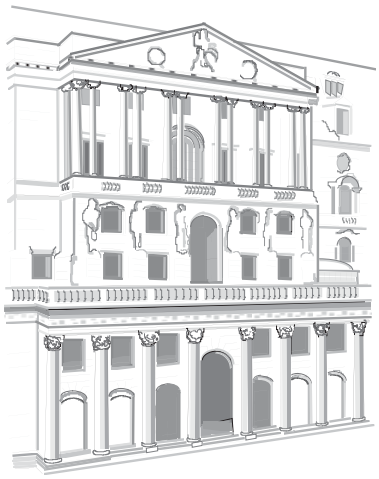
Bank of England Quarterly Bulletin



August 1994

Volume 34 Number 3

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Bank of England publications

Quarterly Bulletin and Inflation Report

From 1994, copies of the *Bulletin* and *Inflation Report* may be obtained from the Bank as a **combined** package at the following prices:

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The *Bulletin* is also available on microfilm: enquiries from customers in Japan and North and South America should be addressed to University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan 48106, United States of America; customers from all other countries should apply to White Swan House, Godstone, Surrey, RH9 8LW.

Bound volumes of the *Bulletin* for the period 1960 to 1985 (in reprint form for the period 1960 to 1980) can be obtained from Schmidt Periodicals GmbH, Dettendorf, D-83075 Bad Feilnbach 2, Germany, at a price of DM 180.00 per volume or DM 4,100.00 per set.

See page 281 for details of the annual *Statistical Abstract*.

The gilt market

'Investing in gilts: A guide for the small investor', providing basic information for small investors, and 'British Government Securities: The Market in Gilt-Edged Securities', intended for those with a professional interest in gilts and the gilt market, may be obtained from the Bank of England, PO Box 96, Gloucester, GL1 1YB.

Working Papers

The following ***Working Papers*** have been published in the last twelve months:

No	Title	Author
18	Interest rates and the channels of monetary transmission: some sectoral estimates	Spencer Dale Andrew G Haldane
19	The effect of futures trading on cash market volatility: evidence from the London stock exchange	Gary Robinson
20	M0: causes and consequences	F J Breedon P G Fisher
21	An empirical analysis of M4 in the United Kingdom	P G Fisher J L Vega
22	A model of building society interest rate setting	Joanna Paisley
23	Deriving estimates of inflation expectations from the prices of UK government bonds	Mark Deacon Andrew Derry
24	Estimating the term structure of interest rates	Mark Deacon Andrew Derry

Issued by the Inflation Report Division, Bank of England, London, EC2R 8AH, to which enquiries regarding this *Bulletin* should be addressed. Telephone enquiries may be made to 071-601 4030 and letters should be marked 'for the attention of the Publications Group'.

Printed by Park Communications

ISSN 0005-5166

The Quarterly Bulletin and Inflation Report

Inflation Report
(published separately)

The *Inflation Report* provides a detailed analysis of recent price and cost developments in the UK economy. Output price inflation remains subdued, in spite of recent increases in costs: RPIX inflation (the government's target measure) was 2.4% in June—the same as in March—while the Bank's RPIY measure of underlying inflation (which excludes the effect of indirect taxes) fell to 1.7%. The economy is continuing to grow at above its long-run potential rate and unemployment has fallen further, although other labour market indicators give conflicting signals. Section 6 of the *Report* lays out the Bank's current views on the prospects for inflation over the next two years.

Operation of monetary policy (pages 199–207)

Sterling remained on the sidelines in the foreign exchange markets in the second quarter, with its effective rate index generally steady at around 80. Despite difficult market conditions internationally, sufficient gilt sales were made to keep pace with the annual funding target. The Bank maintained a generally neutral stance in its money-market operations, and kept its dealing rates unchanged.

The international environment
(pages 208–13)

There has been a strengthening of activity in France, Germany and Japan, but recovery is likely to be modest initially. Inflation has continued to decline in most major countries over recent months, but some forward-looking indicators have suggested some upward pressure on future inflation. In volatile market conditions in the second quarter, bond yields rose further and the dollar weakened.

Financial market developments
(pages 214–22)

The further falls in government bond prices in the second quarter returned many markets to the levels prevailing before last year's strong rally. In the turbulent conditions, the volume of issues was significantly lower than in Q1; most were made at maturities of five years or less. The falling bond prices led to price falls in many equity markets.

Research and analysis
(pages 223–54)

Research work published by the Bank is intended to contribute to debate, and is not necessarily a statement of Bank policy.

UK trade—long-term trends and recent developments (by Andrew Dumble of the Bank's Structural Economic Analysis Division) considers why trade performance matters. It analyses the factors that determine whether a current account deficit gives grounds for concern, and considers some longer-term trends in UK trade performance. It then assesses the impact of two major influences on recent UK performance—sterling's depreciation following the suspension of ERM membership and the recession that has affected its main EU trading partners—and suggests some elements in the short-term outlook.

Estimating market interest rate and inflation expectations from the prices of UK government bonds (by Mark Deacon and Andrew Derry) summarises recent Bank research into how best to derive expectations of interest and inflation rates from the prices of gilts. It explains the important issues of estimation and interpretation that arise, and outlines a number of changes the Bank proposes to make to the techniques it uses.

Company profitability and finance (by Kieren Wright of the Structural Economic Analysis Division) assesses the evolution of firms' financial position over 1993 and 1994 Q1, comparing it with the 1982–84 recovery. Profitability has been markedly higher this time; ICCs' retained earnings were up by over a third in 1993. Firms have made unprecedented net repayments of bank debt, while increasing their use of capital markets. Investment has been higher as a share of GDP, but has not yet picked up as the recovery has progressed.

Investment appraisal criteria and the impact of low inflation (by Andrew Wardlow of the Conjunctural Assessment and Projections Division) looks at the impact of a return to low inflation on corporate investment decision-making. It considers the different investment appraisal criteria used by firms—and the role they give them—and assesses the significance of firms' apparent slowness to adjust.

Operation of monetary policy

- *The economic and monetary data released during the second quarter provided further evidence of a steady recovery with low inflation. The April tax increases did not appear to have significant impact on the course of the recovery in the quarter.*

- *Although there was some increase in earnings growth and manufacturers' input prices, current inflation remained subdued.*

- *International financial markets continued to be volatile; much of the disturbance in the UK gilt-edged and equity markets reflected this worldwide instability.*

- *Despite the difficult market conditions, sufficient sales of gilts were made to keep pace with the annual funding target. This satisfactory result was achieved by introducing at the monthly auctions a range of gilt-edged instruments designed to take account of the unstable market conditions.*

- *With no significant pressure on UK interest rates in either direction, the Bank maintained a broadly neutral stance in its money-market operations and kept its dealing rates unchanged throughout the period.*

Decisions on monetary policy are based on a wide range of indicators. The Bank's current assessment of the latest indicators is given in the August *Inflation Report*; this article describes the operation of monetary policy in the second quarter of 1994. The minutes of the monthly monetary meetings between the Chancellor and the Governor are published by HM Treasury around two weeks after the subsequent meeting has taken place.

Overview

The economic and monetary data released during the quarter suggested that the economy was continuing to grow steadily. They showed output expanding at—or just above—the rate envisaged in the November Budget and a broadening of the recovery, with consumer spending, investment and net trade contributing in broadly equal degree to GDP growth. The tax measures which took effect in April did not appear to have significant impact on the course of the recovery in the quarter.

Although there was some increase in earnings growth and manufacturers' input prices, current inflation remained subdued. At their monthly meetings during the quarter to review monetary developments, the Chancellor and Governor concluded that it was appropriate to leave interest rates unchanged.

At times early in the quarter, short-term money-market rates and the rate implied by the June short sterling futures contract fell on expectations of a further slight easing in official rates, but the prices of the September and December 1994 futures contracts indicated that the market expected any reduction to be short-lived. As evidence of the recovery continued to accumulate, the yield curve

tended to steepen. There was, however, no significant pressure on current interest rates in either direction. The Bank maintained a broadly neutral stance in its money-market operations and kept its dealing rates unchanged throughout the period.

The international economic outlook showed signs of improvement, with some evidence of recovery in the major continental European economies and in Japan. Growth in the Group of Seven industrialised countries was estimated to have been 1.5% in the fourth quarter of 1993, and appeared to accelerate in the first quarter of 1994, with investment rising more rapidly than consumption. The US economy continued to grow quite strongly in the first quarter, though below the very high rate recorded in the fourth quarter of 1993. The Federal Reserve tightened its monetary stance further in the quarter, raising the federal funds target rate twice by a total of 75 basis points to 4¼% and the discount rate by 50 basis points to 3½%. In Germany, the Bundesbank lowered the discount and Lombard rates twice by a total of 75 basis points to 4.5% and 6% respectively, despite an M3 growth rate above its target range. Markets nevertheless revised upwards their expectations about future movements in German rates as the German economy showed signs of recovery, though such expectations moderated towards the end of the quarter.

In the foreign exchange markets, attention was focused principally on the dollar—and especially its rate against the yen. Concerted central bank intervention early in May briefly checked its fall, but it weakened again from the middle of June onwards, falling to a post-war low against the yen despite a further round of intervention on 24 June. Sterling's trade-weighted effective exchange rate index remained steady throughout the quarter at around 80; its appreciation against the weaker dollar was counterbalanced by depreciation against a stronger Deutsche Mark.

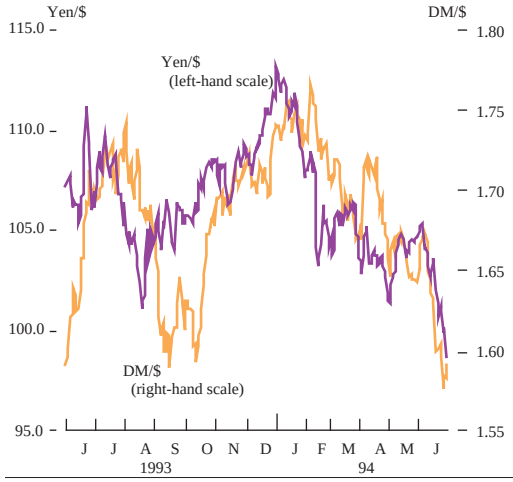
There was continued turbulence in bond markets around the world, and this again made its impact felt on the gilt-edged market. International equity markets were also disturbed (for details, see the review of financial market developments on pages 214–22). But differences in the performance of individual countries' government bonds were more marked than in the initial period of turbulence in February and March; gilts again tended to weaken by more than many other major bond markets. Over the quarter, despite a narrowing of differentials in June, the spread between UK and German ten-year yields rose from 115 to 160 basis points, and the spread between UK and US bonds increased by 60 basis points to 130 basis points. In part, these movements reflected a rise in real yields: the yield on index-linked gilts increased from 3½% to 4% over the quarter. They served to return nominal gilt yields—and yield differentials with German and US bonds—to broadly the levels prevailing a year earlier, suggesting that the strong rally in the second half of 1993 had run too far.

Foreign exchange markets

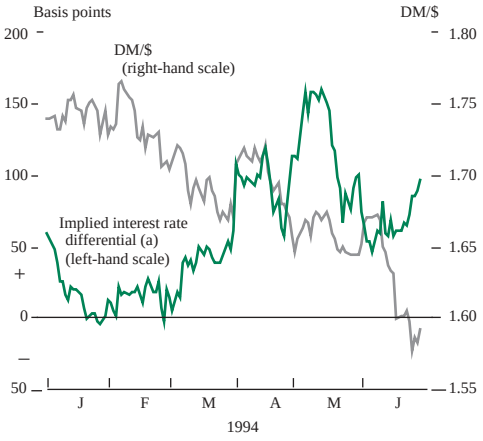
The main feature of the quarter was the dollar's persistent weakness. The Deutsche Mark and the yen strengthened; sterling remained on the sidelines.

The dollar fell sharply against the yen and reached a post-war low below ¥100, mainly in response to the protracted and inconclusive

Dollar exchange rates



Expected differential between US and German three-month rates in March 1995



(a) Derived from the difference between the prices of LIFFE's March 1995 US and German three-month futures contracts.

US/Japanese trade negotiations. Against the Deutsche Mark, after strengthening by five pfennigs to DM 1.72 in the first few weeks of April, it lost 14 pfennigs, falling to just below DM 1.58—its lowest level for over a year.

The persistence of the United States' trade and current account deficits with Japan appeared to be a main factor underlying the dollar's weakness against the yen. Though the US authorities stated that a fall in the dollar was not desired, setbacks in the bilateral trade talks heightened market expectations that the necessary adjustment would have to come through a depreciation of the dollar.

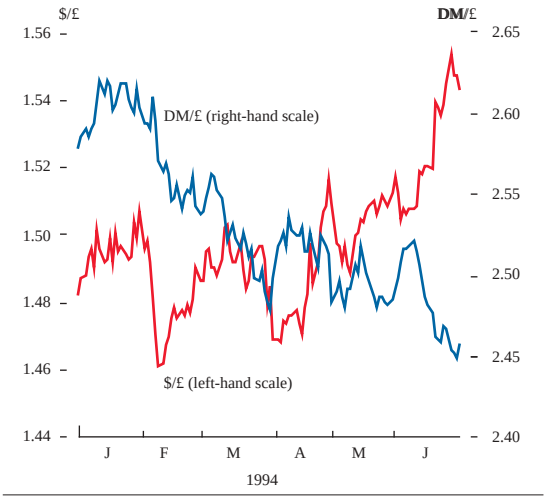
Market perceptions that the dollar would continue to depreciate were compounded by changing expectations about the differential between US and German interest rates. The actual spread of German over US three-month interest rates narrowed, from 182 basis points at the start of the quarter to 14 at the end of it. But expectations of future interest rates may have been more influential. Throughout the quarter, eurodollar and euromark futures implied expectations that in March 1995 US three-month rates would be higher than German rates; but the expected differential declined from a peak of 170 basis points in mid-May to 97 basis points by the end of June. A reduction of $^{1}/_{2}$% in the German discount and Lombard rates on 13 May left the markets with the view that the pace of any further easing in German interest rates would slow. When the Federal Reserve raised the federal funds target and discount rates on 18 May, its statements suggested that the rise of $^{1}/_{2}$%—rather than $^{1}/_{4}$%—showed that a neutral monetary stance would be reached sooner than previously expected. The resulting change in expectations about the future spread between US and German short-term interest rates reduced a source of support for the dollar.

The dollar rallied in the first half of April, following buoyant employment figures and a sharp rise in the US purchasing managers' index, reaching a peak of ¥105 and DM 1.72. But it fell back later in the month after the resignation of the Japanese Prime Minister and a higher-than-expected increase in the US GDP deflator (despite GDP data that were lower than expected).

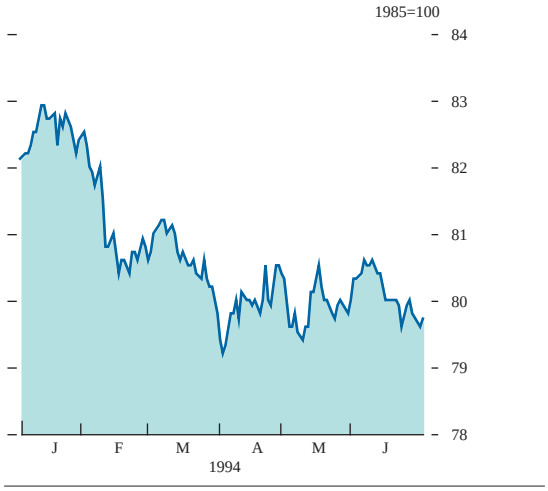
There was concerted intervention by a large number of central banks in support of the dollar on two occasions during the quarter. On 4 May, support was given at around DM 1.655 and ¥101.25; statements by the US authorities made clear their view that the dollar's fall had gone further than could be justified by economic fundamentals. The intervention, which was followed later in the month by the reduction in German and the increase in US rates, was temporarily successful in checking the dollar's fall; it steadied at around DM 1.665 and ¥102.50.

Further heavy sales, however, were triggered on 17 June by a research report suggesting that the dollar could fall by as much as 10% against the Deutsche Mark by the end of 1995. By 21 June, the dollar had dipped below DM 1.59, and below ¥100 for the first time since the Second World War. A further round of concerted intervention on 24 June provided some support at these lower levels but, because the market had expected the further intervention and many market participants were seeking to unwind long dollar positions, its impact was smaller than the intervention in early May. Statements by the US Treasury indicating that the administration

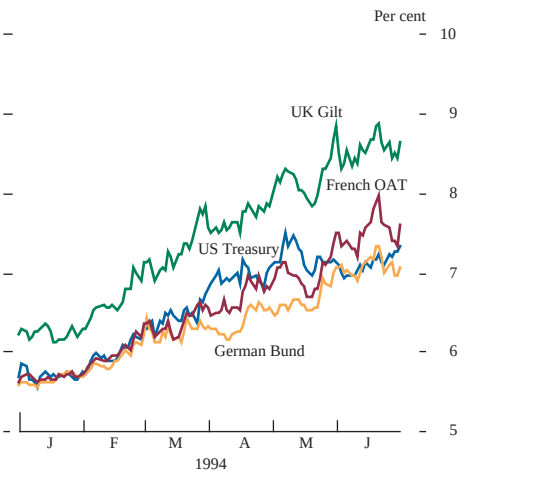
Sterling exchange rates



Sterling's effective index



Ten-year government bond yields(a)



(a) Gross redemption yield.

would prefer a stronger dollar failed to provide lasting support. Trading conditions remained nervous to the end of the quarter, by which time the dollar was trading at DM 1.5915 and ¥98.65.

Against this background, sterling rose in late June to a nine-month high against the dollar of around $1.55. Against the Deutsche Mark, it weakened somewhat in the wake of the dollar's fall. But sterling remained very much on the sidelines and experienced no significant pressure: its average value in trade-weighted terms against the major currencies—as measured by the Effective Rate Index (ERI)—remained steady at around 80. Sterling's stability was helped by strengthening market perceptions of the continuing economic recovery and the developing view that UK rates would fall no further. Political developments—especially at around the time of the local and European elections—had only a fleeting influence, and sterling ended the quarter calmly at around DM 2.46 and 79.7 on the ERI.

Most countries within the ERM followed German interest rate reductions, and for the most part the French and Belgian francs and the Dutch guilder traded steadily against the Deutsche Mark. Short-term market rates in Portugal and Spain rose occasionally in response to a weakening of the escudo and the peseta at the bottom of the ERM grid; the divergence between the strongest and weakest currencies widened to 8% on occasions. Outside the ERM, the lira suffered bouts of weakness, partly as a result of uncertainty about the policies of the new Italian government. The drachma weakened markedly towards the end of May in anticipation of the removal of capital controls; the Greek authorities moved to counter this by raising overnight interest rates temporarily to above 200%.

Developments in the bond markets

The disturbance in bond markets worldwide, which began in February, continued for much of the second quarter. Yields in all major bond markets rose further. There was, however, more differentiation in the changes in yield among the individual markets than in the first quarter. The US bond market steadied in May and the first half of June, whereas a further period of disturbance affected the German and other European bond markets from the last week of May.

The sharpest rises in ten-year government bond yields over the first half of the year were in Sweden, Australia, Finland, Canada, Spain and the United Kingdom. Those countries' bonds had been among the best performing during the rally in 1993, and the subsequent correction in the first half restored their differentials with German and Japanese bonds to levels close to those prevailing before last year's rally.

The increases in nominal yields in part reflected a rise in real interest rates during the second quarter. By the end of June, index-linked gilt yields had increased to 4% from 3% in January. There were similar—or larger—measurable rises in other countries with index-linked government bonds, such as Canada and Australia. This rise in real yields may have reflected the first evidence—seen since the start of the year—of a recovery in activity in a number of the major overseas economies, perhaps heightened by concern at the financing burden of high structural budget deficits in some countries.

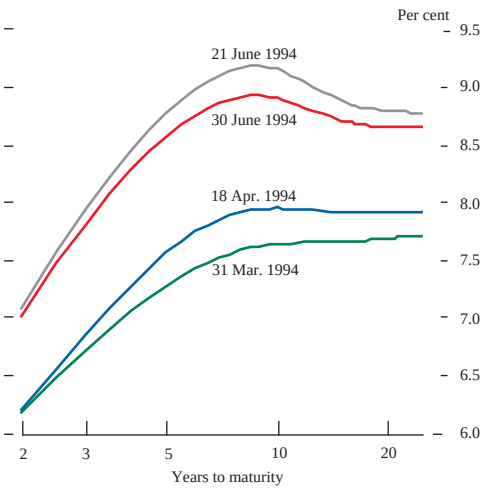
Table A
International ten-year government bond yields

As at end month:

	Dec. 1993	Mar. 1994	Change in Q1 (a)	June 1994	Change in Q2 (a)	Change in H1 (a)
United Kingdom	6.10	7.63	153	8.64	101	254
United States	5.80	6.77	97	7.33	56	153
Germany	5.55	6.33	78	7.06	73	151
Japan	3.04	4.01	97	4.30	29	126
France	5.63	6.56	93	7.60	104	197
Italy	8.49	9.11	62	10.46	135	197
Canada	6.64	7.95	131	9.28	133	264
Spain	8.12	9.19	107	10.67	148	255
Australia	6.64	7.88	124	9.64	176	300
Sweden	7.02	8.31	129	10.15	184	313
Finland	6.73	7.96	123	9.58	162	285

(a) In basis points; a positive figure indicates an increase.

Par yield curves for British government stocks



A further factor underlying the rise in nominal bond yields was the volatility displayed by the major bond markets. Implied volatility in both the US and German markets rose from around 5% in 1993 to around 9% in the second quarter of 1994.

Apprehension about greater inflationary pressures probably also played a part in the rise in bond yields internationally. The increased momentum seen in most industrialised economies this year led to some fears that the gap between potential and actual output might close earlier than previously expected, with inflationary consequences despite the low prevailing levels of inflation. Rises in commodity prices, in part attributable to increasing global demand and activity, were also taken by the markets to imply upward pressure on input costs.

All these factors appeared to lie behind the rise in bond yields early in the quarter. Around the middle of May, international bond markets showed signs of recovering some stability, following the concerted intervention to support the dollar, and the subsequent ½% cut in German interest rates on 13 May and the ½% rise in the US rates on 18 May. Markets were encouraged by this sequence of official actions, which improved confidence in US and other bond markets.

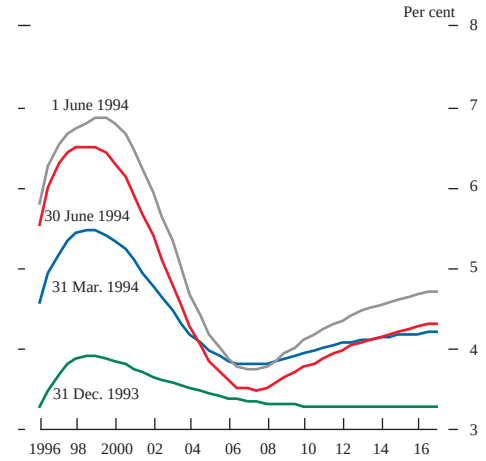
However, renewed disturbance emerged towards the end of May, led mainly by weakness in German Bunds. Initially, this seemed to reflect uncertain expectations about the future course of German interest rates, as the Bundesbank continued to make small reductions in its repo rate despite evidence of strengthening German economic activity and the continued growth of M3 above its target range. The market weakened further when the German authorities cancelled two bond auctions in the last week of May. In June, ten-year German yields briefly rose above US yields and on 21 June recorded their highest level for 18 months at 7.33%. Other European bond markets, including the gilt-edged market, weakened sharply in line with the rise in German yields.

International bond markets had seemed to steady in early June, but the weakness in the dollar in the second half of the month led to a renewed rise in US yields, with the ten-year Treasury yield rising from 6.92% on 6 June to 7.33% by the end of the month. This produced further falls in other major bond markets, although European bonds performed rather better than the US market.

Gilt-edged funding

Conditions in the gilt-edged market largely reflected the continuing disturbance in the international bond markets; ten-year conventional gilt yields rose from 6.2% at the turn of the year to 8.6% by the end of June. Of this 240 basis-point rise, about 100 basis points were the result of the rise in real yields. Part of the remaining increase may have reflected inflation expectations, although surveys of analysts' short-term forecasts did not corroborate the rise suggested by implied forward inflation rates. It may also have reflected a rise in the risk premium in response to the increase in bond market volatility. The average intra-day range of the price of the long gilt future was 1.15 points, compared with 0.93 points during the first quarter and 0.56 points during 1993. The implied volatilities of options on the long gilt future were typically twice as high in the first half of 1994 as in the second half of 1993,

Implied forward inflation rates(a)

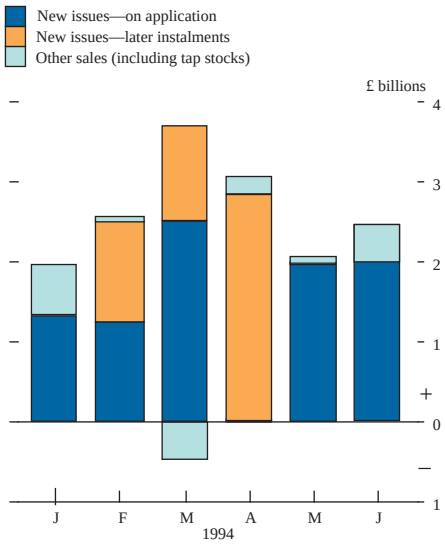


(a) Expectations of the 12-month change in the RPI in future years derived from the differential between yields on conventional and index-linked stocks. See the article on pages 232–40 for further explanation.

UK implied bond market volatility(a)

(a) The expected standard deviation of annualised price movements in LIFFE's long-gilt future.

Gross official sales of gilt-edged stock



which suggested that nominal yields may have embodied a higher risk premium than in 1993. In addition, the gilt-edged market-makers (GEMMs) cut the size of their overall open positions during the second quarter—thereby reducing the extent of the normal buffer between price pressure and price movements—which contributed to volatility.

In April, short and medium-term yields rose more than those at the long end, partly reflecting the continued hedging of fixed-rate mortgages by lenders or their swap market counterparties. The increase was most pronounced in the six to nine-year maturity range, with the yield curve becoming inverted further out. Gilt yields were steadier for most of May, following the concerted intervention in favour of the dollar and subsequent changes in German and US interest rates, and as hedging of fixed-rate mortgage lending came to an end. But towards the end of the month, yields rose sharply in the wake of the renewed rise in German Bund yields. In June, the weakening in the dollar was a further unsettling factor, but towards the end of the month the market showed signs of consolidation after more than four months of disturbance. Medium yields, which had touched 9% on 21 June, recovered to 8¾% by the end of June.

Despite the difficult market environment, the Bank maintained the required pace of funding. An auction was held each month. The market was extremely nervous throughout the quarter and, in order not to aggravate the fragile conditions, the Bank chose to supply £2 billion of stock at each auction—the bottom of the published range. When conditions began to stabilise at the end of the quarter, the Bank supplemented the auctions with sales of stock from official portfolios. Three packages of tap stocks were also issued during the quarter, of which the first two raised £740 million. (Sales of the third package of tap stocks—issued on 29 June—were settled in July, and therefore count as sales in the third quarter.) Gross official sales during the second quarter were £7.6 billion.

The April auction (a £2 billion tranche of 6% 1999 stock) was designed to alleviate a technical difficulty in the market. It was the first tranche issued to be immediately fungible with its parent stock, easing the problems experienced by the GEMMs in borrowing the tightly-held five-year stock. Despite the continuing market disturbance, demand at the auction was high; the tail—the difference between the yield corresponding to the average and lowest-accepted prices—was only one basis point and the auction was covered 1.70 times.

In May, against a background of continuing uncertainty about the future direction of yields, the Bank announced the auction of the first convertible gilt issued since 1987: a three-year stock with four successive options to convert into 9% 2012 stock. The issue provided an outlet for investment of liquid funds at a short-dated maturity—and thereby limited losses if gilt prices were to fall further—but also gave investors a method of gaining exposure to longer maturities, which would be valuable if yields fell. The high degree of uncertainty, evidenced by the implied volatilities on options on the long-gilt future, suggested that a convertible would be attractive. The response was very positive, with the issue covered 1.93 times; the tail of 4 basis points owed more to different methods of valuing the embedded options than to any lack of

Table B
Issues of gilt-edged stock

	Amount issued (£ millions)	Date announced	Date issued	Method of issue	Price at issue (per £100 stock)	Details of payment	Yield (a) at issue	Yield (b) when exhausted	Date exhausted
2½% Index-Linked 2011	150	15.4.94	15.4.94	Tap	164.4375	In full	3.38	3.36	18.4.94
2½% Index-Linked 2024	100	15.4.94	15.4.94	Tap	116.3125	In full	3.46	3.67	18.5.94
6% Treasury 1999	2,000	19.4.94	28.4.94	Auction	93.6563 (b)	In full	7.47 (c)	7.47	28.4.94
4⅜% Index-Linked 2004	150	20.5.94	20.5.94	Tap	111.8125	In full	3.43	3.85	23.6.94
2½% Index-Linked 2016	150	20.5.94	20.5.94	Tap	141.8750	In full	3.64	3.84	3.6.94
7% Treasury Convertible 1997	2,000	17.5.94	26.5.94	Auction	100.3750 (d)	In full	6.87 (c)	6.87	26.5.94
7% Treasury 2001	150	29.6.94	29.6.94 (e)	Tap	92.1875	In full	8.44	8.39	30.6.94
7% Treasury 2001	100	29.6.94	29.6.94	To CRND	92.1875	In full	8.44		
6¾% Treasury 2004 'A'	150	29.6.94	29.6.94 (e)	Tap	88.5938	In full	8.41	8.34	11.7.94
6¾% Treasury 2004 'A'	100	29.6.94	29.6.94	To CRND	88.5938	In full	8.41		
2½% Index-Linked 2011	150	29.6.94	29.6.94 (e)	Tap	156.0625	In full	3.90	3.90	12.7.94
8% Treasury 2013	200	29.6.94	29.6.94 (e)	Tap	96.3125	In full	8.38	8.34	11.7.94
8% Treasury 2013	100	29.6.94	29.6.94	To CRND	96.3125	In full	8.38		
Floating-rate Treasury 1999	2,000	21.6.94	30.6.94	Auction	99.7500 (f)	In full	. .	. .	30.6.94

. . not applicable.

(a) Gross redemption yield, per cent.
(b) Lowest-accepted price for competitive bids. The non-competitive allotment price was £93.7188.
(c) Yield at lowest-accepted price for competitive bids.
(d) Holders have four options to convert this stock into 9% Treasury 2012; the non-competitive allotment price was £100.4688.
(e) Tap stocks issued on 29 June were all settled in July, and will count towards funding for the third quarter.

Table C
Official transactions in gilt-edged stocks

£ billions: *not seasonally adjusted*

	1993/94	1994/95 (a)		
	Total	April	May	June
Gross official sales (+) (b)	54.6	3.1	2.1	2.5
Redemptions and net official purchases of stock within a year of maturity(-)	-5.8	-1.1	-0.5	-1.6
Net official sales (c)	48.9	2.0	1.6	0.8
of which net purchases by:				
Banks (c)	6.5	-1.1	1.8	-0.7
Building societies (c)	1.3	0.1	—	—
Overseas sector	17.5	-0.1	-0.1	-0.7
M4 private sector (c)	23.4	3.0	-0.2	2.2

(a) Later instalments are included in the month when they fall due, not in the month when the sale is secured.
(b) Gross official sales of gilt-edged stocks are defined as official sales of stock with over one year to maturity net of official purchases of stock with over one year to maturity apart from transactions under purchase and resale agreements.
(c) Excluding transactions under purchase and resale agreements.

demand. The implied value received on the options was about £1.25 per £100 of stock.

The auction enabled the government to raise three-year funds at 6.83% when outright yields for that maturity were around 7.3%, with the opportunity for investors—at the first conversion date on 6 August—to switch into the long conversion stock at a yield cost to the issuer of 7.65%, compared with a yield of 8.15% on the 9% 2012 stock at the time of the issue. On the same day as the gilt auction (25 May), the German authorities cancelled a four-year note issue, and a further Bund issue scheduled for early June was cancelled on 31 May. In the prevailing weak market conditions, the Spanish, Austrian and Japanese authorities also cancelled one or more of their auctions. In the United Kingdom, the ability to continue with the monthly programme of auctions on the normal schedule was a helpful element in enabling the market to stabilise once yields had adjusted.

For the June auction, with bond markets worldwide still subject to considerable uncertainty and volatility, the authorities decided to deepen the liquidity of the floating-rate gilt maturing in 1999, first issued in March with a coupon equal to Libid minus ⅛%. This stock had been largely retained by the original investors, so that there had been relatively little trading activity. A £2 billion tranche was therefore added. The response was positive: the cover, at 2.73 times, was the highest since April 1991, and there was a difference of only one penny between the average (£99.76) and lowest-accepted prices (£99.75), equivalent to a tail of only a quarter of a basis point.

The funding arithmetic for 1994/95 was set out in the annual remit for the Bank's operations in the gilt market.(1) Since the remit was published on 17 March, the amount of overfunding in 1993/94 (net of underfunding carried forward from 1992/93) has been estimated at £2¼ billion, and the PSBR forecast for the current fiscal year has been revised down by the Treasury to £36 billion (in the summer economic forecast published on 28 June). Taking into account £8½ billion of gilt maturities in 1994/95, an assumed net contribution of National Savings of £3½ billion, and sales of gilts

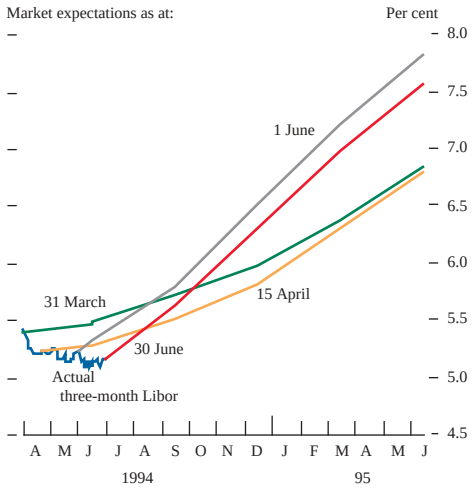
(1) Reprinted in the review of the operation of monetary policy in the May *Quarterly Bulletin*, pages 112–3.

Table D
Interest rates, gilt yields and exchange rates; selected dates[a]

	Interest rates (per cent per annum)					Gilt yields [b] (per cent per annum)				Exchange rates		
	Sterling interbank rates [c]				Short sterling future [d]	Conventionals			Index-Linked			
1994	1 month	3 months	6 months	12 months	3 months	Short	Medium	Long	Long	ERI	$/£	DM/£
31 March	5 7/32	5 5/16	5 13/32	5 11/16	5.47	7.08	7.48	7.68	3.46	79.3	1.4841	2.4804
15 April	5 1/8	5 3/16	5 9/32	5 19/32	5.27	7.10	7.49	7.65	3.44	79.9	1.4733	2.5235
4 May	5 3/32	5 7/32	5 7/16	5 29/32	5.44	7.85	8.19	8.25	3.62	79.6	1.4975	2.4891
18 May	5 1/32	5 3/16	5 3/8	5 7/8	5.33	7.56	7.92	8.00	3.66	80.0	1.5070	2.5004
1 June	5 1/32	5 7/32	5 17/32	6 5/32	5.78	8.45	8.80	8.81	3.95	80.3	1.5170	2.4918
21 June	4 31/32	5 1/8	5 15/32	6 5/32	5.70	8.51	8.85	8.70	4.01	79.9	1.5377	2.4594
30 June	5 1/32	5 5/32	5 15/32	6 3/16	5.63	8.24	8.63	8.57	3.97	79.7	1.5435	2.4564

(a) Close-of-business middle-market rates in London.
(b) Gross redemption yield. Representative stocks: short—6% Treasury 1999; medium—6¾% Treasury 2004; long—8% Treasury 2013; index-linked—2½% Index-Linked Treasury 2016 (real yield assuming 5% inflation).
(c) Middle-market rates.
(d) Implied future rate: until 18 May, the June contract, thereafter the September contract.

Sterling interest rate expectations[a]



(a) Three-month Libor implied by short sterling futures contract.

Table E
Influences on the cash position of the money market

£ billions; *not seasonally adjusted*
Increase in bankers' balances(+)

	1993/94	1994/95		
	Total	April	May	June (a)
Factors affecting the market's cash position				
Under/overfunding (+/-) (b)	-2.8	2.2	2.4	1.7
Other public sector net borrowing from banks and building societies (-) (c)	1.9	-0.7	0.3	0.1
of which, local authorities' deposits with banks and building societies (+)	*2.3*	*-0.4*	*0.4*	*0.1*
Currency circulation (-)	-2.9	0.3	0.7	0.2
Other	-2.4	2.6	1.2	1.3
Total	**-6.2**	**4.5**	**2.2**	**3.3**
Increase (+) in the stock of assistance	4.2	-4.5	2.2	-3.3
Increase (-) in £ Treasury bills outstanding (d)	1.7	—	-0.7	-1.6
Increase in bankers' balances at the Bank	-0.2	—	—	—

(a) Estimate; actual figures to be published on 3 August.
(b) From 1993/94, central government net debt sales to banks and building societies are included in funding.
(c) From 1993/94, banks' and building societies' transactions in local authorities' and public corporations' listed sterling stocks and bonds are included in funding.
(d) Other than those held outright by the Bank and government accounts, but including those purchased by the Bank on a repurchase basis.

made to banks and building societies of £6.8 billion in 1992/93, required gilt sales in 1994/95 are now approximately £32 billion (compared with the £37 billion originally forecast). Approximately 25% of the necessary gross sales were made in the first quarter of the financial year between April and June.

Official money-market operations

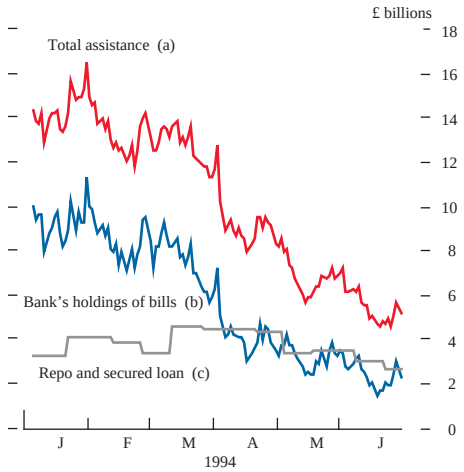
The Bank left its dealing rates unchanged and maintained a broadly neutral stance in its money-market operations throughout the quarter.

Short-term interbank rates drifted lower at the start of the period, and were subsequently fairly stable around 5% at the three-month maturity. This reflected calm money-market conditions and an absence of any significant market pressure for an early change in interest rates in either direction. 12-month rates rose from 5¾% to 6¼% and the rates implied by short sterling contracts increased at all maturities beyond September 1994.

In the middle of April, a number of factors led to a revival of expectations of a possible further rate cut. The minutes of the January, February and March monthly meetings between the Chancellor and the Governor were published on 13 April, and most analysts judged that a further cut remained a possibility particularly if, with the April tax measures, there were signs of a slowdown in activity. The surprise cut in German interest rates on 14 April was followed by March retail prices figures for the United Kingdom a day later, showing a fall in RPIX inflation from 2.8% to 2.4%.

But after the release of underlying average earnings and unemployment figures on 20 April and robust retail sales data on 21 April, the view that short-term interest rates might have reached their low-point gained strength and this was reflected in the prices of short sterling futures contracts. During May and June, implied rates came closer than in the two previous months to economists' forecasts of future interest rates. Sales of short sterling futures to hedge fixed-rate mortgage lending declined, as higher interest rates reduced the demand for fixed-rate mortgages, and hedging in the market became more attractive as a result of a fall in swap spreads (the premium over the yield on the equivalent-maturity gilt for institutions in the swap market paying a fixed rate of interest and receiving Libor).

Money-market assistance



(a) Bank of England's holdings of bills, market advances and funds supplied under the repo and secured loan facilities.
(b) Bank of England's holdings of eligible bank and local authority bills outright and on a repurchase basis; and of sterling Treasury bills on a repurchase basis.
(c) Bank of England's holdings of gilt-edged stocks on a repurchase basis, and loans made against export and shipbuilding credit-related paper.

The pattern of government expenditure and revenue flows, together with the sales of gilt-edged stock, meant that the average stock of assistance provided by the Bank fell from around £12 billion in March to around £5 billion by the end of June. This reduced the average daily money-market shortage and contributed to steady money-market conditions. On three days, there were money-market surpluses (for the first time in over a year)—twice in April and once in June.

There were very few large individual shortages and early rounds of operations were required only on 20 and 21 April. The more modest shortages on other days were comfortably relieved, and on some days with small shortages the Bank invited offers of bills in Band 1 only (bills with a remaining maturity of 1–14 days).

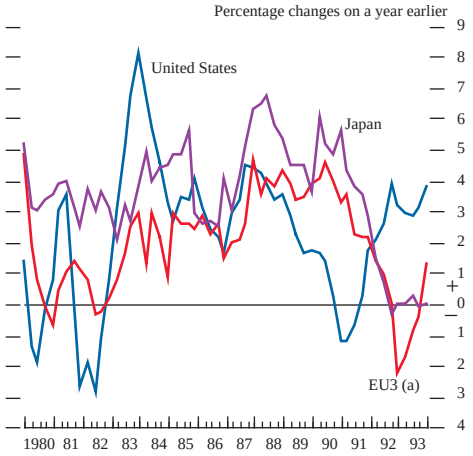
Overnight and other short rates became quite stable, helped by the repo and secured loan facilities which were made permanent earlier this year and are now available to a wider range of institutions. A Master Agreement governing use of the repo facility—formalising the legal arrangements and incorporating margin requirements—was introduced on 20 April. The facility was made available to all members of the UK banking sector, discount houses, GEMMs and building societies; however, as short interbank rates fell below the repo rate ($5^{5}/_{32}$%, the yield equivalent of the Bank's Band 2 discount rate), there was a fall in the amount borrowed using the facility—from £4.4 billion on 6 April to £2.6 billion on 22 June.

In anticipation of a fall in the outstanding stock of assistance, the weekly size of the Treasury bill tender was increased from £200 million to £400 million on 29 April, and to £500 million on 20 May. The increase both allowed the authorities to maintain an adequate influence over short-term interest rates and deepened the Treasury bill market. Demand for the bills remained strong and each issue was heavily oversubscribed. The increase in the size of the tender had little obvious effect on the yield (which remained about $^{1}/_{16}$% below the yield on eligible bank bills). On this basis by the end of August, there will be around £8.7 billion of Treasury bills outstanding, an increase of £3.9 billion compared with April.

The international environment

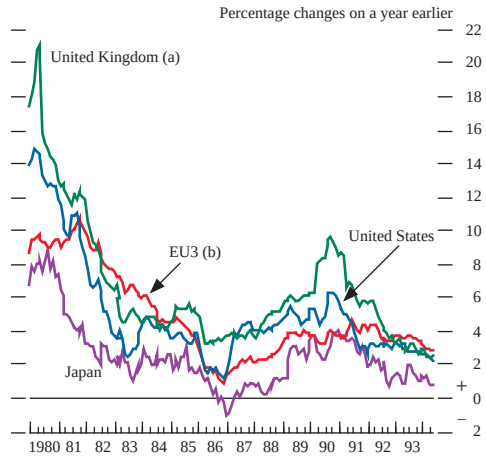
- *Economic activity has strengthened in France, Germany and Japan, but recovery is likely initially to be modest and large output gaps will remain.*
- *Inflation has continued to fall in most major countries. But a number of forward-looking indicators such as commodity prices and, in the United States, high capacity utilisation point to some upward pressure on future inflation.*
- *Despite higher activity and lower inflation, financial markets have continued to be volatile in recent months. Bond yields have risen further and the dollar has weakened.*

Chart 1
GDP growth



(a) GDP-weighted average of France, Germany and Italy.

Chart 2
Consumer price inflation



(a) RPI excluding mortgage interest payments.
(b) GDP-weighted average of France, Germany and Italy.

