

The inflation target ten years on⁽¹⁾

In this lecture to the London School of Economics, Mervyn King, Deputy Governor,⁽²⁾ re-examines the case for price stability ten years after Robin Leigh Pemberton asked the same question in the first LSE-Bank of England lecture. Mervyn King asks three questions. Did the benefits of low inflation promised ten years ago materialise? What does price stability mean in practice? And finally, what are the challenges for monetary policy over the next decade?

Introduction

Ten years ago, in this very room, Robin Leigh Pemberton (then Governor, now Lord Kingsdown), delivered the first LSE-Bank of England Lecture. It was entitled 'The Case for Price Stability'. In the 25 years prior to that lecture, prices had risen by over 750%, more than over the previous 250 years. So the audience on that evening in November 1992 had grown up in a world in which rapidly rising prices appeared inevitable. They were the inflation generation. To them price stability seemed remote. Inflation was simply taken for granted.

But that LSE-Bank of England Lecture coincided with the introduction of a new monetary framework—the inflation target. Since then price stability has become a reality. Over the past decade inflation has averaged 2.5%, and has been no lower than 1.5% and no higher than 3.3%.

Alan Greenspan defined price stability as when 'expected changes in the average price level are small enough and gradual enough that they do not materially enter business and household decisions'. With inflation expected to remain close to 2.5%, it is no longer a material concern to families and businesses in this country. Alan Blinder, who was Alan Greenspan's deputy at the Federal Reserve Board, put it even more clearly. Price stability, he said, was when ordinary people stop talking and worrying about inflation. And so successful has been the pursuit of low inflation that some

commentators have talked about the 'death of inflation' and others have become increasingly concerned about the prospect of deflation.

Tonight I want to re-examine the case for price stability, and ask the following questions. Did the benefits of low inflation promised ten years ago materialise? Is the case for price stability the same as in 1992? What does price stability mean in practice? Finally, what are the challenges for monetary policy over the next decade?

Ten years of the inflation target: what has it achieved?

Since Britain's departure from the Exchange Rate Mechanism in September 1992, monetary policy has been based on an explicit numerical target for the rate of inflation—now 2.5%—and a high degree of transparency and accountability. Indeed, it was in his LSE lecture that Lord Kingsdown announced that the first *Inflation Report* would appear in February 1993. And last week's *Report* completes exactly a decade of *Inflation Reports*—40 assessments of the outlook for growth and inflation in the British economy.

Although inflation targeting in the United Kingdom is now ten years old, the most significant institutional changes occurred five years ago. Decisions on interest rates were taken out of the political arena in May 1997 and delegated by the Chancellor to the new Monetary Policy Committee. It is too soon to compare the

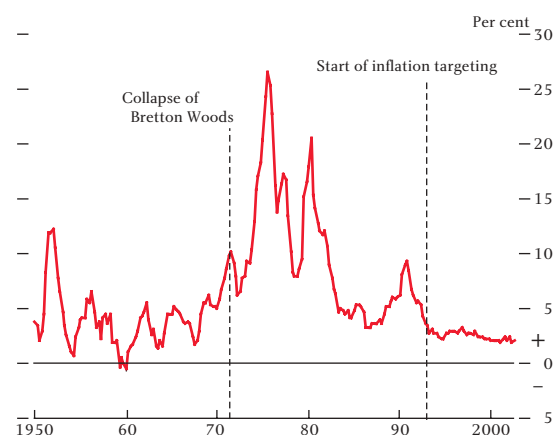
(1) Speech delivered to the London School of Economics, 19 November 2002. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech181.pdf

(2) I would like to thank Jens Larsen and Jan Vlieghe for their excellent research support and for many of the ideas in this lecture. I am grateful also to Luca Benati for help with interpreting the macroeconomic statistics, to Richard Geare and James Cookson for their efforts in compiling the data on historic Harrods prices and to Kath Begley for help in identifying material on retail prices in the early 20th century. I have also benefited from comments, help and advice from Peter Andrews, Hasan Bakhshi, Sebastian Barnes, Charlie Bean, John Campbell, Enzo Cassino, Philip Evans, Katie Farrant, Guillermo Felices, Neal Hatch, Rishi Kansagra, Ben Martin, Jack McKeown, Michael McMahon, Alan Mankikar, Peter Rodgers and Greg Thwaites.

nine-member Monetary Policy Committee with the Council of Nine that ruled Siena during the 14th century. Exactly 660 years before the Chancellor created the MPC, the Council of Nine commissioned Lorenzetti to paint the marvellous frescoes in the Palazzo Pubblico showing the virtues of Good Government and the vices of Bad Government. There are few more convincing representations of the case for stability than those frescoes. Since the MPC has not, at least yet, discovered a modern Lorenzetti, I shall present the case for price stability in a more orthodox, if less compelling, visual form.

Chart 1 shows consumer price inflation in this country over the past 50 years. The decade of inflation targeting stands out as a period of low and stable inflation. Table A shows that not only has inflation been lower since inflation targeting was introduced, but that, as measured by its standard deviation, it has also been more stable than in recent decades. Moreover, inflation has been less persistent—in the sense that shocks to inflation die away more quickly—under inflation targeting than for most of the past century.⁽¹⁾

Chart 1
Annual inflation in the United Kingdom



Source: ONS.

Four-quarter growth rate of the quarterly retail price index (RPI) until 1974, and four-quarter growth rate of the quarterly retail price index excluding mortgage interest payments (RPIX) after 1974. Note that the RPI methodology before 1974 did not include mortgage interest payments, so the RPI series before 1974 is equivalent to RPIX in that sense. Data up to 2002 Q3.

Now this fall in inflation has led to sharp reductions in nominal interest rates, at both short and long time horizons, as shown in Table B. That reflects both lower inflation expectations and smaller risk premia to compensate for future inflation uncertainty. The total inflation premium—the sum of expected inflation and

Table A
Inflation in the United Kingdom

	Mean	Standard deviation
1950–59	4.14	1.06
1960–69	3.65	0.72
1970–79	13.07	1.81
1980–92	6.40	1.14
1993–2002	2.49	0.24
1950–2002	5.93	1.41

Source: Bank of England calculations based on ONS data.

Mean inflation is the total increase in the quarterly price level (RPI until 1974, RPIX after 1974) over the period indicated, expressed as a four-quarter growth rate. Standard deviation is calculated on quarterly inflation rates (not annualised) over the period indicated. Data up to 2002 Q3.

the inflation risk premium—is measured by the difference between yields on conventional and index-linked government securities. Chart 2 shows that the total inflation premium fell significantly on the announcement of Bank of England independence and the creation of the MPC. It is highly suggestive of a fall not just in expected inflation but also in the inflation risk premium. In principle, the behaviour of businesses and households depends on real interest rates—nominal

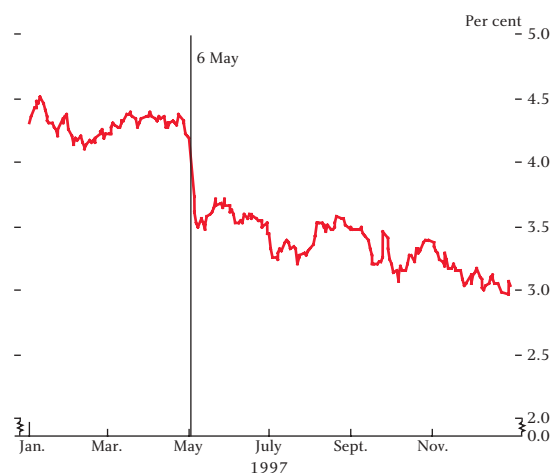
Table B
Short and long interest rates in the United Kingdom

	Short rate		Long rate	
	Mean	Standard deviation	Mean	Standard deviation
1950–59	2.87	1.67	4.40	0.88
1960–69	5.51	1.31	6.58	1.07
1970–79	8.92	2.81	11.94	2.41
1980–92	11.28	2.23	10.83	1.88
1993–2002	5.58	0.88	6.38	1.59
1950–2002	7.09	3.59	8.19	3.32

Sources: Global Financial Data, Inc. and Bank of England calculations.

