IV

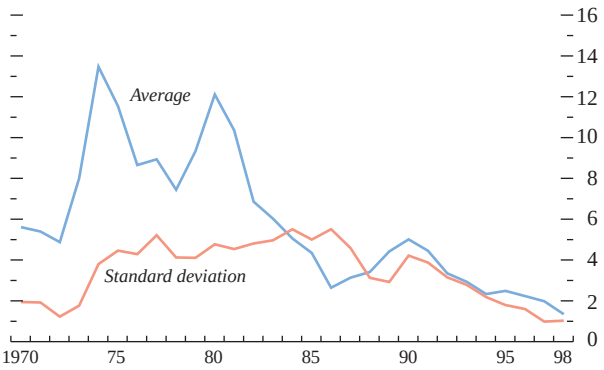
Safeguarding Macroeconomic Stability at Low Inflation

The 1990s have witnessed some notable economic achievements but a number of new challenges have also arisen. The establishment of reasonable price stability in the industrial countries and of low rates of inflation in the majority of developing and transition economies stand out as particularly remarkable accomplishments. There has also been widespread progress in fiscal consolidation. As events in recent years have shown, however, while these conditions are necessary for safeguarding reasonably robust and stable economic growth, they are clearly not sufficient. Eliminating fiscal and monetary policy shortcomings addresses some, but not all, sources of macroeconomic disturbances. Indeed, it is now generally accepted that private sector behavior—especially in the context of improperly regulated markets and poor contractual environments, but at times also in the context of well-functioning and undistorted markets—can result in what in retrospect turn out to be mistaken real and financial investment decisions, or in booms-and-busts in asset prices and economic activity.

This chapter focuses on the challenge of safeguarding macroeconomic stability in a low-inflation environment. It begins with a review of how low inflation was achieved in the industrial countries and then turns to a discussion of the effectiveness of policies in the presence of nominal rigidities and the relationship between price stability and macroeconomic stability. In doing so it addresses questions such as: Can inflation be too low? When should deflation be of most concern? Does low inflation induce excessive risk taking? And what role should asset prices play in the conduct of monetary policy?

Figure 4.1. Industrial Countries: Consumer Price Inflation
(Percent)

In recent years inflation rates in industrial countries have converged to levels approaching reasonable price stability.



The Achievement of Reasonable Price Stability

Over the past two decades or so, the industrial countries have succeeded in bringing their inflation rates under control. Average inflation fell steeply in the 1990s, following an earlier episode of broad-based disinflation in the first half of the 1980s, and during the last few years it has stood at rates that many would consider to constitute reasonable price stability (Figure 4.1). The decline in inflation has been associated with a marked convergence of inflation rates across countries. In 1998, consumer price inflation in

all but one of the 23 industrial countries was below 3 percent—with 12 countries in the 1–2 percent range and six below 1 percent. Inflation as low as in the past five years has not been experienced since the late 1950s and early 1960s.

Although many factors have played a role in the disinflation, including declining prices for oil and other primary commodities, undoubtedly the main factor has been the policy environment, namely, central banks' focus on the goal of price stability, as the public became increasingly aware that higher inflation is associated with broadly inferior economic performance. In many countries this was part of a medium-term policy strategy that also included fiscal consolidation and structural economic reform. In Europe, it was further reinforced by the required convergence of economic performance in the areas of inflation, public finances, and interest rates, as set out in the Maastricht Treaty in preparation for monetary union. In many developing countries too, the decline in inflation owes much to improved policies, especially more disciplined fiscal policy and the adoption of outward-oriented trade regimes. And globally, the trend toward greater openness of economies and closer integration of the world economy seems to have contributed to lower inflation by increasing competitive forces.

How has monetary policy been conducted to achieve low inflation in the industrial countries? The approaches adopted fall into four categories or monetary policy regimes: monetary targeting, exchange rate targeting, explicit inflation targeting, and implicit inflation targeting.[1]

In the mid-1970s, a number of industrial countries, including the United States, Canada, Germany, and the United Kingdom among the major economies, adopted targets for money growth.[2] This reflected two developments: the rise in inflation to postwar highs and the collapse of the Bretton Woods system of pegged exchange rates, which deprived countries of their nominal anchor. The adoption of official money growth targets served two main purposes: they acted as a guidepost for monetary policy, aiding the central bank in setting its instruments for an appropriately disinflationary policy stance; and they signaled to the public the central bank's intentions and goals with respect to inflation and provided the basis for a public understanding of its policy actions. In some cases targets for broad monetary aggregates also served a third purpose, helping to discipline fiscal policy by highlighting the implications of fiscal deficits for monetary expansion.[3] Although not without some success in helping to control inflation, by the early 1980s monetary targets began to be de-emphasized and have since been largely abandoned, with the notable exceptions of Germany and Switzerland.[4] The difficulty with monetary targeting was, of course, the instability of the relationship between monetary aggregates (the intermediate target of policy) and inflation (the ultimate target or goal), which in many countries increased in the 1970s and the early 1980s partly owing to financial deregulation and innovation.

The problems with monetary targeting led some countries to pursue a disinflationary monetary policy making use of an array of indicators of monetary conditions and the expected future course of inflation. For the three major economies (the United States, Japan, and Germany), as well as for some of the smaller industrial countries, monetary policy has been found to correspond to a policy reaction function whereby the central bank seems to adjust interest rates in response to deviations of projected inflation from the desired rate or range and in response to the position of output relative to trend.[5] In particular, in response to a rise in projected inflation relative to the "target" rate, the central bank seems inclined to raise nominal interest rates by a greater amount than the increase in inflation so that the real interest rate rises and dampens demand.[6]

Exchange rate targeting was used most prominently in reducing inflation in Europe in the context of the exchange rate mechanism (ERM) of the European Monetary System, and in the Nordic countries (Finland, Norway, and Sweden), which unilaterally pegged their currencies to the ECU.[7] Inflation in the participating countries converged fairly steadily, and in some countries quite steeply, toward the rate in Germany but the strategy was not entirely successful in other respects. In particular, it did not succeed in firmly establishing policy credibility: financial markets obliged a number of countries with histories of relatively high inflation and/or large fiscal imbalances to maintain high real interest rates to support their ex-

[1]An alternative to inflation targeting that has received considerable attention in the economic literature is nominal income targeting, but it has not been explicitly adopted by any central bank, perhaps because it is more difficult to explain to the public.

[2]Japan, like other major central banks, also began to pay more attention to money growth rates, but instead of announcing "targets" for money growth it announced "forecasts."

[3]J.S. Fforde, "Setting Monetary Objectives," *Bank of England Quarterly Bulletin*, Vol. 23, No. 2, June 1983, pp. 200–08.

[4]According to some observers, in both countries money-growth targeting was applied flexibly—the target ranges were frequently missed, on the order of 50 percent of the time; see, for example, Frederic S. Mishkin, "International Experiences with Different Monetary Policy Regimes," NBER Working Paper 6965 (February 1999).

[5]A policy rule for interest rates along these lines was first proposed by John Taylor, "Discretion Versus Policy Rules in Practice," *Carnegie–Rochester Conference Series on Public Policy*, Vol. 39 (1993), pp. 195–214.

[6]For empirical evidence in support of this interpretation for the 1979–93 period, see Richard Clarida, Jordi Gali, and Mark Gertler, "Monetary Policy Rules in Practice: Some International Evidence," NBER Working Paper 6254 (November 1997).

[7]The motivation for the ERM, of course, extended beyond the desire for lower inflation.

Table 4.1. Selected Countries: Measurement Bias in the Consumer Price Index
(Percent)

	Canada	Germany	Japan	United Kingdom	United States[1]
Total	0.50	0.75	0.90	—	1.10
Range	—	0.50–1.50	0.35–2.00	0.35–0.80	0.80–1.60

Sources: Allan Crawford, "Measurement Biases in the Canadian CPI: An Update," *Bank of Canada Review*, pp. 28–56 (Spring 1998); Johannes Hoffmann, "Problems of Inflation Measurement in Germany," Deutsche Bundesbank, Economic Research Group, Discussion Paper No. 1/98 (1998); Shigenori Shiratsuka, "Measurement Errors in Japanese Consumer Price Index," Federal Reserve Bank of Chicago, Working Paper No. 99-2 (1999); Alistair W.F. Cunningham, "Measurement Bias in Price Indices: An Application to the UK's RPI," Bank of England, Working Paper No. 47 (1996); Advisory Commission to Study the Consumer Price Index, *Toward a More Accurate Measure of the Cost of Living*, final report to the Senate Finance Committee (1996).

[1]In recent years a number of methodological changes, including the use of updated expenditure weights, have reduced the measurement bias.

change rates, and the policy regime did not sufficiently modify wage- and price-setting behavior. Moreover some countries could not sustain their membership in the ERM or could only do so with wide exchange rate bands, which were established following the crises of 1992–93. What emerged from this experience is that although fixing exchange rates to a credible anchor currency for a time may achieve considerable success in reducing inflation, for some countries it may not prove sustainable because of cyclical divergences and differences in policy fundamentals.[8]

In light of the shortcomings of monetary targets and pegged exchange rates, in the 1990s, inflation targeting gained in popularity and has become the preferred monetary policy strategy in a number of countries, especially by those who assign a large weight to transparency and accountability in the monetary policy process. With the launch of European Monetary Union in January this year and the adoption by member countries of price stability as the ESCB's primary objective—with price stability defined as an annual rate of increase in the Harmonized Index of Consumer Prices for the euro area of below 2 percent over the medium term—a numerically explicit inflation goal is now a central feature of the monetary policy strategy of most industrial countries. The notable exceptions are, of course, the United States and Japan where the monetary authorities have clearly demonstrated their commitment to a high degree of price stability but have not adopted an explicit nominal anchor.

As inflation rates have come down to low single digits since the mid-1990s, increasingly the question is being raised as to what constitutes price stability. What inflation rate should central banks target? This is especially the case for countries that have adopted explicit inflation targets, but it is also relevant for countries with implicit inflation targets. On account of some upward bias in the measurement of consumer price inflation it could be argued that the targeted rate of inflation should be some small positive rate rather than zero (Table 4.1). On analytical grounds too, having to do with nominal rigidities and the efficacy of countercyclical monetary policy, it could be argued that the optimal rate of inflation is a small positive rate. From the announced target ranges for inflation by the countries with explicit inflation targets—ranges that typically lie between between 1 and 3 percent—it would appear that the authorities generally agree with this assessment.

Maintaining reasonable price stability does not mean maintaining a stable price index on a short-term basis—that is, on a monthly or even a quarterly basis. First of all, it is not possible to do so because many factors affect prices on a day-to-day basis and monetary policy is not so precise a tool that it could accomplish the task. Control of inflation requires both that the central bank be able to forecast its future path and that the impact of policy changes on that path be known (or estimated) with some precision. However, as is the case with other economic variables, inflation is quite difficult to forecast with any degree of precision, including at short horizons of one quarter. And the relationship between monetary policy instruments—typically a very short-term interest rate—and inflation varies considerably over time and is difficult to estimate precisely.[9]

Secondly, even if monetary policy could eliminate short-run fluctuations in inflation, it would not be desirable to do so, since attempts to do so would require sharp fluctuations in short-term interest rates, creating increased volatility in money markets and exchange rates and risking instability in financial markets. Even the achievement of reasonable stability of inflation on a yearly basis may not be feasible at all times. Indeed, the best that realistically can be achieved is reasonable

[8]Lars E.O. Svensson, "Fixed Exchange Rates as a Means to Price Stability: What Have We Learned?," *European Economic Review*, Vol. 38, 1994, pp. 447–68.

[9]On these points see Stephen G. Cecchetti, "Inflation Indicators and Inflation Policy," NBER Working Paper 5161 (June 1995).

price stability over the medium term. In this context, it is worth emphasizing that price stability is not all that matters for monetary policy. Central banks, even in inflation-targeting countries, do not ignore traditional stabilization goals. Indeed, the two objectives of monetary policy, long-run price stability and short-run output stabilization, are complementary and consistent. The first objective relates to the average thrust of policy over time, while the second relates to variations in that thrust over the course of the business cycle. Moreover, since inflation usually follows a cyclical pattern, smoothing cyclical fluctuations in output helps to even out inflation, when variations in output and inflation are primarily driven by disturbances to demand. The behavior of prices over the cycle thus allows monetary policy to pay attention to developments in real economic activity in conformity with the aim of reasonable price stability.

Can Inflation Be Too Low?

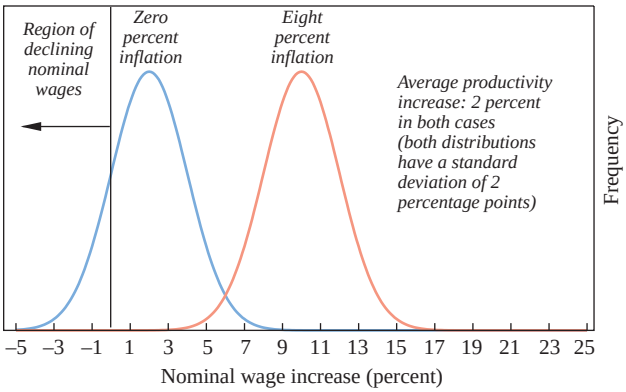
Downward Rigidity of Nominal Wages

As inflation declines to low levels, adjustments in the labor market may become more difficult owing to resistance to reductions in nominal wage levels. Efficient adjustment to changes in the relative scarcity of different types of labor requires that changes in real wages not be uniform but that they be distributed around the economy-wide average. The higher the average rate of general price and wage inflation, the less will be the need for nominal wage reductions in particular sectors and enterprises to achieve an optimal real wage adjustment, since the warranted real wage reductions can be achieved by raising nominal wages in the enterprises or sectors concerned by less than the rate of inflation. But the lower the overall inflation rate, the larger the part of the left-hand tail of the wage adjustment distribution that will fall into the range of nominal wage reductions (Figure 4.2). When nominal wage stickiness prevails, this will prevent or retard the warranted real wage adjustment, increasing the natural rate of unemployment.[10]

The fact that wages and prices adjust only gradually to their equilibrium values following exogenous shocks to the economy, as well as the resistance to reductions in nominal wages, has been long recognized by economists, but the implications for economic policy conduct have received major attention only in the post-World War II period. A historical review of the recognition by leading economists of wage and price stickiness and its effects on the real economy is pro-

Figure 4.2. Hypothetical Distribution of Nominal Wage Increases

In the absence of downward rigidity of nominal wages, the average rates of inflation and productivity growth (and the standard deviation of the wage change distribution) will determine the share of wage recipients experiencing a decline in nominal wages.



[10]A rise in average productivity growth can offset a decline in inflation by an equal amount (in percentage points) by moving the distribution of wage increases to the right for any given rate of inflation.

vided by David Laidler who points out that the classical economists were well aware of price and particularly wage stickiness, while Keynes himself treats it—much like the classical economists before him—as a fact of life, which is, however, not central to his analysis.[11]

Some analysts and policymakers have concluded that a moderate positive rate of inflation will facilitate labor market adjustment by allowing declines in real wages even if nominal wages are rigid downward.[12] Underlying this argument is an assumption of some degree of money illusion in the wage negotiation process, which is inconsistent with the assumption of rational behavior underlying conventional economic analysis. However, seemingly irrational behavior—including incidence of apparent money illusion in various guises—is not uncommon in practice, and often constitutes a rational response to imperfect information, adjustment costs, and other market imperfections.[13] The hypothesis of downward rigidity of nominal wages can therefore not be rejected *a priori* as based on unrealistic assumptions, but becomes a legitimate object of empirical investigation.

Survey results for the United States do indeed document a certain reluctance by employers to reduce nominal wages and by employees to accept such reductions. This resistance to declining nominal wages is overcome usually only where the survival of the firm is threatened by bankruptcy or other severe circumstances. A common explanation given for such behavior is that a cut in real wages brought about by a reduction in the nominal wage (at zero inflation) is considered "unfair" by a significantly larger percentage of persons than an equivalent reduction in the real wage brought about by a nominal wage increase lower than the rate of inflation.[14] A more recent survey of employers' attitudes towards reducing nominal wages confirms these findings.[15] A rational explanation for employers' reluctance to demand—and employees' resistance to accept—nominal wage reductions in established employment relationships has been provided by implicit contract theory.[16] However, the latter does not exclude the possibility of a decline in nominal wages in the context of job turnover.

Can any resistance to nominal wage reductions be detected in actual statistics? The available evidence for the United States is mixed, and few comparable studies are available for other countries.[17] An analysis based on the Panel Study of Income Dynamics (PSID) finds that individuals' wages in these panel data vary considerably over time, and that nominal wage cuts are not rare—affecting on average some 17 percent of panel members each year.[18] A subsequent study, also based on the PSID data set, does find some evidence for nominal wage rigidity, which, however, is judged insignificant in quantitative terms.[19] The preceding results differ starkly from the analysis in the influential paper by Akerlof et al., who also survey empirical studies of the incidence of reductions in nominal

[11]It is not the "discovery" of price stickiness, but the elaboration of its theoretical foundations and its systematic linkage to the business cycle, which distinguishes the Neo-Keynesian contribution; see David Laidler, "Wage and Price Stickiness in Macroeconomics: Historical Perspective," in Forrest Capie and Geoffrey E. Wood, eds., *Monetary Economics in the 1990s* (London: Centre for Banking and International Finance, City University of London, 1996), pp. 92–121.

[12]This point was prominently developed in James Tobin, "Inflation and Unemployment," *American Economic Review*, Vol. 62 (1972), pp. 1–18. The argument has recently been formalized in a paper by Akerlof et al., which attempts to quantify the implications of downward nominal wage rigidity on the equilibrium level of unemployment using a stochastic general equilibrium model; see George A. Akerlof, William T. Dickens, and George L. Perry, "The Macroeconomics of Low Inflation," *Brookings Papers on Economic Activity*: 1 (1996) pp. 1–59.

[13]For a comprehensive survey see James Haley, "Theoretical Foundations for Sticky Wages," *Journal of Economic Surveys*, Vol. 4 (No. 2), pp. 115–55. A discussion of the underlying causes of money illusion, its impact on wage formation, and possible ways to integrate these aspects into formal models of the economy can also be found in Eldar Shafir, Peter Diamond, and Amos Tversky, "Money Illusion," *Quarterly Journal of Economics* (May 1997), pp. 341–374.

[14]Daniel Kahnemann, Jack Knetsch, and Richard Thaler, "Fairness as a Constraint on Profit Seeking: Entitlements in the Market," *American Economic Review*, Vol. 76 (No. 4), pp. 728–41. The authors quote survey results that show that a given decline in real wages is considered unfair by 62 percent of persons interviewed when it involves a cut in nominal wages, but by only 22 percent when it comes about by nominal wages rising by less than the rate of inflation.

