

Bank of England Quarterly Bulletin



November 1996

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Bank of England Quarterly Bulletin

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Summary 359

Recent economic and financial developments

The operation of monetary policy 361

Note on developments in the gilt repo market 375

The international environment 379

Box on developments outside the largest overseas economies 382

Financial market developments 387

Research and analysis

Interpreting sterling exchange rate movements 394

The demand for Divisia money by the personal sector and by industrial and commercial companies 405

International monetary policy co-ordination: some lessons from the literature 412

The external balance sheet of the United Kingdom: recent developments 418

Box on the co-ordinated portfolio investment benchmark survey 420

Box on measurement issues: cross-border repos 422

Public sector debt: end-March 1996 426

Reports

How should central banks reduce inflation?—conceptual issues 434

Developing voluntary domestic markets for government debt 449

***Financial Stability Review*—a profile of the new publication** 462

Speeches

Research and policy at the Bank of England 463
Speech given by the Deputy Governor on 5 September at the Money, Macro and Finance Conference

Practical issues arising from the introduction of the euro 471
Introductory comments given by the Governor and John Townend, Deputy Director, at a press conference on 16 September

Box on the statistical implications of the single currency 474

Economic policy approaches—some reflections 475
Lecture given by the Governor on 14 October at the Reserve Bank of India

Risk reduction in payment and settlement systems 481
Chartered Institute of Bankers' Gilbert Lecture given by the Governor on 22 October

Statistical annex 487

Volume 36

Number 4

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Bound volumes of the *Quarterly 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 back page for details of other Bank of England publications.

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The Quarterly Bulletin and Inflation Report

Inflation Report

(published separately)

The *Inflation Report* reviews developments in the UK economy and assesses the outlook for UK inflation over the next two years in relation to the government's inflation target—a twelve-month rate of 2½% measured by RPIX. Section 1 examines retail prices, Section 2 considers money, credit, and financial market data, including the exchange rate, and Sections 3, 4 and 5 investigate demand and output, the labour market and firms' pricing behaviour respectively. Section 6 presents the Bank's medium-term inflation projections and discusses the risks surrounding them.

The operation of monetary policy

(pages 361–78)

There was no change in UK official interest rates, which remained 5¾% throughout the period from July to September. Sterling ended the period stronger, at its highest level on the effective exchange rate index (87.0) since March 1995. Gilt sales of £11.2 billion were made in the period, bringing total gilt sales for the fiscal year to date to £22.3 billion.

The international environment

(pages 379–86)

In Germany, the pause in growth, which started in the middle of 1995, now appears to be over. There is less sign of a revival in activity in France and Italy. Output and employment have continued to grow rapidly in the United States. The recovery in the Japanese economy that started around the end of last year has continued, albeit at a moderate pace. Inflation in the major overseas economies has been low in recent years. There are some signs of a slight pick-up in the United States, but the evidence is mixed. Inflation has fallen further in most European countries and remains negligible in Japan. Producer price inflation is very low in almost all the industrialised countries. Interest rates were trimmed in Germany and other European countries in September, continuing the recent shift in policy mix towards tighter fiscal and looser monetary policy. Official interest rates were left unchanged in the United States and Japan.

Financial market developments

(pages 387–93)

Bond and equity prices rose slightly in most major financial markets, probably reflecting a market view that the interest rate and inflation outlook in the major economies was more favourable than previously thought. Issuance and secondary market turnover remained high in bond and equity markets, as did activity in OTC and exchange traded derivatives. Prospects for Stage 3 of EMU remained a major influence on participants in most markets in the third quarter, and there is evidence of a continuation of convergence-related positioning as well as some convergence of European bond yields.

Research and analysis

(pages 394–433)

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

Interpreting sterling exchange rate movements (by Mark Astley and Anthony Garratt of the Bank's Monetary Assessment and Strategy Division). This article considers the analysis and interpretation of exchange rate fluctuations. It stresses the importance of identifying the sources of exchange rate movements, and recognising the many channels through which they can affect consumer prices. It reports empirical results which confirm that there is no simple relationship between the exchange rate and inflation. Sterling exchange rate depreciations are not necessarily associated with rises in UK consumer prices relative to prices overseas. In particular, UK prices may fall relative to those overseas if the depreciation is caused by increases in aggregate supply or falls in real spending, but rise if it is caused by increases in the money supply.