Short rates are three-month Treasury bill yields. Long rates are 20-year gilt yields. Data are monthly, and use the rate at the close of the last business day of the month. Data up to September 2002.

Chart 2
Total inflation premium expected in ten years' time, United Kingdom 1997



Source: Bank of England.

The total inflation premium is measured as the difference between implied forward nominal rates on conventional gilts ten years hence and implied real rates on index-linked gilts ten years hence.

(1) The conclusion reflects statistical tests including first-order autocorrelations of consumer price inflation over ten-year rolling windows, and estimated spectral densities for inflation from a random coefficient AR (4) and GARCH (1,1) model. The only periods in which persistence was lower than in the 1990s was in the early 1930s and early 1960s.

interest rates less the expected increase in prices.⁽¹⁾ To the extent that the inflation risk premium falls, then so too does the level of real interest rates. The evidence in Chart 2 suggests that real rates have fallen too, although by less than nominal rates.

So price stability appears to have led to a more stable macroeconomic environment, with fewer surprises to inflation, less inflation uncertainty, and a lower level of real interest rates. Has this improved nominal performance led to greater stability of the real economy? Table C shows that since 1992, output has grown at a little above its 40-year average, and has been much more stable than before. The standard deviation of quarterly growth rates over the past decade was less than half that in earlier periods.

Table C
Real GDP growth in the United Kingdom

	Mean	Standard deviation
1956–59	2.42	1.22
1960–69	3.15	0.92
1970–79	2.12	1.42
1980–92	1.86	0.84
1993–2002	2.76	0.36
1956–2002	2.42	0.98

Source: Bank of England calculations based on ONS data.

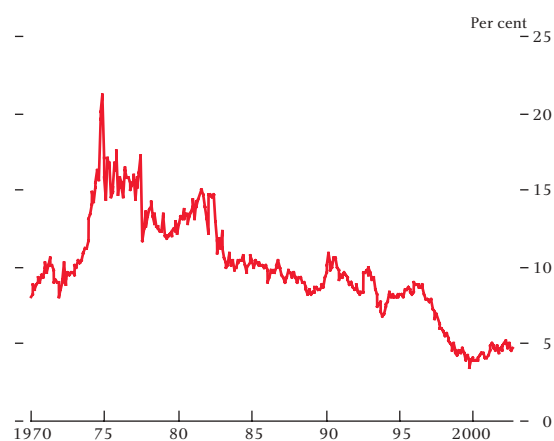
Mean GDP growth is the total increase in real quarterly GDP over the period indicated, expressed as a four-quarter growth rate. Standard deviation is calculated on quarterly growth rates (not annualised) over the period indicated. Data up to 2002 Q2.

Can these gains in terms of greater stability be attributed to a more stable monetary regime? After all, a sceptic might argue that the causation runs from a more stable economic environment to lower inflation. But some of these alternative explanations, such as the rise in the share of services in total output and better inventory management, are part of longer-term trends and do not fit well with the observation that volatility has fallen sharply over the past decade. And shocks to the United Kingdom from the world economy and from the sterling real exchange rate have been as large, if not larger, over the past five years as in earlier periods.⁽²⁾

It is, of course, difficult to identify the effect of changes in the monetary policy regime on the path of total output. One approach is to consider long runs of data which make it easier to identify structural breaks in the behaviour of output. Luca Benati of the Bank of

England has been investigating the statistical properties of inflation over long periods for a number of countries. He finds that changes in the behaviour of inflation appear broadly to coincide with changes in the monetary policy regime. Some tentative evidence that this general conclusion applies to the United Kingdom can be found in the behaviour of ten-year forward interest rates on UK government bonds. At this horizon, high and variable interest rates are signs of high expected inflation and a large inflation risk premium. As shown in Chart 3, the ten-year forward interest rate has fallen significantly in recent years, and has been less variable since inflation targeting, and especially the MPC, were introduced.

Chart 3
Ten-year forward rates in the United Kingdom, 1970–2002



Source: Bank of England.

Implied forward nominal rates on conventional gilts ten years hence, calculated on the last business day of the month.

What is the mechanism by which monetary policy contributes to a more stable economy? I would argue that monetary policy is now more systematic and predictable than before. Inflation expectations are anchored to the 2.5% target. Businesses and families expect that monetary policy will react to offset shocks that are likely to drive inflation away from target. In the jargon of economists, the 'policy reaction function' of the Bank of England is more stable and predictable than was the case before inflation targeting, and easier to understand.⁽³⁾ More simply, monetary policy is not adding to the volatility of the economy in a way that it did in earlier decades.

- (1) If index-linked contracts were widely used the relevant real rate would be the index-linked rate. And if the risk premium were determined largely in an integrated world capital market without frictions then again the real rate would be the riskless index-linked rate.
- (2) Most of the evidence on the link between inflation and stability comes from the United States where the greater stability of output is evident over the past two decades. A number of recent studies have concluded that at least part of the explanation for greater stability can be attributed to better monetary policy, for example Taylor (1998).
- (3) The behaviour of monetary policy in the United Kingdom after 1992 more closely resembles a 'Taylor Rule' that has been shown to fit data in the United States than was the case before 1992. See the work of Ed Nelson of the Bank of England (Nelson (2001)).

The case for price stability: what have we learnt over the past ten years?

The costs of departing from price stability—either inflation or deflation—depend upon whether it is expected or comes as a surprise. In his 1992 lecture, Lord Kingsdown distinguished three costs of unanticipated inflation and four of anticipated inflation. I shall focus on the former, commenting on the latter only briefly. Although none of the ideas are new, research since 1992 has thrown new light on both the theoretical and the empirical relevance of the costs of inflation. The main costs of unanticipated inflation are:

(i) Distortions to production and investment resulting from mistakes in distinguishing between relative and absolute price changes

The crucial link between price stability and production and investment is that high inflation is associated with more volatile and uncertain inflation. I showed earlier that as inflation has fallen in Britain, so too has its variability. The same link can be seen in cross-section data. Chart 4 shows the relationship between average inflation and its variability, measured by its coefficient of variation, over different time horizons for a sample of 144 countries. In all cases it is clear that inflation uncertainty increases with the average inflation rate.

But does this link between inflation and its volatility mean that higher inflation results in greater variability of relative prices? Chart 5 provides the answer for the United Kingdom. For each (approximate) decade for which the data on 80 subcomponents of the retail prices index are available, the chart shows the relationship between the standard deviation of those relative prices and the inflation rate in each month. At low inflation rates, say up to 4% a year, it appears that it is the absolute value of changes in relative prices that is linked to the inflation rate. This would be the case, as in Britain recently, where changes in relative prices, whether up or down, were largely responsible for short-term fluctuations in the inflation rate around a relatively stable long-run level. Variability in relative prices might lead inflation to be either above or below the inflation target, but not systematically in one direction or the other. Increases in house prices move the inflation rate up and falls in oil prices move it down.

In both cases, an increase in the variability of relative prices leads to movements of inflation away from the target, but not in a systematic direction. But at higher rates of inflation (or deflation) the deviation of inflation from zero is positively correlated with the variability of relative prices. Hence, outside a range close to price stability, the higher the inflation rate, the greater is the variability of relative prices.

So inflation makes it more difficult for firms and households to work out whether the prices of the products they buy and sell have changed relative to other goods, or whether there has been a change in the overall price level. Such confusion can lead firms to produce, at least temporarily, the wrong level of output. And if many firms make these mistakes at the same time then the result is an unnecessary fluctuation in aggregate output.

