Bond yield changes in 1993 and 1994: an interpretation

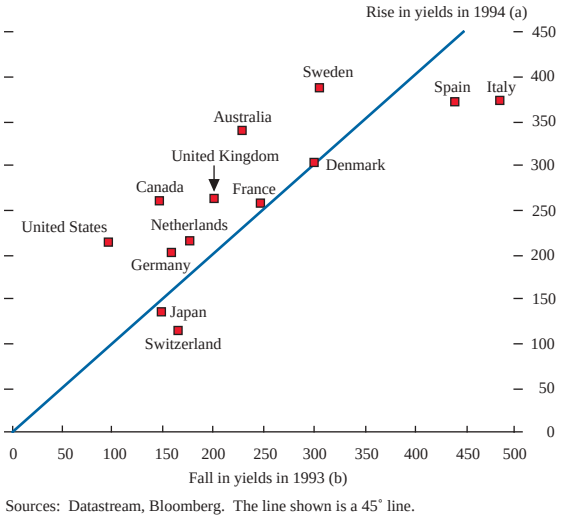
By Joe Ganley and Gilles Noblet of the Bank's Monetary Assessment and Strategy Division.(1)

Government bond markets experienced a prolonged rally in 1993. This reflected subdued inflationary pressure—the result of, among other influences, weak commodity prices, and declining output and rising unemployment in some countries. Last year, bond markets entered a protracted period of turbulence and reassessment following the monetary tightening by the US Federal Reserve that began on 4 February 1994. A number of explanations for this turnaround have been put forward, including the changing cyclical conjuncture and technical factors, such as the behaviour of hedge funds. This article gives the results of research exploring the role of monetary policy credibility in the yield changes over the two years.

Introduction

The fall in government bond prices in 1994 followed a long rally during most of 1993. Ten-year UK government bond yields fell by 210 basis points in 1993, but rose by more than 275 basis points in 1994. In the United States, ten-year yields fell 151 basis points between the end of 1992 and their low-point in mid-October 1993. During 1994, they rose by 200 basis points. The pattern of sharp declines in yields in 1993 followed by more than offsetting rises in yields in 1994 was seen in most major countries—as shown in Chart 1, which compares the falls in yields in 1993 with the rises in 1994.(2)

Chart 1
Changes in long-bond yields in 1993 and 1994

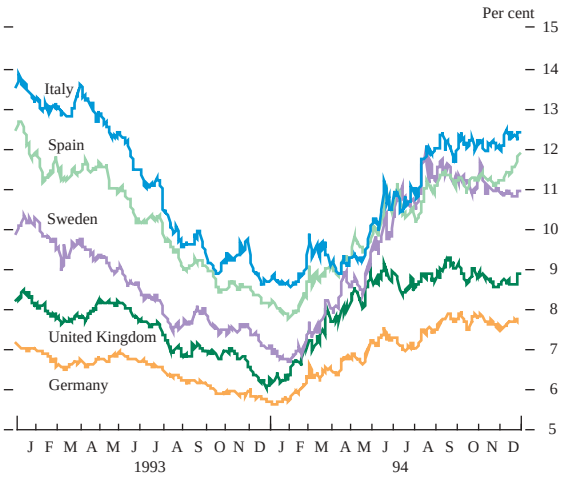


Sources: Datastream, Bloomberg. The line shown is a 45° line.

(a) Basis-point change in long-bond yields between 31 December 1993 and 31 December 1994.
(b) Basis-point change in long-bond yields between 31 December 1992 and 31 December 1993.

Another interesting aspect of the market rally in 1993 was the convergence of government bond yields. As Chart 2 shows for a selection of countries, the range of yields was far larger at the beginning of 1993 than at the end of the rally a year later. For a representative sample of countries, the range in yields fell from 890 basis points at 31 December 1992 to 495 basis points by 3 February 1994; the standard deviation of yields halved during the period. During 1994, yield levels began to diverge—with the range rising to 749 basis points by the end of December. Both the rally and the convergence of yields in 1993, therefore, were largely reversed in 1994. This suggests that bond market developments over the two years were closely connected and that a full explanation of the turnaround in yields in 1994 requires an examination of the preceding rally in 1993.