Overview

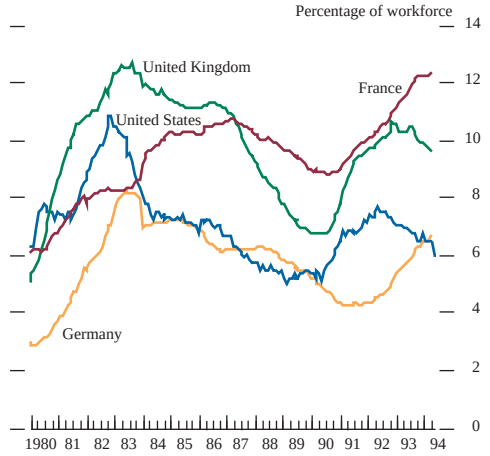
A feature of the recent period of slow growth in the industrialised world—which began in 1990 with the US recession—has been the diverse growth paths of the major countries: the timing, duration and depth of recession have varied widely. As a result of this variation, the overall effect of recession has probably been less severe than in the 1981–82 downturn (when countries' growth paths were more synchronised) but the slowdown has lasted much longer. In the last three months, however, there has been clearer evidence that all of the Group of Seven (G7) countries—including those which entered the recession last—are recovering.

In the first quarter of this year, aggregate G7 GDP rose by around 0.8%—its highest rate for four years. Chart 1 shows the path of GDP growth in the major international economies; in the first quarter, GDP rose by 0.5% in France and Germany and by 1% in Japan, while growth in the United States slowed to 0.8% from its very high fourth-quarter rate.

Although economic recovery in Europe and Japan seems to be more firmly established than three months ago, growth is likely to be modest this year and may be uneven, at least initially. The government sectors have provided large contributions to growth in France and Japan, but these effects may fade later this year. Increasing unease in bond markets over budget deficits and rising government debt may limit the scope for future fiscal stimulus. Consumer confidence and spending in France and Germany are still weak and business investment is not yet recovering. First-quarter growth in Germany and Japan may also have been overstated because of seasonal factors.

Chart 2 shows that most of the major countries have continued to make progress in reducing consumer price inflation in recent months. Despite lower inflation in the G7 countries since the beginning of the year, however, uncertainty and volatility have continued to affect financial markets. The weakness of the dollar, and falls in bond and equity prices worldwide, have illustrated the concerns of financial markets over potential upward pressure on US inflation from high capacity utilisation and rising commodity prices.

Chart 3
Unemployment[a]



(a) OECD standardised rate except for the United States, which is on the basis of a national definition.

Chart 4
European industrial production

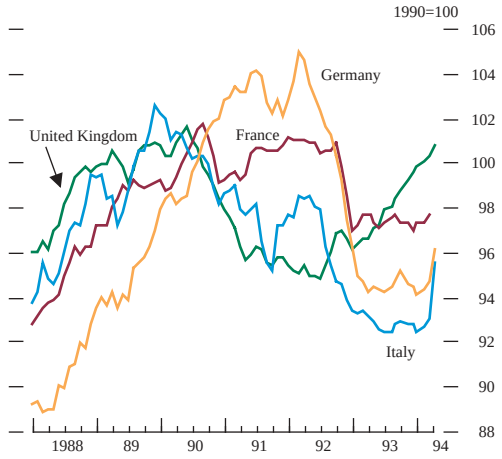


Table A
Contributions to western German and Japanese GDP growth

Percentage points (a)

	1992 Year	1993 Year	1993 Q4	1994 Q1
Western Germany				
Consumption	0.9	—	—	—
Investment	0.2	-1.4	-0.5	0.8
Government expenditure	0.6	-0.2	0.1	-0.2
Stockbuilding	-0.3	-0.6	-0.9	0.2
Domestic demand	**1.1**	**-2.4**	**-1.2**	**0.7**
Net trade	0.1	0.6	0.8	-0.2
GDP	**1.2**	**-1.9**	**-0.4**	**0.5**
Japan				
Consumption	1.0	0.6	0.4	0.8
Investment	-1.2	-1.6	-0.6	-0.5
Government expenditure	1.1	1.4	0.1	0.6
Stockbuilding	-0.5	-0.1	—	-0.2
Domestic demand	**0.4**	**0.3**	**-0.1**	**0.7**
Net trade	0.8	-0.3	-0.6	0.2
GDP	**1.2**	**0.1**	**-0.7**	**1.0**

(a) Figures for quarters give the change compared with the previous quarter.

The significance of rising commodity prices for the near-term outlook for inflation is debatable. Commodities are a small input into OECD production; manufacturing unit wage costs are a much larger element in manufacturers' costs and, in the first quarter, were lower than a year earlier in Canada, Germany, Italy and the United States. And, with the exception of the United States, the level of output is still well below potential.

Economic recovery is under way in continental Europe and Japan but is unlikely to be rapid

The 0.5% rise in GDP in France and Germany in the first quarter was narrowly based. Private consumption made no contribution to growth in either country.(1) Retail sales volumes were still falling in Germany in April (though they rose in May) and were not yet on a firm upward trend in France. High unemployment in continental Europe is probably a key factor holding back a more rapid consumer-led recovery (see Chart 3). The inflexibility of European labour markets relative to the United States may mean that unemployment will respond slowly to a rise in activity.(2) Chart 3 shows that unemployment in France and Germany has continued to rise in recent months, though the rate of increase has slowed this year; in the United Kingdom and the United States, which are further advanced in the economic cycle, it is falling. Although personal sector activity is weak, European consumer confidence has risen in recent months. But if continental Europe follows the precedent of the United Kingdom and United States, confidence may remain low despite the strengthening of activity. Chart 4 shows that, in spite of the weakness of consumer spending, industrial production in the major EU countries seems to have passed its low-point.

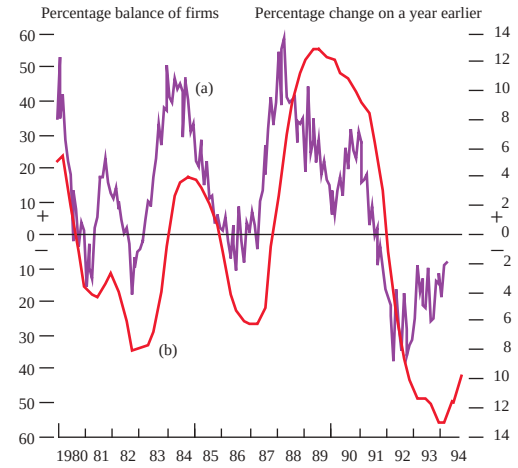
Table A summarises recent contributions to western German and Japanese GDP growth. The rise in west German GDP in the first quarter was largely accounted for by a rise in construction output. Net exports made a negative contribution to first-quarter GDP growth, despite reports of buoyant foreign orders towards the end of 1993; over the previous year, they had made a positive contribution to growth. In the last two years, Germany's competitiveness has deteriorated as the real effective exchange rate—the nominal rate adjusted for changes in relative unit labour costs—has risen by around 8%. Since 1985, Germany's real effective exchange rate has risen by 30%.

In France, the 0.5% increase in output in the first quarter was based primarily on stockbuilding, with net exports—as in Germany—making a negative contribution to growth after several quarters of positive contribution. French unemployment—which averaged 11½% in 1993—had risen to more than 12% by May this year. The government has announced a variety of measures to stimulate the economy and reduce unemployment: these include providing subsidies for employing youth workers and exemptions from social security contributions. But although the government sector made a small positive contribution to growth in the first quarter, unemployment has continued to rise.

As Table A shows, the 1% rise in Japanese output in the first quarter was led by private consumption and government spending, as the effect of earlier government fiscal packages continued to feed

(1) A box on pages 118–19 of the May 1994 *Quarterly Bulletin* described recent developments in the household sector in more detail.
(2) Indicators of labour market turnover were presented on page 16 of the February 1994 *Quarterly Bulletin*.

Chart 5
Japan: industrial production and manufacturing confidence



(a) Industrial production, right-hand scale.
(b) Diffusion index of major manufacturers' view of business conditions, left-hand scale. The figure for the third quarter of 1994 is a forecast.

Table B
Unit wage costs in manufacturing

Percentage changes on a year earlier

	1991 Year	1992 Year	1993 Year	1994 Q1
Canada	-2.6	-2.4	-2.7	-1.3
France	2.1	0.5	1.5	. .
Germany	4.3	4.9	1.5	-5.0
Italy	13.4	5.5	4.3	-1.8
Japan	4.4	8.7	4.5	5.2
United States	1.3	-0.7	-1.2	-1.6
Major six	**3.1**	**1.8**	**0.3**	. .
Memo:				
United Kingdom	7.0	2.1	0.2	2.1

. . not available.

through. The latest Tankan survey of business conditions showed the first rise in confidence for five years, but from a low base (see Chart 5). Last year, industrial production and GDP rose in the first quarter but then fell. Recovery this year is likely to be modest; the OECD projects a 0.8% rise in GDP. Consumer confidence is weak and the outlook for the corporate sector has been adversely affected by the sharp appreciation of the yen and the rise in long-term interest rates.

In the United States, economic growth has fallen from its high (and probably unsustainable) fourth-quarter rate. Output rose by 0.8% in the first quarter, compared with 1.7% in 1993 Q4. Nevertheless, retail sales and industrial production in April were 4%–5% higher than a year earlier. The labour market has also continued to tighten: non-farm employment rose by 3½% in the year to June, compared with 2% last year. But so far, there has been little discernible effect on wage costs: the annual rise in manufacturing earnings was around 2¾% in the second quarter, similar to the rise in the second half of 1993.

Inflation has continued to fall in the major countries

Consumer price inflation in the G7 countries fell from 2½% in the year to December to around 2% in the year to May. In the past year, producer prices have fallen in France, Japan and the United States. And, as Table B shows, in the first quarter of this year, manufacturing unit wage costs were lower than a year earlier in four of the G7 countries. Despite this favourable inflation news, financial markets—particularly in the United States—have concentrated on forward-looking inflation indicators, such as commodity prices, and the implications for earnings growth and output prices of a tightening US labour market and high US capacity utilisation.

Measured by the Economist's dollar-denominated index, non-oil commodity prices rose by 30% in the year to June, while Brent crude oil prices fell by 5%. Non-oil commodity prices have been rising because of a series of unconnected supply shocks and some producer agreements to limit supply. There have also been reports of speculative inflows into some commodity markets, which may presage a rise in final demand. In the past, *supply-driven* non-oil commodity price shocks have often been temporary. And Bank research also suggests that even *demand-driven* changes in non-oil commodity prices have sometimes been partly transitory: non-oil commodity prices have tended to overshoot in response to changes in G7 demand.(1)

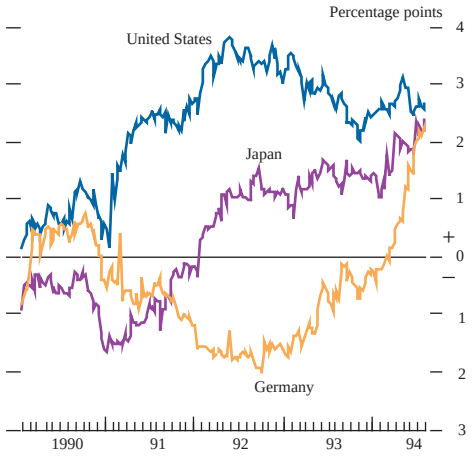
Until March, weak oil prices had largely offset price rises in other commodity markets. Since then, however, the Brent crude oil price has risen from around $13.50 a barrel to $17 a barrel in June, pushed up by higher oil demand in the United States and, reportedly, by the threat of conflict in Korea. But, at $17 a barrel, the oil price is at around last year's average. The surprise, perhaps, is not that oil prices have risen, but that they should have fallen so low in March and April. The implications for inflation of rising commodity prices are discussed in more detail in the August *Inflation Report*.

Financial market volatility poses a threat to nascent recovery

Despite the continuing favourable news of falling inflation and evidence that economic growth was becoming more widespread throughout the G7, there was further financial market volatility in

(1) A box on page 14 of the February 1994 *Quarterly Bulletin* described this process in more detail.

Chart 6
Yield spreads(a)



(a) Ten-year government bond yield minus three-month domestic money-market rate.

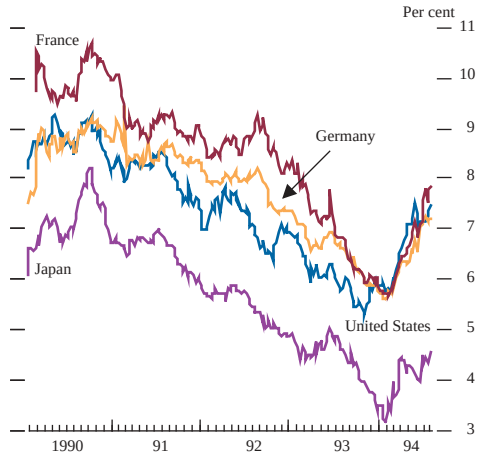
Table C
General government financial balances

Percentage of GDP

	1990	1993	1994
Canada	-4.1	-6.8	-5.5
France	-1.6	-5.8	-5.9
Germany	-2.1	-3.3	-2.9
Italy	-10.9	-9.5	-9.7
Japan	2.9	0.3	-1.9
United States	-2.5	-3.5	-2.6
Memo:			
OECD Europe	-3.7	-6.3	-6.1
G7	-2.0	-3.9	-3.7

Source: OECD; the figures for 1994 are OECD projections.

Chart 7
Government bond yields(a)



(a) Ten-year bonds.

the second quarter. Changed perceptions over the outlook for economic growth and the direction of short-term interest rates in Germany, Japan and the United States, together with a weakening of the US dollar, have contributed to bond and equity-market falls this year.

Earlier in the year, the trigger for falling bond and equity prices was the Federal Reserve's first increase in short-term interest rates for five years. In June, falling US bond prices followed renewed US dollar weakness and a growing view that short rates in Germany and Japan might not need to fall further, given the rise in activity. European bond yields followed US yields up—though eventually yields in some European countries rose by more than US yields. Chart 6 shows that in Germany the gap between long and short-term interest rates widened sharply between March and June. European and Japanese bond yields rose because of changed perceptions of future short rates, but perhaps also because European markets have focused once again on high government borrowing. The latest Economic Outlook produced by the OECD, for example, projects that general government deficits in European OECD countries will be 6.1% of GDP this year, compared with 6.3% last year (see Table C). In most European economies, deficits are projected to fall this year but gross government debt is set to continue rising as a proportion of GDP.

In continental Europe, most personal sector mortgages are priced relative to long-term interest rates and the corporate sector is also more reliant on borrowing at long-term interest rates than, for example, in the United Kingdom.(1) There have therefore been some concerns that rising long rates in Europe (and Japan) could damage recovery—particularly of business investment, which fell sharply during the recession and has not yet begun to rise.

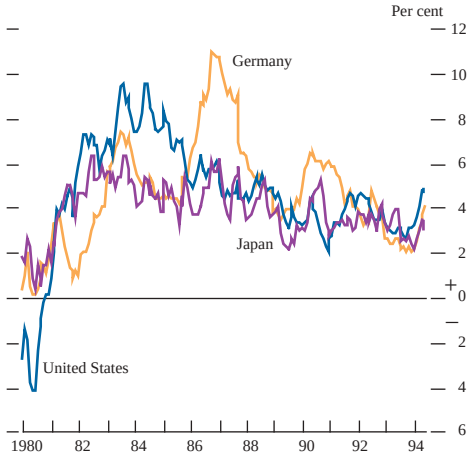
It should be recalled, however, that the increase in long-term yields this year followed three years of steady falls in nominal bond yields (see Chart 7). With hindsight, the rally in bond prices in the second half of last year may have pushed prices too high, and this year's rise in yields may therefore be in part a correction from that overbuoyant period. In June, ten-year government bond yields in France and Germany were 150 to 200 basis points higher than at the end of 1993, but less than 50 basis points higher than a year earlier; Japanese yields were still lower than in June 1993. So it seems unlikely that the rises seen in French and German long-term rates in the year to the end of June will seriously damage the recovery (interest rates have, however, risen more sharply in other European countries, such as Italy and Spain). In the United States, long-term interest rates rose by more than 100 basis points in the year to June, but recovery is firmly established there and the tightening of monetary conditions at the short and long ends of the yield curve may be consistent with maintaining growth on a broadly steady path. One concern, however, is that, adjusted for current inflation, US and German nominal bond yields rose sharply between January and June (see Chart 8).

Monetary growth has been weak in France and Japan but high in Germany

There is little evidence yet that the rise in long-term interest rates has reduced money and credit growth in the major economies

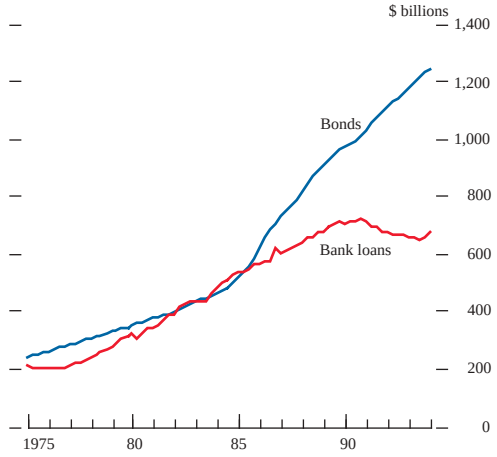
(1) See the article on fixed and floating-rate finance in the United Kingdom and abroad on pages 34–45 of the February 1994 *Quarterly Bulletin*.

Chart 8
Bond yields adjusted for current inflation(a)



(a) Ten-year government bond yield minus current CPI inflation.

Chart 9
US companies' bond and bank borrowing(a)



(a) Amounts outstanding.

Table D
Current account balances

Percentage of GDP

	1992	1993			1994
	Year	Year	Q3	Q4	Q1
Canada	-3.8	-4.3	-4.1	-4.5	. .
France	0.3	0.8	1.6	1.3	. .
Germany	-1.2	-1.3	-1.6	-1.6	-1.6
Italy	-2.3	1.1	1.5	2.6	0.5
Japan	3.2	3.1	2.9	2.8	3.2
United States	-1.1	-1.6	-1.7	-1.9	-1.9
Memo:					
United Kingdom	-1.7	-1.7	-1.3	-1.3	-0.5

. . not available.

(though effects would be expected to feed through with some lag). In the United States, where short-term interest rates have also increased, outstanding corporate bond issues have continued to rise and, in the fourth quarter of last year and the first quarter of this, the level of bank loans outstanding rose, after falling between 1991 and 1993 (see Chart 9).

In Germany, where an intermediate money supply target is used, M3 growth has continued to be high in the second quarter. Although its annualised growth rate (compared with the fourth quarter of last year) has fallen in recent months, it was still above 10% in May, compared with a target of 4%–6%. In the first five months of the year, monthly M3 growth averaged 1%. The high growth rate can be explained partly by high government borrowing and increased competition for savings deposits following a relaxation of rules governing savings banks. And earlier this year, M3 growth was distorted upward by taxation effects. So, despite M3 growth in excess of the target range, the Bundesbank has focused on the falling rate of inflation and has continued to guide money-market rates down by cutting its repurchase ('repo') rate and, in May, making a larger-than-expected, 50 basis-point cut in the discount and Lombard rates.

In France, by contrast, the annual rate of M3 growth was negative between October 1993 and May this year. There were a number of special factors, such as taxation changes and high sales of the 'Balladur bond' (a large government issue last year which raised funds to finance measures to reduce unemployment), but underlying M3 growth has been weak. Between May 1993 and February this year, outstanding bank credit was also lower than a year earlier.

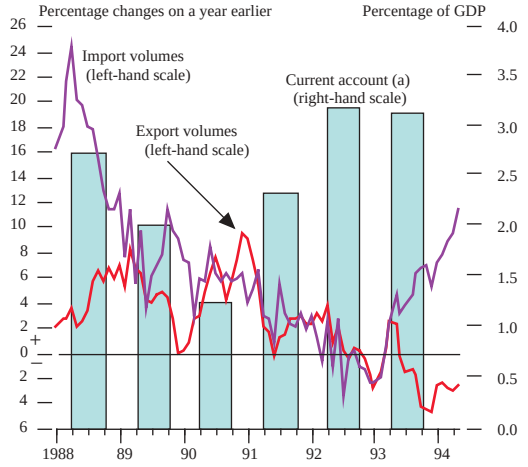
In Japan, annual growth of the most widely watched money supply measure, M2+CDs, has continued at around 1½%–2% for more than a year. The Bank of Japan's foreign exchange intervention to support the dollar—which might otherwise have boosted the money supply—seems largely to have been sterilised by sales of Japanese government bonds to the non-banking sector. In the first four months of the year, the stock of bank loans to non-financial enterprises was unchanged from the same period of 1993 and, with long-term interest rates rising, the cost of bank loans has risen since April. The firms surveyed in the latest Tankan survey confirmed that loan rates had increased in the three months to May, although the overall lending attitude of financial institutions had eased.

By the second quarter, the dollar had been depreciating against the yen for more than a year; by contrast, it strengthened against the Deutsche Mark for most of last year, though it depreciated in the first half of this year. In the year to June, the dollar fell by 6% against the yen and, despite central bank intervention and supporting policy statements, fell below ¥100 for the first time since 1945. The weakness of the dollar, despite the fact that the United States was further ahead in the economic cycle than Germany or Japan, probably resulted primarily from underlying concerns over the bilateral current account imbalance between the United States and Japan.

Current account imbalances have been slow to adjust

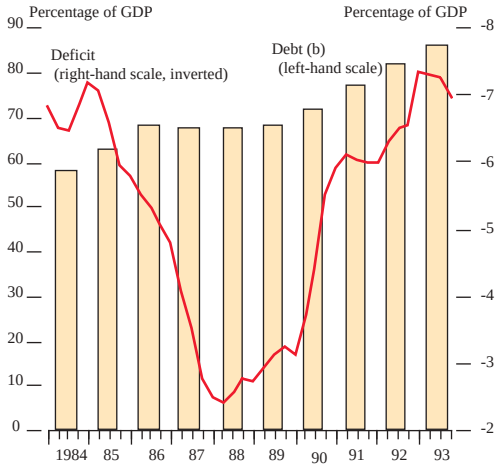
Table D shows current account balances in the G7 countries. The Canadian deficit is the largest relative to GDP (it rose to 4.3% of GDP in 1993), but Japan's surplus is the largest absolute imbalance

Chart 10
Japanese current account balance and trade volumes



(a) Year average.

Chart 11
Canadian government debt and deficit(a)



(a) General government.
(b) End-year.

and it has attracted most interest. The rise in Japan's surplus in the first quarter reflected its weak relative demand—domestic Japanese demand rose by less than 1% over the fourth and first quarters, compared with nearly 3% in the United States. In the first five months of this year, Japan's visible trade surplus with the United States was $20 billion, 9% higher than in the same period last year. Aggregate trade volumes have, however, responded to the high yen—Chart 10 shows that a clear gap has opened up between import and export volume growth. Because a rising yen causes the terms of trade to move in Japan's favour, the surplus has been slow to respond to these volume trends, but it might be expected to narrow if they persist and as Japanese relative demand recovers.

Canada's real effective exchange rate has fallen by 20% over the two years to June, because of a depreciating nominal exchange rate and falling manufacturing unit wage costs. Despite this improvement in competitiveness, the current account deficit has risen, because of strong demand relative to its non-US export markets and—more importantly— a widening invisibles deficit because of rising interest payments to foreign holders of Canadian government debt. Chart 11 shows that Canada's general government debt (domestic and foreign currency) has risen to more than 80% of GDP. Recent rises in long-term interest rates will make it more difficult to reduce the deficit despite a strengthening economy and gradually-falling unemployment (now below 11%).

The mobility of capital, boosted over the last 15 years by deregulation and a trend toward risk diversification via cross-border investment, means that it is easier to finance the current account deficits shown in Table D. But the weakness of the dollar in recent months shows that markets are focusing on these imbalances and the means by which they are financed.

In 1993, the main counterparts to Japan's $130 billion current account surplus were a $78 billion outflow of long-term capital, a $26 billion outflow of short-term capital and a $26 billion rise in foreign exchange reserves, largely the result of intervention to support the dollar. By contrast, in the first quarter of this year, Japan's $34 billion current account surplus was accompanied by a $47 billion *inflow* of long-term capital. This net inflow of long-term capital mainly comprised foreigners' net purchases of Japanese equities (which helped to support the stock market) and a reduction in Japanese holdings of overseas bonds—some investors were reportedly selling overseas bonds because of capital losses following the yen's appreciation. The first-quarter surplus on the current and long-term capital accounts was matched by a $6 billion rise in foreign exchange reserves and an $84 billion outflow of short-term capital.

Financial market developments

- *Government bond prices continued to fall during the second quarter, prompted mainly by growing concern about inflationary pressures and uncertainties over the future level of short-term interest rates. In many markets, prices returned to the levels prevailing before last year's strong rally.*

- *The volume of borrowing in the international bond markets was significantly lower than in the first quarter, reflecting borrowers' reluctance to issue and investors' unwillingness to commit funds while markets remained turbulent.*

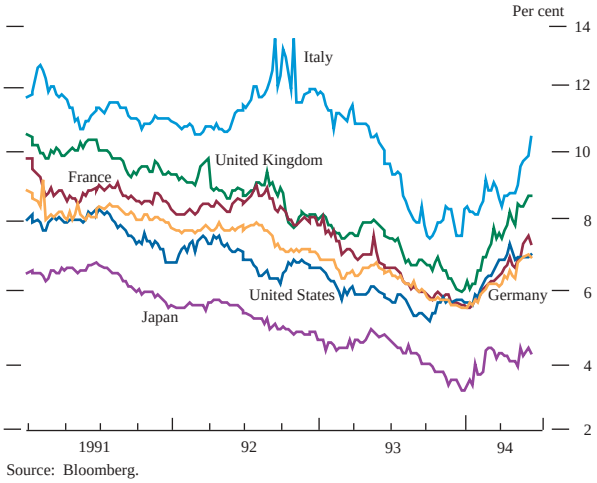
- *In the US, Japanese and most European markets, yield curves steepened as investors—taking a defensive view—shifted their interest away from long maturities. Most of the limited number of new bond issues were concentrated at maturities of five years or less.*

- *Rising real bond yields led to price falls in many equity markets. New equity issues were therefore more difficult, though this did not stop a large number of companies coming to the market in the United Kingdom.*

Overview

Bond prices continued to fall in volatile conditions during the second quarter. The falls were led by the US and German government bond markets, but the trend of rising yields was seen in all the major markets (see Chart 1). Growing concerns about inflation, particularly in the United States, contributed to the falls.

Chart 1
Ten-year government bond yields



Source: Bloomberg.

The prices of US Treasuries continued their decline; the yield on ten-year Treasury bonds rose by 47 basis points during the quarter. The Federal Reserve continued to tighten monetary policy, raising the target federal funds rate twice —by 25 basis points on 18 April and 50 basis points on 17 May (when the discount rate was raised by the same amount)—to a level of 4.25%. The second increase was initially perceived as a move towards a neutral monetary stance and provided a brief fillip to bond markets. With annual inflation of 2.3% at the end of the quarter, the 'real' federal funds rate was then 1.95%, close to its 2% average over the last 25 years. The markets nevertheless remained sensitive to any indicator suggesting higher future inflation, and the upward revision (to 3%) to the figure for first-quarter GDP growth ended the minor rally seen after 17 May.

In Europe, falling Bund prices and cuts in German short-term interest rates led to a significant steepening of the Deutsche Mark yield curve: the yield differential between ten-year and three-month rates, which had been negative in the fourth quarter of 1993, increased to 212 basis points by the end of June, influenced by rapid money supply growth, strengthening perceptions of recovery in Germany and diminishing expectations of further immediate cuts in short-term interest rates.

Japanese bond markets performed relatively strongly at the start of the quarter. Market sentiment was buoyed by relative currency stability in the first two months of the quarter as well as by perceptions that the government was continuing its accommodating stance on short-term interest rates. Lower interest rates, combined with renewed demand from institutional investors following the start of the new Japanese financial year, encouraged borrowing. After a brief sell-off in mid-June, however, prices of Japanese government bonds ended the period slightly lower than they began.

The general fall in bond prices in turbulent market conditions resulted, for most of the period, in a dearth of primary

market issues. Borrowing in the international bond markets totalled only $91 billion in the second quarter, a third less than in the previous quarter (see Table A) and the lowest total since the fourth quarter of 1992. Most of the straight bonds issued were in currencies other than the dollar. The high volume of floating-rate notes (FRNs) issued in the first quarter ($39 billion) was not maintained in the second (only $17 billion), partly because underwriters had been left with FRNs on their books. The volume of equity-linked debt issues fell even more sharply; only $6 billion was raised from such issues, down from $21 billion in the first quarter.

Table A
Total financing activity:[a] international markets by sector

$ billions; by announcement date

	1992	1993				1994	
	Year	Year	Q2	Q3	Q4	Q1	Q2
International bond issues							
Straights	281.5	375.7	88.0	82.2	82.6	76.8	68.5
Equity-related	24.0	39.6	8.3	10.6	12.0	20.7	5.7
of which:							
Warrants	*18.3*	*20.8*	*3.7*	*5.5*	*5.3*	*8.2*	*0.8*
Convertibles	*5.7*	*18.8*	*4.6*	*5.1*	*6.8*	*12.5*	*4.8*
Floating-rate notes	43.2	68.5	13.6	19.0	20.3	38.7	16.7
Bonds with non-equity warrants (currency, gold, debt)	1.2	1.5	0.4	0.2	0.1	0.1	—
Total	**349.9**	**485.4**	**110.3**	**112.0**	**115.1**	**136.2**	**90.9**
Credit facilities (announcements)							
Euronote facilities	113.2	117.4	14.9	31.1	55.9	35.7	46.0 (b)
of which:							
ECP	*21.5*	*24.2*	*3.4*	*2.9*	*12.2*	*3.9*	*15.4* (b)
EMTNs	*90.8*	*92.7*	*11.2*	*28.1*	*43.6*	*31.9*	*30.6* (b)
NIFs/RUFs	*0.9*	*0.5*	*0.3*	*0.1*	*0.1*	—	—
Syndicated credits	221.4	221.2	69.4	54.7	55.0	52.0	64.5
Total	**334.6**	**338.6**	**84.3**	**85.8**	**110.9**	**87.7**	**110.5**
Memo: amounts outstanding							
All international							
Bonds (c)	1,686.4	1,847.9	1,774.9	1,843.6	1,847.9	1,980.8	. .
Euronotes (b)	173.1	255.8	199.3	234.6	255.8	289.8	330.3
of which, EMTNs	*61.4*	*146.6*	*94.8*	*124.6*	*146.6*	*177.9*	*216.5*

. . not available.

(a) Maturities of one year and over. The table includes euro and foreign issues and publicised placements. Issues which repackage existing bond issues are not included. Figures may not add to totals because of rounding. Bond total includes issues from MTN programmes.
(b) Euroclear figures.
(c) BIS-adjusted figures, including currency adjustment. Includes issues of fixed-rate bonds and floating-rate notes.

Among the issuers in the international market, sovereign borrowers remained prominent. Some domestic auctions by sovereign issuers were, however, cancelled in the face of adverse market conditions; but it is not clear how much this helped the markets, since cancellation may have heightened concerns about the scale of future borrowing. Re-assessment of risk by investors also led to lower levels of borrowing by emerging-market issuers who were, on the whole, unwilling to pay the higher premia. There was some recovery in fixed-rate borrowing towards the end of the quarter, and relatively strong borrowing in particular currencies: 28% of fixed-rate bonds were issued in yen (up from 8% in the previous quarter).

Investor interest shifted to shorter maturities in most currency sectors since, in an environment of rising yields (and falling prices), bonds of shorter duration(1) hold their value better than those with longer duration. This move was a reversal of the trend during 1993, when investors had bought longer-maturity instruments in order to maximise returns while yields were falling.

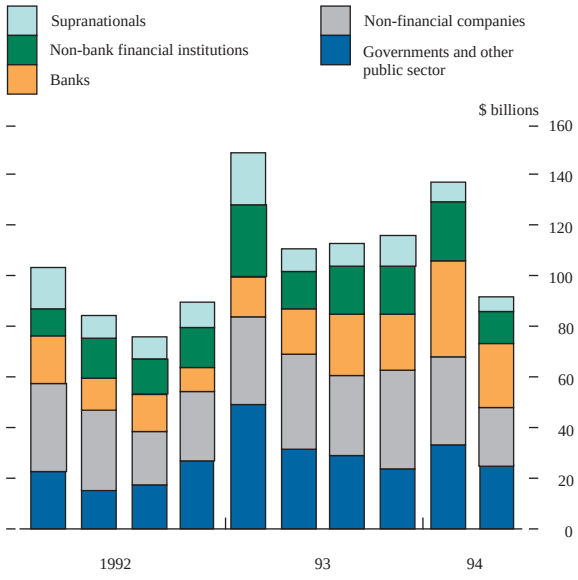
Short-term instruments such as eurocommercial paper (ECP) therefore became relatively attractive to investors: announcements of new ECP programmes rose strongly to $15.4 billion in the quarter and net borrowing rose to $4.8 billion. Announcements of new euromedium-term note (EMTN) programmes were at broadly similar levels to the first quarter and, with the investor preference for shorter maturities, issues from existing EMTN programmes rose to $38.6 billion. Despite the low levels of international bond issues, announcements of syndicated credits continued their recent strength, totalling $64 billion. Some of this was refinancing, but the attractiveness of floating-rate assets in the prevailing market conditions may also have boosted the volume of new loans.

Rising real yields in bond markets undermined prices in most equity markets, despite generally-improving economic conditions and a favourable outlook for corporate earnings. The general weakness of European equity markets led to a low level of equity-related bond issues. Another factor limiting volumes of these issues was a change in Japanese accounting rules, which deterred Japanese borrowers from issuing bonds with attached warrants.

International bond markets

Only $91 billion was raised through international bond issues in the second quarter of 1994. As a result of the fall in FRN issues and weakness in the equity-related bond sector, the share of the total formed by fixed-rate borrowing was higher than in the previous quarter. Overall, however,

Chart 2
Borrowers in the international bond market



Source: Bank of England ICMS database.

(1) *Duration* is defined as the average maturity of all future payments on a security (coupon and principal), weighted according to the discounted present value of each payment. For a given change in yield, a bond's price will move further the longer is its duration.

falling prices made borrowers reluctant to issue, and uncertainty about the timing of future interest rate moves (especially in Germany and the United States) and concerns over future inflation made investors unwilling to commit funds, particularly at long maturities.

Of those who did borrow, public sector issuers were prominent (see Chart 2): they raised $24 billion in total, including $14 billion of issues by central governments. Banks and financial institutions were also active, raising $38 billion in the quarter, almost half of which was accounted for by European banks.

Currency sectors

Dollar-denominated issues fell back markedly in the early part of the quarter. The weakness of the currency and rising short and long-term dollar interest rates meant that issuers preferred to postpone borrowing or issue in other currencies. There was, however, a recovery in the volume of dollar-denominated issues after the 50 basis-point rise in short-term US interest rates on 17 May; over the three months as a whole, dollar issues accounted for almost a quarter of all fixed-rate issues (see Table B).

Table B
Currency composition of fixed-rate bond issues(a)

Percentage of total issues announced

	1992	1993			1994	
Currency denomination	Year	Year	Q3	Q4	Q1	Q2
US dollar	32	30	29	28	24	24
Deutsche Mark	11	13	13	16	13	4
French franc	8	11	8	12	13	12
Sterling	6	8	8	6	12	4
Yen	14	13	16	16	8	28
Italian lira	2	3	4	2	6	5
Canadian dollar	6	8	8	5	5	6
Ecu	7	3	2	2	4	3
Swiss franc	5	5	6	5	2	4
Other	9	6	6	8	13	10
Total	**100**	**100**	**100**	**100**	**100**	**100**

(a) Excluding equity-related issues.

In contrast, the low cost of funding and relative stability of the yen in the first two months of the quarter encouraged issues in that currency; 28% of total fixed-rate borrowing was in yen. There was renewed demand from Japanese institutional investors following the start of the new financial year, and issues were particularly strong after the Golden Week holiday at the beginning of May. Almost half of the euroyen borrowing was by Japanese companies that had been unwilling to issue before the financial year-end, but Scandinavian public sector institutions were also prominent.

The share of fixed-rate issues denominated in European currencies fell to 42%. This partly reflected the very low level of Deutsche Mark borrowing (only $3 billion) as rising long-term yields, concerns about inflationary pressures and uncertainty over the next move in German short-term interest rates deterred investors. Borrowing in Dutch guilders, often viewed as a close substitute for Deutsche Marks, was also lower than the previous quarter. In contrast, there was heavy borrowing in the French franc sector ($8 billion), boosted when two sovereign borrowers, the Kingdom of Spain and the Republic of Finland, took advantage of the low yield spread compared with German Bunds to issue deals of FFr 6 billion. The sector also saw its largest mortgage-backed deal to date, a FFr 2.5 billion two-tranche issue of securitised mortgages by Comptoir des Entrepreneurs.

Eurolira borrowing was also relatively strong (totalling $4 billion), helped by favourable swap rates and investor demand for higher coupons. Over 15% of the eurolira bonds issued in the first half of 1994 were in callable form (offering investors a yield premium in return for giving the borrower the right to redeem the bond early).

Volatility and sharply-rising yields in the gilt market meant that the volume of eurosterling fixed-rate borrowing was relatively low—only £1.9 billion over the quarter. Many issuers—particularly financial institutions—preferred to issue floating-rate notes. Activity overall remained subdued and issuers found it difficult to judge when best to come to the market and at what price. Investors, influenced by the persistence of the price falls, were reluctant to buy new debt and, with foreign investor interest in the eurosterling market at a low ebb, new issues were increasingly targeted at UK institutions. In the gilt market, the UK government's programme of regular monthly auctions was nevertheless successfully maintained, despite the market's turbulence; a flexible approach was adopted and a number of non-conventional instruments were brought to the market.

In the Ecu sector, $1.8 billion of fixed-rate bonds were issued; investors were attracted by widening spreads over German and French government bonds, and by arbitrage possibilities against Italian Ecu-denominated government bonds.

Volatility in currency and bond markets adversely affected the liquidity of the Ecu bond and money markets during the quarter. The Bank was nevertheless able to hold its regular monthly Ecu Treasury bill auctions. These were oversubscribed at all three maturities on offer, with overall cover at each auction of at least two times, at levels between Ecu Libid and 10 to 15 basis points below Ecu Libid at six months. ECU 200 million of one-month, ECU 500 million of three-month and ECU 300 million of six-month bills were on offer at each tender. There are now ECU 3.5 billion of Treasury bills outstanding across all maturities; monthly turnover averaged over ECU 2 billion during the quarter.

Despite the adverse market conditions, liquidity in all three of the outstanding Ecu Treasury notes (maturing in 1995, 1996 and 1997) was good, with turnover steady at around ECU 1 to 2 billion a month. These instruments benefited from investor demand for good quality short-term assets in the volatile market conditions.

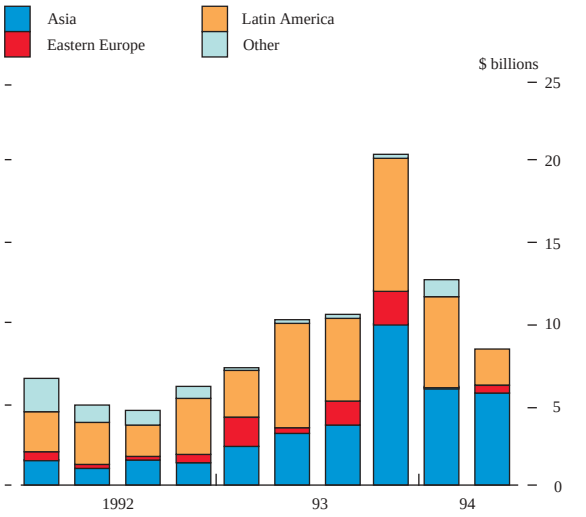
Among the United Kingdom's other foreign currency debt, the DM 5.5 billion five-year and $3 billion ten-year bonds, launched in 1992 to complete HMG's ECU 10 billion

currency borrowing programme have continued to trade well. Over the last quarter, they continued to be liquid and remained among the more actively traded eurobond issues settled through Euroclear and Cedel.

Emerging markets

Issues by emerging-market borrowers continued to be affected by events in the US bond market and investors' earlier re-assessment of risk (see Chart 3). Domestic difficulties in some countries (in particular, Venezuela) also influenced market sentiment. Many issuers therefore postponed borrowing, and those emerging-market borrowers that did come to the international markets were reliant on their lead managers to pre-place high proportions of their issues or indeed to be prepared to retain some of them. The secondary markets for Brady bonds and other less developed country (LDC) debt instruments steadied in April, and showed initial signs of recovery in May—but the Finacor 'LDCx' index of debt prices registered a 10% fall during June.

Chart 3
International bond issues by non-OECD borrowers



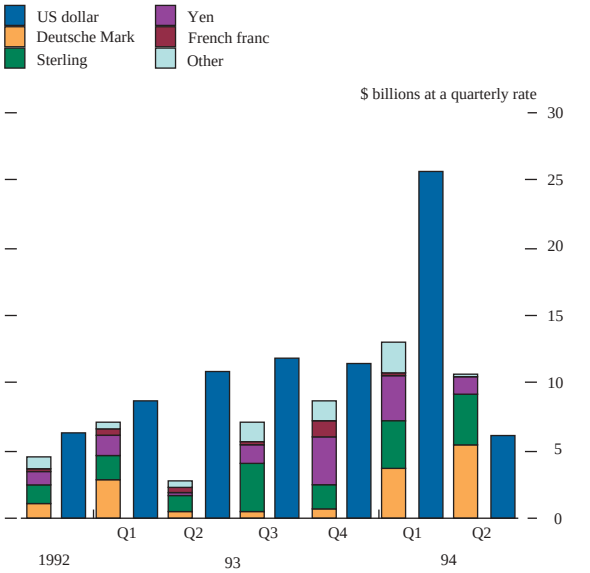
Source: Bank of England ICMS database.

Brazil agreed a Brady-style restructuring for $49 billion of its commercial debt; net debt reduction is estimated at 18%. Following four years of negotiation, Poland advanced towards the completion of its Brady deal to restructure $13 billion of commercial debt (an overall debt reduction of between 42% and 45%). The deal would be the first to give a reduction on short-term debt; this led some creditors to express reservations about its terms.

Floating-rate notes

Issues of FRNs in the international markets fell significantly from their levels in the first quarter (see Chart 4), despite their attractiveness to investors as defensive investments in an environment of rising short-term interest rates and steepening yield curves. At $17 billion, they represented only 18% of total bond borrowing, compared with 28% in the first quarter. The fall was perhaps in part a reaction to the high level of FRN issues in the first quarter, which

Chart 4
Currency composition of floating-rate issues



Source: Bank of England ICMS database.

saturated short-term demand for such assets and made further issues difficult while underwriters still held high levels of unsold inventory.

Nevertheless a number of governments issued FRNs. The United Kingdom issued a floating-rate gilt and public sector borrowers were also prominent in issuing floating-rate debt in the international markets: the Republic of Finland, the Hellenic Republic (which had previously issued in the name of the Bank of Greece), the Province of Nova Scotia, the Kingdom of Sweden and the World Bank (with the first tranche of its global MTN programme) were among those to issue.

Several large asset-backed issues were launched in the sterling market during the quarter. The deals were reasonably well received—reflecting in part a shortage of such paper—and more are expected to follow. Two separate mortgage-backed deals totalling £590 million were brought by Barclays Bank, using a special-purpose vehicle. There were several other issues backed by residential mortgages, both performing and non-performing. And a special-purpose vehicle of First National Bank issued £75 million of securities backed by a variety of small-business loans, the first time such assets have been securitised in the United Kingdom.

A few borrowers responded to specific investor demand by offering short-maturity structured products. Several dollar-denominated hybrid FRNs were issued during the quarter. These offered investors a generous spread over Libor (normally 50 to 60 basis points) for the first two or three years, with fixed rates (normally above 8%) subsequently. The small size of the deals suggested that they were essentially private placements.

