ZIF means there is less room to lower the nominal interest rate, constraining the initial decline in real interest rates.

Consequently, output recovers more slowly, causing inflation to decline more, which in turn
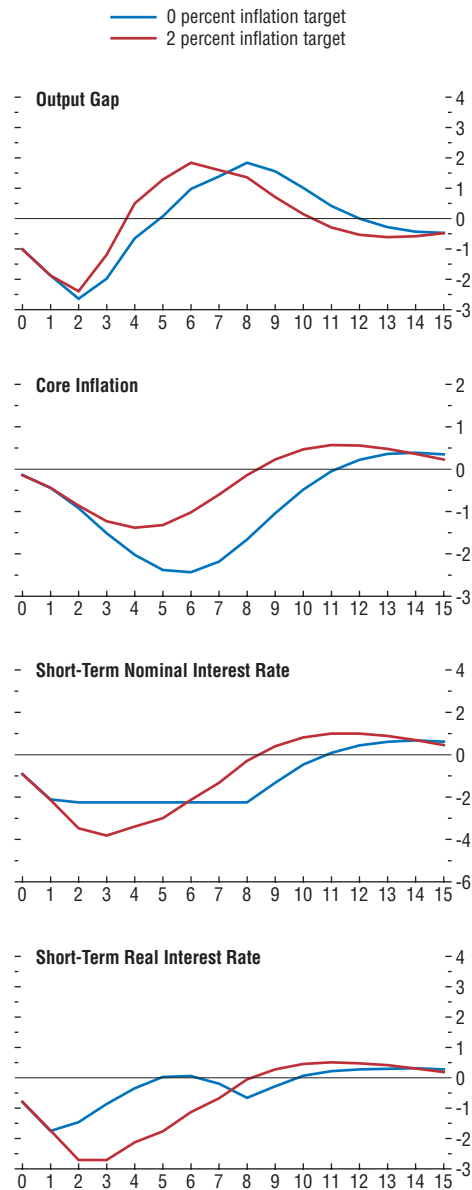

The main author is Benjamin Hunt.
[1]See Summers (1991).
[2]For more details of the analysis, see Hunt and Laxton (2001) and for a detailed description of MULTIMOD, see Laxton and others (1998).
[3]These coefficient magnitudes are within the range of empirically estimated coefficients using U.S. data.

Impact of Different Target Rates of Inflation[1]
(Percentage points)

Source: IMF staff estimates.
[1]Deviations from baseline.

drives real interest rates upward, further depressing aggregate demand and leading to more

Box 2.3 *(concluded)*

Impact of Average Inflation Target Rate on Interest Rates and Output
(Percent)

	3.0	2.5	2.0	1.5	1.0	0.5	0
Probability that interest rates become zero	2.0	3.0	4.0	8.0	13.0	23.0	31.0
Probability of a deflationary spiral	0.0	0.0	0.0	2.0	3.0	8.0	11.0
Variance of real output	1.8	1.8	1.8	1.81	1.85	1.96	2.16

downward pressure on inflation. If the shocks hitting the economy are large enough, this dynamic interaction can lead to a deflationary spiral that cannot be reversed by adjustment of the short-term nominal interest rate alone, as a result of which the model cannot be solved without assuming additional actions by the fiscal or monetary authorities.

Given the potential difficulties presented by the ZIF, how can the monetary policy framework, as summarized by the policymaker's price stability objective and the rule governing the systematic adjustment of the short-term interest rate, be designed to minimize the possibility of the ZIF becoming a binding constraint? Further analysis suggests two modifications that can be effective. One is responding more aggressively to negative deviations of output from potential output and inflation from its target rate. In response to negative shocks, adjusting the short-term nominal interest rate aggressively reduces the probability and severity of periods of deflation.[4]

In model simulations another effective modification was found to be generalizing the monetary authority's reaction function to include an explicit price-level component. Incorporating an explicit price-level component gives monetary policy more influence on real interest rates once nominal interest rates become constrained at zero. To achieve the price-level target, inflation must exceed its underlying target rate following periods during which inflation has been below target, a factor that

affects inflation expectations and real interest rates.[5] This result relies on the price level target being credible. However, this credibility may be difficult to achieve in practice. Private agents may doubt the policymaker's ability to generate future inflation if the nominal interest rate is at or near the ZIF and, even more important, question the policymaker's commitment to achieve the future inflation once deflationary pressures have dissipated. This suggests that monetary authorities may need to rely on other mechanisms, besides the adjustment of short-term interest rates, to enhance the credibility of their announced objectives. Direct purchases of assets such as long-term bonds and foreign currency have been suggested as possibilities.[6]