[15]Truman Bewley and William Brainard, "A Depressed Labor Market as Explained by Participants," unpublished paper, quoted in Akerlof et al., "The Macroeconomics of Low Inflation."

[16]For a seminal paper on implicit contracts see George A. Akerlof, "Labor Contracts as Partial Gift Exchange," *Quarterly Journal of Economics*, Vol. 97 (1982), pp. 543–69.

[17]Given the higher job turnover, as well as comparatively unregulated labor markets and low unionization in the United States, the downward nominal rigidity of wages is likely to be more prevalent in Europe than in the United States. On the other hand, where part of labor compensation is based on profit sharing, this should facilitate a decline in (effective) nominal labor income and thus lower the natural rate of unemployment—which is consistent with experience in Japan.

[18]The PSID data record the hourly wages (or salary equivalents) of breadwinners in over five thousand families since 1968. The analysis referred to is by Kenneth J. McLaughlin, "Rigid Wages?" *Journal of Monetary Economics*, Vol. 34 (1994), pp. 383–414.

[19] The supportive evidence is twofold: first, there is a positive correlation between the symmetry of the wage change distribution (as measured by skewedness—or absence thereof) and the rate of inflation; second, there is a spike in the wage changes distribution at zero changes, the size of which rises as inflation falls. However the estimated welfare loss from the estimated degree of nominal wage rigidity amounts to less than one tenth of a percent for a decline in inflation from 4 percent to zero percent; see David Lebow, David Stockton, and William Wascher, "Inflation, Nominal Wage Rigidity, and the Efficiency of Labor Markets," Finance and Economics Discussion Series 94-45 (Washington: Federal Reserve Board, 1995).

wages in the United States and conclude that the downward rigidity of nominal wages is indeed widespread (Box 4.1).[20]

One reason why downward rigidity of nominal wages may have been common in the postwar period is that the average inflation rate has been comparatively high. Under such conditions a fall in nominal wages implies a large cut in real wages, at a time when average real wages have risen rapidly. It is quite possible that at lower rates of inflation nominal wage reductions will become more acceptable. Likewise, institutional arrangements may influence the ability of implementing nominal wage reductions in response to changes in relative scarcities in labor market skills: if a substantial part of the pay package depends on the enterprise's economic performance (e.g. through profit sharing) or is delivered in the form of (non-contractual) fringe benefits, *de facto* nominal wages may be easier to cut. Whether these factors are capable of reducing the widely observed discontinuity of the wage change distribution at zero wage increases is an empirical question, which cannot be resolved *a priori*. It would therefore be premature for policymakers to dismiss downward nominal wage rigidity as a temporary cost in the transition to price stability, rather than acknowledging its permanent impact on equilibrium (un)employment and output.[21]

Since inflation during the postwar period has been around 3 percent or above in virtually all industrial countries until very recently, a test of the hypothesis that zero inflation will entail a significant increase in equilibrium unemployment due to downward nominal wage rigidity, as predicted by Akerlof et al., is difficult using postwar data. Box 4.1 presents a summary of simulation results by these authors, showing a large increase in equilibrium unemployment as inflation is reduced to zero. However, recent developments in the U.S. economy seem to contradict such a prediction: the rate of inflation has been reduced below any five-year moving average since 1950 (and well below 3 percent), while the unemployment rate, far from ratcheting upward, has reached the lowest level since the 1960s.[22] The hypothesis seems to conform better with the experience in the majority of European economies, where determined efforts to reduce inflation toward low German levels in the run-up to the formation of monetary union (stage 3 of EMU) succeeded in reducing inflation to record low levels, but were accompanied by an increase in unemployment to new postwar peaks. As has been widely argued, this is the consequence of significant and pervasive labor market distortions and rigidities, but it is an open question whether downward rigidity of *nominal* wages plays a particularly important role among them.[23] In Japan, too, the reduction of inflation to zero has been accompanied by a substantial rise in unemployment, despite the relative flexibility of the Japanese compensation system, though it is unclear how much of the increase in the unemployment rate is of a cyclical nature rather than a structural phenomenon causally linked to zero inflation.

In any case, potential benefits from facilitating wage adjustment by some positive steady state inflation rate need to be evaluated against the cost of such inflation that may result from distorting price and wage signals. A recent study which tries to identify these offsetting effects on labor market efficiency for the U.S. economy comes to the conclusion that the two effects largely offset each other below an inflation rate of 5 percent, above which the net costs increasingly dominate. Below the 5 percent threshold, the net output and employment effects of inflation are estimated to be positive but statistically indistinguishable from zero.[24] This study does not take account of the benefits of zero inflation due to the efficient holding of real balances, nor of the potential distortions of low inflation on household saving and business investment decisions.

[20]A summary of their findings on nominal wage rigidity is presented in Table 3 of their paper. All studies reviewed show an asymmetry of wage changes about the mean and, with the exception of evidence from the PSID data set, they all find that reductions in nominal wages are infrequent—much more so than could be expected on the basis of normally distributed wage changes. Concerning the PSID data set, the authors argue that the high incidence of nominal wage cuts reported in this survey can be accounted for by measurement error. Cf. Akerlof et al., "The Macroeconomics of Low Inflation."

[21]The discontinuity of the wage change distribution at "zero" is extensively documented in a recent paper by Beth Anne Wilson, "Wage Rigidity: A Look Inside the Firm" (unpublished; Washington: Federal Reserve Board, April 1999). The research reported in this paper supports the contention by Akerlof et al. that downward nominal wage rigidity is widespread and important.

[22]A positive productivity shock may be responsible (at least partly) for preventing falling inflation from translating into higher structural unemployment in the U.S. in the recent past; see Chapter 3 for a more detailed discussion of this issue. It is worth noting that the recent performance of the U.S. economy is difficult to reconcile not only with the predictions of the Akerlof/Dickens/Perry model, but with those of the standard natural rate models as well. If a permanent increase in productivity growth has shifted the long-run Phillips curve to the left, this does not refute the Akerlof/Dickens/Perry hypothesis that at low rates of inflation the curve becomes non-vertical; cf. Box 4.1.

[23] For a recent discussion of European labor market rigidities, see Chapter IV in the May 1999 *World Economic Outlook*, pp. 88–121.

[24]Erica L. Groshen and Mark E. Schweitzer, "Identifying Inflation's Grease and Sand Effects in the Labor Market," NBER Working Paper 6061 (June 1997). The results of this study rely on identifying the detrimental and beneficial effects of inflation in the wage formation process: inflation-induced deviations among employers' mean wage changes are interpreted as unintended distortions, while inflation-induced inter-occupational wage changes are interpreted as efficiency-enhancing relative wage adjustments. This identification strategy has, however, been questioned by several economists; see "Discussion Summary" in Martin Feldstein (ed.), *The Costs and Benefits of Price Stability* (Chicago and London: Chicago University Press, 1999), pp. 311–13.

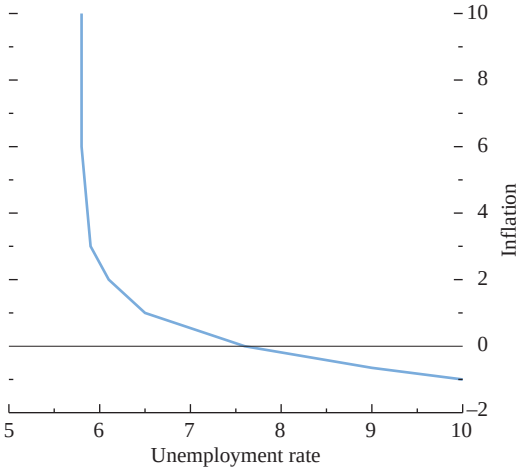
Box 4.1. The Effects of Downward Rigidity of Nominal Wages on (Un)employment: Selected Simulation Results

Annual inflation has averaged above 3 percent for all major industrial countries since 1950, and price stability seems to have come into reach only during the most recent years. It is therefore difficult to conclude from the empirical data pertaining to the postwar period how significantly labor market outcomes and output will be affected by downward nominal wage rigidity.[1] To gauge the potential importance of these effects, Akerlof et al. have constructed a stochastic general equilibrium model of the U.S. economy embodying downward rigidity of nominal wages, monopolistic competition among firms, and heterogeneous demand and supply shocks affecting individual firms.[2] The equilibrium level of real wages in the model is determined by a Nash bargaining process which produces a conventional "wage setting curve" relating the real wage to the rate of (un)employment, but in addition real wages of individual firms are subject to stochastic shocks. Profit-maximizing firms in the model respond to both demand and supply shocks by adjusting the prices they charge, wages they pay, and number of persons they employ.[3]

The model is simulated for a large number of alternative parameter combinations, all of which replicate three key characteristics of the U.S. labor market: the equilibrium rate of unemployment prevailing in the mid-1990s, the rate of job creation and destruction, and the standard deviation of changes in nominal wages.[4] As the shocks affecting the economy are heterogeneous, the resulting wage changes in the economy are heterogeneous as well. They are distributed around the average rate of (wage) increase, itself determined as the sum of average inflation and labor productivity increases. Without downward wage rigidity, firms' wage responses are symmetric, and other model characteristics will determine the model's unique equilibrium unemployment rate. Downward rigidity of nominal wages will act as a constraint on wage changes for some firms if the average rate of inflation is low enough so that the left hand tail of the hypothetical wage change distribution implies declining wages (Figure 4.1 in the main text). These model characteristics result in a nonlinear relation between the rates of unemployment and inflation in equilibrium. A large number of simulations with alternative parameter sets results in a mean increase in the equilibrium unemployment rate when the economy operates at 0 rather than 3 percent inflation by 2.1 percentage points.[5] The nonlinear Phillips curve generated from a representative parameter set by simulating the model for alternative equilibrium inflation rates is presented in the first figure.

Akerlof et al. also develop an inflation equation consistent with their general equilibrium model, which can be estimated from time series data. This equation equals the standard accelerationist Phillips curve, but in addition contains an additive term embodying the effects of downward nominal wage rigidity. This "wage rigidity term" reflects the number of firms inhibited to lower their nominal wages and the degree to which they are constrained[6]

Long-Run Phillips Curve with Downward Nominal Wage Rigidity[1]
(Percentage points)



[1]Results based on simulations by Akerlof, Dickens, and Perry, "The Macroeconomics of Low Inflation."

[1]Some observers have noted that average inflation rates were well below 3 percent in several major countries during the 1950s, with little apparent detrimental effects on labor market performance. This may be partly due to rapid productivity growth (and thus large average nominal wage increases) in the early postwar period.

[2]George A. Akerlof, William T. Dickens, and George L. Perry, "The Macroeconomics of Low Inflation."

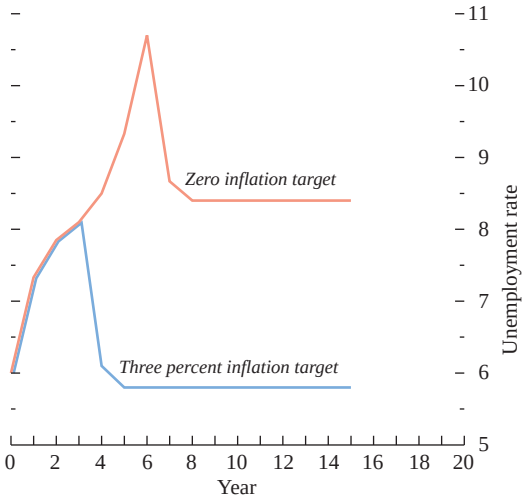
[3]Comparable studies are not available for other countries. While the quantitative results obtained for the United States presented here cannot be readily applied to other economies, the qualitative arguments may nevertheless be relevant for policymakers in other countries as well: reducing inflation to zero will entail not only a transitory cost, but also a permanent cost (reflected in an increase in equilibrium unemployment) if there is downward nominal wage rigidity.

[4]The equilibrium rate of unemployment (at rates of inflation of 3 percent and above) is fixed at 5.8 percent, corresponding to the consensus estimate in the mid-1990s. The standard deviation of nominal wage changes is set at 2.8 percent, corresponding to empirical estimates for the U.S. manufacturing sector. Finally, annual job creation is set at 11 percent of total employment, and that of job destruction slightly lower, following estimates by Steven J. Davis, John C. Haltiwanger, and Scott Schuh, *Job Creation and Job Destruction* (Cambridge, Massachusetts: MIT Press, 1996).

[5]An increase of 1 (5.7) percentage points delimits the 10th (90th) percentile of the distribution of simulated changes in the equilibrium unemployment rate.

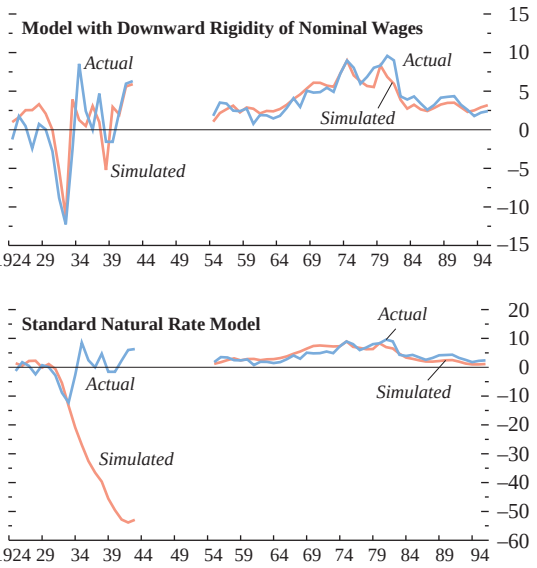
[6]The model allows for firms lowering nominal wages if they incur losses in two consecutive periods.

Alternative Stabilization Paths for Zero and 3 Percent Inflation Targets[1]
(Percentage points)



[1]Dynamic projections starting from 6 percent inflation, based on equation 5-2 of table 5 in Akerlof, Dickens, and Perry, "The Macroeconomics of Low Inflation."

Dynamic Simulations of Inflation, 1929–42 and 1954–95[1]
(Percentage points)



Source: Akerlof, Dickens and Perry, "The Macroeconomics of Low Inflation."
[1]Both models estimated using data for 1954–95 only.

and measures the distortions in unit labor costs introduced by downward nominal wage rigidity. Estimating this equation on data from 1954 to 1995 and using the resulting parameter estimates to simulate alternative stabilization paths serves to illustrate both the increase in the cost of adjustment and the permanently higher equilibrium unemployment rate entailed if policymakers—starting from an inflation rate of 6 percent—aim at zero rather than 3 percent steady state inflation under conditions of downward nominal wage rigidity (see second figure).

The ability of the "rigidity augmented" Phillips curve to replicate actual data does not differ greatly from the performance of conventional Phillips curve estimates within the estimation period (1954–95). This is because during that period average wage increases were large enough to make the rigidity constraint largely inoperative. However, in out-of-sample simulations covering the interwar depression years, the rigidity augmented Phillips curve replicates the actual inflation/unemployment experience quite closely, a test which standard models assuming a vertical long-run Phillips curve tend to fail (see third figure).[7]

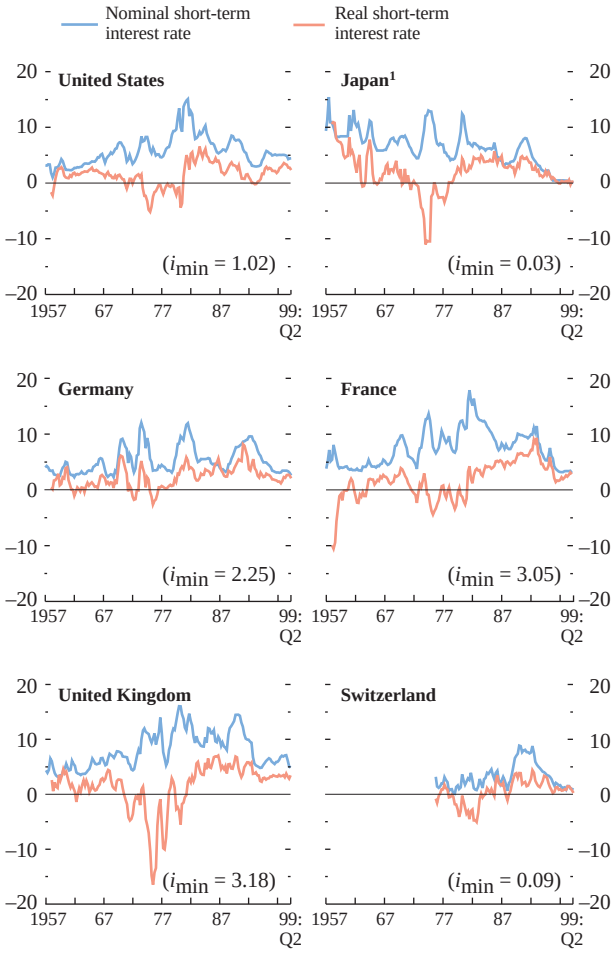
While the authors recognize that their simulation results are subject to considerable uncertainty, they nevertheless consider that these results provide sufficient evidence to strongly support the idea that the optimal inflation rate in the United States is a small (but positive) number. In particular they emphasize that a proper analysis of the optimal rate of inflation requires not only that the *transitory* costs of reducing inflation be compared with the *permanent* gains of reducing inflation to zero (by removing inflation distortions), but that the cost calculations need to take account of the *permanent* costs of downward nominal wage rigidity and the resulting increase in the equilibrium rate of unemployment at zero inflation. The authors also argue that this downward wage rigidity provides a useful safety net against deflationary spirals, and that policymakers—rather than aiming at eliminating this downward nominal wage rigidity—should accommodate it by choosing a proper (nonzero) inflation target.

[7]According to the standard model, the substantial labor market slack persisting during the depression should not only have brought inflation to zero (which it did), but also have induced accelerating deflation, which did not materialize: following an initial fall in the price level, inflation returned to above zero after 1933, despite a double digit unemployment rate.

Figure 4.3. Selected Countries: Short-Term Interest Rates

(Percent a year)

Nominal rates remained well above zero in all countries (except Japan and Switzerland) throughout the period, while real rates were negative only in periods of high inflation.



Source: IMF, *International Financial Statistics.* Short-term money market rate or, if unavailable, comparable lending rate.

Note: The notation i_{min} indicates the minimum quarterly nominal interest rate (in percent) since 1957.

[1]The real short-term interest rate excludes the effect of the April 1997 value-added tax (VAT) increase.

In a different context it has been argued that these effects are not negligible.[25] However, a comprehensive study of the net benefits (or costs) of low inflation, including all the separate effects studied in isolation, is still outstanding, explaining why the question of what constitutes the optimal rate of inflation remains controversial.