Chart 2
Yields on long-dated bonds in 1993 and 1994(a)



Sources: BIS and Datastream.

(a) Ten-year benchmark bonds, redemption yields.

Developments in 1993

The decline in yields in 1993 was widely attributed to a number of influences, several of them cyclical and affecting

(1) Gilles Noblet worked in the Division during a secondment to the Bank from the Bank of France.
(2) The bonds shown are chosen on the basis of their actual maturity so as to provide representative yields on long-dated government debt. It is likely that there are differences in the *duration* of these stocks—the average maturity of all their future payments, weighted according to the discounted present value of each payment; however, these differences are likely to be small.

market perceptions of the inflation outlook. Although recovery was well under way in the United States and the United Kingdom, output continued to fall in most of continental Europe during 1993. For example, GDP (at constant prices) fell by 1.7% in Germany, 0.9% in France, 0.7% in Italy and 1.0% in Spain. At the same time, unemployment was rising, indicating a slackening of labour markets in these countries. Non-oil commodity prices rose little during the first three quarters of 1993, before picking up fairly sharply in November and December. The twelve-month growth rate in Brent oil prices fell for most of the year. The decision to widen the fluctuation bands in the European exchange rate mechanism to 15% following the market turbulence in July 1993 reinforced the view that short-term interest rates might fall sharply in the following months to stimulate depressed activity. Together, these influences appeared to create a favourable environment for government bonds. Market participants increasingly felt that inflation was unlikely to be a policy problem in the foreseeable future.

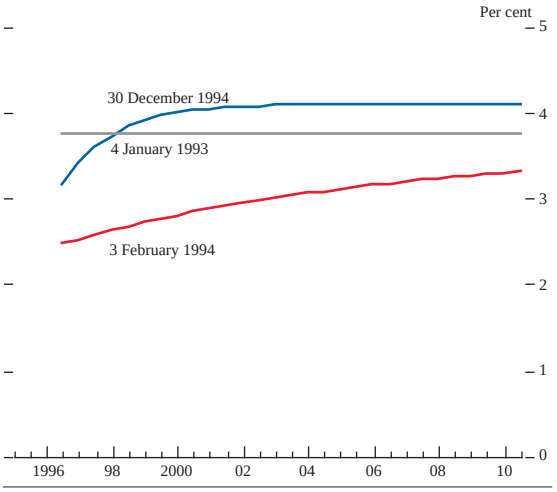
Towards the end of 1993, however, there were indications that the outlook was beginning to change. As mentioned, non-oil commodity prices began to pick up sharply in November and December in response to growing evidence of stronger economic activity in the United States. The yields on long-dated debt in the United States began to rise as early as mid-October. But it was not until the decision by the US authorities to increase the target federal funds rate on 4 February 1994 that yields worldwide began to rise. Following the tightening in US monetary policy, data releases in a number of countries began to revive market concerns about possible future inflationary pressure. In the final quarter of 1993, for example, US GDP (at constant prices) grew by over 6% on an annualised basis. On an annualised basis compared with the previous quarter, German broad money grew by 21.3% in January 1994, compared with a target range of 4%–6%—though the increase was partly attributable to special factors. As Chart 1 shows, in most countries the increase in yields prompted by these developments was substantial and, taking 1994 as a whole, broadly offset the falls seen in 1993.

Interpreting the turnaround in yields

Many explanations have been put forward for the turnaround in yields which began in most countries in February 1994. Nominal yields can be decomposed into four components: the expected real rate of return, the real rate risk premium, the expected inflation rate and the inflation risk premium.(1) Explanations of the changes in yields in 1993 and 1994 must account for a change in one or more of these components.

For example, unexpectedly strong economic growth in 1994 led to fears of a shortage of capital and so to an increase in expected real interest rates. It is possible to estimate changes in the real rate for the United Kingdom from the yields on index-linked gilts. Between 4 January 1993 and 3 February 1994, real rates at most maturities fell by around a quarter, or approaching 100 basis points (see Chart 3). This formed about 40% of the change in nominal yields over that period. During 1994, the reduction in real rates in 1993 was reversed—and rates returned to levels close to those prevailing at the beginning of 1993.