Even under the best possible policy rule, where the commitment to generate future inflation when required is perfectly credible, the probability of getting into a deflationary spiral increases markedly as the target rate for inflation is lowered below 2 percent. The table reports results derived from stochastic simulations on MULTIMOD, in which the model is subjected to "typical" shocks. Output variability increases as the average inflation target declines below 2 percent and there is an increasing probability that the economy can be tipped into a deflationary spiral of prices and output that cannot be solved by adjusting the short-term nominal interest rate (hence preventing the model from computing a solu-

[4]Other researchers using models of the U.S. economy have also reached this conclusion. See Orphanides and Wieland (1998) and Reifschneider and Williams (1999).

[5]This is a channel through which several commentators have suggested Japanese monetary policy must now operate. For example, see Svensson (2000b) and Krugman (1998).
[6]See Clouse and others (2000).

tion).[7] While this work was done on the Japanese sector in MULTIMOD, preliminary work with the models for the United States and the euro area suggest that, if anything, the ZIF issue could be more compelling in these regions owing to the greater inertia in the inflation process. These conclusions are also consistent with other work examining the optimal level of

inflation using a variety of monetary policy models, which generally conclude that it is best if inflation does not fall below 1–1½ percent, implying target inflation rates above that level.[8] The fundamental point that emerges is that the easiest and best way to solve the issue of the ZIF is to target a sufficiently high rate of inflation.

[7]There are many other factors—such as alternative channels for monetary policy, uncertainty about the structure of the economy, distortionary effects of inflation, and biases in price indices—that influence the optimal level of inflation in the face of the ZIF that this MULTIMOD analysis does not incorporate.

[8]See Fischer (1996) for a general survey; Akerlof, Dickens, and Perry (2000), Orphanides and Wieland (1998), and McCallum (2001a) on the United States; and Wyplosz (2001) and Viñals (2001) on the euro area. By contrast, Reifschneider and Williams (2001) conclude that the inflation target can be as low as ¾ percent if appropriate policies are followed.

into deflation, while the effectiveness of monetary policy may be constrained either as interest rates hit the zero bound or if they are anticipated to do so in the future (Meyer, 2001). In these circumstances, it may be more appropriate to respond somewhat more aggressively to significant negative shocks to activity. Indeed, the relatively robust response of a number of central banks to the current downturn in activity appears consistent with this analysis.

Appendix 2.1. A Stylized Model of Monetary Policy[59]

There is an extensive and growing literature evaluating the performance of monetary policy in advanced economies. One popular method of analyzing the design of monetary policy rules is to use small macroeconomic models comprising a few key relationships and rational expectations, following the original work by Taylor (1979). See, for example, Clarida, Galí, and Gertler (2000); Rudebusch and Svensson (1999); Svensson (2000); and King (2000). While such

small models do not include many important economic mechanisms—such as asset prices and balance sheet effects—their analytical tractability and forward-looking dynamics make them a useful tool for the discussion of monetary policy and private sector responses.[60]

This appendix presents a closed-economy three-equation monetary model for the United States embedding rational expectations estimated by the staff. The system includes a reduced-form interest rate rule, an expectation-augmented Phillips curve, and an IS curve—or aggregate demand equation—which are characterized respectively as follows.

$$i_t = \alpha_0 + \alpha_1 \pi^e_{t+1} + \alpha_2 (y_t - \overline{y}_t) + \rho i_{t-1}; \qquad (1)$$

$$\pi_t = \beta \pi^e_{t+1} + (1 - \beta) \pi_{t-1} + \gamma (y_t - \overline{y}_t); \qquad (2)$$

$$(y_t - \overline{y}_t) = \delta_0 + \delta_1 (i_t - \pi^e_{t+1}) + \delta_2 (y_{t-1} - \overline{y}_{t-1}). \quad (3)$$

Equation (1) relates the monetary authority's choice of short-term interest rate, i_t, to the next period's expected inflation, π^e_{t+1}, the output gap, $(y_t - \overline{y}_t)$, and the lagged interest rate i_{t-1}. According to this policy rule, the monetary authority

[59]The main author is Silvia Sgherri.