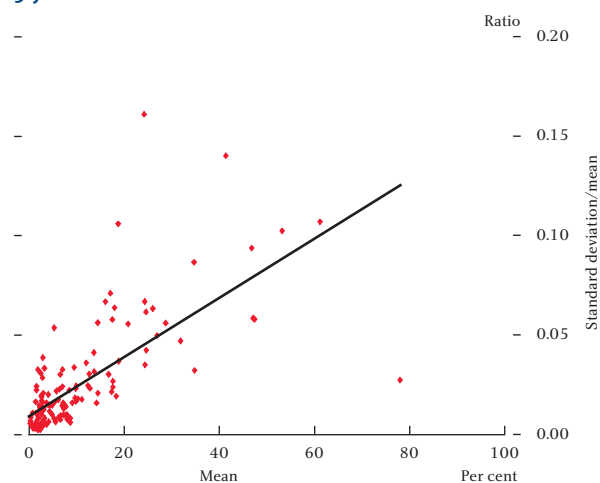
Another decision affected by uncertainty about prices is investment. Many investments are specific to a particular model or product, and so they become sunk costs. For such irreversible investments it may pay to wait before investing since time will resolve some of the uncertainty. A Premiership football team may decide to postpone the construction of a new stadium until their survival in the League is assured. Or a car manufacturer may postpone a decision about opening a new plant to see if a rise in demand is temporary or appears likely to last. And that uncertainty could stem from a difficulty in disentangling relative from absolute prices. In the language of finance, there is an option value to waiting when there is uncertainty about the returns on an irreversible investment.

So a project must offer a rate of return sufficient not only to cover the cost of financing of the project, but also the option value to waiting. That may explain why surveys of firms show that their hurdle rates of return are often well in excess of the cost of either equity or debt finance. For example a CBI survey last year found that the average real hurdle rate for UK firms was 11.3%—down from rates of around 15% in surveys conducted in 1994—but still well above the cost of financial capital. If uncertainty about inflation creates an option value to waiting, then it will reduce investment. And there is growing empirical evidence that inflation is a key explanatory variable for cross-country differences in investment to output ratios.⁽¹⁾

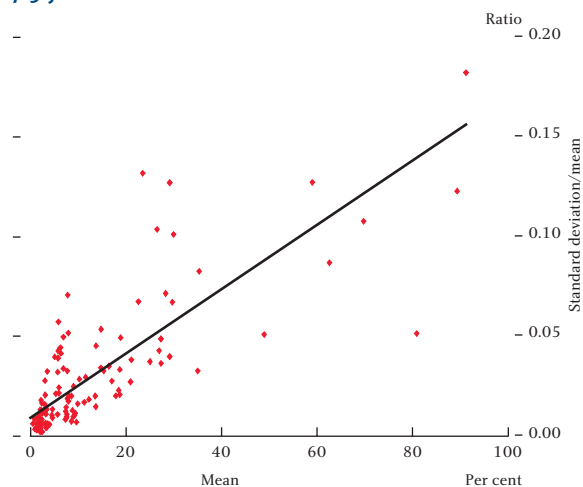
(1) See, for example, Pindyck and Solimano (1993). Examples of how the option value to waiting can lead to significant increases in required rates of return are given in Dixit and Pindyck (1994).

Chart 4
Cross-country relationship between level and variability of inflation

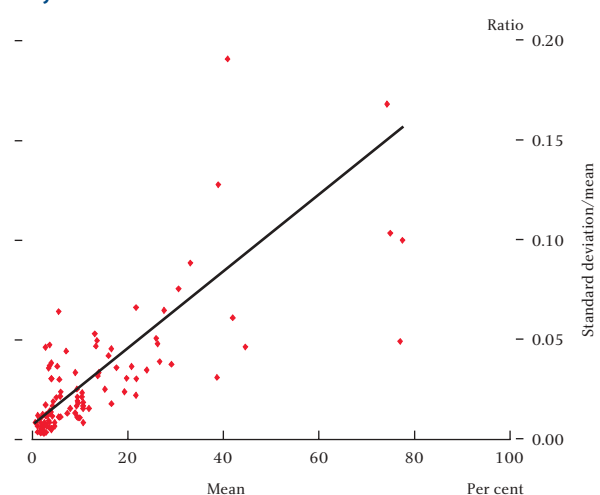
5-year inflation



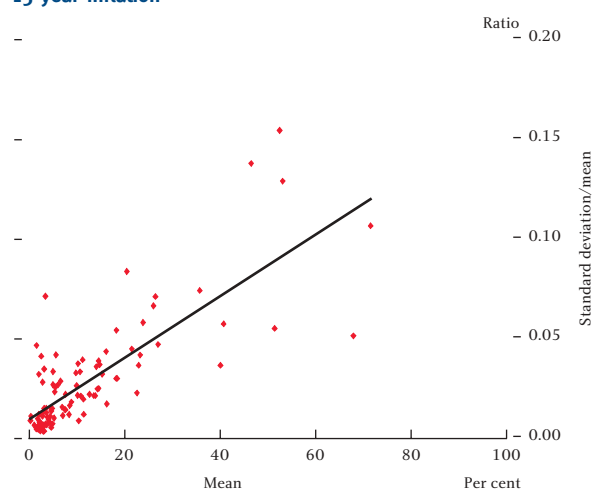
7.5-year inflation



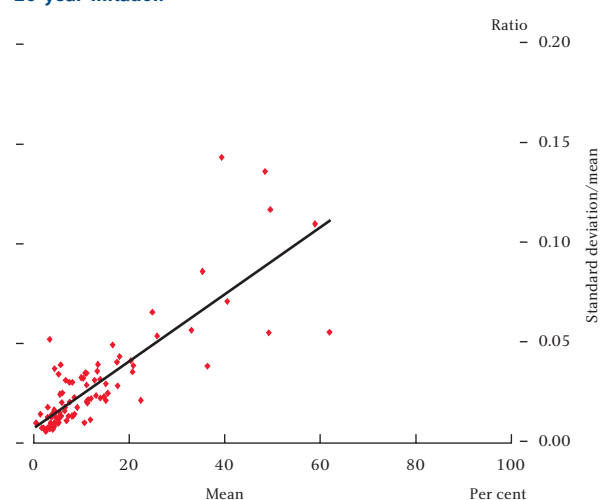
10-year inflation



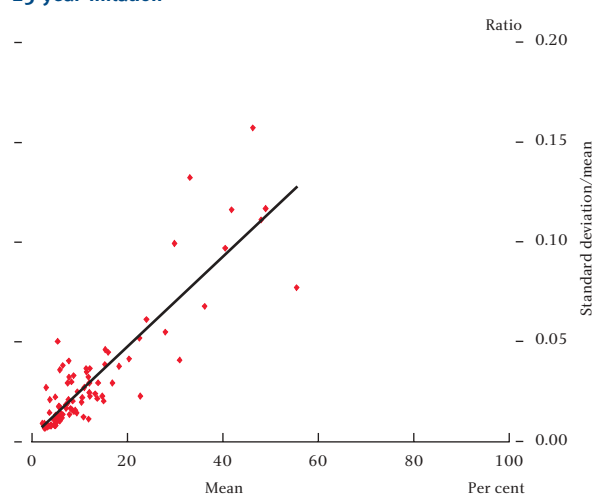
15-year inflation



20-year inflation



25-year inflation

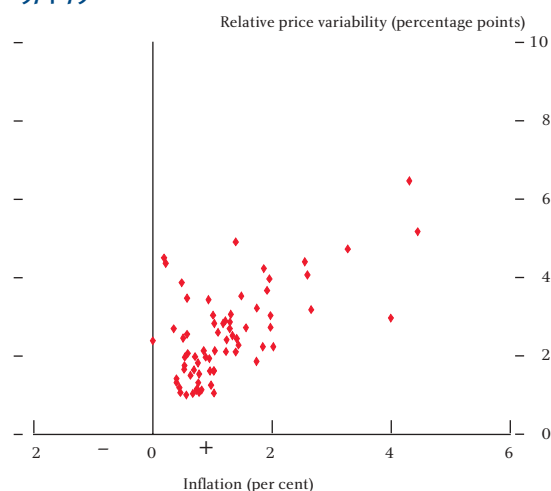


Sources: IMF *International Financial Statistics*, data item 64, and Bank of England calculations.