Zero Interest Rate Floors and the Effectiveness of Monetary Policy

Another argument as to why a small positive rate of inflation may be preferable to zero inflation as a policy target is that countercyclical monetary policy is constrained by the zero floor on nominal interest rates. An important stabilizing function of monetary policy is to reduce output gaps by helping to maintain aggregate demand close to potential output through variations in interest rates and other transmission mechanisms. The fact that nominal interest rates cannot fall below zero places a floor under real interest rates that may limit the extent to which monetary policy can support or stimulate aggregate demand.[26] The floor under real interest rates will be higher and more constraining the lower the rate of inflation. Thus real interest rates cannot become negative if the actual and expected rate of inflation is at or below zero.[27]

[25]For an estimate of welfare gains from more efficient cash management at zero inflation, see Alexander L. Wolman, "Staggered Price Setting and the Zero Bound on Nominal Interest Rates," *Economic Quarterly*, Federal Reserve Bank of Richmond, Vol. 84, No. 4 (Fall 1998), pp. 1–24. Extensive research on permanent welfare gains from reducing distortions in private saving/consumption decisions resulting from the interaction of taxation and inflation is referred to in Martin Feldstein, *The Costs and Benefits of Price Stability*. This volume contains estimates for the *permanent* level gains in GDP when inflation is reduced from 2 to zero percent, and compares these gains with *transitory* losses entailed by the shift to price stability for four countries (Germany, Spain, the United Kingdom, and the United States). The results reported imply large net gains for the U.S., Germany, and Japan, and a somewhat smaller net gain for the U.K. The analysis, however, does not address the issue of *permanent* losses due to downward rigidity of nominal wages when inflation is reduced to zero analyzed by Akerlof et al., nor does it take into account the constraints on monetary policy resulting from zero inflation.

[26]The zero floor to nominal interest rates is a consequence of the existence of government issued currency with a zero nominal interest rate and the fact that the non-pecuniary returns to currency exceed those of other financial assets. In principle the effective interest rate floor could be reduced below zero by taxing currency. See Willem H. Buiter and Nikolas Panigirtzoglou, "Liquidity Traps—How to Avoid Them and How to Escape Them" (unpublished; London: Bank of England, March 1999).

[27]Real interest rates are defined as the nominal interest rates minus the (expected) rate of inflation. In practice, *ex post* real interest rates are computed as the difference between observed nominal interest and inflation rates. This leaves open the question whether real interest rates can actually be negative if inflation is fully anticipated; while this seems possible for short-term (policy-determined) interest rates, it appears less plausible for long-term rates on which policy exerts only a limited influence.

How important a constraint on policy effectiveness is the zero interest rate floor? This will depend on a number of factors, importantly including the nature, frequency, severity, and duration of the shocks to which the economy is exposed, and which determine the need for offsetting policy action. To gather evidence on the likelihood of such events, it is informative to observe the incidence of negative real interest rates during past economic cycles. This information can be gleaned from Figure 4.3, which shows the level of policy-determined nominal and corresponding (*ex post*) real interest rates over the period from 1957 to the present for several major economies.

The data presented in Figure 4.3 show that real interest rates were negative in the majority of industrial countries both at the beginning and during the latter half of the 1970s, when policymakers in these countries were trying to overcome the slowdown induced by the first oil shock.[28] In contrast, real interest rates were abnormally high on average during the 1980s, when policy priorities had shifted to combating inflation. Beyond this common pattern, there are isolated episodes when real rates were close to zero in some countries (e.g., the United States in the early 1990s, and Switzerland in the late 1970s), but in general, short-term interest rates have tended to be well above zero and positive in real terms over the postwar period. The only noteworthy exception is Japan, which slid into a deepening recession during the 1990s, with nominal interest rates and inflation approaching zero.[29]

Empirical evidence preceding 1957 is scarce: it seems that the only period when the zero nominal interest rate floor may have been a constraint on monetary policy was during the depression. But many believe that it was self-inflicted policy errors in the form of restrictive monetary policy—documented in the contraction of the real money supply—which best characterize this episode, rather than a genuine liquidity trap.

Due to the limited experience with very low rates of inflation in the postwar period, and the dubious relevance of experience during those periods in which real short-term interest rates were actually negative, it is difficult to derive firm empirically based conclusions on how seriously the effectiveness of monetary policy is curtailed by the zero nominal interest rate constraint. Given the scarcity of relevant empirical episodes and data, it is useful and informative to analyze this question using counterfactual simulation analysis, and this has indeed been carried out with respect to the economies of the United States and Japan. Representative results of these simulations for the U.S. are presented in Box 4.2. Similar simulations for the Japanese economy are discussed in Box 4.1. of the October 1998 *World Economic Outlook*, where conditions leading to a downward deflationary spiral are also explored. If inflationary expectations are adaptive (backward looking) rather than rational (forward looking), the risk of initiating a deflationary spiral by a contractionary shock greatly increases, putting a heavy responsibility on policymakers to prevent such developments by a credible policy commitment to resisting deflation.

The effect of the zero interest rate floor on monetary policy effectiveness principally depends on the target rate of inflation and on the (equilibrium) real interest rate of the economy:

- The higher the target rate of inflation, the less likely it is that the zero interest rate floor will become binding. This is because a higher inflation target raises the nominal rate of interest and the actual inflation rate in steady state (or the average inflation and interest rates over the cycle), providing room for monetary policy to ease by lowering real rates, including to negative levels if deemed necessary.
- Similarly, the higher the steady state (or equilibrium) real interest rate, the lower the probability of the zero interest rate floor to become binding. This is because the steady state real interest rate will equal the nominal steady state interest rate at zero inflation, and the higher this rate, the more room remains for monetary policy to lower the nominal (and real) rate in pursuit of expansionary policies.[30]

Stochastic simulation exercises for the U.S. economy imply that a nominal rate of interest in steady state (and thus on average over the cycle) exceeding 3 percent will provide sufficient downward flexibility for monetary policy to avoid the zero interest rate floor, under the assumption of a "normal" size and distribution of shocks (as gauged by those experienced since the early 1980s) and "conventional" policy reaction functions (as implicit in the average size of policy responses to macroeconomic disequilibria over the same

[28]As discussed above, real rates of interest could reach such low negative levels only because of high rates of inflation. It has been argued that the easy monetary conditions implied by the negative real interest rates in the 1970s constituted a policy error, which entailed a steep rise in inflation. Arguably, a more appropriate response to the oil price shock would have been a policy geared towards preventing a rise in inflation expectations and supportive of rapid structural adjustment, rather than expansionary demand management. The cost of this error continued to be paid in the "stabilization" recession of the early 1980s, when the "Medium-Term Strategy" was formulated by industrial countries, signaling a shift in policy.

[29]More recently negative rates of inflation (and rapidly falling nominal interest rates) have been experienced in some other economies as well (e.g., Sweden, Australia, China, Hong Kong SAR), suggesting that the issues discussed here may become relevant for other countries as well.

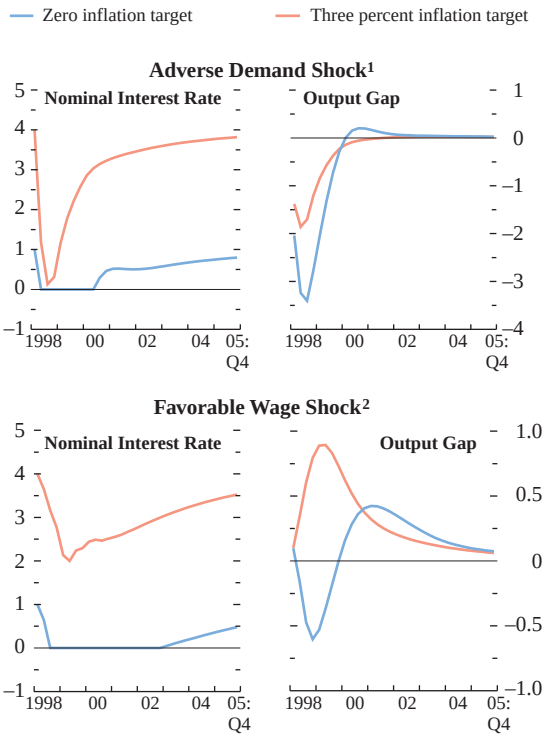
[30]The equilibrium real rate of interest is influenced by a large number of factors, including both technological and economic variables, as well as various parameters characterizing the behavior of economic agents. The most important among these factors are the growth of the labor force and rate of technical progress (summing to the "natural" rate of growth), and the propensity to save, determined by the (social) rate of time preference, the risk aversion of economic agents, the level of government debt, distortionary tax regimes, etc.

Box 4.2. The Effects of a Zero Floor for Nominal Interest Rates on Real Output: Selected Simulation Results

This box presents some selected results from recent studies of how the effectiveness of monetary policy can be affected by low target rates of inflation in conjunction with the inability of reducing nominal interest rates below zero. While the empirical research discussed is based on U.S. data, the qualitative lessons provided are applicable more generally. And given the compactness of the simulation model used, even for the United States the results should be considered illustrative rather than providing reliable quantitative estimates.[1]

The rational expectations models used for this analysis have a similar structure,[2] comprising equations for aggregate demand and a forward-looking wage-price determination mechanism. A policy-determined nominal short-term interest rate is set according to a monetary policy reaction function, responding to the output gap and the deviation of actual from targeted inflation, or—in the case of the FM study—the deviation of nominal GDP from its target level. The long-term real interest rate, which influences aggregate demand, is derived from a forward-looking (rational expectations) term structure equation adjusted for inflation expectations. Prices are determined as a markup on wages, and the latter are determined in an overlapping contract model, taking account of past wage contracts, expected future wage settlements, the rate of inflation (both past and anticipated), and the expected output gap over the duration of the contract. Both models concentrate exclusively on the interest rate transmission channel of monetary policy, thereby probably overestimating the importance of the zero interest rate floor (see main text for a discussion of this point).

Effects of a Zero Nominal Interest Floor Under Alternative Inflation Targets



Source: See Athanasios Orphanides and Volker Wieland, "Price Stability and Monetary Policy Effectiveness When Nominal Interest Rates are Bounded at Zero," Finance and Economics Discussion Series, No. 1998-35 (Washington: Board of Governors of the Federal Reserves System, 1998).

[1]The shock consists of a temporary (one quarter) reduction in gross fixed investment equivalent to 1 percent of GDP.

[2]The shock consists of a temporary (two quarters) reduction in nominal wage growth by 0.25 percentage points.

[1]Two key references are Jeffrey C. Fuhrer and Brian F. Madigan, "Monetary Policy When Interest Rates Are Bounded at Zero," *The Review of Economics and Statistics*, 1997, pp. 573–85 (hereafter referred to as FM), and Athanasios Orphanides and Volker Wieland, "Price Stability and Monetary Policy Effectiveness When Nominal Interest Rates Are Bounded at Zero," Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series 1998-35 (Washington: Federal Reserve Board; hereafter referred to as OW).

[2]Despite the similar structure of the models used, the two studies referenced in the preceding footnote come to quantitatively different conclusions concerning the seriousness of the zero nominal interest rate constraint. The difference can be traced to different assumptions about the underlying equilibrium real interest rate in the two models: it equals 1 percent in the OW model, but exceeds 2 percent in the FM model; see discussion below.

period).[31] This "safe" equilibrium nominal interest rate can be secured by either having a sufficiently high real interest rate in steady state (e.g., by pushing up the natural rate of growth), or by picking a sufficiently high target inflation rate, so that the sum of the two exceeds

[31]Athanasios Orphanides and Volker Wieland, "Price Stability and Monetary Policy Effectiveness when Nominal Interest Rates are Bounded at Zero," Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series 1998–35, (Washington: Federal Reserve Board). Obviously this does not exclude the possibility that a much larger contractionary shock than those experienced since the early 1980s might render the constraint effective. On the other hand, to the extent that policy responses tend to be more cautious the less certain policymakers are about the nature of the underlying shock to be offset, or about the ultimate effect of changes in policy instruments, increased uncertainty in these areas tends to reduce the probability that the constraint becomes binding, but raises the risk that policy reactions are too timid.

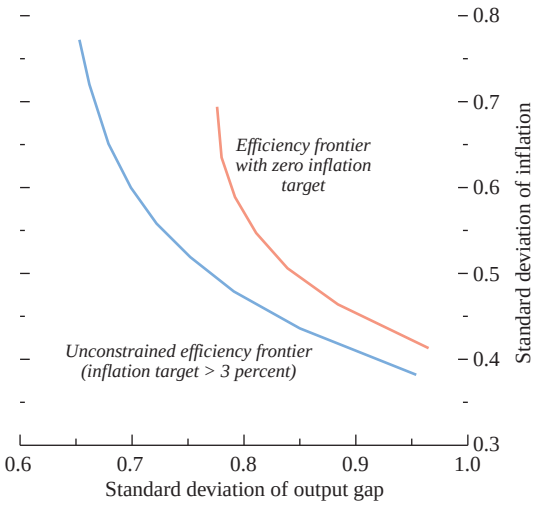
The first figure depicts two representative simulation results from the OW study, showing how the zero nominal interest rate floor becomes a binding constraint on expansionary monetary policy when policymakers target a zero inflation rate in case of an adverse demand shock (top panels of the figure) and in the case of a beneficial wage shock (bottom panels). In response to the adverse demand shock at the low target (and thus steady state) inflation rate, monetary authorities cannot lower the policy rate by as much as indicated by the policy reaction function because the policy rate attains its zero floor (panel 1). This in turn prevents the real long-term rate from falling as much as implied by a "normal" (i.e., unconstrained) policy response. Consequently, monetary policy is unable to provide the desired demand stimulation, resulting in a larger temporary decline in inflation and output than desired (panel 2). It is interesting to note that the zero interest rate constraint inflicts the largest losses in output (relative to the unconstrained case) not in case of a negative demand shock, but in case of a beneficial wage shock (e.g., an autonomous decline in wages). In this case inflation would fall and monetary policy could be eased to reap some of the benefits of the positive supply shock in the form of increased output. But the zero interest rate floor prevents monetary policy from easing sufficiently (panel 3): real long term rates will rise rather than fall, causing demand and thus output to decline rather than increase (panel 4).

More generally, the zero interest rate floor will hamper monetary policy from pursuing its stabilization objectives whenever the economy experiences shocks for which the central bank would aim at a real interest rate sufficiently low so as to require a nominal rate lower than zero. As a result, the variability of the arguments in the objective function—typically some measure of output and inflation—will increase. This implies a deterioration in the policy efficiency frontier, characterized by the trade-off between the standard deviations of the output gap and inflation, respectively, subject to a maximum variability of the instrument variable (the policy-determined short-term interest rate). These relationships are summarized in the second figure, which depicts the deterioration in the efficiency frontier when a zero rate of inflation is targeted.

The authors use stochastic simulations to gauge the impact of the zero inflation target on the level of output, subjecting the model to a large number of shocks modeled to have the same characteristics on average as those actually experienced since 1980. The result is that on average output is reduced by 0.1 percent when the inflation target is reduced from 2 percent (or higher) to zero percent. These output losses fall well short of those implied by the simulations embodying downward rigidity of nominal wages discussed in Box 4.1. Of course larger shocks than those experienced on average since 1980 would entail larger output losses, while incorporating other transmission mechanisms than the interest rate channel would tend to reduce average losses.

Policy Efficiency Frontier Under Alternative Inflation Targets[1]

(Percentage points)



Source: See Orphanides and Wieland, "Price Stability and Monetary Policy Effectiveness."

[1]Based on a constant standard deviation of the instrument variable (the federal funds rate), computed from a Henderson-McKibbin policy reaction function with coefficients of 2 and 1 for the output gap and inflation gap, respectively.

3 percent. Since rapid steady-state (or equilibrium) growth tends to raise the equilibrium real rate of interest, it also facilitates the pursuit of lower inflation by making it less risky in terms of the probability of hitting the zero nominal interest rate constraint.

Problems related to the inability of monetary authorities to reduce the nominal rate of interest below zero have been discussed widely in the literature under the heading of the "liquidity trap." This discussion has given rise to claims that in such a situation monetary policy is ineffective as a stabilization tool. However, modern monetary theory has added some important caveats to the liquidity trap hypothesis. In particular, the liquidity trap does not prevent monetary authorities from increasing the supply of base money through open market operations in government debt, foreign exchange, or even private securities. If the resulting increase in liquidity can raise private domestic expen-

diture or net exports (via changes in the exchange rate) independently of changes in the nominal interest rate, the liquidity trap will only reduce the effectiveness of monetary policy by paralyzing the interest rate transmission mechanism, while leaving other transmission mechanisms unaffected.

Prominent monetarists have challenged the key policy implication of the liquidity trap, i.e. that monetary policy will be rendered ineffective if there is an effective floor to the nominal interest rate.[32] The key argument is that implicitly the liquidity trap framework ignores many of the complicated and diverse transmission mechanisms set in train when the central bank changes the monetary base, thus causing a disequilibrium in the portfolios of private agents containing a large number of different financial and real assets. Changes in the composition of these portfolios in reaction to an increase in real money supply continue to affect aggregate demand even if the nominal interest rate has a binding floor.[33] A similar—though less general—line of reasoning underlies more recent arguments for a separate "credit channel" of the monetary policy transmission mechanism. This analysis emphasizes the special role of the banking sector and the impact of imperfect and costly information on the availability of bank credit and how it can be affected by changes in free bank reserves.[34] Like the monetarist critique, the "credit channel" implies that expanding the base money supply will induce an increase in aggregate spending apart from the narrow interest rate transmission channel.

These arguments appear to be supported by empirical studies that show a statistically significant impact of real money balances on major demand components as well as on aggregate output, independent of (and in addition to) the explanatory power of the real interest rate.[35] The policy implication of the monetarist critique of the liquidity trap concept is that even when the short-term interest rate has been driven down to zero, monetary policy can still effectively stimulate aggregate demand by further increasing the monetary base, in particular by including a wider range of assets among those eligible for open-market purchases by the central bank.[36] However, the monetarist contention of the practical irrelevance of the liquidity trap concept due to alternative transmission mechanisms is looking increasingly implausible in Japan, where despite an increase in real base money supply by over 42 percent since 1992, real output has risen by less than 1 percent per year on average, entailing a widening output gap. The Japanese experience strongly suggests that expanding the monetary base is not a sufficient condition to raise aggregate demand under *all* circumstances and within the relevant policy horizon, giving rise to the question of the potential role of fiscal policy.