The illiquidity of many of the structured products that had been issued in recent quarters was, however, reflected in

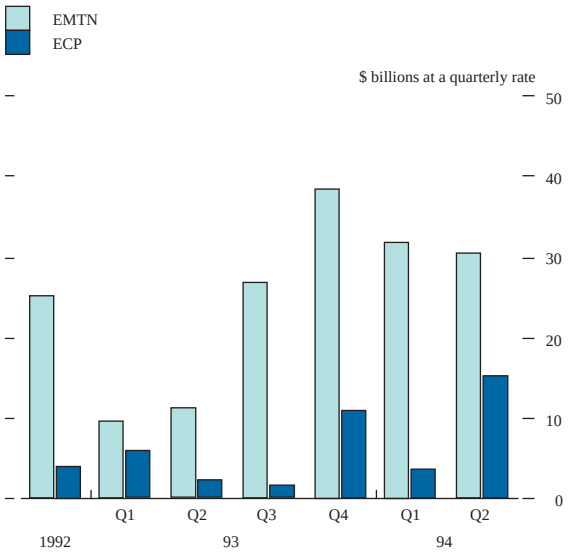
sharp falls in the prices of 'collared' and 'range' FRNs; and much of the $20 billion worth of these notes issued since 1992 traded at only 90% of face value. With US short-term interest rates rising, the value to investors of these products' floors was vastly reduced, and the caps applying on longer-maturity notes became an important potential constraint on yield. Even without any imminent impact of the caps (many of which are set at around 8%), the declining value of the options embedded in the bonds reduced their intrinsic value; at the extreme, where Libor had already moved outside the collar, some 'range' FRNs paid no interest at all. The falls in their prices are expected to lead to a repackaging of many collared FRNs, as well as deterring interest among investors for similar issues in the near future.

Structured issues were nevertheless popular in the sterling sector. Lloyds Bank and the Cheltenham and Gloucester Building Society both issued step-up FRNs; the Kingdom of Sweden and the Halifax Building Society issued collared FRNs (the latter to refinance maturing debt); and the Swedish Export Credit Corporation issued a small reverse FRN.

Euromedium-term notes and eurocommercial paper

Short-term dollar-denominated paper became relatively attractive to investors taking a defensive position in US bonds. As a result, net borrowing in eurocommercial paper (ECP) totalled $4.8 billion, up from $1.4 billion in the first quarter, and the stock of ECP outstanding grew to $85.8 billion. There was a sharp rise in announcements of new ECP programmes; they totalled $15.4 billion in the quarter (see Chart 5).

Chart 5
EMTN and ECP programme announcements



Source: Bank of England ICMS database; 1994 Q2 figures from Euroclear.

Announcements of new euromedium-term note (EMTN) programmes were, at $30.6 billion, at broadly similar levels to the first quarter. Those borrowers who already had facilities were also active: net issues totalled $38.6 billion, up from $31.3 billion raised in the first quarter and more than double the same quarter last year. The stock of EMTN outstandings continued its upward trend to end the quarter at $216 billion.

Outstandings in the sterling MTN market continued to rise, reaching £10.2 billion at the end of May. The size of the sterling CP market increased to £6.1 billion by the end of May.

Equity-related bonds

Equity-related borrowing totalled $6 billion, only 28% of the first quarter's total and substantially less than 1993 levels. One reason for this fall was the almost total absence of bonds issued with attached warrants (they totalled only $0.8 billion). This was largely a result of changes in Japanese accounting regulations towards the end of their financial year. The new accounting rules, which came into effect on 1 April and brought Japanese practices into line with international ones, require straight-line amortisation of a bond's warrant position throughout the life of the instrument—previously only the warrant's coupon had to be included in the accounts. Amortising the warrant position increases the immediate accounting cost of the bond, with a potentially significant impact on a company's recorded profits. Although the permanent impact of the accounting changes should not be significant, it may be some time before issues return to recent levels; the share of equity-linked debt issued by Japanese borrowers fell to 20% from the 50% level in recent quarters.

This had a particular impact on the Swiss franc warrant market; the share of total equity-related bonds denominated in Swiss francs fell to only 10%. Such issues had been popular with Japanese corporates, who could easily swap the proceeds of ex-warrant bonds for yen to eliminate currency risk. Convertibles—where the options are not detachable—are less easily swapped. As an alternative to Swiss franc equity warrants, the Swiss National Bank subsequently announced that it would permit borrowers to launch yen-denominated convertibles ('Alpines') in Switzerland.

Volumes of equity-related bonds were further depressed by the general weakness of European equity markets; European issuers raised only $1.9 billion during the quarter, down from $6.8 billion in the previous quarter, with UK and French borrowers completely absent from the market.

Syndicated credits activity

The volume of syndicated credits was higher than in the previous three quarters, with a total of $64 billion announced in the second quarter. Non-financial borrowers accounted for the majority of this, and 23% of credits were explicit refinancings of existing loans. OECD borrowers were prominent, including Dutch and Portuguese entities, as well as more regular borrowers from the United States and United Kingdom. Asian borrowers, notably those from Hong Kong and Thailand, accounted for 16% of total borrowing, and a $100 million credit for the State Bank of Vietnam

represented that country's first ever international financing. In currency terms, the dollar share of loans fell slightly to 75%, sterling's share increased to 14% and a number of borrowers moved into more unusual currencies, including the Norwegian krone, Malaysian ringgit and Thai baht.

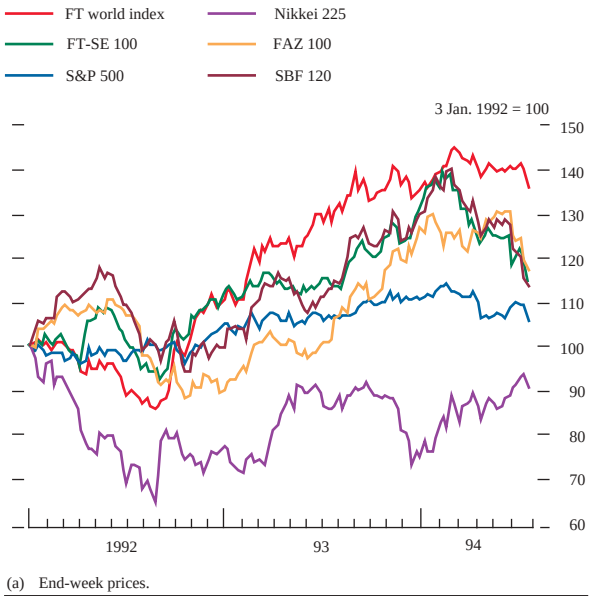
Settlement

On 1 June, the International Securities Markets Association (ISMA) Board announced that the euromarket's standard settlement period would be reduced from seven calendar days after the transaction date to three business days after with effect from 1 June 1995. The decision, approved at the ISMA annual general meeting, followed widespread consultation with international securities market participants and should reduce the level of market risk inherent in the settlement of euromarket transactions.

Equity markets

During the quarter as a whole, the FT-SE Actuaries world index fell by 1%, as price falls in Europe and the United States outweighed price increases elsewhere (see Chart 6). After prices of European equities had increased early in the quarter as German interest rates were lowered, price falls were subsequently triggered by rising bond yields, higher inflation expectations and perceptions that there was a reduced likelihood of significant reductions in interest rates in the near future (indeed that increases might be more likely). Over the quarter as a whole, the Paris SBF 250 fell by 10%, the Frankfurt FAZ 100 by 4.2% and the FT-SE 100 by 5.4%.

Chart 6
Equity indices(a)



(a) End-week prices.

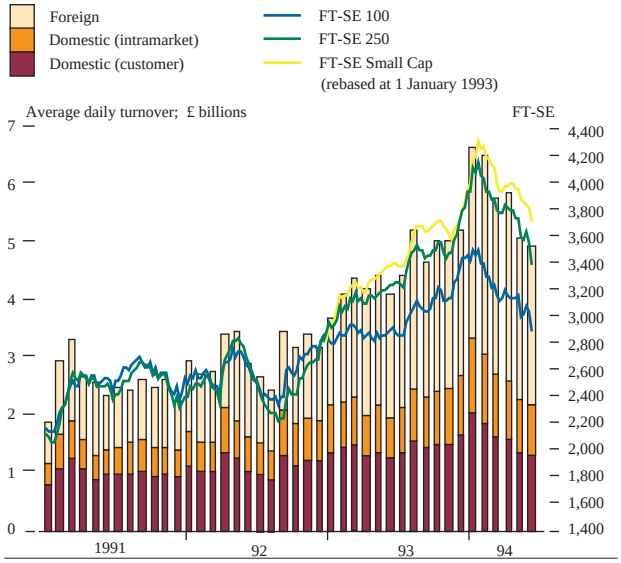
In the United States, weak equity prices were boosted by hopes that the 50 basis-point rise in interest rates on 17 May would lead to a period of stable interest rates. Towards the end of the quarter, however, prices fell sharply as expectations of rising short-term rates returned: the S&P 500 ended the quarter down 0.3%. In Japan, the Nikkei 225 index continued the upward trend which had begun at the start of the year; a series of well-received economic indicators and steady capital inflows from abroad helped the index to rise above 20,900—its highest for over a year—and the Nikkei 225 ended the quarter up 8%.

Despite the volatile and difficult conditions in the equity market, substantial amounts of new issue activity continued to take place in the United Kingdom: well over 100 issues were announced by companies seeking to raise a total of over £4.2 billion; this compares with £6.5 billion for the first quarter of the year. Over half of the equity was raised in rights issues, compared with only 15% in the first three months of the year. Much of this was, however, accounted for by the launch of the £858 million rights issue by Eurotunnel—the largest issue in the transport sector to date and one of the largest ever in the UK market.

A large number of new companies continued to come to the market. In all, 140 new companies were floated during the first half of 1994, compared with 63 in the first half of 1993. With the FT-SE 100 Index falling by almost 17% from its all-time high of 3,520 in February, however, new issues have become increasingly difficult and some may have been postponed or even cancelled.

Secondary market turnover in UK equities fell away steadily from the records set in the previous quarter to levels in line with the average last year (see Chart 7). Daily turnover on

Chart 7
Equity turnover and prices on the London Stock Exchange



SEAQ averaged £2.1 billion, of which customer business accounted for £1.2 billion. Turnover on SEAQI also declined from the previous quarter's record level, though it remained above 1993 levels at a daily average of £2.8 billion.

CREST project

The initial design phase of the CREST project ended in May as scheduled, with the publication by the Bank's project

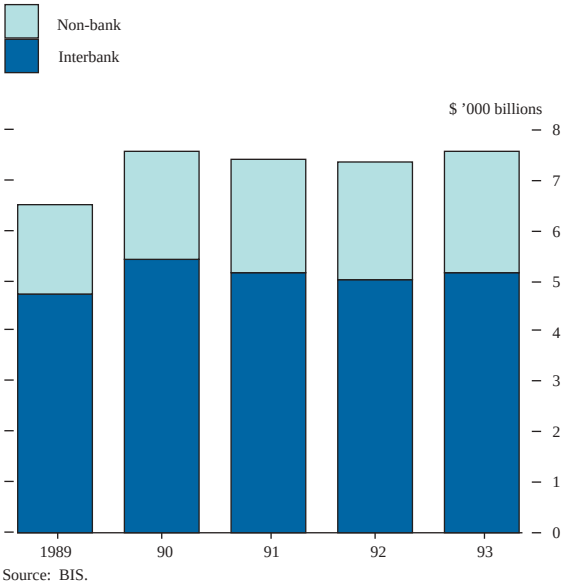
Developments in international banking in 1993

This box summarises developments in international banking in 1993: the first section looks at global trends, as revealed by quarterly statistics published by the BIS; the second section focuses on developments in the London market, using the Bank's own data.

Banking business within the BIS reporting area

International lending by banks in the BIS reporting area rose by $261 billion (4%) in 1993, to an outstanding stock of $7,592 billion[1] (see Chart A). Lending between banks accounted for $5,130 billion (68%) of this stock, an increase of $140 billion (3%) compared with 1992. The majority of this increase occurred during the second half of the year and was related to the turbulent conditions in foreign exchange markets. Lending to non-bank end-users increased by $122 billion (5%); it remained virtually unchanged as a proportion of the total stock of international bank lending.

Chart A
Stock of international bank lending



Source: BIS.

BIS-area banks' business with non-BIS reporting countries

Lending to countries outside the BIS reporting area continued to rise during 1993, but at a much slower pace than in 1992 (see Table 1). Once again, the developing economies of the Far East were the principal recipients of the new lending: the largest increases were to Thailand ($6.1 billion), China ($5.5 billion), Malaysia ($4.8 billion), South Korea ($2.9 billion) and Taiwan ($2.5 billion). Lending to Latin America also increased, with the total $6 billion rise more than accounted for by Mexico and Brazil, which received additional funds of $3.8 billion and $2.4 billion respectively.

Table 1
Lending to, and deposits from, countries outside the BIS reporting area

$ billions

	Exchange rate adjusted flows					Stocks at
	1989	1990	1991	1992	1993	end-1993
Total lending	**-2**	**-12**	**8**	**66**	**17**	**829**
of which:						
Developed countries	3	6	—	7	3	157
Eastern Europe	9	-10	-1	4	-4	88
Oil exporters	6	-2	-5	23	-4	151
Non-oil developing countries	-20	-6	14	33	22	434
of which:						
Latin America	*-17*	*-23*	*—*	*15*	*6*	*208*
Asia	*—*	*18*	*18*	*19*	*18*	*196*
Total deposits	**58**	**92**	**-12**	**14**	**-15**	**707**
of which:						
Developed countries	17	8	-3	11	7	118
Eastern Europe	—	-6	1	10	2	32
Oil exporters	14	25	-14	-9	-26	193
Non-oil developing countries	26	65	4	2	1	363
of which:						
Latin America	*5*	*19*	*-3*	*1*	*-2*	*113*
Asia	*16*	*35*	*2*	*-6*	*1*	*172*

Source: BIS.

Deposits from countries ouside the BIS reporting area fell by $15 billion. There were continuing widespread withdrawals by Middle Eastern oil-exporting countries, including the United Arab Emirates ($6.3 billion), Saudi Arabia ($4.2 billion), Kuwait ($3.2 billion) and Libya ($2.8 billion). Deposits from Taiwan also fell by $3.3 billion. Of those countries increasing their deposits, Malaysia ($6.9 billion) was prominent for the second successive year, along with Portugal ($5.0 billion) and the Former Soviet Union ($2.3 billion).

Analysis by centre and currency

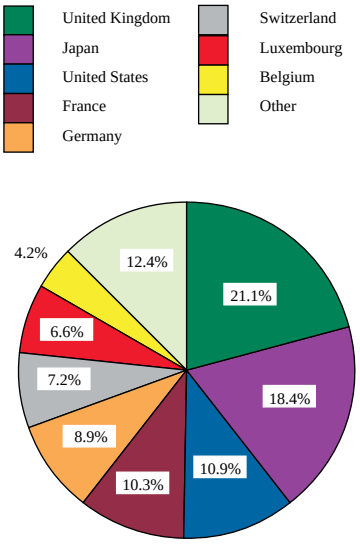
The United Kingdom increased its share of international lending (comprising foreign currency business within the United Kingdom as well as cross-border claims) during 1993, underlining London's position as the world's leading international banking centre. Outstanding cross-border loans by banks located within the BIS industrial area at the end of 1993 amounted to $4,997 billion; as Chart B shows, $1,053 billion (21%) of this was lent by banks in the United Kingdom, an increase of 5% compared with 1992. The amount of foreign currency lending in the United Kingdom also increased, by $24 billion to $287 billion. Within the BIS industrial area, cross-border lending denominated in Deutsche Marks increased strongly (by $112 billion), but the yen's share of cross-border lending continued to decline (falling $23 billion), as did lending in Swiss francs (down $18 billion) and US dollars (down $9 billion).

Analysis by nationality of bank

As a group, Japanese banks remained the largest lenders of funds within the BIS reporting area, with 26.9% of

(1) Stock data are converted to dollars at the prevailing end-year exchange rates; appreciation of a currency against the US dollar will therefore increase the value of foreign currency assets when converted into dollars.

Chart B
Cross-border business transacted by banks within the BIS industrial area(a)

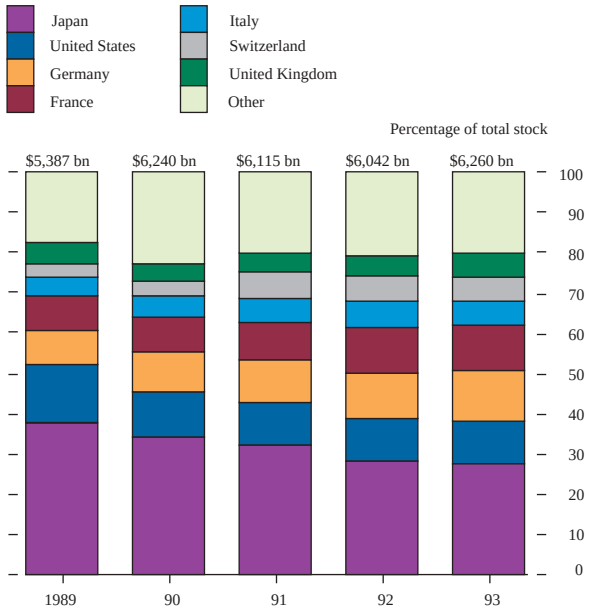


Source: BIS.

(a) BIS reporting countries other than offshore banking centres.

international bank assets (see Chart C), but their share has fallen for the last five years (from a high of 38.3% in 1988). Whereas the retrenchment of the previous two years reflected a genuine withdrawal from the international interbank market, in 1993 the fall was the result of reduced cross-border business with affiliated offices. German banks markedly increased their share of lending (from 11.3% to 12.6%), and British-owned banks' share of business rose from 4.9% to 5.3 %, the third consecutive annual increase.

Chart C
International bank assets by nationality of bank(a)



Source: BIS.

(a) Stocks at end-year, includes cross-border and domestic foreign currency lending.

Analysis of international banking business in London

There was a continued increase in cross-border lending by banks in the United Kingdom during 1993 (see Table 2). British and German-owned banks were particularly active in this market, with the Deutsche Mark and sterling both used increasingly as a currency of transaction.

Table 2
External lending of banks in the United Kingdom

$ billions

	Exchange rate adjusted flows					Stocks at
	1989	1990	1991	1992	1993	end-1993
By country						
BIS reporting area	57	86	-45	78	34	900
Outside reporting area:						
Developed countries	-2	1	-1	3	—	34
Eastern Europe	2	-2	-3	-2	-1	10
Oil exporters	-1	-5	-2	2	—	17
Non-oil developing countries	-4	-3	3	2	4	50
Other	3	9	5	-4	14	42
Total	**55**	**86**	**-44**	**79**	**51**	**1,053**
of which:						
By currency						
US dollar	1	18	-38	38	-12	496
Deutsche Mark	12	18	3	32	18	163
Sterling	5	8	-10	25	15	99
Yen	18	8	-28	-31	-12	63
Ecu	6	7	1	4	2	43
By nationality of bank (a)						
Japanese	3	-5	-57	-44	1	245
British	8	-1	-3	24	32	190
American	9	10	3	4	6	96
German	13	28	5	33	21	147
French	-1	5	2	14	-1	44
Italian	10	19	2	3	-9	69

(a) Nationality flows only relate to monthly reporting banks, whereas other figures include quarterly reporting banks and some other financial institutions.

Most of the new funds were lent to countries in the BIS reporting area (up $34 billion), and to Germany in particular (up $26 billion). There were also sizable increases in lending to Latin American countries (Brazil $1.1 billion, Argentina $0.9 billion and Mexico $0.8 billion) and to the Far East (Malaysia $0.9 billion and China $0.5 billion).

Lending by banks in the United Kingdom to other countries in the European Union continued to grow (up by $31 billion, or 8%), though more slowly than in 1992. Deposits from these countries also increased strongly (up $77 billion, or 20%). Almost half of this was from Germany (with German non-bank residents accounting for $10 billion of this rise).

The impact of the general increase in activity in global securities markets was seen in a number of ways. Greater recourse to the capital markets reduced banks' general lending opportunities; but banks faced an increased demand for funding from securities dealers, including bank subsidiaries (though there was evidence that some securities dealers looked to overseas banking markets for additional finance). Banks themselves also increased their holdings of securities, particularly those issued by European governments; during 1993, the stock of portfolio investments held by banks in the United Kingdom rose by 46% to $162 billion.

team of a concluding group of papers.[1] The business requirements were thus finalised, and an enlarged Bank team has begun to develop the fine detail of the system.

CREST will be owned and managed by CRESTCo. A further 25 firms have indicated their commitment in principle to subscribe capital for the development of CREST, bringing the total to 73. The Bank estimates that this group will be responsible for about three quarters of the activity in CREST. Individual subscriptions have been scaled down considerably, since the total commitments offered exceeded the £12 million sought by some 75%. Pen Kent, a director of the Bank and the chairman designate of CRESTCo, addressed a first meeting of representatives of the 73 committed firms in June; the company will be capitalised in October, subject to a satisfactory audit of the project's progress to be completed in the middle of that month.

The project team has now made an outline functional specification available to potential software developers: it describes the logical processes that will form the core of the CREST system. By making it available, the team hopes to help developers take forward their own business analysis; the documents that will enable them to begin programming will not be available until the late autumn.

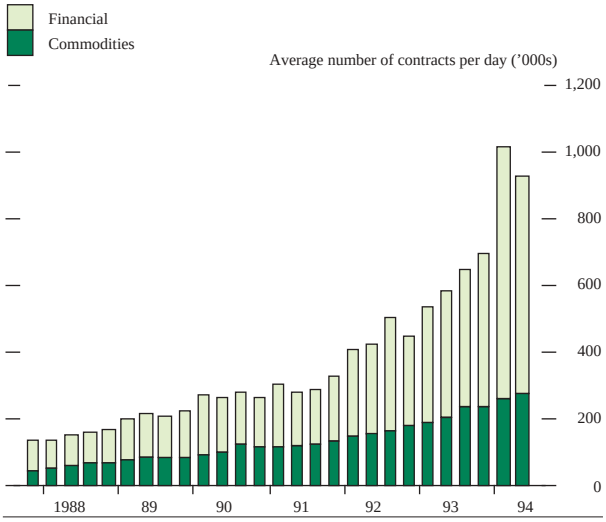
Potential network providers have given the Bank their proposals for developing a network to carry CREST messages. These were delivered by the beginning of August; the CREST team will use them to select up to four providers whose names will be announced on 1 October.

Derivative exchanges

Turnover on London's derivative exchanges remained high during the quarter: although 14% lower than in the first quarter, it was 70% higher than in the same period last year (see Chart 8). Trading on LIFFE was stimulated by the continuing volatility in the cash markets. The commodity exchanges also registered high turnover, because of fears of rising inflation and the sharp price rises of some commodities—notably oil, copper, aluminium and coffee.

LIFFE accounted for 73% of London's exchange-traded derivative business in the first half of 1994. Its volumes at the half-year stage were already 86% of its total turnover in

Chart 8
Turnover on London's derivative exchanges



1993. In the light of these high trading volumes, LIFFE has acted to remove one potential capacity constraint, related to the fact that the number of trading permits was fixed in proportion to firms' holdings of LIFFE shares. A one-for-four rights issue was agreed at an extraordinary general meeting on 26 May; this will increase the number of trading permits available, which should facilitate future growth and reduce the pressure on firms to concentrate their trading activities in the most liquid contracts.

There has been a major restructuring of GLOBEX during the quarter, with the Chicago exchange, CBOT—as expected—leaving the venture. CME and Reuters have been joined by the French exchange, MATIF, as a full partner. LIFFE declined the offer of a similar partnership but the DTB, the Frankfurt exchange, has agreed in principle to join the system.

In aggregate, turnover on the London commodity exchanges (the LME, the IPE and the LCE) increased by 6% in the quarter compared with the first three months of the year. One factor influencing the level of business was the increased presence of funds and other institutional investors in these markets. With the turbulence in bond markets, many funds turned to commodities in search of greater returns, encouraged by the fact that commodity prices tend to rise during periods of economic recovery.

(1) Summarised in the review of financial market developments in the May *Quarterly Bulletin*, pages 130–31.

UK trade—long-term trends and recent developments

By Andrew Dumble of the Bank's Structural Economic Analysis Division.

This article examines why UK trade performance matters; in particular, it considers the factors which determine whether or not a current account deficit provides grounds for concern. It also looks at a number of longer-term trends in UK trade performance, and at the evidence of a structural improvement in manufacturing export performance from the mid-1980s onwards. These opening sections provide the context for an analysis of the impact on recent UK trade performance of two major developments—sterling's depreciation following the suspension of UK membership of the exchange rate mechanism, and the recession affecting the United Kingdom's main export markets in other EU states. The article concludes by examining some elements in the outlook for UK trade in the short term.

Introduction

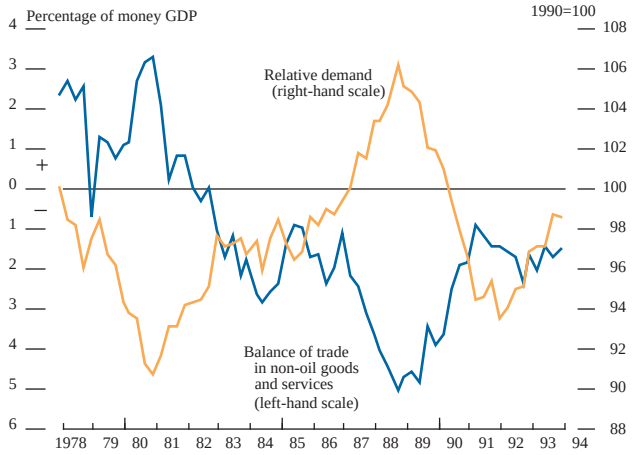
The recorded current account deficit for the United Kingdom in 1992—at the trough of the recent recession—was 1.7% of GDP; the deficit for trade in non-oil goods and services was 1.8% of GDP. At the corresponding point in the previous cycle—in 1981—there was a current account *surplus* of 2.7% of GDP, and a surplus for trade in non-oil goods and services of 1.5% of GDP. The comparison led a number of commentators to express their concerns that the United Kingdom was running a deficit at the trough of the recession.

Since 1992, however, the balance of trade in non-oil goods and services has been broadly stable—in contrast to its sharp decline after the 1979–81 recession. By 1984, the deficit on trade in non-oil goods and services was 2.5% of GDP; in 1993, it was 1.7% of GDP.

Movements in the trade and current account balances depend chiefly—at least in the short term—on movements in the exchange rate and, more importantly, on the different rates of growth in demand in the United Kingdom and elsewhere. Between 1988 and 1991, for example, the trade deficit declined significantly, as UK demand fell by around 1% and world demand rose by over 8% (see Chart 1). In the last two years or so, there have been two major developments. First, a number of continental European economies, which together account for over 50% of the UK export market, entered into recession. There were particularly strong downturns in domestic demand in Italy and in Germany —the United Kingdom's largest export market, according to 1993 data. Second, following the suspension of its membership of the exchange rate mechanism, sterling's effective exchange rate index—its nominal value against a UK trade weighted basket of world currencies—fell by more than 12% between 1992 Q3 and 1992 Q4.

Before examining the impact of these two developments on recent UK trade performance, this article looks at why UK trade performance matters. It then considers long-term trends in UK visible trade, including its changing composition by region and by commodity since the late 1970s, and asks whether the improvement in manufacturing export performance seen since the mid-1980s can be explained by such compositional factors. After looking at UK trade performance in the last couple of years, the article concludes with a discussion of the outlook for the evolution of the UK trade and current account balances over the next few years.

Chart 1
Relative domestic demand and the UK trade balance



UK trade performance—some issues

To assess the importance of movements in the current account, two main questions need to be answered. First, how are sizable current account deficits financed? And second, what are the limits to this financing?

So far as the financing of deficits is concerned, international capital markets provide a means of financing imbalances between domestic savings and investment. The world's stock of international assets has been estimated at around

$7,540 billion at the end of 1988,[1] over 450 times the United Kingdom's current account deficit in 1993. As the comparison suggests, only minor shifts in the allocation of international portfolios would be required to finance far larger deficits over a long period.

Despite capital market liberalisation, financing large current account deficits over long periods may lead to difficulties. Continued deficits will prove difficult to finance if there are expectations of an indefinitely-rising trend in the ratio of net external debt to national income, since this would mean continuing increases in the share of national income being devoted to payments of interest, profits and dividends abroad, and a steady decline in the proportion of national income accounted for by domestic consumption.

Judgments about financing must be applied to the *long-run* position. In the short term, there are a number of reasons why a current account deficit may be financed comfortably in a given year even if the associated capital inflows imply a rate of increase in external debt above that in nominal GDP. First, the recorded current account deficit (and the associated recorded net capital inflows) may not accurately measure the increase in debt. For example, the recorded current account deficit includes the interest payments, but not the changes in the capital values, of external assets and liabilities. As the United Kingdom is a net creditor in equity, the effects of capital gains on the United Kingdom's assets would be expected, at least in part, to offset the impact of current account deficits.

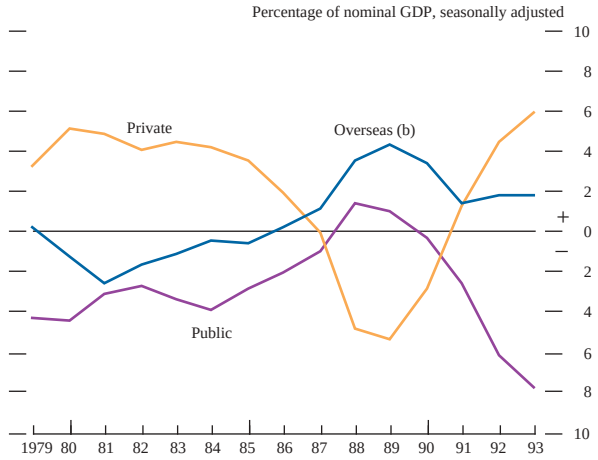
More fundamentally, the composition of the current account deficit is important. Even if a deficit were increasing rapidly (and, notwithstanding the above statistical complications, net external debt were increasing faster than nominal GDP), this might, for example, reflect a rapid increase in domestic investment that would lead to faster GDP growth in the medium term. Between 1987 and 1989, when the current account deficit rose from 2.7% of GDP to 4.8% of GDP, domestic investment increased from 17.7% to 20.3% of GDP.

There are other criteria for judging whether a current account deficit provides grounds for concern. For example, a given current account profile may be consistent with a stable ratio of net external debt to GDP in the long run, but be the result of a private sector financial surplus being more than offset by a high public sector financial deficit. The reasons for being concerned about high public sector deficits have been well-rehearsed.[2] Briefly, public sector deficits may 'crowd out' private sector spending, which may reduce efficiency and therefore output. High public sector deficits may also increase inflation expectations, as a result of the perceived incentive for the government to monetise its debt at some time in the future; this would increase the costs, in terms of output in the short term, associated with achieving a given inflation target.

So if a current account deficit is associated with a weak public sector financial position, it is likely to be a matter of concern.

When a current account deficit is associated with a private sector financial deficit—as it was in the late 1980s (see Chart 2)—the conclusions are less clear-cut. By definition, if the public sector is in balance, the private sector can only run a financial deficit if overseas investors, based on their assessment of the future returns, are willing to finance it. But there have been times when a current account deficit has reflected borrowing by the private sector based on expectations that were subsequently revised. This seems to have been the case in the late 1980s, when the significant increase in debt reflected overoptimism about continued growth.

Chart 2
Financial balances of main sectors[a]



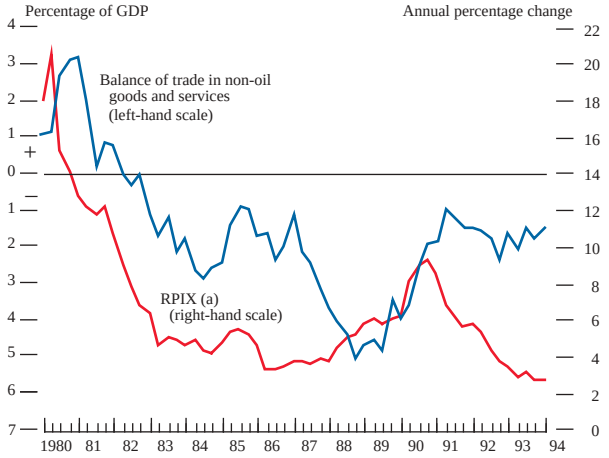
(a) Balances may not sum to zero because of the difference between the totals of the expenditure and income components of gross domestic product.
(b) Overseas financial surplus/deficit (equal and opposite to UK current account surplus/deficit).

Finally, a rapid rise in the trade and current account deficits may indicate a rise in inflationary pressures, and so the need to tighten monetary policy. In the late 1980s, for example, rising inflation was the result of domestic demand increasing much more rapidly than supply; Chart 3 shows that a rapid rise in the trade deficit—as both domestic and overseas tradable producers increased their supply to the UK market—was an early indicator of future capacity constraints and rising prices.

But this does not mean that a given level of the trade deficit (or of its size relative to GDP) should be seen mechanically as a 'trigger' for rising inflation. What determines inflationary pressure in the short term is the pressure of demand on the available resources within the economy: this has no stable relationship with the trade balance. For given levels of domestic and foreign supply, rising inflationary pressures may be associated with a trade *surplus*, as demand pressures from abroad lead to increased UK exports and capacity constraints.

(1) Source: 'Report on the measurement of international capital flows', International Monetary Fund, September 1992.
(2) See, for example, Buiter, W H (1985), 'A guide to public sector debt and deficits,' *Economic Policy*.

Chart 3
Balance of trade and inflation



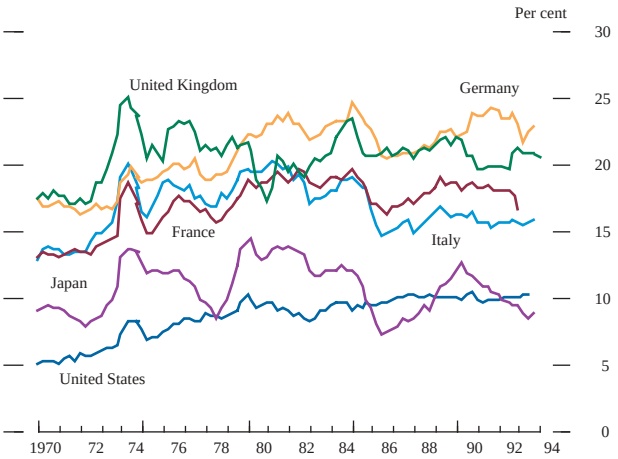
(a) Retail Price Index excluding mortgage interest payments.

Trends in UK trade

This section looks at longer-term trends in UK imports and exports of goods,(1) particularly in the 20 years or so to the start of this decade. It considers changes in the composition of UK trade, both by region and commodity, and assesses whether these changes can explain the changes in the United Kingdom's share of world exports. In particular, it examines the improvement from the mid-1980s onwards in the UK share of main manufacturing countries' exports of manufactures—a development which has attracted the attention of a number of economists. It looks at whether the increase in share can be explained by the composition of UK export markets—that is whether it merely reflects higher-than-average growth in the markets for the types of goods exported by the United Kingdom or in the regions to which it exports.

As Chart 4 shows, *import* penetration—the proportion of total final demand constituted by imports of goods and services—has increased moderately in the main EU economies in recent decades, as international trade has grown more rapidly than domestic demand and economies have grown more specialised. Import penetration in the United States and Japan has remained at much lower levels than in the United Kingdom and the other large European economies, though import penetration in the European Union as a whole is slightly below that for the United States and Japan, reflecting the extent of intra-regional trade within the Union. The relationship between the growth in imports and in GDP in the United Kingdom has been broadly in line with that in other major EU economies.

Chart 4
Import penetration at constant prices(a)



(a) Import penetration is defined as imports of goods and services as a proportion of total final expenditure.

By contrast, UK *export* performance over the post-war period has been poor in comparison with its main competitors, and it has been this historical trend which has attracted considerable attention. As Chart 5 shows, the UK share of the total *manufacturing*(2) exports of the main manufacturing countries(3) has fallen fairly steadily over recent decades, both in value and volume terms. But its share began to stabilise in the mid-1980s and, as the chart indicates, then rose—by ½ percentage point in volume terms—between 1985 and 1991.

Chart 5
UK share of main manufacturing countries' exports of manufactures

A clearer picture of the factors behind the changes in UK export share is discernible by looking at export figures disaggregated by destination and commodity composition. These can clarify whether a recorded increase in UK export share reflects the relatively strong growth of those overseas markets to which the United Kingdom predominantly exports, or of the types of commodity that it exports. Movements in export share that cannot be attributed to the composition of UK exports—ie changes in share across all goods and all markets—could be the result of any factor which increases the demand for and supply of UK products; for example, increased foreign direct investment that leads to an increased supply of tradable goods. Before constructing

(1) Trade in (ie imports and exports of) *goods* constituted almost 80% of trade in goods and services in 1993; excluding oil, the figure was around 75%.
(2) UK manufacturing exports constituted almost 90% of non-oil good exports in 1993.
(3) Includes the United Kingdom, Belgium, Luxembourg, France, Germany, Italy, the Netherlands, Sweden, Switzerland, the United States, Canada and Japan.

measures of UK export markets on a disaggregated basis, however, the next sections examine how the regional and product composition of UK exports and imports has changed in the last 20 or so years.

Trends in the regional composition of UK trade

The pie charts in Charts 6 and 7 show how the regional breakdown of UK visible imports and exports, in value terms, has changed since 1975. Both imports to, and exports from, the European Union have increased significantly: by 1993, 50% of UK imports came from other EU countries, compared with 39% in 1975; and 53% of UK exports were

Chart 6
Percentage of UK imports

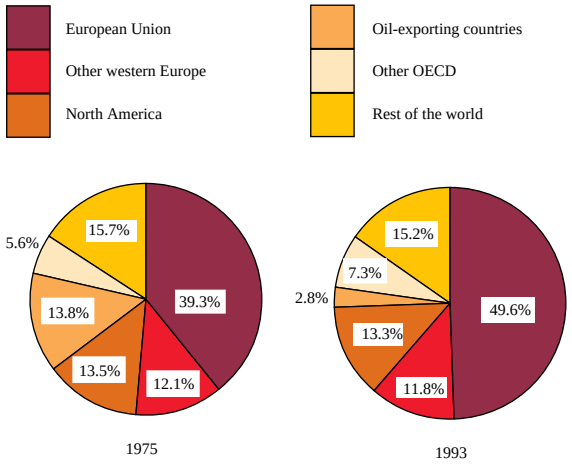
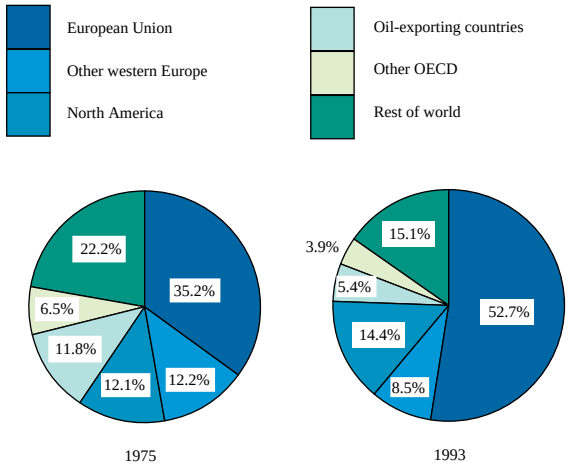


Chart 7
Percentage of UK exports



to other EU countries, compared with 35% in 1975. Although in *total* both imports and exports have increased as a percentage of GDP, the increase in EU imports and exports as a percentage of GDP has occurred at the expense of most of the other main regions with which the United Kingdom trades—as Table A shows. This suggests that closer European integration has led both to trade creation and to trade diversion. Within the European Union, the proportion of UK trade that is with the other major economies—Germany, Italy and France—has increased over

Table A
UK visible exports and imports by region

Visible exports by region as a percentage of UK GDP

	1973	1983	1993
European Union	5.8	9.2	10.1
Rest of Western Europe	2.0	1.9	1.6
North America	2.6	3.1	2.8
Oil exporters	1.1	2.0	1.0
Other OECD	1.2	0.7	0.7
Rest of world	3.5	2.9	2.9

Visible imports by region as a percentage of UK GDP

	1973	1983	1993
European Union	7.6	10.5	10.9
Rest of Western Europe	2.9	2.9	2.6
North America	3.2	3.0	2.9
Oil exporters	2.0	0.9	0.6
Other OECD	1.5	1.5	1.6
Rest of world	4.0	2.8	3.3

the period, as shown in Table B. The Benelux countries (the Netherlands, Belgium and Luxembourg) accounted for around the same percentage of UK exports as Germany in 1993.

Table B
Visible exports to EU countries as a percentage of UK GDP

	1973	1983	1993
Germany	1.1	2.0	2.5
France	0.9	1.9	1.9
Italy	0.5	0.7	1.0
Netherlands	0.8	1.8	1.3
Belgium/Luxembourg	0.6	0.8	1.1
Denmark	0.4	0.4	0.3
Republic of Ireland	0.8	1.0	1.0
Greece	0.1	0.1	0.1
Portugal	0.2	0.1	0.2
Spain	0.3	0.4	0.7

Trends in the commodity composition of UK trade

In the visible goods sector, exports of fuels have fluctuated markedly; but excluding fuels, export shares by category of commodity have been relatively stable (see Table C). Within visible imports, finished manufactured goods now constitute around 54% of UK imports, compared with 25% in 1970. This increase is mirrored by a sharp fall in the proportion of UK imports accounted for by primary products: food, beverages, and tobacco; basic materials; and fuels. Changes in import volumes, rather than prices, accounted for most of these changes in share: the volume

Table C
UK visible exports and imports by category

Visible exports; percentage by value

	Food, beverages and tobacco	Basic materials	Fuels	Semi-manufactures	Finished manufactures	Others
1970	6.2	3.4	2.6	34.0	50.6	3.2
1980	6.8	3.2	13.6	29.4	44.6	2.4
1990	6.9	2.2	7.7	28.3	52.7	2.2
1992	8.1	1.8	6.4	28.4	53.4	1.9
1993	7.5	1.9	6.9	29.2	53.1	1.4

Visible imports; percentage by value

	Food, beverages and tobacco	Basic materials	Fuels	Semi-manufactures	Finished manufactures	Others
1970	22.4	14.8	8.5	28.4	24.8	1.1
1980	12.0	7.7	14.3	27.4	36.9	1.7
1990	9.6	4.6	6.2	26.2	51.9	1.5
1992	10.5	3.8	5.5	25.9	52.9	1.4
1993	9.9	3.8	5.2	25.6	54.4	1.1

increase in imports of manufactures was much greater than their price rise over the period, and primary products' share of imports fell *despite* price increases for food, beverage and tobacco and basic materials far in excess of volume increases. One statistic illustrates well the changing structure of UK visible trade (and particularly of imports): in 1970, exports of finished manufactures were around twice the level of imports, but by 1993 there was a deficit in finished manufactures.

Shift-share analysis

How can the significance of these trends in UK trade by region and commodity be *quantified*? One possible explanation for the post-war decline in the UK share of world trade might be that, compared with its main trading partners, the United Kingdom was initially exporting goods the demand for which was growing relatively slowly. Or the explanation might be linked to the regional composition of UK exports, so that UK export growth was limited by continued close trading links with relatively slow-growing economies.

Using a technique known as *shift-share analysis*, it is possible to quantify the extent to which the commodity and regional composition of UK trade has affected export performance. The results of a shift-share analysis, based on a fairly disaggregated data set covering manufacturing exports within the OECD area, are given in Table D. (A description of the technique and of the data used is given in the Appendix.)

Table D
UK export performance

US$ millions; manufactured goods

	Product composition effect	Regional composition effect	Residual effect	Total (a) effect
1970–85	-407	-1,017	-7,108	-8,532
1985–90	373	6,912	3,719	11,004

(a) The total effect is the sum of the three other effects. A positive figure represents an increase in market share.

The *product composition effect* shows the impact of the commodity composition of UK exports in the relevant starting year: if over the relevant period the growth in OECD imports of the types of goods exported by the United Kingdom was greater than the average growth of OECD imports of all commodities, the product composition effect would be positive. The *regional composition effect* shows the effect of the regional composition of UK exports in the relevant starting year: if the growth of the United Kingdom's OECD export markets was greater over the period than the average growth of OECD markets, then the regional composition effect would be positive. The *residual effect* is the change in total UK export share over a given period which cannot be attributed to either the product or the regional composition effect. If, for example, UK exports as a share of OECD imports remained unchanged over a period but the sum of the product and regional composition effects was positive, then by definition the residual effect would be negative. So the residual effect comprises all factors which can explain UK export share but are not directly related to the regional or commodity composition of exports.

