CHAPTER III ASSET PRICES AND THE BUSINESS CYCLE

Following widespread financial deregulation and increased globalization of capital markets since the early 1980s, industrial economies have witnessed a clear upward trend in asset prices. Alongside this trend, stock, property, and land prices have undergone—in both real and nominal terms—swings around typical business cycle frequencies ranging from three to ten years. Such swings have been quite pronounced. In some cases, such as in Japan and Scandinavia during the late 1980s and early 1990s, these swings turned out to have far-reaching disruptive effects on domestic financial systems and contributed to prolonged recessions. In other cases, such as in the United Kingdom during 1990–92, the financial system withstood the asset price collapse well but the ensuing recession was nevertheless quite severe.

While large asset price fluctuations are by no means a new phenomenon, a distinctive feature of the last two decades is that prolonged build-ups and sharp collapses in asset markets have taken place amidst a decline in consumer price inflation and a more stable macroeconomic environment in most of the industrialized world. Reflecting the primacy of low and stable inflation as a central goal of macroeconomic policy and the design of new monetary arrangements to help achieve this goal,[1] goods and services price inflation not only has declined to levels well below its post-war mean but its variability has also been significantly reduced.[2] Greater monetary discipline has been supported by fiscal consolidation. Public sector deficits have been significantly reduced in most of the European Union (EU). In Australia, Canada, New Zealand, the Scandinavian countries, and the United States fiscal balances have posted surpluses for the first time in a generation.

Notwithstanding the remarkable progress on these fronts, asset price fluctuations have remained substantial and highly correlated with business cycles in the industrialized world (Figure 3.1). This juxtaposition of low and stable consumer price inflation with asset price volatility, which in turn is correlated with output fluctuations, has motivated an intense debate in academic and policy circles about the complex interrelationships between asset prices, output growth, and inflation, and the challenges they pose to the broader task of macroeconomic stabilization. Key questions that have been raised in this connection include:

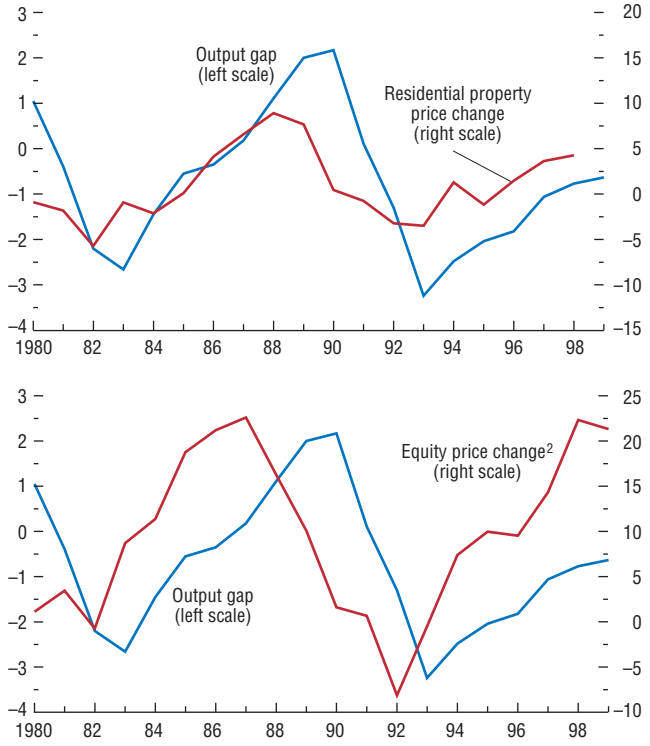
- What drives asset prices?
- What are the channels through which asset prices affect economic activity?
- Do asset prices contain valuable information about the future evolution of economic activity?
- When do large swings in asset price pose a threat to macroeconomic stability and how should policymakers respond to them?
- Do the answers to these questions depend on the different classes of assets considered?

[1]These include greater central bank independence, more accountability and enhanced transparency in the conduct of monetary policy in most countries. The introduction of inflation targeting or an unequivocal commitment to money and exchange rate targeting (including through the establishment of "hard" pegs such as currency boards and monetary unions) have also been instrumental. For an overview of recent experiences with different monetary regimes, see Frederic Mishkin, "International Experiences with Different Monetary Policy Regimes," NBER Working Paper 6965 (Cambridge, Massachusetts: National Bureau of Economic Research, 1999).

[2]In the second half of the 1990s, consumer price inflation in industrial countries has fluctuated within the range of 1 to 2 percent a year, down from some 10 percent in 1980–82. Meanwhile, its standard deviation has declined fivefold, to around 1 percent in 1998.

Figure 3.1. Industrial Countries: Output Gap, Real Property Price Change, and Real Equity Price Change[1]
(Percent)

Asset price swings have been closely correlated with, and tended to lead, output cycles.



Sources: IMF, *International Financial Statistics*; IMF staff estimates; and BIS, *69th Annual Report.*

[1]Arithmetic averages of the respective variables in 16 industrial countries, excluding Portugal prior to 1989 owing to lack of availability of data.

[2]Three-year moving average.

Bearing these questions in mind, this chapter examines the determinants of asset price fluctuations in industrialized countries, their information content, as well as their impact on economic activity and financial fragility. In light of their overwhelming role in the composition of private sector portfolios, the focus of the analysis will be on equity and property prices.[3] The chapter also discusses the circumstances under which policymakers need to respond to large swings in the price of these assets, and concludes with a brief discussion of current policy challenges in the European Union and the United States arising from the high levels of asset prices seen recently.

What Drives Stock Prices?

Since asset ownership constitutes a claim on goods and services, modern asset pricing models build upon the assumption that people engage in asset transactions with the objective of optimally distributing consumption over time. In doing so, people seek to equate the marginal benefit of consuming one more real dollar today to the marginal benefit from investing the dollar in some asset and eventually selling it in order to consume the proceeds in the future. This gives rise to an arbitrage condition between the risk-adjusted *expected* rate of return on the asset and the risk-free interest rate, so that the market value of a given asset will be determined by the present risk-adjusted discounted value of its expected income stream. This relationship can be simplified and the price of an asset at time t can be expressed as the ratio of its dividend at time $t + 1$ over the sum of the nominal risk-free interest rate, an interest risk premium for holding securities, and the negative of the nominal growth rate of dividends or

[3]The relationship between the business cycle and the exchange rate—another important asset price that affects economic activity through various channels—was analyzed in depth in "The Business Cycle, International Linkages, and Exchange Rates," *World Economic Outlook* (May 1998), Chapter III.

earnings.[4] This simple but widely used formula indicates that equity prices should rise (fall) as the risk-free interest rate or investors' risk premium falls (rises), and/or the growth of earnings increases (decreases).[5]

One problem with practical applications of this (or any other) stock valuation formula is that it is based on future values of earnings and interest rates, both of which are unobserved. Thus, its practical implementation must rely on present expectations about the future path of these variables, which can be influenced by over-optimistic or unduly pessimistic assessments by the investor. The fact that over the past century or so there have been several episodes in which stock prices appeared to "overreact" to swings in earnings and dividends does provide some initial evidence that investors' sentiment plays a key role in driving asset prices.[6] And, if investors' sentiment can at times play a prominent role in asset price formation, actual valuations can then deviate considerably from levels consistent with the "fundamental" determinants discussed above, which possibly helps explain why real stock prices have been subject to large swings in the various countries (Figure 3.2).[7] This begs the question of how to gauge the "fair" or "equilibrium" stock value in practice. A simple and widely used yardstick is the historical evolution of price-earnings (P/E) ratios. In the United States, for instance, the inverse of the P/E ratio (the so-called earnings yield) for broad stock indices has closely tracked the average real rate of return on stocks over fairly long time spans. A P/E ratio of 15, which corresponds to the average for the S&P 500 stock index for 1950–99, entails an earnings yield of close to 7 percent a year, which happens to be the average annual real rate of return on U.S. stocks since the end of World War II.[8] Judged by this yardstick, the 1999 price-earnings ratio of 32 would imply a real annual rate of return of stocks of 3.1 percent, which is less than half of that his-

[4]This formula is usually known as the "Gordon equation," after Myron J. Gordon, *The Investment, Financing, and Valuation of the Corporation* (Homewood, Illinois: Irwin, 1962). Algebraically, it can simply be written as,

$$P_t = \frac{D_t(1+g)}{i+\rho-g},$$

where P, D, g, i and ρ stand for the price of the asset, the dividends it pays, the growth rate of dividends, the risk-free interest rate, and the equity risk premium, respectively. With dividends being generally paid as a stable percentage share δ of earnings (i.e., $D = \delta E$), E can be shifted to the left-hand side of the equation to derive the "equilibrium" price-earnings ratio,

$$\frac{P_t}{E_t} = \frac{\delta(1+g)}{i+\rho-g},$$

where g stands for the growth rate of earnings. As will be discussed later, the P/E ratio is a commonly used benchmark indicator for stock valuations.

[5]It is important to note that while the derivation of this formula makes no assumption about equity repurchases by firms, the growing importance of equity repurchases relative to dividend payouts in recent years does not affect its validity. Equity repurchases affect only the time pattern of expected future dividends per share but not the respective totals. See John Campbell, A. Lo, and A. MacKinlay, *The Econometrics of Financial Markets* (Princeton, N.J.: Princeton University Press, 1997), Chapter 7.

[6]Using time series data from 1880, it has been found that a 1 percent increase in the level of dividends is typically associated with a 1.5 percent increase in equity values, implying that faster (slower) dividend growth increases (depresses) stock prices more than proportionately. See Robert Barsky and J. Bradford De Long, "Why Does the Stock Market Fluctuate?" *Quarterly Journal of Economics*, Vol. 108 (May 1993), pp. 291–311. Indications that investors tend to overestimate the persistence of variations in dividend growth—or, equivalently, to underprice risk—have motivated studies on stock valuations in which the rational expectations assumption that investors use optimally current information to forecast future dividend growth is relaxed. See N. Barberis, A. Shleifer, and R.W. Vishny, "A Model of Investor Sentiment," NBER Working Paper No. 5926 (Cambridge, Massachusetts: National Bureau of Economic Research, 1997). A comprehensive review of the literature on investors' herding behavior as a driving force behind stock valuations is provided in Sushil Bikhchandani and Sunil Sharma, "Herd Behavior in Financial Markets: A Review," IMF Working Paper (forthcoming).

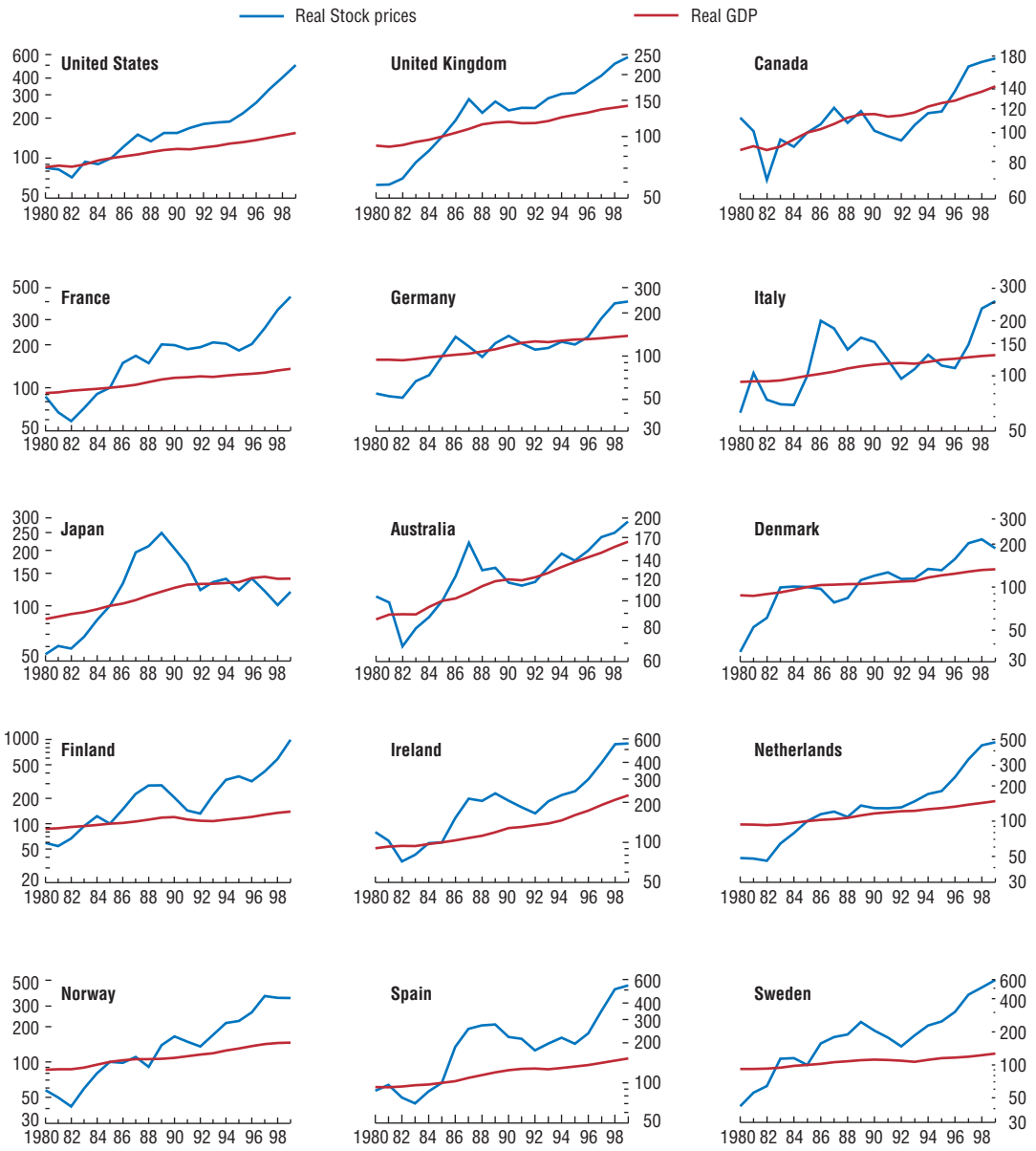
[7]The consumer price index (CPI) is used here to deflate stock prices. This is consistent with the underpinnings of standard asset pricing theory, which regard asset ownership as a claim on consumer goods. Deflating asset prices by the GDP deflator would not, however, change the basic picture.

[8]U.S. data over the past 200 years indicate that the average real return on equity has in fact been remarkably stable in the range of 6½–7½ percent a year over different long sub-periods. See Jeremy J. Siegel, *Stocks for the Long-Run* (New York: McGraw Hill, 1998).

Figure 3.2. Industrial Countries: Real Stock Prices and Real GDP

(Logarithmic scale; 1985 = 100)

Stock prices have risen markedly in most industrial countries in recent years, often outpacing real GDP growth.



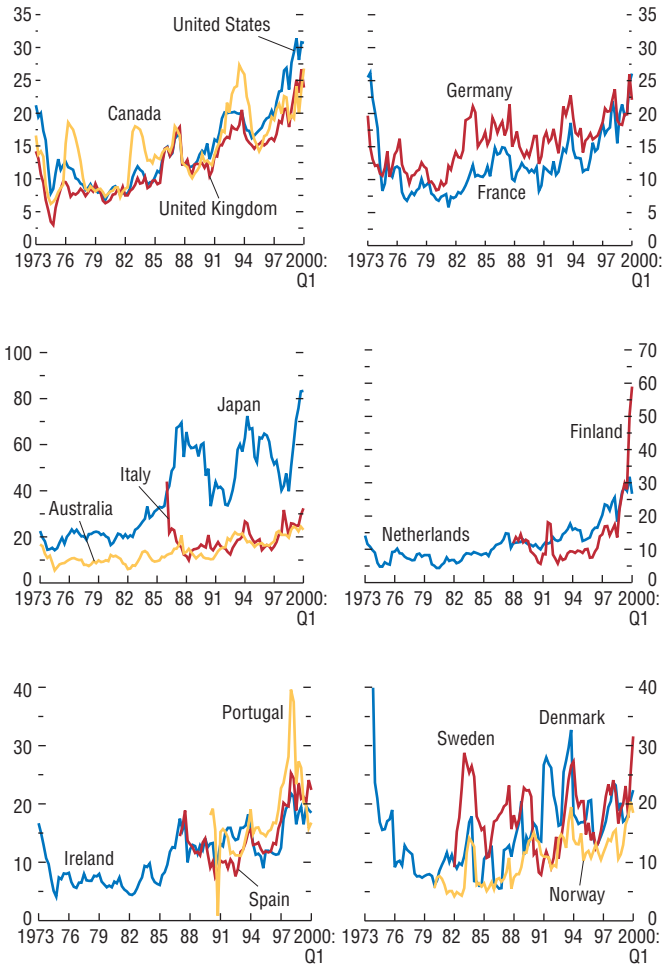
Sources: IMF, *International Financial Statistics;* and IMF staff estimates.

torically demanded by investors. At face value, this seems to indicate that U.S. stocks are currently overvalued. Following the same reasoning, a look at the historical evolution of P/E ratios in other countries points to the possibility of some stock price overvaluation across much of the industrialized world (Figure 3.3).