The conventional Keynesian prescription to escape the liquidity trap is the use of expansionary fiscal policy, in particular an increase in public consumption and/or investment expenditures, which—unlike the indirect incentive effects of monetary policy—can raise aggregate demand directly. However, since the early 1980s the use of fiscal demand management policies has been severely constrained in most countries by the need to contain and correct accumulated deficits and debt, resulting from the earlier asymmetry in fiscal policy conduct, which in turn points to the shortcoming arising from how fiscal demand management has tended to interact with the political decision making process. Governments tended to be eager to raise expenditure and cut taxes in a recession, but reluctant to cut spending or raise taxes during a boom, which lead to an inflation bias in fiscal policy and an upward ratcheting of public expenditures and debt in relation to GDP. However, even if fiscal policy could be applied symmetrically, resulting in a zero contribution to the debt level over a complete cycle, it would still be diffi-

[32]The existence of a liquidity trap is inconsistent with the quantity theory of money (or—equivalently—a stable money demand function with a finite interest elasticity) and has been rejected by leading monetarists. It is interesting to note that Keynes himself considered an infinitely interest-elastic money demand a theoretical curiosity of little practical relevance. In the original Keynesian framework *(The General Theory)*, the ineffectiveness of monetary policy was linked to a low and unstable interest elasticity of aggregate demand (business investment in particular), rather than to an infinitely interest-elastic demand for money, labeled the "liquidity trap" by Keynes and his followers; see Karl Brunner and Allan Meltzer, "Liquidity Traps for Money, Bank Credit and Interest Rates," *Journal of Political Economy*, January–February 1968, pp. 1–38.

[33]An implication is that an assumption of a transmission mechanism that works exclusively through changes in a single interest rate (for example, the federal funds rate), as incorporated in many macro-models, is much too restrictive, ignoring adjustments among a large array of other assets in private portfolios. Only if *all* these assets are perfect substitutes—which is highly unlikely given their diversity—will a further increase in base money at zero short-term interest rates be ineffective.

[34]For a concise exposition of the argument and a survey of the relevant literature, see Chapter 7 ("The Credit Channel of Monetary Policy") in Carl E. Walsh, *Monetary Theory and Policy* (Cambridge, Massachusetts: MIT Press, 1998). Another useful overview of the credit channel in the transmission of monetary policy can be found in Ben S. Bernanke and Mark Gertler, "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives*, Vol. 9 (1995), pp. 27–48.

[35]Evan F. Koenig, "Real Money Balances and the Timing of Consumption," *Quarterly Journal of Economics* (May 1990), pp. 399–425, and Allan Meltzer, "The Transmission Process," manuscript, available at: http://www.gsia.cmu.edu/afs/andrew/gsia/meltzer. While both these studies are based on U.S. data, Meltzer also reports similar results obtained for Germany. In contrast, IMF research by Tamim Bayoumi and James Morsink on Japan fails to detect any independent impact on aggregate demand from changes in the monetary base when controlling for the impact of changes in interest rates.

[36]A detailed discussion of possible central bank actions to affect aggregate spending when the policy interest rate is at its zero floor, and their likely effectiveness and shortcomings can be found in Karen Johnson, David Small, and Ralph Tryon, "Monetary Policy and Price Stability," forthcoming in the *Proceedings of a Conference on Possibilities and Limitations of Monetary Policy*, held on June 10–11, 1999 at the Austrian National Bank in Vienna.

cult to get the timing right for it to be stabilizing rather than destabilizing because of various lags affecting budgetary decision making and policy implementation. Nevertheless, in situations where monetary stimulation fails to prevent massive shortfalls of demand from output capacity, the question of timing loses importance and fiscal stimulus can become appropriate, as suggested by recent developments in Japan.

Some doubts concerning the effectiveness and suitability of fiscal policy for demand management have been related to the possibility of (partly) offsetting variations in private saving behavior ("Ricardian equivalence") and private investment spending ("crowding out"), [37] and to the efficiency arguments for a stable, non-distortionary tax system that is not subject to frequent changes for the sake of macroeconomic stabilization. Use of discretionary fiscal policy for demand management purposes should therefore be restricted to exceptional cases,[38] while the predominant concerns of fiscal policy should be the efficient allocation of resources and justified income distribution objectives. This still leaves an important role for fiscal policy in cyclical stabilization through the operation of built-in stabilizers, to which most of the above criticisms concerning discretionary fiscal policy do not apply.

Deflation Concerns

In the last year or two, with inflation approaching zero in some countries and price levels declining in others (Box 4.3), a concern has been expressed by some that countries may become caught in a deflationary spiral from which it is difficult to escape. Clearly, once reasonable price stability is achieved there is an increased likelihood that a downturn in economic activity could result in deflation. And if price stability were to be maintained over the long run, cyclical episodes of price declines would presumably not be uncommon. One difficulty in assessing the consequences of deflation today is that until recently there have been no significant episodes of deflation in the post-World War II period.

Concerns about deflation are deeply colored by the experience of the interwar Great Depression, when sharp drops in prices were associated with financial crisis, corporate bankruptcies, and the collapse of production. Episodes of mild deflation have been much less disruptive for real economic activity. Prior to World War I, periods of declining prices were quite frequent, but economies nonetheless expanded during these periods, albeit at lower rates than during periods of rising prices (Table 4.2).[39]

In considering the implications of declining prices, it is crucial to distinguish between various potential sources of deflation. If the deflation is the result of a severe contraction in demand and, as may be the case, the deflation further feeds the contraction in demand and real activity in a downward spiral of shrinking demand, falling prices, weakening confidence, and financial distress, the deflation can be very costly. If, on the other hand, the deflation is the result of competitive pricing in a robust economy, in a period when productivity is rising rapidly and there are abundant investment opportunities, as was the case in earlier periods of persistent mild deflation, then there may be less cause for concern, provided the deflation has no independent influence on real economic activity. (For example, declining prices in the computer industry have clearly not been an impediment to investment in the sector, while their price declines have been generally beneficial to the rest of the economy.) The above qualification is crucial, however, since widespread deflation is harmful to business. The business sector as a whole stands to lose by a fall in prices since it is necessarily long in real assets and short in nominal assets.[40] Thus, fear of falling prices may induce businesses to curtail their activity. More generally, deflation shrinks the value of collateral in relation to nominal debt and diminishes the capacity of debtors to service their debt. It is the disruption to the network of credit intermediation that makes deflation particularly worrisome. Furthermore, as stated above, to escape recession real interest rates may need to be negative, but this cannot be achieved when prices are falling.

Industrial countries today are less likely to experience falling prices than in the past. One reason, as noted

[37]Of course, fiscal expansion will not "crowd out" private expenditures through interest rate effects in the case of a liquidity trap.

[38]As noted, a decisive advantage of public consumption and investment expenditure over monetary policy is that the former does not rely on indirect incentive effects but can raise aggregate demand directly. It may therefore be necessary to resort to fiscal demand management if monetary policy should indeed turn out to be ineffective in stimulating demand. The current situation in Japan seems to be a case in point, though the high debt/GDP ratio already attained and its projected further increase may limit the credibility and thus the effectiveness of further fiscal stimulus. A good part of the policy debate between "monetarists" and "Keynesians" is about how likely it is for monetary policy ever to be ineffective, and how effective expansionary fiscal policy will be when expansionary monetary policy has proved ineffective.

[39]The United States in the last quarter of the 19th century provides a good example of an economy that was able to grow rapidly in an environment of sustained moderate price declines. Between 1875 and 1900, a period during which the United States industrialized rapidly, prices fell on average by 1 percent per year, while real output grew at an average annual rate of a little over 4 percent—see James Bullard, "Deflation and Economic Growth," The Federal Reserve Bank of St. Louis, *National Economic Trends*, March 1998, p. 1. It should be noted, however, that periods during which prices were declining faster than trend were periods during which industrial production was declining as well. It should also be recalled that this was a period of considerable macroeconomic turbulence, with large fluctuations in prices and output around their trends. For instance, the period from 1890 to 1897, dubbed the "disturbed years" by Friedman and Schwartz, witnessed three recessions.

[40]This point was emphasized by John Maynard Keynes, *A Tract on Monetary Reform* (London: Macmillan, 1924).

Table 4.2. Deflation and Output Growth

(Average annual percentage growth)

	Deflation Periods[1]		Nondeflation Periods		Memorandum:
	Prices	Output	Prices	Output	Years of Deflation
			1882–1913		
United States	–3.7	–1.2	1.4	4.4	5
Japan[2]	–3.7	1.8	4.4	2.7	4
Germany	–2.0	4.0	1.8	2.6	8
France	–1.1	2.1	0.2	1.6	2
Italy	–1.2	1.3	1.4	2.2	14
United Kingdom	–3.0	1.4	1.0	1.9	8
Canada	–4.7	1.1	1.1	4.6	3
Belgium	–4.2	1.6	1.5	2.1	8
Sweden	–2.8	2.0	2.2	3.3	12
Denmark	–3.5	2.8	1.8	3.0	10
Average	*–3.0*	*1.7*	*1.7*	*2.8*	*7*
			1923–39		
United States	–4.2	–3.8	1.8	7.3	8
Japan[3]	–6.7	0.9	5.7	6.6	8
Germany	–6.4	–2.2	1.6	7.1	4
France	–5.8	–1.9	10.2	3.7	5
Italy	5.4	1.1	6.1	3.4	8
United Kingdom	–3.1	0.6	1.9	4.1	9
Canada	–6.2	–8.6	0.6	6.6	4
Belgium	–5.6	–1.1	8.7	2.6	5
Sweden	–3.0	2.7	1.5	4.2	8
Denmark	–5.0	2.3	3.0	3.5	7
Average	*–5.1*	*–1.0*	*4.1*	*4.9*	*7*
			Of which: 1923–39 excluding 1930–33		
United States	–1.6	1.1	1.8	7.3	4
Japan[4]	–4.2	0.5	6.3	7.9	6
Germany	-	-	1.6	7.1	0
France	–6.1	–1.8	11.1	4.4	2
Italy	–5.5	3.1	6.1	3.4	4
United Kingdom	–2.3	1.8	1.9	4.1	4
Canada	-	-	0.6	6.6	0
Belgium	–3.8	1.3	9.6	2.7	2
Sweden	–3.3	5.9	1.5	4.2	4
Denmark	–5.8	3.0	2.9	3.5	4
Average	*–4.1*	*1.9*	*4.4*	*5.1*	*4*

Source: Bank for International Settlements, 69th *Annual Report*, 1999.
[1]Deflation defined as at least two consecutive years of price decreases.
[2]1885–1913.
[3]1926–38.
[4]1926–29 and 1934–38.

above, is that resistance to nominal wage declines may help to prevent prices from falling, particularly in the relatively low (and more stable) productivity growth service sectors that now account for much of these economies.[41] Thus, a contraction in demand is likely to induce a smaller decline in inflation (and a correspondingly larger decline in output) when inflation is low than when inflation is high.[42] It would take a severe economic downturn to induce firms to cut wages (and prices) on a wide scale. Japan has been experiencing such a severe economic downturn and firms have indeed cut wages on a wide scale—over the past year, employment compensation has fallen by 3 percent.[43]

Another reason is that monetary policy now does not face the constraints faced by policy in the often referred to earlier episodes of deflation when countries were on the gold standard (since the supply of fiat money is completely policy determined). Moreover, in

[41]Deflation in commodity prices, arising, say, from a slump in world demand, can of course have severe adverse macroeconomic effects in undiversified, commodity-exporting countries.

[42]U.S. experience supports this conjecture—see George L. Perry, "Is Deflation the Worry?" Brookings Institution, Policy Brief 41 (Washington, December 1998).

[43]As discussed above, the protection against deflation provided by the institutional structure of labor markets may come at the cost of substantially higher unemployment as the inflation rate approaches zero (see Box 4.1).

the past couple of years, as the threat of inflation has ebbed in many countries and the specter of deflation surfaced, there has been a growing recognition that price stability should be pursued in a more balanced way: monetary policy can be too tight as well as too loose.[44] Unlike in the 1980s and the first half of the 1990s, when the quest for price stability usually meant the adoption of monetary policies aimed at reducing inflation to lower levels, in the past few years the maintenance of price stability has generally called for the adoption of symmetrical policy responses to deviations of inflation from its target or desired rate. Thus, in situations where inflation developments call for a monetary policy response, policy should respond as forcefully when inflation is below target as when it is above target, since deflation is to be as much avoided as inflation.[45] Indeed, some have argued that at price stability an asymmetric policy response should be favored in which monetary policy would respond more forcefully (and in a more timely way) to inflation below than above target.[46] The reason is that monetary policy can always suppress aggregate demand and reduce inflation by raising interest rates sufficiently; but monetary policy's capacity to stimulate aggregate demand—and, therefore, fight deflation—is limited if confidence is very depressed or once short-term nominal interest rates have been lowered close to zero, as Japan's experience in recent years suggests.[47]

For these and other reasons, including the role of stabilization policy, and, more generally, differences in the monetary order, the pre-World War I experience with deflation is not entirely relevant to present-day economies.[48] This does not mean that deflation is not possible, especially when it is considered that it can take different forms, some less problematic than others. Clearly, reductions in prices in particular industries associated with rapid advances in technology and productivity are not problematic. Nor are gradual declines in the general price level associated with broad-based or economy-wide positive supply shocks—since these are likely to be temporary and should not have an adverse effect on investor sentiment. More likely and prevalent today than declines in the general price level in product markets is deflation in asset prices—particularly the prices of corporate stock and real estate. While price declines limited to equities and real estate may not be as damaging as widespread price deflation, they can be very disruptive and costly, especially if the earlier run-ups in these asset prices have been leveraged through credit expansion and give rise to banking sector problems, as Japan's experience has once again shown.[49] (Issues related to asset price inflation are discussed further below.)

Price Stability and Macroeconomic Stability

The continued strong growth of the U.S. economy, the indications of a strengthening of growth in Europe and of a possible pickup in Japan, and the clear signs of recovery in the crisis-afflicted emerging market economies have diminished the concerns about global recession and deflation that were expressed at the height of the financial market turbulence in late 1998 and early this year. Unease about deflation in some countries, particularly China and Japan, remains, but apprehension about a more generalized deflation has abated. Increasingly, the focus has shifted to concerns about developments in asset prices, in particular the U.S. stock market, which many indicators suggest has become overvalued, posing the risk of a sharp correction. The disquiet is that macroeconomic policy, especially monetary policy, may have been too expansionary, with a number of fortuitous and temporary factors, including declining commodity prices and an appreciation of the U.S. dollar, having contributed to keep general product price inflation low even as the overly accommodating policy has fueled a stock market boom.

Recently, therefore, the issue facing policymakers has been: Does maintaining stability of the prices of currently produced goods and services suffice to

[44]See William R. White, "Evolving International Financial Markets: Some Implications for Central Banks," Bank for International Settlements, BIS Working Paper No. 66 (Basel, April 1999).

[45]In response to supply shocks, both negative and positive, inflation is usually allowed to deviate flexibly from target. The need for such flexibility is the reason why in countries with explicit inflation targets, for instance, the price index on which the inflation target is based often excludes the effects of "supply shocks" associated with changes in food and energy prices, indirect taxes, terms-of-trade shocks, and the direct effect of interest rate changes on the price index.

[46]See "The Global Economic Outlook and Challenges Facing Monetary Policy around the World," remarks by Governor Laurence H. Meyer before the World Economic Forum, U.S.A. Regional Meeting, U.S. Chamber of Commerce's National Chamber Foundation, Washington, D.C., April 14, 1999. Paul Krugman, "Deflationary Spirals," February 25, 1999, http://web.mit.edu/krugman/www/spiral.html, presents a simple model in which in the presence of a substantial output gap an incipient deflation can turn into a deflationary spiral if the central bank fails to implement an expansionary monetary policy quickly and vigorously.

[47]This does not mean that monetary policy becomes completely ineffective; there are other channels than short-term interest rates through which monetary policy can affect the real economy—see Karen Johnson, et al., "Monetary Policy and Price Stability."

[48]The "monetary order" refers to the broad set of arrangements encompassing the exchange rate regime and the monetary policy framework and the way these influence private sector expectations and behavior. It includes the goal of monetary policy, the powers of the authorities charged with achieving that goal, and private agents' perceptions of the conduct of policy and how these influence their expectations and actions—see David Laidler, "The Exchange Rate Regime and Canada's Monetary Order," Bank of Canada Working Paper 99-7 (Ottawa, March 1999).

[49]On Japan's experience see Tamim Bayoumi, "The Morning After: Explaining the Slowdown in Japanese Growth in the 1990s," Working Paper 99/13 (Washington: IMF, January 1999).

Box 4.3. Recent Episodes of Negative Inflation

A number of countries have experienced declines in economy-wide price indices in recent years (see the first table). For "headline" consumer prices and GDP deflators, in general, these declines have been short-lived or small (sometimes reflecting seasonal factors, particularly for developing countries), except for countries with substantial oil and other commodity exports or countries that have had civil conflicts.[1] In addition, episodes of declining consumer and total output prices have been no more frequent in the 1990s than in previous decades, other than the 1970s when average inflation rates were relatively high, although producer and wholesale prices have declined more frequently in this decade, perhaps reflecting relatively greater downward price pressures on tradable goods (see the second table). There is some indication, however, that the frequency of price declines has increased, particularly for industrial countries, since 1997.

[1]The consumer price indices referred to in this box include volatile components such as food, energy, and direct interest rate costs. Because these "headline" indices can give misleading signals, monetary authorities that target inflation often focus on consumer price indices that exclude volatile components. For example, in Australia, consumer price inflation, excluding these volatile components, was positive not negative between the first and third quarters of 1997 (see first table).

Selected Countries: Recent Episodes of Declining Prices[1]

(Annual average data unless otherwise stated)

Country	Price Index	Period[2]	Price Change[3] (percent)	Memorandum: 1999 Consumer Price Inflation[4] (percent)
Algeria	GDP deflator	1997–98	–2.8	5.3
Argentina	CPI (monthly)	8/98–6/99	–1.7	–0.8
Armenia	CPI (monthly)	3/98–9/98	–12.7	2.7
Australia	CPI (quarterly)	Q1/97–Q3/97	–0.7	1.8
Azerbaijan	GDP deflator	1997–98	–5.7	–5.5
Bahrain	GDP deflator	1997–98	–5.4	1.0
Barbados	CPI (monthly)	9/97–4/99	–3.9	2.5
Belize	CPI	1997–98	–0.9	2.0
Brazil	CPI (monthly)	6/98–11/98	–1.0	4.6
Brunei Darussalam	GDP deflator	1997–98	–0.2	1.0
Bulgaria	CPI (monthly)	5/98–6/99	–5.1	–1.5
Cameroon	CPI (monthly)	5/97–1/98	–6.8	2.0
Canada	GDP deflator	1997–98	–0.6	1.5
Central African Republic	CPI	1997–98	–1.9	2.4
China	CPI	1997–98	–0.8	–1.5
Congo, Dem. Rep. of	CPI (monthly)	4/97–12/97	–30.4	40.0
Congo, Republic of	GDP deflator	1997–98	–16.9	7.4
Eritrea	GDP deflator	1997–98	–0.9	5.5
Ethiopia	CPI	1995–97	–8.6	3.6
Gabon	GDP deflator	1997–98	–15.1	2.0
Hong Kong SAR	CPI (monthly)[5]	5/98–6/99	–4.3	–3.1
Israel	CPI (monthly)	12/98–3/99	–1.4	5.5
Japan	CPI (monthly)	10/97–2/99	–1.2	–0.4
Kuwait	GDP deflator	1996–98	–14.1	0.9
Macedonia, FYR	CPI (monthly)	2/98–1/99	–3.5	2.0
Maldives	CPI	1997–98	–1.4	2.3
Mali	CPI	1996–97	–0.4	2.5
New Zealand	CPI (quarterly)	Q3/98–Q1/99	–1.1	1.3
Niger	CPI (monthly)	8/98–2/99	–7.2	3.0
Nigeria	GDP deflator	1997–98	–6.4	12.5
Norway	GDP deflator	1997–98	–0.4	2.3
Oman	GDP deflator	1996–98	–15.2	–0.3
Qatar	GDP deflator	1996–97	–9.7	2.6
Rwanda	CPI (monthly)	12/97–5/99	–6.9	–0.5

maintain macroeconomic stability more broadly? There are several aspects to this.