Table D shows that between 1970 and 1985 the decline in the UK share of other OECD countries' manufacturing imports was in part the result of the slower-than-average growth in the markets for the types of goods exported by the United Kingdom and in the regions to which it exported in 1970. Most of the decline, however, was the result of the residual effect—the United Kingdom lost market share across all goods and across all regions. Between 1985 and 1990, the increase in UK export market share was partly the result of faster-than-average growth in both the markets for the types of goods exported by the United Kingdom and—in particular—in the regions to which it exported in 1985. But in addition, around a third of the increase, according to the results of the shift-share analysis, was accounted for by the residual effect. The next section examines this further.

Manufacturing exports in the 1980s

As already noted, a number of economists have examined the improvement in the UK share of main manufacturing countries' manufacturing exports which has taken place since the mid-1980s (see Chart 5 above). In particular, they have looked at whether this change in export share can be explained by movements in demand abroad and/or by movements in UK relative costs and prices (ie the measured real exchange rate). If these factors do not account for the change, then there may have been a *structural improvement* in the United Kingdom's export performance.

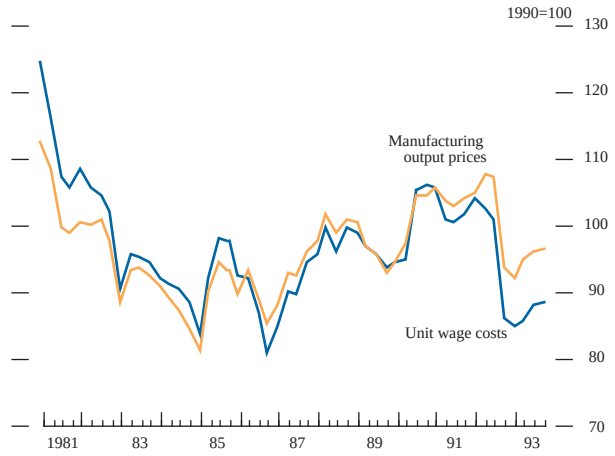
The shift-share analysis in the previous section suggested that not all of the increase in the UK share could be explained by the growth of demand abroad, whether of the types of goods exported by the United Kingdom or of the regions to which it exported.(1)

Another possible explanation is a change in relative costs and prices. In theory, an increase (or decrease) in one country's share of world trade could, other things being equal, be associated with a decrease (increase) in relative prices or costs: a fall in relative prices could lead to an increase in demand for a country's goods; and a fall in relative costs could increase the supply of exports. As Chart 8 shows, however, UK relative costs and prices did not fall in the second half of the 1980s, though the delayed effect of the fall in relative costs and prices in the first half of the 1980s is likely to have had an impact.

A number of econometric studies(2) have confirmed that UK manufacturing export performance in the late-1980s cannot

(1) The shift-share analysis was based on value data, but changes in the UK share of manufacturing exports based on values and volumes have tended to move together, particularly during the time periods examined in the shift-share analysis (as Chart 5 shows).
(2) See, for example, Church, K (1992), 'Properties of the fundamental equilibrium exchange rate in models of the UK economy,' *National Institute Economic Review*, August, pages 62–70.

Chart 8
UK relative prices and costs in a common currency(a)



(a) UK manufacturing costs/prices relative to those in the other G7 countries adjusted for exchange rate movements.

be fully explained by standard export equations relating export volumes to relative costs and prices (or the measured real exchange rate) and overseas demand.

One possible explanation for these results—one that encompasses both the conclusions of Muellbauer and Murphy,(1) that UK exports in the 1980s benefited from a fall in the growth of world trade relative to output, and Landesmann and Snell's finding(2) of a worsening trend share of world trade for Japan and the United States in the same period—is that the United Kingdom may have been a beneficiary of bilateral trade barriers between the United States and Japan.

Alternatively, research by Owen and Wren-Lewis(3) suggests that movements in the UK share of world trade can be explained by changes in the ratio of cumulative UK investment to cumulative investment abroad (this ratio increased in the latter half of the 1980s), as well as by changes in world trade and in sterling's real exchange rate. Their explanation of the link between investment and exports is the following. As a country's supply capability increases, firms produce new varieties of products (since doing this is more profitable than contesting existing export markets). Because consumer demand for differentiated products increases as incomes rise, this increased *supply* will then be associated with higher export *demand*.

Recent developments

A structural improvement in UK export performance would mean an increased level of demand for and supply of UK-produced manufactured goods at *given levels* of the exchange rate and of aggregate demand. But in the short term, the actual levels of the exchange rate and demand conditions at home and abroad are the main factors determining imports and exports.

Over the last few years, UK trade—and particularly export—performance has been affected mainly by the recession in continental Europe and sterling's depreciation after the suspension of UK ERM membership.

Exchange rate movements

Table E shows changes in sterling's exchange rate against the currencies of all other countries, other EU countries and countries outside the European Union. The depreciation

Table E
Movements in the sterling exchange rate

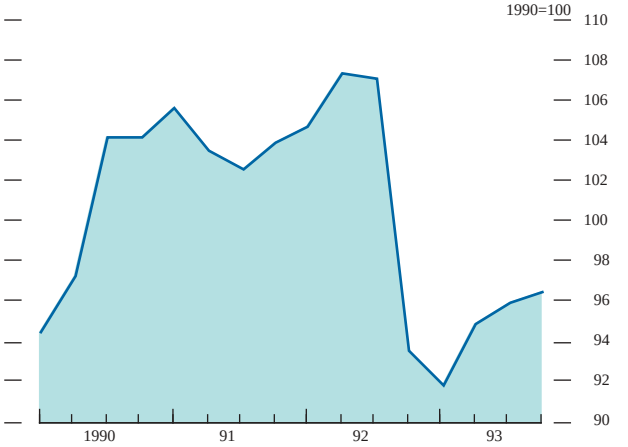
Percentage change in the exchange rate

	1992–93	1992 Q3–92 Q4
Against world currencies (a)	-9.2	-12.2
Against EU currencies (b)	-6.1	-10.4
Against non-EU currencies (b)	-13.1	-14.6

(a) Sterling effective exchange rate index.
(b) Bank estimates based on EU/non-EU trade weights in sterling effective exchange rate index.

between 1992 and 1993 in sterling's effective exchange rate (ie the weighted sterling exchange rate against the currencies of the United Kingdom's most important trading partners) was the largest since 1976. And the change in value was far more rapid: the depreciation of sterling between 1992 Q3 and 1992 Q4 was larger than any quarterly change during the

Chart 9
Real exchange rate(a)



(a) UK manufacturing prices relative to those in the other G7 countries adjusted for exchange rate movements.

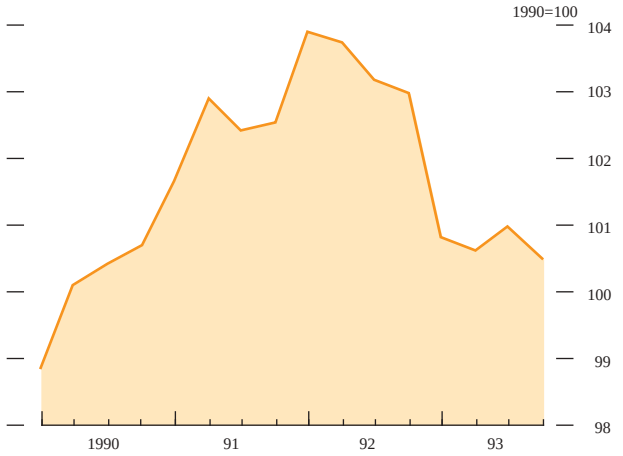
1975–76 period. The effect of the *nominal* exchange rate movements on the *real* exchange rate—measured by relative prices—is illustrated in Chart 9.

Movements in EU demand

As shown in Chart 10, demand within the rest of the European Union fell by almost 3% between 1992 Q2 and

(1) Muellbauer, J and Murphy, A (1990), 'Is the UK balance of payments sustainable?,' *Economic Policy*, October, pages 348–82.
(2) Landesmann, M and Snell, A (1993), 'Structural shifts in the manufacturing export performance of OECD economies,' *Journal of Applied Econometrics*, Vol. 8, pages 149–62.
(3) Owen, C and Wren-Lewis, S (1992), 'Variety, quality and UK manufacturing exports,' July, Strathclyde University.

Chart 10
EU domestic demand(a)



(a) Consists of Germany, France, Italy and Spain weighted by their share of UK exports.

1993 Q1. And as Table F shows, demand in Germany—the United Kingdom's largest single export market—fell by 2% between 1992 and 1993.

Table F
Movements in EU demand

Percentage change in demand

	1992–93	1992 Q4–93 Q1
European Union (a)	-2.6	-2.1
Germany	-2.0	-2.3
France	-1.9	-1.1
Italy	-5.0	-3.8

(a) Consists of Germany, France, Italy and Spain weighted by their share of UK exports.

The impact on trade prices

The major influence on export and import prices over the last few years has been the depreciation of the sterling exchange rate. To the extent that goods are traded in perfectly competitive markets, a nominal depreciation would normally lead to a proportionate increase in sterling import and export prices. Between 1992 Q3 and 1994 Q1, the prices(1) of exports of goods other than oil increased by 15.7%, compared with an increase in non-oil import prices of 12.6%. Over the same period, the sterling effective exchange rate depreciated by 10.6%. In the past, however, exchange rate changes have prompted a greater reaction from import prices than from export prices. So, notwithstanding the revisions which followed the CSO's recent quality audit of the Intrastat system (the system used since the beginning of 1993 to collect EU trade statistics), it is possible that export prices were overstated (and export volumes understated) in last year's trade figures.

The impact on trade volumes

Movements in the exchange rate and in demand would usually both be expected to have a significant impact on import and export volumes. The effect of a change in either the real exchange rate or demand depends, as well as on the size of the initial change, on the responsiveness of trade volumes to any change: technically, it is the estimated *elasticities* of trade volumes with respect to the real exchange rate and demand that are important.(2)

There are a number of uncertainties associated with quantifying the impact of movements in the real exchange rate and demand over the last few years. In particular, estimates of the elasticities of UK import and export volumes with respect to demand and to the real exchange rate (measured by either relative prices or costs, expressed in a common currency) vary widely. In addition, the impact of changes is likely to feed through with long and variable lags.

It is possible, however, to offer a broad indication of the effects of the EU recession and the depreciation of the real exchange rate on export and import volumes. UK costs fell by around 12% relative to those of the other members of the G7 between 1992 and 1993. If the elasticity of import and export volumes with respect to the real exchange rate is around a third,(3) then the long-run effect of the 1992–93 movement in the exchange rate would be to increase export volumes and reduce import volumes by around 4%. EU demand fell by around 2½% between 1992 and 1993. Assuming that the elasticity of export volumes with respect to EU demand is around one,(3) then export volumes to the European Union would fall by around 2½% in response.(4)

The drop in EU demand and the fall in the United Kingdom's real exchange rate have not, of course, been the only developments to have influenced trade volumes since 1992. The increase, for example, in UK domestic demand —which rose by around 2% between 1992 and 1993—has provided an offsetting influence to the downward impact of lower UK relative costs on import volumes. In addition, the trend towards economies becoming more specialised in production has continued gradually to increase trade as a proportion of output.

The impact on the trade balance

The effect of recent movements in trade prices and volumes on the balance of trade in non-oil goods and services is summarised in Table G.(5) Over the two years to 1994 Q1, the deficit in non-oil goods and services increased by £0.3 billion. The increase resulted from movements in net trade volumes: between 1992 Q1 and 1994 Q1, the volume of non-oil goods imported increased by 15%, while the volume of exports rose by 9.9%. Movements in the terms of trade (the ratio of export prices to import prices, both expressed in sterling) have, in part, offset this volume effect—between 1992 Q1 and 1994 Q1, the prices of non-oil

(1) Unit value indices, using weights determined according to the pattern of 1990 trade.
(2) The elasticity of export volumes with respect to overseas demand, for example, is the proportionate change in export volumes divided by the proportionate change in demand; if a 1% increase in overseas demand were estimated to lead to a 0.5% increase in export volumes, then the estimated elasticity would be 0.5.
(3) A figure within the range implied by most econometric estimates.
(4) The effect on aggregate export volumes would be a reduction nearer to 1½%, given that the European Union accounts for around 55% of UK exports.
(5) The price effect estimates the change in the balance which occurred solely as a result of movements in export and import prices (ie assuming import and export volumes had remained unchanged). The volume effect calculates the change in the balance which occurred solely as a result of changes in import and export volumes (ie assuming import and export prices had remained unchanged).

goods imported rose by 10.5%, compared with a rise in the prices of non-oil good exports of 15.9%.(1)

Table G
Contribution of movements in volumes and prices to trade balance

£ millions

	Exports	Imports	Balance
Non-oil goods:			
1992 Q1	24,566	27,748	-3,182
Change resulting from:			
Price effect	2,933	2,064	869
Volume effect	2,433	4,159	-1,726
Residual	280	335	-55
1994 Q1	30,212	34,306	-4,094
Services:			
1992 Q1	8,281	7,243	1,038
Change resulting from:			
Price effect	737	573	164
Volume effect	590	201	389
Residual	57	20	37
1994 Q1	9,665	8,037	1,628
Non-oil goods and services:			
1992 Q1	32,847	34,991	-2,144
Change resulting from:			
Price effect	3,670	2,637	1,033
Volume effect	3,023	4,360	-1,337
Residual	337	355	-18
1994 Q1	39,877	42,343	-2,466

Standardly, economic theory analyses the effects of an exchange rate depreciation on the trade balance in terms of a 'J' curve: the trade deficit first increases—as import prices rise significantly faster than export prices—and then steadily falls, as a result of the delayed impact of the fall in relative costs and prices on export and import volumes. Following the suspension of UK membership of the exchange rate mechanism in 1992 Q3, the initial part of the 'J' curve was very short-lived: the terms of trade fell sharply in 1992 Q4 but by 1993 Q1 were back at around their 1992 Q3 level. In the year after 1993 Q1, despite the recovery in UK demand at a time when demand in other EU countries remained depressed, there was an improvement in the relative performance of non-oil export volumes compared with non-oil import volumes. Between 1992 Q1 and 1993 Q1, non-oil import volumes increased by 7.3% while non-oil export volumes increased by 3.9%; between 1993 Q1 and 1994 Q1, the respective growth rates were 7.2% and 5.8%.

Outlook

Since the United Kingdom is presently running a trade deficit, exports will have to grow faster than imports in the next few years to prevent the deficit increasing. If imports of goods and services were to increase by 4.2% this year in value terms (in line with the average growth rate in 1991–93), exports would need to increase by 4.4% just to ensure that the trade deficit in goods and services remained unchanged.

Increases in EU growth over the next few years may increase the rate of growth of demand overseas relative to UK demand; movements in relative demand would then have a more positive impact on the trade and current accounts than they have had recently. Furthermore, although it is unlikely that future changes in relative costs will be as favourable as those seen in the last few years, some residual effect of the fall in UK relative costs since 1992 will continue to provide a boost to exports and to restrain imports.

Another way of considering the prospects for the trade and current accounts is by assessing the outlook for the public and private sector (personal and corporate) financial balances—since, by accounting identity, the sum of the public and private sector balances is equal and opposite to the current account balance.

The planned reduction in the fiscal deficit will tend to lead to a reduction in the current account deficit; but this effect is likely to be offset, at least in part, by a fall in the private sector financial surplus. Two factors make a fall in that financial surplus likely. First, investment is likely to increase in the next few years, given the recent increases in the rate of return on capital and in the retained earnings of industrial and commercial companies; retained earnings rose by a third in 1993. Second, the personal sector is likely to react to the recent and planned tax increases by reducing savings in order to smooth consumption levels. In the extreme, a reduction in the public sector deficit would have no impact on aggregate savings, if the private sector were to reduce its savings commensurately in response to the reduction in the future expected debt burden. The path of the current account deficit in the next few years will depend on the speed and the extent of the increase in investment and the decline in personal sector savings.

(1) Unit value indices; the prices used to calculate the 'price effects' in Table G are *average* value indices, which are based on current trade weights.

Appendix

UK export performance 1970–90: shift-share analysis

The main article reports the results of the use of a technique known as shift-share analysis to analyse the trends in UK manufacturing exports as a share of OECD manufacturing imports between 1970 and 1990. This appendix briefly describes the technique.

Methodology[1]

Using shift-share analysis, we can divide the United Kingdom's changing share of OECD imports between any two periods into three effects:

- **a product composition effect**—the effect of specialising in goods whose market growth has differed from the average for all commodities;
- **a regional composition effect**—the effect of concentrating in regional markets whose growth rate has differed from the average for all markets; and
- **a competitiveness effect**—the increase/decrease in market share as a result of factors other than the product and regional composition of trade. This effect can be thought of as resulting from a host of factors not connected with the regional and commodity composition of UK exports. This third component is obtained as a residual.

Three formulae[2] are used to separate the three components outlined above. For each period, the formulae are:

(i) Product composition effect =
$$\bullet_i(1+g^i)X^i_{oUK} - (1+g)X_{oUK}$$

(ii) Regional composition effect =
$$\bullet_i \bullet_j (1+g^{ij})X^{ij}_{oUK} - \bullet_i (1+g^i)X^i_{oUK}$$

(iii) Residual effect =
$$X_{tUK} - \bullet_i \bullet_j (1+g^{ij})X^{ij}_{oUK}$$

where:

g^i	=	Growth in OECD imports of good *i* over period.
X^i_{oUK}	=	UK exports of good *i* in base year.
X_{oUK}	=	UK exports to OECD in base year.
g	=	Growth in OECD imports over period.
g^{ij}	=	Growth in country *j*'s imports of good *i* over period.
X^{ij}_{oUK}	=	UK exports of good *i* to country *j* in base year.
X_{tUK}	=	UK exports to OECD in end year.

Data

Data for the following OECD countries were used:

Canada	France	Austria	Sweden
United States	Greece	Finland	Switzerland
Japan	Germany	Portugal	Turkey
Belgium	Ireland	Iceland	United Kingdom
Luxembourg	Italy	Norway	
Denmark	Netherlands	Spain	

All the data came from the OECD's *Foreign Trade by Commodities.*

(1) Based on Thirlwall, A P and Gibson, H, 'Balance of payments theory and the United Kingdom experience', Macmillan, London, 1992.
(2) See Magee, S P, 'Prices, income and foreign trade', *International Trade and Finance: Frontiers for Research*, ed Kenen, P B, Cambridge University Press, 1974.

Estimating market interest rate and inflation expectations from the prices of UK government bonds

By Mark Deacon and Andrew Derry.[1]

Market expectations of interest rates and inflation can give important insights into the credibility of monetary policy. For that reason, the Bank has carried out extensive research over the past two years into the ways in which inferences about these expectations can be drawn from the market prices of government bonds. The preliminary results of this work were discussed at a one-day conference in March organised by the Bank, in which researchers in the field from other central banks and a number of academics took part. Their comments—and the results of further research in the Bank—are reflected in this article. The article explains the important issues of estimation and interpretation which arise in this work, and outlines possible changes to the techniques the Bank uses in its analysis of market expectations—for example, in its Inflation Report. *Comments on the issues raised and on the methodological changes proposed will be most welcome.*

Introduction

The disruption in the foreign exchange markets during 1992 and 1993 led to the suspension of sterling's membership of the exchange rate mechanism (ERM) and to the widening of the fluctuation bands of most of the remaining currencies. The move from essentially a fixed (though adjustable) exchange rate environment to one of floating currencies has meant that the Bank now relies more heavily on monetary policy indicators other than the exchange rate when assessing monetary conditions. These include indicators of inflationary pressures, inflation expectations and perceptions of the monetary policy stance. For instance, estimates of market interest rate expectations can provide an insight into whether participants expect interest rates to rise or fall in the future. The Bank reports on these indicators in its *Inflation Report*. In addition, knowledge of market inflation expectations can be a useful input into decisions about the funding of the public sector borrowing requirement.

The yield curve obtained from government bond prices has long been used as a source of information about *interest rate expectations*: both its level and slope are useful monetary policy indicators. More recently, however, emphasis has focused increasingly on the implied forward rate curve. This contains the same information as the yield curve, but presents it in a way that allows expectations of interest rates in the short, medium and long term to be distinguished more easily.

Information on *inflation expectations* has until recently typically been obtained from surveys. But these have shown themselves to be unreliable—perhaps because survey respondents have little incentive to answer accurately. There are other drawbacks to using survey evidence: surveys take time to compile, and so may not give accurate estimates of current inflation expectations; and they usually survey only short-run expectations.

Some efforts have also been made to infer financial markets' inflation expectations from asset prices. For example, between 1985 and 1987 the New York Coffee, Sugar and Cocoa Exchange traded futures contracts on the US Consumer Price Index. Using the prices of these contracts, it was possible to obtain a direct estimate of inflation expectations. But no similar contracts on the UK Retail Price Index (RPI) have ever existed, so other means of deriving inflation expectations from the prices of financial assets must be sought. Research has shown that generally only the prices of assets with fixed nominal rates of return contain accessible information on inflation expectations; and that only in the case of government bond prices is it likely that such information can be extracted satisfactorily. This article describes how, by comparing the yields on conventional and index-linked bonds, a measure of inflation expectations can be obtained. It also examines the ways in which such estimates of interest rate and inflation expectations may differ from 'true' expectations.

Deriving interest rate expectations from gilt prices

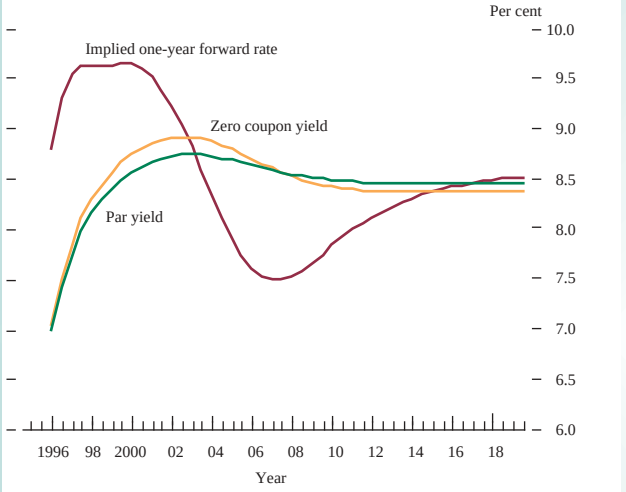
When pricing financial instruments, participants in financial markets are—either explicitly or implicitly—revealing information about the interest rates that they believe are appropriate for the transactions they are making. So it is possible to gain an insight into their interest rate expectations by calculating the yield or internal rate of return on the instruments. These yields will also reflect other factors—such as the liquidity of the securities, the effects of taxation and the perceived risk of default by the issuer. But the underlying interest rate (for a given level of risk) should

(1) This article is based on two working papers written while the authors were in the Bank's Economics Division: Deacon, M P and Derry, A J, 'Deriving Estimates of Inflation Expectations from the Prices of UK Government Bonds', *Bank of England Working Paper No 23*, and Deacon, M P and Derry, A J, 'Estimating the Term Structure of Interest Rates', *Bank of England Working Paper No 24*.

Some terminology

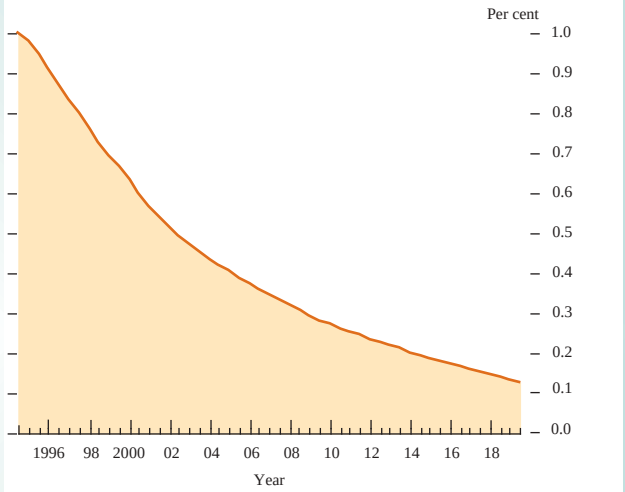
The gilt-edged market currently consists of around 70 different bonds, the majority of which are *conventionals*. These entitle the purchaser to a stream of cash flows consisting of regular (semi-annual) fixed interest—or *coupon*—payments, and a redemption payment together with the final coupon payment on the gilt's maturity date.

Chart A
Yield curves(a)



(a) Based on prices on 27 June 1994.

Chart B
Discount function(a)



(a) Based on prices on 27 June 1994.

The most commonly used measure of a bond's return is the *gross redemption yield*—the single rate that, if used to value each of the bond's cash flows individually, equates the bond's total value to its price. But two bonds with the same maturity and different coupons may not have the same yield, since the composition of their returns is different—the higher-coupon bond provides more of its return in coupon payments than does the lower-coupon bond. Since (other things being equal) investors prefer assets that provide a return sooner, they are willing to pay a premium for high-coupon bonds. This effect makes it difficult to interpret gross redemption yields—and any measures constructed using them—so other measures have been developed to avoid these interpretation problems. The most fundamental of these is the rate at which an individual cash flow on some future date is discounted to determine its value today—the *spot interest rate* or *zero coupon yield*. It can be thought of as the yield to maturity of a (hypothetical) zero coupon bond, and as such is an average of the single-period rates out to that maturity. The term structure of spot rates, or *zero coupon yield curve*, is the curve which is usually referred to when talking about the term structure of interest rates.

The zero coupon yield curve can be transformed uniquely into three other useful curves: the par yield curve, the discount function and the implied forward rate curve. The *par yield curve* shows the coupons that bonds would require in order to trade at their face value—at 'par'. The *discount function* is a continuous function of discount factors—the value of the discount function for any maturity t is the value today of £1 repayable in t years. Finally, the *implied forward rate curve* consists of implied future one-period interest rates—that is, the one-period rates expected to obtain at future dates. It contains the same information as the spot rate curve but, because it is in effect a marginal curve (whereas the spot rate curve gives an average of expected rates over the chosen horizon), it presents it in a way that makes it easier to interpret for monetary policy purposes. Charts A and B give examples of the four curves.

in principle be unique for each maturity; so, when trying to recover underlying interest rates from market prices, the aim is to construct a curve expressing interest rates as a unique function of time to maturity—the *term structure of interest rates*.

Domestic currency government securities are generally used in the estimation of the term structure of interest rates, since they are normally regarded as being free of default risk. If there were single-payment, liquid government bonds maturing at every future date, the interest rates on them could be used directly to construct the term structure. In the United Kingdom (as in other countries), however, government bonds—*gilt-edged securities*—are not equally spaced through the maturity spectrum: there are many 'gaps' in which one needs to interpolate in order to construct a continuous term structure. Moreover, there are no single-payment—*zero coupon*—gilts, so the technical task of identifying the underlying term structure is further complicated by the existence of periodic interest payments.

Estimating the curve

The first problem in yield curve estimation is how to fill the gaps in the maturity spectrum. A key decision to be taken concerns the shapes that the term structure should be allowed

to take—in other words, what trade-off to make between the 'smoothness' of the curve (removing 'noise', such as pricing anomalies, from the data) and its 'responsiveness' (its flexibility to accommodate a genuine movement in the term structure). The purpose to which the term structure is to be put is clearly relevant to this decision. For monetary policy analysis, there is less need than when pricing financial instruments for a precise fitting of local anomalies; a method of estimation better able to generate a smooth curve is preferable.

The Bank's recent research has investigated a number of different models for estimating the term structure—those due to McCulloch, Schaefer, Nelson and Siegel, and Svensson (an extended Nelson and Siegel model)—as alternatives to the current Bank of England model.(1)

The *Bank of England* yield curve model estimates a par yield curve, essentially by fitting a curve through redemption yields so as to minimise the sum of squared differences between the observed and the fitted yields. The functional form used for the yield curve is known as a *cubic spline* and can be thought of as a number of separate cubic functions joined 'smoothly' at so-called knot points.

The other four models are all fitted to a discount function, an approach pioneered by McCulloch. The choice of the functional form in these cases reflects not only the choice between smoothness and responsiveness, but also the fact that a discount function must conform to certain prerequisites based on economic theory—in particular, it should be both positive and 'monotonic non-increasing',(2) and be such that the present value of £1 receivable today is £1.

Like the Bank model, the standard *McCulloch* model uses a cubic spline as the functional form.(3) *Nelson and Siegel* start from a different perspective, by specifying a simple functional form for the *forward* rate curve. From this, it is straightforward to derive equations for the term structure of interest rates and the discount function; again, it is the discount function that is fitted by the estimation procedure. An important property of this model is that it is constrained to produce asymptotically flat forward rates for long maturities—a property shared by the Bank model, because of the type of spline used. *Svensson* increases the flexibility of the original Nelson and Siegel model by adding two further parameters, though he considers the standard model to be generally satisfactory for monetary policy applications.

Tax effects

A second major consideration in deciding how best to estimate the yield curve is the choice of method to model tax effects. Tax rules can materially affect the prices of bonds and, if their effects are ignored in the modelling process, can distort the estimate of the term structure of interest rates.

A substantial proportion of investors in the gilt market are taxed at their marginal rate on any coupon income they receive, but are exempt from taxation on capital gains. Bonds with high coupons provide more of their return in the form of coupon income than do low-coupon bonds; so investors who face a non-zero marginal income tax rate but who are not taxed on capital gains will—other things being equal—prefer low-coupon to high-coupon bonds. This preference on the part of tax-paying investors will increase the prices of low-coupon bonds relative to those of high-coupon bonds, a distortion that needs to be removed when attempting to measure the underlying term structure.

The McCulloch method for modelling tax effects consists in estimating a single 'effective' tax rate for all maturities. In contrast, Schaefer argues that there is no unique term structure of interest rates, but rather a series of tax-specific term structures, each of which should be estimated using only those bonds which are 'efficiently' held by investors in that tax bracket. Schaefer's specification of the problem highlights a number of difficulties with McCulloch's approach. First, McCulloch's effective tax rate will be some kind of average of all income tax rates faced by investors, rather than the marginal rate of the investor whose trading choices determine bond prices. Second, this tax rate is (implicitly) assumed to apply to all bonds along the length of the curve, which is unrealistic if any category of investors has preferences about the maturity of debt held.

The Bank of England model tackles tax effects by explicitly modelling the relationship between yield and coupon, as well as that between yield and maturity. It does this by using capital-income curves which describe the trade-off between capital gain (assuming the bond is held to maturity) and income. Using this method, it is possible to estimate the tax rate faced by the category of investors who determine the price of each bond. Both the Nelson and Siegel and the Svensson models ignore tax effects.

Although Schaefer's approach of producing tax-specific term structures is well suited to an individual or an institution facing a known marginal tax rate, it has drawbacks for estimating a single 'market' term structure of interest rates. The Bank method, though theoretically less rigorous, has distinct practical advantages in this respect and so remains the Bank's preferred approach.

Other issues

Since the choice of model for tax effects is independent of the curve-fitting technique, the choice between fitting a par yield curve or using a discount function is largely independent of the tax model. It is to some extent a matter

(1) The models are presented respectively in: McCulloch, J H, 'The tax-adjusted yield curve', *Journal of Finance*, 1975; Schaefer, S M, 'Measuring a tax-specific term structure of interest rates in the market for British government securities', *The Economic Journal*, 1981; Nelson, C R and Siegel, A F, 'Parsimonious modelling of yield curves', *Journal of Business*, 1987; Svensson, L E O, 'Estimating and interpreting forward interest rates: Sweden 1992–93—first draft', Institute for International Economic Studies, Stockholm University.
(2) A function f is said to be a *monotonic non-increasing function* of time if $f(t_2) \le f(t_1)$ for all times t_1 and t_2 such that $t_1 < t_2$.
(3) Schaefer (and others) have criticised the specification of a cubic spline on computational grounds—it can introduce significant rounding errors. Schaefer's model instead uses a linear combination of Bernstein polynomials, which give better approximations to the derivatives—which is important since the forward curve depends on the first derivative of the discount function. Other research has suggested the use of 'B-splines'.

of taste and beliefs about market behaviour. The discount function approach is explicitly consistent with economic theory, but can be very difficult to estimate; the resultant forward rate curve is also sensitive to small changes in the discount function. The approach of fitting a par yield curve, although theoretically less attractive, appears more robust in practice (particularly when producing implied forward rate curves); this may indicate that it better reflects market pricing realities.

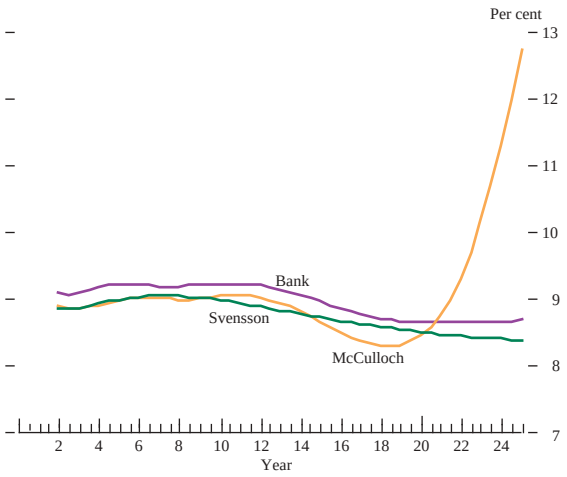
There is also a choice to be made between minimising yield errors and price errors, which can produce significant differences in the forward rate curve. The appropriate choice will again depend on the purpose behind the estimations and—following from that—on the maturity range in which greatest precision is desired. Since the focus in monetary policy analysis is on interest rates rather than prices, it makes sense to minimise yield rather than price errors. A further argument for minimising yield errors is that it improves the fit of the curve at shorter maturities(1)—the most interesting from a monetary policy perspective.

Results of comparative testing

To choose between the different curve-fitting approaches, the Bank's research involved carrying out comparative tests of the Bank, McCulloch, Nelson and Siegel, and Svensson models—with each adjusted to incorporate the Bank tax model to ensure fairness of comparison.(2) Charts 1 and 2 show the different forward rate curves for two recent dates (the Nelson and Siegel curve is excluded because of its closeness to the Svensson curve for these particular dates). They illustrate the sensitivity of the forward rate curve to the choice of fitting approach, and in particular to the constraints set on the long end.

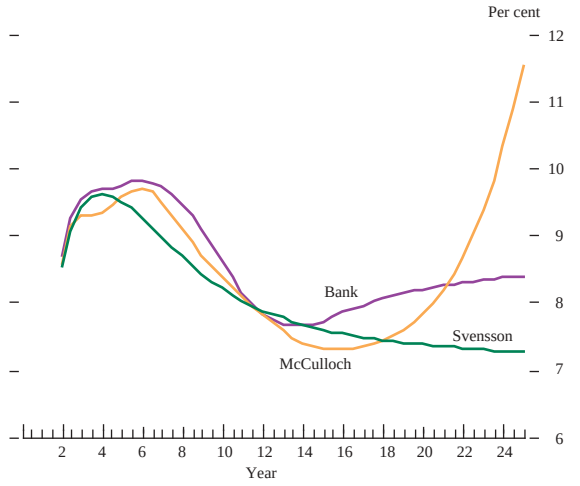
The Bank's provisional judgment is that the economic constraints imposed by the discount function approach—

Chart 1
Implied forward rates(a)



(a) Based on prices on 22 June 1992.

Chart 2
Implied forward rates(a)



(a) Based on prices on 7 June 1994.

which are not rejected by the data—are desirable, and that the functional form suggested by Svensson is that best suited to provide stability in the shapes of the curves. By imposing these restrictions, of course, the model becomes less able to represent observable data, but statistical tests are unable to distinguish between Svensson's approach and other models. It has therefore been decided that, since the gain from restricting the curves to 'reasonable' shapes is offset by only a small loss in precision, a combination of Svensson's functional specification of the discount function and the current Bank adjustment for tax effects should be the main contender to supplant the Bank's current methodology.

A further decision is required concerning the estimation criterion: should price errors or yield errors be minimised? In principle, smaller yield errors might be preferable, on the grounds that it is the interest rates rather than the prices that are the principal factor for monetary policy purposes; moreover, minimising yield errors implicitly gives greater weight to shorter maturity (and therefore more relevant) bonds. Statistical tests, however, point in the other direction: there appears to be a statistically significant estimation cost to minimising the sum of squared yield errors.

Deriving inflation expectations using index-linked gilt prices

The prices of index-linked gilts, which were first issued following the 1981 Budget and now make up approximately 15% of the UK government bond market, can be used in several ways to derive the markets' expectations of inflation. Index-linked gilts are designed to give the investor a known real return independent of the inflation rate: both the coupon payments and the redemption payment are revalued to keep pace with RPI inflation, so preserving the real value of both income and capital. Index-linked gilts do not offer *complete* real value certainty, however, since there is an eight-month

(1) 'Shorter' in this context means up to about ten years. It seems unlikely that participants form anything more than very approximate expectations about economic variables beyond this horizon.
(2) Since incorporating the Bank's tax model makes the McCulloch and Schaefer approaches to modelling the term structure virtually identical, only the former was included in the testing.

lag in the indexation.[1] The effect of this is that an investor will gain if, once the nominal value of a payment is fixed, inflation falls over the succeeding eight months, and will lose if it rises.[2]

Index-linked gilts allow real rather than nominal returns to be measured and so, in conjunction with the nominal returns estimated from the prices of conventional gilts, allow inferences about inflation expectations to be drawn. But an important consequence of the eight-month indexation lag is that, when computing the real yield on an index-linked gilt, some assumption must be made about future inflation in order to value some of the future cash flows.

Simple measures of inflation expectations

Central to the derivation of inflation expectations from bond prices is the *Fisher identity*. This states that the nominal yield on a bond can be separated into (at least) two components: its real yield and the *average* expected inflation rate. Using a simple interpretation of the Fisher identity, a measure of *average* inflation expectations can be calculated by subtracting the real yield (at some assumed average inflation rate) on an index-linked gilt from the nominal yield on a conventional gilt, preferably of identical maturity. For example, by subtracting the real yield on a five-year index-linked stock from the nominal yield on a five-year conventional, this method gives an estimate of average inflation expected over the next five years.[3]

As mentioned above, the gross redemption yield of a bond is dependent on factors other than its maturity—not least on the size of its coupon—so that matching bonds by maturity and ignoring other factors may produce misleading estimates. Conventional bonds are often compared with one another on the basis of their *duration*—a measure that weights each of a bond's cash flows by the length of time before it is received—to standardise the timing of cash flows. It is sometimes suggested that by analogy it is more appropriate to compare conventional and index-linked gilts of similar duration (rather than maturity). However, this assumes that the factors determining the importance of the timing of cash flows are the same for both types of bond. This is reasonable when comparing two conventionals, since the important factor—the risk of a move in the nominal interest rate—is the same for each bond. But when comparing a conventional with an index-linked bond, the risks are not comparable and it is therefore less clear that matching bonds by duration offers any real advantage over matching by maturity.

Since the real yield on an index-linked bond is dependent on an assumed average rate of inflation, the inflation expectation produced by this method depends to some extent on the original inflation assumption: in effect, an inflation expectation is used to estimate an inflation expectation. Comparing, for example, the real yield on 2% Index-linked 1996 with the nominal yield on 10% Conversion 1996 for a recent date, the latter was 7.4%, while the real yield on the index-linked gilt was 4.5% using a 3% inflation assumption and 4% using a 5% inflation assumption. Using this simple method, the inflation expectations using the 3% and 5% inflation assumptions were 2.9% and 3.4% respectively. The problem can, however, be overcome by using the *break-even inflation rate* methodology: this embodies an iterative procedure that solves for the real yield and the inflation expectation simultaneously, and so does not depend on the original inflation assumption. In the above example, the break-even inflation rate is 2.8%.

Implicit in these computations is the crucial assumption that investors require no risk or liquidity premium for holding either index-linked or conventional gilts; or, if they do, that the premia are identical for the two sorts of asset. The assumption implies that, in an equilibrium where there are no arbitrage opportunities,[4] a conventional and an index-linked stock will have the same expected nominal rate of return.

Problems with simple measures

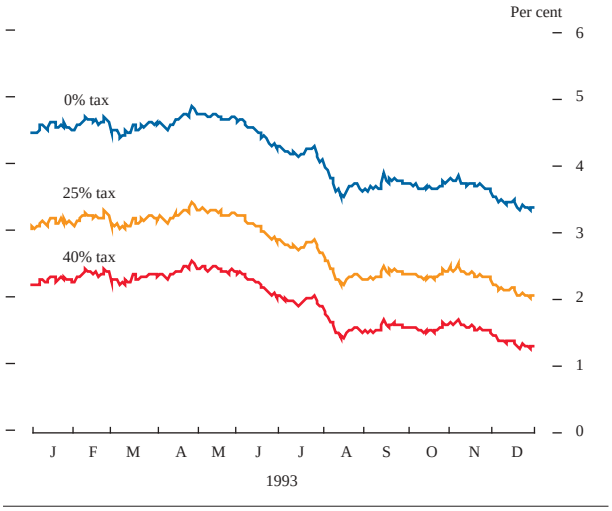
There are several deficiencies with these methods of deriving inflation expectations. First, it will often only be possible to find pairs of gilts of *approximately* the same maturity, introducing inaccuracies into the values calculated for the real rate and the expected inflation rate. More seriously, there may not be an index-linked stock of even approximately the maturity for which it is wished to derive an inflation expectation.

Another problem is that, since the value of a bond to an investor depends on his or her marginal tax rate, some assumption must be made about the tax rate in order to calculate the return. The tax assumption then feeds through into the calculated inflation expectation. Chart 3 shows the sensitivity to the tax assumption of a break-even inflation rate (calculated here using the 2.5% Index-linked 2003 stock and a conventional stock of similar maturity). It shows how expectations of the average inflation rate over the period until 2003—as measured by the break-even rate methodology for investors facing different marginal tax rates—changed over the course of 1993. Without a view on the appropriate tax rate to apply, it is clear that little useful information can be gained from the *level* of a break-even rate series. It seems, however, that the *changes* in the series vary little with tax: there is a fairly stable differential between the break-even time series at different tax rates.

In addition, the fact that a break-even inflation rate is derived from only two gilt prices—one index-linked and one

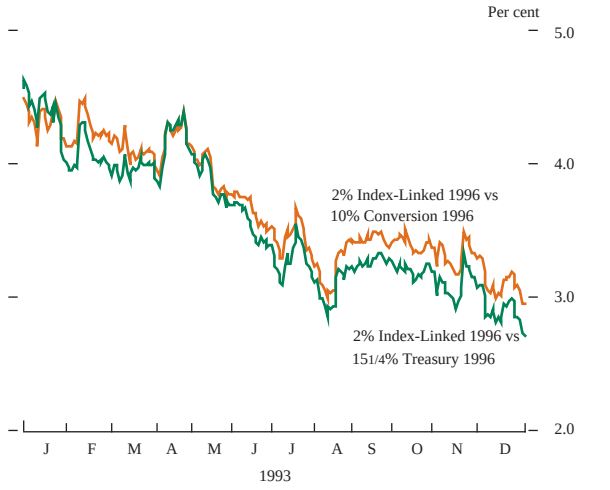
(1) When a bond is traded between coupon payment dates, the seller foregoes the next coupon. It is market practice for the buyer to compensate the seller by paying *accrued interest* (over and above the quoted price)—an amount proportional to the period for which the seller has held the bond but will not receive a coupon payment. To compute the accrued interest payment, the size of the next coupon payment must be known. Since coupons on index-linked gilts are paid every six months, and the RPI for a particular month is known only with a lag, a lag of eight months in the indexation of payments is needed to ensure that the nominal value of the next coupon is always known.
(2) The Bank of England's recent publication, 'British Government Securities: The Market in Gilt-Edged Securities', gives more information on index-linked gilts (see in particular Chapter 3). It is available from the Bank of England, PO Box 96, Gloucester, GL1 1YB.
(3) The measure is often misinterpreted as giving an expectation of inflation in five years' time, rather than the average rate over the next five years.
(4) In the context of this article, *arbitrage* involves the simultaneous purchase and sale of two financial instruments for a riskless profit; the equilibrium referred to is a state in which no such opportunities exist.

Chart 3
Break-even inflation rates



conventional—means that it is particularly vulnerable to distortions produced by the specific pair of stocks selected. For instance, when matching stocks by maturity there may be two conventionals of roughly equal maturity but widely-differing coupons. The difference in the break-even rates derived using the different stocks can be significant, as Chart 4 shows. Another weakness of the approach is that, by

Chart 4
Break-even inflation rates



concentrating on only two stocks, it ignores any inflation information contained in the prices of other bonds.