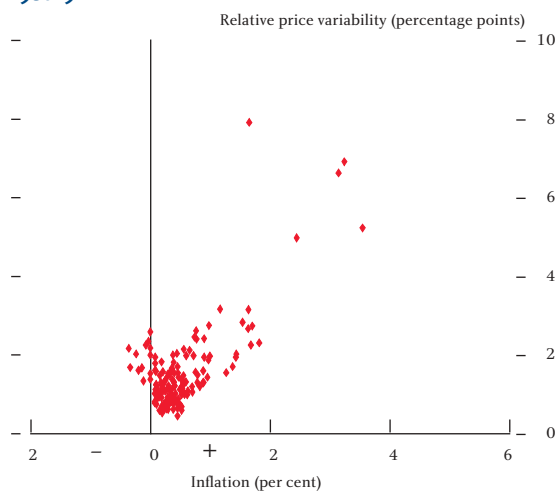
Mean inflation is the total increase in the quarterly consumer price index, expressed as a four-quarter growth rate, over the indicated horizon ending in 1999 Q4. The variability of inflation is the coefficient of variation (standard deviation divided by the mean) of the gross inflation rate (ie 1 + growth rate) over the indicated horizon ending in 1999 Q4. Each panel covers all the countries for which a consumer price index was available over the indicated horizon. The largest sample size is 144 (for the five-year horizon), the smallest sample is 85 (for the 25-year horizon).

Chart 5 Inflation and relative price variability in the United Kingdom

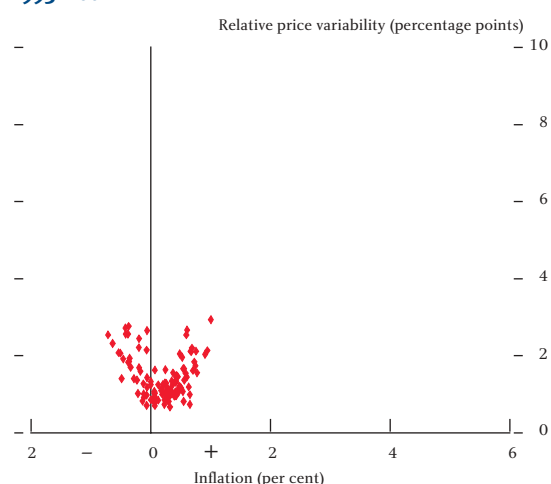
1974–79



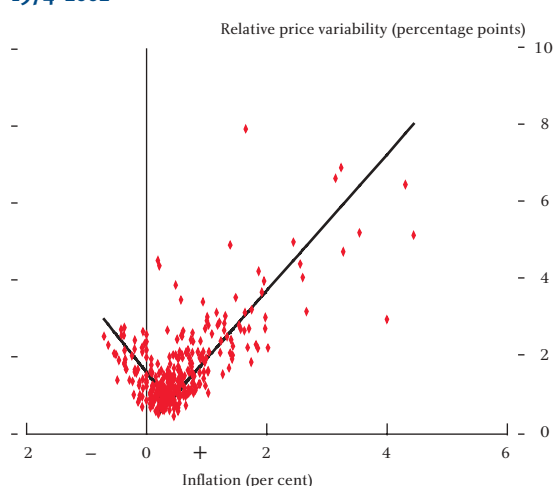
1980–92



1993–2002



1974–2002



Source: Bank of England calculations based on ONS data.

Inflation is the monthly percentage change in total RPIX. Relative price variability is the cross-sectional standard deviation of the monthly percentage changes of the approximately 80 subcomponents of the RPIX in each month. Data end in August 2002.

(ii) Redistribution of wealth between debtors and creditors

Unexpected changes in the price level—the standard of value used to define contracts—produce arbitrary redistributions of wealth. As Keynes wrote in his powerful advocacy of price stability in *A Tract on Monetary Reform*, ‘We leave saving to the private investor. We leave the responsibility for setting production to the business man. These arrangements have great advantages. But they cannot work properly if the money, which they assume as a stable measuring-rod, is undependable. Unemployment, the precarious life of the worker, the disappointment of expectation, the sudden loss of savings, the profiteer—all proceed, in large measure, from the instability of the standard of value.’

Or, as Lenin remarked, the best way to destroy capitalism is to debauch the currency. It is arguable as to whether it is high inflation or serious deflation which results in the greater economic damage. In Europe in the 1920s hyperinflation undermined economic and social arrangements, as it has done more recently in Latin America. But deflation has proved just as unpopular as inflation. In 274 A.D. the Roman Emperor Aurelian tried to restore the integrity of the coinage which had been adulterated by workmen in the Mint. Aurelian exchanged good money for bad, and ordered the destruction of accounts drawn up in the devalued currency. In the long run the operation restored the value of money. But in the short run it caused hardship. Gibbon, in his *Decline and Fall of the Roman Empire*, observed that ‘a temporary grievance of such a nature can scarcely excite and support a serious civil war’.

Unfortunately, taking a different and more Keynesian view that in the long run we are all dead, the population at the time rose in insurrection. Many of them found that they were dead in the short run as well, with 7,000 soldiers and countless civilians perishing during the suppression of the uprising.

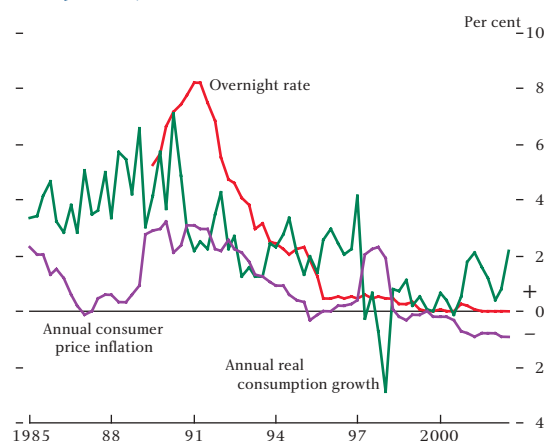
So let us consider the costs of wealth redistributions arising from unanticipated deflation. Such redistributions can lower aggregate demand. Why? Since it is difficult either to borrow or insure against uncertain future employment and earnings opportunities, current assets act as a buffer stock to make it possible to smooth consumption in the face of shocks to future prospects. When net worth is small it is risky to run down the buffer stock even further, and so the marginal propensity to spend out of wealth is much higher for households with low net worth than for families whose assets comfortably exceed their liabilities. If significant numbers of debtors have little net worth—recent first-time house-buyers with high debt-to-value ratios are a prime example—then an unanticipated deflation could cause a sharp fall in aggregate consumption spending.

Such effects can be amplified if spending—consumption or investment—depends on the value of the assets that are used as collateral for loans. A fall in prices can produce a vicious circle in which the initial fall in demand lowers asset prices, reducing the value of collateral, which in turn leads borrowers to repay debt, exacerbating the original decline in aggregate demand. This ‘debt deflation’ was first formulated clearly by Irving Fisher in the 1930s, and has recently been revived in a more sophisticated form by Nobu Kiyotaki and John Moore, here at the London School of Economics.