As discussed above, however, P/E ratios are a function of the risk-free interest rate, the risk premium, and expectations on earnings growth, and these can vary over time with changes in macroeconomic fundamentals and in the financial sector structure.[9] Sound macroeconomic policies leading to lower interest rates and faster earnings growth, together with financial innovations that help reduce transaction costs and allow greater opportunities for portfolio diversification (thus lowering investors' demanded risk premium), may well justify a higher P/E ratio than warranted by historical trends. Substantial productivity growth brought about by major innovations such as those in information technology (IT) in recent years may likewise justify historically high stock valuations in some industries. To the extent that the participation of such sectors in broad stock market indices are significant, this may end up pushing aggregate stock prices to new highs, despite more subdued valuations in other sectors. This has been clearly observed in the United States (Box 3.1).[10]

Figure 3.3. Industrial Countries: Price-Earnings Ratios
(Percent; end of period)

Stock prices have also risen faster than corporate earnings in most industrial countries, in particular during the late 1990s.



Source: Primark Datastream.

[9]Average levels of P/E ratios also vary widely across countries reflecting a host of institutional factors, such as the tax treatment of corporate profits and the degree of stock cross ownership in the business sector.

[10]As discussed in Box 3.1, it remains unclear, however, the extent to which recent productivity gains and the associated earnings growth in those industries (and in the non-farm sector as a whole) are sustainable. It is also noteworthy in this connection that the recent rise in corporate earnings and stock prices has been especially strong relative to the historical record. Previous technological revolutions, such as the dissemination of electricity-based industries in the 1920s (which brought about substantial and long-lasting productivity gains), did *not* produce the sharp rise in stock valuations and in corporate earnings similar to that observed in recent years for the IT sector. See Nicholas Crafts, "Globalization and Growth in the Twentieth Century," IMF Working Paper 00/44 (Washington: International Monetary Fund, 2000).

Table 3.1. Estimates of Potential Stock Market Overvaluation[1]

(Percent, except for price-earnings ratios)

Historical[2]	Price-Earnings Ratio	Dividend Yield	Real GDP Growth	Real Interest[3] Rate	Inflation Rate	Implicit Equity[4] Premium
Canada	15.8	3.1	2.5	4.9	4.3	0.8
France	12.5	3.8	2.0	4.2	4.6	1.7
Germany	16.5	2.3	2.0	4.1	2.6	0.3
Italy	18.8	2.3	1.9	3.4	7.6	0.8
Japan	44.8	1.0	2.7	2.4	1.9	1.4
United Kingdom	13.7	4.4	2.1	3.6	5.6	3.2
United States	15.6	3.4	3.0	3.9	4.2	2.8
Norway	10.5	2.4	3.0	3.8	5.3	1.8
Sweden	18.0	2.5	2.7	4.5	5.6	0.8
Spain	14.2	3.5	3.0	3.6	7.2	3.2
Netherlands	13.0	4.1	3.1	4.6	2.6	2.8
Portugal	18.0	3.0	2.9	1.3	11.6	5.3
Finland	12.8	2.2	2.7	2.7	4.7	2.4
Ireland	12.1	4.4	5.8	4.2	5.7	6.6

Current[5]	Price-Earnings Ratio	Dividend Yield	Potential GDP[6] Growth	Real Interest Rate	Inflation Rate	Implicit Equity[7] Premium
Canada	21.3	1.6	2.4	3.5	2.2	0.6
France	20.6	2.2	2.5	3.6	1.0	1.1
Germany	20.1	1.5	2.1	3.6	0.7	0.0
Italy	25.0	2.1	1.8	3.2	2.1	0.7
Japan	67.7	0.7	1.5	1.2	0.0	1.0
United Kingdom	23.7	2.6	2.4	3.3	1.2	1.7
United States	29.5	1.2	3.2	3.4	2.6	1.0
Norway	16.1	2.0	2.5	3.2	2.7	1.5
Sweden	20.5	1.8	2.3	3.9	0.7	0.3
Spain	21.8	1.9	3.4	2.3	2.7	3.2
Netherlands	27.9	2.0	2.6	2.9	2.3	1.9
Portugal	22.7	2.3	3.1	3.1	2.0	2.4
Finland	29.6	1.3	2.8	4.0	1.1	0.2
Ireland	19.0	2.0	6.4	2.3	1.4	6.3

Potential Overvaluation	Implied Equity[8] Premium Reduction	Implied Excess[9] Real Dividend Growth
Canada	0.2	0.2
France	0.6	0.6
Germany	0.3	0.3
Italy	0.2	0.2
Japan	0.3	0.3
United Kingdom	1.5	1.4
United States	1.8	1.8
Norway	0.4	0.4
Sweden	0.5	0.5
Spain	0.0	0.1
Netherlands	1.0	1.0
Portugal	2.9	2.9
Finland	2.2	2.2
Ireland	0.3	0.3

Sources: IMF staff estimates based on Datastream global stock indices and IMF, World Economic Outlook (WEO) database.

[1]Calculations based on the Gordon equation which incorporates the simplified assumptions discussed in the text. P/E and D/P ratios are measured using end-of-period stock prices and trailing earnings and dividends, respectively.

[2]Averages for 1980–99 (through third quarter 1999 or most recent data available).

[3]Nominal 10-year or longer government bond deflated using the CPI.

[4]Calculated using the historical averages of the dividend yield, real interest rate, inflation rate, and real GDP growth. Algebraically, $\rho = (1 + g)(1 + \pi)D/P - (r + \pi) + (g + \pi)$, where D/P stands for the trailing dividend yield, g for the growth rate of GDP, and r for the risk-free nominal interest rate (here proxied by the 10-year government bond yield on the assumption that ten years is, in most cases, a representative investment horizon in stocks) deflated by the current consumer price inflation π.

[5]1999 average for the price-earnings ratio and the dividend yield; latest quarter 1999 for inflation and real interest rates.

[6]IMF staff estimates.

[7]Calculated as in footnote 4.

[8]Historical implicit equity premium less current implied equity premium.

[9]Implied real dividend growth less potential GDP growth.

Box 3.1. Productivity and Stock Prices in the United States: Are Recent Trends Sustainable?

The sharp rise in U.S. equity prices over the past five years has raised concerns about the current levels of market valuation. Based on traditional indicators, such as the dividend-yield or the price-earnings (P/E) ratio, U.S. equity prices appear to have moved significantly out of line with historical values. A breakdown of S&P500 stocks by sectors (industrial, financial, transportation, and utilities) reveals that P/E ratios have varied considerably across sectors, and that the high valuation of S&P500 stocks reflects primarily high equity prices in the industrial sector—which is the overwhelming weight in the index (see the first table). The P/E ratio for S&P500 industrial stocks suggests that the growth in real earnings would be expected to accelerate in the period ahead, exceeding by 25 to 50 percent its growth performance since 1995, depending on the assumed equity risk premium.[1] Alternatively, to justify the current P/E ratios would require the equity premium for industrial sector stocks to be virtually eliminated.

The acceleration in future real earnings growth implied by current stock valuations in the industrial sector would be plausible if the pickup in U.S. labor productivity growth in the non-farm business sector since the mid-1990s continues. Gains have been mainly concentrated in the manufacturing sector, and in particular in the durable goods sub-sector where the recent average growth rate has reached about 8 percent a year (see the second table). The recent acceleration in productivity has increased corporate profits as a share of national income to levels that have not been seen since the 1960s (see the figure).

It is possible that improvements in management practices and strong investment in information technologies have contributed to this higher growth rate during the 1990s. However, evidence on whether this increase in productivity growth and profits is permanent remains inconclusive, with recent studies yielding conflicting results. These range from a pessimistic view that sees the recent increase as largely transitory, to a highly optimistic view that emphasizes a permanent rise in productivity growth.[2]

[1]As discussed elsewhere in this chapter, equity risk premia estimates tend to vary with the choice of the sample period and statistical method. Thus, calculations in the first table use a range of commonly found estimates.

[2]Data measurement issues further complicate how to interpret the recent performance of productivity over the past several years. Measures of productivity in some sectors, particularly services, tend to be biased downward because output is unobservable and expenditures on inputs are used as a proxy. For a more detailed discussion of the issue, see L. Slifman and

Price-Earning Ratios and Scenarios for Real Earnings and Risk Premium

	S&P 500 Index				
	Overall	Industrial	Financial	Transportation	Utilities
	I. Price-Earnings Ratio				
Price-earnings ratio					
1954–94[1]	16.7	17.4	10.2	26.9	15.8
1999	32.0	38.2	19.0	17.0	18.1
	II. Expected Real Earnings Growth				
Equity risk premium					
at 3 percent	5.7	6.0	5.2	5.2	3.3
at 4.5 percent	7.3	7.6	6.8	6.8	4.8
at 6 percent	9.2	9.3	8.8	9.3	6.5
	III. Implied Equity Risk Premium				
Real earnings growth at					
1954–94 average	0.3	0.2	3.5	6.5	0.6

Source: IMF staff estimates.
[1]Average over 1954–94, excluding the higher-inflation subperiod of 1970–84.

Box 3.1 *(concluded)*

Growth in Labor Productivity[1]
(Percent, average annual rate)

	1960–69	1970–79	1980–89	1990–99	1990–92	1992–95	1996–99	1996	1997	1998	1999
Business Sector	3.3	1.9	1.7	2.1	2.9	0.7	2.7	2.9	2.2	2.8	3.1
Nonfarm business sector	2.9	1.8	1.5	2.0	2.8	0.8	2.5	2.7	1.9	2.8	2.9
Manufacturing	2.6	2.6	2.8	4.0	3.7	3.0	5.3	4.0	5.1	4.8	5.9
Durable manufacturing	2.8	3.0	3.2	5.7	3.7	4.7	8.0	5.8	7.1	7.9	9.1
Nondurable manufacturing	2.6	2.2	2.1	2.2	3.3	1.6	2.1	2.5	3.1	1.1	2.0

Source: U.S. Bureau of Labor Statistics.
[1]Labor productivity is output per hour of all persons; data for 1999 are IMF staff estimates.

According to the pessimistic view, no significant trend increase in productivity has occurred.[3] Improvements in measuring price deflators beginning in the early 1990s have resulted in downward revisions to measured inflation, which implies upward revisions to real GDP and productivity. In addition, productivity follows a procyclical pattern so that with the recent growth rate of real GDP rising above trend, productivity growth has increased as well, reflecting the lags with which labor adjusts to a rise in output. Finally, the sharp decline in the price of computers has meant that real output per hour in the computer sector has risen at a rapid pace. In contrast, productivity growth elsewhere in the manufacturing sector has not recovered from its slowdown in the 1970s, and for some industries has slowed even further. Although computer manufacturing represents just 1.2 percent of the economy's output, the rapid rate of growth was sufficient to boost nonfarm business productivity. Overall, according to the pessimistic view, roughly half of the pickup in productivity growth since 1995 reflects price measurement and cyclical effects, and the remaining half reflects productivity gains emanating from the computer sector alone.

International evidence also casts doubt on the sustainability of stronger productivity growth. If a technological revolution were under way, improvements in productivity would also be observed outside of the United States. Based on international measures of labor productivity, among the Group of Seven countries, only the United States and Germany have experienced a pickup in productivity relative to the weak performance of the 1980s.[4] One explanation for why evidence of a pickup in productivity has yet to occur in other industrial countries, particularly in Europe, is that new technologies have been adopted elsewhere at a slower pace, perhaps reflecting the higher cost of labor market adjustment in these countries compared to the United States. New technologies often require the reorganization of labor and displacement of workers, which could entail costs that would reduce the return to new investment.[5] Finally, historical analysis of the impact of past technological revolutions on productivity indicates that these effects are quite small.[6]

C. Corrado, "Decomposition of Productivity and Unit Costs" (unpublished; Washington: Board of Governors of the Federal Reserve System, November 1996).

[3]This view is largely based on Robert J. Gordon, "Has the 'New Economy' Rendered the Productivity Slowdown Obsolete?" Northwestern University Working Paper (June 1999).

[4]See Charles Plosser, "Has the Productivity Boom Finally Arrived?" University of Rochester, Bradley Policy Research Center, Policy Statement and Position Papers 99–02 (September 1999).

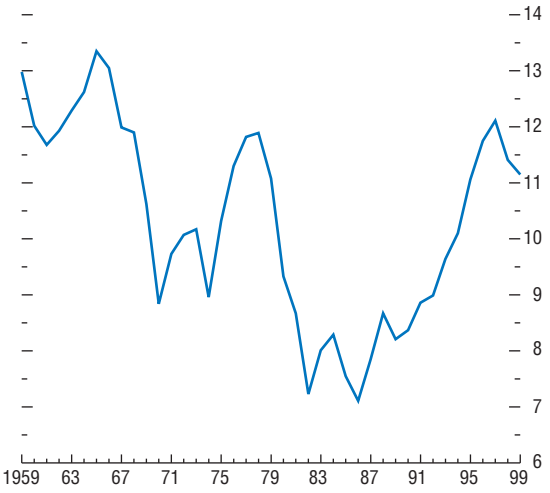
[5]See Remarks by Chairman Alan Greenspan, "Technology and the Economy," Speech before the Economic Club of New York, January 13, 2000.

[6]Nicholas Crafts, "Globalization and Growth in the Twentieth Century," IMF Working Paper 00/44 (Washington: International Monetary Fund, 2000).

Other studies, however, are more optimistic about future productivity growth, emphasizing the remarkable growth in investment in new technologies, but concluding that it is still too soon to draw solid conclusions.[7] Real investment in computers and equipment increased at an annual rate of 41.8 percent over the period 1996–98, compared to 20.5 percent during 1990–95, and roughly 30 percent in the 1970s and 1980s. In turn, the real net capital stock of computers grew at an annual rate of about 37 percent in the recent period. This explosive growth in investment has resulted in an increase in the contribution of computers to output growth to about 0.35 percentage point per year during 1996–98, roughly double the contribution in the early part of the 1990s, and well above that in the 1970s and 1980s. Despite these impressive growth rates, new technologies are also known to contribute to improved productivity with a considerable lag.[8] This is because new technology can render established skills obsolete, and require that new skills be acquired, or in some cases that production processes be reorganized. This suggests that further gains in productivity growth may lie in the future.

Further support for the optimistic view about future productivity growth stems from the finding that none of the growth in productivity over the past year is explained by the cyclical position of the economy, or by temporary accelerations in output and employment; rather, the pickup in productivity is primarily attributable to an increase in the rate of technical advance, capital deepening, and an unexplained residual.[9]

United States: Corporate Profits
(Percent of national income)



Source: Haver Analytics database.

Technical advance reflects the new methods for measuring consumer and producer prices and also the gains in the productivity of workers who *make* computers as evidenced by the accelerating decline in the quality-adjusted price of computers. Combining the effects on productivity of those who *use* computers (capital deepening) with those who *make* computers (technical advance), the computer industry accounts for about 40 percent of growth in potential productivity. Continued growth in the capital stock, and particularly in computer equipment, together with further declines in computer prices would thus be expected to make ongoing contributions to stronger future growth in productivity. Should this scenario materialize, the strong gains on U.S. equity prices in recent years could then be validated.

[7]See Daniel Sichel, "Computers and Aggregate Economic Growth: An Update," *Business Economics* (April 1999), pp. 18–24.

[8]Jeremy Greenwood and Boyan Jovanovic, "Accounting for Growth," NBER Working Paper 6647 (Cambridge, Massachusetts: National Bureau of Economic Research, 1998).

[9]This result is based on estimates of potential productivity growth for the entire economy—that is, the level of productivity consistent with sustainable utilization of capital and labor. For further discussion on this, see Macroeconomic Advisers, "Productivity and Potential GDP in the 'New' U.S. Economy," Special Analysis (St. Louis, Missouri: Macroeconomic Advisers, LLC, 1998).