By calculating a break-even inflation rate for each index-linked gilt, it is possible to build up a picture of market expectations of inflation over different time horizons. But as the index-linked market currently consists of only 13 stocks, spread over a maturity range from two to 37 years, it is not very detailed.(1) In addition, such an approach does not allow reliable estimates of implied future one-year inflation rates (as opposed to the average rates that break-even rates represent).

So although these simple measures are useful in showing how inflation expectations may have changed over time, only a limited amount can be learnt from them about the level of inflation expectations.

Term structure of real interest rates

Before looking at the use of term structure models to derive estimates of inflation expectations—an approach which deals with several (though not all) of the problems discussed above—it is helpful to outline how estimates of a real yield curve can be derived using index-linked gilt prices. The estimation of such a curve provides the real equivalent of the nominal interest rate curve discussed above. In particular, it allows a real forward rate curve to be derived. In practice, however, there are two factors which complicate the estimation: there is—once again—the eight-month lag in indexation; and there are far fewer index-linked gilts in issue. The first means that, without some independent measure of expected inflation, real bond yields and hence the term structure derived from real yields are dependent to some degree on the assumed rate of future inflation.(2) The second problem is more practical: there are currently only 13 index-linked bonds in issue and the Bank yield curve model—to take that example—estimates 12 parameters. So using the Bank model as it stands to estimate a real yield curve from index-linked bonds would give an exact fit to the yields observed. Such an approach would be impractical since it would lead to highly unstable forward rate curves.

Despite these problems, the four term structure models investigated can be amended to produce real yield curves dependent upon an assumed rate of inflation. The *Bank model* can be adapted to produce a real yield curve by ignoring all tax effects and simply fitting the yield to maturity structure, once real yields have been calculated for some assumed rate of inflation. In addition, the number of knot points defining the cubic spline can be reduced (from six to three at present) to accommodate the relative lack of data—with little loss of accuracy, since one would not expect the real curve to be as flexible as the nominal. This fitted curve is interpreted as the real par yield curve, from which the term structure of real interest rates and the implied real forward rate curve can be calculated.

The main drawback with this approach is that it includes no parameters to account for taxation effects. Not only is it impractical to apply the full Bank model but it may not even be appropriate, given the difference in nature between the index-linked and conventional markets. The variation of *coupons* on index-linked bonds is not so large as in the conventional market, so tax rules are unlikely to affect to the same extent the prices of indexed bonds with the same maturity but different coupons. But indexed bonds with different *maturities* may attract different categories of investor. Anecdotal evidence suggests that high-rate income tax payers, who are attracted to indexed gilts because of the advantageous ratio of capital to income, prefer the liquidity

(1) In fact, since the index-linked market contains three stocks which are beyond the maturity of the longest conventional, only ten break-even observations are possible.
(2) This dependence can be important when calculating the yields on index-linked gilts approaching maturity, but becomes less important the longer the maturity of the bond.

and reduced price volatility of short-dated securities. In contrast, long-dated index-linked gilts are favoured by pension funds, which are exempt from income tax.(1) The Bank's current implicit assumption is that the marginal investor at all maturities in the index-linked market does not pay income tax, so any distortions introduced by this assumption are likely to be at short maturities. Research continues in this area.

McCulloch's term structure model can be adapted in a reasonably straightforward manner to produce a real yield curve. For the reasons outlined above, however, his tax treatment may not be appropriate for the index-linked market. But estimation of the parameter does at least partially allow for any tax effect that may exist in the index-linked gilt market, so it may still be desirable to include it in the model—even if the estimated parameter cannot readily be interpreted. As with the Bank model, the number of estimating functions is reduced to accommodate the limited number of observations available to be used in the estimation.

Schaefer's model is more difficult to apply, since the lack of data will severely reduce the number of efficient bonds. The data-set therefore needs to be expanded to include all index-linked bonds, in which case Schaefer's approach becomes essentially equivalent to McCulloch's. The *Nelson and Siegel model* has only four parameters, and so can be applied directly to the index-linked market; increasing the flexibility of the model by adding the two extra (Svensson) parameters seems unnecessary.

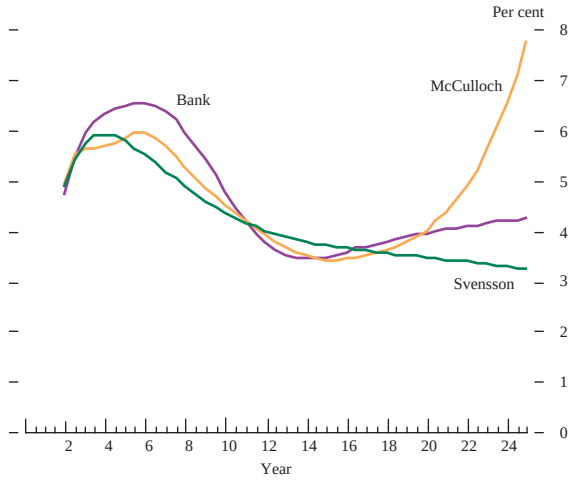
Implied forward inflation rate curve

Because it is possible to estimate two interest rate term structures for the gilt market—a real yield curve modelling the index-linked sector and a nominal curve modelling conventionals—it is possible to create pairs of hypothetical conventional and index-linked bonds of *identical* maturity(2) for any desired maturity.(3) The break-even approach can then be applied to these pairs to give continuous curves for both average and (more importantly) forward inflation expectations (ie implied future one-year inflation rates). As the prices of most bonds are used in the estimation of the yield curves,(4) this approach has the additional advantage of using virtually all the information on inflation expectations available in the gilt market. It also ensures that the rates derived should be free of any stock-specific distortions and adjusts for most tax effects.

Since an inflation assumption is needed to estimate a real yield curve, the implied forward inflation rate curve(5) that is derived will depend on this assumption—the same problem of consistency that arose with the simple measures of inflation expectations discussed above. To remove this dependency, an iterative procedure has been developed to avoid the need for an assumed inflation rate—in simple terms, the real yield curve is re-estimated for each iteration until consistency between the assumed and the estimated forward inflation rate curve is achieved.

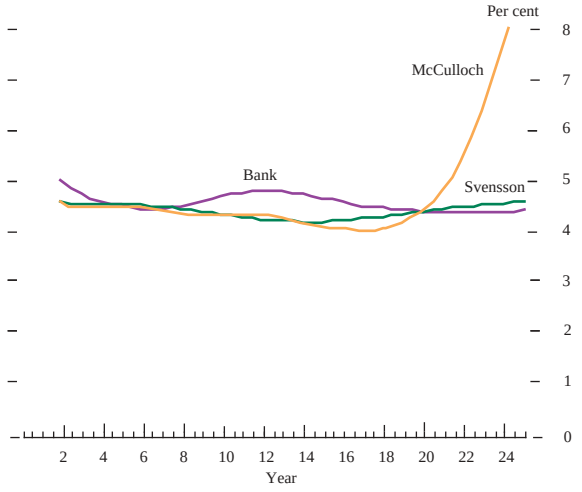
Charts 5 and 6 illustrate implied forward inflation rate curves for the Bank, McCulloch and Svensson approaches. Although there are some differences between the curves, they are all of broadly the same shape; the rise in the McCulloch curve for long maturities is attributable to the lack of constraints that the method places on nominal interest rates.

Chart 5
Implied forward inflation rates(a)



(a) Based on prices on 7 June 1994, so that at the start of year 6, for example, the curves estimate the expected rate of inflation on 7 June 2000.

Chart 6
Implied forward inflation rates(a)



(a) Based on prices on 22 June 1994, so that at the start of year 6, for example, the curves estimate the expected rate of inflation on 22 June 2000.

(1) Pension funds also find long-dated index-linked gilts attractive because they have long-dated, (quasi) index-linked liabilities.
(2) Since the zero-coupon curve is used, the two hypothetical bonds also have identical duration.
(3) It is, however, unwise to extrapolate beyond the maturity of the longest actual bond of either type.
(4) Currently, callable bonds are included in the estimation procedure for nominal curves with a simple rule to determine the maturity date, but convertible, floating-rate, irredeemable and illiquid stocks are excluded.
(5) In past *Inflation Reports* (and in the working papers on which this article is based), the implied forward inflation rate curve is referred to as the inflation term structure.

Since estimation of the forward inflation rate curve relies on a no-arbitrage condition, it is necessary to produce nominal and real curves for the same category of investor. The Bank's current methodology involves modelling both nominal and real curves from the perspective of a zero-rate tax-payer, estimating the nominal curve by modelling the tax effect on the prices of bonds not naturally held by such investors and in this way adjusting them to be comparable with the remainder, and assuming for index-linked gilts that their prices are set by zero-rate tax-payers. The no-arbitrage condition can then be applied, since the index-linked and conventional markets are being compared from the perspective of the same investor paying no income or capital gains tax.(1)

Several previous academic studies have adopted a similar approach to the extraction of inflation expectations. They have not, however, modelled the real yield curve and as a result have derived inflation expectations only for the maturities at which index-linked gilts exist, rather than using the continuous term structure produced by the Bank method. They have also tended to be rather simplistic in dealing with tax effects.

One prerequisite that it may be desirable to impose on a model of the implied forward inflation rate curve is that it is flat for long maturities. This can be achieved by requiring both real and nominal forward curves to be flat at long maturities.(2)

Problems with expectations derived from yield curves

In order to interpret the derived curves as representing 'true' market expectations of interest rates and inflation, it is necessary to assume that the forward interest rates calculated from the term structure model are expected future short rates. In practice, however, there are three main kinds of factor which make it likely that there are differences between the two: those related to risk premia; to liquidity premia; and to 'Jensen's inequality'.

Risk premia

There are two main sources of risk for the holders of government bonds: the risk of unexpected changes in inflation; and the risk of unexpected changes in the spot interest rate. Inflation risk is incurred by holders of bonds with *variable* real returns, ie without a *guaranteed* real return. The inflation risk premium on index-linked bonds is therefore likely to be small, since they offer a high degree of real value certainty. For conventionals, however, it may be significant, because all payments are fixed in nominal terms. The *interest rate* or *price risk premium* represents the compensation a bondholder requires for variability in the value of the bond over time. As the prices of long-duration bonds are generally more sensitive to a change in interest rates than short-duration bonds, the price risk premium included in their returns will be higher.

Liquidity premia

Liquidity premia are important in two respects. First, the prices of bonds that are identical in all respects other than their liquidity may differ. This is particularly likely if one of the bonds is perceived by the markets as a 'benchmark'. How such effects should be treated depends partly on how they are viewed: if, for example, a bond's price is relatively high because the bond is more liquid than comparable stocks, then it is likely to represent the market better. If, however, the bond is being used primarily as a hedge instrument, its price is likely to reflect more than just the term structure of interest rates. The second important effect is a result of the relative liquidity of conventional and index-linked gilts. Because the index-linked market is less liquid, any comparison between the two will implicitly include a premium reflecting the difference in liquidity. The Bank's current methodology assumes that all liquidity effects are negligible, but this may be unrealistic.

Jensen's inequality

There are several competing hypotheses on the economic relationship which should hold between expected future rates and bond prices. If the underlying process corresponds to either of two of the most influential (the *return-to-maturity* hypothesis and the *local-expectations* hypothesis),(3) implied expected future rates will not correspond to actual expected future rates, but will be lower—to an extent dependent on the volatility in future rates. This is essentially because of the difference between $E[(1+r)^{-1}]$ and $(1+E[r])^{-1}$, where $E(.)$ is the expected value function and r is a future interest rate—an example of *Jensen's inequality*.(4)

The effects of both Jensen's inequality and risk premia need to be taken into account when deriving estimates of inflation expectations. The nominal inflation risk premium, the nominal interest rate risk premium and the effect of Jensen's inequality on real rates all tend to bias estimates of inflation expectations upwards. The real inflation risk premium (which is likely to be small), the real interest rate risk premium and the effect of Jensen's inequality on nominal rates work in the other direction.

Preliminary investigation into the effect resulting from Jensen's inequality suggests that it is unlikely to be large if

(1) These estimates can be scaled in the usual way for investors facing other tax treatments.
(2) The restriction is achieved for the Bank model by constraining the cubic spline to flatten at the long end. Although McCulloch's cubic spline will not in general produce asymptotically flat forward rate curves, it can be constrained to do so by applying a technique due to Vasicek and Fong. The McCulloch-based inflation term structures shown in Charts 5 and 6 use the original McCulloch spline specification without the Vasicek and Fong adjustment, and illustrate the unrealistic long rates which this can generate. The functional form of Nelson and Siegel (and that of Svensson) is specifically designed to produce forward rate curves with horizontal asymptotes.
(3) The return-to-maturity hypothesis suggests that the expected return from a single n-period bond is equivalent to the return from rolling over a series of n one-period bonds. The local expectations hypothesis suggests instead that the expected rate of return on any bond in a single period is equal to the corresponding short rate of interest.
(4) More precisely, Jensen's inequality states that for a strictly convex function, the expectation of the function of a random variable will be greater than the function of the expectation of the variable, ie $E[g(x)] > g(E[x])$. For a detailed exposition of the effect of Jensen's inequality when estimating expected interest rates, see the forthcoming *Bank of England Working Paper* by Anderson, N L and Barr, D G, 'Jensen's inequality and the implied forward rate curve'.

the short-term interest rate follows a strongly mean-reverting process. Although it is not clear at this stage how large the *net* effect of risk premia and Jensen's inequality is, it is possible that the Bank's current estimates *overstate* 'true' inflation expectations when referring to implied forward inflation rates in the *Inflation Report* (the risk premia effects probably outweigh those resulting from Jensen's inequality). Further work is under way to model these effects more accurately. Most similar academic studies do not attempt to estimate risk premia.

Summary

Over the past two years, the Bank has investigated a number of sophisticated techniques to extract information on interest rate and inflation expectations from gilt prices. It is not at all easy to choose between them but, on the basis of economic prerequisites and comparative statistical testing, the approach proposed by Svensson seems the most appropriate for creating the forward inflation rate curves used in the *Inflation Report* and for the analysis of monetary policy choices. No final decision has yet been taken on the precise specification to be used to implement the Svensson approach. This—in particular, the choice between minimising price and yield errors—will be determined after further testing and after monitoring the stability of the various options over the coming months. The intention is to make a final decision in time for the new approach to be adopted in the November *Inflation Report*. In order to make as well-informed a decision as possible, the Bank would welcome practitioner comment on the issues raised in this article and on its provisional conclusions.

Irrespective of the precise methodology, it seems clear that further research will be required into the accuracy with which these methods represent market expectations: in particular, the lack of quantification of the effects of risk premia and of Jensen's inequality are potentially important gaps in knowledge. Nevertheless *movements* in the term structures generated using these techniques can be useful indicators of changes in markets' perceptions of policy credibility and so have a role to play in informing monetary policy decisions.

Company profitability and finance

By Kieren Wright of the Bank's Structural Economic Analysis Division.

As the recovery has become more firmly founded, the financial position of industrial and commercial companies (ICCs) has strengthened. This article compares the present recovery with that of 1982–84, and examines in detail how firms have performed in 1993 and the first quarter of 1994. The main points include:

- *Profitability is at a markedly higher level than at a similar stage in previous recoveries. In the first quarter of 1994, the pre-tax return on capital in the non North Sea sector increased to 9.5% from a trough of 6.3% in the first quarter of 1992. This return on capital is almost double that at the equivalent stage in the previous recovery.*

- *ICCs' retained earnings increased by over a third in 1993, when firms made unprecedented net repayments of bank debt. ICCs' net repayments to banks were equivalent to 1.8% of GDP in 1993, compared with total net borrowing equal to 2.4% of GDP in 1982, the comparable year in the last recovery.*

- *At the same time, firms have increasingly used the capital markets as a source of external finance. Gross capital issues by ICCs increased by 51% to £23.9 billion in 1993, representing 30.3% of total ICCs' funding.*

- *ICCs' dividend payments—which have been historically high since the mid-1980s—have grown further in the recovery; they increased 9.3% to £22.7 billion in 1993. But many firms with relatively weak profitability and high indebtedness have chosen to cut or pay no dividends in the recent cycle.*

- *Fixed investment has been higher as a share of GDP than in the previous recovery. This reflects a higher starting level of investment at the end of the recession; but to date, investment has not risen further as the recovery has picked up.*

Performance in the present and previous recoveries compared

Company performance in the present recovery so far has differed in a number of ways from the previous one in 1982–84. The differences have to some extent reflected the relative shallowness of the recent recession, and they have been seen in the profitability, investment and financial transactions of industrial and commercial companies (ICCs). The recent cycle has also had a different sectoral impact—with business failures in the service sector, for example, remaining high compared with the previous recovery.

Profitability

Excluding the North Sea sector, ICCs' pre-tax return on capital recovered to 8.3% in 1993—almost twice as high as in 1982, the similar stage in the last recovery (see Table A). The rise in profitability has occurred from a higher starting-point than both in the early 1980s and after the 1974–75 recession, but has not been significantly sharper than in those recoveries. The pre-tax rate of return on capital

Table A
Measures of ICCs' performance (1980–84 and 1990–93)

Per cent in italics

	Firms operating below capacity (a)	Return on capital (b)	Net income gearing (c)	Capital gearing (d)	Valuation ratio (e)
1980	*73*	*4.1*	*27.3*	*9.0*	0.4
1981	*80*	*3.0*	*23.7*	*7.5*	0.4
1982	*76*	*4.3*	*22.6*	*9.8*	0.4
1983	*70*	*5.1*	*18.1*	*9.2*	0.5
1984	*58*	*5.4*	*17.7*	*9.5*	0.5
1990	*49*	*7.5*	*31.2*	*24.9*	0.9
1991	*67*	*7.2*	*27.5*	*26.3*	1.0
1992	*69*	*6.9*	*25.2*	*27.1*	1.1
1993	*65*	*8.3*	*18.1*	*23.3*	1.2

(a) Source: CBI quarterly survey of manufacturing firms.
(b) Pre-tax rate of return on capital stock at replacement cost in the non North Sea sector.
(c) Net interest payments as a percentage of after-tax income.
(d) Outstanding borrowing (debt at nominal value) as a percentage of the capital stock at replacement cost.
(e) Ratio of ICCs' net financial liabilities to their capital base.

rose to 9.5% in the first quarter of 1994 from a trough of 6.3% in the first quarter of 1992. This compares with rises over a similar period of two percentage points from a trough of 2.3% in 1981 Q2, and of three percentage points from a trough of 3.5% in 1975 Q3.

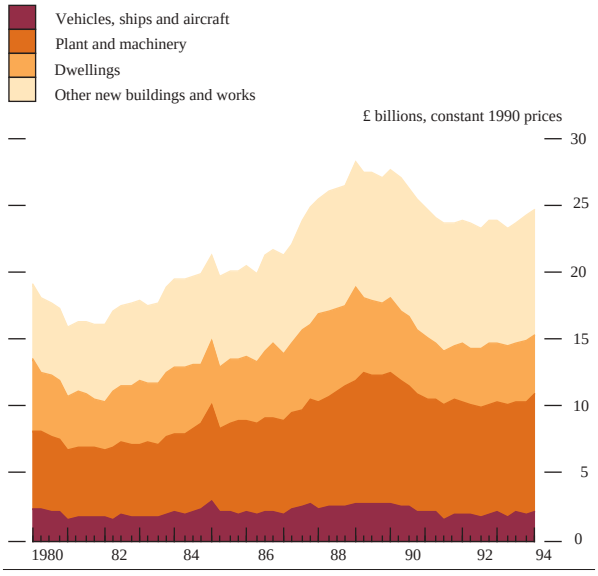
The higher level of profitability has reflected in particular the strong growth of labour productivity relative to the growth in real wages in the last decade or so. ICCs' labour productivity(1) increased by 36% between 1990 and 1993, compared with a rise of 9.4% in 1979–82.

In addition, the shallowness of the recent recession has meant that manufacturers' levels of capacity utilisation have remained higher than previously, helping to contain fixed costs per unit of output. As Table A shows, CBI survey evidence suggests that 65% of manufacturers were operating below capacity in 1993, compared with 76% in 1982.

Investment

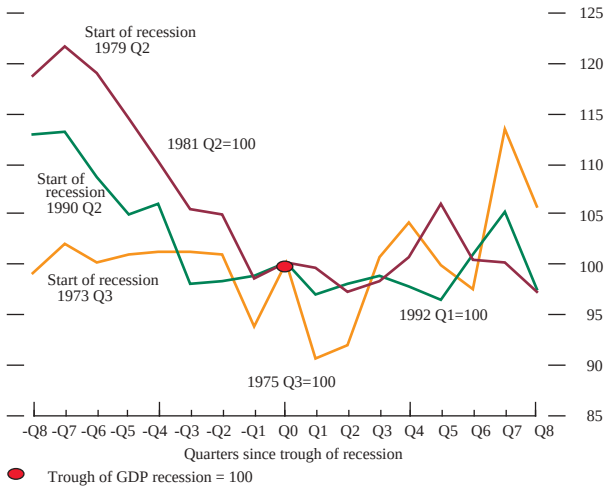
Investment by ICCs was 9.1% of GDP in 1993, compared with an average of 6.4% a year between 1982 and 1984.(2) Stronger investment in plant and machinery has been a notable feature—it represented 6.1% of GDP in 1992 and 1993, compared with an average of 5.1% a year between 1982 and 1984 (see Chart 1).(3) There has also been greater investment in 'other' new buildings and works—6.6% of GDP in 1993, compared with 5.6% in 1982.

Chart 1
Whole-economy investment—analysis by asset



So far, however, there has not been a strong upturn in ICCs' capital spending, and over the last year or so investment has contributed less to the growth of GDP than in the previous recovery. In real terms, ICCs' investment grew by 1.7% in 1993, compared with a rise of 2.4% in 1982 (see Chart 2). A possible explanation for this may be that firms have given priority to reducing their higher levels of debt this time rather than to new investment.

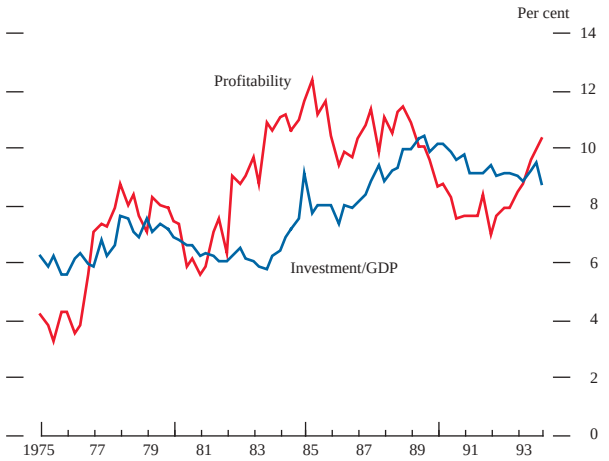
Chart 2
ICCs' investment in three recessions(a)



(a) Investment in 1990 prices.

Changes in profitability do, however, tend to precede changes in the investment to output ratio—as Chart 3 shows. In the previous recovery, ICCs' profitability started to increase in the first quarter of 1981, but the investment to output ratio did not grow until the third quarter of 1983. In the present recovery, profitability reached a trough in the first quarter of 1992, and the investment to output ratio is yet to show any sustained rise.

Chart 3
ICCs' return on capital(a) **and ICCs' investment as a percentage of GDP**(b)



(a) Pre-tax rate of return on capital stock at replacement cost.
(b) Investment and GDP at 1990 prices (GDP at market prices).

In an upturn, firms may postpone major investments until output shows definite signs of recovery and profitability begins to increase. In addition, the installation of plant and equipment is often a lengthy process. Nevertheless, the sharp rise in profitability in recent quarters should add

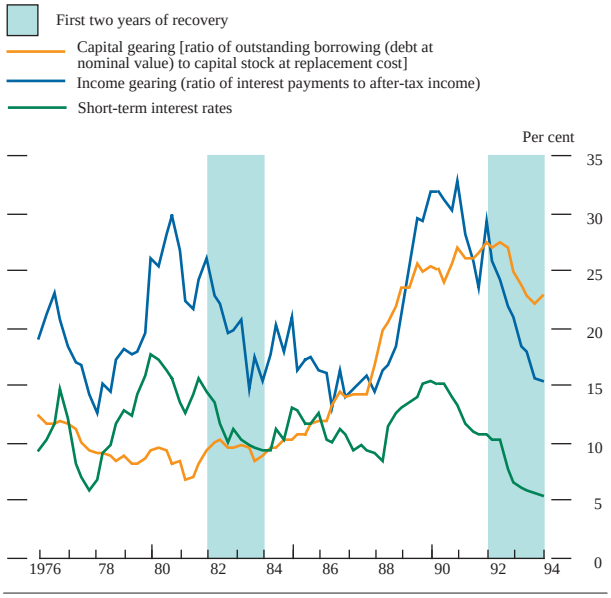
(1) The figures cover the mining and quarrying, manufacturing, utilities, construction, distribution and transport, and communication sectors. Sectors are weighted using the Central Statistical Office's 1990 weights.
(2) The higher corporate-sector investment to output ratio, however, partly reflects the effect of privatisations, which have widened the sector.
(3) The figures cover whole-economy investment in plant and machinery, and not just that by ICCs.

strength to the recovery in investment—a view which is supported by survey evidence (see below).

Financial transactions

ICCs' financial transactions have been very different in this recovery from that in the early 1980s. Firms have reduced their levels of bank debt significantly and turned increasingly to the capital markets for external finance; bank borrowing has been much lower than in the previous recovery. Nevertheless, capital gearing—outstanding borrowing at nominal value as a proportion of capital stock at replacement cost—remains high. Most of the improvement in ICCs' income gearing—the ratio of interest payments to after-tax income—reflects lower interest payments (Chart 4).(1)

Chart 4
Financial transactions



Although profits fell as the economy entered the recent recession, investment levels were maintained and this led to a significant worsening in companies' financial balance in 1990–92. The sharp improvement in retained earnings last year has enabled firms to improve their financial position: ICCs recorded a financial surplus of £2.8 billion (0.4% of GDP)—the first surplus for six years. In the previous recovery, ICCs recorded an average surplus of £4.1 billion a year (1.4% of GDP) between 1982 and 1984, as capital expenditures remained below retained earnings.

After a high net borrowing requirement—boosted by mergers and acquisition activity—in the years leading up to the last recession, there has been a large fall in ICCs' net borrowing requirement, though it remains above the levels seen in the previous recovery. It fell from £28.6 billion to £14.3 billion in the year to end-1993, compared with an average of £3.7 billion between 1982 to 1984. Although the borrowing requirement has been higher in this recovery, bank borrowing has actually been lower. Instead, ICCs have made significant net *repayments* to banks. In 1993 alone, companies repaid £11.4 billion to banks (£2.3 billion in 1992), compared with average borrowing of £5.1 billion a year between 1982 and 1984 (see Table B). The emphasis that firms have placed on reducing gearing levels by repaying bank debt may be partly the result of low inflation. Capital gearing levels were similarly high in the mid-1970s, but with strongly negative real interest rates following that recession, real debt values were rapidly eroded; it is unlikely that firms expect debt to be eroded by inflation in such a way in this recovery.

Table B
Selected items from ICCs' accounts and financial transactions (1980–84 and 1990–93)

Percentage of GDP (a)

	Total income (b)	Undistributed income	Investment	Financial surplus(+)/ deficit(-)	Borrowing requirement	Bank borrowing
1980	15.5	8.1	7.1	—	2.4	2.7
1981	15.5	7.8	6.4	0.6	1.7	2.2
1982	16.4	7.8	6.2	1.1	2.5	2.4
1983	17.6	8.8	5.8	1.7	0.3	0.5
1984	19.2	9.7	6.8	1.3	1.0	2.2
1990	19.5	6.7	9.9	-4.1	6.7	3.6
1991	18.6	7.0	8.7	-1.4	4.7	-0.2
1992	17.5	6.8	8.0	-1.3	4.8	-0.4
1993	18.3	8.6	7.8	0.4	2.3	-1.8

(a) GDP at current market prices.
(b) Net of stock appreciation.

There has been increased recourse to the capital market, with ICCs' net capital issues totalling £17.3 billion in 1993. There was a significant rise in the volume of equities issued; this was partly a consequence of the rise in share prices in 1993, which contributed to the relative attractiveness of the capital market.

There has also been a tendency since the early 1980s for the corporate sector to issue a greater amount of fixed, rather than floating-rate, finance: only about 60% of the stock of corporate sector debt is now closely linked to short-term market rates, compared with over 90% in 1982.(2) A consequence of the large debt repayments by ICCs has been that their capital gearing has fallen, although it remains at historically a high level. ICCs therefore remain sensitive to changes in nominal interest rates, but the tendency to issue more fixed-rate finance may reduce that sensitivity in the short term.

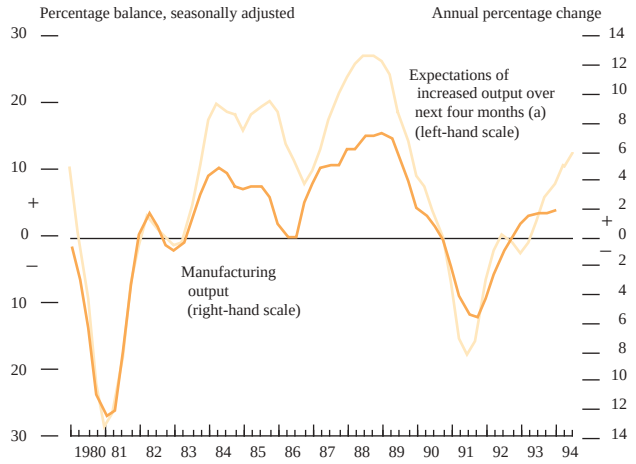
Company performance in 1993 and 1994

The cash flow of firms has improved significantly over the last year, as consumer demand has strengthened and sales have recovered. In 1993, output grew across all sectors except construction; growth in this sector resumed in the last quarter of 1993. Chart 5 shows the annual change in manufacturing output and the balance of manufacturers expecting an increase in output (as reported by the CBI). The rate of output growth is expected to continue increasing in 1994, albeit moderately. Improved trading conditions

(1) For a disaggregated analysis of corporate sector debt, see the article on personal and corporate sector debt in the May 1994 *Quarterly Bulletin*, pages 144–55.
(2) See the article, 'Fixed and floating-rate finance in the United Kingdom and abroad', in February 1994 *Quarterly Bulletin*, pages 34–45.

have also led to a sharp decline in business failures in the recovery so far.

Chart 5
Output expectations

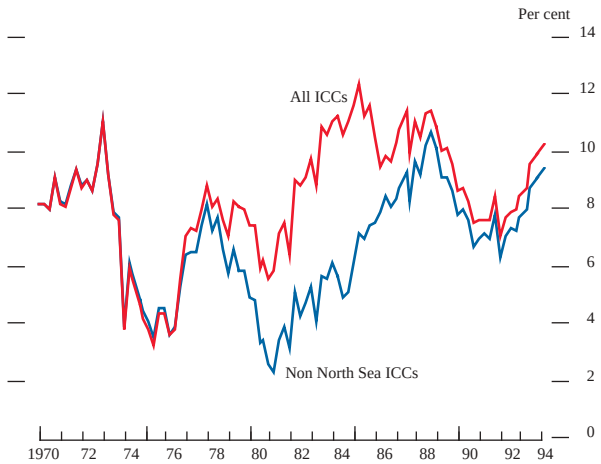


(a) Source: CBI Industrial Trends survey.

Profitability

Cost containment and sustained productivity growth have contributed to the continued rise in profitability. Non North Sea ICCs' pre-tax rate of return increased sharply from the third quarter of 1993, and by the first quarter of 1994 was only 1.2 percentage points below its peak in the fourth quarter of 1988 (Chart 6). The return on capital of these

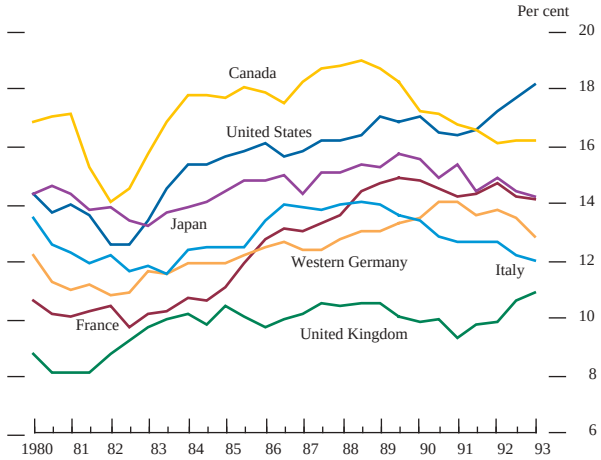
Chart 6
Return on capital(a)



(a) Pre-tax rate of return on capital stock at replacement cost.

ICCs is now 3.2 percentage points higher than its trough in the first quarter of 1992. Chart 7 shows that the gap between the profitability of the UK business sector and those of other G7 economies narrowed sharply in the first half of the 1980s, but that the improvement was not sustained later in the decade.(1) Recently, UK profitability has improved once more, particularly relative to other European economies.

Chart 7
Cross-country profitability



Source: OECD.

Income and appropriations

As Table C shows, gross trading profits (net of stock appreciation) increased markedly in 1993; they were 14.4% higher than in the previous year. In the year to the first quarter of 1994, they increased by 16.6%. ICCs' profits

Table C
ICCs' income and appropriation accounts

£ billions

	1990	1991	1992	1993	1994 Q1
Income					
Gross trading profits (a)	74.4	78.1	77.8	89.0	24.3
Rent and non-trading income	15.4	13.9	12.0	9.9	2.6
Income from abroad	18.0	15.0	14.6	16.2	4.0
Total income (a)	**107.8**	**106.9**	**104.3**	**115.1**	**30.9**
Allocation of income					
Dividends on ordinary and preference shares	17.6	18.4	20.8	22.7	5.1
Interest and other payments	32.1	29.8	26.8	21.1	4.9
Profits due abroad	7.7	5.4	5.0	6.3	2.0
UK taxes	18.7	15.4	13.4	13.0	3.1
Undistributed income (a)	**31.7**	**37.9**	**38.2**	**51.9**	**15.8**
Capital transfers	-0.5	-0.5	-0.5	-0.4	-0.2
Fixed investment	54.7	50.0	47.8	48.7	11.8
Physical increase in stocks	-1.1	-4.8	-2.1	0.2	-0.3
Financial balance (surplus +)	**-22.8**	**-7.8**	**-7.6**	**2.8**	**4.3**

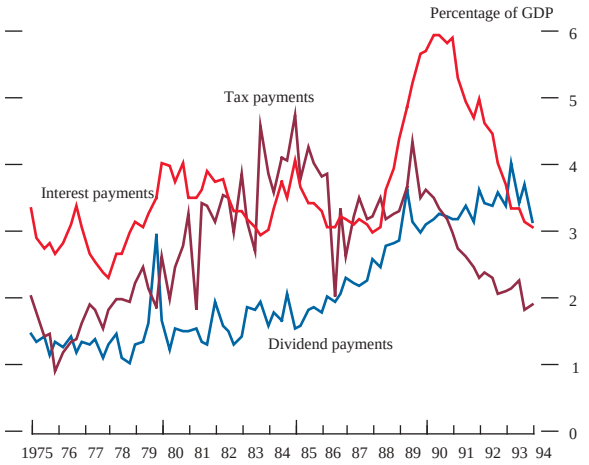
(a) Net of stock appreciation.

have now increased in every quarter since their trough in the first quarter of 1992, rising a total of 33.2%. ICCs' tax payments declined marginally in 1993, reflecting the increase in capital allowances between November 1992 and October 1993, and the stability of profits in the previous year.

Dividend payments rose by 9.3% in 1993—more slowly than the growth in profits—but fell by 1.3% in the year to the first quarter of 1994. Over the last ten years, dividend payments by ICCs have doubled as a percentage of GDP—to 3.1% in the first quarter of 1994 (Chart 8). The path of the

(1) Profitability is measured here by the pre-tax operating surplus net of depreciation as a percentage of the capital stock net of cumulative depreciation. Differences in estimates of asset lives mean that the levels of profitability are not directly comparable across countries.

Chart 8
Selected items from ICCs' balance sheets(a)



(a) Tax, interest and dividend payments at current prices; GDP at current market prices.

dividend payout ratio—dividends as a proportion of post-tax income—has been similar during the early 1990s' cycle to that in the early 1980s, but from a higher starting-point.(1)

The ratio remained above 30% between 1990 and 1993—high by the standards of the last 20 years (though not as high as in the late 1960s). A possible explanation for this is that the long-term profit growth of firms has been expected to be higher and this optimism has influenced dividend behaviour. It may also reflect the provision for tax-exempt shareholders to reclaim advance corporation tax on dividends. For companies paying mainstream corporation tax, there is a higher charge on retained than on distributed profits when shareholders are exempt from tax on dividends. As profitability increased in the 1980s, a greater proportion of firms paid mainstream corporation tax, and so dividend behaviour was more influenced by the difference in effective tax rates. As profits have increased in the recovery, this difference may have provided an incentive to increase dividends.

In addition, firms have continued to restructure their balance sheets by increasing their use of the capital market and lessening their reliance on bank borrowing (see below). The resulting greater proportion of equity has contributed to the rise in dividend payments. Reduced bank borrowing and lower nominal interest rates led interest payments to fall by 21.4% in 1993; they continued to fall in the first quarter of 1994. ICCs' undistributed income rose 33.7% in nominal terms in 1993, primarily reflecting higher profits. Company performance continued to strengthen in the first quarter of 1994, when undistributed income rose to £16.3 billion. The level of ICCs' undistributed income as a proportion of GDP has in fact been similar to that seen in the previous recovery, because dividend payments have been higher—ICCs' dividend payments were 3.6% of GDP in 1993, compared with 1.6% in 1982.

Capital expenditure

In real terms, ICCs' fixed investment grew in the third and fourth quarters of 1993, but fell back in the first quarter of 1994, when it was 0.2% lower than a year earlier. The fall was greatest in the manufacturing sector, where investment was 3.7% down on 1993 Q1.

According to CBI survey evidence, however, investment intentions have increased in the manufacturing sector. The balance of manufacturing firms expecting investment to increase in the following 12 months improved from -13% in 1992 to -5% in 1993. In the first two surveys of 1994, there was a positive average balance of +6%.

CBI surveys have also shown that an increasing proportion of firms are investing to increase capacity—27% in the April 1994 survey, compared with 19% in 1992 (see Table D). These indications are consistent with the rise in the CBI capacity utilisation balance (see Table A above), but that balance also suggests that capacity pressures are not significant. At this stage, firms' priority when investing seems to be to improve efficiency—a view supported by the contacts of the Bank's regional agents. The number of firms reporting the cost of finance as a factor limiting investment has fallen markedly in the recent recovery, from 12% in 1992 to 2% in the April survey. Uncertainty about demand has remained the major limiting factor, with 55% of firms mentioning it in April, compared with a peak of 60% in January 1992.

Table D
CBI survey evidence on investment (percentage of manufacturing firms)

Reasons for capital expenditure:

	Expand capacity	Increase efficiency	For replacement	Other
1991	18	71	53	11
1992	19	70	50	11
1993	23	70	52	10
1994 Q1	25	75	52	8
1994 Q2	27	76	47	7
Mean 1979 Q4–1994 Q1	*23*	*72*	*50*	*7*

Factors limiting capital expenditure:

	Cost of finance	Inadequate net return	Uncertainty about demand	Lack of internal finance	Lack of external finance
1991	17	42	55	24	4
1992	12	44	58	23	4
1993	5	46	54	26	5
1994 Q1	2	46	44	24	3
1994 Q2	2	44	55	23	3
Mean 1979 Q4–1994 Q1	*11*	*41*	*46*	*21*	*3*

There is also some evidence that firms have continued to be deterred from investing by inadequate rates of return; a balance of 46% reported this as a limiting factor in 1993. One reason for it might be that firms have not yet adjusted their required rates of return to take account of lower and less variable inflation.(2)

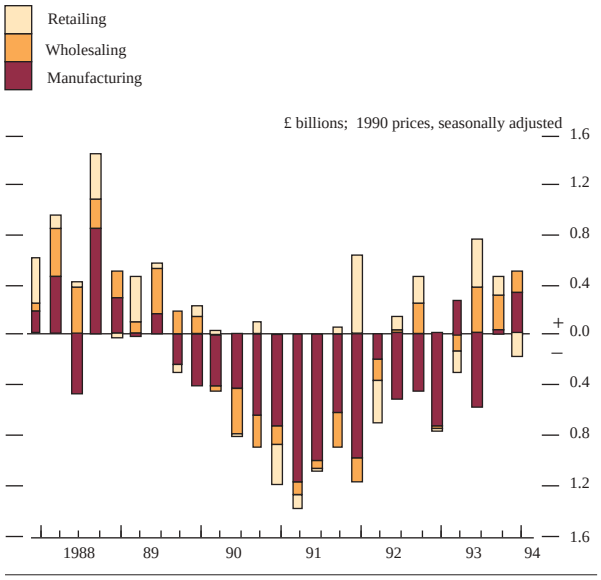
(1) See the box on the cross-sectional analysis of dividend payments on page 247.
(2) The article on pages 250–4 looks at companies' criteria for investment appraisal and the implications of a return to sustained low levels of inflation.

It seems likely that investment will show stronger signs of recovery in the near future, as firms' financial positions improve further. Anecdotal evidence suggests, however, that rates of scrapping were lower in the recent recession than in 1981–82; if so, there is likely to be significant spare capacity in the economy—particularly in sectors such as construction—and this may weaken the growth in investment in the short term.

Stockbuilding

Whole economy stocks rose by £335 million in 1993, compared with a fall of £1.8 billion in 1992 (see Chart 9). There was, however, significant destocking in the manufacturing sector: stocks there fell by £1 billion in 1993, though they recovered by £334 million in the first quarter of this year. The latter was in line with CBI survey data which suggest expectations of reduced destocking: the April survey showed a balance of -14% of firms expecting to increase stocks, compared with a trough of -26% in July 1991.

Chart 9
Stockbuilding in the manufacturing and distribution industries

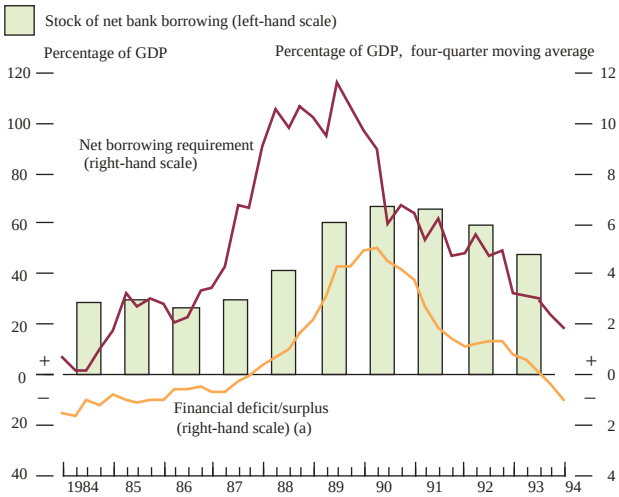


Overall in the first quarter of 1994, total stocks fell by £449 million.(1) Manufacturing and wholesaling stocks increased—the latter by £158 million—but in the retailing sector, there was a fall of £184 million, perhaps because firms underestimated demand prior to announced tax changes. Firms may be inclined to increase rather than reduce stocks in the near term, as they become more confident about the strength of demand, and with the incentive provided by low inflation and low nominal interest rates.

Financial transactions

ICCs recorded a financial surplus of £2.8 billion (0.4% of GDP) in 1993—the first surplus for six years; in the previous five years, their financial deficit had averaged 2.5% of GDP (Chart 10). The dramatic turnaround in financial position seems to have resulted from the emphasis firms have placed on reducing debt levels, with their large growth in profits enabling them to do so. Firms' net borrowing requirement began to fall in 1989, at an earlier stage of the downturn than in the previous recession. In 1993, the borrowing requirement was 2.3% of GDP, compared with the 1988 peak of 10.6%. The financial balance of firms took longer to adjust, as capital expenditures remained high by historical standards, so that firms did not record a surplus until last year. The trend continued in the first quarter of 1994, when ICCs' financial surplus of £4.3 billion was the largest on record.