One is that reasonable price stability—that is, a low rate of change of the aggregate price level—is an essential element of macroeconomic stability. The distortionary and harmful effects of inflation are well known. By distorting relative price signals, increasing uncertainty about future prices, and generally reducing

(concluded)

Country	Price Index	Period[2]	Price Change[3] (percent)	Memorandum: 1999 Consumer Price Inflation[4] (percent)
Saudi Arabia	GDP deflator	1997–98	–13.4	1.5
Senegal	CPI (monthly)	9/98–5/99	–2.9	2.0
Singapore	CPI (monthly)	11/97–10/98	–1.7	0.2
Sweden	CPI (monthly)	9/97–12/98	–1.4	0.2
Syrian Arab Republic	CPI	1997–98	–1.2	2.5
Thailand	CPI (monthly)	8/98–6/99	–1.6	0.5
Uganda	CPI (monthly)	1/98–7/98	–6.3	5.0

Source: CPI (consumer price index) from IMF, *International Financial Statistics*, or IMF staff estimates and GDP deflator from WEO database.

[1]During 1996–99.

[2]Starting and ending periods of price index decline in years, quarters, or months according to data availability.

[3]Price change is calculated as the percent change of the price index (second column of this table) between the first date and the last date of the period (third column) and reflects the period yielding the maximum decrease in the price index.

[4]IMF staff projections for annual consumer price inflation.

[5]Composite consumer price index.

Frequency of Episodes With Negative Inflation[1]

(Percent of observations with year-on-year price declines)

	1960–69	1970–79	1980–89	1990–99	1997–99
Annual data					
CPI					
All countries	8.4	1.9	4.2	4.0	4.0
Industrial countries	0.9	0.0	1.3	1.0	2.2
Nonindustrial countries	11.9	2.4	4.8	4.6	4.4
GDP deflator					
All countries	14.6	9.4	10.8	5.9	7.3
Industrial countries	0.7	0.0	2.3	5.1	6.8
Nonindustrial countries	16.6	10.7	12.0	6.0	7.3
PPI/WPI					
All countries	12.9	3.8	9.8	13.9	25.8
Industrial countries	11.9	3.1	13.9	26.5	40.5
Nonindustrial countries	13.6	4.2	7.7	8.0	18.9
Monthly data					
CPI					
All countries	12.2	3.2	5.7	5.5	7.1
Industrial countries	1.5	0.0	2.0	1.9	3.8
Nonindustrial countries	16.8	4.1	6.6	6.2	7.7
PPI/WPI					
All countries	15.3	4.7	10.0	16.6	25.0
Industrial countries	12.1	4.3	15.1	29.2	41.8
Nonindustrial countries	17.7	5.0	6.5	9.8	17.3

Source: CPI (consumer price index) and PPI/WPI (producer or wholesale price index) from IMF, *International Financial Statistics*, and GDP deflator from WEO database.

[1]Observations (country-periods) when year-on-year inflation was negative as a percent of all available observations. For example, for the first (upper-left) cell in the table, there were 67 instances where countries had negative CPI inflation in a given year during 1960–69 out of 796 available observations (country-years).

the information content of the price system, inflation distorts the allocation of resources and adversely affects economic efficiency and growth. High inflation tends to be associated with increased variability of—and hence increased uncertainty about—the aggregate price level *and* relative prices, which has a negative effect on output. Countries that, on average, over the past four decades have had higher rates of inflation

have tended to have more variable rates of inflation. And countries with more volatile inflation have tended to have more volatile output growth.[50]

Perhaps most illustrative of the relationship between inflation and macroeconomic instability is the fact that run-ups in inflation have usually been followed by recessions as monetary policy was tightened to bring inflation under control. Moreover, in some countries with pegged exchange rates, higher rates of inflation than in the anchor country have resulted in real exchange rate overvaluations, a loss of international competitiveness, and balance of payments crises. The ensuing currency devaluations have in some cases further resulted in debt crises and financial sector distress. This suggests that by keeping inflation low and stable, policymakers can make recessions less frequent, shallower, and shorter, and thereby enhance macroeconomic stability.[51] They can also avoid the excessive expansion of credit and overheating that often precedes currency and banking crises.[52]

International evidence on the magnitude of output fluctuations is difficult to interpret because historically there have been only a small number of business cycles.[53] Thus, to obtain a meaningful sample size the data must span many decades, which introduces the further complication of poorer quality data or the unavailability of data in the more distant past. With this caveat in mind, it appears that cyclical variations in output have tended to moderate in the postwar period compared to the prewar period. (The interwar period (1914–45), during which output and other macroeconomic variables were exceptionally volatile, is usually considered a special case.) This has often been attributed to stabilization policy having become more effective in the postwar period. An additional explanation is that as economies have become increasingly integrated internationally, they have become less susceptible to the influence of developments in any one country—the international business cycle has been diversified.[54] Structural changes in the economy—for instance, the rise of the service sector and the public sector, which are less cyclical than agriculture and manufacturing—and differences in the incidence and magnitude of exogenous shocks may also have played a role.

The behavior of prices does differ markedly between the post-World War II and the pre-World War I periods in some important respects. In most countries, price levels changed very little, on average, during the prewar period (the 50 years or so before 1914), but rose persistently after World War II.[55] But while mean inflation was considerably lower in the prewar period than in the postwar period, it was not more stable: the standard deviations of inflation rates in the two periods are comparable, on balance. The behavior of inflation rates in the two periods further differ in two other respects: one, inflation rates have become more persistent in the postwar period, reflecting perhaps changes in economic structure and in the policy environment, which have created the general expectation that government policies will oppose large price movements; and two, price fluctuations have changed from being procyclical to countercyclical—that is, from a positive to a negative correlation between price level and output fluctuations, possibly reflecting a shift to non-accommodation of price movements by the monetary authorities in the postwar period.[56]

When the postwar period alone is considered, there is no evidence that for industrial countries as a group cyclical fluctuations in output have moderated over time (Figure 4.4): the experience across countries has been too mixed to allow firm conclusions to be drawn. While business cycles have become more moderate in recent years, the experience of industrial countries more broadly (including the G-7 economies and several smaller industrial countries) has typically been one of more frequent recessions in the second half than in the first half of the postwar period.[57] The favorable performance of the U.S. economy since the mid-1980s, which has witnessed two exceptionally long expansions, has been attributed by some observers to the better management of aggregate demand, which has kept inflation low and thus avoided

[50]See "The Rise and Fall of Inflation—Lessons from the Postwar Experience," in the October 1996 *World Economic Outlook*.

[51]For arguments and evidence that this has indeed been the case for the United States in the postwar period, see John B. Taylor, "Monetary Policy and the Long Boom," *Federal Reserve Bank of St. Louis Review*, Vol. 80, No. 6 (November/December 1998), pp. 3–11, and Christina D. Romer, "Changes in Business Cycles: Evidence and Explanations," *Journal of Economic Perspectives*, Vol. 13, No. 2, Spring 1999, pp. 23–44.

[52]See "Financial Crises: Characteristics and Indicators of Vulnerability," in the May 1998 *World Economic Outlook*.

[53]For instance, the United States has had only nine cycles since 1945, and only seven in peacetime.

[54]U. Michael Bergman, Michael D. Bordo, and Lars Jonung, "Historical Evidence on Business Cycles: The International Experience," in Jeffrey C. Fuhrer and Scott Schuh, *Beyond Shocks: What Causes Business Cycles* (Boston: Federal Reserve Bank of Boston, 1998).

[55]The notable exception in the prewar period was Japan, where the price level rose. During most of that period Japan was not on the gold standard.

[56]David K. Backus and Patrick J. Kehoe, "International Evidence on the Historical Properties of Business Cycles," *American Economic Review*, Vol. 84, No. 4 (September 1992), pp. 864–88. The countercyclical behavior of prices in the postwar period has been reported in a number of studies—see, for instance, Laurence Boone and Stephen G. Hall, "Stylized Facts of the Business Cycle Revisited: A Structural Modelling Approach," *International Journal of Finance and Economics*, Vol. 4, No. 3 (July 1999), pp. 253–68.

[57]Victor Zarnowitz, "Theory and History Behind Business Cycles: Are the 1990s the Onset of the Golden Age?" *Journal of Economic Perspectives*, Vol. 13, No. 2, Spring 1999, pp. 69–90.

policy-induced recessions.[58] Indeed, during the current U.S. expansion, the inflation rate has declined, which is unlike any other expansion in the postwar period. In contrast to the U.S. experience, the Japanese economy has been in a slump through most of the 1990s, while for the euro area as a whole unemployment rates have remained persistently high and there is no evidence that cyclical fluctuations in output have moderated. Indeed, the uneven growth among the three major currency areas and growing trade imbalances have raised concerns about macroeconomic stability in the years ahead. More broadly, considering the string of emerging market financial crises, there is little to suggest that macroeconomic instability in the world economy has diminished.

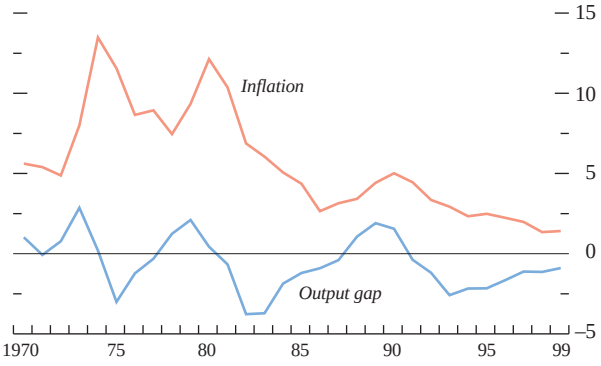
It would be inappropriate, however, to assign exclusive importance to policies and exogenous shocks in explaining economic fluctuations. Economic expansions do not necessarily result in excessive inflation to be countered by tight monetary policy; nor do increases in official interest rates to dampen a boom necessarily cause or explain recessions. Rather, at the core of business cycles stand endogenous interacting movements in business profits, investment, and credit.[59] This does not mean that policies do not play a role in alleviating or contributing to recessions; but the view that market economies are inherently stable and that it is excessively stimulatory policies that first cause excesses to develop and then belatedly curtail them, engendering a downturn in real activity, clearly do not fully reflect international experience.

A second aspect of the relationship between price stability and macroeconomic stability has come to the fore in recent years, as central banks have increasingly focused on price stability as the main, or even the sole, long-run goal of monetary policy. The concern has arisen whether such a narrow focus might compromise the stability of the financial system. The concern is that in the absence of a perceived threat to its inflation goal, a central bank may fail to respond in a timely manner to developments that may place the financial system at risk of instability. An alternative view maintains, in contrast, that price level instability can exacerbate financial instability, which might then result in economic instability more broadly. A monetary policy directed at maintaining price stability, therefore, would enhance both financial and economic stability.

Underlying this alternative view is the notion that price instability leads to inefficient lending because it increases the uncertainty faced by both borrowers and

Figure 4.4. Industrial Countries: Output Gap and Inflation[1]
(Percent)

Cyclical fluctuations in output for industrial countries as a group show no sign of having moderated during the past three decades.



[1]Data for 1999 are IMF staff projections.

[58]Christina D. Romer, "Changes in Business Cycles: Evidence and Explanations," *Journal of Economic Perspectives*, Vol. 13, No. 2, Spring 1999, pp. 23–44; and John Taylor, "Monetary Policy and the Long Boom," *Federal Reserve Bank of St. Louis Review*, Vol. 80, No. 6 (November/December 1998), pp. 3–11.

[59]Zarnowitz, "Theory and History Behind Business Cycles."

Table 4.3. Pronounced Changes in Real Equity Prices[1]

(Annual real equity price index, starting year = 100)

		Rise in Equity Prices[2]		Subsequent Equity Price Correction[3]	
Country	Starting Year	Peak year	Index at peak year	Trough year	Index at trough year
Industrial countries					
Finland	1981	1989	527	1992	240
Ireland	1982	1989	320	1992	227
Japan	1982	1989	427	1992	210
Spain	1983	1989	389	1992	247
Finland	1992	1998	447		
Ireland	1992	1998	544		
Norway	1982	1997	863		
United States	1980	1998	477		
Emerging markets					
Israel	1988	1993	407	1996	202
Korea	1983	1989	608	1992	308
Malaysia	1986	1996	378	1998	157
Mexico	1988	1994	528	1995	344
Thailand	1986	1994	646	1998	130

Source: IMF, *International Financial Statistics*.
[1]Nominal equity prices deflated by CPI.
[2]Average annual increase exceeding 20 percent.
[3]Overall correction of at least 25 percent in annual price index.

lenders about the potential real returns to investment and because inflation makes it more difficult to assess the true quality of borrowers. Furthermore, sustained inflation can encourage speculative investment and borrowing by creating the expectation that prices will continue to rise. When disinflation unexpectedly sets in, the realized real returns to investment fall below what had been expected, and the real burden of nominal debt rises above what had been expected, resulting in increased defaults by borrowers and distressed lenders. The historical evidence for a number of industrial countries is consistent with this view.[60]

Price stability may be conducive to maintaining financial stability in another sense: when inflation is under control the central bank has greater flexibility to respond to crises when needed. In what is perhaps the best recent demonstration of this, the existence of reasonable price stability in the United States allowed the Federal Reserve to cut interest rates decisively, and arguably by more than seemed warranted at the time by U.S. domestic considerations alone, in order to contain potential spillover effects during the emerging market financial crisis in the fall of last year.

While price stability generally enhances financial stability, it can at times also induce excessive risk taking. Booms in asset prices, especially in equity prices, have tended to develop in periods of relatively low inflation. But it may not be the maintenance of price stability per se that engenders booms in asset prices. Rather, booms in asset prices tend to be associated, in a mutually reinforcing manner, with relatively long economic expansions which breed overconfidence, overborrowing, overinvestment, and overconsumption. In turn, long expansions are associated with relatively low inflation. Rising equity prices help to keep the expansion going by lowering the cost of capital, which spurs investment, and, through wealth effects, by raising consumption. They may also channel part of the monetary growth into the demand for stocks, which may restrain the rise in prices of goods and services and accentuate the rise in equity prices.[61] Business expansions, especially long expansions, ultimately give rise to imbalances that make them unsustainable. The difficult task of policy is to forestall the speculative excesses in asset prices, especially in equity and real estate prices, that sometimes develop during long expansions by preventing the overexpansion of credit that feeds asset price bubbles.

Table 4.3 summarizes medium-term developments in equity markets in selected industrial countries and emerging market economies over the past two decades, singling out periods of rapidly rising equity prices and those of significant price falls. The following features stand out: typically periods of rising equity prices are prolonged, coinciding with periods of rapid output growth and moderate or declining inflation. In both industrial countries and emerging market

[60]Michael D. Bordo and David C. Wheelock, "Price Stability and Financial Stability: The Historical Record," *Federal Reserve Bank of St. Louis Review*, Vol. 80, No. 5 (September/October 1998), pp. 41–62.

[61]Zarnowitz, "Theory and History Behind Business Cycles."

economies, periods of equity price increases have usually been accompanied by large capital inflows, rapid expansion of domestic demand—often in the form of investment booms—and a deteriorating external balance. The contraction of equity prices is usually rather sudden and often coincides with, or leads to, a significant deterioration in the real economy. However, not all periods of significant equity price rises are followed by a disruptive correction.

What leads to a sudden reversal to prolonged rises in equity prices during a boom? The empirical evidence suggests that it occurs when monetary conditions tighten significantly, either because monetary authorities react to the manifestation of actual or prospective inflationary pressures, or because of large swings in transborder capital flows, as was the case in Mexico in 1994 and Thailand in 1997.

Monetary policy—and demand management policies in general—seem a blunt instrument to prevent large swings in asset prices from adversely affecting the real economy, or from preventing such swings in asset prices in the first place. It is therefore important to recall the role of prudential regulations and supervision of the financial sector in preventing asset price behavior from threatening macroeconomic stability. Part of their task is to limit the tendency of easy monetary conditions to entail asset price inflation, and to reduce adverse repercussions of substantial declines in asset prices on the balance sheets of private businesses (including banks and other financial institutions) and households alike. The 1988 Capital Accord reached among members of the Bank for International Settlements in Basel constitutes a major supranational effort to safeguard the stability of the international banking system. By establishing risk-adjusted minimum capital requirements the Accord aims to prevent excessive risk taking as international competition among banks intensifies. However, experience with the Accord has revealed that some of its features lead to procyclical bank lending behavior, and this is one of the reasons why it is currently under review by the Basel Committee.[62]

Not every asset price collapse needs to entail a recession, as witnessed by the experience of the 1987 stock market crash. The initial magnitude of the October 1987 stock market collapse was comparable to that of 1929, and like the latter it extended around the globe. But the policy reaction in 1987 was very different from that in 1929, with central banks taking seriously their roles as lenders of last resort in response to a sudden surge in liquidity preference, and governments worldwide refrained from interfering with free world trade in order to protect the domestic economy. As a result, the massive stock market decline was barely reflected in output growth and employment, and most stock markets recouped their losses within less than two years (Figure 4.5). It appears ex post that the monetary policy response to the 1987 stock market crash was probably too expansionary for too long, not only preventing a recession, but actually leading to a re-acceleration of inflation in the industrial countries. And the quick recovery of equity prices it facilitated in some countries, like Japan, may have reduced investors' caution, thus contributing to the subsequent stock market bubble.