The demand for Divisia money by the personal sector and by industrial and commercial companies (by Norbert Janssen of the Bank's Monetary Assessment and Strategy Division). This article updates previous Bank analysis of Divisia money. It assesses the demand for Divisia money by the personal sector and by industrial and commercial companies (ICCs). Divisia money weights the component assets of M4 according to an estimate of the transactions services they provide. As an index of total liquidity in the economy Divisia

might therefore be more closely related to spending than simple-sum monetary aggregates. The article concludes that a sectoral analysis of Divisia money can contain important information about future spending.

International monetary policy co-ordination: some lessons from the literature (by Charles Nolan and Eric Schaling of the Bank's Monetary Assessment and Strategy Division). This article provides a brief survey of the academic literature on monetary policy co-ordination. Particular attention is given to identifying any guidance it may offer on how best to arrange the nominal framework between EU countries in the run up to, and following, EMU.

The external balance sheet of the United Kingdom: recent developments (by Andrew Clayton of the Bank's Monetary and Financial Statistics Division). Continuing the annual series which began in 1985, this article describes the principal influences on the external asset position of the United Kingdom arising from capital flows and from the impact of valuation changes to existing assets and liabilities. The article includes an international comparison of external asset positions and reviews developments in the United Kingdom's net investment earnings from abroad. It also describes the preparation for an internationally co-ordinated survey of cross-border holdings of portfolio assets, and recent evidence of the scale of UK-based repo business in foreign securities.

Public sector debt: end-March 1996 (by Nick Parish of the Bank's Monetary and Financial Statistics Division). This article continues the annual series analysing the public sector debt position and the composition and distribution of the national debt. In 1995/96, the nominal value of the net debt of the public sector rose by around £33 billion, while market holdings of the national debt rose by around £38 billion. As a proportion of GDP, these measures increased by 2.7 and 3.4 percentage points respectively, to 44.6% and 47.5%. In the twelve months to the end of March 1996, the ratio of general government consolidated gross debt to GDP (calculated on a Maastricht basis) rose by 3.3 percentage points to 53.8%, remaining well below the 60% reference level specified in the Maastricht Treaty.

Reports

(pages 434–62)

How should central banks reduce inflation?—conceptual issues. In a paper prepared for the Symposium on 'Achieving Price Stability' sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Mervyn King, Executive Director and Chief Economist of the Bank of England discusses how quickly a central bank should reduce inflation to its desired level following an inflationary episode. He argues that a central bank is unlikely to wish to move immediately to price stability, since there are costs to disinflation and these costs increase more than proportionally with the rate of disinflation. These costs, which arise because economic agents have to learn about the central bank's commitment to price stability, also mean that a central bank may wish to react to shocks to output as well as to inflation. But Mervyn King stresses that any such response should be cautious in the period in which the private sector is still learning about the central bank's commitment to price stability.

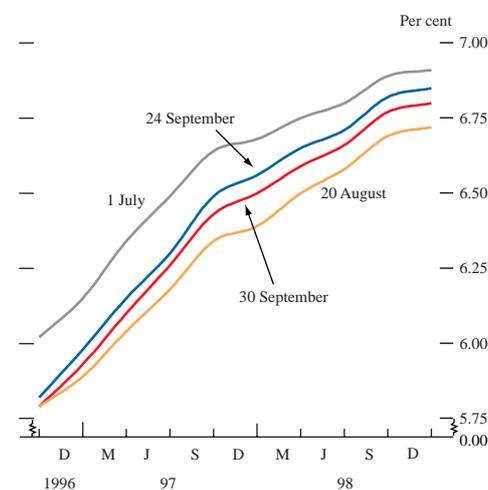
Developing voluntary domestic markets for government debt. For the Bank of England's 1995 Central Bank Governors' Symposium, Max Fry, Charles Goodhart and Alvaro Almeida surveyed the objectives, activities and independence of central banks in developing countries. One striking finding was that developing countries suffered considerably higher inflation than the OECD countries. While the proximate cause was more rapid money growth, their work suggested a more fundamental cause was that developing country governments resorted to their central banks much more for deficit financing. For the Bank of England's 1996 Central Bank Governors' Symposium, Max Fry was asked to investigate in more detail the ways in which governments finance their deficits.