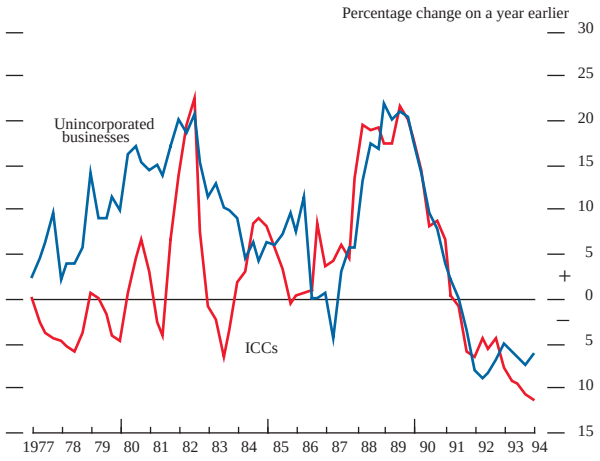
Chart 10
Financial deficit/surplus, net borrowing requirement and stock of net bank borrowing



(a) + = deficit, - = surplus

ICCs repaid £11.4 billion to banks in 1993 (1.8% of GDP) continuing the trend seen since 1991 (see Chart 11); this has

Chart 11
Real(a) stock of bank lending(b) to ICCs and unincorporated businesses



(a) Deflated by GDP deflator (at market prices).
(b) Includes building societies.

(1) This was in large part the result of significant destocking in the 'other industries' category.

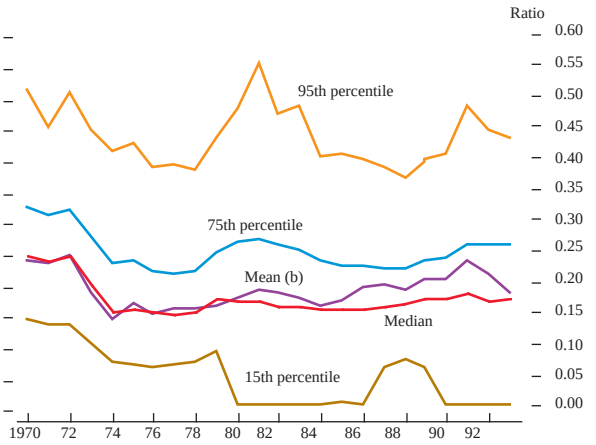
A cross-sectional analysis of dividend payments

Since the late 1970s, firms as a whole have increased their dividend payout ratio—the proportion of post-tax income they distribute in dividends. This box investigates whether the increase has been a feature across the corporate sector or has been confined to a relatively small number of firms.(1)

Some commentators have suggested that the dividend payout ratio remained at historically high levels in the recent recession because firms did not wish to give an adverse signal to shareholders. If so, such behaviour would mean that one commonly-perceived difference between equity and debt finance—that interest payments are less contingent on company performance than dividends—was in practice less clear cut. To explore this, the box also examines the proportion of firms that cut dividends, and compares the performance of those firms that cut and those that raised dividends.

In order to examine whether the increase over time in the mean dividend payout ratio is a feature shared by firms generally, Chart A shows a cross-sectional distribution of dividend payout ratios. The lines show the ratio for representative firms at various points in the distribution; for example, the line showing the 95th percentile gives the payout ratio of the firm with a ratio higher than 95% of the firms in the sample.

Chart A
Dividend payout ratio:(a) cross-sectional distribution and mean

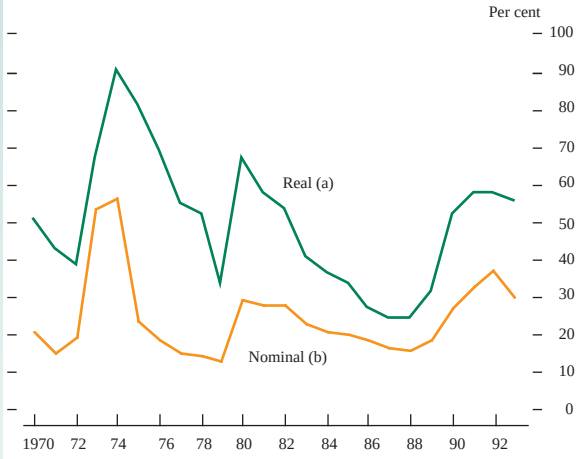


(a) Dividend payments as a proportion of total income net of tax and interest payments.
(b) The mean dividend payout ratio increased from 13.9% in 1974 to 23.4% in 1991.

Chart A shows that although the mean dividend payout ratio increased steadily from the mid-1970s to 1991, it did not increase across all firms. In the late 1980s, it increased sharply for firms in the upper tail of the distribution, but by 1990 at least 15% of firms paid no dividends. So the rise in the average ratio may reflect a minority of firms paying higher levels rather than low-income firms being resistant to cutting dividends.

Chart B reinforces the view that some firms did choose to cut dividends (or pay no dividends) in the recent recession. A greater proportion of firms cut their nominal dividends in the recent recession than in the early 1980s. Indeed, the proportion of firms cutting the real dividends they paid rose to 58% in 1992: 22% of the firms included paid no real dividends and a

Chart B
Percentage of firms cutting and/or paying no dividends

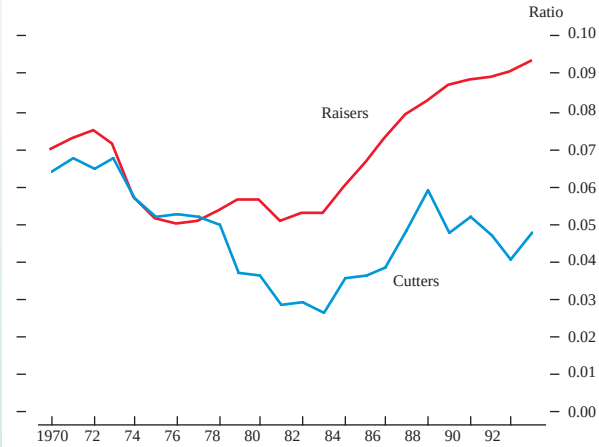


(a) Dividend payments expressed in real terms (deflated by the GDP deflator).
(b) Dividend payments expressed in current values.

further 36% of firms paid lower (real) dividends. This was, however, rather less than in the early 1980s.

The cross-sectional analysis can be used to examine the characteristics of firms that cut their real dividend payments. For most of the 1970s, there was little difference between the profit to output ratio of firms cutting and those raising dividends, but from the late 1970s a widening wedge developed between the two groups—see Chart C. A similar picture

Chart C
Profit-output ratios(a) of real(b) dividend-cutting and dividend-raising companies



(a) Post-tax income net of interest payments as a proportion of turnover. The lines represent the median profit to output ratio of the group in each year. The composition of the groups changes in each year.
(b) Deflated by the GDP deflator.

emerges from looking at the capital gearing of dividend-cutting and dividend-raising firms: the cross-sectional analysis therefore confirms that firms with relatively low profitability and high indebtedness *were* prepared to cut or pay no dividends in the recent recession. This may have sent a signal of their relatively poor performance to shareholders, but it helped to relieve their cash-flow difficulties.

(1) It uses company accounts data compiled by Datastream International. The accounts of, on average, 1,200 quoted companies are used for each year. 1993 data are provisional, as only around half of the data have been collected to date.

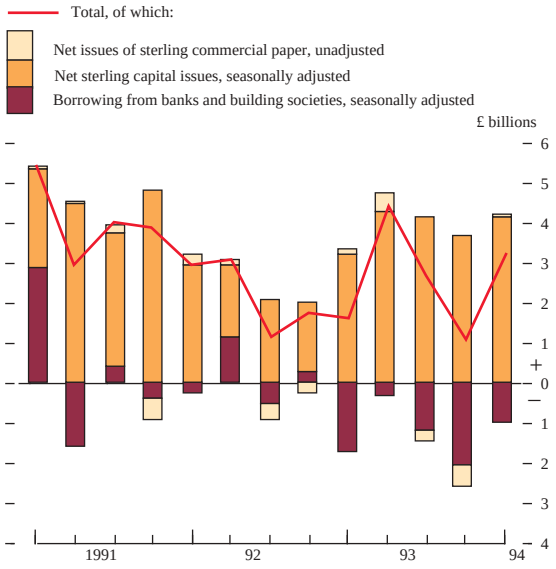
been followed by a further £2.8 billion repayment in 1994 Q1. The switch away from bank borrowing partly reflects the desire of firms to reduce their income and capital gearing. There have been significant differences in the rates at which different sectors have reduced their borrowing. Table E shows that the reductions have been greatest in the construction industry—where firms borrowed 15.7% less in 1993 than in the previous year—and in the manufacturing and distribution sectors. Bank lending to the utilities increased by 17.6% over the course of 1993, reflecting strong investment in that sector.

Table E
Stock of sterling bank lending across UK industrial sectors

	Utilities	Construction	Transport	Manufacturing	Distribution
£ billions, constant 1990 prices, levels:					
End-1993 Q4	6.4	11.3	6.2	34.3	33.7
Percentage change on a year earlier:					
End-1990	34.0	15.0	12.1	10.9	13.6
End-1991	27.4	-8.1	7.2	-4.5	-0.1
End-1992	46.8	-7.3	-3.6	-1.1	-0.2
End-1993	17.6	-15.7	7.2	-7.2	-7.9
Percentage change on previous quarter:					
End-1993 Q1	1.4	-4.8	1.1	-3.2	-2.1
End-1993 Q2	-6.1	-3.5	0.9	-3.2	-0.3
End-1993 Q3	10.3	-2.9	-1.4	1.9	-3.0
End-1993 Q4	11.9	-5.6	6.6	1.0	-2.7

Reduced recourse to the banking system was to some extent counterbalanced by an increase in capital issues in 1993 (Chart 12). ICCs' sterling capital issues (net of redemptions) totalled £15.2 billion in 1993, which was followed by net

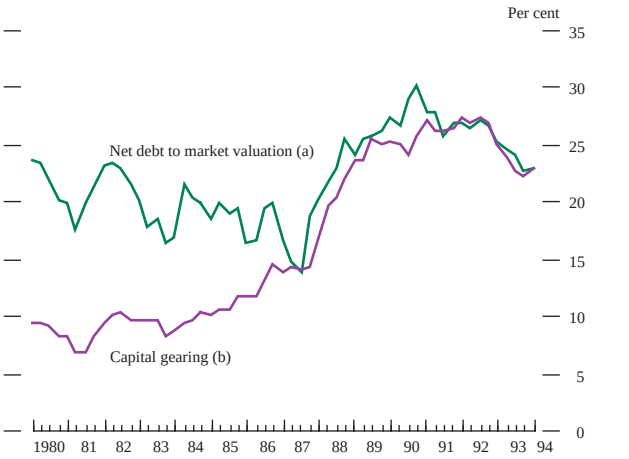
Chart 12
Estimated total quarterly sterling borrowing by ICCs



issues of £4.1 billion in 1994 Q1 on a seasonally adjusted basis. The increase was the result of a sharp rise in net issues of ordinary shares by ICCs: in 1993, ordinary share issues totalled £12.3 billion, a 134% increase on the previous year; in 1994 Q1, £2.4 billion worth of shares were issued.

Chart 13 shows the ratio of ICCs' net debt to net financial wealth (or market valuation).(1) The fall in the stock of ICCs' net debt combined with the rise in their market valuation led to the ratio falling to 24.1% in 1993, from a peak of 28.1% in 1990. The capital gearing ratio—net debt as a proportion of the physical capital stock—also fell in

Chart 13
Measures of gearing



(a) Ratio of ICCs' net debt at market value to the market value of ICCs' firms.
(b) Ratio of outstanding borrowing (debt at nominal value) to capital stock at replacement cost.

1993, to 23.3% compared with 27.1% in 1992; it was 22.8% in the first quarter of 1994. Since 1990, the ratio of net debt to market valuation has fallen more than the capital gearing ratio, as net financial wealth has increased more than the physical stock of capital. Firms continued the reduction in income gearing seen since 1990: average income gearing fell by more than 7 percentage points to 18.1% in 1993. It fell further to 15.2% in the first quarter of this year.

Mergers and acquisitions in the corporate sector have showed some signs of recovery in the last year. In 1993, the number of domestic acquisitions in the United Kingdom totalled 526, an increase of 22% on the previous year, but still a third below their peak in 1987. In the year to the first quarter of 1994, the number of acquisitions increased by 71%. Spending by ICCs on mergers totalled £2.7 billion in 1994 Q1—a 69% increase (in nominal terms) on a year earlier. An increasing proportion of domestic mergers have been financed by cash rather than through share issues: 80% in 1993, compared with 64% in 1992. The first quarter of 1994 showed a sharp fall in cash-financed mergers, however—down to 46% from 87% in the last quarter of 1993.

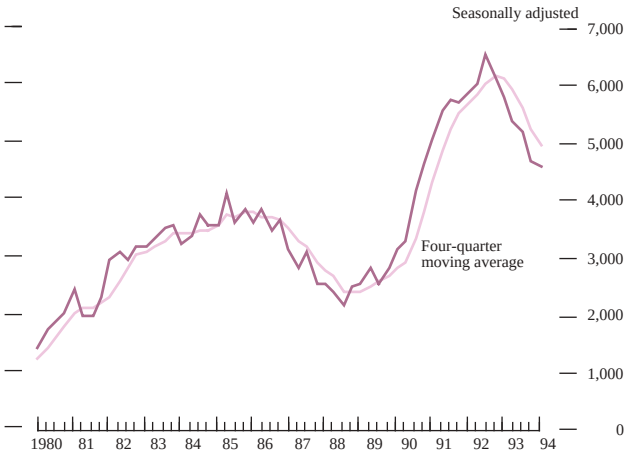
Insolvencies

Company insolvencies peaked much earlier in the present recovery than in the previous upturn, but the number of

(1) This is an alternative measure of capital gearing to the one commonly used: the major difference is that the denominator is the market valuation of firms rather than the replacement value of the physical capital stock.

insolvencies remains higher—see Chart 14. Since the peak in 1992 Q3, company failures have fallen sharply; they were 14.7% lower in 1993 than in the previous year. Company failures continued to fall in the first quarter of 1994—by 2.6% on the previous quarter and 21.6% on the same quarter of 1993—and now stand at their lowest level since the third quarter of 1990. The improvement partly reflects the fact

Chart 14
Company insolvencies



that firms took active steps early on in this recovery to reduce indebtedness, which was a major factor in many insolvencies in the recent recession.

Table F shows that a higher proportion of the business failures during the recent recession were in the financial and business service and construction sectors; in the early 1980s' recession, insolvencies increased most in the manufacturing, and retailing and wholesaling sectors. This

Table F
Company insolvencies by sector

			Insolvencies by sector, as a percentage of total insolvencies excluding 'other'(a)			
	Total insolvencies ('000s)	'Other' ('000s)	Manufact-uring	Construct-ion	Retailing and wholesaling	Financial and business services
1981	8,596	2,341	42.8	15.8	24.4	17.0
1982	12,067	3,059	45.0	15.8	25.7	13.5
1991	21,827	7,249	34.5	23.1	23.3	19.1
1992	24,425	8,072	33.3	23.4	22.8	20.5
1993	20,825	7,193	33.7	23.4	22.1	20.8
1993 Q1	6,235	2,142	35.4	23.7	20.9	20.0
1993 Q2	5,318	1,845	33.0	24.4	21.4	21.2
1993 Q3	4,356	1,425	35.1	22.1	22.7	20.2
1993 Q4	4,916	1,781	30.9	23.2	24.0	21.9
1994 Q1	4,887	..	..	..	..	..

.. not available.

(a) Not seasonally adjusted; source: Department of Trade and Industry.

sectoral difference has had a regional element. Firms in the financial and business service sector, for example, tend to be concentrated in the south of England, which was affected relatively severely in the recent recession because the debt burden was greatest there.(1) Manufacturing industry is more concentrated in the North and Midlands, which were less affected by the recent recession.

Manufacturing company failures have fallen sharply during the recovery—by 15.8% in 1993. They still account for more than 30% of total insolvencies in England and Wales (excluding 'others'), however. In the construction sector, failures fell by 16.7% in 1993, but activity in the sector has remained depressed. Company insolvencies are also falling in the financial and business service sector, though at a slower rate than elsewhere, so that the sector's *share* of insolvencies has been rising, accounting for 20.8% of the total in 1993 compared with 19.1% in 1991. The downward trend is likely to continue as the recovery becomes more established and the financial position of firms becomes even stronger. At the same time, a significant minority of firms remain highly indebted, so that in the short to medium term business failures are likely to remain above levels seen in the previous recovery.

Summary

There has been a marked turnaround in the financial performance of ICCs in the recent cycle. The rise in profits since 1992 has led to a reduction in ICCs' financial deficit: indeed, they have recorded surpluses in the last three quarters, with an unprecedented surplus in the first quarter of 1994. Lower costs, higher productivity and higher capacity utilisation have meant that profitability has been increasing from a higher starting-point than in the previous recovery. The combination of strong profitability and increased recourse to the capital market has enabled firms to make significant net repayments of bank debt. This, together with the fall in interest rates, has contributed to a fall in their income gearing to levels similar to those in the previous recovery. Capital gearing has also fallen in aggregate, but the debt overhang from the late 1980s remains a constraining factor on the spending of a number of firms.

Capital expenditures have been maintained—rather than increased significantly—so far in the recovery, but the outlook for investment growth is favourable. As debt levels are reduced further, firms are likely to become more confident about their financial position. The growth in retained earnings is likely to continue, enabling more investment to be financed internally; the need for such investment is likely to rise as firms approach capacity constraints.

(1) See the personal sector section of the article in the May 1994 *Quarterly Bulletin*, pages 144–55.

Investment appraisal criteria and the impact of low inflation

By Andrew Wardlow of the Bank's Conjunctural Assessment and Projections Division.

An informal inquiry conducted by the Bank earlier this year suggested that firms were being cautious in the rate at which they were reducing their required returns on investment to reflect lower and more stable inflation. This article considers the impact of a return to low inflation on corporate investment decision-making. It looks at the various appraisal criteria employed by firms—and the role they give them in their decision-making—and assesses the significance of firms' apparent slowness to adjust.

The prospect of sustained lower inflation and lower nominal interest rates has implications for all areas of economic decision-making. This article is concerned with just one area—corporate investment decisions—and focuses in particular on firms' adaptation of the appraisal criteria that they use to guide these decisions to reflect the return to low inflation.

Businesses are obviously concerned with the real returns generated by their investments. But the relationship between real and nominal rates of return is often distorted by volatility and uncertainty—both in periods of significant inflation and in the period of transition to a more stable economic environment. It is appropriate to consider how low and stable inflation might affect investment appraisal criteria.

Investment decisions involve the assessment of a great many interrelated variables—and judgments about the future course of these variables—often many years ahead. The decision-making is complex, both in the assessment of particular projects and in the management of the process; and it is therefore sensible to have rules and systems to guide the process. But a rule about the required rate of return from an investment that is appropriate in a world of unpredictable and significantly positive inflation may not be appropriate in a world where prices are generally stable. Clearly, there is a need for firms to ensure that the systems they use for appraisal are responsive to changes in their economic environment. In considering the process of adjustment to an environment of sustained lower inflation, this article considers the use that firms make of investment appraisal criteria. It draws on an informal inquiry undertaken earlier in the year by the Bank—the box on page 251 summarises its main findings—which offered some preliminary indications and insights into the adjustment process.

Investment and high inflation

By their nature, investment decisions involve uncertainty. In the recent past, however, there has often been the additional uncertainty stemming from unexpected changes in the general level of prices. High and variable inflation makes it more difficult to determine the discount rate that should be applied in order to calculate expected real returns on investment.(1) If the level of future inflation is likely to be different from that seen in the past, past returns are a less reliable guide to what is currently appropriate, complicating judgments about what level of returns to require. And uncertainty about inflation may affect not only the allocation of investment among different projects, but also the overall level of investment and saving. Savers may require higher average expected real returns. Such a risk premium will affect the real cost of funds, and so affect investment decisions.

Over much of the last three decades, it would have been inappropriate for companies deciding how to allocate their resources to have assumed generally stable prices. Both average inflation and inflation volatility were high in the 1970s and 1980s, much higher than in the 1950s and the early 1960s. Between 1945 and 1965, average annual retail price inflation was around 3.75%. Between 1965 and 1990, it was close to 9% and its variance was about four times higher than in the earlier period. Similarly, the real cost of funds has been more variable in recent decades, adding to the difficulties in making investment calculations. It is not surprising in such an environment that companies—and households—not only try to allow effectively for inflation in their calculations, but require a higher return because of the additional uncertainty and risk that accompanies unpredictable monetary conditions.

A return to low and stable inflation

One benefit of a return to an environment of lower and more stable inflation, in addition to a lower cost of capital, should be that uncertainty about the value and cost of money is a less critical factor in investment decisions. In such circumstances, the assumptions used in past investment decisions may need to be amended. But the process of transition may be problematical if companies have become accustomed to high and variable inflation.

(1) See the box on page 252 for an explanation of the use of discount factors in investment appraisal.

With the benefit of hindsight, it is clear that at times during the 1970s and 1980s it would have been reasonable for companies considering investment projects with five or ten year horizons to have incorporated nominal discount rates of 20% or more into their appraisal criteria. Between 1970 and 1990, the average annual rate of increase in producer prices was just over 9.5%. Taking 3.5% as a *rough* estimate of the required real rate of return on risk-free debt—the real yield on index-linked gilts since the first issue in the early 1980s has usually been between 3% and 4%—and adding a risk premium of about 6% (based on the average excess return on equities over debt) suggests a required real return on a typical project financed by equity of around 10%.(1) So, allowing for inflation at the average rate between 1970 and 1990 produces a required nominal return of around 20% for the period. Making some allowance for tax raises the figure still higher. These rough calculations illustrate that nominal discount rates of 20% would not have been unreasonable in past high inflation years, and explain why companies may have come to use factors of 20% or more to discount future cash flows.

Firms may be cautious about changing their required rates of return, given both the past history of uncertainty and the relatively short period of low and stable inflation to date; it may take a considerable period for them to become confident about making this kind of adjustment. But if inflation is expected to remain lower over a long period, it would be rational for firms to consider lowering their nominal target rates of return. There would also be reason to reconsider their required real rates of return, if the real cost of capital has fallen or if less variable inflation and lower interest rates have reduced the relevant investment risks. Clearly, if firms require excessive rates of return, they are likely to reject good investment opportunities with the consequent risks for their future earnings and competitiveness.

The appraisal criteria used by firms

This section considers some of the underlying practical issues raised by the adjustment of investment criteria. To understand the process of adaptation to an environment of stable prices, it is necessary to consider both the kinds of investment appraisal criteria firms use and the role they give them in their investment decision-making.

Firms use a wide variety of criteria in their appraisal of investment opportunities. The Bank's inquiry revealed significant differences in appraisal techniques and in the rates of return that firms seek. Those using required real rates generally reported targets in the range of 7%–20%, and those using nominal rates targets in the range of 10%–25%. The average among firms targeting a real rate of return was around 15% after tax; nominal targets averaged around 20%. (Given the nature of the inquiry, it would be inappropriate to draw any conclusions from the differential between these average nominal and real target rates of return.) Larger firms tended generally to employ lower target rates than smaller firms.

Other differences—for example, in the cost of capital faced by large and small firms—may partly explain the width of

Summary of the Bank's inquiry

Through its network of regional agents, in early March the Bank of England conducted an informal inquiry involving around 250 of its industrial contacts. The firms contacted were mainly large and medium-sized companies, including a number of large plcs and foreign-owned enterprises, but smaller firms were also represented. Some 65% of respondents were in the manufacturing sector.

Firms were asked to comment on a number of questions concerning the investment appraisal criteria they used, the role given to these criteria in their investment decisions, and the impact of lower inflation and interest rates to date on their use. The Bank is grateful to all the firms that took part in the inquiry and who continue to inform it on a range of issues.

It should be stressed that the inquiry was an informal one; there was no attempt to structure the sample or to trial the questions. The detail of the findings summarised in the table below should therefore be treated with caution, and the results viewed as indicative, rather than representative. The aim was simply to gain some early indications about the process of adjusting investment criteria to the new inflation envionment and to deepen our understanding of the way that firms use appraisal criteria in practice, in order to judge the significance of such an adjustment.

Summary of inquiry findings

1 Investment criteria: percentage of firms using:

Target required *real* rate of return	Target required *nominal* rate of return	Payback criterion only	Payback plus a required rate of return
29%	32%	8%	32%

2 Net present value (NPV): percentage of firms:

Making some use of NPV
70%

3 Thresholds: approximate average post-tax threshold rate(a)

15% real	20% nominal

4 Adjustment to date: percentage of firms that had:(b)

Reduced required rates of return (or lengthened payback)	Increased required rates of return (or shortened payback)	Left required rates of return (or payback period) unchanged
26%	2%	72%

(a) Some firms used more than one threshold rate, depending on the type of investment.
(b) Among firms using *nominal* required rates of return, 27% had lowered their targets. Among firms using *real* required rates of return, 34% had lowered their targets. Among firms using *payback rules and a required return*, 27% had lowered their thresholds.

(1) In fact, the average real yield on index-linked gilts has been less than 3½%. And the return on a diversified portfolio of UK equities has exceeded the yield on government bonds by about 8%. The latter, however, overestimates the risk premium on an all-equity financed project, because the 8% reflects the risk of claims upon geared corporations. Gearing increases the riskiness of returns to shareholders; shares are more risky than the firm's other liabilities. Making a rough adjustment for the effect of debt suggests an appropriate risk premium for an average all-equity project of about 6%.

these ranges; the ranges may also reflect differences in the nature of the investments that firms tend to undertake. Nevertheless, the wide variance is an area that warrants further investigation. It would be interesting to assess the significance to the threshold level of firm size, status (eg whether the company is public or private) and other variables.

Investment appraisal techniques

The Bank's inquiry confirmed that the main investment appraisal techniques used by companies are:

- *Net present value (NPV)*

The economic value of a project is calculated by estimating its future cash flows over the projected life of the investment, which will depend on a series of assumptions about demand, prices etc. The cash flows are then discounted at a compound rate reflecting the opportunity cost of capital, which—in turn—will reflect the risk and timescale of the investment. The discounted present value of the cash flows compared with the initial cost of the investment.

Financial theory stresses the superiority of the net present value method of investment appraisal and that, as a rule, projects with a positive NPV should be undertaken.

- *Internal rate of return*

Formally, the internal rate of return is that rate at which expected future cash flows must be discounted to equate them with the initial project cost—ie to produce a net present value of zero. Once calculated, the internal rate of return is then compared with a specified threshold rate reflecting the firm's cost of capital. The technique can generate the same decisions as NPV, but has a number of potential pitfalls—for example, when ranking competing projects or accommodating variable rates of risk through the life of a project—which are more easily avoided with the NPV method.

- *Payback period*

The criterion used is the length of the period before the initial investment cost is recovered. Payback rules require that the cost of an investment should be recovered within a specified timescale. Discounted cash flows may be used in the calculation.

- *Accounting rate of return*

Accounting rates of return are based on the average annual forecast profits of a project (after depreciation and tax) divided by the average annual book value of the investment. This ratio may then be compared with the existing book rate of return for either the firm as a whole or, in some cases, an industry average.

Within individual companies, target rates of return varied according to the nature of the investment project: its risk, its necessity for the firm and its size. For example, investment in manufacturing operations—where the returns are largely in the form of known cost savings—attracted lower target rates of return than 'riskier' investment in new product development. The difference in the threshold rates within a single company was as much as 10%. Some multinationals distinguished between investments undertaken in different countries, notably between those in Europe and the United States (where the required rates of return are often lower). In addition, a number of firms noted that a significant part of their recent capital expenditure had been on projects which offered no direct commercial return, such as compliance with environmental, and health and safety legislation.

The Bank's inquiry also showed that many firms used more than one criterion when assessing investment opportunities. The criteria used included: net present values; internal rates of return; accounting rates of return; payback periods and broader measures such as the return on capital employed. Many used accountancy-based measures together with other techniques; this is not surprising given the importance accorded to accountancy practices in many areas of corporate decision-making. It is also not surprising to observe that larger firms tend to employ more sophisticated appraisal and capital-budgeting techniques.

70% of inquiry respondents reported that they made some use of net present values, but other techniques are also common, even in larger firms. Some 40% of firms surveyed used a payback criterion in one form or another; this kind of criterion was used mainly—but not exclusively—by the smaller companies in the sample. It was also notable that many of the firms that used payback criteria alongside other measures stressed the importance of payback rules at that time, ie they sought a target rate of return within a specified period.

The use of payback criteria

The Bank's inquiry drew attention to the prevalence of payback criteria; a number of advantages and limitations of their use can be suggested.

Among the limitations, payback rules give no weight to the timing of cash flows within the period specified; they also do not take account of cash flows beyond the chosen cut-off point. In addition, the payback period that companies use is often short—the inquiry indicated a normal period of around two to three years. And in a period of transition to low inflation, use of a payback criterion may make it more likely that projects will be rejected, if firms do not increase the threshold period: since, when inflation is high, the nominal outlay on a project will be covered more quickly by incoming cash flows.

There are a number of reasons which may explain why firms, particularly smaller firms, feel that the use of payback criteria is justified—or at least that more sophisticated

methods are not appropriate. Future cash flows can only be estimated after assumptions about the productive and market possibilities of an investment have been made; for investments relating to export sales, exchange rate assumptions will in addition be a central consideration. Assumptions about, for example, the benefits of new process technology or larger-scale production will be more important than the choice of appraisal technique. Even with reasonable assumptions, it may be difficult to estimate the cash flows over the life of an investment project, particularly if the way that the new project fits into the existing business is complex. This uncertainty and complexity may encourage smaller firms to adopt simpler investment criteria, and to base their investment decisions on more general considerations, often governed by an assessment of 'what needs to be done'.

But perhaps the main reason, for the widespread use of payback criteria—at least recently—has been the financial constraint that firms have faced or imposed on themselves to improve their financial condition. Credit restrictions clearly make it sensible to be concerned about the time-horizon over which investment projects generate returns. Although in larger companies with fairly unrestricted access to capital markets, financing decisions can be relatively easily separated from investment decisions, in smaller firms managers may have to consider the impact of individual projects on the wider corporate position. The impact of a project on the overall financial condition of the company may be the prime concern, and if capital expenditure is being tightly controlled, investment decisions will have to be made on a priority basis. This is, however, less of a justification if the capital rationing is self-imposed as a means of financial planning and control. It will be interesting to see to what extent this kind of criterion is modified as the corporate sector's financial position continues to improve.

None of these points, however, is an argument against discounted cash flow techniques. If used in an appropriate way, they are widely agreed to offer a better basis for firms to formulate their business plans, though this is not to suggest that such criteria should be used uncritically or in isolation.

The role of appraisal criteria

The Bank's inquiry indicated that appraisal criteria—in the form of threshold rates of return—are a critical hurdle when there are many competing claims on corporate resources, most frequently in larger groups. Formal appraisal criteria act to limit the number of projects that are brought forward—operating as a kind of feasibility test prior to a more qualitative consideration. Large companies often have to decide between a number of competing claims from different business areas or subsidiaries. Although offering the required rate of return may not guarantee a project success, it may be used to rank it among similar projects.

Broader observation suggests, however, that rate of return criteria tend to be used in a flexible way, depending on wider commercial considerations. Although important, a rate of return criterion appears rarely to be the sole determinant of investment decisions. Many firms in the Bank's inquiry underlined the importance of overall corporate strategy and of 'strategic fit' in investment decision-taking. In some cases, lower target rates of return are applied to projects considered important (or essential) for corporate strategy than to more marginal operational investment decisions. In the case of acquisitions in particular, the usual criteria may be overlooked or relaxed.

These findings might be seen as more coherent with the tenets of strategic analysis than with financial theory. Of course, it is possible that investments that fit well within a company's overall strategy—and so concentrate on areas where the company has a relative expertise or competitive advantage—are more likely to be profitable. But what such observations emphasise is that firms do not tend to use formal appraisal techniques in an uncritical or mechanical fashion.

The short-run impact of lower inflation

Having considered both the nature and the role of rates of return criteria, this section looks at the adjustment of them that firms have so far made in the light of lower inflation and interest rates.

Responses to the Bank's inquiry in March showed that over 70% of firms questioned had yet to adjust their target rates of return, around a quarter had already made a reduction and a number said that they were currently considering revising their criteria.

Of those firms that employed a target real rate of return, around a third reported that they had reduced their threshold rate; this may have reflected either a lower cost of capital or a reduction in the risk premium being included as a result of lower inflation and interest rate expectations. Just over a quarter of respondents using nominal required rates had made an adjustment by the time of the survey.

Firms reported that their current tendency was to leave their target rates of return—and nominal discount rates—unchanged over long periods. Their arguments for this were usually that investments are affected by longer-term considerations and that there was little reason yet to adjust their longer-term expectations of inflation rates and the cost of capital.

Overall, the findings in this area suggested that, by March, the process of adjustment was not very advanced. The transition to an environment of stable prices is, however, unlikely to be rapid or smooth, particularly if many firms continue to face fairly difficult trading conditions. The findings in relation to firms using nominal required rates of return would, though, be of some concern if they persisted over a longer period. And it would be of particular concern if firms had implicitly reduced their expectations of inflation in their expected future nominal revenue streams, but had not similarly reduced their nominal discount rates.

One important question arising from the inquiry's results is whether the lack of adjustment by March had had significant impact on investment decisions. Growth in investment has played only a small part in the economic recovery to date: investment has risen by less in this recovery than it did between 1982–84 (though its share of GDP remained higher throughout the last recession and it may now be picking up). By the time of the survey, however, firms' slowness to adjust their investment criteria may not have implied that they were failing to identify profitable investment opportunities. It has been suggested above that formal appraisal criteria are often given a flexible role in companies' investment decisions; firms may have considered other factors to have been more central to their decisions at the time.

Many firms have suggested, for example, that they will not consider new investment without more evidence of an increase in demand. In addition, overcapacity has remained a real issue in a number of sectors. There has also clearly been some continued caution among companies about their financial position, with firms continuing to restructure their balance sheets to reduce the high levels of debt taken on in the late 1980s.

Finally, some firms have even suggested that lower inflation may have a negative impact on investment, arguing that higher inflation makes it easier to widen margins slightly following investment, for example, to improve product quality. Inflation's impact on the real burden of debt and on the real value of assets placed as security have also been cited. But although such considerations need to be borne in mind, the notion that inflation is good for investment needs firmly to be refuted. First, higher inflation and nominal interest rates reduce the income available for investment. In 1993, lower interest rates reduced industrial and commercial companies' interest payments by £11 billion compared with a year earlier; to the extent that cash flow is important as a determinant of investment, lower nominal interest rates will have a positive impact on investment.

More fundamentally, as suggested above, higher inflation is correlated with greater inflation volatility and so greater uncertainty. A stable monetary environment allows investment decisions to be taken more efficiently, on the basis of real returns.

Summary

The Bank's inquiry in March emphasised the extent to which many companies remained to be convinced that inflation and interest rates would remain low and stable over the long term. Many firms continued to seek rates of return which partly reflected past higher and more variable inflation and interest rates. In view of the role that many firms seem to give to formal appraisal criteria, this slowness to adjust may not at that stage have been critical to investment. Other factors, such as cash flow and expectations of demand, are likely to have been more important. But, if excessively high target rates of return continue to be used as the recovery progresses and as the financial constraints on investment are further relaxed, there is a risk that they will limit the level and type of investment undertaken by UK firms.

A further period of monetary stability may, however, be needed before a more fundamental adjustment in behaviour becomes widespread. The Bank's inquiry has offered some useful insights into the process of adjustment, but it is an issue that clearly warrants further investigation.(1)

(1) A recent survey of manufacturing companies by the CBI offers more precise indications about the nature of appraisal criteria and the extent of the adjustment to date.

The role of the exchange rate in monetary policy

*The **Governor** discusses[1] the role that should be given to the exchange rate within monetary policy. He affirms the desirability of stable real exchange rates, both as a necessary complement to free trade and in the context of domestic policies aimed at achieving monetary stability. But, he argues, the cart of exchange rate stability should not be put before the horse of domestic stability. And he suggests that if countries were more successful in their pursuit of stability—which is an increasingly widely shared approach, and in Europe is reflected in the convergence criteria of the Maastricht Treaty—that would go a long way towards bringing about more stable exchange rates.*

As Honorary President of Forex London, it gives me immense pleasure that you should have returned here—to what is more than ever the hub of the world's foreign exchange markets—after an interval of 12 years. And in my other role, as Governor of the Bank of England, I am genuinely delighted that you should have chosen to return in what is a particularly important year for the Bank—our tercentenary year. I am grateful to each one of you for helping us to mark that occasion through your presence here in the City.

The close relationship between the Bank of England and the foreign exchange market, of course, goes a long way back into our history. It is a multi-dimensional relationship. We directly supervise many of the market participants under the Banking Act and more recently we have had a formal responsibility for wholesale financial market supervision under the Financial Services Act. But we have long been involved in matters of market structure and standards of behaviour in the professional market—through, for example, the Joint Standing Committee. In this context, we played an important part in establishing London Forex and the ACI, through the still well-remembered person of Roy Bridge. We operate continuously ourselves in the market, on behalf of our customers—including government departments and our central bank customers. And we operate in the market, of course, on behalf of the Government itself—managing the foreign exchange reserves and at times intervening in sterling to influence the exchange rate in support of monetary policy.

It is this last, monetary policy dimension of our relationship with the exchange market that I thought I would talk about this morning, because while there is a strong and increasing consensus among monetary authorities internationally on the role of monetary policy generally, there are still widely-differing views within that consensus on the role of the exchange rate.

Of course, that was not always the case. For years, with occasional intervals, until the 1930s, the gold standard —maintaining a fixed gold parity—*was* the effective substance of monetary policy internationally. And fixed exchange rates, adjustable only as a last resort, were at the heart of the Bretton Woods international monetary arrangements for more than 25 years after the Second World War. A more likely topic for a talk of this kind during that period would have been the role of monetary policy in support of the exchange rate. Why is it then that the discussion now is apparently turned on its head?

In looking at any set of arrangements a useful starting-point is what went before. The creation of the IMF at Bretton Woods was intended to restore order to international monetary arrangements and was clearly, in an important sense, a response to the inter-war depression and to the perception of beggar-thy-neighbour exchange rate practices designed to export unemployment—just as GATT was a response to beggar-thy-neighbour trade policies. And both these institutions have been spectacularly successful generally in preventing predatory behaviour. But the IMF framework of fixed but adjustable exchange rates was designed to do more than this. It was designed to ensure that the IMF member countries pursued domestic policies necessary to *sustain* exchange rate parities. And in this respect it was ultimately less successful.

Volumes have been written on the reasons for that. But a key factor for my present purpose was that in the post-war period the predominant problem increasingly became the problem of inflation rather than unemployment; and the IMF framework—even though it operated asymmetrically in practice through adjustment pressure on deficit, or inflation-exporting, countries—proved to be an inadequate discipline on domestic policies, not least in the United States, the anchor country. The framework of fixed exchange rates eventually collapsed under the weight of outflows from the US dollar taken into official reserves on such a scale that the dollar's official convertibility into gold had to be suspended.

Efforts to rescue the fixed but adjustable exchange rate system in the early 1970s were unsuccessful—in part because of the global economic uncertainties caused by

(1) In a speech to the annual congress of the Association Cambiste Internationale (ACI) in London on 4 June.

successive hikes in the oil price, though the problems were more fundamental than that. And we have lived ever since with an untidy patchwork of exchange rate arrangements which vary both from country to country and from time to time.

Many smaller countries have chosen to peg their currencies unilaterally to other major currencies or to various currency baskets—adjusting the peg only rarely or quite regularly, some seeking an external discipline in support of domestic counterinflation while others have attached more weight to seeking to protect (or improve) their external position.

The major currencies—as well as many others—have floated. For much of the time, the float has been relatively clean, with the exchange rate essentially a residual outcome from domestic policy. But 'benign neglect' at other times produced disorderly markets and serious misalignments of real exchange rates, so that periodic attempts have had to be made—whether unilaterally, or through concerted intervention or co-ordinated policy action—to manage the float with, it must be said, varying degrees of success.

And in Europe, of course, there has been the ERM which, on a regional basis, is a lineal descendant of the fixed but adjustable exchange rate system of Bretton Woods, but with the important difference that it was seen increasingly as the precursor to EMU and a single European currency.

All of these arrangements—including the Bretton Woods system itself—became greatly complicated by the progressive removal of capital controls, by financial deregulation, by advances in information technology, and by the huge, associated increase in global finance and international capital flows. The fashionable concern with derivatives and hedge funds is only the latest manifestation of this.

It would take a bold man—or a foolish one—to seek to derive from all this a single policy prescription for the role of the exchange rate in monetary policy, and I do not intend to try. Instead I will offer you some general observations that may have a bearing on how official attitudes towards the exchange rate will evolve as we move—in the terms of your conference theme—'Towards 2000'. I will concern myself essentially with the major currencies. Smaller countries, whose economies are more closely integrated with those of their larger neighbours, choose in practice in many cases to maintain a more-or-less fixed exchange rate link, with the corollary that they accept too the monetary policy of their larger neighbours.

I think we can all agree that *real* exchange rate stability is a desirable feature of international economic relations. It encourages the growth of international trade and promotes the more efficient allocation of investment in the world economy. And any businessman will tell you that he *needs* exchange rate stability so that he can make plans for investment and production on the basis of a business judgment rather than guesses about future exchange rates.

But we need to be careful about precisely what we mean. Exchange rate stability is not an absolute good, nor is it an end in itself. Nominal exchange rates will need to adjust to reflect sustained divergences in rates of inflation. And some movement even in real exchange rates may be necessary in the long run to reflect, for example, changes in the prices of products in which a country specialises. But there is no doubt that much real exchange rate volatility has arisen in the past from large and unpredictable changes in monetary and fiscal policies. After a period, the domestic price level adjusts. But in the meantime, there can be large and disruptive swings in real exchange rates. The case for exchange rate stability in this context is much the same as the case for domestic price stability in a national context. But given the general desirability of stable real exchange rates, is it nevertheless feasible to have any exchange rate objective in a world of free international capital movements?

There is a popular misperception of the foreign exchange markets as a huge, single-minded pack of wolves acting in unison to hunt down and destroy one largely defenceless currency after another in an insatiable lust for short-term profit. As I look out at this vast audience this morning, I can understand how that misperception arises! But it is a misperception.

It is true that there is a huge volume of liquidity in the world's money markets that can move suddenly from one currency into another. And freedom of capital movements —which brings great benefits in terms of the international allocation of investment—is a real complication for those seeking to preserve something approaching exchange rate stability.

Among those controlling these liquid funds, there are certainly some pure speculators who take open positions in currencies purely in the hope of making capital gains. In doing so, of course, they expose themselves to corresponding losses and they tend, therefore, to take very large open positions only when they are very confident in their view.

But there are legions of others, who *look*, and *walk*, and even *talk* exactly like speculators, often managing other people's funds, who are seeking to protect the value of the assets they control against losses by diversifying risks or covering their currency exposures. And all these principals transact their business through bank intermediaries, which are typically restricted in the size of the positions which they themselves may take.

The whole point about financial markets—and above all the foreign exchange market—is that they comprise tens, indeed hundreds, of thousands of different participants, with different resources, different responsibilities and objectives, and different expectations about values. In most situations where expectations are diffused, quite small movements in prices will be enough to balance market supply and demand. The problems arise when market expectations are all one way, and in a direction that conflicts with the relevant authorities' objectives for the exchange rate.

In such situations, the market might simply have got it wrong, collectively exaggerating particular risks or misinterpreting either the financial situation or official intentions. That can produce unnecessary, disruptive exchange rate movements if, in the event, those expectations prove to be unfounded. But more often that not, in my experience of markets, there is a serious rationale for strong market movements, which as I say do not result from the judgments of a small group of particular individuals but from the aggregate judgments—backed up by having money at risk—of thousands and thousands of separate market participants. Often such strong movements are based upon a perception of inconsistencies in official policy such that the particular exchange rate level is not sustainable. And the pressure will tend in these situations to be heavier where there is a precise, published exchange rate objective, because of the risk that this objective can change abruptly imposing significant capital losses or providing significant capital gains.

Confronted with a strong market challenge, the authorities have a number of options. They can accept that there is indeed a policy inconsistency and correct it, by modifying the exchange rate objective or adjusting domestic policy to validate the existing objective. Or they can contest the market view—through intervention and associated explanation. Before choosing this latter course, they need to be pretty confident in their judgment.