Table 3.1 uses the Gordon valuation formula to gauge quantitatively the different factors behind the recent rise in P/E ratios in selected industrial countries. The first four columns of the first panel provide averages of the P/E ratio, the dividend yield (D/P), real GDP growth (which can be thought of as a proxy measure of the expected growth of real earnings),[11] the risk-free interest rate, and the inflation rate for each country over the 1980–99 period.[12] These are used to derive the respective equity risk premia, reported in the last column of the table's upper panel.[13] In contrast, the second panel provides current (1999) information on each of the variables and, using potential GDP growth as a proxy for investors' expectations of future earnings growth, derives the current implicit equity risk premium. The first column of the Table's bottom panel then compares the estimated risk premium for 1999 with that for the 1980–99 period as a whole. The results indicate that, under current P/E and D/P ratios, investors in Finland, the Netherlands, Portugal, the United Kingdom, and the United States appear to be willing to accept a substantial reduction in the risk premium. Alternatively, Table 3.1 also presents calculations assuming that the equity risk premium has not declined.[14] In this case, the figures provided in the last column of the table's bottom panel indicate that current P/E and D/P ratios can only be validated if earnings grow faster than current estimates of potential output in the long run (in other words, if there is excess dividend growth in these countries), or estimates of potential output are too low. If none of these alternatives is plausible, it follows that current stock prices are overvalued, and an eventual stock market "correction" can be expected.

This raises the question of whether it is plausible to have either excess dividend growth or a significant reduction in the equity risk premia (or even a combination of both) on a long-lasting basis. One problem with justifying current levels of P/E ratios by assuming that earnings and dividends can grow faster than output is that, while the share of profits and dividends in national income can rise in the short to medium run—as witnessed by recent developments in the United States (Box 3.1)—it cannot do so indefinitely. In fact, historical evidence points to the relative long-term stability of the share of profits and dividends in national income, a phenomenon that has been widely accepted as a "stylized

[11]The underlying assumption is that, unless there are significant shifts in the share of profits and dividends in national income, real earnings (and hence real dividends) should be expected to grow approximately in line with the output growth trend. This assumption is discussed further below.

[12]This sample period was chosen on the basis of data availability for all countries. While there are good reasons to exclude the macroeconomically turbulent 1970s, it would be desirable to extend the sample to the early post-World War II years. However, data availability and consistency then become a problem for many countries.

[13]There are alternative ways of measuring the equity risk premium. One approach is to subtract the average *actual* rate of return on stocks over several decades from the actual yield to maturity on long-term government bonds (a proxy for the risk-free asset in industrial countries) averaged over the same period. However, several analysts have noted that this ex post measure can diverge considerably from the more technically accurate ex ante definition of equity risk premia demanded by the investor. Accordingly, some studies have applied different techniques to long time series to estimate the expected or ex ante difference between the rate of return on stocks and on government bonds. In the case of the United States (for which long time series are readily available), the results yielded by these distinct methods are similar to that obtained using the approach of Table 3.1, which points to an equity risk premium of around 4½ percent for the period between the mid-1950s and the late 1990s. See Sushil B. Wadhwani, "The U.S. Stock Market and the Global Economic Crisis," *National Institute Economic Review* (January 1999), pp. 86–105, and Olivier J. Blanchard, "Movements in the Equity Premium," *Brookings Papers on Economic Activity: 2,* Brookings Institution (1993), pp. 75–138. As will be discussed below, higher estimates of the equity risk premium when computed over a longer time span suggest that the risk premium may have declined in recent years.

[14]Econometric evidence that the equity risk premium has not significantly trended down between 1983 and 1997 in France, Germany, the United Kingdom, and the United States is provided by Simon Hayes, Chris Salmon and Sanjay Yadav, "Equities: What Can They Tell Us About the Real Economy?" in *The Role of Asset Prices in the Formulation of Monetary Policy*, BIS Conference Papers Vol. No. 5 (Basel: Bank for International Settlements, 1998), pp. 178–195.

fact" in economic growth theory.[15] So, either potential GDP growth is bound to catch up with earnings growth or the latter will fall short of expectations at some point in the future.

Evidence of a decline in the equity risk premium is more controversial. Using rolling regression analysis and other statistical techniques, some studies have found that the risk premium in the United States has about halved over the 1980–99 period relative to the post-World War II average, to values in the neighborhood of 2 to 3 percent, consistent with the estimate of Table 3.1.[16] A significant decline also appears to have taken place in a few (but not all) other countries.[17] This is consistent with the fact that opportunities for portfolio diversification have increased, and that the cost of stock transactions has been lowered with the proliferation of mutual and pension funds.[18]

Several recent studies have also indicated that demographic factors may have induced a long-lasting decline in equity risk premia. To the extent that "baby boomers" increase their savings for retirement and the purchase of stocks for retirement purposes receives a more favorable tax treatment, then the demand for stocks increases. This, in turn, lowers earnings and dividend yields in equilibrium, thus pulling down the implicit risk premium demanded by investors.[19] Although there is widespread consensus that these different factors help lower the equity risk premium in equilibrium, there is scant agreement as to whether these effects are large enough to bring about a substantial reduction in equity risk premia needed to justify current stock valuations in some countries.

The other consideration to bear in mind when judging whether the risk premium implicit in current stock valuations is sustainable is that the equity risk premium appears to have been very cyclical historically. There is evidence that periods of high economic growth tend to be associated with an underpricing of risk and vice-versa.[20] This implies that adverse shocks to aggregate productivity or other macroeconomic variables in countries that are currently experiencing faster output growth may raise the equity risk premia to levels closer to their historical averages, thus tending to produce a stock market correction. The fact that the *current* estimated risk premia in some fast-growing industrial countries are not only somewhat below 1980–99 averages but also far below longer-term historical levels, suggests that some rebound in the equity risk premia in these countries may well lie ahead.

[15]See Robert M. Solow, *Growth Theory* (Oxford: Oxford University Press, 1987); also Robert J. Barro and Xavier Sala-i-Martin, *Economic Growth* (New York: McGraw-Hill, 1995), Chapter 1. While recent studies have documented a significant increase in the share of profits in national income in a few OECD countries since the 1980s, this has been viewed as a medium-run phenomenon, rather than a sustainable long-term trend. See Olivier J. Blanchard, "The Medium Run," *Brookings Papers on Economic Activity: 2,* Brookings Institution (1997), pp. 89–141.

[16]See Sushil B. Wadhwani, "The U.S. Stock Market," and also Olivier J. Blanchard, "Movements in the Equity Premium."

[17]Estimates of the equity premium risk premia for a number of industrial countries going back at least to 1970 are provided in John Y. Campbell, "Asset Prices, Consumption and the Business Cycle," National Bureau of Economic Research Working Paper 6485 (Cambridge, Massachusetts: National Bureau of Economic Research, 1998).

[18]Empirical evidence relating inflows into mutual and pension funds points to a lowering of the risk premium and a decline in equity earnings and dividend yields; see Sushil B. Wadhwani and M. Shah, *The Equity-Bond Debate in the UK* (London: Goldman Sachs, 1993), and Charles Kramer, "Stock-Market Equilibrium and the Dividend Yield," IMF Working Paper 96/90 (Washington: International Monetary Fund, 1996). For a theoretical analysis of the relationship between increased household participation in equity markets, portfolio diversification, and the risk premium, see John Heaton and Deborah Lucas, "Stock Prices and Fundamentals," presented at the 1999 National Bureau of Economic Research Macroeconomic Annual Conference, (unpublished; June 1999).

[19]See, for instance, Gurdip Bakshi and Zhiwu Chen, "Baby Boom, Population Aging, and Capital Markets," *Journal of Business*, Vol. 67 (April 1994), pp. 165–202, and Robin Brooks, "What Will Happen to Financial Markets When the Baby Boomers Retire?" IMF Working Paper 00/18 (Washington: International Monetary Fund, 2000).

[20]See Barsky and De Long, "Why Does the Stock Market Fluctuate?" For a broader discussion of the time-varying nature of the equity risk premia and extensive bibliographic references on the issue, see Campbell, "Asset Prices, Consumption and the Business Cycle."

Table 3.2. Correlations between Deviations of Actual from Predicted Stock Prices for a Selected Group of Countries, 1985–1999

	United States	United Kingdom	Japan	Germany	France	Ireland	Netherlands	Canada	Sweden
United States	1								
United Kingdom	0.65	1							
Japan	0.08	0.25	1						
Germany	0.44	0.59	0.18	1					
France	0.44	0.48	0.20	0.49	1				
Ireland	0.45	0.51	0.29	0.47	0.34	1			
Netherlands	0.67	0.57	0.30	0.46	0.55	0.33	1		
Canada	0.58	0.55	0.31	0.43	0.26	0.48	0.48	1	
Sweden	0.13	0.20	0.31	0.19	0.14	0.19	0.26	0.26	1

A distinct approach to gauging the extent to which broad stock indices are over- or under-valued at a given point in time consists of estimating econometrically the relationship between (the log of) the P/E or the D/P ratio and a set of macroeconomic and financial variables believed to determine the "fundamental" or "equilibrium" stock price.[21] These include the risk-free real interest rate, the difference between short- and long-run bond yield (i.e., the slope of the yield curve, which is often considered a good business cycle indicator), actual inflation, measures of the economy's growth potential, as well as some rough proxies for the effect of greater household participation and risk diversification in asset markets. Staff estimates using a variety of alternative econometric specifications combining these variables (or empirical proxies for some of them) have found the econometric results for the different countries to be broadly consistent with the findings reported in Table 3.1. That is, stock markets in Finland, the Netherlands, the United Kingdom, the United States—and also in France and Spain—seem to be above what can be justified by movements in the explanatory variables. The size of the deviations around the estimated fundamental values varies widely across countries and should be interpreted with caution, as they prove to be quite sensitive to the period considered and choice of proxy variables. Yet, the deviations between model-estimated and actual values of price-earnings ratios for Finland, the Netherlands, the United Kingdom, and the United States over the past two years are consistently positive across different specifications and sample periods, indicating that at least some degree of stock market overvaluation is likely.

In addition to marked cycles in P/E ratios along their equilibrium trends estimated by regression analyses, this econometric approach to stock valuations also provides interesting evidence of significant cross-country correlations in these deviations over time. This indicates that, besides the domestic factors explaining P/E ratios in the various countries, there are factors that seem to be common to "clusters" of countries. Such common links between stock markets can be gleaned from the matrix of correlation coefficients reported in Table 3.2.

The latter shows that correlations between Canada, the United Kingdom, and the United States are especially high. Likewise, some intra-European correlations—notably that between France and Germany, and France and the Netherlands—are also quite large. The existence of such cross-country correlations is, on the one hand, consistent with greater capital mobility across industrial economies since the mid-1980s, which has increased the scope for global liquidity conditions to affect national asset markets (Box 3.2).

[21]See, for instance, Charles Kramer, "Stock-Market Equilibrium and the Dividend Yield," IMF Working Paper 96/90 (Washington: International Monetary Fund, 1996), and Vincent R. Reinhart, "Equity Prices and Monetary Policy in the United States," in *The Role of Asset Prices in the Formulation of Monetary Policy*, BIS Conference Papers, Vol. 5 (Basle: Bank of International Settlements, 1998).

Box 3.2. Global Liquidity and Asset Prices

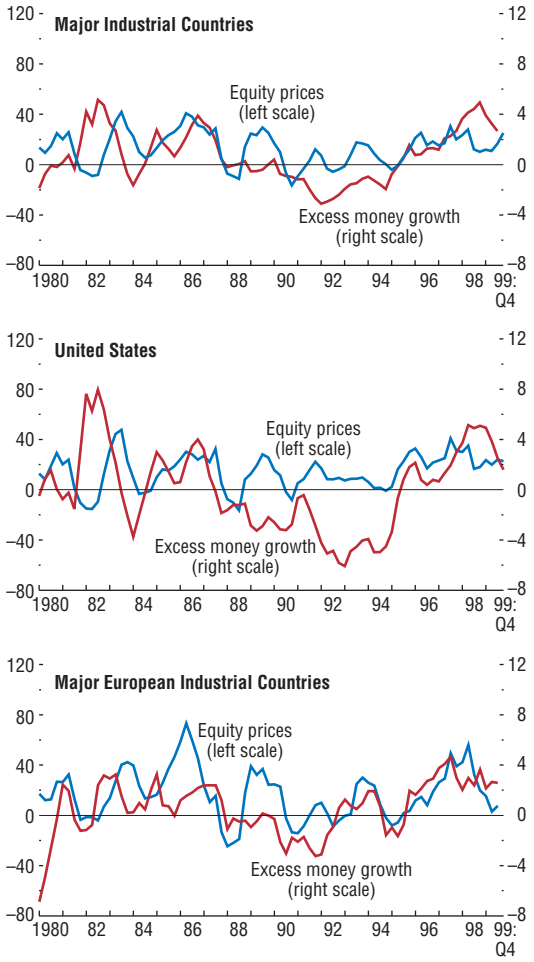
Recent commentary suggests that global liquidity has importantly influenced financial conditions in the major international markets, and that excess liquidity in one financial center can influence conditions elsewhere. For example, it has been suggested that ample global liquidity compressed risk premia during the run-up to the 1997–98 turbulence, which started with the devaluation of the Thai baht, and that "carry trades" are increasingly used to shift liquidity among financial centers.[1] The relationship of liquidity to asset prices has been extensively studied in a domestic context, but it has been little studied in an international context. In a world where capital is increasingly mobile and can be readily deployed internationally, it is important to consider the extent to which changes in liquidity conditions in one major country may be associated with changes in financial conditions elsewhere. This box reviews some recent research on the international dimension of the relationship between liquidity and asset prices.

Previous work identifies two concepts of liquidity. *Market liquidity* is the capacity of financial markets to absorb temporary fluctuations in demand and supply without undue dislocations in prices. It is most often used to describe secondary markets, such as stock exchanges, although it is sometimes applied to primary markets as well; for example, market participants often describe large issues of new equity as "liquid." *Monetary liquidity* describes conditions in short-term credit markets and is often measured by short-term interest rates or the aggregate quantity of money. When a quantity measure of monetary liquidity is used, it is often measured as a growth rate, or relative to a base such as GDP. For example, some studies focus on excess money growth (money growth less nominal GDP growth). Most studies of the liquidity effect have focused on monetary liquidity, rather than market liquidity, since market liquidity is more difficult to measure. The two are undoubtedly related.

[1]See Chapters 3 and 4 in *International Capital Markets: Developments, Prospects, and Policy Issues* (Washington: International Monetary Fund, September 1999) and the October 1999 *World Economic Outlook,* pp. 3–9 and Box 4.4.

Major Industrial Countries: Excess Money and Equity Price Growth

(Percent change from a year earlier)



Sources: IMF, *International Financial Statistics;* and WEFA, Inc.

Past studies suggest several possible relationships between monetary liquidity and asset prices, consistent with the existence of a positive correlation between the two variables (see the figure). First, an increase in liquidity tends to boost the demand for a fixed supply of assets and lead to inflation in asset prices. In a context where inflation in goods and services prices is kept low due to competition, rapid productivity

Box 3.2 *(concluded)*

growth, or nominal rigidities, asset prices will then increase in real terms. Second, an increase in liquidity might simply be correlated with, rather than cause, a rise in asset prices in an environment of improving economic prospects. For example, a cyclical upturn might give rise to an increase in money demand, an improved outlook for corporate earnings, and a rise in stock prices. Third, an increase in liquidity might raise the value of assets by reducing interest rates, thereby lowering the discount rate on future cash flows from assets (the decline in interest rates might also stimulate demand and reduce corporate borrowing costs, leading to higher future dividends, and further boosting stock prices.)

These mechanisms point to at least two possible channels for the international transmission of liquidity effects. One could be characterized as a "push" channel. If excess money growth in (say) Europe gives rise to capital flows from Europe to foreign asset markets (a "push" of money overseas), upward pressure on foreign stock and bond prices (and downward pressure on foreign interest rates) would be expected. This would result in a positive correlation between European money growth and foreign stock prices, and a negative correlation between European money growth and foreign interest rates. Such correlations could also be consistent with economic spillovers, or "a rising tide that lifts all boats." For example, rapid money growth in Europe (owing either to stimulative policy or an accommodated rise in money demand) might coincide with improved economic prospects in Europe, which would suggest improved prospects for other major countries, raising asset prices in those countries.

Alternatively, spillovers could occur through a "pull" channel. Suppose that excess money growth in Europe gave rise to asset price inflation in Europe. If foreign investors viewed the asset price inflation as real and sustainable, it could attract a reallocation of capital to Europe from abroad and depress foreign asset prices (a "pull" of capital from overseas into Europe). Such capital inflows could also contribute to a deepening of European capital markets. In that case, one would expect a negative correlation between European money growth and foreign stock prices, and a positive correlation between European money growth and foreign interest rates.