Chart 3
Real forward interest rates



There was a different pattern to changes in the expected inflation rate, particularly at longer maturities where the reduction in inflation expectations seen in 1993 was broadly maintained in 1994. At shorter maturities, inflation expectations rose by around 200 basis points between 3 February and 30 December 1994, more than offsetting the decline in 1993. By contrast, ten-year inflation expectations were little changed over the period (Chart 4).

Chart 4
Implied forward inflation rates

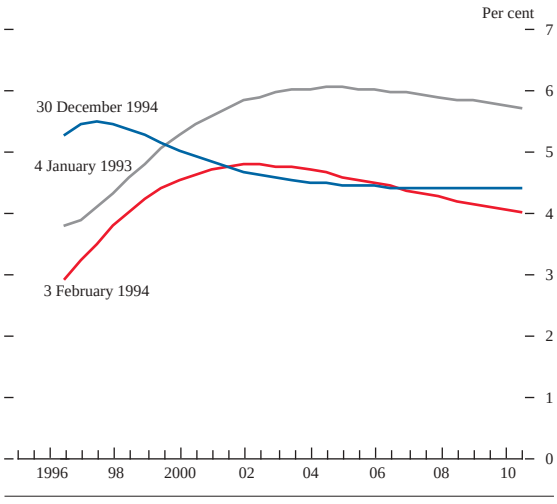
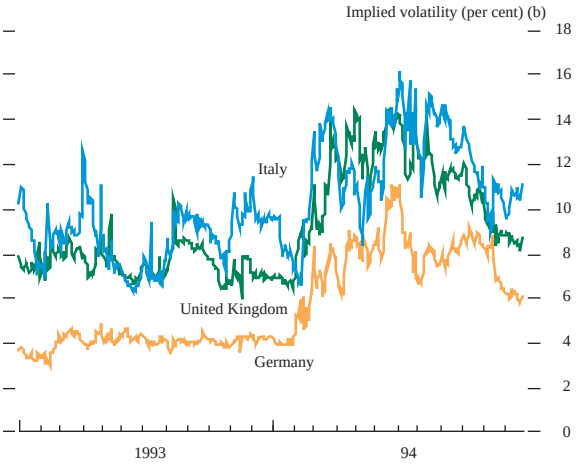


Chart 4 does not separate the expected level of inflation and the inflation risk premium. Part of the increase in implied forward inflation rates may have reflected an increased inflation risk premium. Inflation risk is difficult to measure. Assuming, however, that changes in the real interest rate risk

(1) The components were discussed in Mr King's speech to the Scottish Economic Association on 'Credibility and monetary policy', reproduced in the February 1995 *Quarterly Bulletin*, pages 84–91.

premium are relatively small, a reasonable proxy for the risk is given by the implied volatility of government bond futures contracts. As Chart 5 illustrates, volatility in major bond markets was much higher in 1994 than in 1993. The increase appears to have happened around the time of the change in the target federal funds rate on 4 February. Volatility in markets outside the United States may have reflected domestic developments and uncertainty about the response of the authorities to them, as well as some 'spill-over' effects from the US Treasury market (see below). If so, the developments would offer an important insight into market perceptions of the authorities' policies and their credibility.

Chart 5
Implied bond market volatility(a)



(a) Derived from the options on LIFFE's long gilt, Bund and BTP futures.
(b) The annualised daily standard deviation of continuously compounded returns.

A technical explanation advanced for the turnaround in yields in the United States is a link between the mortgage-backed securities (MBSs) and US Treasury markets.(1) A common hedging strategy for those with a long position in MBSs is to take a short position in US Treasuries of a similar maturity (most mortgages are fixed-rate). When interest rates rise, the likelihood of early mortgage repayment is reduced and the effective maturity of MBSs lengthens. This possibility is called extension risk, and necessitates further sales of Treasuries of an appropriate maturity in order to match the new effective maturity of the MBS. After the interest rate increase by the Federal Reserve in February 1994, such sales of Treasuries may have contributed to the sharp rise in yields. Given the limited extent of securitisation in many other countries, however, it is difficult to see how this explanation can account for the turnaround in bond yields internationally.