Because deflations are, fortunately, few and far between, there is a lack of hard empirical evidence on the quantitative significance of debt deflation. In 1993, I argued that the depth of the recession in the United Kingdom and the United States in the early 1990s was the result of debt deflation. Consumption fell more sharply than would have been expected given movements in incomes and interest rates, reflecting an unexpected fall in inflation and asset prices. The effects on consumption of negative equity in housing were particularly severe.

The experience of Japan may add to our knowledge in this area, although, as shown in Chart 6, despite a

Chart 6
Consumption, inflation and interest rates
in Japan, 1985–2002



Source: Thomson Financial Datastream.

Inflation is measured using the consumer price index excluding foodstuffs. The overnight interest rate is the nominal overnight uncollateralised call rate.

stagnant economy over the past decade, deflation of consumer prices has not been especially large. And I am confident that all central banks will do their best to prevent the sample size of countries suffering from serious deflation from increasing.

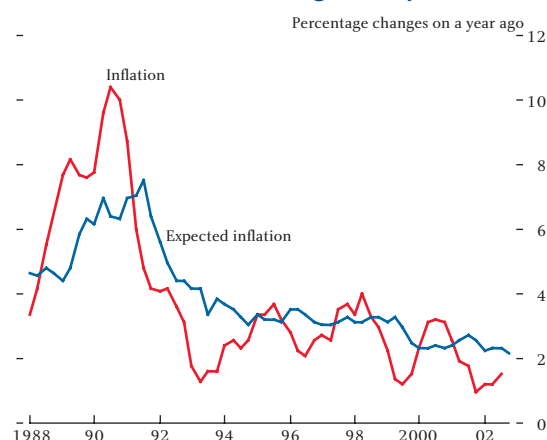
(iii) Aversion to long-term contracts and excessive resources devoted to hedging inflation risks

As we have seen, high inflation goes hand in hand with greater uncertainty about future inflation. Inflation is, therefore, associated with a positive risk premium to compensate investors for that uncertainty. The longer the time horizon, the greater the risk premium is likely to be. That discourages long-term contracts and interest rates in such contracts will often depend upon future spot interest rates. Floating-rate mortgages are a good example. With a floating-rate mortgage the borrower is exposed to the risk of sharp fluctuations in the proportion of income that is devoted to debt service, as many households in Britain still remember from the late 1980s when interest rates doubled to 15%. Fixed-rate mortgages eliminate that risk, but at the cost of introducing a new risk: the real value of the outstanding debt may change relative to the value of the house. John Campbell and João Cocco (2002) have suggested that a superior contract would be a fixed-rate mortgage where the principal was index-linked. That would reduce both income and capital risk. For whatever reason the market has not generated many private-sector index-linked contracts, despite the encouragement of high inflation in the past. Perhaps that is because the risks are generated not by some exogenous process, but by policy decisions. In any event, price stability is a good alternative to indexation.

The move from a regime of high inflation to one of price stability can have consequences which again are best illustrated by the housing market. A credible move to inflation targeting can bring down inflation expectations relatively quickly, even if with a lag. Chart 7 shows that inflation expectations, as measured by surveys, fell steadily following the introduction of inflation targeting, and are now anchored on the 2.5% target. But a move to low inflation has other consequences that may be less easily understood. Price stability means lower nominal interest rates, and lower mortgage interest payments. It may also mean lower real interest rates if the inflation risk premium falls. But the fall in nominal rates is likely to be much larger than the fall in real rates. The lower mortgage payment largely reflects a rise in the effective duration of the loan because inflation no longer erodes the real value of the debt as quickly as before. In a low inflation world, nominal incomes rise more slowly than before and the real burden of servicing the debt persists. It may take longer for households to work out the impact of low inflation on real interest rates than to realise that the rate of increase of prices of everyday purchases has fallen. Learning takes time.

One possible consequence of a slow adjustment to low inflation is that households may mistake too much of the reduction in nominal interest rates for a permanent fall in the real rate. As a result, asset prices are bid up to levels that prove unsustainable when learning finally occurs—and at the LSE you know that in time we do learn. How far this theoretical argument applies to the British housing market at present is difficult to say, but

Chart 7
One-year ahead inflation expectations and inflation outturns in the United Kingdom, 1988–2002



Sources: ONS and Basix.

Inflation is the four-quarter change in the RPI. Expected inflation is based on the quarterly Barclays Basix survey of inflation one year ahead. It is the weighted average across all surveyed subgroups, excluding the general public. Expected inflation is lagged one year in the chart, so that expectations and outturns for the same period can be compared.

it demonstrates the risks from current house price to earnings ratios that are close to the peaks reached in the late 1980s.

So much for the costs of unanticipated inflation. What are the costs of anticipated inflation? Time permits me to comment only briefly on the four costs of anticipated inflation noted by Lord Kingsdown.

(i) Distortions to cash balances

Money—notes and coin—may no longer, as Sally Bowles claimed, make the world go round, but, even in a world of plastic, it oils the wheels of transactions. Cash still accounts for a large number of transactions, albeit a smaller fraction of the value of all transactions. The opportunity cost of holding cash is the interest rate on deposits. Inflation raises nominal interest rates and hence this cost. So agents economise on their real money balances, and incur additional costs in the form of more frequent trips to the cash dispenser—the so-called ‘shoe-leather costs’ of inflation. The traditional view was that these costs could be measured by the area under the money demand curve. Such estimates were typically small, and left researchers wondering if the costs of inflation were really all that important. But high inflation rates can affect more than just money demand. If agents economise on money balances, transactions costs may rise in markets for goods, labour and assets. As argued by Hahn (1965) and more recently articulated by Wallace (2001), many monetary models contain hidden inconsistencies in the sense that they ignore the credit or trade frictions—in particular, imperfect monitoring and enforceability—that give to money an essential role in the first place. To assess the welfare implications of inflation we need a theoretical framework that takes seriously the role of money in all these transactions. I have discussed elsewhere (King (2002)) the potential importance of money in reducing the transactions costs of firms by reducing liquidity premia in a wide range of financial markets. There is much to learn here.

(ii) Incomplete indexation of the tax system

A second cost of anticipated inflation is the added inefficiencies that arise when an already distortionary tax system is incompletely indexed. Martin Feldstein (1999) has edited a major study of the costs of incomplete indexation which includes a detailed analysis of the tax distortions to saving, consumption and investment in several major countries, and to which the

Bank of England contributed. The benefit of reducing inflation in an already low inflation environment is estimated to be lower in the United Kingdom than in some other countries because some parts of the tax system are indexed. Nevertheless, the authors estimate that a reduction in inflation by 2 percentage points would bring an annual benefit equivalent to 0.2% of GDP. That may sound small, but it is a large absolute number. Against that, the end of mortgage interest deductibility will have lowered the impact.

(iii) Front-end loading of debt burdens

A third distortion is that of front-loading of the real debt burden when debt contracts are fixed in nominal terms. Inflation reduces the amount that households borrow because it raises the cost of servicing the loan in the early years. In this way decisions on consumption and investment may be distorted.

(iv) Costs of changing price lists

The costs of changing price lists and catalogues—so-called menu costs—are generally agreed to be of little direct consequence. But they may produce a degree of nominal rigidity in wages and prices which takes on greater significance. Inflation now causes relative price variability as not all firms are able to change their prices at the same time. The cost of greater relative price variability was discussed above, and continues to be an active field of research. Recent work at the Institute for Fiscal Studies (2002) shows that when inflation is higher, there is a larger dispersion in the inflation rates faced by individual households. This finding points strongly to the role of nominal rigidities in contributing to relative price dispersion.