Recent work by IMF staff provides evidence on the relationship between liquidity (money growth) and asset returns at an international level.[2] Several measures of excess money growth are calculated for Group of Seven (G-7) countries separately, as well as for them as a group. A variety of econometric relationships between liquidity and real asset returns are estimated, from simple correlations to regressions and tests of Granger causality. The main results are twofold. First, excess money growth at the aggregate G-7 level is consistently related to higher real stock returns and lower real interest rates. Second, there is evidence of significant liquidity spillovers across G-7 countries. An increase in excess money growth in one G-7 country is consistent with higher real stock returns and lower real interest rates in other G-7 countries, providing support for the existence of the "push" channel described above. There is also evidence of a relationship between excess money growth in the United States and excess money growth in Japan, and some evidence (albeit limited) that volatility in money growth in one country spills over to volatility in real asset returns in other countries.

The same study also highlights some measurement issues that may be important for other analyses of liquidity in the international context. For instance, narrow money appears to have a stronger relationship to asset prices than broad money, perhaps indicating that demand deposits are more readily used to purchase assets than time deposits. This points to several pathways for future research. These include the use of different measures of liquidity, including non-monetary and off-balance sheet instruments; a full exploration of the possible transmission channels that might underlie the results; and consideration of the interaction between monetary liquidity in large industrial countries and financial conditions in emerging markets.

[2]Klaas Baks and Charles Kramer, "Global Liquidity and Asset Prices: Measurement, Implications, and Spillovers," IMF Working Paper 99/168 (Washington: International Monetary Fund, 1999).

On the other hand, notwithstanding the forces of globalization, the tighter correlation between deviations in P/E across certain groups of countries is consistent with empirical evidence that geographic proximity and other institutional factors remain important determinants of the degree of financial integration among countries.[22] It is therefore possible that assessments of asset market conditions in different countries, which focus exclusively on domestic factors and neglect these international linkages, may be missing an important factor behind the currently high stock prices across certain groups of countries.

Property Prices

While real property prices have been closely related to the business cycle in the industrialized world as a whole (as seen in Figure 3.1), in some countries the association is especially striking (Figure 3.4). Recessions in Japan and European Union countries since the early 1980s have been accompanied by falling property prices in real terms. Conversely, the strong upswings in economic activity in Australia and smaller EU countries since the mid-1990s have been associated with robust growth in property prices.

Studies on the determinants of property prices in different countries generally find them to be driven by current and lagged income growth and real interest rates (or some other proxy for mortgage costs). The fact that property prices appear to be partly determined by current and past income growth is hardly surprising. As the supply of land is fixed and that of residential dwellings and offices can only increase slowly in the short run, property prices tend to be largely demand determined over the business cycle. Financing conditions have also played a major role. Financial liberalization and stiffer competition among financial intermediaries since the 1980s have helped reduce interest margins on mortgages, while also allowing banks to finance a higher share of the assessed property value. Moreover, the combination of very high marginal tax rates with widespread tax provisions granting households partial deductibility on mortgage interest payments in many countries and the ability of households to use the higher collateral value of their houses to increase their mortgages have provided incentives to take on more mortgage debt as house prices have increased.[23]

Reflecting these developments, outstanding mortgages as a share of GDP have risen dramatically, particularly among smaller European countries (Table 3.3). In quite a few EU countries, the (negative) correlation between real housing prices and real interest rates has been especially high (Figure 3.5). Following the decline in real interest rates in the second half of the 1990s and the elimination of the exchange rate risk premium with the introduction of the euro, property prices have risen sharply in Finland, Ireland,

Table 3.3. Outstanding Residential Mortgage Debt as a Share of GDP in European Countries
(Percent)

	1990[1]	1998[2]
Denmark	63	69
Netherlands	40	65
United Kingdom	55	57
Germany	43	53
Norway	48	45
Sweden	47	50
Finland	32	30
Ireland	19	27
Luxembourg	24	26
Portugal	11	26
Belgium	20	25
Spain	14	24
France	24	21
Italy	5	8
Greece	5	7
Austria	4	5

Source: European Mortgage Foundation, *Hypostat* 1988–98.
[1]For Denmark 1992 is used; for Luxembourg 1994 is used.
[2]For Luxembourg 1997 is used.

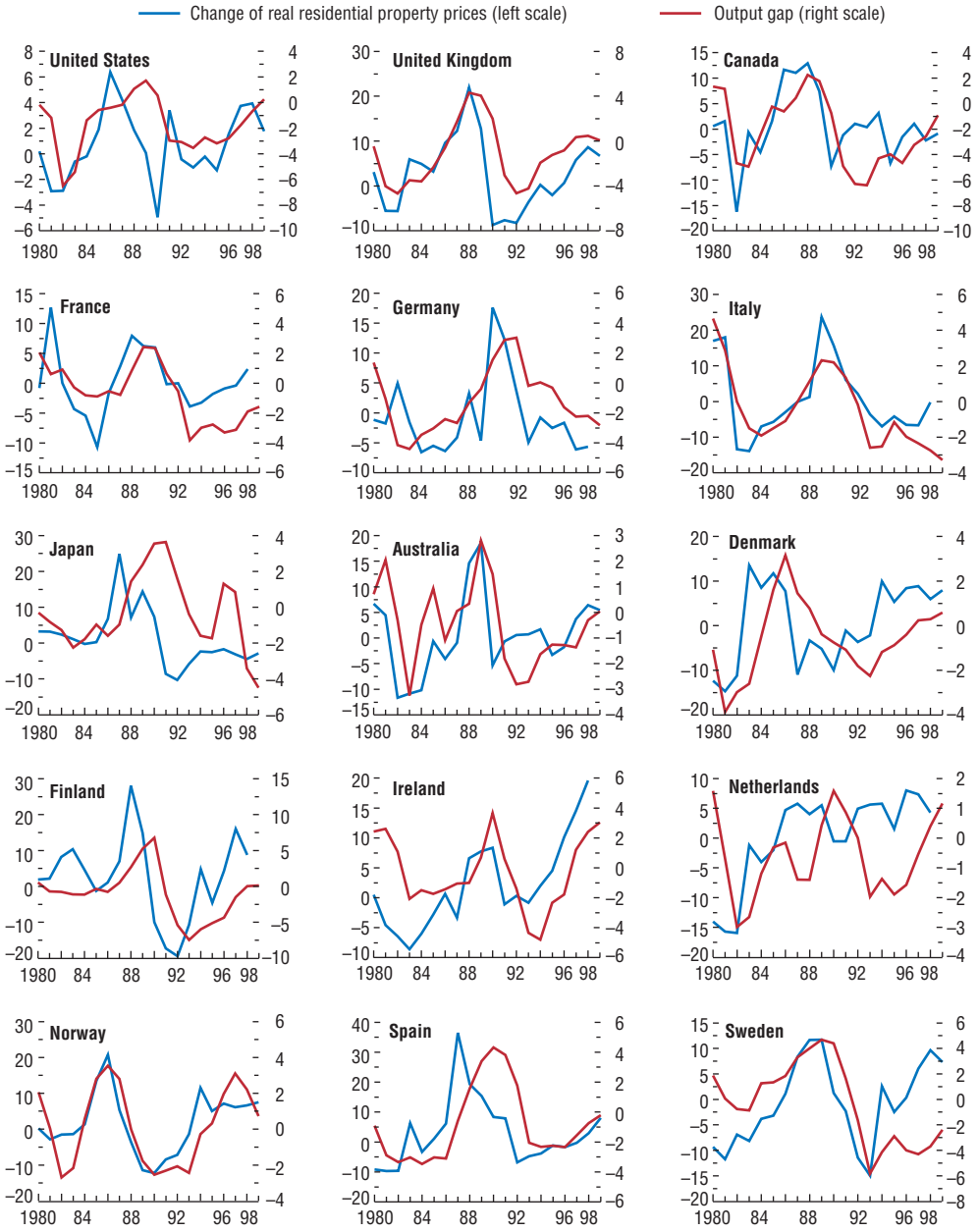
[22]See Richard Portes and Hélene Rey, "The Determinants of Cross-Border Equity Flows" (unpublished; London School of Economics, August 1999).

[23]In some cases—notably, in Denmark and the United Kingdom—tax deductions on mortgage interest payments have been rolled back recently, effectively raising the cost of new mortgages and thus helping dampen the growth of mortgage debt.

Figure 3.4. Industrial Countries: Real Property Prices and Output Gap

(Percent)

Real property prices have been highly cyclical and closely correlated with the output gap, particularly among European Union countries.

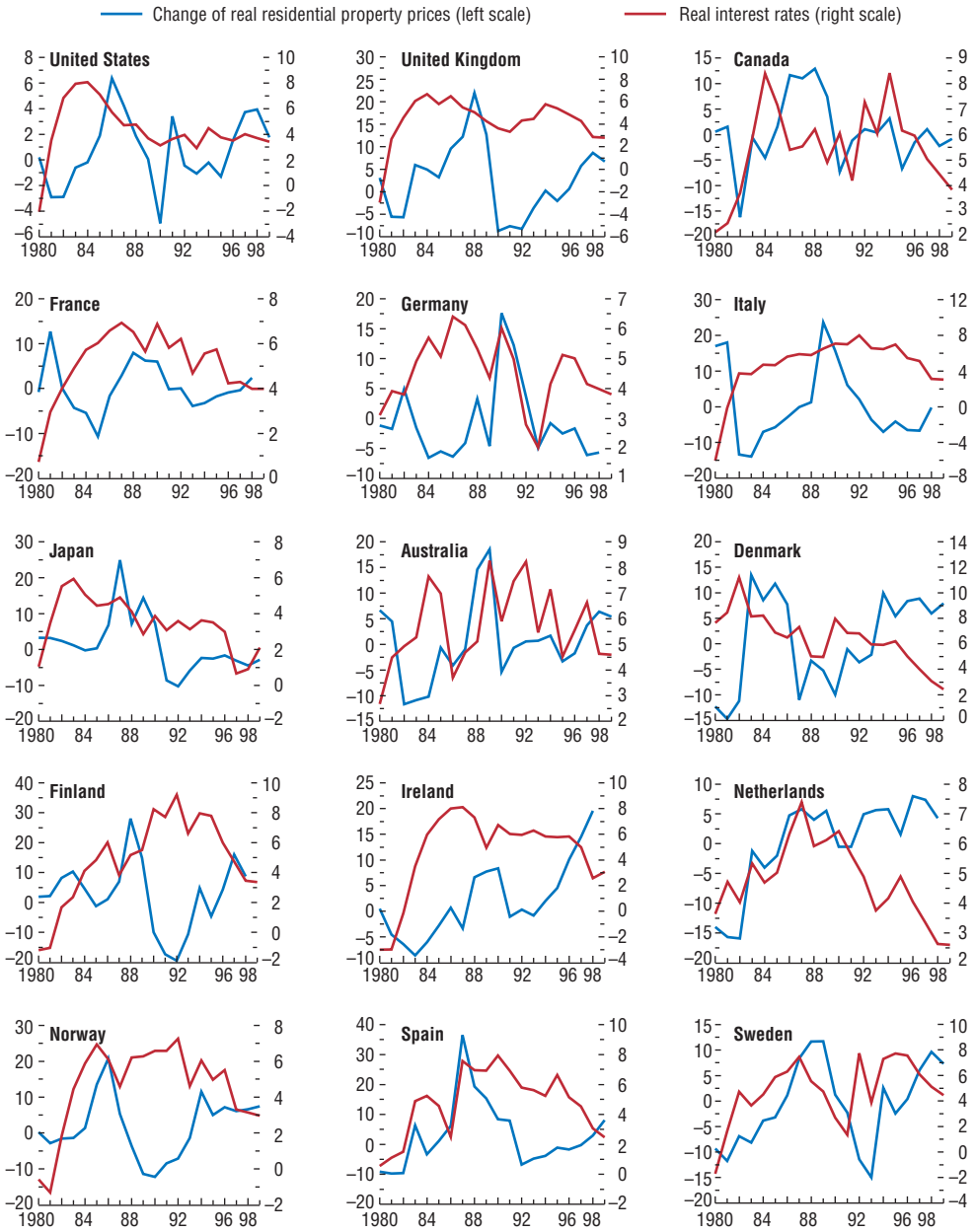


Sources: IMF, *International Financial Statistics;* IMF staff estimates; and BIS, *69th Annual Report.*

Figure 3.5. Industrial Countries: Real Property Prices and Real Interest Rates

(Percent)

Real property prices have tended to be inversely correlated with real interest rates across the industrial world.



Sources: IMF, *International Financial Statistics;* IMF staff estimates; and BIS, *69th Annual Report.*

the Netherlands, Portugal, Spain, and the Scandinavian countries. In some of these countries, the growth of real property prices has far exceeded that of real GDP and has approached or even surpassed the level of previous cyclical peaks (Figure 3.6). In the United Kingdom and Australia, there is also evidence that lower real interest rates have boosted property prices in recent years; although property prices have grown rapidly in recent months, they remain below previous historical peaks. In Japan, property prices have historically been quite responsive to interest rates, but the banking solvency problem and debt overhang of the household sector following the collapse of asset prices in the early 1990s kept real property prices depressed through much of the 1990s in spite of low real interest rates.

Compared with Japan and the European Union, the correlation between property prices, real interest rates, and real GDP growth has been less pronounced in Canada and the United States. This possibly reflects less binding land constraints and a more prompt response of residential investment to imbalances between supply and demand. Property prices have been rising rapidly since the mid-1990s but have yet to reach historical highs; despite some localized pressures, they remain low for the country as a whole relative to both the level of stock prices and the pace of real GDP growth over the past decade (see Figure 3.6).

Following a similar procedure as that for stocks, the "fair" value of property prices can be estimated as a function of key fundamental variables, such as real long-term interest rate, inflation, and GDP growth.[24] The unexplained component of this relation for each country can be interpreted as an indication of an apparent misalignment. Econometric estimation using panel data for industrial countries suggests that property markets in Ireland, the Netherlands, Portugal, and Spain may be currently overvalued. At the same time, the residuals of the respective regressions also reveal that changes in property prices have been much less correlated across countries than changes in stock prices. While there are a number of factors contributing to equalization of property prices across countries, such as interest rate parity conditions and the international business cycle, these forces appear to be less strong than those observed in stock markets, reflecting the fact that property markets generally are less liquid and that there are obvious physical constraints to international arbitrage in property. This suggests that national monetary and tax policies have greater scope for affecting domestic property prices than is the case with stock prices.