Financial Stability Review—a profile of the new publication. The Bank, in association with the Securities and Investments Board, launched a new publication, the *Financial Stability Review*, at the end of October. The *Review* will highlight developments, whether in the United Kingdom or overseas, which might affect the stability of the financial system. It will also promote the latest thinking on risk, regulation and market institutions, as well as providing a forum in which ideas about regulatory change can be debated dispassionately.

The operation of monetary policy

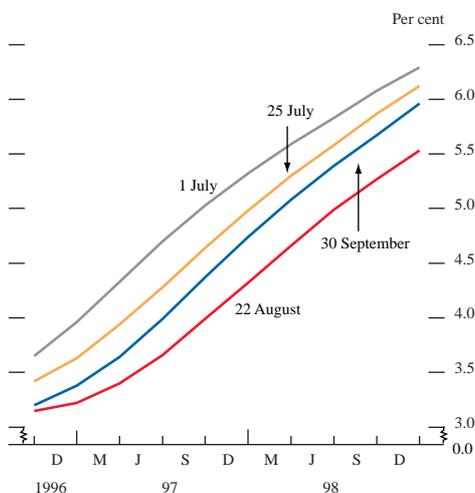
- *There was no change in UK official interest rates, which remained 5³/₄% throughout the period from July to September.*
- *Sterling ended the period stronger, at its highest level on the effective exchange rate index (87.0) since March 1995.*
- *Gilt sales of £11.2 billion were made in the period, bringing total gilt sales for the fiscal year to date to £22.3 billion.*

Chart 1
Eurodollar futures^(a)



(a) 90-day eurodollar rates implied by traded futures contracts.

Chart 2
Euromark futures^(a)



(a) 90-day euromark rates implied by traded futures contracts.

Market developments

The main influences on international financial markets were the continuing uncertainty about inflationary pressure and, consequently, the path of monetary policy in the United States, and, in Europe, the unexpectedly large easing of German monetary policy in August. The Bundesbank's cut in its money-market repo rate on 22 August gave a number of other EU countries scope to reduce their own official interest rates. Financial markets appear to have taken the view that monetary easing, by improving the outlook for activity in a number of EU countries, would increase the probability that these countries would meet the Maastricht criteria—particularly the fiscal criteria—for participation in European Monetary Union (EMU). They took further encouragement for this view from the budget plans unveiled by a number of EU countries in September.

The dollar and US markets

In the United States, movements in short-term implied interest rates in this period contrasted with those in the first half of the year, when implied rates had risen on the basis that the economy was growing strongly, and at a rate which financial markets believed would result in inflationary pressure requiring a tightening of monetary policy. Financial markets worldwide watched the monthly US labour statistics—in particular the headline change in non-farm payrolls figure—extremely closely. But markets revised down their expectations when the Federal Open Markets Committee (FOMC) left policy unchanged.

Interest rates implied by the shorter-dated three-month Eurodollar futures contracts accordingly fell by 20–25 basis points over the period as a whole. By end-September, the term structure of forward interest rates was lower but slightly steeper. Ten-year Treasury bond yields fluctuated between 6.5% and 7.05% as expectations of the path of US monetary policy waxed and waned; bond volatility data indicate that uncertainty about the cash price of ten-year Treasuries in December 1996 increased slightly. Medium/long yields and nominal forward rates fell towards the end of the period as bond markets worldwide rallied following the FOMC's 'no change' decision at its 24 September meeting, together with the subsequent publication of benign US economic data. Ten-year yields ended the period at 6.75%, little changed from

Table A
Interest rates, gilt yields and exchange rates; selected dates^(a)