Asset Prices and Monetary Policy

The recent rapid and sustained rise in equity prices in most industrial countries has led to concerns about excessive global liquidity (Box 4.4) and that some of these markets may have become overvalued and potentially subject to large and sudden corrections that may destabilize future real activity. The most notable example is the U.S. stock market, which rose about 190 percent in nominal terms in the last five years through June 1999, and almost 80 percent from the time Federal Reserve Chairman Alan Greenspan first spoke of "irrational exuberance" in December 1996 (Figure 4.6).[63] The U.S. stock market now has a capitalization of over U.S. $12 trillion, equivalent to an unprecedented 140 percent of the annual output of the U.S. economy. Other standard valuation measures also confirm that U.S. stock prices have reached historical highs, including in relation to corporate profits (Figure 4.7).[64] The U.S. stock market is not the only buoyant market: other major stock exchanges, with the exception of Japan's, have also risen in recent years, although not to the same extent.[65]

Sharp increases in equity prices can complicate the task of assessing the appropriate stance of monetary policy, particularly in an environment of low and stable inflation in goods and services prices. This is because asset price inflation, even in the absence of goods and services price inflation, can lead to excessive growth in aggregate demand, which could eventually spill over to general inflation. Also, past experience indicates that disproportionately large increases in asset prices can be suddenly reversed, resulting in a deterioration of household, corporate, and financial sector balance sheets and adversely affecting real ac-

[62]Changes to the existing accord currently under consideration are discussed in Basel Committee on Banking Supervision, *A New Capital Adequacy Framework* (Basel: June 1999).

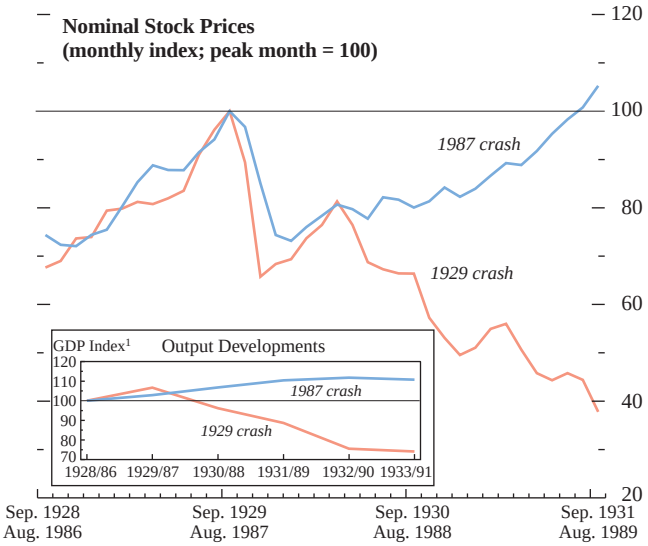
[63]Calculated price increases for the U.S. stock market are percent changes for the monthly averages of the S&P 500 index.

[64]Valuation measures are generally not comparable across countries because of differences in accounting practices, tax laws, the relative importance of cross shareholding, and the structure and operation of financial markets.

[65]Although stock prices in Japan have generally declined in recent years, they have risen sharply in recent months.

Figure 4.5. Comparison of Two Stock Market Crashes

Stock prices behaved similarly in the initial phase of the 1929 and 1987 crashes, but a different response by monetary authorities entailed very different developments in both equity prices and aggregate output following the initial crises.



Sources: Bureau of Economic Analysis, *Business Conditions Digest*; and IMF, *World Economic Outlook (WEO)* database.

[1]Year preceding the year of the stock market crash equals 100.

tivity.[66] Monetary authorities, therefore—even those with the sole declared goal of stability in the overall level of product prices—have reason to be concerned about rapid changes in asset prices, including stock prices, real estate prices, exchange rates, and bond yields, since they may influence or signal changes in future inflation and economic activity.

Although equity prices have risen sharply in many industrial countries in the past few years and although there is some anecdotal evidence that the real estate markets in some countries have recently tightened, goods and services price inflation have approached postwar lows. Potentially unsustainable imbalances may have developed, however, as indicated by large and increasing external current account imbalances and declining household saving rates and declining and negative net private financial balances in Australia, Canada, Denmark, New Zealand, and the United States, partly related to rising equity prices (Figure 4.8). Falling net private financial imbalances are often suddenly reversed, as highlighted by the experiences of Finland, Japan, Sweden, and the United Kingdom in the late 1980s and early 1990s.[67] A key issue in the current conjuncture, then, is how central banks should interpret the rise in asset prices—specifically, equity prices, and whether they should react to them. In addressing this issue it is useful to consider the information content of asset prices, the determinants of asset prices, and whether asset price booms are more likely or more dangerous at low rates of product price inflation.

Information Content of Asset Prices

Whether monetary authorities should respond to asset price fluctuations in part depends on whether they provide leading information about future movements in output or inflation. For instance, rising equity prices can stimulate aggregate demand by increasing the wealth of households, improving corporate balance sheets and confidence, and lowering the cost of capital. If the increase in equity prices does not reflect changes in underlying factors—such as an improvement in supply conditions (for example, through productivity gains) or changes in preferences—then it could also lead to excess demand pressures, a misallocation of resources, and a rise in infla-

[66]For discussions of recent examples of the boom-bust cycle in asset prices, see Garry J. Schinasi and Monica Hargraves, "Boom and Bust in Asset Markets in the 1980s: Causes and Consequences," *Staff Studies for the World Economic Outlook* (Washington: IMF, 1993) and Chapter IV, "Japan's Economic Crisis and Policy Options," in the October 1998 *World Economic Outlook*.

[67]See also Chapter II, "Global Repercussions of the Crises in the Emerging Markets and Other Conjunctural Issues," in the May 1999 *World Economic Outlook*.

tion.[68] Similarly, fluctuations in the exchange rate can affect the level and composition of aggregate demand and the rate of inflation. And an increase in the spread between long- and short-term interest rates, for example, can signal strengthening demand or expectations of rising inflation.

Empirical evidence on the information content of asset prices is mixed. There is some evidence that changes in equity prices help to explain changes in aggregate demand and output, particularly for the United States, the United Kingdom, and Japan, but the evidence is mixed and the causal relationships unclear.[69] Equity price changes, however, have been only weakly (and generally, negatively) correlated with current and future changes in product prices (as illustrated below). Rising equity prices may not cause but simply anticipate increases in future real activity, because equity price valuations reflect expectations of future profits growth. The distinction matters for policy. If equity prices increase for speculative reasons, aggregate demand may rise owing to wealth effects or changes in the cost of capital, thereby temporarily boosting real activity, but the increase will be unsustainable in the longer term since aggregate supply does not rise to meet the increase in demand. In contrast, if equity prices rise because of accurate expectations of higher future real growth (perhaps because of favorable developments in productivity), then the growth is likely to be sustainable. Real estate prices have also been found to provide information about economic activity, particularly when they are declining, but generally are contemporaneous with real activity and inflation.

Changes in the exchange rate—which is also an asset price—can affect inflation directly through import prices or indirectly through effects on demand conditions. Empirical evidence for a number of industrial countries, including Canada, Finland, Iceland, New Zealand, Norway, and Sweden, indicates that inflationary pressures have depended in part on the effects of movements in the exchange rate on aggregate demand and the output

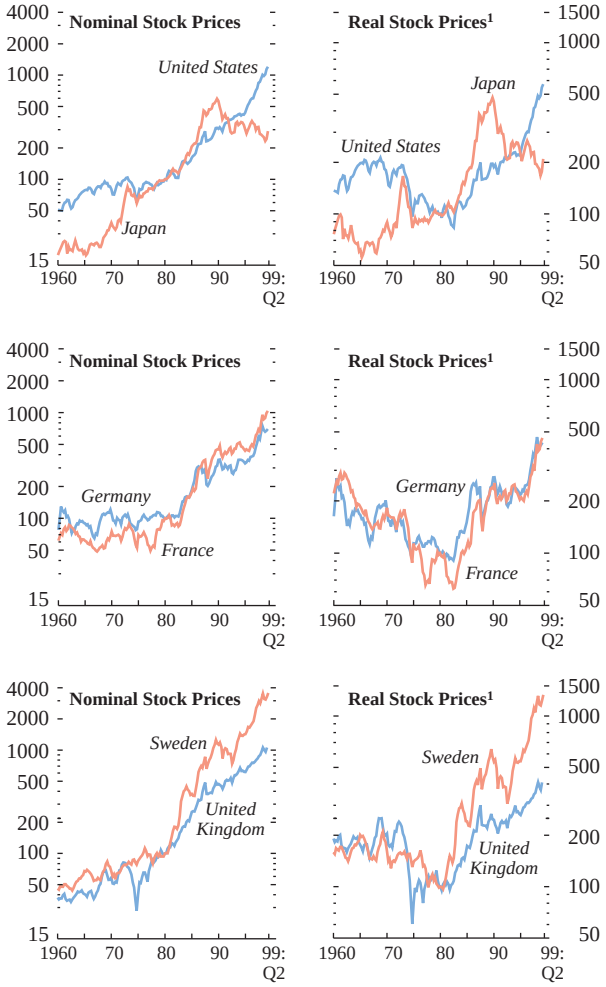
[68]For some supply shocks, such as a discovery of natural resources, the induced wealth effect may also lead to excess demand and inflation in the near term because the increase in demand may precede the increase in supply.

[69]See, for example, Bank for International Settlements, *The Role of Asset Prices in the Formulation of Monetary Policy* (1998); B.S. Lee, "Causal Relations Among Stock Returns, Interest Rates, Real Activity, and Inflation," *Journal of Finance*, Vol. 47 (1992); and Martha Staff-McCluer, "Stock Market Wealth and Consumer Spending" (unpublished; Washington: Federal Reserve System, Board of Governors, 1998). For evidence that the wealth effect from equity prices has increased in the United States in recent years, perhaps because household equity holdings have increased and market capitalization has grown larger than nominal output, see Vincent R. Reinhart, "Equity Prices and Monetary Policy in the United States," in BIS, *The Role of Asset Prices in the Formulation of Monetary Policy.*

Figure 4.6. Selected Countries: Stock Prices

(Index in local currency; logarithmic scale; 1980:Q1 = 100)

Stock prices in many industrial countries have risen sharply in recent years in both nominal and real terms.

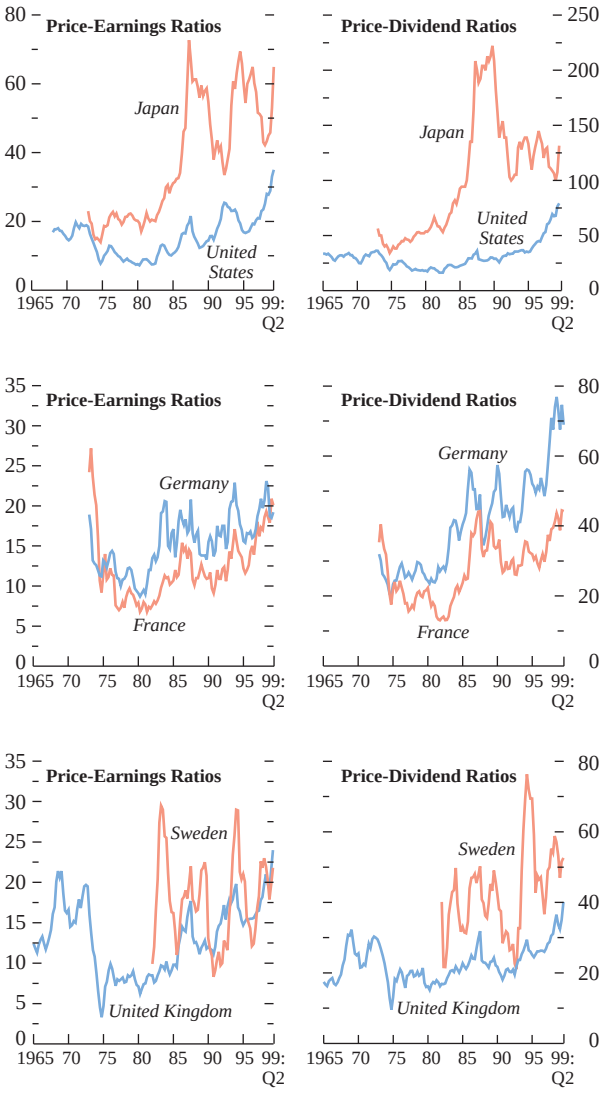


Sources: Bureau of Economic Analysis, *Business Conditions Digest;* and IMF, *International Financial Statistics.*

[1]Stock price index deflated by CPI.

Figure 4.7. Selected Countries: Measures of Stock Market Valuation

Several measures of stock market valuation indicate that stock prices in many industrial countries are at or near historical peaks.



Source: Primark Datastream.

gap.[70] These findings have led a number of these countries to use a monetary conditions index—a weighted average of the exchange rate and short-term interest rates—as an indicator or operating target of monetary policy. The importance of the exchange rate for inflation has naturally been found to depend on the openness, flexibility, and competitive structure of the economy.

The term structure of interest rates, namely the spread between long- and short-term interest rates, has also been found to contain information about future inflation and economic activity and to perform better than many other macroeconomic indicators, including indices of leading economic indicators, in predicting recessions.[71] Conceptually, the term structure may be correlated with future economic activity because it reflects the market's expectations about future short-term interest rates, which may or may not be induced by changes in monetary policy, and hence about future economic growth and inflation.[72] The empirical findings about the relationship between the term structure and future economic activity are very strong for the United States and Germany, but weaker for some other industrial countries, particularly Japan and France.[73]

But even though asset prices contain some information about future economic activity, their usefulness as indicators for monetary policy are limited because forecasts based on them have been subject to large errors. Furthermore, even if the forecasts, particularly for real activity, were accurate, it is not clear that monetary policy should in every case try to resist the predicted changes in activity, since changes in asset prices may reflect changes in the underlying fundamentals, such as a terms of trade, rate of time preference, or

[70]C. Freedman, "The Use of Indicators and the Monetary Conditions Index in Canada," in T. Balino and C. Cottarelli, eds., *Frameworks for Monetary Stability—Policy Issues and Country Experiences* (Washington: IMF, 1994).

[71]See, for example, Eugene F. Fama, "Term-Structure Forecasts of Interest Rates, Inflation, and Real Returns," *Journal of Monetary Economics*, Vol. 25 (1990); Arturo Estrella and Gikas A. Hardouvelis, "The Term Structure as a Predictor of Real Economic Activity," *Journal of Finance*, Vol. 46 (1991); P. Jorion and F. Mishkin, "A Multi-Country Comparison of Term-Structure Forecasts at Long Horizons," *Journal of Financial Economics*, Vol. 29 (1991); C.I. Plosser and K.G. Rouwnhorst, "International Term Structures and Real Economic Growth," *Journal of Monetary Economics*, Vol. 33 (1994); Arturo Estrella and Frederic S. Mishkin, "The Yield Curve as a Predictor of U.S. Recessions," *Current Issues in Economics and Finance*, Vol. 2 (Federal Reserve Bank of New York, 1996); and Henri Bernard and Stefan Gerlach, "Does the Term Structure Predict Recessions? The International Evidence," Working Paper No. 37 (Basel: Bank for International Settlements, 1996).

[72]In rare instances, the term spread may also widen if there is a flight to liquidity such as occurred in October 1998.

[73]It has been argued that the weakness of the results in some industrial countries may reflect tighter financial market regulations during parts of the time periods that were investigated, which may have made interest rates less sensitive to market expectations.

productivity shock. For it to be advisable for monetary policy to consider counteracting a rise in asset prices, the monetary authorities must determine that the assets have become overvalued or misaligned—that is, the asset price increases do not reflect changes in the underlying fundamentals, including accurate and rational changes in expectations. This determination involves the difficult task of assessing changes in the determinants of asset prices.

Determinants of Asset Prices

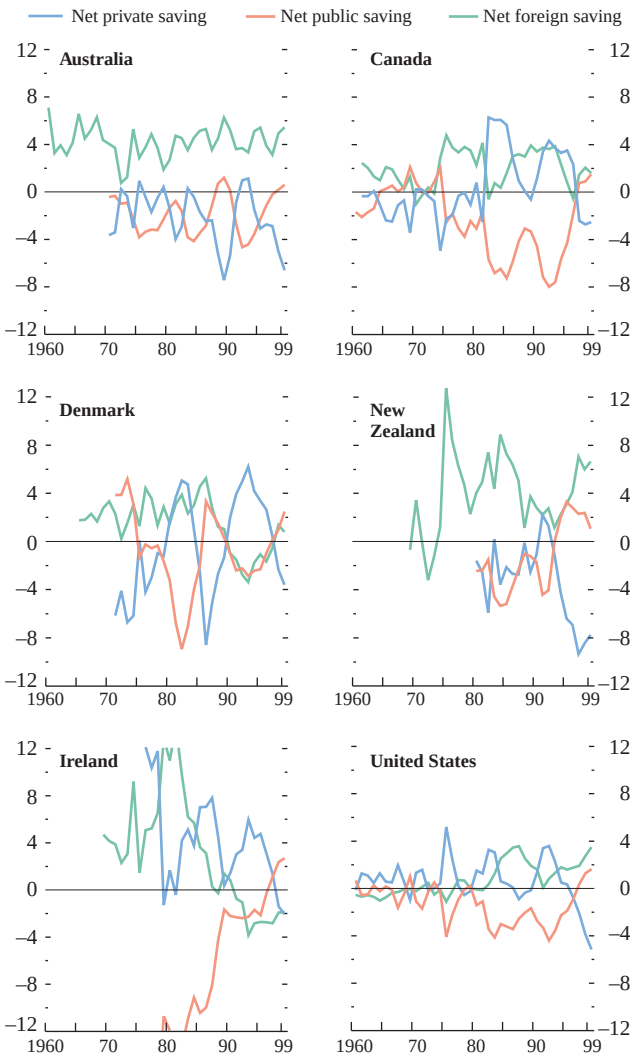
Most asset price models in modern finance theory are based on the assumption that households choose the path of their consumption over time and allocate their assets at each point in time so that risk-adjusted expected rates of return are equated to the risk-free interest rate. Under this assumption, asset prices will be determined by the present (risk-adjusted) discounted value of their respective expected income streams. For stocks, the income stream is the stream of future dividends, and under some simplifying assumptions, the stock price will be equal to the expected dividend divided by the sum of the nominal risk-free interest rate, a premium for holding (risky) equities rather than a bond paying the risk-free interest rate, and (the negative of) the expected nominal growth rate of dividends.[74]

This formula can be used to understand the factors that may lead to equity price gains. Equity prices can rise because of changes in these "fundamental" variables—namely, because the real interest rate or the equity premium falls or the expected real growth rate of dividends rises. In a period of strong economic growth, therefore, equity prices generally rise because of changes in these variables in the near term such as expectations for the increasing growth of dividends and decreasing volatility of stock returns.[75]

It has been argued that the unusual strength of most industrial country stock markets over the past decade

Figure 4.8. Selected Countries: Net Financial Balances[1]
(Percent of GDP)

Net private financial balances have turned negative in several countries, leading to concerns of a sharp correction, as occurred in some countries in the past.