Attitudes to the effectiveness of intervention vary. At one extreme, there are those who point out—rightly—that official reserves are limited by comparison with the resources in the market, so that intervention on its own is unlikely to be effective for very long against strong market pressure. Others argue that intervention is not primarily designed to affect the balance of supply and demand in the market *directly* (though discreet intervention can help modestly to ensure that some demand is seen in what would otherwise be an entirely one-way market); the main purpose of intervention, which needs to be visible to the market at large for this purpose, is on this view to demonstrate the authorities' attitude to the exchange rate and cause the market participants to question whether, in the light of the official attitude, they are really sure of its ground. It carries the implication that the scale of the intervention could become quite substantial even in market terms, and that it could be supported by domestic policy action if that became necessary. There have been many instances—such as Plaza, with which you will be familiar—where intervention has found important sectors of the market heavily short or long of a particular currency, causing a sharp reversal in sentiment as they scrambled to cover in the light of the new information which the intervention represents.

But there have of course been many other episodes where intervention has failed either to convince or to reverse the tide. My own view is that intervention can be tactically useful in some situations where the predominant market opinion is out on something of a limb, without great confidence in its view, and that it can on occasion usefully buy time until more fundamental corrective action can be taken—but that its role is a limited one. Certainly, there are situations too in which the weight of market opinion is *looking* to the authorities to intervene, and where a failure to do so would send strong, unhelpful signals.

Beyond that, if the market as a whole remains persuaded that there is indeed a conflict between domestic and external objectives, then one or the other has to give.

Overall, I think it *is* practicable—even in a world of free movement of capital—to have at least a loosely defined exchange rate objective, but that a necessary condition for pursuing it is that it must be fundamentally consistent with domestic policy objectives and with the actual thrust of domestic policies.

The question then is how can that consistency best be assured?

The Bretton Woods arrangements—and indeed the ERM which was descended from them—set relatively tightly-drawn *nominal* exchange rate relationships which were intended as a constraint on domestic policies. That domestic discipline ultimately proved inadequate in the Bretton Woods system, as I said earlier. And the ERM margins had to be substantially widened last year, to accommodate the exceptional tensions generated by divergent domestic policy needs in the different member states arising importantly out of German reunification.

There has been a growing international consensus about the conduct of economic policy in the last decade and more —including fiscal discipline, a reduction in the role of the public sector, often involving privatisation, internal and external liberalisation, and with the main focus of monetary policy in particular directed at domestic—internal—price stability as a necessary condition for wider economic stability. It is true that we have not all been equally successful in implementing these policies. But if we *were* more successful, then that would go a long way towards bringing about also more stable exchange rates. And if we can't achieve greater internal stability as a matter of national self-interest, then I'm not at all sure that a nominal external anchor would necessarily be a more compelling general discipline.

I hope it will be clear to you that in saying this I am not for a moment suggesting that the exchange rate doesn't matter. On the contrary, as I've explained, real exchange rate stability is a necessary complement to free trade; and in terms of national policies in pursuit of stability, the exchange rate is far too important a price to be ignored.

In our own case, for example, although we have no specific exchange rate target, we do monitor the rate closely and continuously. We seek to distinguish between short-term and more lasting influences; and between influences originating elsewhere and those that reflect market perceptions of the state of—and prospects for—our own

economy, which we need to take into account in pursuing our primary objective of domestic stability. It clearly is the case that internal and external stability are bound up together—that they are in an important sense two sides of the same coin. But what I have just described is quite different from a fixed but adjustable exchange rate system in that, if a conflict between internal and external objectives should arise, while the exchange rate will always be an important consideration, it will not in itself be the predominant one. The emphasis would be on maintaining domestic stability; and that, I believe, would deliver greater exchange rate stability in the medium and long term. It is interesting to speculate whether, if the Bretton Woods conference was being convened now, it would still put exchange rate rather than domestic stability—as it perfectly well could—at the heart of the arrangements. Certainly it is domestic stability, rather than exchange rate stability, that is typically at the heart of IMF advice to member countries today.

However that may be, conflicts clearly can arise. Ironically, differential rates of inflation, which have typically been seen as a primary source of nominal exchange rate tension, are now lower than they have been for ages, in the context of unusually low inflation—both actual and prospective—throughout the industrial world. Yet exchange market uncertainties persist, reflecting other influences such as the different—and changing—mix between monetary and fiscal policy from one country to another, different cyclical positions and structural imbalances seen, for example, in the widely-differing levels of apparently intractable long-term unemployment within Europe, as well as in Japan's chronic external surplus with the rest of the world. I don't see that as an environment in which more structured exchange rate arrangements at the level of the major industrial countries would be likely to help. We each know what needs to be done to address these issues in our own countries and it seems to me that the substance of international discussion is better directed to supporting each other in those efforts, and to understanding their international ramifications, than to the narrower issue of exchange rate objectives *per se*.

Similarly in Europe, however appealing the vision of a single currency may be—and that is a matter for political decision—the absolutely essential prior economic condition is to establish sustainable convergence, based on underlying stability in the participating member states, as envisaged in the Maastricht Treaty. Without that, a single currency couldn't possibly function effectively: the associated single monetary policy would necessarily be too severe in some countries and too loose in others. I believe that we have a long way to go before that necessary precondition will be met.

A measure of the present imbalance within Europe—not directly addressed by the Maastricht criteria—is the intolerably high level of unemployment throughout the European Union and the huge differentials between the levels of unemployment between the different member states. It just is not good enough simply to wave all that aside on the grounds that it is 'structural'. It would be a high-risk strategy to fix exchange rates when there are such large disparities in unemployment. The solutions to structural unemployment, which more and more countries see in terms of the need for lower non-wage costs of employment and a more flexible labour market, may themselves have implications for appropriate long-run real exchange rates. With a fixed nominal exchange rate, adjustment of the real exchange rate can come about only through differences in national inflation rates, thus challenging the convergence on price stability. Until much greater real economic convergence has been achieved, flexibility of nominal exchange rates may, in some circumstances, help to speed up the process of convergence. To renounce that possibility prematurely would, as I say, be a high-risk approach—leaving the Union unnecessarily exposed to the persistence of regions of high, long-term unemployment; *or* to larger-scale migration; *or* to pressure for much larger intercountry fiscal transfers within Europe—none of which would seem likely to me to promote greater cohesion.

In the meantime, we all know what we have to do to achieve the convergence conditions, as a matter of national self-interest, as well as contributing to as much sustainable exchange rate stability within Europe as we can realistically hope to achieve. The critical thing is that we should, individually and collectively, concentrate on that job in hand.

Against that background, Mr Chairman, I expect that there will still be plenty of work for foreign exchange traders as we move 'Towards 2000'.

The prospects for monetary stability

*The **Governor** picks out[1] a number of encouraging signs, both domestic and international, for UK economic prospects—including the monetary policy framework now in place which, in his view, provides the best chance in 30 years of achieving price stability in the medium term. Underlining the need above all else to avoid another cycle of boom and bust, he notes that the testing time will be the moment—which may still be some way off—when interest rates need to be raised to moderate the pace of expansion. He expresses the hope that, when that point does come, it will be seen not as evidence of weakness, but as a considered response to the underlying strength of the economy.*

This is a very special year for the Bank and it is a very special occasion for me—my first Mansion House dinner as Governor.

I am, of course, singularly fortunate to be Governor during this tercentenary year. During the past fortnight alone, I have been privileged to participate in the World Foreign Exchange Congress, the World Gold Conference and the International Monetary Conference, as well as acting as host to over 120 of my fellow central bank governors and former governors from all parts of the world at a conference of our own. All these events were organised in London to celebrate not just the fact of the Bank's 300 years of existence. They celebrated too one of the Bank's distinctive characteristics through so much of its history—its participation in international monetary co-operation and its involvement with, and in, the international financial markets which have their natural home here in the City. I am grateful to so many of our friends, from both this country and overseas, who joined in these celebrations with us.

But, My Lord Mayor, this is a special occasion for a quite different reason. The British economy is in its third year of expansion. But not only that, over the past year the *rate* of growth has exceeded the rate of inflation. The latest figures show that industrial production has increased by 5½%, and manufacturing output by over 3%, on 12 months ago. And GDP—on the latest data—is growing at a rate of 2¾%. Retail prices, on the other hand, on the official measure of underlying inflation have increased by only 2½% over the past year, or by only 1¾% if the effect of indirect tax changes is excluded.

There have been only 12 years since the war in which the rate of growth has exceeded the rate of inflation in this way—and only four years since 1970. So this too is also something to celebrate—something that is of profound importance for the future prosperity of the country as a whole.

Of course, it is not enough. We can't be satisfied with this achievement in a single year. The challenge is to improve on this performance and sustain it year after year. The crucial importance of stability—price stability as a necessary condition for the sustained growth of output and employment—is a theme on which I have spoken repeatedly during my first year as Governor. And I make no apology for that. But I will spare you that sermon this evening. The fact is that we have now taken the first steps along the path of sustainable, non-inflationary growth. The task now is to keep going. And, if you won't find this shocking coming from a central banker, I believe that the prospects are encouraging. Let me give you four particular reasons why.

First, there is the improvement in the world economy, including the recovery now clearly visible in our major markets on the Continent. This—taken together with agreement at last on the Uruguay Round of trade negotiations—provides a more favourable international context for activity in this country than seemed possible a year ago.

Second, there is the improved supply-side flexibility of our own economy—in both the goods and services and the labour markets—following the deregulation and liberalisation that has characterised the past decade and more. Compared with many countries—in continental Europe certainly—this means that we are relatively well placed to face up to global competition. It has meant too that, despite the intense pressures on larger-scale businesses to improve productivity and reduce their labour force, unemployment has nevertheless declined more rapidly than would previously have been expected at this stage of expansion. Employment continues to depend importantly on smaller businesses and I know that many of you here this evening are committed to ensuring that small business is served effectively by finance.

Third, there is our prospective fiscal position. The action taken by the Government—and indeed by our present Chancellor—last year progressively to reduce the PSBR was never going to be popular, whatever form it took. But such action was crucially necessary. It was necessary to achieve

(1) In a speech on 15 June at the Lord Mayor's banquet for the bankers and merchants of the City of London.

a proper balance between fiscal and monetary policy; it was necessary to achieve a proper balance between domestic and external demand; it was necessary to make room for private sector expenditure, and for a shift in the balance of private spending from consumption to investment, without which the expansion could not be sustained.

And finally there is the monetary policy framework—which, I believe, gives us a better chance of moving towards our goal of price stability in the medium term than at any stage in my professional lifetime. Since we came out of the ERM, a series of steps have been taken to make our objective unequivocally clear and the policy process almost totally transparent. The latest step—the Chancellor's recent decision to publish the minutes of our monthly monetary policy meetings—will in time do a great deal to improve public understanding of our shared commitment to continuing low inflation. Those minutes will provide a full account of our discussions. We in the Bank will be publicly accountable for our advice, as is the Chancellor for his decisions. I have no doubt that this public accountability will over time improve monetary policy-making. It may, though, spoil the fun for some of the pundits who will no longer need to speculate about possible disagreements between us. They, and their clients, will have the authentic story of our discussions only six weeks after the meetings. I think that they will be surprised by the extent of the common ground between us.

So, My Lord Mayor, we have a good deal going for us in this country. Most fundamentally, there is a broader and increasing understanding—among the population at large and across the political spectrum—that we must not this time allow the expansion to get out of hand, that we must above all else avoid the social and economic trauma of another cycle of boom and inevitable bust. That is a great strength.

I recognise that there are nevertheless still those who are yet to be convinced—both of the validity of the approach and of our determination to stick to it. They will judge only by performance.

The testing time will come—as it must inevitably come sooner or later—when we need to raise interest rates in order to moderate the pace of expansion and pre-empt the emergence of associated cost and price pressures. With the economy still operating below capacity—though no-one can know just how far below—it may be that this point is still some way off. But whenever it comes, I hope that it will be regarded positively, as a considered response to the underlying *strength* of the economy and to the prospects for inflation in the medium term, and not as evidence of *weakness*, in simple knee-jerk reaction to the latest set of erratic monetary or economic data. Our purpose will be to maintain the expansion at a sustainable pace, and not to leave the tightening of policy so late that the economy is brought to a juddering halt by a much larger interest rate rise than would otherwise be needed.

Successful monetary management cannot be judged—as some seem tempted to judge—by how low interest rates can be pushed or by how long they can be held down. Nor is it a matter of snatching at what casual observers may see as 'windows of opportunity'. That lies at the root of short-termism in both finance and industry. Monetary policy has to be judged by its success in achieving and maintaining the price stability that will allow the growth of output and employment to continue.

The prospects today are, as I say, encouraging—provided we stick to our course. It is a realistic hope that next year I will be able to report to your successor on a second consecutive year of growth above the rate of inflation—and I even venture to look forward to the year after next!

In the meantime, My Lord Mayor, let me congratulate you and the Lady Mayoress on your extraordinarily active and successful period in your high and historic office. You have made the international promotion of the City financial the theme of your Mayoralty, and I pay warm tribute to all that you have achieved. The whole City is delighted that those achievements have been recognised through the knighthood conferred on you in Her Majesty's recent birthday honours.

The transmission mechanism of monetary policy

Mervyn King, an Executive Director of the Bank and its Chief Economist, considers[1] *the monetary policy transmission mechanism—the various channels by which the discretionary actions of the monetary authorities feed through, ultimately, to the rate of change in the price level.*

He suggests why scope for disagreement about monetary policy exists even when there is agreement on the qualitative nature of the transmission mechanism, and outlines the Bank's general view of the role of money in the economy. He also points out a number of the practical problems of interpreting the monetary aggregates, drawing from these considerations some conclusions about the practice of monetary policy.

Introduction

To set the right course for monetary policy requires not only a clear direction for the objective of policy—which we have in the inflation target—but also an understanding of how the instruments of policy affect the economy and, ultimately, inflation. What, then, is the mechanism by which monetary policy controls inflation? The transmission mechanism of monetary policy is one of the most important, yet least well understood, aspects of economic behaviour. Why is this so? Surely, it is now widely accepted that, in the words of Milton Friedman's famous dictum, 'inflation is always and everywhere a monetary phenomenon' (Friedman 1968)?

At one level, this proposition is obvious. Inflation is a fall in the value of money, and so must be a 'monetary phenomenon'. But what does this statement mean? A rise in the price of whisky is a whisky phenomenon—but that is not a very helpful statement. As one of the great monetary theorists, Don Patinkin, wrote last year, 'I have never found [Friedman's] dictum very enlightening about either the mechanics of the inflationary process or the optimum way to bring it to an end' (Patinkin 1993).

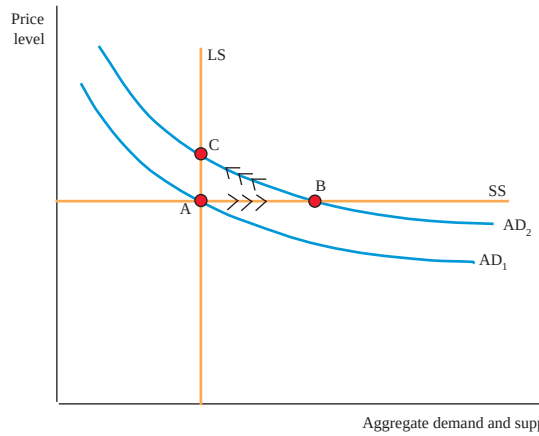
Instead of a 'monetarist black box', what is required is a coherent theory of the demand for, and supply of, money, and how they relate to nominal demand and output. In this talk, I want to do four things. First, to explain why there is plenty of scope for disagreement on monetary policy, even when there is agreement on the qualitative nature of the monetary transmission mechanism. A common view of the transmission mechanism is necessary but not sufficient for agreement on monetary policy. Second, to spell out our general view of the role of money in the economy, and the various channels by which changes in money and interest rates affect activity and prices. Third, to describe some of the practical problems of interpreting the monetary aggregates. Finally, to draw some conclusions about the practice of monetary policy.

The starting-point

To add spice to this talk, I shall try to indicate where the Bank agrees with, and where it differs from, Tim Congdon.[2] In most important matters of substance, we agree—money matters. Where we differ is in tone and conviction, reflecting our roles as central bank and commentator or prophet, respectively. In his latest quarterly forecast, Tim writes: 'mainstream macroeconomics has a relatively simple monetary theory of the determination of national income'. To judge from his comments elsewhere, Tim believes that this theory is regarded by most economists in Britain as controversial. In contrast, I believe that the theory is relatively uncontroversial, but decidedly not simple.

To illustrate this point, let us consider a truly simple diagram of the mainstream model. Chart 1 shows aggregate demand and aggregate supply plotted against the aggregate price

Chart 1
A demand shock



level. Initially the economy is in equilibrium at point A, where the aggregate demand curve AD_1 intersects both the short-run and long-run supply curves. (The aggregate

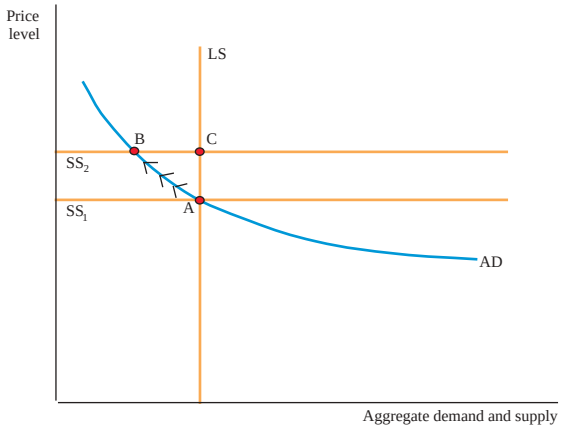
(1) In a speech delivered at Lombard Street Research on 9 May.
(2) Professor Congdon is the Managing Director of Lombard Street Research.

demand curve slopes downwards because a lower price level raises the real value of money balances and wealth, and hence spending.)

Suppose that there is a shock to aggregate demand —households become more optimistic, for example. The aggregate demand curve shifts up to AD_2. In the short run, prices are 'sticky' and do not respond; the increase in demand raises output—hence the short-run aggregate supply curve, SS, is horizontal. There is a boom as the economy moves to point B. The demand for money rises, and is accommodated by an increase in supply by the monetary authorities and by an expansion of both deposits with, and loans from, the banking system. Greater use of existing capacity and higher levels of overtime and employment start to push wages and prices up. As the price level rises demand starts to decline, and the economy approaches its long-run natural rate of output at point C. The long-run supply curve, LS, is vertical. The increased money supply means that although output returns to its original level, the price level is higher than before the expansion began. All this is commonsense and it might seem obvious that if the authorities refused to accommodate the increased demand for money, and raised interest rates, then prices would not rise and the demand shock could quickly be stabilised.

Unfortunately, life for policy-makers is not quite so simple. To see this, consider the effects of a different type of shock—this time a supply shock. Chart 2 shows the consequences of a short-run supply shock, such as an adverse shift in the terms of trade (a rise in oil prices for example). The short-run supply curve shifts up from SS_1 to SS_2. With no change in aggregate demand and an unchanged monetary policy, the economy moves from point A to point B, with rising prices and falling output —stagflation, such as we experienced in the 1970s. In these circumstances, policy-makers have a choice. They can either wait for the recession and unemployment to lower prices sufficiently for the economy to return slowly to point A. Or they can accommodate the impact of the change in the terms of trade on the price level, by lowering interest rates and expanding the money supply such that aggregate demand shifts up, intersecting the supply curve at point C.

Chart 2
A supply shock



In one case, the appropriate policy response is to raise rates; in the other, it is to lower them. It is not always easy to tell which type of shock predominates at any given moment. Diagrams such as these are useful in highlighting the issues. But they do not tell us at what level interest rates should be set to achieve price stability and full employment. Indeed, they help us to understand why it is so difficult to be certain of the appropriate monetary stance. Three reasons for this are suggested by Charts 1 and 2:

(i) First, getting policy right depends upon an ability not only to distinguish between demand and supply shocks, but also to quantify their impact on aggregate demand and supply. This is not straightforward. Consider only the latest example of a demand shock —the tax increases which came into effect last month. What is likely to be their impact on aggregate demand? We cannot be sure.

(ii) Second, calculating the appropriate degree of monetary expansion or contraction depends upon the predictability of the velocity of money and its dependence on interest rates. But we know that there are shocks to velocity—indeed Goodhart's Law tells us that they always come at the most inconvenient time. And a stable monetary policy means that shocks to velocity should be accommodated. The problems created by unstable velocity are well known, and I shall return to these later. So a central bank must spend time trying to understand why the velocity of money has changed, not just in a statistical sense but in terms of the economic reasons for the change—finding the story behind the numbers. This requires a great deal of institutional knowledge.

(iii) Third, it is the 'stickiness' of prices and wages—the slowness of their response to changes in the balance between demand and supply—which is the source of the frustratingly 'long and variable' time lags between changes in monetary policy and their impact on inflation. Economists are still trying to discover a coherent explanation of these nominal rigidities which mean that a fall in aggregate money demand is translated into a fall in output and employment. Much of the post-war research programme in macroeconomics has been devoted to understanding the role of expectations in the process of wage and price adjustment, and how firms and wage-bargainers learn to distinguish between real and nominal shocks.

For these reasons, monetary policy inevitably involves difficult judgments. But I want to make clear that the Bank of England has no difficulty in accepting the principal insights of the mainstream 'monetary theory of the determination of national income'. We do not, however, approach it with the feeling that it is likely to be simple.

Let me turn, therefore, to the mechanics of the monetary transmission mechanism itself. There are three steps in the transmission mechanism. The first is between changes in

discretionary actions of the monetary authorities and the response of money and interest rates. The second is the link between changes in money and interest rates on the one hand, and aggregate demand on the other. The third step is the link from changes in demand to activity and ultimately the price level.

I shall say a little about all three steps, but the core of the transmission mechanism is the second—the link from money to demand. In turn, there are several channels through which changes in money and interest rates flow through to aggregate demand. One of these is called the *monetary channel* of the transmission mechanism, another the *credit channel*. The terminology is unfortunate, because the difference between them has little to do with the difference between money and credit. The distinction, as I shall discuss later, is more concerned with whether certain financial institutions—banks—play a special role in the transmission mechanism. The monetary channel does not of itself require that banks play such a special role. The credit channel does. Both channels are part of the propagation of monetary shocks and work together hand in hand.

Let me turn now, however, to the first of the three steps in the transmission mechanism.

Instruments of policy

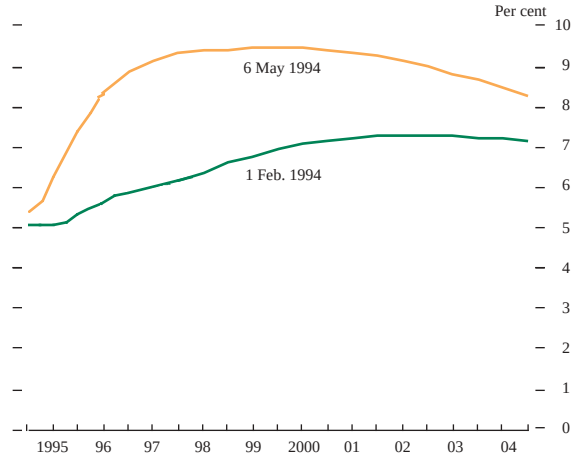
For the authorities to control inflation in the long run, it is necessary for them to control the growth rate of money. Can the authorities do this? In principle the answer is 'yes', but in practice it is hard to quantify the link between the actions open to the monetary authorities and the consequent changes in the relevant broad measures of money. Policy is a matter of trial and error—some would say errors by the authorities and trials of the private sector.

One of the main elements in the monetary transmission mechanism is the impact of interest rates on spending decisions. Control over short-term official interest rates does not give unique control over market rates, especially at longer maturities. And it is the entire spectrum of interest rates which affects the spending decisions of families and businesses. Market interest rates are not set by the authorities, rather they reflect *expectations* about future monetary policy, as well as the demand and supply of credit. To see this, examine Chart 3, which shows expected future short-term interest rates at two different dates—1 February and 6 May. Despite a reduction in official rates on 8 February, interest rates at virtually all maturities have risen. Hence the emphasis which central banks place on conditioning market expectations and credibility. The institutional changes started by Norman Lamont when he was Chancellor of the Exchequer and continued by the current Chancellor will, in time, help to reinforce the influence of policy on the yield curve.

The monetary channel

If money were neutral—in the sense that a change in the money supply produced an immediate equiproportionate

Chart 3
Implied forward rates(a)



(a) From 1996, one year forward rates; prior to 1996, three-month Libor implied by short sterling futures contracts.

change in the price level—then the uncertainties of the transmission mechanism would be reduced to the link between the discretionary actions of the authorities and the behaviour of money. In practice, of course, the link between money and activity and inflation is far from clear.

The traditional view of the transmission mechanism of monetary policy is, at least *qualitatively*, relatively uncontroversial. A decrease in the monetary base or, equivalently, higher short-term official interest rates, will feed through to interest rates at all maturities and alter asset prices. Given some inertia in the setting of nominal wages and prices, the higher level of nominal interest rates will, in the short run, imply a higher level of real interest rates. Higher nominal interest rates will reduce the demand for money, and higher real rates will reduce the demand for credit. Real asset prices will fall, and there will be a process of substitution among various real and financial assets, and between assets and spending. With fewer profitable lending opportunities, the banks will wish to attract fewer deposits, and the broad money supply will fall.

The fall in money has as its counterpart a fall in nominal incomes, as households and companies adjust their portfolios and spending plans to the new levels of real money balances and interest rates. How does this come about? The rise in real interest rates and fall in asset prices will reduce real aggregate demand in three ways.

First, the higher real rate of interest will lead to a switch of spending from the present to the future, as saving becomes more attractive. Second, higher real interest rates will lower asset prices and hence wealth. Both effects will reduce consumer spending and private investment. Third, the rise in real short-term interest rates is also likely to lead to an appreciation of the exchange rate to a level from which it will be expected to revert slowly to its original real level. In turn, this will lead to lower prices for imports in terms of domestic currency and also a depressing effect on the economy through a reduction in the net trade balance. Eventually the contraction of the real economy will affect

prices and wages, and real demand and output can, in the long run, return to their original levels.

As I mentioned, there is nothing particularly controversial here. Turning this qualitative story into a *quantitative* account of how monetary policy affects the economy is, however, a different story. And both recent research and experience have made us aware of the importance of expectations about future inflation in determining how long and how variable are the lags between changes in interest rates and their effect on inflation.

One of the most contentious issues in assessing the role of money is the direction of causation between money and demand. Textbooks assume that money is exogenous. It is sometimes dropped by helicopters, as in Friedman's analysis of a 'pure' monetary expansion, or its supply is altered by open-market operations. In the United Kingdom, money is endogenous—the Bank supplies base money on demand at its prevailing interest rate, and broad money is created by the banking system. The endogeneity of money has caused great confusion, and led some critics to argue that money is unimportant. This is a serious mistake. In his latest (April 1994) forecast, Tim Congdon—who could never be accused of understating the role of money—argues that 'the upturn in monetary growth has done its usual work in bolstering balance sheets and encouraging more spending on big-ticket capital items'. Some of his critics might reverse the causation and say 'the upturn in spending on big-ticket capital items and the bolstering of balance sheets has done its usual work in raising monetary growth'. In other words, spending and activity determine money, not the other way round (Kaldor 1982). I would prefer to say that interest rates have been kept at a level such that monetary growth has turned up, balance sheets have improved and there has been an increase in spending on big-ticket capital items.

Monetary policy does affect nominal growth in the economy, but the point is that money and interest rates are twins—two sides of the same coin. Many of those who find it difficult to accept that money plays a key role find it quite natural to assign great importance to the role of interest rates in determining expenditure and output. And equally, some of those for whom money is the key driving variable in the economy sometimes overlook the crucial role of interest rates in the transmission mechanism.

Of course, there may be times when the relevant interest rates are unobservable, either because of lack of data on rates charged to certain types of borrower or because of credit rationing—in which case the observed monetary flows will contain unique information. This was especially true in the circumstances of the credit crunch in the early 1990s, which affected particularly the banking systems of Japan, the United States and the Nordic countries. But this issue concerns the question of which variables we should be monitoring, rather than the underlying transmission mechanism.

It is crucial to distinguish between a *structural* view of the transmission mechanism and a *predictive* relationship between money on the one hand, and inflation and activity on the other. Much of the discussion in the post-war period among those engaged in econometric studies of the effects of money has focused on the latter. This was certainly necessary because the authorities need leading indicators of the impact of their policy actions on the economy. But it is important to distinguish between the two.

A good example is the role of narrow money. There is some evidence that, over long time periods, M0 is a leading indicator of inflation. It is implausible that this is because there is a causal relationship between narrow money and inflation—for the very simple reason that in the United Kingdom narrow money is purely demand-determined in the short run by variables such as retail sales. But changes in currency *may* proxy unrecorded expenditures which affect activity and inflation with a lag. It is not easy to explain changes in currency holdings either over time or across countries. In Britain, until recently, the velocity of M0 had grown by about 4% a year, reflecting new ways of economising on cash. But a period of lower nominal interest rates is likely to mean a slower growth of velocity in future. And cross-country comparisons of currency holdings reveal substantial differences. The table shows per capita currency holdings in the G7 countries. The United Kingdom has by some way the lowest level of cash, even making generous allowance for the use of some currencies—such as the dollar—outside their borders. Although it is wise to monitor the behaviour of M0, it does not play a major part in the structure of the transmission mechanism.

Per capita currency holdings in the G7

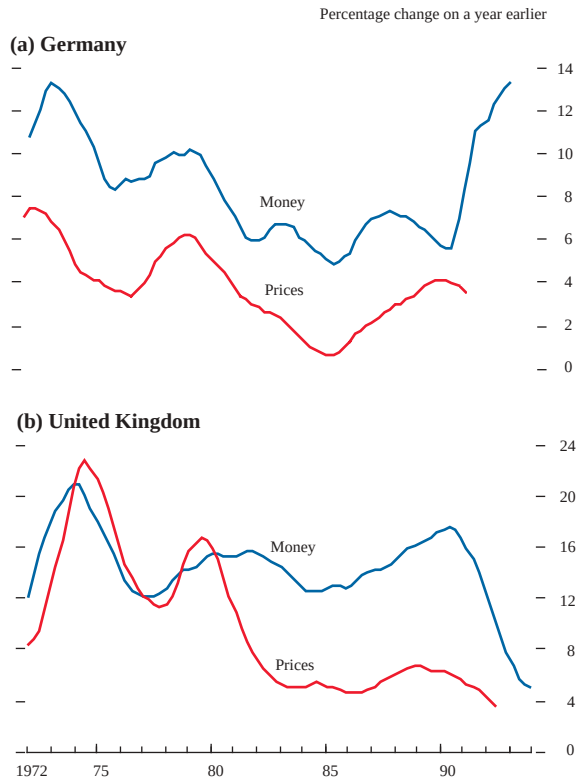
	Home currency	Sterling equivalent (a)
United Kingdom (b)	£306	306
United States (c)	$1,270	850
Germany (c)	DM 2,700	1,040
Japan (c)	¥ 291,800	1,750
France (d)	FFr 4,600	530
Italy (c)	L1,599,400	640
Canada (c)	C$840	420

(a) Conversion based on 1994 Q1 average exchange rate.
(b) Notes and coin holdings of M4 private sector.
(c) Currency in circulation (excluding bank holdings).
(d) Notes in circulation (excluding bank holdings).

It is the broader measures of money—of which there are several—which correspond most closely to the monetary variables in the transmission mechanism. As defined in the United Kingdom, broad money—or M4—is used both to finance transactions and also for savings or portfolio purposes. This means that broad money is likely to be related to both income and wealth. Indeed, by looking at the sectoral composition of M4, personal and corporate holdings separately, the Bank has been able to estimate reasonably stable money demand functions (reported in the February *Quarterly Bulletin*). These help to explain the decline in income velocity of broad money in the 1980s in terms of the rapid increase in wealth during that period. And there is some evidence that a more stable relationship between M4 and inflation has started to re-emerge.

Chart 4 shows the relationship between money growth and inflation in Germany and the United Kingdom. The upper panel is based on a chart in an article by Professor Issing of the Bundesbank. The link between monetary growth —smoothed by taking a ten-quarter moving average—and inflation ten quarters later is apparent. The lower panel shows the same data for the United Kingdom—with the inflation rate shifted back six quarters (this shorter lag gives a better 'fit' in the United Kingdom). In the 1970s, the relationship was reasonably close, but it broke down at the beginning of the 1980s with the marked decline in M4 velocity which accompanied financial liberalisation and the rise in personal sector wealth. More recently, the link between the two series has reappeared, with both the rise and fall in broad money growth mirrored in the inflation rate. It is no surprise, therefore, that Norman Lamont, as Chancellor, brought back a monitoring range for M4.

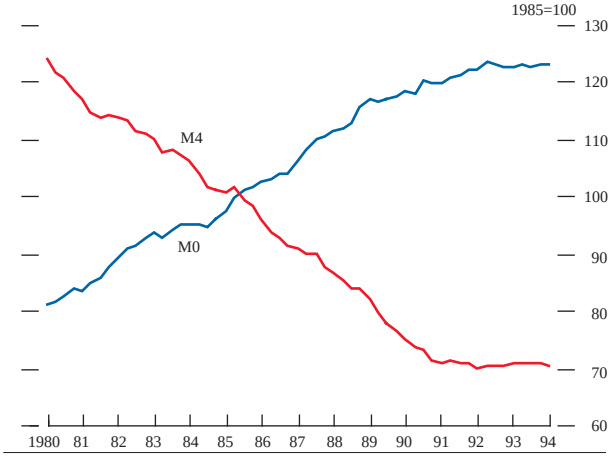
Chart 4
Long-term trends of money stock and prices in Germany and the United Kingdom



Monetary growth measured as change from previous year, smoothed with a ten-period mean: M3 for Germany, M4 for United Kingdom. Prices measured as change in domestic demand deflators on previous year smoothed with an eight-period mean, and shifted back ten quarters (Germany) and six quarters (United Kingdom). Deflator for Germany supplied by EC Commission.

Another example of confusion between structural and predictive models of inflation is the view that costs determine prices. Some City commentators have argued that since changes in unit wage costs and the sterling exchange rate help to predict future inflation, then they must be the cause of inflation. Such a view is wrong and misleading. Wages do not cause inflation. Of course it is sensible to look closely at changes in costs as a guide to likely movements of inflation in the short run—as we do in the *Inflation Report* —but the underlying cause of persistent rises in both costs and prices is monetary expansion.

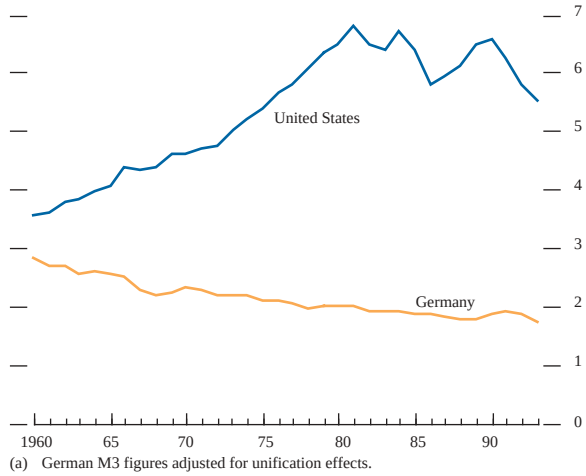
Chart 5
Velocity of M0 and M4



Conventional expositions of the transmission mechanism are often conveniently vague about the definition of money. It would be possible to argue for hours about the appropriate definition of that elusive concept 'money'—and many do. Perhaps 'money' is altogether too precise a word for what monetary economists study. The reason for disagreement about the relevant definition of money is less, I think, that there are different views about the transmission mechanism, and more that there is disagreement over the predictive content of the various monetary aggregates. Policy has to be based on a forward-looking assessment of monetary conditions and the prospects for inflation, and so the predictability of money velocity is an important determinant of the weight that should be attached to money as a leading indicator. Shocks to velocity have affected all measures of money at different times in different countries. In the 1980s, our own experience was rather extreme. Chart 5 shows the velocity of both narrow and broad money in the United Kingdom since 1970—the United Kingdom 'velocity cross'. It shows the sharp changes in velocity during the 1980s, which led some to make the mistake of throwing out the baby with the bathwater, as well as the recent relative stability.

Other countries, too, have experienced unexpected changes in velocity. Chart 6 shows velocity of the principal

Chart 6
Velocity of US M1 and German M3[(a)]



(a) German M3 figures adjusted for unification effects.

monetary aggregates in Germany and the United States. Since 1980 in the United States, and more recently in Germany, changes in velocity have affected the predictive power of broad money. Indeed, in his Humphrey Hawkins testimony in July 1993, Alan Greenspan admitted that 'the historical relationships between money and income and between money and the price level have largely broken down, depriving the aggregates of much of their usefulness as guides to policy'.

In January of this year, the Bundesbank President, Hans Tietmeyer, said that 'the M3 figures are to some extent due to special factors'; rapid monetary growth has not prevented the Bundesbank from continuing with its cautious programme of interest rate reductions. But despite these difficulties in interpreting observed monetary growth, there has been no radical reappraisal of the underlying transmission mechanism, either here or overseas.

Money is not a mechanical indicator to be taken solely at face value. That is why it is sensible to set 'monitoring ranges' for the growth of one or more monetary aggregates, rather than precise target ranges. Such monitoring ranges act as a warning signal, not as an automatic pilot. This is also why we see our task as understanding as much as we can about velocity, and explaining in the *Inflation Report* the behaviour of each of the monetary aggregates so that we can build up a consistent 'economic story' about recent developments in money. For example, in trying to assess the implications of M4 growth for future inflation, it is not enough to look simply at its current growth rate. One has to ask: why has M4 risen, and is its growth likely to persist? To answer this question requires an analysis of the counterparts to M4. Such an analysis is contained in the Bank's *Inflation Report*, and has been a regular feature of Tim Congdon's commentaries. So I hope you will all buy a copy of the next *Inflation Report*.

The credit channel

So far I have discussed the traditional monetary channel of the transmission mechanism. More recently, an additional channel has been explored—the so-called *credit channel*—primarily by economists in the United States.

The idea is that certain borrowers, typically small businesses and households, are heavily dependent on banks as a source of finance. Hence the interest rates charged on bank loans—rather than market rates or rates charged by other financial intermediaries—may have a disproportionate effect on spending by this type of borrower. Banks have information about their customers which it is not costless for other financial intermediaries to acquire. As a result, bank assets are not perfect substitutes for other types of loan. Decisions made by banks about their spreads between borrowing and lending rates have an impact on nominal spending. Shocks to banks' balance sheets—from changes in financial regulation or large loan losses, for example—can affect the position of borrowers unable to turn to the capital market.

An article in the November 1993 *Quarterly Bulletin* by two Bank economists, Spencer Dale and Andrew Haldane, explained how this credit channel could increase the potency of monetary policy if bank lending rates move more than one-for-one with changes in market interest rates, and decrease it if they respond sluggishly to movements in market rates. Lack of data makes it difficult to discover which effect is the more important. In the United States, there is evidence that loan rates adjust sluggishly to movements in market rates.

None of this should be very surprising. Monetary economists down the years have always paid close attention to the behaviour of banks. Banks play an important role in the transmission mechanism. As Karl Brunner and Allan Meltzer put it in 1988, 'the analysis of the transmission process is incomplete without both the money and credit markets and their interaction'.

It should be clear that the credit channel is not in any sense an alternative to the monetary channel. It is an additional way in which changes in monetary policy affect private spending. The main message is that there are important differences in the way in which the different sectors of the economy react to changes in monetary policy. For example, although the contribution of the small firms sector to total output is still relatively small, its contribution to the variability of output is large. The aggregate figures for money and credit may, therefore, conceal important sectoral differences between, for example, small businesses and large companies. Exploring further the nature of such differences is crucial to our understanding of the transmission mechanism as a whole.

An examination of the *disaggregated* monetary data has always formed part of the Bank's commentary on monetary developments. Since this has also featured in Tim Congdon's own commentaries, it is disappointing that Tim feels that the Bank has proposed a new theory in which credit determines national income. The Bank has proposed nothing of the kind. We believe in the traditional transmission mechanism: changes in monetary policy—implemented by short-term official interest rates—result in a reallocation of portfolios and changes in spending by the private sector, which lead to endogenous changes in both broad money and credit. These lead to changes in nominal spending and incomes. Real spending and output are affected first, and inflation only later. The more credible is the policy stance, the sooner inflation responds.

Conclusions

What conclusions should we draw from this analysis? There is a rather curious British predilection to claim that money does not matter. It is hard to square this view with any plausible theory about the effects of money on output and inflation. We know something—but by no means all—about the transmission mechanism through which money operates. Yes, money does matter; but it moves in a mysterious way its wonders to perform. That is why recognition that inflation

is a monetary phenomenon should go hand in hand with a realistic appraisal of the current state of knowledge. There is much to learn, especially about short-term changes in the velocity of money.

Practical men—or at least those Maynard Keynes wrote about—often believe that there must be simple answers to economic problems. And there is no shortage of quacks offering patent medicines. Keynes believed that economists should become more like dentists—'humble, competent [specialists]'. Central bankers, however, are more like GPs—they have to be aware of the latest scientific thinking, mindful of the lessons of practical experience, immune to the quacks peddling magical cures and forever conscious that they are dealing with live patients. A good bedside manner helps too. If monetary policy is, therefore, an art, it is not because economics is not a science—it is—but because there is much that we do not understand. That is as true of physics or any other natural science as it is of economics. There will, I am sure, be intellectual revolutions in monetary theory in the future. Present theory can, in the words of Frank Hahn (1982), 'at best be regarded as scaffolding and not as the building'.

Policy-makers should not be ashamed of admitting ignorance about the underlying mechanisms relating money to activity and inflation. Vanity has never bred good policy—in the economic or any other field. The art of monetary policy is making decisions under uncertainty—but as well-informed decisions as possible. That is why the Bank has a continuing obligation to research into what some commentators might see as rather arcane and technical matters. And whatever we discover we shall publish, as we did with our recent work on money and credit, so that others may comment and criticise and, perhaps, learn.

The efforts of Tim Congdon and Lombard Street Research to keep the eyes of the City and the monetary authorities firmly on money are to be welcomed. In the process, he has also made money for his investors. Congdon has not only put money into his economic analysis, but also his economic analysis into the money.

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Monetary policy instruments: the UK experience

Taking examples from the history and the current structure of UK money markets, Mervyn King, an Executive Director of the Bank and its Chief Economist, provides[1] *an analysis of a number of the features of money markets and monetary policy instruments. He distinguishes features which are fundamental to any structure, those which derive primarily from the history of the particular markets and those which are likely to be more transient. He identifies two criteria for measuring the efficiency of money-market structures. And he highlights a set of issues that need to be addressed in shaping any money-market structure, including that to be used in Stage 3 of EMU.*

Introduction

It is a privilege to join you this morning—and especially my colleagues Otmar Issing, André Icard and Nout Wellink—to discuss the instruments with which we conduct monetary policy. Stage 2 of Economic and Monetary Union began on 1 January this year, and this is an apposite time to reflect on our domestic monetary operations and the experience of our colleagues in the rest of Europe. It is also a great pleasure to address a symposium organised by the Institute for Bank-Historical Research; few activities of central banks have been more influenced by historical circumstances than operations in money markets.

Since, as the chairman noted, I arrived this morning straight from the Bank of England's Tercentenary Symposium, I hope you will permit me to start my talk with some words of that great observer of the London money markets, Walter Bagehot. In 1873, he wrote that 'you might as well, or better, try to alter the English monarchy and substitute a republic, as to alter the present constitution of the English Money Market, founded on the Bank of England' (Bagehot 1873). And, as with much of Bagehot's thinking, how prescient it has proved. The present constitution of the London money market—more than a century on from Bagehot—owes much to history. That alone, of course, does not make it any better or worse a constitution than any other. But the British tradition of unwritten constitutions means that we attach great importance to our ability to adapt to changing circumstances by changes in what we do, rather than changes in what is written down about what we do—although the Bank's 'Red Book' provides a great deal more enlightenment on our monetary constitution than is available on our political constitution (Bank of England, October 1988).