Technical factors may either have had an independent influence on yields or have arisen as a result of more fundamental causes. International capital markets are now highly integrated and movement in one major market is likely to have a rapid impact on others. Because of the increased internationalisation of portfolios, a loss in one market may have to be offset by liquidating positions in others. In 1994, for example, investors may have liquidated long positions in European and emerging markets to cover losses in the US bond market. In addition to such spill-over effects, bond price movements were probably influenced by the unwinding of highly geared long positions and by market practices such as stop-loss trading.

Some commentators have emphasised the role of hedge funds and other leveraged funds, which rapidly liquidated such positions. Their importance, and the duration of their effect on bond yields, is difficult to estimate, however; all market participants—not merely leveraged funds—may have reassessed their portfolio strategy in the light of their changing perceptions of monetary and economic developments. These developments suggest that 1994 can be interpreted as a period in which market participants generally reassessed the expectations they had formed in 1993. The fact that the increase in yields during 1994 was sustained and large suggests that this reassessment took time.

Other explanations of the yield changes in 1994 have referred to the high levels of fiscal deficits and public debt in many countries, although these had been present in 1993 during the bond market rally. Indeed, some governments—particularly in Europe, and partly in response to the convergence criteria included in the Maastricht Treaty—had already begun to consolidate their fiscal positions in 1994.

A role for monetary policy credibility

This section explores the extent to which the movements in bond yields during 1993 and 1994 were correlated with monetary policy credibility. In late 1994, nominal yields in many countries were only slightly higher than in early 1993. This may suggest that monetary policy credibility was in fact little changed overall over the two-year period, but that it increased in 1993 and fell back in 1994. Before pursuing this interpretation further, it is necessary to explain what is meant by credibility and to examine some of the means used to measure it.

A monetary policy strategy is credible if the public believes that the authorities will actually carry out their plans. The actions of the authorities will depend on their preferences; but those preferences, and so credibility, are not directly observable. If the public believes that the authorities are genuinely committed to low inflation and will deliver it, then private-sector expectations will closely reflect the authorities' forecasts (or targets) for inflation. The private sector's expectations will affect the response of the economy to changes in monetary policy. With a credible policy, a tightening in monetary policy will influence expectations rapidly, inflation will fall in line with expectations and there should be relatively low short-term output costs associated with the adjustment. Low policy credibility, by contrast, will mean that a monetary tightening may have high short-term output costs and a slower effect on inflation,

(1) The explanation is advanced in Fernald, J, Keane, F and Mosser, P, 'Mortgage security hedging and the yield curve', *Federal Reserve Bank of New York Research Paper No 9,411*, 1994.

because it will have little impact on expectations. These considerations emphasise the desirability of policy credibility.(1)

In practice, it is likely there will be some divergence, at least initially, between the authorities' announced inflation forecasts (or targets) and private-sector expectations. The public cannot be certain about the strength of the authorities' commitment to low inflation and its feasibility; they are therefore likely to form expectations based on the authorities' track record and inflation outturns following a policy change. So at the start of a new monetary regime—for example, of inflation targeting—the public is likely to be sceptical, particularly where there is a history of high inflation. If, however, the authorities' subsequent performance is satisfactory and actual inflation is maintained within the target range, expectations are likely to begin to converge on the authorities' announced target.

The inflation history of an economy may therefore be an important determinant of expectations, with the result that there may be a tendency for inflation to persist. A number of studies have attempted to approximate this persistence in inflation by using averages of past inflation.(2) The appropriate length of inflation history is unclear, but it should be long enough to provide a representative summary of past experience.

Proxies for monetary policy credibility

Any variable that may offer information on the authorities' attitude to inflation can potentially be used as a proxy for credibility; the persistence of inflation, by indicating the authorities' willingness to tolerate inflation, is therefore one possible proxy. In the results discussed below, proxies for credibility have usually been expressed as averages over the previous ten years.(3)

In a study of credibility in the European Monetary System, Grilli *et al* used measures of central bank independence, given the evidence of a link between independence and low inflation, and thus indirectly with credibility.(4)

Since inflation is ultimately a monetary phenomenon, a number of studies have examined the growth rates of monetary aggregates as proxies for credibility.(5) Again it is likely that agents will form expectations based on past histories or averages of money supply growth over several years.