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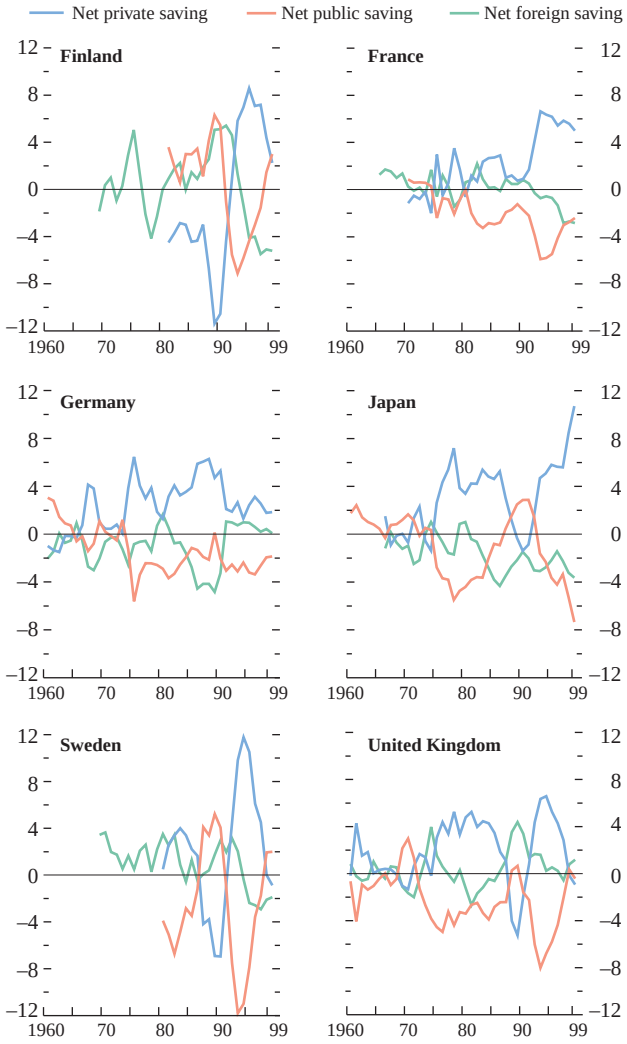
[74]This formula is known as the "Gordon equation." See Myron J. Gordon, *The Investment, Financing, and Valuation of the Corporation* (1962). Similar price formulas can be constructed for other assets including real estate and bonds with (imputed) rents and interest payments, respectively, substituting for dividends. The simplifying assumptions are that the interest rate, the equity premium, and the expected growth rate of dividends are constant and that the sum of the interest rate and the equity premium are greater than the expected growth rate of dividends. Alternatively, if a constant dividend payout ratio is assumed, expected earnings times the payout ratio can be substituted in the formula for the expected dividend. The equity premium is not well understood but is thought to depend on how stock returns (including the potential for corporate default) are correlated with the marginal utility of consumption.

[75]Because of discounting, near-term changes in the underlying variables have greater weight and may lead to a higher "fundamental" price, even when average long-term growth and volatility remain the same.

Figure 4.8 *(concluded)*



[1]Public net saving is the general government current balance less government net investment, as defined in the national accounts. Foreign net saving is the current account balance, shown with opposite sign. Net private saving is the sum of public and foreign net saving, with opposite sign; it represents household disposable income less expenditure, plus after-tax corporate profits, less investment. The net saving of a sector is also known as its financial balance. Data for 1999 are IMF staff projections.

Box 4.4. Global Liquidity

Ample global liquidity has been cited as a factor behind the strong gains in financial asset markets in recent years.[1] Some have argued that abundant global liquidity contributed to the surge in private capital flows to emerging markets and compression of yield spreads in the lead up to the Asian crisis. Favorable liquidity conditions also may have contributed to the general buoyancy of mature equity markets, and the rebound since early 1999 in many emerging equity markets.

But what is meant by global liquidity, and how should it be measured? There is no single agreed concept or measure of global liquidity. Both price and quantity measures are usually invoked in discussions of this issue. When the interest cost of obtaining near-term finance is exceptionally low, this is usually regarded as a symptom of easy liquidity conditions. Similarly, when the growth rate of the money and credit aggregates is high, especially in relation to growth in nominal income, this is usually viewed as a sign of ample liquidity. This box examines a few possible indicators of global liquidity. It finds that interest rate indicators present a mixed picture, but trends in G-7 money growth suggest a rise in global liquidity that may have contributed to the buoyancy in financial asset markets in recent years.

In principle, a measure of liquidity conditions at the global level should be some aggregate of conditions at the individual country level. In practice, however, it is normally the case that the predominant determinants of global liquidity are conditions in the major reserve center countries. Global liquidity conditions may also be affected by developments outside these economies, but policymakers in the major economies can generally offset such developments through adjustments in their own policy stance.[2] Accordingly, for the purpose of this exercise, the focus is on liquidity conditions in the seven major industrial countries (broadened to include the euro area from the beginning of 1999).

Recent interest rate developments in the major industrial countries do not of themselves provide strong grounds for concluding that global liquidity conditions have been unusually accommodative (see first figure).[3]

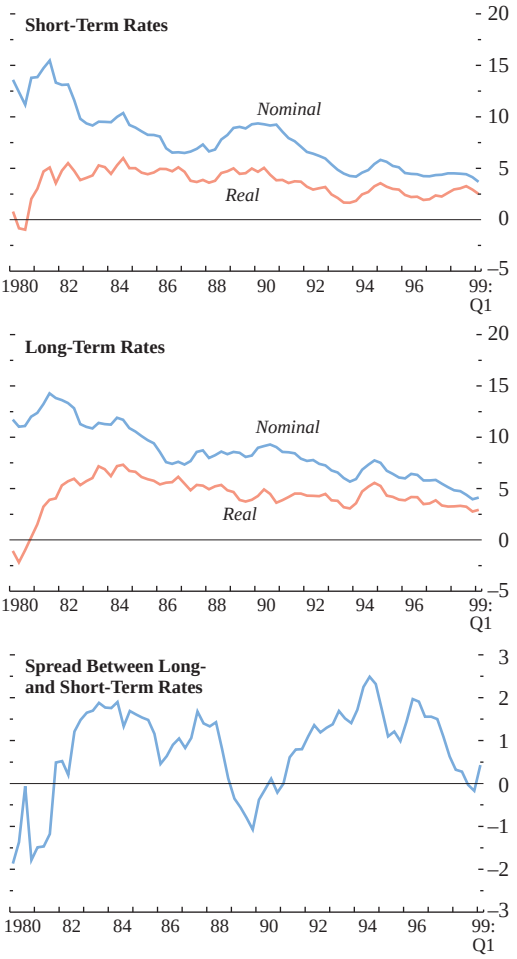
[1]See, for example, *International Capital Markets—Developments, Prospects, and Key Policy Issues* (Washington: IMF, September 1999).

[2]A notable recent example is the global liquidity tightening in the fall of 1998 that was sparked initially by developments in Russia, but ultimately was offset by a moderate monetary easing in the major economies, particularly the United States.

[3]The aggregates in this box are weighted by GDP converted to U.S. dollars at market exchange rates (averaged over the preceding three years).

may also be a result of permanent shocks to these fundamental variables. Examples of these permanent shocks include higher future productivity growth (and thereby expected dividend growth) and lower ex ante

Major Industrial Countries: Interest Rates[1]
(Percent)



Sources: National authorities; and WEFA, Inc.

[1]GDP-weighted average of three-month interest rates for short-term rates, and of ten-year (or nearest maturity) government bond yields for long-term interest rates. Real interest rates are nominal rates less consumer price inflation over the last year.

Nominal interest rates have declined significantly at both the short and the long end of the term structure since 1995. The decline in short-term rates reflects cuts in official interest rates, which have been reduced since early 1995 by a cumulative 100 basis points in the United States, and 200 basis points in Japan and Germany (with larger reductions elsewhere in continental Europe). However, inflation has also slowed, partly reflecting temporary factors, so that real interest rates have fluctuated around fairly stable trends at the short end and fallen only moderately at the long end. Real interest rates currently are generally below average levels in the 1980s but do not seem unusually low from a longer-term perspective. As regards the shape of the yield curve, the upwardly-sloping curve in the period 1992–97 is suggestive of relatively accommodative monetary conditions. However, the yield curve subsequently flattened as G-7 bond yields fell more than short-term rates in the wake of the Asian crisis. Overall, interest rate developments among the G-7 countries do not suggest that liquidity conditions have been particularly tight in recent years, but it is also not obvious that they have been unusually loose, particularly when viewed against the background of declining inflation.

While interest rate indicators provide a mixed picture, there has been a marked increase in money growth among the G-7 countries in recent years that does appear suggestive of increasing global liquidity (see second figure).[4] The upswing is most pronounced for broad money, which has accelerated sharply since early 1995. The pickup in narrow money growth is a more recent phenomenon, but this primarily reflects the fact that narrow money growth in the United States was negative in the period 1994–97.[5] Excluding the United States, narrow money growth has also been strong since early 1995. The acceleration in money growth is particularly striking when viewed against the background of developments in nominal output. While broad money growth has been on a marked upward trend, nominal output of the major economies grew at a relatively steady 4–5 percent rate

[4]Growth in the monetary aggregates reflects changes in the balance sheets of financial institutions, but does not reflect off-balance-sheet transactions, which are typically more difficult to measure. In general, it seems reasonable to expect the macroeconomic forces driving on- and off-balance-sheet activities to be broadly similar, i.e., an environment that fosters rapid growth in bank lending is also likely to be associated with significant increases in off-balance-sheet financing activities. However, there may also be a degree of substitutability between on- and off-balance-sheet activities, reflecting regulatory practices as well as short-term factors (e.g., in late 1998, U.S. companies drew down their bank credit lines as liquidity in the corporate bond market dried up).

[5]The contraction in M1 primarily reflects the introduction of "sweep programs" designed to minimize the level of transactions balances subject to reserve requirements (see, for example, the February 1999 Humphrey-Hawkins Report of the Federal Reserve Board).

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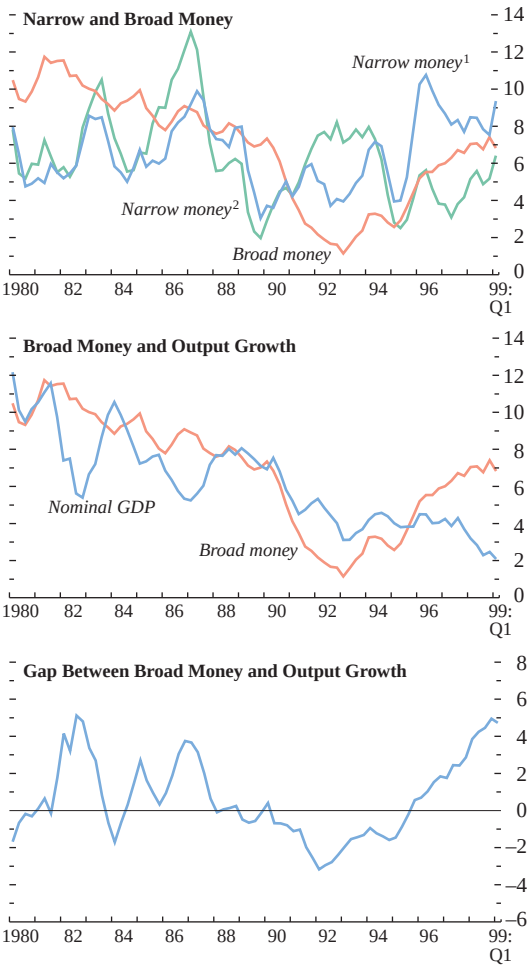
real interest rates compared to previous economic booms because fiscal balances have improved. Another permanent shock may be a decreased equity premium because financial liberalization and lower transaction costs may have allowed individuals who previously could not afford to invest in the stock market (perhaps because of liquidity constraints) to buy stocks, and those who held stocks to better diversify

Box 4.4 *(concluded)*

Major Industrial Countries: Money and Output Growth

(Percent change from a year earlier)



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

[1]Excluding the United States.

[2]Including the United States.

through mid-1997, before slowing to below 3 percent in the second half of 1998. As a result, a gap between broad money and output growth emerged in the second half of 1995 and widened steadily over the subsequent 3½ years, peaking at about 5 percentage points in late 1998. The only previous instances of significant "excess" money growth in the past two decades occurred in 1982–83 and 1985–87.

The emergence of a significant excess of money growth over growth in nominal output for the G-7 economies reflects developments in the individual countries. In the United States, nominal output growth has remained fairly steady at around 5 percent a year since the early 1990s, whereas annualized M3 growth accelerated from 1 percent in 1993 to 11 percent in 1998. Temporary factors may partly explain the surge in broad money growth in 1998,[6] but there is little evidence for the period as a whole that monetary policy has exerted a strong restraining influence on money and credit growth. In Japan, the monetary stance was eased significantly in 1995 as short-term interest rates were reduced and growth in the monetary base accelerated. Broad money growth has been more moderate—in the 3–4 percent range—while nominal output has been volatile but generally weak. As a result, sizable gaps between money and output growth opened up in 1994–95 and, more dramatically, in 1997–98. Monetary policy has also been eased in continental Europe, where broad money growth has generally exceeded nominal output growth since 1995.

Episodes of rapid money growth in excess of growth in nominal output of goods and services have on occasions been associated with strong asset price gains that ultimately proved unsustainable. Two notable examples from the late 1980s were the asset price bubble in Japan and the house price boom in the United Kingdom.[7] In the recent period, a link between excess money growth and rising asset prices could be inferred from the strong gains since 1995 in U.S. equity prices (see third figure). A similar relationship is also evident for the G-7 countries as a group, particularly when equity prices in Japan—which have been depressed until very recently—are excluded. In Japan and Europe, the combination of accommodative monetary policies and weak domestic demand has been associated with sizable capital outflows, including a surge in bank lending to emerging markets prior to the Asian crisis. Subsequently, those capital flows may have been redirected to the mature financial markets, contributing to a further rise in equity prices.

The link between excess money growth and asset prices does not appear to be particularly tight, nor does

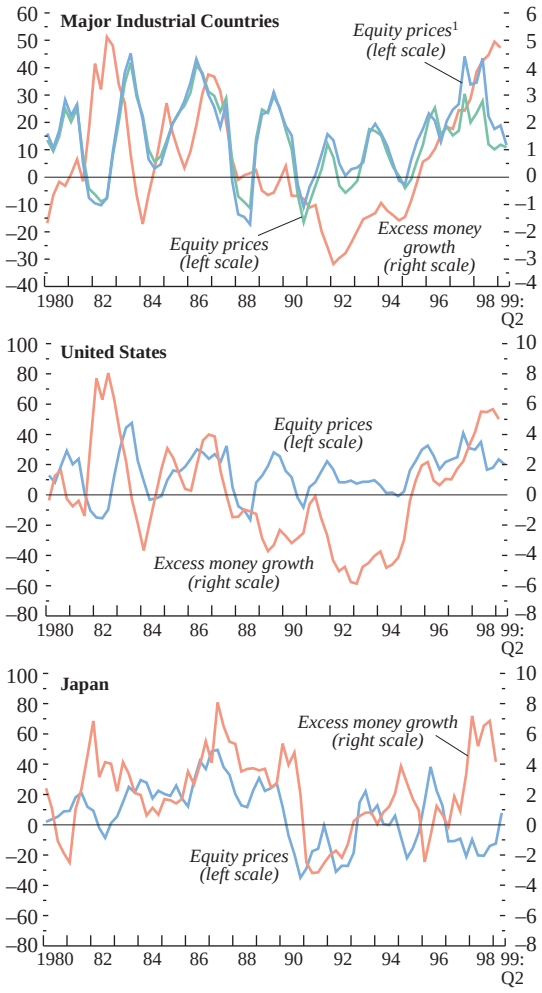
[6]Including safe haven flows in response to the increased volatility in financial markets.

[7]These episodes were analyzed in the May 1993 *World Economic Outlook*, pp. 81–95.

their portfolios and decrease the volatility of their stock market returns. A decrease in the equity premium might also reflect an increase in the demand for stocks stemming from changing demographics—in particular, an increase in the proportion of the population that is in the prime earning and saving portion of the lifecycle. If these explanations are correct, the unusually large run-up in stock prices in recent years

Major Industrial Countries: Excess Money and Equity Price Growth

(Percent change from a year earlier)



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

[1]Excluding Japan.

it necessarily say anything about causality between the two. For example, rapid gains in stock market prices may be driven by real economic "fundamentals" such as corporate restructuring, policy reforms, or technological progress that increase the share of capital in national income, but they may still be associated with rapid money growth to the extent that share purchases are partly financed through increased borrowing. Alternatively, rapid asset price increases could themselves be a sign of broader imbalances or inflationary pressures fueled by an overly expansionary monetary policy that, for temporary or other reasons, is not reflected in a rise in measured inflation. Definitive evidence on which of these two explanations more closely approximates reality is rarely available ex ante. However, the high costs of cleaning up after previous asset price bubbles suggest it may be prudent for monetary policy to err on the firm side when confronted with a combination of rapid money growth, strong asset price gains, and macroeconomic imbalances that raise questions about medium-term sustainability.

To conclude, recent trends in G-7 money growth provide some indication that global liquidity conditions have been particularly accommodative since 1995. This may have contributed to the surge in capital flows to emerging markets, the reversal of which resulted in substantial output losses for a number of countries, as well as to the strong gains in some mature equity markets. Relatively accommodative global liquidity conditions in the wake of the Asian crisis may also have helped cushion the subsequent negative demand shock, and partly explain why the slowdown in world economic growth has been more modest and short-lived than initially feared. Global liquidity conditions are primarily an outcome of the monetary policies adopted in the major economies. In Japan and Europe, accommodative monetary policies have been fully appropriate given the weak state of domestic demand. However, rapid monetary growth in the United States may raise a question about whether monetary policy has been sufficiently firm in the face of unusually strong domestic demand growth, notwithstanding the subdued performance of measured inflation. Looking forward, the large disparity between money and output growth seems unlikely to persist, and liquidity conditions can be expected to become less accommodative as world growth recovers and as G-7 monetary policy reverts to a more neutral stance. This process should be viewed as part of a return to more normal conditions. However, it also carries a risk of renewed instability in circumstances where some mature equity market valuations—most notably in the United States—are near historic highs, and some emerging market economies face sizable short-term external financing needs.

could be justified by changes in the underlying fundamentals.