[60]Large macroeconomic models are also used to analyze monetary policy, as summarized in Reifschneider, Stockton, and Wilcox (1997) for the United States; Blake (1996) for the United Kingdom; Armour, Fung, and Mclean (2002) for Canada; and Drew and Hunt (2000) for New Zealand.

controls the path of the nominal interest rate to correct for deviations of expected inflation and real output (the feedback variables) from the inflation target and the potential level of output (the policy goals). The policy choices for the policymaker are the parameters α_1, α_2, and ρ. Higher values of α_1 (α_2) imply a more aggressive policy response for a given deviation of the inflation forecast (real output) from its target (potential). The coefficient ρ indicates the degree of instrument smoothing, which, in turn, dictates the speed at which the feedback variables are brought back to target, following inflationary disturbances. The constant α_0 embeds both the target level of inflation and the economy's underlying real rate of interest.

Equation (2) defines the model's supply side using an augmented Phillips curve, which relates current inflation, π_t, to expected inflation, π_{t+1}^e, to lagged inflation, π_{t-1}, and to the output gap, $(y_t - \bar{y}_t)$. The responsiveness of π_t to π_{t+1}^e, as measured by β, can be regarded as the proportion of informed agents who forecast future inflation by correctly understanding the underlying structure of the economy. On the other hand, $(1 - \beta)$ represents the proportion of uninformed agents, who use the past inflation rate to forecast future inflation.[61] Other things being equal, larger values of β imply a higher degree of nominal flexibility. The parameter γ governs how current inflation responds to deviations of output from potential: the larger the value of γ, the greater the effect of output on inflation, and the higher the real flexibility of underlying wages and prices.

Equation (3) makes the real output gap $(y_t - \bar{y}_t)$ depend on the (expected) real interest rate $(i_t - \pi_{t+1}^e)$ and on its own lagged value $(y_{t-1} - \bar{y}_{t-1})$. The parameter δ_1 determines the semi-elasticity of aggregate spending to real interest rate: the larger its absolute value, the larger the decline in demand following a given rise in the short-term real interest rate. Implicit in this IS equation is the conventional specification of the Fisher equation: the short-term

Table 2.9. Estimated Parameters of the Stylized Model for the U.S. Economy

	High Inflation	Low Inflation
Monetary reaction function		
Expected inflation	0.118**	0.461**
Output gap	0.181**	0.046*
Smoothing parameter	0.744**	0.816**
Memorandum		
Long-run elasticities		
Expected inflation	0.462**	2.51**
Output gap	0.705**	0.249*
Phillips curve		
Relative weight on expected inflation	0.511**	0.774**
Output gap	0.015**	0.044**
Aggregate demand function[1]		
Real interest rate	–0.157*	–0.157*
Lagged output gap	0.789**	0.789**
Memorandum		
Long-run elasticities		
Real interest rate	–0.745*	–0.745*

Note: Estimates of the intercepts are not reported in the table. One and two asterisks indicate that the coefficient is significantly different from zero at the 5 and 1 percent level, respectively.

[1]No significant structural break was identified over the two subsamples.

real interest rate equals the difference between the short-term nominal rate and the rate of inflation that is expected to prevail in the next period. The coefficient δ_2 on the lagged term in output measures the degree of persistence in output fluctuations, reflecting potential adjustment costs in private agents' spending decisions.

The structure of the model highlights the importance of two monetary transmission channels: a conventional real interest rate channel, through which monetary policy affects the spending decisions of the private sector and—thereby—inflation; and an expectation channel, through which central banks drive markets' expectations by conveying information about the future course of monetary policy. The relative importance of these two channels proves critical in understanding what makes monetary policy effective. In circumstances where the Phillips curve is predominantly myopic, policy is mainly effective through the standard interest rate

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[61]For a micro founded model based on information frictions see Mankiw and Reis (2001).

Table 2.10. Estimated Parameters of the Stylized Model for Other Advanced Economies

	Germany[1,2]		United Kingdom[1,2]		Canada[2]	
	High inflation	Low inflation	High inflation	Low inflation	High inflation	Low inflation
Monetary reaction function[3]						
Expected inflation	−0.192**	0.212**	0.019	0.098**	0.268**	0.376**
Output gap	0.140**	−0.013**	0.002	0.023**	0.030**	0.040**
Smoothing parameter	0.696**	0.867**	0.788**	0.828**	0.894**	0.804**
Memorandum						
Long-run elasticities						
Expected inflation	−0.631*	1.59**	0.090	0.570**	2.55**	1.91**
Output gap	0.462**	−0.095	0.010	0.132*	0.286**	0.202*
Phillips curve						
Relative weight on expected inflation	0.563**	0.750**	0.584**	0.558**	0.429**	0.499**
Output gap	0.007**	0.005	−0.040**	0.037**	−0.004	0.015**
Aggregate demand function[3]						
Real interest rate	−0.194*	−0.194*	−0.254*	−0.254*	−0.143*	−0.143*
Lagged output gap	0.883**	0.883**	0.638**	0.638**	0.891**	0.891**
Memorandum						
Long-run elasticities						
Real interest rate	−1.67	−1.67	−0.800**	−0.800**	−1.31	−1.31

Note: Estimates of the intercepts are not reported in the table. One and two asterisks indicate that the coefficient is significantly different from zero at the 5 and 1 percent level, respectively.