Fiscal measures—measured by either the stock of government debt or the fiscal deficit—may also have implications for the credibility of monetary policy. In particular, to maintain (or enhance) credibility the fiscal deficit should be financed in a non-inflationary way.(6) Similarly, a number of studies(7) have highlighted the relevance of the exchange rate and the foreign exchange market in assessing credibility; Baxter found that the level of foreign exchange reserves was a statistically-significant determinant of credibility.

Information on credibility can also be extracted from the difference between nominal and real implied forward interest rates derived from the yields on conventional and index-linked bonds,(8) though the absence of index-linked bonds in most major bond markets restricts the use of this source. And the average level of nominal bond yields may itself contain information on credibility.(9)

In recent research, the variables mentioned above—central bank independence, averages of past inflation, money supply growth, the fiscal deficit, the stock of government debt, the level of foreign exchange reserves and ten-year nominal bond yields—were used in a simple bivariate analysis of changes in bond yields in 1993 and in 1994. Although the approach was clearly crude and there was inevitably a degree of arbitrariness in the final choice of variables used, it nevertheless produced results consistent with more sophisticated methods, and suggested that monetary policy credibility may have at least a partial role in explaining the bond-market developments in 1993 and 1994.

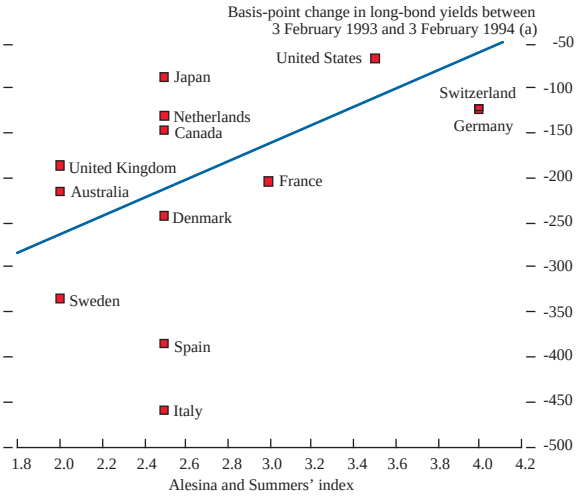
The correlates of bond yield changes in 1993 and 1994

A cross-sectional analysis covering 13 countries was used to find relationships between proxies for monetary credibility and yield changes in 1993 and 1994. The proxies for credibility—usually expressed as ten-year averages—were defined as variables from which agents might learn (indirectly) about the preferences of the monetary authorities. The analysis was based on simple bivariate regressions of the changes in long-dated bond yields and in the proxies for credibility. The dependent variable was defined over two sample periods, looking first at the change in yields during the bond market rally in 1993, and then at yield changes during the correction in yields in 1994.

The results indicated statistically-significant correlations in both sample periods for three proxies for credibility: averages of past inflation, the level of nominal bond yields in the previous ten years, and the Alesina and Summers' index of central bank independence.(10) The significance of these three variables appeared to be robust to changes in the precise choice of sample period. Regressions using two

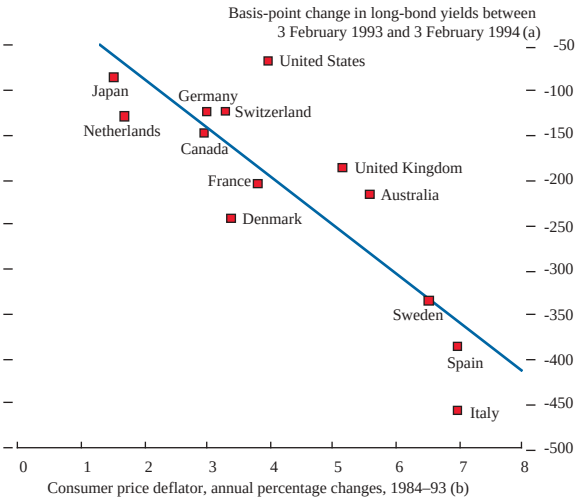
(1) On this point, see the article on the costs of inflation in the February 1995 *Quarterly Bulletin*, pages 33–45.
(2) See Alogoskoufis, G, 'Monetary accommodation, exchange rate regimes and inflation persistence', 1992, *Economic Journal*, 102, pages 461–80.
(3) In some cases where full data were unavailable, however, shorter averages have been used.
(4) See Grilli, V, Masciandaro, D and Tabellini, G, 'Political and monetary institutions and public financial policies in the industrial countries', *Economic Policy*, 1991.
(5) See Baxter, M, 'The role of expectations in stabilisation policy', *Journal of Monetary Economics*, 15, pages 343–62, 1985.
(6) The possibility of a link between deficits and inflation is explored in Sargent, T and Wallace, N, 'Some unpleasant monetarist arithmetic', *Federal Reserve Bank of Minneapolis Review*, 5, 1–17, 1981.
(7) See for example Christensen, M, 'On interest rate determination, testing for policy credibility, and the relevance of the Lucas Critique', *European Journal of Political Economy*, 3, pages 369–88, 1987.
(8) See Mr King's lecture to the Scottish Economic Association, reproduced in the February 1995 *Quarterly Bulletin*, pages 84–91.
(9) See Table A in Mr King's lecture, *ibid*, page 89.
(10) The index is taken from Alesina, A and Summers, L, 'Central bank independence and macroeconomic performance', *Journal of Money, Credit and Banking*, 24, 151–62.