Taken together, the verdict of economics, history and common sense is that inflation and deflation are costly. It is clear that very high inflation—in extreme cases hyperinflation—can lead to a breakdown of the economy. There is now a considerable body of empirical evidence that inflation and output growth are negatively correlated in high-inflation countries. For inflation rates in single figures, the impact of inflation on growth is less clear. But in a study of 133 market economies over the past 50 years, Stanley Fischer and his co-authors (2002) concluded that ‘the old idea that in some sense inflation may be good for growth or is perhaps an inevitable part of the growth process should remain buried in the cemetery of harmful policy ideas’.

Price stability: what does it mean in practice?

So there is a strong case for price stability. But what does price stability mean in practice? Recall that the definitions of price stability offered by Alan Greenspan and Alan Blinder are rather general in nature and make no reference to particular indexes of prices or precise numbers for inflation. There are good reasons for this. The prices of the goods that I buy may rise at a different rate from the goods that you buy. Relative prices are always changing. And the basket of goods and services that you buy today is very different from the basket you could or would have bought 50 or 100 years ago. The official retail price index now includes computers and cable TV, but no longer bowler hats or the price of admission to cricket matches. Measurement problems mean that there is no unique way to calculate inflation.

Information on prices of individual commodities in the past can be found in Harrods catalogues which were published from the mid-1890s until 1930, catalogues for the Army and Navy Stores from 1872 to 1940, and the advertising records for Selfridges which go back to 1909. To illustrate the problems of measuring inflation, I shall draw largely on historic price material kindly provided by Harrods—mainly the Catalogues, Harrods News, and Harrods Food News. No records were published after 1970, so we have supplemented the historical data by our own researches. And I am very grateful to the young Bank of England economist who was apprehended in the Food Hall, suspected of comparing prices for a competitor who was opening a store across the road.

The richness of this information can be seen from the size of the Catalogue for 1907—weighing over six pounds and containing 1,375 pages. In those days the telegraphic address of Harrods was ‘Everything, London’. The Internet has nothing on Harrods in 1907 when a telephone service with real people answering was available to take orders right through the night which were despatched early the next day with free local delivery (as far as Windsor) and by mail elsewhere.

According to the catalogues, a record player in Harrods cost £11 in 1910 (approximately £627 in today’s money). That would have bought you a hand-cranked machine that provided low-quality sound. Today, you could buy a record player for as little as £39 on the Internet, and at Harrods a better quality model for £250. How much have record players increased in price? Ignoring quality

changes, the price rose by a factor of 3.5 (that is, £39/£11). But ignoring the vast quality improvements would surely overstate this increase—a *quality change bias*. So how do we quantify the increase in the quality of today's record player relative to the one in 1910? Statistically, there are a number of ways of dealing with this issue: one is to determine the price as a function of characteristics that do not change over time. The prime example of such hedonic pricing techniques in use today is for pricing computers, where the quality characteristics—performance in terms of speed and memory—can be fairly accurately measured. But hedonic pricing is not the only way to deal with this measurement issue, and recent research suggests that these techniques may overstate the extent to which quality has improved.

Is a record player still the relevant product, since record players today are only used by a small group of enthusiasts of—now outdated—vinyl records? Perhaps a computer or CD (or DVD or MP3) player is the relevant product today. From about £34 you can buy a CD player on the Internet today. This is a much more sophisticated piece of equipment than even today's record player, and its features are impossible to compare with those of a 1910 record player. If we ignore the invention and marketing of new products, we introduce a *new product bias*.

To illustrate the quality change and the new product bias, imagine that we go shopping in Harrods both today and in 1910. Suppose that we are given £350 to spend—the same amount in both years. In 1910 you could have bought a vacuum cleaner, a record player, an iron, a camera, and a telephone. The vacuum cleaner would have spread as much dust as it removed, the record player would have been hand-cranked and the iron would need to be filled with coal. The camera would have been bulky and awkward to set up, and the telephone would have been largely silent because so few people owned one. Today you can buy a similar bundle of goods for the same total outlay, but all would be of vastly superior quality. So for durable goods it is not clear that the cost of living has increased at all.

But if we buy food, however, the results are very different. Unlike appliances, many of the food items in 1910 are unchanged today—McVitie's digestive biscuits,

Quaker oats, Rose's Lime Juice, Bournville cocoa, Frank Cooper's Oxford marmalade, Marmite, Heinz baked beans and Colman's mustard are only some of the familiar items for which precise comparisons over the years are possible. In 1910 you could have fed yourself on 10p a day by eating Marmite on Hovis toast for breakfast; eggs, bacon and toast for lunch; Heinz beans on toast for dinner; with a pint of milk to drink. The same menu, consisting of exactly the same brand products, would cost £4.80 today. The food basket has increased in price by a factor of 48.

A vacuum cleaner, if you wanted one in 1910, cost £229. That is more than six years worth of food based on the menu used in the previous example. A vacuum cleaner was an item of such luxury that owners would invite their friends round to 'Hoover parties' to show off their prized possession. Over the years, the price of food increased in nominal terms by a factor of 48, but the price of vacuum cleaners stayed roughly the same. Today you can still buy a vacuum cleaner for £229. But that is only 47 days of food shopping, rather than six years. As vacuum cleaners became cheaper relative to food, people bought more of them—ignoring such change would introduce a *substitution bias*. If there is any degree of substitutability between products, then rational consumers would have taken account of such changes in relative prices, and the weight of this particular good in the consumption bundle may have changed. The overall result of the substitution is that the expenditure share of electrical appliances⁽¹⁾ has not changed much, at least not in the past 50 years. If we ignored the fact that vacuum cleaners were a rare luxury item in 1910 and applied today's quantities to calculate the 1910 consumption basket, we would greatly understate the increase in the average cost of living.

And, of course, Harrods today is not exactly the typical place to go shopping—there was not much talk in 1910 of suburban shopping centres, or of Internet shopping. Ignoring developments in retail practice introduces an *outlet bias*. Had the bias remained constant over the years, this would have been less of an issue for measuring retail price inflation, but it clearly has not.

Quality change bias, new product bias, substitution bias and outlet bias—these are some of the issues that the Boskin Commission discussed in its report on measuring inflation in the United States.⁽²⁾ The finding of the

(1) Electrical appliances and audio-visual equipment share was 0.021 in 1956 and was 0.018 in 2002.

(2) See Boskin, M *et al* (1996), 'Towards a more accurate measure of the cost of living', *Final report to the Senate Finance Committee from the Advisory Committee to Study the Consumer Price Index*.

report, which generated wide national and international interest, was that the US CPI might have overstated changes in the cost of living by between 0.8 and 1.6 percentage points per year. The examples I have given show how difficult it is to measure changes in the price level over time. Precision is not to be had. According to the official retail prices index, the general level of retail prices rose by a factor of 52 between 1910 and 2002. But changes in the nature of the goods and services available, and the nature of retail selling, make such comparisons treacherous.

Does this matter for price stability? Probably not. The Greenspan-Blinder definitions of price stability suggest that we know price stability when we see it, or rather, when we stop hearing about inflation. There is nothing mystical about the RPIX measure of inflation, nor the figure of 2.5%. But it is important to have a precise numerical target which is easy to understand in order to provide an anchor for inflation expectations and to which the MPC can be held accountable.

Monetary policy over the next decade: what are the challenges?

Although inflation targeting has delivered many of the benefits from low inflation that were promised ten years ago, there remain real challenges for monetary policy over the next decade. Two questions have been prominent recently. First, is inflation targeting enough? Second, is deflation, not inflation, the main threat at present?