1996	Interest rates (per cent per annum)				Short sterling future (d)	Gilt yields (b) (per cent per annum)			Exchange rates			
	Sterling interbank rates (c)					Conventionals	Index-linked		ERI	\$/£	DM/£	
	1 month	3 months	6 months	12 months			Short	Medium				Long
1 July	5 ³ / ₄	5.49/64	5.25/32	6.1/32	5.90	7.38	7.91	8.22	3.85	86.5	1.5557	2.3698
10 July	5.47/64	5.45/64	5.45/64	5.61/64	5.77	7.32	7.89	8.20	3.80	86.5	1.5535	2.3688
22 August	5.23/32	5.45/64	5.45/64	5.61/64	5.70	7.13	7.78	8.12	3.70	85.1	1.5485	2.3162
30 September	5.27/32	5.55/64	5.61/64	6.3/16	5.98	7.09	7.66	7.99	3.64	87.0	1.5640	2.3854

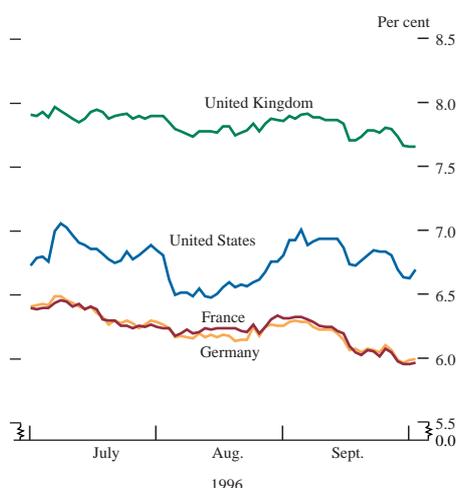
(a) Close-of-business rates in London.

(b) Gross redemption yield. Representative stocks: short—7% Treasury 2001; medium—7½% Treasury 2006; long—8% Treasury 2015; index-linked—2½% Index-Linked Treasury 2016 (real yield assuming 5% inflation).

(c) Middle-market rates.

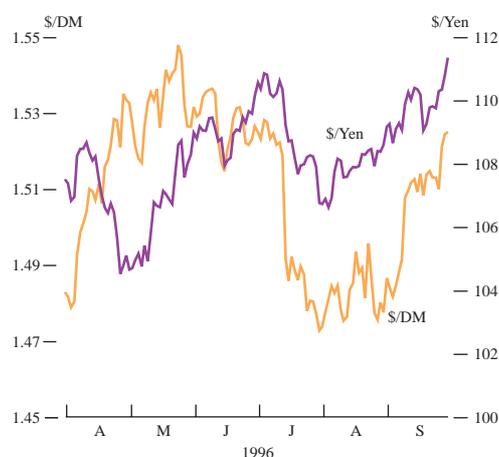
(d) Implied future rate: December 1996 contract.

Chart 3
Ten-year government bond yields^(a)



(a) Gross redemption yields on a semi-annual basis.

Chart 4
Dollar exchange rates



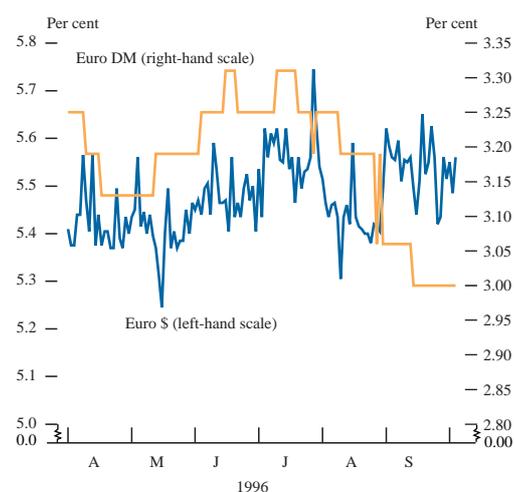
three months earlier. In contrast, as discussed below, government bond yields in the United Kingdom, Germany, France and many other EU countries declined over the period as a whole.

The dollar's effective exchange rate rose by 0.3 points to 97.5 in this period. Its movements were influenced in the main by uncertainty concerning the prospects for German and (to a lesser extent) Japanese, as well as domestic US, monetary policy. Having weakened during July, it subsequently recovered, supported by the official rate reduction in Germany and a perception that the US economic conjuncture remained benign.