Transmission Channels from Asset Prices to Economic Activity

There is extensive empirical evidence that asset price changes tend to lead output growth in industrial countries.[25] However, the leading indicator property of asset price changes appears to be limited to certain classes of assets and dependent on the depth of asset markets in the dif-

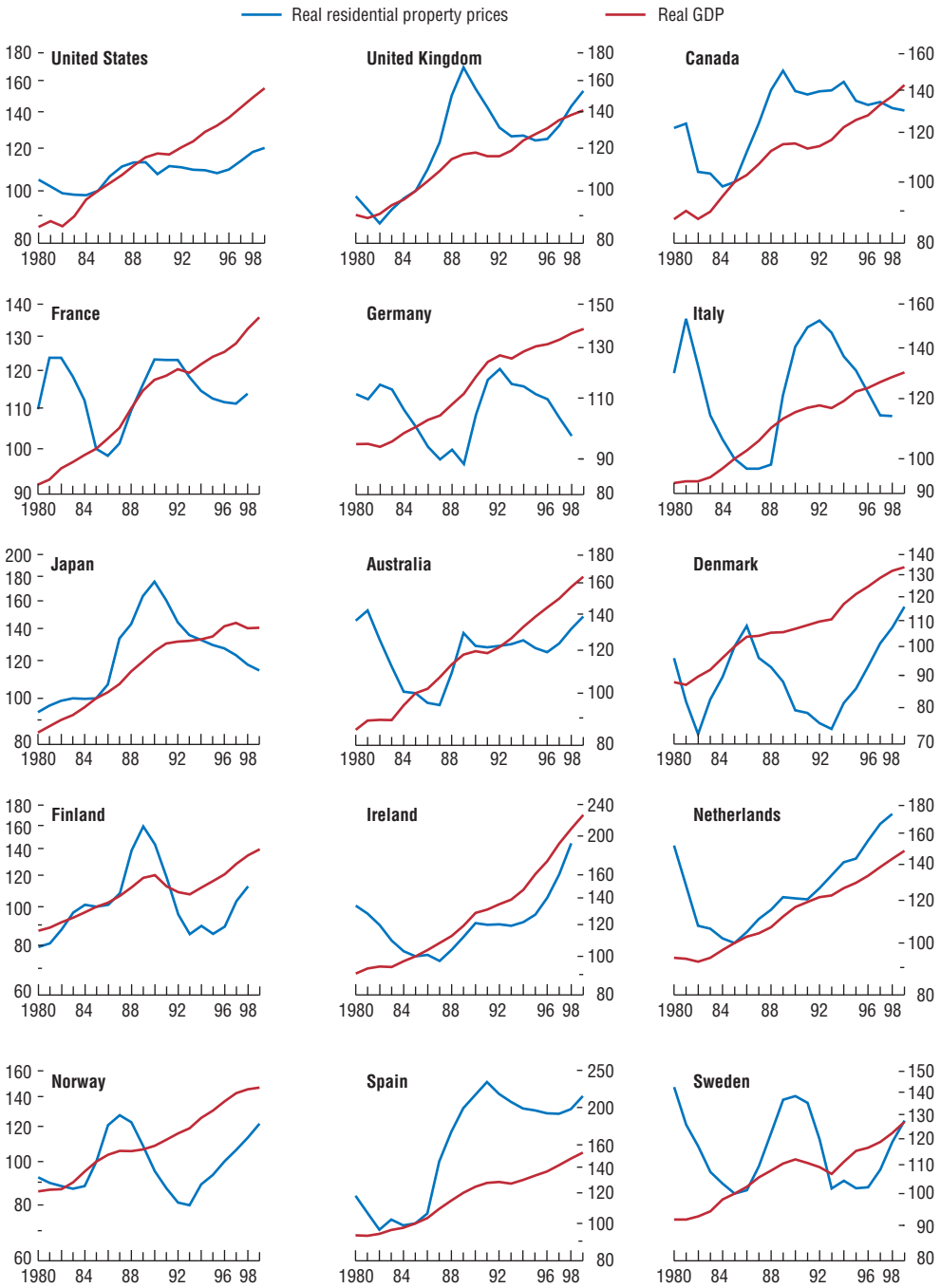
[24]These are the most common explanatory variables used in econometric studies of the determinants of housing prices. See, for instance, Matthew Higgins and Carol Osler, "Asset Market Hangovers and Economic Growth: U.S. Housing Markets," in *The Role of Asset Prices in the Formulation of Monetary Policy*, BIS Conference Papers, Vol. 5 (Basel: Bank for International Settlements, 1998), pp. 220–38, and Sanjay Kalra, Dubravko Mihaljek, and Christoph Duenwald, "Property Price and Speculative Bubbles: Evidence from Hong Kong SAR," IMF Working Paper 00/02 (Washington: International Monetary Fund, 2000). Some of these studies also contemplate a role for demographic and construction costs, but the significance of these factors appears to be relatively country-dependent.

[25]See Eugene F. Fama, "Stock Returns, Expected Returns, and Real Activity," *The Journal of Finance*, Vol. 45, No. 4 (1990), pp. 1089–1108, for the case of the United States. Evidence on Group of Seven and non-G-7 European countries can be found in Jongmoo J. Choi, Shmuel Hauser, and Kenneth J. Kopecky, "Does the Stock Market Predict Real Activity? Time Series Evidence from the G-7 Countries," *Journal of Banking and Finance*, Vol. 23 (December 1999), pp. 1771–92; and Mads Asprem, "Stock Prices, Asset Portfolios, and Macroeconomic Variables in Ten European Countries," *Journal of Banking and Finance*, Vol. 13 (September 1989), pp. 589–612. Stock returns also led output growth in several emerging economies. See Paolo Mauro, "Stock Returns and Output Growth in Emerging and Advanced Economies," IMF Working Paper, International Monetary Fund, forthcoming.

Figure 3.6. Industrial Countries: Real Property Prices and Real GDP

(Logarithmic scale; 1985 =100)

Real property prices have risen considerably faster than real GDP in a few countries since the mid-1990s and have exhibited a somewhat diverse cyclical pattern across the industrial world.



Sources: IMF, *International Financial Statistics;* IMF staff estimates; and BIS, *69th Annual Report.*

Table 3.4. Asset Prices as a Leading Indicator of Real GDP and Output Gap

	Stock Prices Leading Indicator of:		Property Prices Leading Indicator of:	
	Real GDP Growth	Output Gap	Real GDP Growth	Output Gap
Australia	•		•	
Canada				•
Denmark				•
Finland	•			•
France				•
Germany				•
Ireland	•	•		•
Italy				
Japan	•		•	•
Netherlands				•
Norway				
Sweden				
Spain	•			•
United Kingdom	•			•
United States	•			•

Note: Estimated equations are (1) GDP growth = constant + α*lagged real asset price growth, and (2) Output gap = constant + β*lagged real asset price growth. The α and β coefficients in these relations are significant for the countries marked in the table. The relations are estimated on annual data over the period 1970–1999. Including the lagged endogenous variable does not change the results significantly. Portugal is omitted because its property price series is too short.

ferent countries.[26] In general, stock prices are found to have a significant predictive power on output growth in many countries.[27] In contrast, property prices tend, for the reasons discussed above (fixed supply in the short-run and traded in less liquid markets), to be less forward-looking and more contemporaneously correlated with output growth. Yet, it appears that the leading indicator properties of property prices are considerably stronger regarding the output gap, which is a closer indicator of business cycle conditions (Table 3.4).

Despite this evidence, *causal* relationships between price changes in either of these assets and output growth are complex and empirically difficult to identify. It is therefore not surprising that views on the topic differ widely. At one end of the spectrum, it has been argued that the correlation between asset prices and economic activity is solely due to the fact that asset prices incorporate information about future output growth (i.e., asset prices affect current spending only to the extent that they are "leading indicators" of future changes in economic activity). The leading indicator properties of asset prices follow the main assumptions of the valuation model discussed above—namely, that current prices represent the discounted value of the expected dividend growth and that, to the extent that such assets are traded in deep and well-informed auction markets, expectations about future dividend growth tend to be rational. From this viewpoint, no behavioral causal relationship running from asset prices to economic activity exists; the only causal connection is between current and future output growth, with stock markets thus merely being a "side-show."[28]

At the other end of the spectrum lies the more traditional view that the impact of asset prices on output is through wealth effects and changes in the cost of capital.[29] From this perspective, the causality runs in the opposite direction to the "side-show" view of stock markets. Instead of acting merely as a leading indicator of households' labor income and business profits, higher asset prices actually raise agents' lifetime wealth which, in turn, enhances consumer and business confidence and leads to higher spending.

[26]Evidence on whether stock market capitalization to GDP has a bearing on the predictive power of stock prices is provided in Mauro, "Stock Returns and Output Growth in Emerging and Advanced Economies."

[27]The other asset price found to generally have a significant predictive power on economic activity—in some cases to a greater extent than stock prices—is the government bond yield spread (the difference between returns on short- and long-term government bonds).

[28]See Randall Morck, Andrei Schleifer, and Robert W. Vishny, "The Stock Market and Investment: Is the Market a Sideshow?" *Brookings Papers on Economic Activity;* 2 Blookings Institution (1990), pp. 157–202.

[29]Lurking behind this view is the perception that asset prices often reflect financial market excesses that detract from their information content. As expressed in an oft-cited quotation attributed to Paul Samuelson: "The stock market has predicted nine of the last five recessions." For a skeptical note on the information content of asset prices, see Mark Gertler, Marvin Goodfriend, Otmar Issing, and Luigi Spaventa, *Asset Prices and Monetary Policy: Four Views* (London: Centre for Economic Policy Research, 1998).

In practice, the two transmission channels are hard to disentangle, entailing postulated relationships between asset prices and output growth that are very similar. Notwithstanding this difficulty, it is still possible to shed light on two key aspects of the relationship between asset prices and economic activity that are important to both market participants and policymakers. The first key aspect concerns the question of whether asset price movements have some information content on the evolution of economic activity and inflationary pressures that are not detected in any other variable. On the basis of the results reported above, as well as on the findings of various studies, asset prices do seem to provide useful information about the pace of future economic activity and, in particular, about variations in the output gap. The second aspect pertains to the magnitude of the impact of asset price changes on spending and its possible side effects on financial system fragility. A key question in this connection is whether the elasticity of aggregate spending to asset prices is significant enough to bring about large fluctuations in domestic demand, private-sector indebtedness, and credit risk. Since these elasticities can be very different for consumption and investment, it is useful to assess the impact of asset prices on each of these GDP components separately.

Asset Prices and Consumption

Equity and property prices can affect private consumption via three main channels. First, since consumption spending is a function of households' lifetime financial resources—as predicated by life cycle/permanent income models—and financial assets and property wealth are an important part of those resources, changes in the price of these assets can be expected to influence consumption. [30] Accordingly, this effect can be expected to be stronger in countries where property and stock ownership are more prevalent among households—that is, where stock market capitalization and the ratio of housing wealth to income are higher. Second, consumption in any given period will be a function of peoples' expectations about their wage income. To the extent that real asset prices affect such expectations by signaling faster or slower growth of real incomes in the future, they will influence current consumption.[31] Third, the classical life cycle model of consumption assumes that capital markets are perfect, allowing households to distribute optimally their consumption spending over time according to their net wealth and permanent income. In practice, however, information asymmetries and other imperfections in credit markets often prevent households from borrowing solely on the basis of their income prospects, entailing an "excess sensitivity" of current consumption to disposable income and the availability of external finance. Since the availability and cost of external finance provided by banks and other financial intermediaries depend on their assessment of a household's net worth, loan rates on consumer loans will be a function of the market value of assets owned by the household. To the extent that the market value of these assets affect the household's borrowing capacity to finance current consumption, asset price fluctuations have a further impact on aggregate consumption.

There is evidence that changes in real property and stock prices have significant effects on private consumption in most of the industrialized world. Estimates of the magnitude of this effect vary considerably across countries, however, and are highly dependent on the type of asset in question. The effects of stock prices on consump-

[30]A concise exposition of life cycle and permanent income models of consumption can be found in Angus Deaton, *Understanding Consumption* (Oxford: Clarendon Press, 1992).

[31]Empirical support for the hypothesis that stock prices affect consumption via its leading indicator properties about the growth of labor incomes is provided in Maria Ward Otoo, "Consumer Sentiment and the Stock Market," Board of Governors of the Federal Reserve System (November 1999); see also James M. Poterba and Andrew A. Samwick, "Stock Ownership Patterns, Stock Market Fluctuations, and Consumption," *Brookings Papers on Economic Activity: 2,* Brookings Institution (1995), pp. 295–357.

Table 3.5. Household Equity Holdings as a Percent of Net Wealth

	1980–84	1985–89	1990–94	1995	1996	1997
United States	10.6	11.0	15.1	19.5	20.9	24.4
Japan	4.5	7.6	5.8	5.4	4.9	3.7
France	1.3	3.1	2.9	2.6	2.9	3.2
Italy	0.8	2.1	3.6	3.8	3.6	4.7
United Kingdom	5.5	6.3	9.4	11.3	11.3	12.4
Canada	13.7	13.9	14.2	15.6	16.5	18.3

Source: Laurence Boone, Claude Giorno, and Pete Richardson, *Stock Market Fluctuations and Consumption Behavior,* OECD Working Paper (98)21 (Paris: OECD, 1998).

tion appear to be strongest in the United States, where most estimates point to an elasticity of consumption spending relative to net stock market wealth in the range of 0.03 to 0.07. Taking the mid-point, this implies that about five cents on the dollar of an increase in stock market wealth is spent on consumer goods, with the effect taking one to three years to materialize.[32] In contrast, studies for other countries have not found any significant effect of stock prices on private consumption in France and Italy,[33] whereas for Canada, Germany, Japan, the Netherlands, and the United Kingdom the effects are significant but smaller than in the United States.[34] This appears to reflect the smaller share of stock ownership relative to other financial assets in these countries, as well as the more concentrated distribution of stock ownership across households in continental Europe when compared with the United States (Table 3.5).

The effect of changes in real property prices on consumption, on the other hand, appears to be much stronger in European Union countries. Rising real property prices can 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 of credit based on higher property values. The two latter channels, in particular, have become increasingly important in European Union countries in recent years, thus bolstering the sensitivity of consumption to property price cycles. In the United Kingdom, for instance, the elasticity has been recently estimated to be 10 percent within the year, and in the Netherlands to be 7 percent over two years (so that a 20 percent drop in housing prices would lead to a 1½ percent contraction in consumer spending over two years, all else held constant).[35] There is evidence that changes in housing prices have also been a main determinant of consumption growth—being far more important than stock prices—in Australia as well as in some other European countries operating through the "credit channel."[36] This evidence ac-

[32]See Martha Starr-McCluer, "Stock Market Wealth and Consumer Spending" (unpublished; Federal Reserve Board of Governors, April 1998), and Laurence Boone, Claude Giorno, and Pete Richardson, "Stock Market Fluctuations and Consumption Behavior: Some Recent Evidence," OECD Working Paper (98)21 (Paris: Organization for Economic Cooperation and Development, 1998). These estimates are based on U.S. national income account figures prior to recent revisions based on SNA93 guidelines, and limited to stock market wealth. Using a broader definition of wealth (including both corporate equity and other forms of wealth) the wealth effect in the United States has been estimated at around 3½ cents on the dollar.

[33]A systematic analysis of the French experience is provided in Pierre Jaillet and Pierre Sicsic, "Asset Prices: Relationships with Demand Factors and Credit and Implications for Monetary Policy," in *The Role of Asset Prices in the Formulation of Monetary Policy*, BIS Conference Papers, Vol. 5 (Basel: Bank for International Settlements, 1998), pp. 210–219. Estimates for Italy are provided in Boone, Giorno, and Richardson, "Stock Market Fluctuations and Consumption Behavior."

[34]For Canada and the Netherlands, see, respectively, Gilles Bérubé and Denise Côté, "Long-Term Determinants of the Personal Savings Rate" (unpublished; Bank of Canada, February 1999) and Jeannette Capel and Aerdt Houben, "Asset Inflation in the Netherlands: Assessment, Economic Risks, and Monetary Policy Implications," *The Role of Asset Prices in the Formulation of Monetary Policy*, BIS Conference Papers, Vol. 5 (Basel: Bank for International Settlements, 1998), pp. 264–279. Estimates for Germany, Japan, and the UK are provided in Boone, Giorno, and Richardson, "Stock Market Fluctuations and Consumption Behavior."

[35]De Nederlandsche Bank, "The Dutch Housing and Mortgage Markets: A Risk Analysis," *Quarterly Bulletin* (Amsterdam: DNB, September 1999), pp. 23–33. Estimates for the United Kingdom are from Laurence Boone, Claude Giorno, and Pete Richardson, "Stock Market Fluctuations and Consumption Behavior."

[36]On Australia, see Christopher Kent and Philip Lowe, "Property Price-Cycles and Monetary Policy" in *The Role of Asset Prices in the Formulation of Monetary Policy*, BIS Conference Papers, Vol. 5 (Basel: Bank for International Settlements, 1998), pp. 239–263. For Europe, see De Bondt, "Credit Channels and Consumption, European Evidence," De Nederlandsche Bank, Staff Report No. 39 (1999).

cords well with the close correlation between changes in property prices, consumption, and credit cycles in most countries (Figure 3.7).