My aim today is to clarify why some of the features of the UK money market, and the Bank of England's operations within it, are in fact basic to any system; why other features derive primarily from the history of the money markets in London; and why yet a third set of characteristics has proved rather more transient—often those based upon specious economic arguments which did not stand the test of time. I will highlight a set of issues—by no means exhaustive—which I think are central to monetary policy, monetary instruments and the money markets generally. Inevitably for an institution in its tercentenary year, I have in places been rather selective, both in the fragments of Bank of England history I have assembled and in the issues on which I have chosen to focus. But I hope they will provide a backdrop to the forward-looking discussion that is to come between myself and my central bank colleagues in the panel later this morning.

Monetary policy and the money markets

Let me begin by going to the heart of the matter of how and why central banks interact with the money markets. Central banks differ from commercial banks because of the uniqueness of their liabilities—base, or central bank, money. And base money is in turn unique because it is the final means of settlement for transactions. It follows that provided a market demand exists for base money, then as monopoly supplier a central bank is able to exercise control over either the price or the quantity which clears the money market. This base money demand can be manufactured artificially by the central bank—for example, by selling securities or imposing positive reserve requirements. But in economies like ours, which are subject to stochastic shocks to payment flows, such a demand will tend to arise naturally for most of the time; it needs no artificial stimulus.

It is important to note two points about this argument. First, as Bagehot recognised, the actual size of the disequilibrium in the base money market is irrelevant to the central bank's ability to set a price or quantity—this requires only that the central bank be the marginal source of funds. And second, it does not matter in principle whether the disequilibrium in the money market is an aggregate net shortage or a net surplus of funds—control of prices or quantities carries across irrespective of whether the central bank is the monopoly supplier or demander of its own liabilities. Either way, it plays a pivotal role in the money market.

(1) In a paper for the 17th symposium of the Institute for Bank-Historical Research in Frankfurt, delivered on 10 June. The symposium was also addressed by, among others, the directors with responsibility for economic research at the Bundesbank, the Bank of France and De Nederlandsche Bank.

This role gives a central bank one degree of policy freedom—no more and no less. Whether this is used to exercise control over the price or the quantity which clears the base money market is a matter of choice—and I will discuss this choice later. But comparative work on central banks, both across countries and across time, demonstrates that exercising influence over short-term interest rates—the price or opportunity cost of central bank money—has been the most important and long-lived common denominator among the various instruments of monetary control used by central banks across the world. This is true both for the price of present central bank money relative to future central bank money (the interest rate), and for the price of central bank money relative to foreign central bank money (the exchange rate).

Consider the UK experience in this respect. During the nineteenth century, the Bank of England devoted considerable attention to making bank rate 'effective'. This was of particular importance under the Gold Standard, when the Bank was seeking to influence market interest rates in order to control inflows and outflows from the nation's gold reserves. Even then, the position of the Bank of England within the financial system provided it with the means of influencing short-term rates in the money market, at least up to the point at which it provoked an inflow or outflow of gold.

This influence has persisted to date. Its incarnations through the nineteenth and twentieth centuries have been, first, bank rate; then, through the 1970s and on occasions since then, minimum lending rate; and, most recently, the Bank's dealing rates with the discount houses—the specialist intermediaries through which the Bank has conducted its money-market operations since early in the nineteenth century. These names are of little more than historical interest. For in each case what was being set was essentially the same—the price of central bank money. Indeed, dealing rates were historically the means by which announced bank rate and minimum lending rate were made 'effective'.

Influence over short-term interest rates has been maintained despite massive changes in the nature and structure of the financial system—liberalisation of markets, abolition of exchange controls and changes in the market power of the major banks. The degree of competition among banks in the United Kingdom has changed greatly over time. The process of amalgamation of small banks into larger units in the late nineteenth and early twentieth centuries created a group of major clearing banks exhibiting cartel-like behaviour from the First World War until the early 1970s. Since then competition has intensified, although a small number of large banks have an influential role in the UK money markets.

Short-term interest rates have not always assumed primacy as a monetary instrument. In the 1950s and 1960s, interest rates were relatively little used. This was mainly because interest rates were felt to be relatively ineffective as a demand management tool. In a world of pervasive controls, quantitative constraints on credit bit harder and faster. Without question, however, interest rates have become the predominant instrument since the monetary control reforms of 1971 and 1980–81.

Although I do not wish to deny the historical importance of non-price instruments of monetary policy, the interesting question to ask is why do central banks prefer interest rates over money quantities as their primary monetary instrument?

The instrument problem: prices and quantities

This question was posed by William Poole in a seminal paper back in 1970. Interest rate control was to be preferred, Poole argued, whenever money-demand shocks were more important than shocks to real spending. Shocks to money demand would then be passively accommodated in the money market, thus stabilising nominal spending. When shocks to real spending were the more important, control of the monetary base was the more likely instrument to stabilise nominal spending. Poole's conclusions have proved remarkably robust.

In the United Kingdom, the monetary base control debate was alive most recently in 1980. The conclusion then was that 'we [the UK Treasury] doubt whether a monetary base control system . . . would produce the desired results. None of the schemes so far suggested appear to give a reasonable prospect of doing so'.

A critical factor in reaching this decision was that 'there would be a period of years before it could be established that there was a predictable relationship between money and the base and there would be no assurance that monetary control would necessarily be better at the end'. The arguments used at the time seem to me inconclusive. More relevant may be the US experiment with non-borrowed reserves targeting between 1979 and 1982 which, while not strictly money base control, led to a fourfold increase in the volatility of short-term interest rates.

But, before we leave the question of money base control, let us not forget Poole's analysis. What Poole showed was that a mixed strategy, combining control of both the monetary base and interest rates, was strictly superior to controlling either quantity or price in isolation. And in many ways I see the historic operating practices of most central banks—the Bank of England among them—as having been exactly such a hybrid. Let me explain.

Clearly, both money prices and money quantities cannot be controlled simultaneously. But time horizons are important here. If we looked at a central bank's money supply schedule over a short window, say a week, then it would appear horizontal, with the supply of the monetary base being perfectly elastic—consistent with interest rate targeting. But if we lengthen the window, say to a year, then the supply schedule begins to steepen—any persistent shocks to money, other than those resulting from a shift in the money-demand function, will cause central banks to engineer an interest rate response to control inflation. The

longer the window, the steeper the supply schedule and thus the more pronounced the interest rate response.

In the long run, the central bank's base money supply schedule could be vertical (adjusting for shocks to money demand)—consistent with the authorities setting a target for the money stock and hence for the price level. And, of course, at this stage we are back to a world of pure money base control. The point here is that the money price/quantity distinction is never as black and white as theory might suggest. Central bank policy rules are some fairly complex intertemporal mix—a mix which Poole has shown can be optimal.

Monetary instruments and monetary targets

Let me for a moment examine instruments other than interest rates. When considering these, UK history is very revealing. And by this I mean not just the history of how monetary policy in practice was conducted, but also the history of policy objectives, both final and intermediate. In the 1950s and 1960s, Keynesian demand management was the macroeconomic orthodoxy. The key policy objective was full employment, subject to maintaining external balance. Interest rates were held down, partly because demand was thought to be restrained by fiscal policy backed up by direct controls on credit, and partly because low rates helped to restrain the budget deficit. Monetary policy was tightened almost only when the external constraint was threatened—although this occurred frequently.

During the 1950s, direct controls on hire-purchase terms, qualitative calls for restraint on bank lending and controls on capital issues were widespread. Cash ratios (of 8% of deposit liabilities) and liquidity ratios (of 30%) were already in place and for most banks were binding constraints on balance-sheet growth. Bank rate adjustments, while important as a signal of restraint, were believed to be slow and ineffective in controlling aggregate demand. The use of quantitative controls reflected the widespread use of planning during the war, and the belief that if planning had won the war then it could equally 'win the peace'.

But there was clearly an efficiency cost to doing this. The Radcliffe Committee, set up in 1957, alerted the wider public to the significance of these distortions. Their report, published in 1959, concluded that the authorities must 'regard the structure of interest rates rather than the supply of money as the centrepiece of the monetary mechanism'. Direct controls should, in the main, only be used in extreme conditions.

The move to more market-oriented instruments was, however, delayed. In the 1960s, direct controls became, if anything, more specific in their application. Lending ceilings were imposed on all banks and finance houses, with guidance on lending giving priority to export finance; hire-purchase controls were progressively tightened; and a special deposits scheme was introduced, obliging banks to hold a proportion of their liabilities at the Bank of England, remunerated at Treasury bill rates but not counting as part of the banks' liquidity ratios, thus placing further pressure on banks' liquidity positions.

The 1970s marked something of a watershed. Two factors were responsible for this. First, a change in the intellectual climate led to a preference for market solutions. Second, there emerged a growing dissatisfaction with the deadweight efficiency losses resulting from a directly controlled financial system. Disintermediation had already begun to eat into the effectiveness of direct controls, as the UK financial system grew in size and sophistication during the 1960s. In 1971, a series of reforms was introduced, known as Competition and Credit Control (CCC). CCC served notice of the freer hand that was to be given to interest rates in monetary policy. Quantitative controls were dismantled, together with the clearing banks' interest rate cartel. Cash and liquidity ratios were retained, but at much lower levels—1½% and 12½% respectively—with the latter retitled 'reserve asset ratios'. The ability to call special deposits was retained, but with the intention that the option be exercised only infrequently to reinforce upward movements in interest rates. The key element of CCC was the emphasis placed on the level—and structure—of interest rates as the primary instrument for influencing the growth of money and credit.

Rapid bank balance-sheet growth followed the ending of direct controls. With the authorities reluctant to increase interest rates far or rapidly enough to limit inflationary pressures, direct controls were reintroduced sporadically throughout the 1970s. Hire-purchase controls, calls for special deposits and restrictions on the scale and direction of bank lending were old favourites. But they were buttressed by a new control—the Supplementary Special Deposit scheme or 'corset'. This was a penalty (in the form of non-interest-bearing deposits at the Bank) on the rate of growth of banks' interest-bearing eligible liabilities rather than on the size of the balance sheet as such.

Although these controls were in principle temporary, they persisted through much of the 1970s. Their downfall—this time for good—was inevitable as a consequence of a different liberalisation measure: the abolition of exchange controls in 1979. With banks' customers now free to borrow offshore funds to meet financing needs, domestic controls on banks' balance-sheet growth were rendered obsolete. By the end of 1980, all quantitative restrictions had been withdrawn (with the exception of a residual form of lending guidance which remained notionally in force until December 1986).

Among other reforms, the *corset* was scrapped. And while the option to call special deposits was retained, it has never been exercised subsequently, although it remains available. The cash ratio was also retained, but at a much reduced level of ½% and with a new name, *cash ratio deposits*. This requirement has since been progressively reduced and currently stands at just 0.35% of banks' eligible liabilities. Moreover, the function of cash ratio deposits today is strictly non-operational: they serve the sole purpose of providing income for the Bank. The fulcrum for money-market

management is provided by the requirement that the banks avoid overdrafts on their operational accounts. The reserve asset ratio requirement was also abolished as a monetary control device, although liquidity requirements were retained for supervisory purposes as a purely prudential measure, and therefore play a part in affecting banks' behaviour and thus the context in which the authorities conduct their monetary operations.

The effect of the 1980–81 reforms was, at long last, to focus the spotlight firmly upon interest rate management—a decade after CCC had first proposed this. The prime mover in this shift was unquestionably financial liberalisation—whose invisible hand was in turn steered by a new economic orthodoxy.

In this intellectual climate, monetary targets had risen to prominence as an intermediate monetary objective. The United Kingdom had been obliged by the IMF to introduce targets for domestic credit expansion in 1968. But the Bank made voluntary use of unpublished targets for broad money growth (at the time M3) from 1973 onwards. Annual target ranges were first announced in 1976, following their introduction in Germany and the United States. And this gradual progression reached its zenith with the publication of medium-term broad money targets by the incoming Conservative government in 1980. These were intended to influence inflation expectations over a medium-term horizon.

But there was to be a twist in the tail. Financial liberalisation and increasing competition among newly-liberated financial institutions caused banks' balance sheets to swell rapidly. Broad money targets came under threat. The authorities' reaction was to draw more heavily upon yet another instrument: debt management. The intention was to withdraw liquidity from the private sector by the sale of government debt—even at times in excess of that required to meet the government's borrowing requirement, so that it became known as *overfunding*—in order to hit the broad money target. In that way, broad money growth could be reduced. Overfunding operated between 1981 and 1985, until broad money targets themselves fell out of favour. Even overfunding was rarely sufficient to bring broad money growth back within its target range, and as a by-product it placed strains on the Bank of England's money-market operations by draining large amounts of liquidity from the money market.

Since the mid-1980s, interest rates have been pretty much the sole and exclusive monetary control tool of the UK authorities. Foreign exchange intervention has, on occasion, played a supporting role—when sterling shadowed the Deutsche Mark in 1987–88, and of course during the period of sterling's membership of the ERM. But outside these episodes, the use of intervention has been sparing. Its effectiveness is in any case short-lived without supporting monetary policy action.

The United Kingdom's new monetary framework, introduced following sterling's departure from the ERM in the autumn of 1992, is based on the use of interest rates to achieve an inflation target of 1%–4%, with the intention of bringing inflation down below 2½% by the end of the present parliament. This is a simple and transparent framework. Equally simple and transparent instruments will help us to achieve our objective.

Monetary policy and signalling

This brings us up to the present day. By historical comparison, the current money market and operational infrastructure in the United Kingdom is relatively uncluttered by instruments serving subsidiary objectives. Price signals now take primacy. And this freeing-up of market forces has afforded efficiency benefits: deadweight losses have been reduced.

But even in a system where a single price signal serves as the system's pivot, there is still, inevitably—as with all financial arrangements—debate about the United Kingdom's current money-market structure. Among the criticisms which have been voiced are the following:

- the system is complicated;
- the frequency of intervention is greater than is needed for the purposes of monetary policy;
- signals about monetary policy as conveyed through money-market operations are not clear;
- overnight rates are more volatile than elsewhere; and
- the range of the assets in which the Bank deals is unnecessarily limited.

Many, if not all, of these criticisms are based on a misunderstanding of the market for liquidity in the United Kingdom.

But to assess the validity of these criticisms, I need first to define some criteria for measuring money-market efficiency. I shall identify two. And although I shall use these to examine the United Kingdom's current structure, the criteria apply equally when looking forward to Stage 3 of EMU.

First, the money markets should provide an effective channel through which changes in the monetary policy stance can be signalled. Second, the money markets should ensure that the distribution of central bank liquidity within the banking system is achieved efficiently.

Consider the signalling criterion first. An oft-quoted stylised fact about the UK money market is that overnight and other short-maturity interest rates appear very volatile, relative to similar portions of the yield curve in other countries. For example, Kasman (1992) calculated that the average absolute deviation of UK overnight rates from UK official rates between 1988–91 was almost 33 basis points. This was double that in the United States (14 basis points) and Germany (16 basis points), and three and a half times that in Japan (9 basis points). A number of explanations have been put forward to explain this and I will consider some of them later.

But from a macroeconomic perspective the real issue is whether this short-rate volatility disrupts monetary policy signalling. That is, whether noise at the short end of the yield curve infects points further up the curve—points where expectations of future policy actions are crucial, and where savings and investment decisions are made.

Empirical evidence suggests that volatility is not passed up through the maturity spectrum from overnight rates. Kasman considers the transmission of *unconditional* overnight interest rate variability to three-month money-market rates in the United Kingdom, finding little evidence of significant volatility spillovers. Ayuso, Haldane and Restoy (1994) use a *conditional* (ARCH) measure of overnight rate volatility, and consider its effects up the length of the money-market yield curve. They find significant volatility transmission effects only at the three-month maturity. And even then the extent of the spillover—less than 10%—is quantitatively small. The same study finds significant volatility transmission effects for France and Spain, but not for Germany. Monetary policy signalling does not, therefore, appear to have been befogged by noise at the very shortest end of the UK yield curve.

There is a second—rather more abstract—point I would like to make about monetary policy signalling. The ability to send monetary policy signals is inextricably linked to a central bank's liquidity provision, as I discussed earlier. But the act of monetary policy signalling need not be linked to such liquidity provision. The two are separable functions. Indeed, we could easily envisage a world where policy signalling was achieved not through open-market operations, but by hoisting a flag from the top of the Bank, or by speeches by the Governor. The system would be immediately transparent to all—not just those with whom the Bank deals. It could easily be made more sophisticated. For example, probabilities could be assigned to future monetary policy outcomes as an alternative means of managing yield curve expectations. And the United Kingdom has started to move in this direction. Advice by the Bank to the Government on the appropriate level of interest rates is now published in the minutes of the monthly monetary meetings which take place between Governor and Chancellor.

The posting of bank or minimum lending rate was, in principle, also an unambiguous signal. The essential principle is that signals should be clear. Agents will always be quick to overinterpret money-market operations as signals about the future. And the best way to guard against this is to make the setting of policy objectives and the determination of the monetary stance as open and transparent a process as possible.

Money-market microstructure

The second criterion I suggested was that money-market arrangements should produce an efficient allocation of central bank liquidity. The formal structure of the Bank's operations in the money market has changed little since the turn of the century, although continuity of form may conceal changes of substance. Certainly, the notion of the Bank of England using daily operations to smooth money-market prices, and making funds available to the discount houses at a rate of its choosing, was well established prior to the Second World War.

Money-market microstructures are also relevant to the current debate about the operation of policy in EMU. I will restrict myself to three issues. First, the means by which central banks supply liquidity to the banking system. Second, the frequency with which the target requirement on banks bites and with which liquidity is injected. And third, the counterparties to these liquidity injections. This taxonomy cuts across a number of related issues—for example, reserve requirements and real-time gross settlement. Significantly, all three issues have been raised as possible explanations for the stylised fact of high overnight interest rate volatility in the United Kingdom.

Means of liquidity provision

There are a number of routes by which the issue of central bank liquidity provision might be approached. The classical dichotomy is between open-market operations on the one hand, and the discount window or standing facilities on the other. *A priori*, I think the differences between these are more apparent than real, especially when window borrowing is secured on collateral. The differences become more important if we consider central banks' occasional lender of last resort function to institutions encountering liquidity problems.

Bagehot favoured levying a bank-specific penal interest rate on the provision of lender of last resort services via the discount window. Moreover, such services were only to be extended to solvent—that is, *temporarily* illiquid—banks. More recently, Goodfriend and King (1988) have proposed that open-market operations, rather than the discount window, be used to meet lender of last resort *and* monetary policy objectives. Under their scheme, open-market operations would furnish an elastic supply of currency to head off occasional risks of systemic failure. This is fully consistent with interest rate smoothing. At the same time, short-term interest rates would be held at levels appropriate to longer-term monetary objectives. McCallum (1994) discusses these issues. But, for monetary policy purposes at least, whether a central bank holds on its balance sheet high-quality paper or advances backed by high-quality paper is more a question of semantics than economics. To some extent, the issue concerns the nature of the money market. If individual banks have access to attractive central bank facilities, they have little incentive to deal with each other. But if they cannot rely on direct access to central bank funds, private markets in liquidity are likely to develop.

UK history tends to bear this out. Both open-market operations and standing facilities have, to differing degrees, been used over time. Consistent with the increasing market orientation of operations, there has been a gradual shift toward use of open-market operations through the 1970s and 1980s, but with the discount window available as a backstop.

A number of central banks—the Bundesbank, the Banque de France and De Nederlandsche Bank among them—use a corridor system for short-term interest rates. This is a formal mix of the discount window and open-market operations. The ceiling and floor rates for the corridor are most often central bank discount window lending and deposit rates respectively; while short-term rates within the corridor are managed via periodic open-market operations. Often, official interest rates within the corridor will be market-determined, with the central bank fixing the quantity, rather than the terms, of its open-market operations.

The UK system can be seen as a special case of these arrangements. The Bank's open-market operations dictate its preferred mid-point for money-market rates, which are then allowed to fluctuate freely around this mid-point in line with agents' expectations. Since the Bank of England always stands ready to deal daily in its open-market operations, this mid-point for short-term interest rates is reinforced frequently. And this in turn prevents money-market rates in the all-important one-month to three-month maturity range—the range affecting banks' base rates—from diverging too much or for too long from official dealing rates. It is not clear that there is a need for a formal band, or corridor, for money-market rates. *De facto*, both systems serve similar functions.

My second point relates to the maturity of the instruments used to provide liquidity. Open-market operations in the United Kingdom typically specify only the maturity window—most often up to one month—within which liquidity is to be provided to the banking system. This effectively gives the banking system the discretion to choose roughly upon which point on the yield curve the Bank of England operates. And because this is a private sector decision, some short-maturity interest rates may therefore move out of the central bank's direct control. Such behaviour may help to explain deviations of the overnight rate from UK official interest rates, but does not threaten the influence of official rates on banks' base rates.

My third and final point on central bank liquidity provision concerns the stock of securities the Bank of England is willing to accept in its market operations—so-called eligible bills. This stock of bills is relatively small in relation to gross money-market flows. Moreover, in the recent past, the Bank of England owned a significant proportion of the total (the so-called 'bill mountain'). Between 85% and 95% of eligible bills were held by the four largest UK clearing banks between 1987 and 1991. This meant that the transactions media with the central bank—eligible bills—were not always held by the banks which were deficient of funds. As a result, reserves-deficient banks could find themselves forced to borrow from the central bank via a commercial bank holding eligible bills. This effectively allowed the bill-holding commercial bank to exert some control in the money market. And this in turn could generate pressures upon interest rates in the interbank market, contributing to overnight rate variability.

The Bank has addressed this by announcing, on 12 January this year, new repo and secured loan facilities intended as a lasting feature of the Bank's money-market operations. These arrangements formalised and extended the temporary facilities, put in place following sterling's withdrawal from the ERM in September 1992, to manage the very large money-market shortages created by earlier foreign exchange intervention. They follow a regular timetable, with funds being made available for fixed periods of two or four weeks once every fortnight.

The facilities complement the Bank's daily operations in the bill market, extending both the range of instruments and direct counterparties through which the Bank is willing to provide liquidity. Funds are provided through repos in gilt-edged stock and loans secured against certain types of government-guaranteed paper. Total outstanding gilt-edged stock alone is some £200 billion compared with only £19 billion in eligible bills, and holdings are much more widely dispersed, so the new facilities provide additional scope for relieving shortages without straining the bill market. Counterparties are large banks and building societies, market makers in gilt-edged securities (GEMMs) and discount houses. GEMMs' facilities are limited in line with their capital, so as to limit the extent to which the Bank disintermediates the banking system, but other counterparties can apply for any amount of funds under the facility, although the Bank reserves the right to scale back applications. The rate of interest on the facilities is fixed by the Bank in advance and is closely related to the rate at which the Bank provides funds through its daily bill operations. Thus interest rates are still, at least for the present, set through the traditional daily operations rather than through the new facilities.

We expect these measures to help counter the problems highlighted earlier. Already there seems to be some evidence of this in the behaviour of overnight rates. Since the turn of the year, the standard deviation of the difference between UK overnight and official interest rates has fallen to 0.48%, against an average of over 0.6% over the preceding five-year period, and to 0.44% over the past three months. Overnight volatility may already be waning, although it is too early to judge.

Frequency of liquidity provision

Let me turn now to discuss the frequency of money-market operations. It is well known that the Bank of England operates daily to inject liquidity into the money market. This is sometimes interpreted as indicating our desire to regulate overnight interest rates—as occurs, for example, in the United States. It is no such thing.

The need to intervene daily derives from the reserve requirement regime the United Kingdom operates. That is, a zero reserve requirement with a maintenance—or averaging—period of one day. To prevent this reserve requirement being violated by at least one bank, any aggregate reserves disequilibrium must therefore be offset

each day—hence the need for daily liquidity injections. Imposing a daily reserve requirement increases daily pressures upon liquidity. Commercial banks are given less time to 'work off', or smooth out, the effects of stochastic liquidity shocks. It has been suggested that the imposition of positive reserve requirements could usefully reduce the daily pressure, by providing banks with an artificial pool of liquidity to cushion the effects of liquidity shocks. But I feel this misses the point, for two reasons.

First, the stabilising role of reserve requirements derives from the averaging of reserve requirements, not from the level at which they are imposed. Without averaging, a reserve requirement—of whatever size—must be met each day and so cannot be drawn down to insulate against liquidity shocks.

Second, positive unremunerated reserve requirements—as is well known—are distortionary taxes upon financial intermediation. And even if reserve requirements were remunerated, it is unlikely that this would be 'full' remuneration—in the sense of leaving banks indifferent between holding required reserves and other assets. Those deadweight losses from earlier years would rise from their grave. This is the main reason why cash ratios in the United Kingdom have been progressively lowered since the Second World War, to levels which are now behaviourally unimportant. More fundamentally for our purposes, however, the distortions inherent in positive unremunerated reserve requirements are avoidable without compromising required reserves' stabilising function.

The liquidity buffer for commercial banks could equally be provided by collateralised central bank overdrafts, with a required reserve ratio of zero averaged over some period. The outcome would be stabilisation of the money market, without the inefficiencies associated with positive required reserves. To borrow some terminology from monetary theory: liquidity stabilisation can be as well—and more efficiently—achieved by central bank credit on demand, as by commercial bank cash in advance. Indeed, we already have credit on demand, in the form of lending facilities available to the discount market.

What I have been describing could be characterised as a system of averaging with zero reserve requirements. In the United Kingdom, the averaging period is one day. Elsewhere, it is longer and tends to be operated such that any reserve deficiency over the averaging period as a whole is charged at a Lombard rate, while any excess of reserves at the central bank is paid a deposit rate. Generalising, under this kind of arrangement, intra-period reserves positions—whether debit or credit—would not earn or pay interest, though daily overdrafts would be collateralised. The central bank would then be acting as a *de facto* market-maker in central bank money. It is not clear that such a system would differ markedly from existing operations. At present, the Bank is in effect a market-maker in central bank money through open-market operations and lending facilities. And there is a wider issue of whether market-making in liquidity is something which can be left to the private sector, as in other financial markets, or carried out by the central bank.

A different pressure on liquidity will emerge as we move towards real-time gross settlement systems for large-value payments. These systems will be introduced in the United Kingdom at the end of 1995. The possibility of commercial banks going overdrawn intra-day with the central bank will then arise. It might be argued that positive reserve requirements could provide the necessary buffer-stock of liquidity, enabling banks to meet their real-time payment obligations without going overdrawn at the central bank. But again, these obligations can equally be met through collateralised overdraft facilities—thereby obviating the distortions imposed by required reserves—and this is the path we will follow.

Of course historically reserve requirements have often been rationalised in quite different terms: as a mode of taxation; as a prudential safeguard; and as a means of monetary control. But as US experience, for example, has shown, none of these arguments has stood the test of time.

Counterparties to liquidity provision

Finally, I come to counterparties. There is probably more confusion about the institutional mechanics in the United Kingdom than about anything else. Central to this confusion is the role played by the discount houses.

In principle, the discount houses' role is simple: they funnel liquidity between the Bank of England and the banking system, 'smoothing out irregularities in the ebb and flow of funds among the commercial banks and others' (Radcliffe Report 1959). In practice, this role has evolved considerably through time and is smaller now than in the 1950s.

A number of structural factors have contributed to this. Among these, the growth of the interbank market since the early 1970s, and a corresponding fall in the proportion of banks' assets held with the discount houses, has been prominent. The phasing out of 'club money'—secured money required to be held with the discount houses by eligible accepting banks—from 1986 strengthened this trend. Most recently, the introduction of the new repo facilities has provided banks and building societies with direct access to central bank money. At the same time, this should relieve strains on the discount houses' balance sheets, allowing them to play a more active role in daily operations. The real issue is whether or not there is a demand for a market in liquidity. And the most important point to make about counterparties is that it is the reserve management behaviour of the larger clearing banks, rather than that of the discount houses, which has the strongest influence on money-market conditions.

Conclusions

Monetary union means harmonisation—but of interest rates and policies, not of private sector institutions and behaviour. In a single-currency area, those money-market structures which are efficient will flourish, while those which are

inefficient will wither on the vine. No-one rationally argues that the monetary unions of London and Liverpool, of Frankfurt and Freiburg, of Paris and Perpignan or of Amsterdam and Arnhem should necessarily have the same financial infrastructures. The same principle applies to Europe as a whole.

We shall all find it difficult to adapt to the implications of monetary union. It will call into question habits of mind and practices with which we have long been familiar. Change is especially difficult for central bankers. After all, we stand for stability. But sometimes change is necessary in order to achieve stability. And it will be important to the success of monetary co-operation—let alone union—in Europe that we refrain from taking entrenched positions in advance of a careful and open debate about the optimal instruments of monetary policy. That will require a degree of openness that may not come naturally to us. In that regard, I can do no better than return to Bagehot who wrote:

"The Bank directors now fear public opinion exceedingly; probably no kind of persons are so sensitive to newspaper criticism. And this is very natural. Our statesmen, it is true, are much more blamed, but they have generally served a long apprentice to sharp criticism . . . But a Bank director undergoes no similar training and hardening . . . He is not subjected to keen and public criticism, and is not taught to bear it . . . He is apt to be irritated even by objections to the principles on which he acts, and cannot bear with equanimity censure which is pointed and personal. At present I am not sure if this sensitiveness is beneficial."

As central bankers, we shall need equanimity as well as principles.

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Derivatives—a central banker's view

Brian Quinn, an Executive Director of the Bank of England, offers[1] *a central bank assessment of the recent disturbances affecting global financial markets and of the part played in them by the growing derivatives markets. He argues that good progress is being made in capturing and confining the risks arising from derivative transactions, but that regulators and market participants have a shared interest in ensuring that there is further progress.*

Introduction

We are in the midst of a paradox: there appears to be a malaise in financial markets at a time when the prospects for sustained global economic recovery are probably better than they have been for many years.

The United States' economy is enjoying steady, non-inflationary growth, with Europe—including the United Kingdom—promising to follow the same pattern. The Pacific region continues to display vigour and dynamism. The countries of Latin America, on the whole, are negotiating the passage to market economies without undue alarm. And the countries of Eastern Europe, no doubt with individual variations and vicissitudes, are gradually managing the enormous transformation from command economies to modern capitalist states.

Yet financial markets in the principal developed countries appear to have suffered a collective disturbance that, in degree, casts a shadow over this more welcome evolution of the world economy. Of course, there can be argument whether the outlook is quite so promising. Some doubt whether steady non-inflationary growth is assured in the United States and Europe; others express concern about the recovery in Japan. That said, the hesitancy and anxiety recently displayed by foreign exchange and capital markets seem to go beyond what such doubts would usually provoke.

As always, we do not lack for explanations of the behaviour of financial markets. Current and prospective government financial deficits, fears of the alleged global capital shortage, political uncertainties, technical corrections and portfolio adjustments all have their proponents. But it is difficult to avoid the feeling that there is a widespread view, amounting to an apprehension, that the global financial system may be becoming more unstable. It is, I think, worthwhile asking ourselves what feeds this view, before turning to the question of derivatives and how they fit into the picture.

Global financial instability

The first factor, commonly acknowledged and not negative in itself, is a recognition that the world economy and financial markets are more closely connected and probably more integrated than ever before—and growing ever more so daily. This undoubtedly has brought many benefits. Over the past 25 years, the proportion of world output traded internationally has doubled, reaching about 18% in 1993. The successful completion of the GATT negotiations will surely maintain this trend. Taking just the United Kingdom, life assurance and pension fund portfolios' holdings of overseas assets rose from some 3%–5% in the early 1960s to 19% by the end of 1992; a list of the funds available to those who wish to invest outside the United Kingdom suggests that this proportion will continue to rise, current events notwithstanding. Collective investment vehicles in the United States appear already to be diversifying their portfolios worldwide.

Trade and investment are now managed on a global basis and international markets operate on the basis of decisions taken and news arising just about anywhere. The international news agencies and media have targeted their market very effectively. However, although it may follow naturally that events, particularly those creating risk of loss, should influence a wider group of financial markets, it does not seem to me to be obvious that that should create greater volatility in the markets. Perfect markets, we were taught, behave rationally, not erratically. But that is what appears to have happened as markets have become more open and accessible. Until recently, it seemed that this greater volatility was primarily if not exclusively within a given market—foreign exchange in 1992 and 1993, equities in 1987 or bonds in 1994; but the experience of recent months raises the possibility that the contagion may have spread across markets.

Another phenomenon, again not problematic *per se*, is that innovation and competition represent very powerful and fast-changing forces that constantly challenge pre-existing business strategies. Being on the leading edge is exhilarating, and indeed vital, to survival in most international businesses—whether industrial, commercial or financial. That said, the pace of change needed to stay abreast of the competition may be taxing financial agents, particularly those who manage funds, to the point where abrupt changes in sentiment take place. Complexity plays its part too. Financial products and business decisions are no

(1) In a speech delivered on 1 July at the Annual Managed Derivatives Industry Conference in New York.

longer as straightforward. In a word, people get jumpy. Investors, faced with increasing pressure to perform, can at times behave like a shoal of small fish: all turning quickly and at once out of a feeling that there may be safety in numbers when there are dangers around them. The presence of one or two large sharks can greatly aggravate this behaviour.

This tendency, if true, is aggravated by the emphasis on short-term performance. Those whose results are assessed on a quarterly basis and according to a league table can hardly be expected to take a passive attitude to the flow of information which comes to them. Steady nerves are in short supply when the business in your market is all one-way. Sophisticated models may help manage correlated risk when markets are deep and functioning well; but they may not be able to cope—or dealers may put them to one side—when several markets are moving rapidly together.

The role of central banks

How do central bankers respond to such fears? First, I do not think we should exaggerate what we see. It is not clear yet that market disturbances in recent times lie outside the limits of what we have seen in the past. Memories do tend to be selective, marking previous periods of instability. In the real world, perfect markets are hard to find.

Second, let us look at the basics. Central banks in most countries have three main roles:

- the maintenance of monetary stability: so that business and economic life can go forward and deliver the welfare gains of a properly-functioning market economy;

- the maintenance of financial stability: ensuring sound financial institutions so that monetary stability can be safely pursued and so that economic agents—individuals as well as firms—can conduct their business with confidence; and

- the maintenance of stable payments systems so that financial transactions can be safely and efficiently executed. Some central banks, such as the Bank of England, play an even wider role, helping the financial infrastructure of markets and systems more generally to operate efficiently.

The developments which I outlined earlier certainly make the task of managing *monetary policy* challenging, on several counts. First, the assessment of monetary conditions can be made more difficult, first by unpredicted—and unpredictable—shifts in the measures of the intermediate targets of policy, notably money supply. Germany is the country most recently going through this experience. Secondly, policy-makers need to assess and evaluate the effects on financial markets of changes in the control variables, notably short-term interest rates. The exact response of holders of financial assets to officially determined changes in short-term interest rates is inevitably a matter of uncertainty and the more so when financial markets are themselves suffering a bout of instability. And thirdly and most important for those carrying out monetary policy, changes in the relationships between the control variables, the intermediate targets and the ultimate objectives of monetary policy can of course be clouded by extraneous disturbance in financial markets.

Complex though these issues are, there is no sense of drift or inertia among central bankers. We never have used simple rule books in the conduct of monetary policy; adaptability to change and the ability to detect it have always figured highly in our job descriptions. Let me repeat what I said at the outset: despite the current turbulence in financial markets, the outlook for the principal economies is very much brighter than for some time past. Monetary and macroeconomic policies generally seem to me set in the right direction.

This is also important for *financial stability*. I can think of no better way of bringing greater stability to financial markets and financial institutions than achieving the avoidance of exaggerated cycles of economic activity, accompanied by large swings in prices of goods and services of all kinds. The connections between the real and the financial economy have never been closer. Individuals as well as companies are very alert to movements in the relative rates of return on a wide range of savings and investment vehicles, foreign as well as domestic. At present, their behaviour suggests a lack of conviction that the inflationary dragon has been slain, and the coexistence of low nominal and positive real rates of interest has not yet sunk in for people accustomed to seeing their savings repeatedly destroyed by higher prices of goods and services. A period of steady growth in real incomes should gradually generate more stable expectations and less volatile investor behaviour.

The role of derivatives

But, you will quite correctly argue, this is certainly not yet the world we live in; rather we have encountered a heightened uncertainty. The emergence of derivatives is, at least in part, a response to this climate of greater uncertainty. They may even be giving the wheel of asset-price volatility a further spin, making the task of the central banker correspondingly harder. Does this lead us to want to outlaw them, regulate them out of existence or even wish they did not exist?

I should like to add my voice to those central bankers who have already acknowledged the value of derivatives. Chairman Greenspan set out the case eloquently in his recent testimony to Congress. Derivatives clearly meet a market need. They diffuse and re-allocate risk to risk-bearers who are more willing to bear it. The efficiency of financial markets is improved and indeed the economy generally benefits. Contrary to some perceptions, innovation is welcome to central bankers since it is the life-blood of

efficient, dynamic markets, and policy is better conducted in such an environment than in one in which signals and responses are obscured or distorted.

But as with all innovations, questions also arise. I do sometimes wonder whether the mixture of Greek letters, mathematical formulae and very large numbers does not have the same mesmeric and scary effect as the Wizard of Oz. Some derivative products are complex to the point where the risks being assumed are not evident to the buyer or user. What are the risks and how is the financial community —participants as well as central banks and other regulators—dealing with them? The catalogue of risks is well known and admirably set out in a number of reports coming from both public and private sector sources. I would also refer you again to the very comprehensive statement made by Chairman Greenspan who reported on the scene in the United States. Let me also go through them and record progress in tackling them, as seen from the angle of someone who sits on international committees spanning the G10 and the European Union.

Derivatives are originally a response to *market* risk, the possibility that current and future values might diverge. Trading in these products itself of course carries market risk —the customary prudential response to which is to require those authorised to trade in these products to hold capital against the possibility of loss. I believe both the market participants and the regulatory authorities have come a considerable way in identifying the capital needed for derivatives and all other instruments carrying market risk. Until recently, the methodologies used by either side differed fundamentally. The G10 Committee of Bank Supervisors is now well advanced in considering whether the models used by the leading participants in the markets, which relate the capital requirements to the risk of the overall portfolio, might also play a part in determining these requirements. Perhaps as important, the G10 is also focusing on the qualitative controls that management of supervised entities should employ in managing these activities.

I rather doubt whether models will represent the way forward for all firms involved in derivative activities; we may need to have more than one approach to hand to cope with the needs of the less active and less sophisticated firms. The possibility of a dual approach to capital adequacy is also reflected in the provisions of the Capital Adequacy Directive enacted last year in Europe. I cling to the hope that the progress being made in this connection by banking supervisors, both in the G10 and the European Union, will find a positive response from the securities supervisors. It would be regrettable if securities firms from the United States and Japan, in particular, found themselves operating under a different system from those in the European Union and other G10 countries in which this business is carried out primarily by banks.

Banks, securities houses and regulators have also targeted *counterparty* or credit risk as a priority area. The credit losses suffered by banks during the last cycle have been a powerful spur and, indeed, the risk-management models being developed in the market not only encompass counterparty risk in derivative trading but also address credit risks of the more conventional kind. It took a space programme to lead to the discovery of Teflon, and perhaps the work on derivatives will greatly enhance our understanding of credit risk. Rocket scientists have their other uses.

I am perhaps less optimistic about *liquidity* risks. We have seen examples over the last few years of individual instruments and markets that can ‘dry up’. There are some signs that this is happening on a wider scale during the current period of market disturbance. This could mean that the absence of liquidity in a given market, notably bonds, was creating the conditions for greater volatility in price movements not only in that market but in other markets connected or linked, in a way not previously observed. Against this possibility, regulators will be looking with an even keener eye at the stress tests and behavioural assumptions built into the risk models used by firms active in derivative trading. Perhaps we are seeing a development in markets at the moment which will have as its result a far more meaningful understanding of the liquidity and contagion risks in these markets; and if the development occurs without serious damage being done to either the principal players or to the markets themselves then the experience may be worth much more to us than any amount of stress testing—although we are still likely to insist on it.

The derivative sector, if there is such a thing, is still an example of comparatively *concentrated* risk. Both in the London and New York markets, over three quarters of the business in swaps and options is being conducted by a small handful of authorised firms.

So long as these firms maintain their expertise, this degree of concentration seems unalarming and does not call for any regulatory response. However, the regulators still carry the scars of previous clusters of exposure which they did not realise represented a dangerous concentration until it became all too painfully clear. A good part of the problem was that the population of the sector in question—and the scale of its activities—was not sufficiently evident in advance of the difficulty. One cannot rule out the possibility that serious problems being encountered by a large player in derivatives might not knock on more or less automatically to others who are known to be very active in the business.

The answer to this, and to other questions posed by derivatives, is greater transparency and disclosure, accompanied by common and satisfactory accounting rules. It is a second-order, but nevertheless important, question whether disclosure should be only to the market, which is then free to make its own judgments, or also to regulatory authorities. My own preference is to have both, but certainly not to the point that all those who use derivatives need to be

regulated. The criterion should be the capacity to endanger the financial system.

As with other new financial instruments, derivatives raise questions of *legal*, *operational* and *reputational* risk. It would be naive to think that problems might not arise in any or all of these areas. The authorities in most developed countries have picked up the need to ensure that contracts involving derivatives, notably but not exclusively netting contracts, are robust under legal challenge. In many countries, this has been done by changing the law. In the United Kingdom, we are tackling this through the medium of the Financial Law Panel, whose views carry great influence in the UK courts without necessarily involving new legislation. In the area of operational risk, computers can fail, creating difficulties for the settlement of outstanding transactions; and settlement itself contains counterparty and other forms of risk, of course.

Both the authorities and the markets have, I believe, anticipated many of the problems here by re-examining carefully the risk characteristics of wholesale payments and settlement arrangements. The Federal Reserve led the way five years ago in pointing up the hitherto submerged set of issues in the payments field and, as you will know, organised a repeat of its original symposium at a conference held earlier this year in Washington. European payments regulators have already published a set of principles governing the operation of national wholesale payment systems in the European Union and are now turning their attention to the integration of these systems in Stages 2 and 3 of European Monetary Union. The G30 Report on settlements in equities markets demonstrated that market participants make their own invaluable contribution in this area. Likewise the efforts currently being made on both sides of the Atlantic to establish multilateral, multicurrency payments systems.

Payments and settlements now represent an area which is enjoying a great deal of attention from both the market and from regulators, and the way forward in reducing risk is satisfyingly clear; but we must press on with the implementation of the reforms to the financial infrastructure needed to underpin the development of derivatives and other traded financial instruments.

Reputational risk arising from transactions involving customers needs little elaboration from me. Financial institutions will make their own assessments of whether the damage to their reputation exceeds the financial costs of picking up or sharing losses which arise in the course of derivatives transactions carried out by their customers. The market will find its own solution. I sincerely hope that, in the process, sight is not lost of the principle that willing buyers and sellers should carry responsibility for their own decisions.

Conclusion

As you can see, good progress is being made in capturing and confining the risks which arise from derivatives operations. The supervisors and regulators in the main centres are working hard in specialised groups to find solutions that deliver regulation without strangulation. Perhaps equally important, the market is developing its own form of safeguards by insisting on greater disclosure and transparency, improved accounting rules, collateralisation and margining requirements that protect both them and the ultimate users of the product. As a regulator and central banker whose direct responsibility includes the stability of the financial system, I feel this combination of effort must be the right way.

There is also encouragement to be taken from the fact that, over a period of two years when conditions in the market have been particularly taxing, no large failures have occurred. Some parties have of course made losses, some of them very substantial; and we are by no means yet out of the woods. We have already seen failures arising directly from mistakes made as a result of derivatives trading. It would be an imprudent man who would claim at this stage that a threat could not arise to the system.

Nor do I feel that all the questions of risk have yet been fully answered. We need more reliable and complete data, so that those whose responsibility it is to maintain the stability of the system can have a good idea of where the failure might arise and what might be the consequences of such a failure. We need a better understanding of the relationship between derivatives markets, cash markets and the behaviour of economic agents. And we need a clearer view of how the risk management techniques employed by banks and other financial institutions measure up to the task of producing the correct combination of profit and prudence in an uncertain financial environment.

Nevertheless, progress is being made. The earliest apprehensions about derivatives have been replaced by a methodical analysis of the possible sources of difficulty. The facts are being collected to illuminate that analysis, and regulators and regulated seem generally at one on what needs to be done—although the detail will no doubt excite the usual passions on both sides. Central bankers are, as a whole, ready to take part in the exercise to trade off the costs and benefits of derivatives. With their interest in financial stability, that is both desirable and inevitable. We have a somewhat perplexed user group to persuade. There is therefore a joint interest, regulators and market participants, in finding a safe and profitable way ahead.