Chart 6
Yield changes and central bank independence: the rally



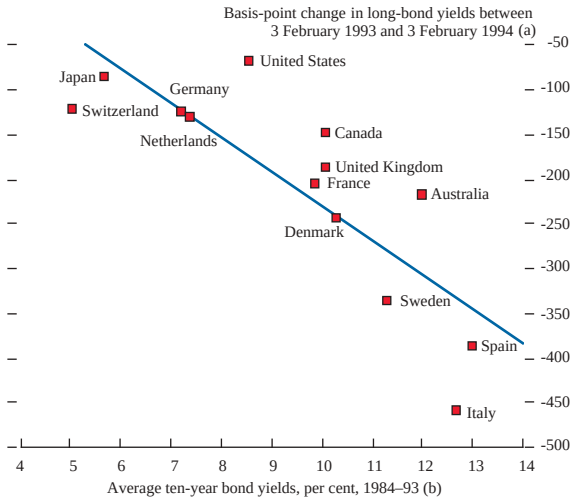
(a) Ten-year benchmark redemption yields. (Source: Datastream.)

Chart 7
Yield changes and past inflation: the rally



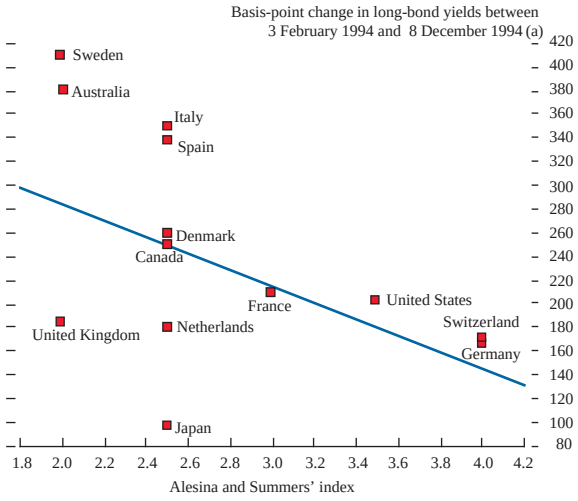
(a) Ten-year benchmark redemption yields. (Source: Datastream.)
(b) Source: *OECD Economic Outlook*, December 1993.

Chart 8
Yield changes and nominal yields: the rally



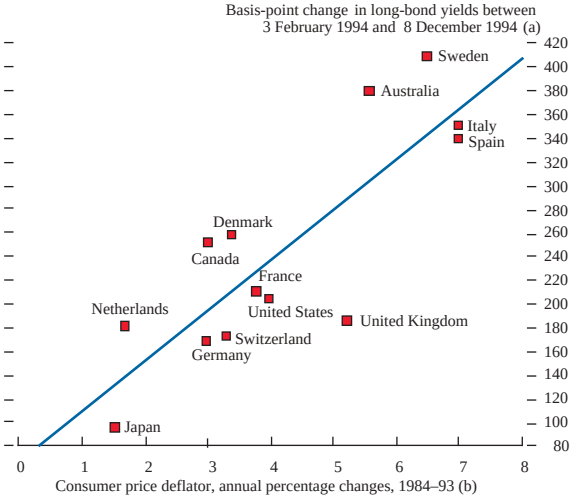
(a) Ten-year benchmark redemption yields. (Source: Datastream.)
(b) Source: *OECD Economic Outlook*, December 1993.