Is inflation targeting enough? Do rapid increases in asset prices pose a threat to stability, even though inflation targeting has delivered steady growth with low inflation? Some commentators have suggested that monetary policy target asset prices in addition to inflation.⁽¹⁾ But which asset prices, and what would that mean for interest rates? House prices have been rising rapidly, and as a ratio to average earnings have reached the previous peak in the late 1980s. That might suggest that interest rates should have been higher. Sterling has for six years now been around 30% higher against the euro (or its predecessors) than before, the trade deficit has grown and the profitability of manufacturing has fallen by two-thirds. That might suggest that interest rates should have been lower. Equity prices rose by 120% between 1995 and 2000, before falling 40% subsequently. Presumably that would have implied first

higher and then lower interest rates. What this means is that asset prices cannot sensibly be viewed in isolation, but only in the context of the economy as a whole. I believe that, although there are justifiable concerns about recent movements in asset prices, the policy dilemma can be analysed within the framework of inflation targeting that we have in the United Kingdom.

No honest person actually knows the 'equilibrium' level of asset prices. They are dominated by expectations of the prices that other investors will pay for those assets in future. The relevant uncertainties can rarely be quantified by observing the frequencies of events in the past. And the response of asset prices to changes in monetary policy is also unpredictable. So targeting asset prices directly is virtually impossible. But changes in asset prices can have a major impact on levels of spending and the MPC devotes considerable time to the question of how such changes should affect policy.

The immediate question is whether changes in asset prices have led to an imbalance within the economy that poses the risk of a large negative demand shock at some point in the future. I believe the answer is yes; but how big is that risk is extremely difficult to judge, and so the appropriate policy response is far from clear. Beneath the surface of overall stability in the UK economy lies a remarkable imbalance between a buoyant consumer and housing sector, on the one hand, and weak external demand, on the other. As a summary statistic of this imbalance, Table D shows that in the United Kingdom the growth of real domestic demand exceeded the growth of output by no less than $7\frac{1}{2}$ percentage points over the five years to 2002 Q1, more than over any five-year period in the 1980s and more than in any other major country during the recent past. Even the optimistic Mr Micawber would realise that this cannot continue indefinitely. How then, and over what timescale, will these imbalances unwind?

Table D
Domestic demand and output growth

	United Kingdom	United States	Euro area	Japan
Output growth (1997–2002 Q1)	2.4	3.2	2.5	-0.4
Domestic demand growth (1997–2002 Q1)	3.8	3.9	2.3	-0.6
Cumulative difference	-7.5	-4.2	0.8	0.9

Sources: ONS (for UK data) and Thomson Financial Datastream (for data on the euro area, United States and Japan).

Growth rates are calculated as the total increase in output (and domestic demand, respectively) over the period 1997 Q1–2002 Q1, based on quarterly data, expressed as a four-quarter growth rate. Cumulative difference is the cumulative growth rate, in percentage points, of output less domestic demand.

(1) The most rigorous statement of the case for stabilising asset prices is Dupor (2002).

Three possibilities deserve consideration. First, the rapid growth in household consumption—averaging over 4% for the past five years—may reflect an adjustment to higher real disposable incomes. Consumption growth would then slow naturally as spending and debt reach their new levels. The imbalance between domestic demand and output would unwind as steadily as it built up, with no reason to fear a sudden correction. For this to occur the source of higher disposable incomes must be permanent. In part the increase in recent years has resulted from the improved terms of trade—7% up on five years ago—which raise real national income for any given level of output. The main threat to the persistence of that improvement is the possibility of a fall in sterling that may be a necessary part of the rebalancing of the UK economy. It is very hard to assess the risk of that over any given time horizon. So far the path of consumer spending is not inconsistent with this benign outcome.

The second possibility is that the level of debt taken out by households—the debt-to-income ratio is now at an all-time high—makes households sensitive to any adverse future shock to their employment or income prospects. In that event the risk is of a sharper adjustment of consumption to the shock than might otherwise have occurred. Monetary policy would respond, but a large negative demand shock might result in an undershoot of the inflation target for some considerable time.

The third possibility I touched on earlier. Households may adjust more quickly to the implications of a low inflation world for the prices of goods and services than for nominal interest rates or the future growth of nominal incomes. A mistaken underestimate of real interest rates or overestimate of nominal income growth may raise borrowing, spending and asset prices temporarily. Eventually households learn and consumption adjusts, again possibly sharply.

The policy dilemma is that by allowing consumption and demand to grow rapidly there is a risk that there will be a sharp correction of demand later. The essence of the argument is well put by Borio and Lowe who, in a BIS Working Paper, argued that, ‘lowering rates or providing ample liquidity when problems materialise, but not raising them as imbalances build up, can be rather insidious in the longer run. They promote a form of moral hazard that can sow the seeds of instability and of costly fluctuations in the real economy’. In practice it is

difficult to know whether an ‘imbalance’ does contain the seed of a future negative demand shock on a scale that would leave inflation below the target for some considerable time, or whether it will unwind of its own accord.

The fact that growing imbalances might cause sharp deviations of inflation from target at some point in the future, raises the possibility of a trade-off between deviations of inflation from target over the next year or so and deviations of inflation from target further ahead. That, I believe, is the right way to think about the challenge to monetary policy posed by asset price movements. Although there are no simple answers I hope I have shown that inflation targeting is enough, provided that one thinks carefully about the horizon over which policy can hope to affect inflation.

The second challenge for monetary policy over the next decade is the possibility of deflation. That prices are now rising at the slowest rate for decades is, of course, a positive achievement of which the Bank is proud. But is the real threat now deflation? It is important to recognise that falling prices of manufactured goods are not the same as general deflation. In fact price stability, in the sense of an inflation rate overall of around $2\frac{1}{2}\%$ a year, is likely to mean that the prices of manufactured goods will, on average, not rise at all. Faster productivity growth in manufacturing than in services, averaging around 2 percentage points over the past 20 years, means that the prices of services will rise faster than those of manufactured goods. And the rise in sterling over the past five years increased the difference between inflation rates in the two sectors.

Table E shows the inflation rates for goods and services in the major economies. Positive rates of inflation for services, which account for around half of consumer spending, show deflation in most of the world economy is still some way off. In all countries over the past decade the gap between goods and services price inflation reflects productivity differences. That gap has widened somewhat in recent years as increasing competition from new producers has driven down prices of tradable goods. But the striking feature of the table is the extent to which the difference has increased to no less than 5.7 percentage points in the United Kingdom, much more than in the United States where in turn the gap is larger than elsewhere. Exchange rate movements are largely responsible for these differences. The extent to which services inflation has risen relative to goods

Table E
Total, goods and services inflation

	United Kingdom	United States	Euro area	Japan
CPI inflation (year to Aug. 2002)	1.9	1.7	2.2	-0.9
CPI goods	-1.1	-0.1	1.4	-1.6
CPI services	4.6	3.1	3.3	0.0
Services - goods inflation	5.7	3.2	1.9	1.6
Services - goods inflation (1990-97)	1.6	1.6	1.6	1.3
Services - goods inflation (1990-2002)	2.3	1.8	1.3	1.3

Sources: ONS (for UK data) and Thomson Financial Datastream (for data on the euro area, United States and Japan).

Inflation rates are calculated as the total increase in the price index over the indicated period, based on monthly data, expressed as a twelve-month growth rate.

inflation is another manifestation of the imbalance within the UK economy.

Deflation—in the sense of a sustained fall in the aggregate price level—can be found among the G7 economies only in Japan, where the consumer price level has been falling almost continuously for four years and by a cumulative total of 4%. Elsewhere, deflation is remote.

All of this serves to remind us that, with a single instrument, monetary policy cannot ensure that inflation is at target and output on trend all of the time. To suppose otherwise is to believe in the ‘myth of the straight line’, as Nigel Lawson described it. Monetary policy can reduce, but not eliminate, fluctuations in output. Cycles in real activity sometimes reflect behaviour outside the influence of monetary policy. As Lawson (1994) put it, ‘I find it wholly unconvincing to believe that the credit cycle is caused simply by mistakes in monetary policy. Of course, such mistakes can exacerbate the cycle; but the cycle would be there without them. There is no way in which the monetary authorities can fine-tune bank lending, any more than they can fine-tune expectations.’