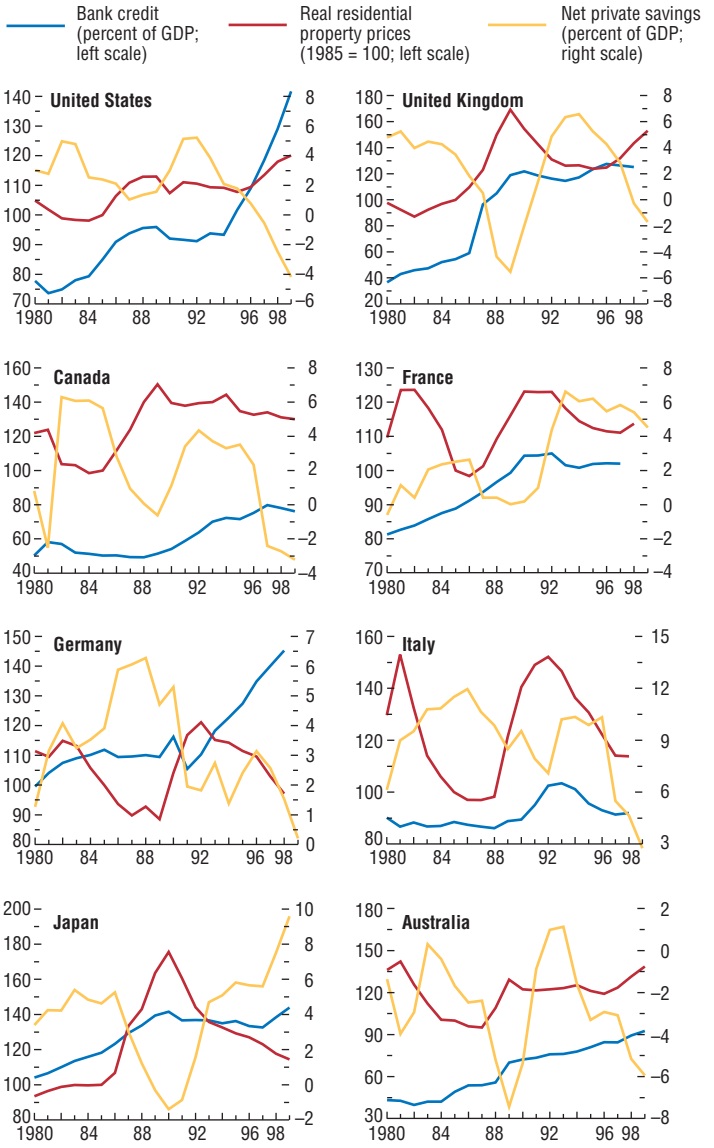
Asset Prices and Investment

Equity and property prices can affect investment via three channels. First, an increase (decrease) in asset prices lowers (raises) the cost of new capital relative to existing capital. If the ratio of market valuation of capital to the cost of acquiring new capital (also referred to as Tobin's *q*) rises (drops), so will investment. Second, several empirical studies find that private fixed investment is well explained by expected future output growth, as predicated by the so-called "flexible accelerator" model.[37] To the extent that changes in stock prices predict future GDP growth, they will thus impact current investment. Third, over and above the simple cost of capital there is the credit channel, through which changes in the net worth of the firm will have an additional impact on the financing premium and hence the cost of capital. Rising asset prices, for instance, will improve firms' and banks' balance sheets, inducing banks to charge a lower finance premium on loans, hence lowering the cost of capital.[38]

Changes in asset prices are found to have significant effects on private investment through these distinct channels in most of the industrial-

Figure 3.7. Industrial Countries: Bank Credit, Real Property Prices, and Net Private Savings

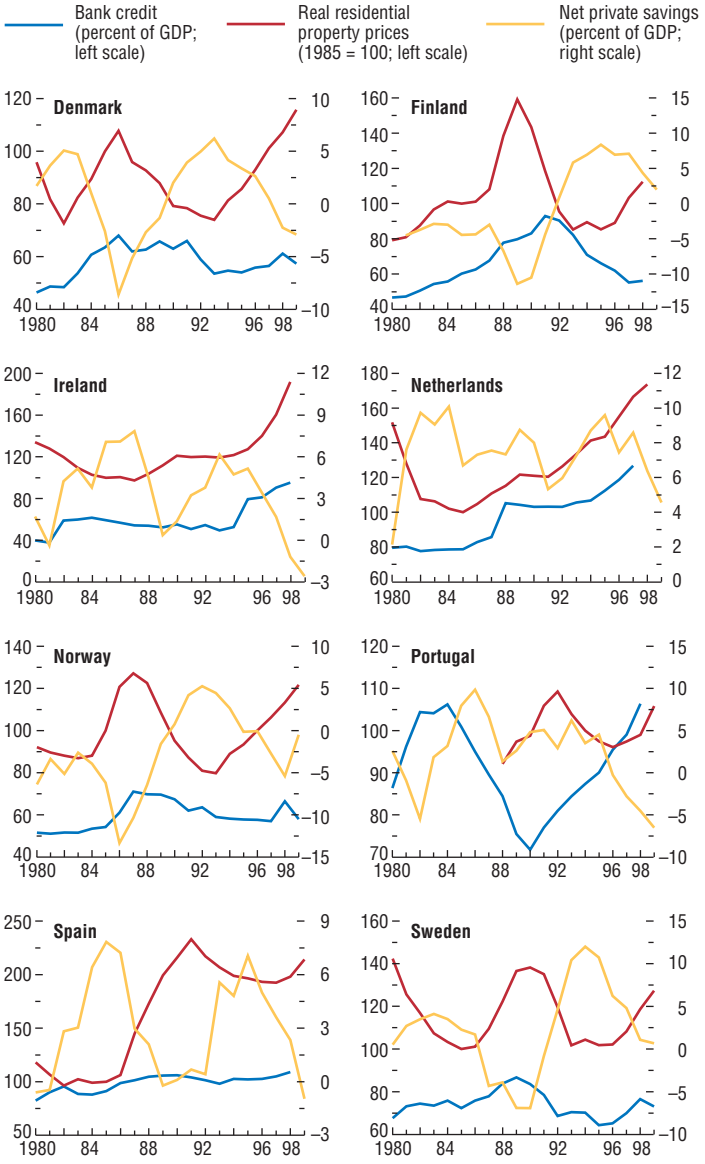
Property price cycles have been closely related to swings in domestic bank credit and negatively associated with changes in net private sector savings.



[37]See Dale Jorgensen, "Capital Theory and Investment Behavior," *American Economic Review*, Vol. 53, No. 2 (May 1963), pp. 247–259. For empirical evidence on the explanatory power of accelerator-type models, see Mark Mullins and Sushil Wadhwani, "The Effect of the Stock Market on Investment," *European Economic Review*, Vol. 33 (May 1989), pp. 939–961.

[38]There is evidence that this balance sheet effect is often reinforced by the so-called "financial accelerator" mechanism. This postulates that firms and households at the peak of the business cycle tend to be financially overextended and an adverse shock may therefore worsen financial conditions significantly, impairing firms' and households' access to credit at the same time that the need for external funds may be rising. See Ben Bernanke, Mark Gertler, and Simon Gilchrist, "The Financial Accelerator and the Flight to Quality," *The Review of Economics and Statistics*, Vol. 78 (February 1996), pp. 1–15.

Figure 3.7 (*concluded*)



Sources: IMF, *International Financial Statistics;* IMF staff estimates; and BIS, *69th Annual Report.*

ized world. In the United States the impact of changes in stock prices on investment appears to have been particularly strong in the current expansion, with the Tobin's *q* having risen by 75 percent between 1992 and 1998 to reach its highest level since World War II.[39] Rapid investment growth has played a key role in raising productivity and sustaining the current U.S. expansion (see Box 3.1). Studies for other countries also yield a strong relationship between stock prices and investment for Australia, the United Kingdom, and Japan.[40] In France, Germany, and the Netherlands, however, the link between asset prices and investment seems less pronounced (Figure 3.8).[41] One possible explanation for the historically smaller role for stock prices in continental Europe is the difference in corporate laws and traditions, as witnessed by less frequent takeovers, the greater importance accorded to employees in decision making, and the higher gearing ratios. These features imply that managers tend to be less responsive to the stock mar-

[39]For evidence on the impact of stock prices and Tobin's *q* on investment in the United States and Canada, see Robert Barro, "The Stock Market and Investment," *Review of Financial Studies*, Vol. 3, No. 1 (1990), pp. 115–131. While the predictive performance of *q*-type investment models has been traditionally weak (relative to accelerator-type models, for instance), there is little dispute that the market drop in the price of capital associated with the recent boom in equity markets has contributed importantly to rapid investment growth in the United States. Empirical studies have also highlighted, however, the important role of other factors, such as the higher rates of capital depreciation in the 1990s and the permanent nature of shocks to computer prices. See, for instance, Stacey Terlin and Karl Whelan, "Explaining the Investment Boom of the 1990s," FED Working Paper 2000-11 (Washington: Federal Reserve Board, 2000).

[40]See Michael Andersen and Robert Subbaraman, "Share Prices and Investment," Reserve Bank of Australia, Research Discussion Paper 9610 (1996), Bank of England "Small, Inventory investment and cash flow," (unpublished, 1997), and Tamim Bayoumi, "The Morning After: Explaining the Slowdown in Japanese Growth in the 1990s," NBER Working Paper 7350 (Cambridge, Massachusetts: National Bureau of Economic Research, 1999).

[41]Jeannette Capel and Aerdt Houben, "Asset Price Inflation in the Netherlands: Assessment, Economic Risks, and Monetary Implications," in *The Role of Asset Prices in the Formulation of Monetary Policy*, BIS Conference Papers, Vol. 5 (Basel: Bank for International Settlements, 1998), pp. 264–279.

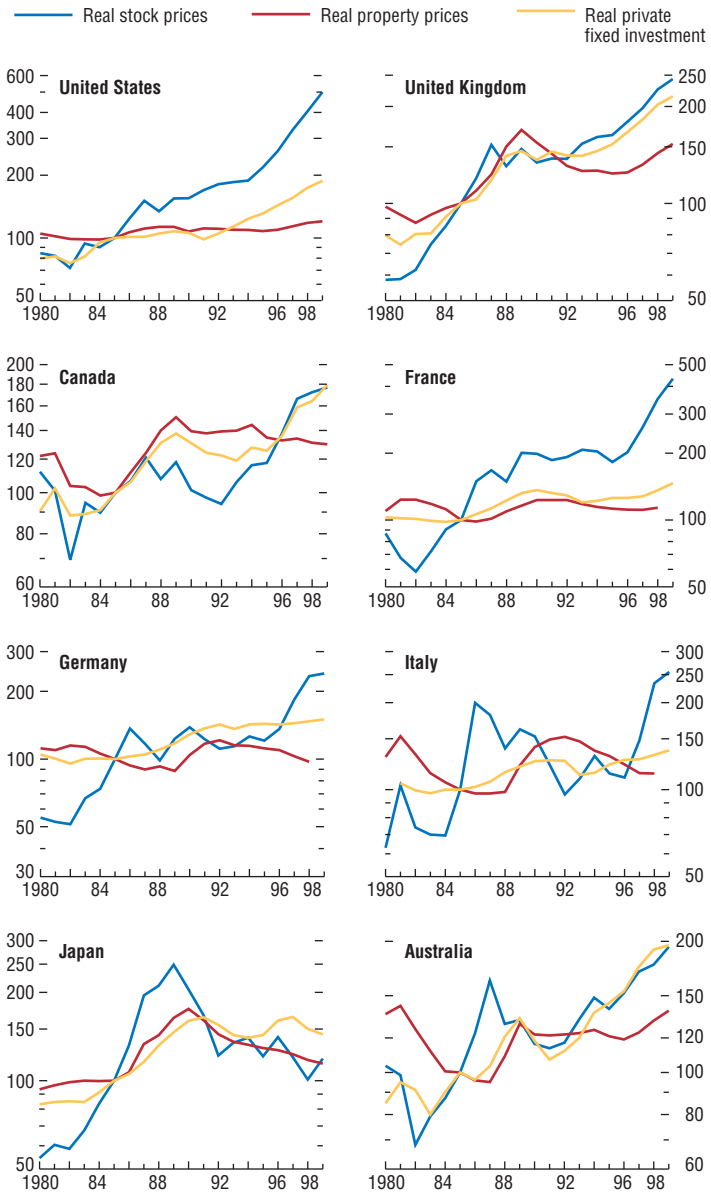
ket relative to their counterparts in the Anglo-Saxon countries. Studies show that investment in Germany has indeed been less sensitive to changes in stock prices relative to the United States and the United Kingdom,[42] although there are indications that this sensitivity may increase in coming years, in response to the pressure for firms to restructure to raise productivity and take full benefit of the single-currency European capital market. On the other hand, there is evidence that property prices—rather than stock prices—have a more significant effect on investment in continental Europe and Japan, consistent with the more widespread use of property collateral against loans and the greater role of bank credit in firms' financing. In these countries, cycles in property prices in fact have been closely linked to cycles in credit and investment, although the direction of the causality between these three variables is hard to pin down empirically (see Figures 3.7 and 3.8).[43]

Asset Prices and Financial Fragility

Reflecting the rapid expansion of the financial industry over the past two decades, the share of the financial sector in GDP has risen significantly in all industrial countries. As financial sector linkages within national economies strengthened, widespread deregulation and stiffening competition induced banks to become increasingly engaged in non-traditional lines of business; among these, asset trading and mortgage financing to highly leveraged households and corporations stand out.[44] In particular, banks' exposure to the property market increased markedly during the 1980s and, in some coun-

Figure 3.8. Industrial Countries: Real Stock Prices, Real Property Prices, and Real Private Fixed Investment
(Logarithmic scale; 1985 = 100)

The recent increase in real stock prices in the United States, Canada, and the United Kingdom appears to have played a key role in driving aggregate investment, whereas in continental European countries and Japan property prices have been more closely associated with investment cycles.

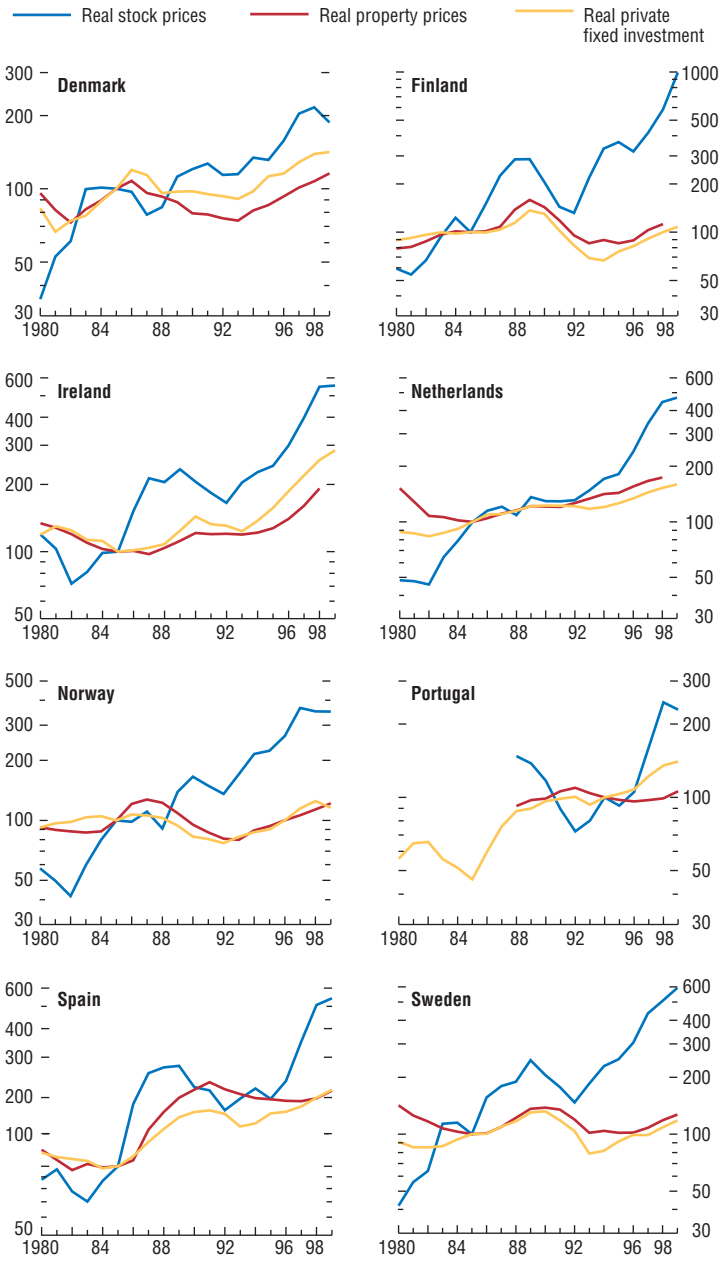


[42]Mullins and Wadhwani, "The Effect of the Stock Market."

[43]Kent and Lowe, "Property Price-Cycles and Monetary Policy."

[44]The share of lending to the private sector relative to the public sector also increased markedly during the period, partly reflecting fiscal consolidation in most industrial countries. To the extent that loans to the private sector are riskier, this contributed to the increase in the overall risk exposure of national financial systems.

Figure 3.8 (*concluded*)



Sources: IMF, *International Financial Statistics;* IMF staff estimates; and BIS, *69th Annual Report.*

Table 3.6. Bank Real Estate Lending in Selected Countries[1]

(Percent of loans to private sector)

	1982	1985	1990	1992
Canada	30	33	46	51
France	28	29	31	30
Germany	44	46	42	40
Japan	12	14	24	19
Norway	51	48	50	46
Portugal	23	28	34	33
Spain	19	19	27	30
Switzerland	51	52	54	54
United Kingdom	16	19	31	32
United States	29	31	41	43

Source: Bank for International Settlements, *Annual Reports*, various years.

[1]Post-1992 data not published on a consistent basis.

tries, this trend continued through the early 1990s (Table 3.6).