For much of 1996 the dollar has been supported against the other G3 currencies by the development of relative interest rate expectations and by the buoyancy of US capital markets. The spread between expected short-term US and German rates continued to widen in this period, in the main due to the downward movement in the German yield curve which followed the rate reduction. But this failed to lift the dollar which ended the period at DM 1.5252, virtually unchanged from the end of June. In July several events weakened the dollar: the sharp falls in the US stock market on 15/16 July, the Bundesbank's decision to leave rates unchanged at its Council meeting on 25 July, and Japanese official comments interpreted as meaning that monetary policy would be tightened sooner than had been expected. On 16 July, the dollar experienced its sharpest fall since September 1995, from DM 1.5125 to DM 1.4920. It gradually recovered its losses over the remainder of the period. This was helped by the release of a weaker-than-expected Tankan survey, which reduced expectations that monetary policy in Japan would be tightened in the near future; the German interest rate reduction; and US asset markets' favourable reaction to the FOMC's decision to leave official rates unchanged.

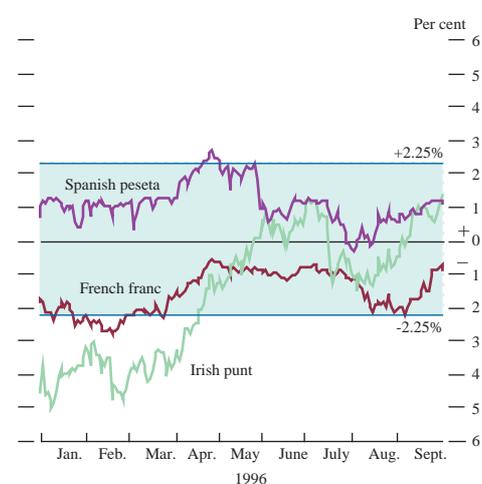
The dollar (and sterling) rose by around 1% against the Deutsche Mark on 10 September, as market expectations of a possible rate rise at the September FOMC grew. The dollar was also supported by the August non-farm payrolls data which showed that the rate of unemployment had fallen further to its lowest level since 1989, and press reports suggesting a majority of regional Federal Reserve presidents favoured a ½% increase in the target federal funds rate. Ahead of the FOMC meeting on 24 September the dollar reached DM 1.5131. In the event, the decision to leave rates unchanged had little lasting impact on the US currency.

Chart 5
Eurodollar and euro-mark implied interest rates^(a)



(a) Implied by December 1996 futures contracts.

Chart 6
Movements of the French franc, Irish punt and Spanish peseta in the exchange rate mechanism^(a)



(a) Using the Deutsche Mark as a central rate.

Table B
Ten-year government bond yield differentials against German bunds^(a)

	1 July	21 August	30 September
United States	33	36	70
United Kingdom	149	159	165
France	-1	8	0
Italy	279	309	244
Ireland	94	106	75
Denmark	85	91	82
Spain	222	251	179

(a) In basis points.

Continental European Union currencies and markets

The significance of the German easing of monetary policy is best seen in a wider European context. In the first half of 1996, monetary policy had been eased in Germany and in a number of other EU countries. Financial markets appear to have taken the view that the prospects for EMU going ahead had improved. At the beginning of the third quarter, however, expectations emerged of a stronger recovery in the German economy. The Bundesbank Council left interest rates unchanged at its July meeting, which was interpreted by financial markets as making it more difficult for other EU countries to ease their official rates, dampening the prospects for activity and so fulfilment of the Maastricht criteria, particularly the target for fiscal deficits.

Exchange rate tensions briefly re-emerged within the ERM towards the end of July, when the French franc weakened on mounting evidence that the economic conjunctures in France and Germany were markedly different. German manufacturing orders were much stronger than expected, but surveys of both business and consumer confidence in France were gloomy. The franc weakened to above FFr 3.40 for the first time since May on 5 August, and the Spanish peseta weakened to a eight-month low against the Deutsche Mark following the announcement by the Spanish authorities that additional borrowing of more than 0.7% of GDP would be required to finance 'inherited budgetary insufficiencies'.

However, other financial market indicators, such as the differential between German and French expected short-term interest rates beyond 1999 and ten-year bond yield differentials, generally remained convergent. And throughout the period, ERM currencies traded in a fairly narrow band during European trading hours.