[1]Additional dummy variables have been included in the German model, to account for the stress of unification on the economy in 1990Q4 and 1991Q1, and in the U.K. model, to account for disinflationary policies carried out in 1979Q2 and 1979Q3.

[2]For these open economies, additional indicators were found to be significant in explaining changes in the policy rate. However, for the sake of comparison, corresponding estimated parameters have not been reported here.

[3]No significant structural break was identified over the two subsamples.

channel, although with a lag. Indeed, the monetary authority can succeed in temporarily increasing activity with little impact on inflation. As the weight on forward-looking expectations in the Phillips curve grows, however, the consequences of such unstable policies become more evident, because of the expectation channel. As a result, the ability of monetary policy to stabilize current inflation hinges crucially on the belief that the monetary authority will maintain future inflation at its target level.

Table 2.9 reports the parameter estimates for this model for the U.S. economy, both for the high inflation period (1970Q1–1982Q1, hereafter the 1970s) and the subsequent move to the low inflation (1982Q2 onward) period. As can be seen from Table 2.10, generally similar results are obtained for other industrial countries with independent monetary policies in-

cluded in the sample (Canada, Germany, and the United Kingdom), so that while the discussion that follows below is based on the estimated parameters for the United States, the conclusions remain largely valid with respect to a range of other countries.[62] In the presence of unobservable expected variables, asymptotically efficient estimates of the parameters are obtained by using Hansen's (1982) Generalized Method of Moments estimation technique, with lagged endogenous variables as instruments. The significance of structural breaks between the high- and low-inflation period has been tested in each equation with the aid of step dummies, taking the value of one in the 1970s and zero otherwise. Significant breaks in the early 1980s were found in the monetary reaction function and the Phillips curve. No evidence of a significant break was found in the IS

[62]However, in the case of the open economies included in the sample, the model also allows for an interest parity condition. In addition, the real exchange rate (along with other indicators) has been found statistically significant in explaining changes in the nominal interest rate.

curve, so the full period estimates are used in both subperiods.[63]

The parameter estimates indicate that—since 1982—policymakers have become significantly more aggressive on inflation, less responsive to the output gap, and more gradualist in adjusting their policy instruments. Indeed, the parameter estimates for the 1970s indicate that monetary policy was close to being unstable, which may help explain the corresponding price instability (on this point, see Taylor, 1999; and Clarida, Galí, and Gertler, 2000). While the point estimate of the feedback coefficient on inflation in the 1990s is about four times as large as it was during the 1970s—rising from 0.12 to 0.46—the coefficient on output over the same period is approximately one-fourth its value in the era of great inflation—falling from 0.18 to 0.05. At the same time, the degree of instrument smoothing has increased, implying that policy has become more gradual and predictable (see also Sack and Wieland, 1999; and Batini and Haldane, 1999). Net, the long-run monetary policy response to inflation has increased fivefold, while the steady-state response to deviations of output from potential has more than halved. These shifts have also resulted in changes in private sector price-wage behavior. In particular, the coefficient on forward-looking inflation in the Phillips curve has risen significantly. This increases the effectiveness of monetary policy, as the private sector responds more rapidly to current and anticipated future actions by the monetary authority. This change in the private sector appears to be closely linked to the greater focus on (formal and informal) inflation targeting in policymaking, thereby providing an anchor to private agents' inflation expectations (see Amano, Coletti, and Macklem, 1999; Isard, Laxton, and Eliasson, 2001; and Laxton and N'Diaye, 2002). In addition, inflation—since 1982—appears to be significantly more responsive to deviations of output from potential, as revealed by estimates of the parameter γ in the Phillips curves (Tables 2.9 and 2.10). Hence, the traditional interest rate channel also appears to have become more effective over time.

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[63]Estimates of the coefficients α_1, α_2, ρ, β, and γ over the 1990s were significantly different from their corresponding estimates in the 1970s, at the usual 5 percent level.

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