To some degree, nevertheless, it is also possible that sustained, strong economic growth may boost confidence and result in overly optimistic assessments of future stock market returns and volatility, thereby leading investors to underestimate the inherent risks in equities and leading to some stock price

Table 4.4. Selected Countries: Illustrative Examples of Potential Stock Market Overvaluation (First Quarter, 1999)[1]

(Percent)

Historical[2]	Dividend Yield	Real GDP Growth	Real Interest Rate[3]	Inflation Rate	Equity Premium[4]
Canada	3.1	2.4	5.0	4.4	0.5
France	3.9	2.0	4.2	4.7	1.7
Germany	2.4	2.5	4.1	2.7	0.8
Italy	2.3	1.9	3.5	7.8	0.7
Japan	1.0	2.9	2.5	1.9	1.4
United Kingdom	4.5	2.1	3.6	5.7	3.2
United States	3.5	2.6	3.9	4.3	2.4

Current[5]	Dividend Yield	Potential GDP Growth[6]	Real Interest Rate[3]	Inflation Rate	Implied Equity Premium[7]	Implied Expected Real Dividend Growth[8]
Canada	1.7	2.4	4.7	0.5	–0.5	3.4
France	2.2	2.3	3.8	0.3	0.7	3.3
Germany	1.3	2.1	3.2	0.5	0.3	2.6
Italy	2.1	1.8	2.7	1.4	1.3	1.3
Japan	0.8	2.1	0.4	–0.1	2.5	1.0
United Kingdom	2.9	2.5	2.2	2.3	3.3	2.5
United States	1.3	2.7	3.3	1.7	0.8	4.3

Potential Overvaluation	Implied Equity Premium Reduction[9]	Implied Excess Expected Real Dividend Growth[10]
Canada	1.1	1.0
France	1.0	1.0
Germany	0.6	0.5
Italy	–0.6	–0.5
Japan	–1.1	–1.1
United Kingdom	–0.1	0.0
United States	1.6	1.6

[1]These illustrative calculations are based on the Gordon equation (described in the text), which incorporates several simplying assumptions, including constant interest rate, equity premium, and expected dividend growth.

[2]Geometric averages for 1980–99 (through first 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 (as a proxy for expected real dividend growth).

[5]First quarter 1999, except fourth quarter 1998 for the real interest rate in France and Japan.

[6]IMF staff estimates.

[7]Calculated using the current values for the dividend yield, real interest rate, inflation rate, and potential real GDP growth (as a proxy for expected real dividend growth).

[8]Calculated using the historical average of equity premium and the current values for the dividend yield, real interest rate, and inflation rate.

[9]Historical equity premium less implied equity premium.

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

overvaluation relative to fundamentals.[76] In the United States, for example, where there have been two relatively long economic booms with a relatively mild recession in between, assessments may be even more optimistic than in previous business cycles, and therefore, stock price overvaluations may be correspondingly larger. Also, to the extent that there is asymmetric information in the credit approval process, asset price inflation can become self-perpetuating as the value of collateral rises and private sector balance sheets improve, potentially boosting investment and temporarily increasing earnings.

It is, however, very difficult to determine ex ante whether asset price increases are justified by changes in fundamentals or stem from excesses in financial

[76]There have been many economic studies examining whether asset prices are excessively volatile—i.e., whether prices are more volatile than their underlying fundamentals. See, for example, Robert Shiller, "Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?" *American Economic Review,* Vol. 71 (1981), pp. 421–36.

Table 4.5. Selected Countries: Correlation of Equity Price Inflation and Goods Price Inflation[1]
(Percent)

	All Industrial[2]	Canada	France	Germany	Italy	Japan	United Kingdom	United States
Contemporaneous	–14.3	–11.6	–20.2	–33.9	–3.9	–14.5	–8.7	–35.8
Equity lagged one year	–5.8	2.9	–5.9	–42.1	2.8	14.3	–28.4	–20.4
Equity lagged two years	0.1	19.7	–0.5	–20.0	1.9	25.6	–9.4	–12.2
Equity lagged three years	–1.4	3.8	–6.2	–9.9	–4.8	11.9	–0.8	–15.9

Source: IMF, *International Financial Statistics*.
[1]Data are quarterly from first quarter 1958 to first quarter 1999 (unless unavailable).
[2]Excluding Iceland for which data are unavailable.

markets, and to assess whether stock prices are overvalued—because the equity premium and the expected growth rate of dividends are unobservable. Furthermore, small changes in assumptions about these variables can lead to large changes in the estimated "fundamental" value. However, as an illustrative example, rough assessments are possible by making assumptions about one of the two unobservable variables and assessing what this implies for the other (Table 4.4).[77] For the major industrial countries, these calculations indicate that during the first quarter of 1999 the U.S. stock market is possibly the most overvalued with the equity premium 1.6 percentage points below its historical average, or the expected real growth rate of dividends 1.6 percentage points above potential GDP growth.[78] These calculations further indicate that markets in Canada, France, and Germany also may be overvalued, while the Japanese and Italian markets may be undervalued.

Equity Prices at Low Inflation

Generally, changes in equity prices (in nominal terms) have not been positively correlated with inflation in the short to medium term (except in instances of very high inflation or hyperinflation).[79] The contemporaneous correlation between equity price inflation and goods price inflation is negative for most countries (Table 4.5). In addition, periods of sustained increases in real equity prices tend on average to occur in periods of relatively low or declining inflation. During 1961–99, in instances when real equity prices in the industrial countries rose by over 100 percent during a five-year period, the average rate of goods price inflation was 3.7 percent, while during periods when equity prices rose by less than 100 percent, the average inflation rate was 6.1 percent.

Since stocks are claims on the earnings of real assets, it is somewhat surprising that real stock returns are negatively correlated with inflation. Indeed, if increases in goods price were purely monetary in nature, stock prices should also rise to the extent that costs and earnings are equally affected. For example, if nominal interest rates rise because expected inflation rises, the real value of stocks should be unchanged because the expected nominal growth rate of dividends will rise by the same amount, unless higher expected inflation also leads to higher expected volatility of earnings.

There are several potential explanations of why increasing goods price inflation may undermine stock price fundamentals and lead to decreasing stock valuations. Goods price inflation may be the result of (at least partly accommodated) adverse supply shocks. During the 1970s, inflation rose and stock prices and corporate profits fell as oil and energy prices rose faster than corporate revenues. Conversely, positive supply shocks (such as increasing productivity growth) can lead to rising stock prices with falling inflation. In addition, stock prices may fall when goods price inflation rises because of expectations of monetary tightening to counteract the increase in goods prices, leading to lower future economic activity and corporate earnings.[80,81]

[77]These illustrative calculations are based on the Gordon equation, which employs several simplifying assumptions, including constant interest rates, equity premiums, and expected dividend growth.

[78]Based on the Gordon equation, the implied price overvaluation is an increasing function of the implied excess expected real dividend growth or the implied reduction in the equity premium. Similar results can be found in Mike Kennedy, Angel Palerm, Charles Pigott, and Flavia Terribile, "Asset Prices and Monetary Policy," OECD Working Paper No. 188 (Paris), and IMF, *International Capital Markets* (1999).

[79]Jeremy J. Siegel, *Stocks for the Long Run* (New York: McGraw-Hill, 1998).

[80]Another explanation is that tax codes that are not fully indexed for inflation affect the after-tax return to investors by lowering real after-tax corporate profits, dividends, and capital gains when inflation is high.

[81]A recent study for the United States finds that the negative correlation between equity valuations and expected inflation stems from the fact that a rise in expected inflation coincides with both lower expected real earnings growth and higher required real returns—see Steven A. Sharpe, "Stock Prices, Expected Returns, and Inflation"(Washington: Board of Governors of the Federal Reserve System, April 1999).

Some analysts have argued, however, that stock prices may also rise without corresponding improvements in stock price fundamentals in a period of low and apparently stable inflation, particularly when monetary and credit aggregates are growing faster than nominal output. One argument is that investors take excessive risks in their search for higher yields when inflation is low because nominal interest rates are low. Other arguments are based on the premise that in periods of low goods inflation the monetary authorities, particularly when targeting goods inflation, are more likely or willing to interpret rapid monetary expansion as an increase in the real demand for money (or decrease in money velocity). In one scenario, goods prices remain restrained because of positive productivity shocks, while corporate profits temporarily rise faster than productivity gains because real wages rise but not as fast as productivity rises since workers are temporarily satisfied with their increased purchasing power.[82] An asset price bubble develops as investors overestimate future earnings growth by extrapolating past earnings gains. In another scenario, goods prices and wages are temporarily restrained by increased global competition, while financial liberalization, demographic changes, structural changes, and tax reforms shift the use of money and credit from purchasing goods to purchasing assets, creating an asset price bubble.[83] In both cases, the monetary authorities err by focusing solely on the stability of goods prices. If they focused instead on the stability of a broader index of prices, including asset prices, goods prices would have been allowed to fall moderately while equity prices may not have risen as sharply.

These arguments are based, in part, on the premise that asset price inflation is also more dangerous at low inflation because asset prices can decline in real terms only by falling in nominal terms. Asset price deflation may lead to prolonged and adverse effects on output because of its impact on household, corporate, and financial sector balance sheets. As net wealth and asset values decline, aggregate spending may also fall. In addition, the credit allocation process (when there is asymmetric information) may be impeded as the value of collateral declines. Alternatively, it has been argued that asset price inflation is less dangerous when there is low inflation because the monetary authorities have more freedom to respond to a sudden decline in asset prices by easing monetary conditions if they believe there is a danger to the financial sector or credit allocation process.[84]

Should the Measure of Inflation Relevant for Policy Include Asset Prices?

When central banks explicitly or implicitly target inflation, they generally focus on current consumption or production-based measures such as the consumer price index or the GDP deflator. In principle it is possible to target a broader index of prices that includes not just measures of prices for current consumption and production but also measures of prices for future consumption and production, such as asset prices that are claims on future income or production.[85] An intermediate step for central banks might include using a broader index of monetary conditions, including other asset prices in addition to exchange rates and short-term interest rates, as an indicator or operational target of monetary policy.[86]

In practice, however, monetary policy based on a broader measure of prices or monetary conditions may lead to greater variability in current and future output and inflation. For instance, if changes in equity prices occur mainly because of changes in the underlying fundamentals such as real shocks (for example, productivity shocks, as discussed above), monetary policy that counteracts such changes may not be optimal and indeed can be destabilizing.[87] Essentially, using a broader index of prices or monetary conditions, which include asset prices, presupposes that the monetary authorities understand the equilibrium or fundamental prices for these assets. Monetary conditions indices as practiced today work reasonably well for some countries because the equilibrium real exchange rate and

[82]Federal Reserve Bank of Cleveland, "Beyond Price Stability: A Reconsideration of Monetary Policy in a Period of Low Inflation," *Annual Report* (1998).

[83]Monica Hargraves and Garry J. Schinasi, "Monetary Policy, Financial Liberalization, and Asset Price Inflation," Annex I, in the May 1993 *World Economic Outlook;* and Garry J. Schinasi, "Asset Prices, Monetary Policy, and the Business Cycle," Paper on Policy Analysis and Assessment 94/6 (Washington: International Monetary Fund, March 1994).

[84]This may create moral hazard, but moral hazard can be limited with effective supervision and regulation. Also, see Mark Gertler, Marvin Goodfriend, Otmar Issing, and Luigi Spaventa, *Asset Prices and Monetary Policy—Four Views* (London: Centre for Economic Policy Research, 1998) for views on why asset price inflation is less of a concern when there is goods price stability.

[85]Armen A. Alchian and Benjamin Klein, "On a Correct Measure of Inflation," *Journal of Money, Credit and Banking*, Vol. 5 (1973), advocate using an intertemporal cost of living index (ICLI) to properly reflect changes in the purchasing power of money. A price index based on the ICLI was developed and computed for Japan by Hiroshi Shibuya, "Dynamic Equilibrium Price Index: Asset Price and Inflation," *Bank of Japan Monetary and Economic Studies*, Vol. 10, No. 1 (1992), pp. 95–109, and Shigenori Shiratsuka, "Asset Price Fluctuation and Price Indices," Bank of Japan, Institute for Monetary and Economic Studies, Discussion Paper No. 99–E–21, July 1999.

[86]The optimal weight for each type of asset in these broader indices will depend on the impact of asset prices on current and future economic activity.

[87]The intuition here is that changes in asset prices have differing impacts on economic activity over time depending on the underlying causes affecting the asset prices. Therefore, the optimal weights for each asset vary over time.

short-term interest rate remain relatively stable for these countries. Nevertheless, for most countries, because equilibrium asset prices, particularly equity prices, are volatile and almost impossible to determine with any degree of precision, a policy of targeting a broader index of prices or monetary conditions faces severe practical and conceptual difficulties.[88]

Monetary Policy at Low Inflation

Macroeconomic policy has been very successful in the industrial countries in achieving low inflation, but the work of policy is not done: sustaining reasonable price stability presents its own challenges. There are two aspects to this that in recent years have come to the fore. One is deflation and the other is asset price inflation. With consumer price inflation—the explicit or implicit target of many central banks—close to zero, monetary authorities have had to confront a question they have not faced in many decades: How should they respond to deflation? The appropriate response depends, of course, on the form the deflation takes. When deflation is the result of deficient aggregate demand there is no question that the response is the adoption of an expansionary monetary policy, with fiscal policy available to provide additional support depending on the seriousness of the deflationary pressure and the room to maneuver allowed by medium-term sustainability considerations. The difficulty may lie in the implementation of monetary policy in situations where nominal short-term interest rates have been reduced effectively to zero. While the zero bound on nominal interest rates constrains the effectiveness of policy through the interest rates channel, monetary policy does not lose all effectiveness. The challenge for policy is to prevent the economy from possibly becoming caught in a deflationary spiral from which it may be difficult to escape. The greater challenge, therefore, may be not the actual implementation of expansionary monetary policies, but rather the early recognition of difficulties and the adoption of timely and sufficiently forceful policies. In this respect, targeting a small positive rate of inflation—as the midpoint of a target range—would be preferable to targeting zero inflation.

A difficulty with targeting a positive rate of inflation—in excess of any measurement bias—is that price increases can fall below the target rates as a result of sustained positive supply developments or, in some cases, the consequence of increased exposure to international competition and domestic structural reforms that remove barriers to competitive pricing. In the case of positive supply developments, the concern is that resistance to deflation might result in excessive monetary expansion which in the first instance might be reflected in asset price inflation, especially equity prices, rather than in consumer prices. Fear of precipitating a sharp drop in equity prices might then deter the central bank from tightening policy until financial imbalances and inflationary pressures have clearly surfaced.

The solution to this dilemma, however, is not to abandon price stability as a long-run goal of monetary policy, nor to redefine price stability more broadly to include asset prices. First of all, permanent increases in the economy-wide rate of growth of productivity are unlikely to be so large as to imply a rate of deflation that if not resisted would adversely affect consumer and business sentiment, and lead to a contraction in demand and real activity. Deflations associated with positive supply developments are likely to be mild and temporary. Secondly, redefining price stability more broadly to include asset prices would not be particularly helpful: not only because of the difficulty of constructing and applying such a price index, but also because directly focusing monetary policy on asset prices can be destabilizing. While in retrospect it may seem clear that monetary policy mistakes were made during past episodes of rapidly rising asset prices, it is not at all clear that the mistakes occurred because central banks focused on the "wrong" price index. A forward-looking monetary policy will take into account the effect of asset price movements on future inflation, but precisely how policy settings should be adjusted in response to asset price developments is not always clear, in part because the leading indicator properties of asset prices are not well established.

The critical issues facing policymakers are: When should they be concerned about the behavior of asset prices? And how should they act? Two situations may be distinguished. One is a sharp break in asset prices that generates turbulence in financial markets and threatens to disrupt the financial system—for instance, the stock market crashes in October 1987. In these circumstances there is no question that central banks should respond to the asset price declines by supplying the needed liquidity. The other situation is a persistent buildup of asset prices, during which there is little evidence of inflationary pressures, but that threatens to destabilize economic activity and financial markets in the event of a crash. In this case there may be reasons to presume that inflationary pressures are mounting but they are being temporarily offset by benign influences. There may also be reasons to believe that the buildup in asset prices carries an increased risk of a crash. In this case too central banks need to act. The response of policy to asset price movements should be symmetrical—that is, policy

[88]For a discussion of the issues see Charles A.E. Goodhart, "Price Stability and Financial Fragility," in Kunio Sawamaoto, Zenta Nakajima, and Hiroo Taguchi, eds., *Financial Stability in a Changing Environment* (New York: St. Martin's Press, 1995), and the comments by Horst Bockelmann, Franco Bruni, and Jerry L. Jordan. For an illustration of the practical difficulties see Shiratsuka, "Asset Price Fluctuation and Price Indices."

should respond not only to sharp declines in asset prices that threaten to disrupt the financial system and the economy more broadly, but also to unsustainable increases in asset prices that carry a similar risk. The problem is that for technical and political reasons it may be difficult to do so. Technically, it is extremely difficult to determine ex ante whether the increase in asset prices is justified by changes in fundamentals. And even if it were not, the consequences of policy actions on financial markets and the economy more broadly are very uncertain. Politically, too, central banks charged with maintaining price stability may feel that they do not have the mandate under the circumstances to risk bringing an end to a beneficial economic expansion and go against the judgment of markets. The alternative, however—to delay action until there are clearer signs that asset price inflation is spilling over to generalized inflationary pressures—is much more costly, as the example of Japan so clearly illustrates.

While there is no mechanical way for taking account of asset price inflation in setting monetary policy, attention should be paid to it if past mistakes are to be avoided. The challenge facing stabilization policy stems from the possibility that traditional indicators of inflationary pressures—that is, measures of inflation in goods and services prices—may not provide sufficiently unambiguous signals at low inflation rates to allow policymakers to rely primarily or exclusively on them in gauging the extent of imbalances that may be developing in an economy as the expansion matures. Central banks cannot ignore the implications for the economy of large changes in asset prices, particularly when they may signal deviations from fundamentals—notwithstanding the fact that these deviations will be difficult (or even impossible) to measure. Monetary authorities should attempt to ascertain the underlying reasons for the changes in asset prices and determine their relationship to current and future economic activity. In particular, central banks should examine asset price inflation in light of other developing imbalances that can be suddenly reversed, including external and private sector financial balances as well as growth in money and credit aggregates that persistently exceeds growth in nominal output by a large margin. Monetary policy should not target or attempt to stabilize asset prices, but neither can it neglect the consequences for economic and financial stability of asset price movements and unsustainable balance sheet developments.