Greater exposure to asset market developments implies that sharp swings in stock and property prices, such as those observed over the last two decades, tend to have a major impact on the balance sheets of financial institutions. One direct channel is through revaluations of nonloan assets and changes in earnings accruing from brokerage fees on the value of asset transactions. A less direct but key channel is through changes in the net worth of the household and corporate sectors. To the extent that falling stock and property prices affect the solvency of household and corporate borrowers, they tend to raise the share of nonperforming loans in the portfolios of financial institutions, thereby undermining banks' capital position and lending capacity. Under generalized asset price deflation, these effects are reinforced by the falling value of loan collateral, which banks can usually recover in the case of outright defaults. As financial institutions try to sell those assets at fire sale prices, the negative impact on asset markets and banks' balance sheets can become self-reinforcing. The combination of these effects can create a "credit crunch," worsening the contractionary effects triggered by the original drop in asset prices.

Conversely, a similar mechanism tends to magnify the impact of rising asset prices during cyclical upswings. As the net worth of households and

corporations increases, so do banks' balance sheet positions and lending capacity, fostering a credit boom. This transmission channel has proven to be particularly strong in countries where the financial system is bank-dominated, such as in continental Europe and Japan (where cross shareholding between the banking and corporate sector is extensive), as opposed to a financial system where stock and bond markets play a more central role, such as in the United Kingdom and the United States.[45] The potentially disruptive impact of asset price fluctuations on the balance sheets of financial institutions underscores the need for a highly capitalized and well-supervised financial system. Fragile financial systems have a reduced capacity for channeling funds from savers to borrowers, raising the cost of capital and restricting the access of innovative entrepreneurs to liquid funds, which, in turn, hampers investment and economic growth.[46] The experiences of several industrial and emerging economies over the past two decades also suggest that government-sponsored bank rescue operations following asset price collapses can be very costly. Moreover, structurally fragile financial systems can also undermine price stability in the longer term by inducing monetary policy "forebearance"; that is, to avoid the potentially high costs of financial system disruptions and fiscal rescue operations, monetary authorities may be tempted to maintain a looser policy stance than that warranted by current macroeconomic and asset market indicators, which may allow an incipient asset price bubble to inflate further. Conversely, governments may be tempted into "regulatory forebearance" following an asset price collapse, setting regulation standards too loosely. This may hinder faster progress toward needed financial system restructuring. The considerable effort spent on reforming capital adequacy standards and updating regulations on credit and market risk measurement across countries partly reflects such concerns about the higher exposure of financial institutions to asset market fluctuations and their potential impact on financial system soundness.[47]

Even if financial systems are well-capitalized and properly supervised, financial fragility can still arise in circumstances of excessive corporate and household debt. As the stock adjustment following a long boom usually takes time to unwind, this can also lead to protracted recessions even if the solvency of the financial sector is unaffected initially. Protracted stock adjustment can be particularly severe in the case of business and residential investment. This is because, as discussed above, periods of stock and property price booms often lower the real cost of capital below its fundamental-based levels, which, via expectational and Tobin's *q* effects, leads to overinvestment. The overshooting reduces corporate profitability while enhancing financial fragility, which, as witnessed by the experience of Japan in the 1990s, may take very long to unwind.[48] But even in milder cases where no financial crises ensued, such as in Spain and the United Kingdom in the early 1990s, the share of private investment in GDP dropped significantly following the asset price deflation and took quite long to recover (Figure 3.9).

Policy Issues

Monetary and fiscal policies have succeeded in lowering inflation in industrial countries but the broader challenge of macroeconomic stabi-

[45]For a discussion on the Scandinavian experience of the 1980s and early 1990s, see Buckhard Drees and Ceyla Pazarbaşıoğlu, "*The Nordic Banking Crisis: Pitfalls in Financial Liberalization?"* IMF Occasional Paper No. 161 (Washington: International Monetary Fund, 1998). For econometric evidence on the central role of financial intermediaries in magnifying the impact of asset price fluctuations on output in Japan, see Bayoumi, "The Morning After."

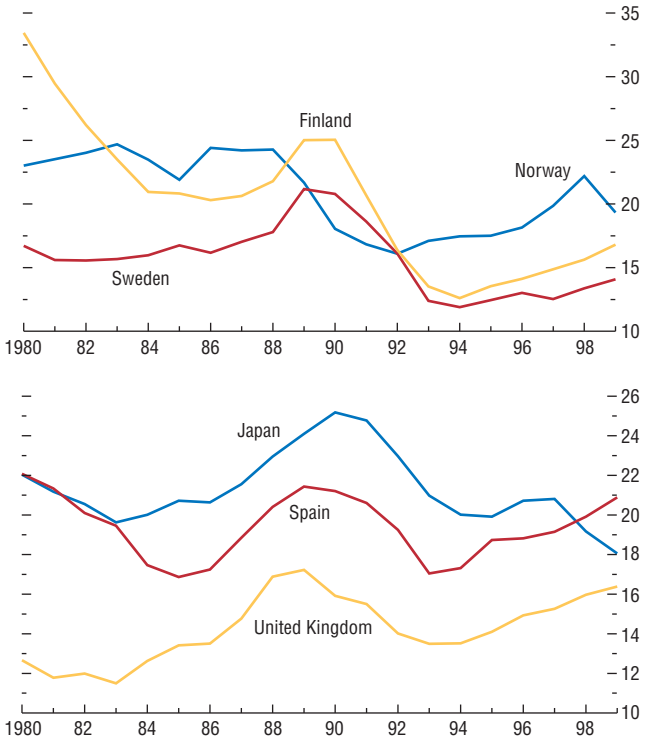
[46]A comprehensive discussion of the links between financial system soundness and economic growth is provided in Ross Levine, "Financial Development and Economic Growth: Views and Agenda," *Journal of Economic Literature*, Vol. 35 (June 1997) pp. 688–726.

[47]See Basel Committee on Banking Supervision, *A New Capital Adequacy Framework* (Basel, June 1999).

[48]See Ramana Ramaswamy, "The Slump in Business Investment in Japan in the 1990s" in *Post-Bubble Blues: How Japan Responded to Asset Price Collapse,* ed. by Tamim Bayoumi and Charles Collyns (Washington: International Monetary Fund, 2000).

Figure 3.9. Industrial Countries: Private Investment
(Percent of GDP)

Private investment took relatively long to recover following large asset price collapses in the late 1980s and early 1990s.



lization remains in two important respects. One is minimizing boom and bust cycles in economic activity and their disruptive effects on the financial system. The other is to keep at bay inflationary pressures while also preventing the emergence of its converse—namely, generalized price deflation. Given evidence that large asset price swings tend to have significant effects on current and future output growth as well as on financial system stability, a main challenge for macroeconomic policy in industrial countries in the current low-inflation environment is twofold: to prevent financial market excesses from spilling over to goods and services markets, thus threatening macroeconomic stability; and to minimize the risk that sustained periods of asset price inflation or deflation—even if they appear to be broadly justified by "fundamentals"—will undermine financial sector soundness.

These considerations do not imply, however, that targeting a certain level of asset prices should become a macroeconomic policy goal similar to inflation or monetary targeting. First, as discussed earlier, asset price models are based on unobserved variables and so their empirical predictions are subject to wide margins of error. This makes it very unlikely that the "right" price can be identified in all—or even in most—circumstances. Second, since an adequately designed monetary policy of targeting goods and services price inflation should take asset price developments into account (given their leading indicator properties and implications for financial fragility discussed above), it would be redundant to have an extra explicit goal of targeting an asset market index; indeed, setting a fixed policy target for goods and services price inflation and another one for, say, stock price inflation could prevent relative price movements that might well be justified by changes in fundamentals.[49] Third,

[49]The alternative of targeting stock or property prices indirectly by including them in an expanded monetary conditions index (MCI) is also problematic. Changes in such asset prices have varying impacts on economic activity depending on the type of asset in question and the underlying causes of its movements, so policy responses to changes in this broader index of monetary conditions could be destabilizing.

because asset markets place greater reliance on information and are generally acknowledged to be more competitive than some goods and labor markets, macroeconomic policy authorities ought to be especially cautious when pitting their judgment against those of the market.

There are, nevertheless, sound conceptual reasons and ample historical evidence in support of policies that do not always accommodate asset price movements. Conceptually speaking, given that monetary policy operates with relatively long lags, inflation targeting requires monetary policy to act in anticipation of changes in the output gap and/or inflation. Under strong assumptions about rational expectations and policy credibility, agents would fully anticipate future policy reaction to changes in the output gap and inflation, making it redundant for monetary policy to react to any forward-looking indicator other than the *current* output gap and inflation.[50] However, in a more realistic setting, where information is costly and not fully available to all agents, and learning about the "true" macroeconomic parameters is gradual, information provided by asset prices about expected changes in inflation and the output gap has a role to play; to the extent that this information is not contained in any other variable, it is clear that macroeconomic policy should take asset price movements into account. In this context, the case for macroeconomic policies to "lean against the wind" during cyclical upswings arises when asset prices rise too fast because of excessive optimism about future productivity or earnings growth. To the extent that this boosts aggregate demand in the short run but not the economy's supply potential (since actual productivity growth will lag behind expectations), inflationary pressures or other macroeconomic imbalances are likely to result. Given that the welfare costs of a belated adjustment between supply and demand tend to be very high, it is important for policy to react at a relatively early stage to the emergence of such imbalances. Conversely, the case for a looser policy stance can be made during a cyclical downswing when asset prices decline sharply to levels below those warranted by historical trends and sound valuation analyses. Insofar as this may lead to a deflationary spiral and exacerbate financial fragility, policy should be loosened.

In light of these considerations, it appears that the main error of macroeconomic policies in several industrialized countries in the 1980s and early 1990s was not that of targeting the wrong indicator (goods and services price inflation), but rather the failure of making full and more prompt use of the information content of asset prices and overlooking their impact on private-sector balance sheets. As abundantly documented elsewhere, this led to accommodative monetary policy that fueled excess demand and inflationary pressures in goods and services markets, requiring a substantial policy tightening at a later stage of the cyclical upswing.[51] This arguably ended up having more traumatic effects on the macroeconomy and the financial system than an earlier pre-emptive policy action. Another historical episode that illustrates well the inadequacy of a late policy reaction to destabilizing asset market developments is the response of the U.S. monetary authorities to the asset price collapse that triggered the Great Depression of the 1930s: by keeping a tight monetary policy stance as industrial production declined sharply and the economy spanned into a deflationary spiral, monetary policy contributed to the severity of the associated

[50]For a model along these lines, see, for instance, Ben Bernanke and Mark Gertler, "Monetary Policy and Asset Price Volatility" (unpublished; Princeton University, September 1999). One channel through which forward-looking private agents anticipate the policy response to future changes in the output gap or deviation in inflation from target is the long-term interest rate. For instance, if a shock to asset prices is expected to lower future output below potential, a rational bond market would anticipate the policy response to the shock by lowering the long-term interest rate. This, in turn, would help stabilize demand, obviating the need for a pre-emptive policy response to such an asset price change. As noted above, however, the efficiency of this mechanism relies on strong assumptions about the process of expectations formation.

[51]See *World Economic Outlook*, May 1992 and May 1993 issues.

recession.[52] In contrast, the prompt response of monetary policy in the U.S. to the stock market crash of October 1987 stands out as a good example of how effective early policy actions can be in mitigating the impact of asset market excesses on the macroeconomy and financial system.[53]

These distinct episodes not only indicate the need for a pre-emptive policy action in some infrequent occasions, but also that such a policy reaction has to be *symmetric*. On the one hand, the policy stance should be relaxed whenever a sharp collapse in asset prices undermines the solvency of the financial system and can trigger a severe recession.[54] On the other hand, policy should equally offer some resistance to an apparently unsustainable buildup of asset prices that—even when gradual and not immediately accompanied by inflationary pressures—carries a high risk of crashing, spilling over into the macroeconomy to produce substantial output and employment losses. In particular, the historical evidence reviewed above suggests that the need for a pre-emptive policy response to either a sustained buildup or a sharp collapse in asset prices may be warranted in the following situations. First, in cases where signs of overvaluation (undervaluation) are generalized across the different assets and, in particular, when both stock prices and property prices rise (drop) well above (below) historical or estimated equilibrium trends. Second, in light of the potentially disruptive effects that asset price swings can have on financial sector soundness and private sector solvency (even in financial systems that appear to be well-regulated ex ante), the case for some policy tightening is strengthened whenever high asset price inflation is accompanied by rapid credit and money growth, and vice versa.[55] Third, all asset bubble episodes of the 1980s and 1990s were associated with a marked drop in private savings ratios, rapidly rising investment ratios, sharp deterioration in private sector balance sheets, and large external current account deficits (usually in excess of 4 percent of GDP). When significant imbalances in these distinct macroeconomic and financial indicators begin to emerge, some policy tightening seems well warranted.

This leads to the question of which policy instruments are most effective to deal with these particular situations. The previous discussion makes clear that macroeconomic and regulatory policies can affect aggregate demand and real asset prices via four distinct channels: (1) through changes in interest rates and/or rediscount facilities controlled by the central bank; (2) through regulatory policies such as reserve and capital requirements, and loan provisioning regulations on financial institutions, which help contain the impact of large variations in market liquidity on credit supply; (3) through counter-cyclical fiscal policies aimed at dampening excessive expansion or contraction of private-sector spending, thereby affecting output and earnings growth; and (4) through selective tax changes which raise or lower the real post-tax return on asset transactions.[56]

[52]For a review of stock market and macroeconomic developments leading to the Great Depression of the 1930s, and the conduct of macroeconomic policy during the period, see Christina Romer, "The Nation in Depression," *Journal of Economic Perspectives*, Vol.7 (Spring 1993), pp. 19–39.

[53]See Gertler, Goodfriend, Issing, and Spaventa, *Asset Prices and Monetary Policy: Four Views*. On the other hand, while policy reaction in the wake of the 1987 asset price collapse was instrumental in preventing a repeat of the 1930s depression, it could be argued that policy should have been used to prevent such excesses from building up in the first place, given their likely adverse effects on the macroeconomy.

[54]As discussed earlier, a well-regulated and supervised financial system should in principle be able to withstand large shocks to asset prices. In practice, however, even financial systems that appear to be well-regulated and supervised ex ante are unlikely to be immune to the effects of a sharp recession triggered by a collapse in asset prices, especially when the non-financial private sector debt is high, as is usually the case in the advanced stages of a strong cyclical expansion.

[55]See Garry Schinasi and Monica Hargraves, "'Boom and Bust' in Asset Markets in the 1980s: Causes and Consequences," in *Staff Studies for the World Econonic Outlook* (Washington: IMF, December 1993).

[56]One example is through higher tax rebates on mortgage interest payments. By effectively lowering the discount rate used to determine the present value of property, such tax cuts will tend to raise its price.

The combination of instruments that should be preferred will depend on a number of considerations. In general, monetary policy tends to be a more agile instrument than fiscal policy insofar as it can affect interest rates and bank credit more directly and does not require the longer lags usually associated with budget approval and implementation. Moreover, there is a strong case for fiscal policy to follow stable and transparent rules that may constrain their counter-cyclical role beyond built-in automatic stabilizers. Similarly, there is a case for regulatory policies to be stable over the business cycle, although the built-in automatic stabilizers in those rules may be a desirable feature in some contexts, as will be discussed below.

There are cases, however, where monetary policy may be either ineffective or an effective but blunt instrument to defuse macroeconomic imbalances stemming from asset market excesses.[57] One case is when the economy falls into a liquidity trap following an asset price collapse. Since the monetary authorities cannot make interest rates negative, whenever inflation in goods and services is close to zero or negative, then monetary policy loses much of its effectiveness as a counter-cyclical instrument. In such circumstances, fiscal policy may need to play a role. Limits to monetary policy are also obvious in the case of monetary unions or large currency areas in which asset price bubbles (or their converse) are not generalized, affecting only some regions, and are restricted within those regions to a specific class of assets such as commercial and residential property. In such cases, fiscal and regulatory policies may, again, have an important role to play.

Current Challenges in the Euro Area and in the United States

Despite the marked divergences across European countries, stock prices in the euro area as a whole have evolved broadly in line with those in the United States. But the increase—at least until very recently—has been less marked (Figure 3.10) and, as in the United States, the largest gains have been in the high productivity technology sector.