That is why the framework introduced in 1997 explicitly recognises that the MPC would not attempt to bring inflation back to the target immediately following a large shock. As a result inflation might deviate from the 2.5% target by more than 1 percentage point. That would require the Governor to write an open letter to the Chancellor. Ed Balls explained in his Oxford lecture in 2001, ‘Some have assumed it [the requirement to write an open letter] exists for the Chancellor to discipline the MPC if inflation goes outside the target range. In fact the opposite is true. In the face of a supply-shock, such as a big jump in the oil price, which pushed inflation way off target, the MPC could only get inflation back to 2.5 per cent quickly through a draconian interest rate

response—at the expense of stability, growth and jobs. Any sensible monetary policymaker would want a more measured and stability-oriented strategy to get inflation back to target. And it is the Open Letter system which both allows that more sensible approach to be explained by the MPC and allows the Chancellor publicly to endorse it.’ That applies not just to a supply shock, but also to a demand shock that might follow a large movement in asset prices.

Both challenges to policy in the future have one aspect in common: they make us think carefully about the consequences of current policy for inflation well into the future. Asset prices raise the question of how far one should err on the side of caution while imbalances are building up. Deflation makes us aware of the risk that the zero lower bound on interest rates might bind in the future. They imply that while, in normal circumstances, monetary policy should focus on meeting the inflation target 18 months or two years ahead, in practice it may be necessary to look even further ahead about the consequences of present actions. But that should not deflect monetary policy from its task of keeping inflation on track to meet the target in the medium term, in other words achieving price stability.

Conclusions

When Lord Kingsdown addressed the LSE ten years ago, he said that departure from the Exchange Rate Mechanism offered an opportunity—‘An opportunity to demolish the image of the United Kingdom as a second-rate inflation-prone economy’. I believe that opportunity was taken. Today the United Kingdom has low and stable inflation. And that has not come at the expense of either output or employment. Britain has now experienced 41 successive quarters of positive economic growth. And unemployment in this country is lower than in any other G7 country. This greater stability is no accident. It is the product of a commitment to price stability as reflected in an institutional design encompassing a clear inflation target and a transparent and accountable process for reaching decisions on interest rates embodied in the Monetary Policy Committee.

At the beginning of my lecture I referred to the frescoes of Good and Bad Government by Lorenzetti. If today you go to the Palazzo Pubblico in Siena to see these wonderful paintings in the Sala della Pace, which I translate as the Room of Stability, you will see the results of allowing daylight to fall on the walls. Yes, greater

transparency—more daylight—has damaged the paintings. But if you look carefully, you will see that whereas daylight has caused no harm to the paintings of Good Government, it has indeed damaged Bad Government on the opposite wall. Even today, Lorenzetti's frescoes tell us about the benefits of transparency and the importance of careful institutional design.

Five years ago I delivered, again in this room, a lecture on the inflation target five years on. I argued that the new requirement on the Governor to write an open letter to the Chancellor whenever inflation deviated from target by more than 1 percentage point would provide ample opportunity for the Bank to restore the lost art of letter-writing. No letter has so far been required. But

given Alan Blinder's definition of price stability—when ordinary people stop talking about inflation and converse instead about more important matters—I hope that the MPC, by remaining focused on its task of meeting the inflation target, will be more successful in restoring the equally lost art of good conversation. In that way the inflation generation will give way to a new generation able to devote its energies to the wider economic and social policies from which our attention has so often been diverted by the need to control inflation.

The lesson of the past ten years is that it is stability—price stability and the broader economic stability which it generates—that is the platform for the deeper satisfaction portrayed so well in Lorenzetti's frescoes.

References

- Bakhshi, H, Haldane, A and Hatch, N (1999)**, 'Some costs and benefits of price stability in the United Kingdom', in Feldstein, M (ed), *The costs and benefits of price stability*, University of Chicago Press.
- Balls, E (2001)**, 'Delivering economic stability', Oxford Business Alumni Annual Lecture.
- Benati, L (2002)**, 'Investigating inflation persistence across monetary regimes', *Bank of England Working Paper*, forthcoming.
- Borio, C and Lowe, P (2002)**, 'Asset prices, financial and monetary stability: exploring the nexus', *BIS Working Paper*, No. 114.
- Boskin, M, Dulberger, E, Gordon, R, Griliches, Z and Jorgenson, D (1996)**, 'Towards a more accurate measure of the cost of living', *Final Report to the Senate Finance Committee from the Advisory Commission to Study the Consumer Price Index*.
- Campbell, J and Cocco, J (2002)**, 'Household risk management and optimal mortgage choice', Harvard University, *mimeo*.
- Crawford, I and Smith, Z (2002)**, 'The variation of inflation across the population', *Commentary No. 90*, The Institute for Fiscal Studies.
- Dixit, A and Pindyck, R (1994)**, *Investment under uncertainty*, Princeton University Press.
- Dupor, W (2002)**, 'Nominal price versus asset price stabilisation', University of Pennsylvania, *mimeo*.
- Feldstein, M (1999)**, 'Introduction', in Feldstein, M (ed), *The costs and benefits of price stability*, University of Chicago Press.
- Fischer, S, Sahay, R and Vegh, C (2002)**, 'Modern hyper- and high inflations', *Journal of Economic Literature*, Vol. 40, pages 837–80.
- Fisher, I (1933)**, 'Debt deflation theory of great depressions', *Econometrica*, Vol. 1, pages 377–57.
- Greenspan, A (1989)**, *Monetary report to Congress*, 21 February.
- Hahn, F (1965)**, 'On some problems of proving the existence of an equilibrium in a monetary economy', in Hahn, F and Brechling, F (eds), *The theory of interest rates*, Macmillan and Co, London.
- 'Interview with Alan S. Blinder' (1994), *The Region*, Federal Reserve Bank of Minneapolis, Vol. 8 (4).
- Keynes, J (1923)**, *A tract on monetary reform*, Macmillan and Co, London.
- King, M (1994)**, 'Debt deflation: theory and evidence (Presidential address)', *European Economic Review*, Vol. 38 (3–4), pages 419–45.
- King, M (2002)**, 'No money, no inflation—the role of money in the economy', *Bank of England Quarterly Bulletin*, Vol. 42 (2), pages 162–77. Forthcoming in Mizen, P (ed), *Central banking, monetary theory and practice: essays in honour of Charles Goodhart*, Volume One. Cheltenham, UK: Edward Elgar, 2003.

Kiyotaki, N and Moore, J (1997), 'Credit cycles', *Journal of Political Economy*, Vol. 105 (2), pages 211–48.

Lawson, N (1994), 'The conduct of economic policy', *Bank of England Quarterly Bulletin*, May, pages 175–80.

Leigh Pemberton, R (1992), 'The case for price stability', *Bank of England Quarterly Bulletin*, November, pages 441–48.

Nelson, E (2001), 'UK monetary policy 1972–97: a guide using Taylor rules', *CEPR Discussion Paper*, No. 2931, August. Forthcoming in Mizen, P (ed), *Central banking, monetary theory and practice: essays in honour of Charles Goodhart*, Volume One. Cheltenham, UK: Edward Elgar, 2003.

Pindyck, R and Solimano, A (1993), 'Economic instability and aggregate investment', *NBER Macroeconomics Annual*.

Taylor, J (1998), 'Monetary policy and the long boom', *Federal Reserve Bank of St Louis Review*, November/December.

Wallace, N (2001), 'Whither monetary economics?', *International Economic Review*, Vol. 42, pages 847–69.