The Bundesbank cut its repo rate by an unexpectedly large 30 basis points on 22 August, paving the way for cuts by many other EU central banks in the following days. It was the first of a series of events which appear to have increased the probability the market attached to the achievement of EMU. The passage of a package of spending cuts by the German parliament reassured the markets about Germany's ability to meet the Maastricht fiscal criteria. Many other EU countries unveiled their own budget plans in September, with the common theme of projecting that the fiscal deficit target would be met on time. Financial markets reacted by narrowing spreads over German bunds, and by currency appreciation against the Deutsche Mark. The ten-year spread between Spanish government bonds and German bunds narrowed by 72 basis points from 251 basis points on 21 August, the day before the Bundesbank's rate cut, to 179 basis points by the end of September. The Italian government bond/bund spread narrowed by 65 basis points over the same period (see Table B).

The French franc came under pressure again in the first half of September, ahead of the French budget. However, the evolution of option prices during the period suggested that the bout of volatility was likely to be short-lived (the rise in implied volatility on French franc option contracts was most pronounced at the short end). In the event, the budget was received favourably by financial markets:

the Bank of France cut interest rates shortly afterwards and the French franc recovered.

Uncertainty ahead of the French budget also resulted in a marked rise in the level of money-market interest rates in France relative to Germany. This was reflected in an increase in the French franc's two-year forward rate against the Deutsche Mark which reached Ffr 3.4794 on 5 September (3.7% above the French franc's bilateral ERM central rate). However, the depreciation was not expected to continue to any significant degree beyond 1998. The implied differential between French and German interest rates in June 1999 averaged only 0.03% during the third quarter (with a 0.20% range).

Sterling

Sterling ended the period stronger, reaching its highest level on the effective exchange rate index (87.0) since March 1995. Once again, sterling's effective exchange rate index tended to track the dollar's. In July and early August sterling weakened with the dollar, only to recover later in the period aided by a variety of factors: the perception that monetary policy in the United Kingdom was likely to be kept on hold in the short term, reductions in continental European interest rates, dollar firmness ahead of the September FOMC meeting, and sterling's general out-performance of non-core ERM currencies towards the end of the period.

Sterling's effective index reached a 1996 high of 86.9 on 3 July (a 17-month high, and a level which was last approached prior to the unexpected UK rate reduction on 6 June). It then remained relatively firm until the dollar's sharp fall on 16 July, when it initially strengthened before what seems to have been profit taking. As a result sterling's fall against the Deutsche Mark was even more pronounced than the dollar's, and it lost over 5 pfennigs between 16 and 17 July, when it closed at DM 2.3012. As the Deutsche Mark strengthened in the wake of the Bundesbank's decision to leave interest rates unchanged on 25 July, sterling fell further to a low of DM 2.2777 and 84.1 on the index by early August.

However, sterling began to recover from 7 August in a movement that coincided with the publication of the Bank's *Inflation Report*, which said that the Bank's latest view on inflation two years ahead showed a central projection for RPIX inflation a little above the 2½% target, and that a tightening of monetary policy would be necessary at some point to establish a better-than-even chance of achieving the target. Sterling rose by 1% on the index on 7 and 8 August. On 25 August it recovered back above DM 2.30 following the Bundesbank's interest rate cut; however, it remained well below what market chartists reported as key 'technical' resistance levels at around DM 2.3440. These levels were not regained until 10 September, when sterling and the dollar both rose by around 1% against the Deutsche Mark.

Although the decision to leave UK interest rates unchanged at the UK monetary meeting on 23 September was not unexpected, it did remove a downside risk to sterling, which rose from 86.1 to 86.9 on the effective exchange rate index between 24 September and 29 September, and finished the period up 0.5 points at 87.0.