Chart 9
Yield changes and central bank independence: the correction



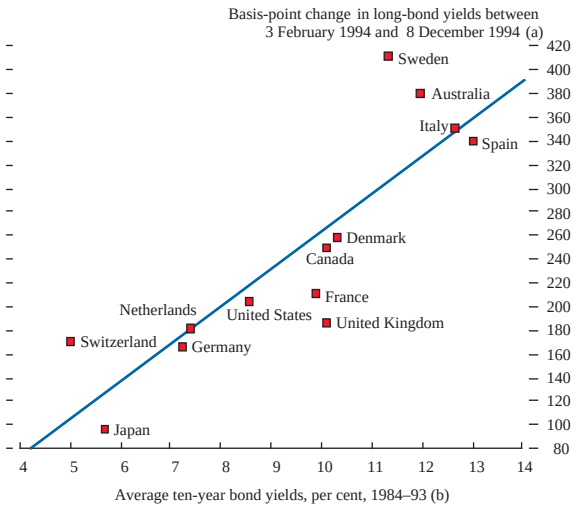
(a) Ten-year benchmark redemption yields. (Source: Datastream.)

Chart 10
Yield changes and past inflation: the correction



(a) Ten-year benchmark redemption yields. (Source: Datastream.)
(b) Source: *OECD Economic Outlook*, December 1993.

Chart 11
Yield changes and nominal yields: the correction



(a) Ten-year benchmark redemption yields. (Source: Datastream.)
(b) Source: *OECD Economic Outlook*, December 1993.

shorter sample periods showed the same three variables to be statistically significant.(1) The relationships are summarised, separately for the rally and the correction, in Charts 6 to 11. In each chart, the line shown represents the best fit from the regression analysis. The regressions are of course suggestive and do not imply causal links with the yield changes.

Perhaps the most striking aspect of the results is that in each case the direction of the relationship with the proxy for credibility was reversed during the correction. In particular, during the rally in 1993 the relationships showed that countries with relatively low central bank independence experienced the largest reductions in yields (Chart 6). Charts 7 and 8 show that the same countries had had a history of relatively high inflation and high nominal bond yields. During the correction in bond yields in 1994, however, those countries with the lowest measured monetary policy credibility experienced the largest increases in yields (see Charts 9, 10 and 11). Taking the two years together, it is noticeable that the smallest reductions in yields in 1993 and the smallest increases in 1994 were seen in those countries with higher measured credibility.

Interpretation of the results

The fall in yields in 1993 was related to the economic conditions shared by many countries at that time. Market participants increasingly felt that inflation was unlikely to constitute a major policy problem for the foreseeable future. This view allowed yields to fall—particularly in countries with low measured credibility, since it was those that had the most to gain, in terms of the yields payable on their debt, from this change in market perceptions. In the circumstances, central bank independence and other aspects of credibility appeared to be less important for the achievement of price stability.

In 1994, the latest economic data—showing stronger output growth—and the monetary tightening by the Federal Reserve on 4 February prompted a revival of market concerns about possible future inflation, particularly after primary product prices rose sharply towards the middle of the year. Some tightening of policy had been expected by the markets—as evidenced, for example, in futures prices on US Treasuries in 1993; however, developments in 1994 suggested that the extent of this tightening might have been underestimated.

In this light, it was perhaps not surprising that yields should readjust in 1994, and that the extent of the readjustment should reflect the credibility of national monetary policies. This may partly explain the increasing divergence in yields last year. A comparison of the sets of charts on the rally and the correction shows that the readjustment of yields was greatest in countries with low credibility and smallest in high-credibility countries.

Summary

In 1993, the fall in bond yields was related to the falling inflation expectations at the time. Yields converged on the levels in those countries with higher monetary policy credibility. During 1994, cyclical changes led to a revival of inflation expectations. Yields began to rise to reflect this—particularly in those countries with less established monetary policy credibility—and the reduction and convergence in yields observed in 1993 were reversed.

(1) An additional analysis showed that these variables also had a statistically-significant relationship with the *level* of bond yields on 3 February 1994 and 8 December 1994.