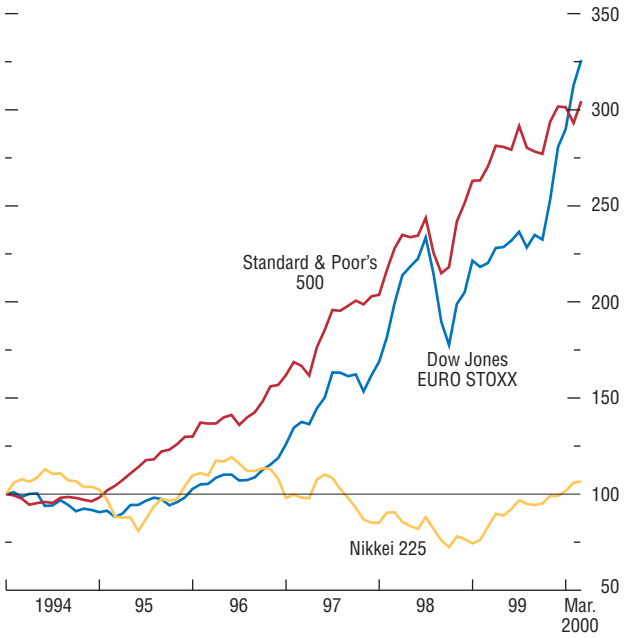
From a policy standpoint, a main concern about recent stock price trends is the magnitude of the observed regional divergences. Given that large stock price swings in euro countries tend to have a much less significant effect on domestic demand than in the United States due to factors already discussed, the much more rapid rise in prices in Finland, Ireland, the Netherlands, Portugal, and Spain—as well as in Sweden (which is not yet a member of the euro area)—than elsewhere in the area is a matter of greater policy concern than is the rise in stock prices for the euro area as whole. At the same time, these are countries where—with the apparent exception of Finland—signs of overvaluation have also emerged in the property market, which can have a greater impact on aggregate demand and credit conditions.

While these divergences can be, at least in part, justified by the process of regional convergence associated with economic integration, the potentially significant impact of large asset price corrections on credit growth and bank soundness in such countries (where the financial system tends to be bank dominated) poses a particular challenge for the conduct of monetary policy.[58] In some countries, nominal and real interest rates declined steeply in the run-up to the introduction of the euro in January 1999. Short-term nominal interest rates are now equal across the member countries, but real short-term interest rates are lower in the faster growing economies owing to higher inflation rates. The difficulties are not unlike those posed by regional asset price booms in other large currency unions, but may be more problematic because of the lower degree of labor mobility across regions, greater structural rigidities, and the absence of fiscal federalism. In setting monetary policy, the European

[57]See the October 1999 *World Economic Outlook* for a detailed discussion of these cases.
[58]On convergence in Europe, see the discussion in Chapter III of the October 1999 issue of the *World Economic Outlook*.

Figure 3.10. Industrial Countries: Equity Prices
(January 1994 = 100)

Stock prices in the United States have risen faster than in the European Union and Japan since the mid-1990s.



Source: European Central Bank, *Monthly Bulletin.*

Central Bank has focused, appropriately, on the medium-term inflation prospects as well as monetary developments in the euro area as a whole. This has resulted in monetary conditions that appear to be too loose for some countries and too tight for others. Asset price inflation is taken into account in the ECB's monetary policy framework in two ways: first, to the extent that the rise in asset prices, especially property prices, is sustained by strong credit growth, this will be reflected in rapid growth of the broad monetary aggregate M3 (the first pillar of the monetary policy framework); second, through their indirect effect on consumer prices, and hence on the ECB's inflation target (the second pillar of the framework).[59] The difficulty is that the risks of asset price inflation in the smaller euro-area countries may be downplayed because these countries have a relatively small weight in the euro area's aggregate harmonized index of consumer prices (HCPI) and M3. However, because of the link of asset prices to bank soundness, developments in asset prices in the smaller euro-area countries are more important than their weight in the aggregate HCPI or M3 suggests, as financial-sector difficulties in a small euro area country associated with a collapse in asset prices might affect financial sectors of other euro area countries.

Monetary policy is not well equipped alone to deal with regional asset price booms. Fiscal and regulatory policies thus have a potentially important role to play. On the fiscal front, reforms to remove distortions in the tax regime for housing, such as the elimination or reduction of the tax deductibility on mortgage interest payments, would be helpful in some countries.[60] In addition, fiscal policy could be tightened further in the

[59]The euro area harmonized index of consumer prices (HCPI) does not yet include housing and therefore underestimates the effect of asset price inflation on consumer prices.

[60]The recent Danish experience, for instance, suggests that such a policy can be effective. Private consumption growth has slowed following cuts in the tax deductibility of mortgage interest payments (which helped lower the growth of disposable income of a substantial part of the household sector), while property prices have been affected only slightly.

Table 3.7. Change in Fiscal Balances and Output Growth in the Euro Area

	Change in Actual Balance (in percent of GDP)			Change in Structural Balance (in percent of GDP)			Output Gap (in percent)			Real GDP (percent change)		
	1998	1999	2000[1]	1998	1999	2000[1]	1998	1999	2000[1]	1998	1999	2000[1]
Germany	0.9	0.5	0.4	0.8	0.8	0.0	–2.2	–2.9	–2.3	2.2	1.4	2.8
France	–0.3	0.7	0.6	–1.1	0.4	0.0	–1.9	–1.5	–0.6	3.4	2.8	3.4
Italy	0.0	0.7	0.3	0.2	0.9	0.0	–2.8	–3.3	–2.6	1.3	1.3	2.6
Spain	0.8	0.4	0.5	0.2	–0.2	0.3	–0.7	–0.3	0.2	4.0	3.7	3.7
Netherlands	0.4	1.0	0.2	–0.1	0.7	–0.1	0.7	1.3	1.9	3.7	3.4	3.3
Belgium	0.8	0.2	0.4	0.5	0.1	–0.3	–1.5	–1.5	–0.3	2.7	2.0	3.3
Austria	–0.6	0.1	0.6	–0.6	0.5	0.3	–1.2	–2.0	–1.8	2.9	2.0	3.1
Finland	3.0	1.7	1.5	2.1	1.6	1.2	0.0	0.1	0.6	5.0	3.6	4.1
Portugal	0.4	0.4	0.3	0.0	0.3	0.1	0.0	–0.1	0.2	3.9	3.0	3.4
Ireland	1.5	1.1	0.1	1.0	0.8	0.2	2.4	3.0	2.7	8.9	8.4	7.4

[1]IMF staff projections.

countries with strong domestic demand. Although, on balance, discretionary fiscal policy (measured using the structural budget deficit) was moderately restrictive in 1998 and 1999 and is expected to be so again this year, it has tended to be looser (relative to the level of economic activity) in the faster growing economies and tighter in the slower growing ones. The restrictive influence of fiscal policy on aggregate euro-area economic activity has come largely from the tightening of fiscal positions in Germany and Italy, the two slowest growing economies in the euro area; in the faster growing economies, fiscal policy has been expansionary or only mildly restrictive. At the individual country level, fiscal policy has thus tended to be pro-cyclical, in part owing to the Growth and Stability Pact's focus on actual rather than structural budget deficits (Table 3.7).

The result has been a regional policy mix in which both monetary and fiscal policies have tended to be excessively accommodating in the faster growing economies and not quite as supportive as might seem warranted in the slower growing ones. Since monetary policy cannot be differentiated by country but fiscal policy can (as it continues to be determined nationally), fiscal policy thus needs to play a much greater role in helping reduce regional cyclical divergences than was the case prior to European Economic and Monetary Union (EMU).[61] The role of fiscal policy in managing unsustainable asset price inflation should of course be symmetrical: that is to say, in the event of a sharp correction in asset prices, fiscal expansion should help to stabilize economic activity. The usefulness of fiscal policy in alleviating deflationary pressure—as well as its limitations—has been demonstrated most recently by the experience of Japan.[62]

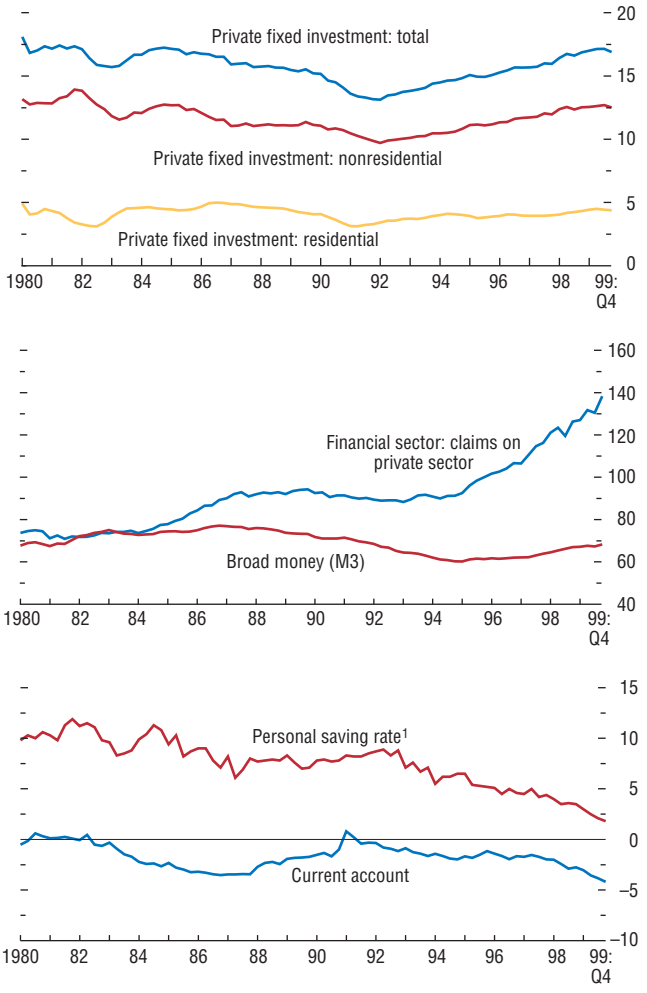
Financial sector supervision and regulation also can contribute to avoiding regional asset price booms and busts. Prudential measures such as raising provisioning requirements for consumer and real estate loans, margin requirements, and enhanced monitoring of lending standards, along with moral suasion, may all have a role to play. To avoid potential credit problems, sufficient account must be taken of business cycle effects in lending. Indeed, banking problems have often arisen from the tendency in periods of booming asset prices and generally favorable economic conditions for credit assessments to be based on overly optimistic assumptions. Stress testing, which takes account of business cycle effects and feasible

[61]One difficulty with putting this in practice is that the fastest growing economies in Europe are already posting fiscal surpluses, making it politically more difficult to demand further improvements in their fiscal balances.

[62]See Adam Posen, *Restoring Japan's Economic Growth* (Washington: Institute for International Economics, 1998), for a discussion of this point.

Figure 3.11. United States: Economic Indicators
(Percent of GDP)

Rapid economic growth in the United States has been associated with strong increases in private investment and bank credit and a marked decline in personal savings and in the current account balance.



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

[1]In percent of disposable personal income.

downside scenarios with respect to asset prices, is one way of incorporating a broader view of credit risk into credit decisions. Collateral values need to be monitored closely by banks, and in some cases it may even be desirable for collateralized lending, especially for real estate, to adopt countercyclical features. For instance, larger down payments could be required for real estate loans in periods of booming property prices. In addition, greater disclosure requirements for banks concerning their loan risk management and internal control policies and practices would increase transparency and strengthen market discipline, thereby helping to avoid some of the weak credit risk management practices and poor credit quality problems that typically underlie financial-sector fragility.[63]

In comparison with other industrialized countries, U.S. stock prices have risen more rapidly since 1994.[64] Despite the concomitant rise in productivity growth and indications that at least some of the stock price rises may be sustained (see Box 3.1), both the valuation analysis discussed earlier and evidence from other studies point to some degree of overvaluation in broad stock indices such as the S&P 500 and the overall Dow Jones. While the sharp bifurcation in the different stock sub-indices associated with the pricing of technology stocks adds further complication to the valuation assessment of broad indices, triple-digit P/E ratios for the average technology stock point to exceptionally high market expectations of future earnings growth.[65] Given

[63]See Bank for International Settlements, *Best Practices for Credit Risk Disclosure* (Basel: BIS, July 1999).

[64]Between January 1994 and December 1999, average U.S. stock prices (as measured by main stock indices such as the Standard and Poor's 500) also rose considerably faster than the Euro Dow Jones index when both are expressed in the same currency (rather than in the respective national currencies as in Figure 3.10), but the gap has narrowed considerably since.

[65]For instance, a P/E ratio of 186—such as that of the NASDAQ stock index in early March 2000—entails earnings expectations in excess of 25 percent a year for the next five years, even assuming that at the end of 2005 the index's P/E ratio will remain well above historical values, in the 75 to 100 range. See Greg Jensen and Tyler Shubert, "What Is the Nasdaq Telling Us?" *Bridgewater Daily Observations,* Bridgewater Associates (March 13, 2000), pp. 1–3.

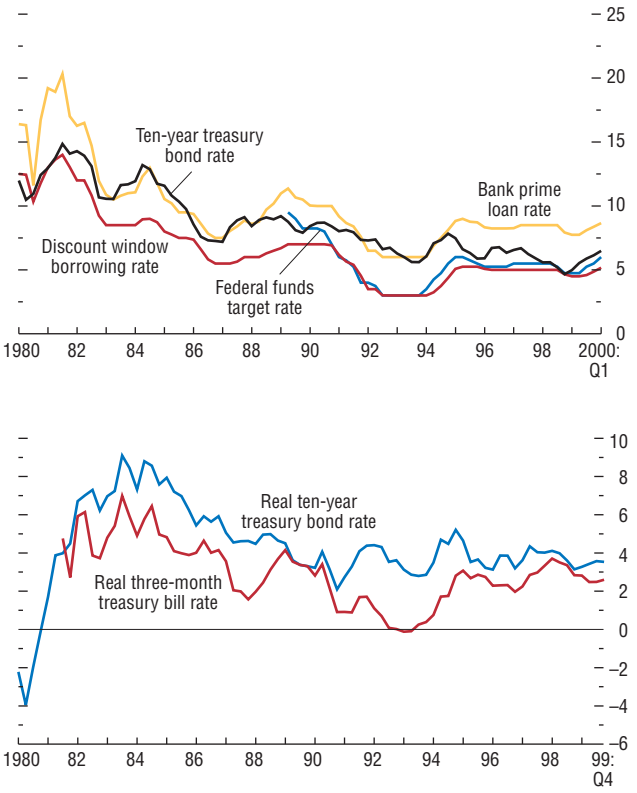
the significant predictive power of stock prices on investment and output growth in the United States and, in particular, the higher elasticity of private consumption to stock market wealth in the United States compared with other industrial countries, a continuation of the recent trend in stock prices points to faster growth of domestic demand and real GDP relative to potential—even after estimates of the latter are revised upward in line with the recent revisions in U.S. national income accounts. Combined with a positive output gap and an unemployment rate at a 30-year low, recent stock market trends seem to be signaling further demand pressures ahead, despite the (so far) quiescent price inflation in goods and services.

In addition to indications of stock price overshooting, there are clear signs of macroeconomic imbalances in the United States. These include rapid credit growth, a sharply rising investment ratio, record low household savings, and a widening current account deficit (Figure 3.11). Although the fiscal stance (as measured by the general government structural balance) has been broadly contractionary, *real* interest rate indicators remain below their average levels in the 1980s despite the recent step increases in the Federal Reserve Funds rate (Figure 3.12).[66] International shifts in portfolio and other capital inflows to the United States fostered by the emerging market crises of 1997 and 1998 as well as by recession in Japan and slow growth in Europe have also helped fuel domestic liquidity. Although economic recoveries under way in these regions should take some pressure off domestic demand and help reduce the U.S. current account deficit gradually, symptoms of financial fragility may emerge in the wake of a significant drop in asset prices or of a sharp growth slowdown, as the U.S. private sector is highly leveraged and the personal saving ratio has reached historical lows in early 2000. Even

[66]An overview of recent trends in fiscal balances and the output gap in the United States is provided in the October 1999 issue of the *World Economic Outlook*, Chapter III.

Figure 3.12. United States: Interest Rates
(Percent)

Rapid economic growth in the United States has been associated with lower and less volatile real interest rates in the 1990s.



Sources: Haver Analytics database; and IMF staff estimates.

though the financial system in the United States is widely acknowledged to be well-regulated and capitalized, such concerns are heightened by evidence that periods of rapid credit growth have been historically associated with a decline in the quality of the loan portfolio of financial institutions.[67] In light of these considerations, it seems that monetary policy will have to strike a fine balance in the near future between the need to bring output growth in line with potential to keep inflationary pressures at bay, and that of preventing an abrupt correction in asset markets that could likewise be macroeconomically destabilizing.

[67]Evidence on the relationship between rapid credit growth and the easing of credit standards in the United States is provided in William R. Keeton, "Does Faster Loan Growth Lead to Higher Loan Losses?" *Federal Reserve Bank of Kansas City Economic Review*, Vol. 84, No. 2 (1999), pp. 57–75.