Chart 7
Effective exchange rates

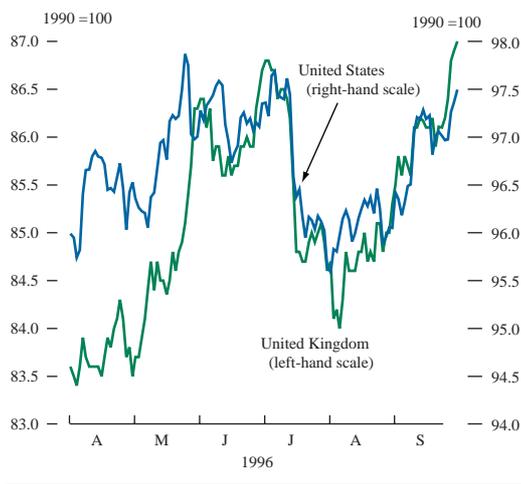


Chart 8
Sterling exchange rates

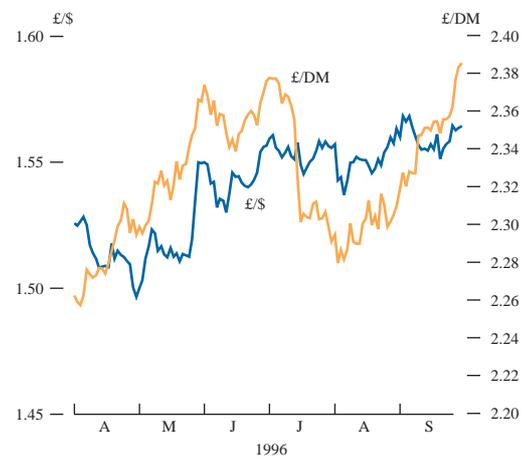
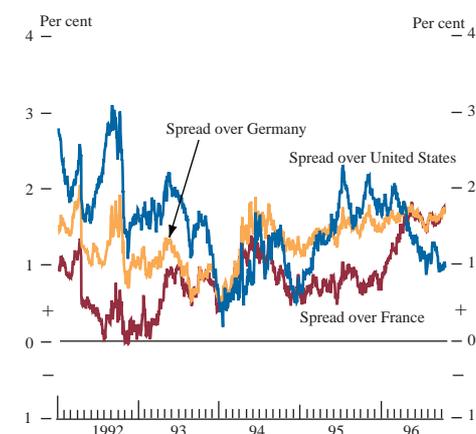
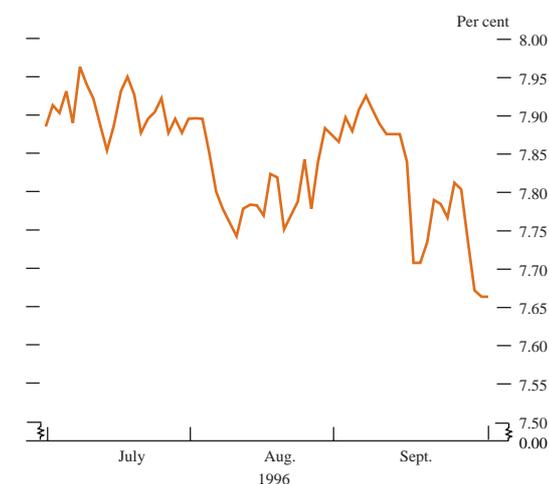


Chart 9
Ten-year government yield differentials
of the United Kingdom over France,
Germany and the United States^(a)



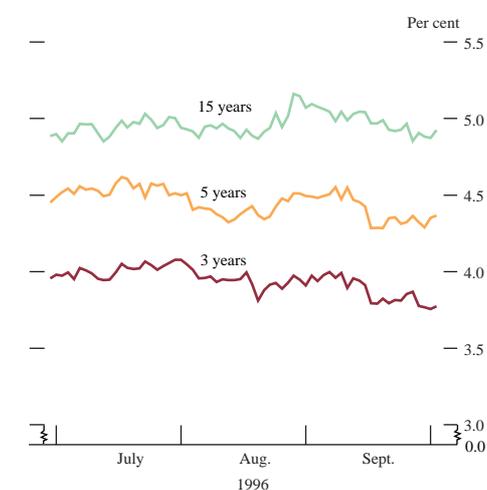
(a) Based on benchmark stocks; gross redemption yields on semi-annual basis.

Chart 10
Yield on ten-year gilt-edged stock^(a)



(a) Gross redemption yield on a semi-annual basis.

Chart 11
Inflation expectations at 3, 5, and 15 years^(a)



(a) Implied annualised inflation in the six-month period beginning 3, 5 and 15 years ahead.

Gilt yields

UK bond yields fluctuated with the changing sentiment over the path of US monetary policy, and shared in the strong rally in world bond markets at the end of September. Nominal gilt yields fell sharply: the ten-year yield ended the period at 7.66%, 23 basis points below the end-June level. The spread against ten-year US Treasuries narrowed by 21 basis points to 96 basis points by the end of the period. However, the spread over German bunds and French OATs widened by 15 and 17 basis points respectively. The gilt market also underperformed Italian and Spanish government bonds, where yields fell markedly towards the end of the period as financial markets attached a higher probability to their joining EMU.

A market perception that UK official interest rates might be reduced further saw the yield curve steepen during August, with the spread between five and 20-year yields reaching a peak of 99 basis points on 30 August. However, market expectations were subsequently revised, particularly following publication on 18 September of the minutes of the 30 July Monetary Meeting, which reported the Bank's preference for higher interest rates and the Chancellor's preparedness to raise rates pre-emptively if necessary. As a result, and with UK official rates unchanged following the Monetary Meetings on 4 and 23 September, the yield curve began to flatten again; the five to 20-year spread fell slightly to 90 basis points by the end of the period, still 6 basis points higher than at end-June.

Inflation expectations

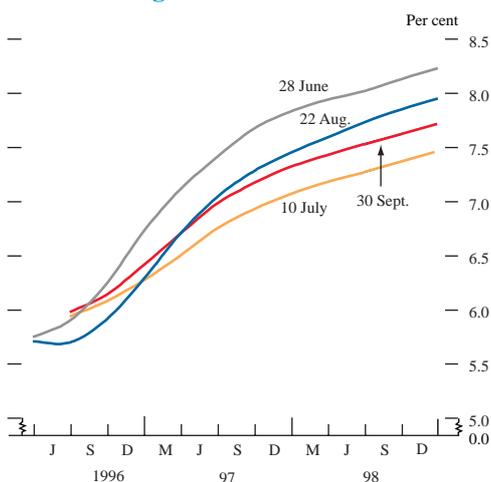
The possibility which the market attached to a further easing of UK monetary policy resulted in a rise in implied forward inflation rates, as derived from the yields on index-linked and conventional gilts. Inflation expectations at the 15-year maturity rose to a peak of 5.16% at the end of August. Towards the end of the period, inflation expectations at all maturities fell: probable explanations include the apparent absence of inflationary pressures internationally, the perception that UK official interest rates were less likely to be reduced further, and, perhaps, the comfort the market appeared to take from the party conferences that risks would not be taken with policy. At the end of September, inflation expectations, as derived, stood at 3.78%, 4.37% and 4.93% at 3, 5 and 15 years respectively. At 15 years this was slightly higher than at the end of June, but was 9 basis points lower at three years and 18 basis points lower at five years.

Sterling money markets

There was no change in UK official interest rates during the period and—for the most part—there was no strong expectation in the sterling money markets that there would be any change. The September short sterling contract reached its lowest implied rate early in the period (5.69% on 10 July), having rallied strongly from the time of the last, unexpected interest rate reduction on 6 June when official interest rates were reduced by 25 basis points to 5³/₄%.

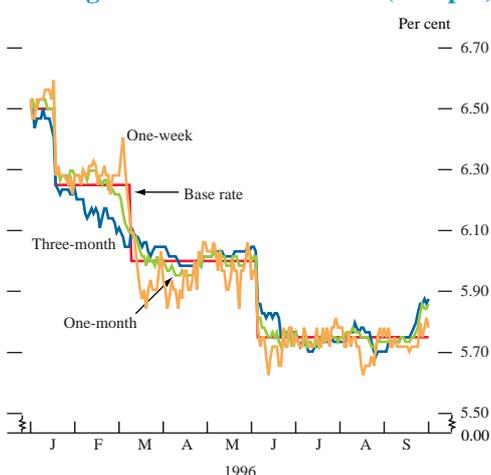
By the end of the period the December contract implied a three-month rate of 5.98%, 8 basis points higher than at the end of June; the September contract had expired on 18 September at an

Chart 12
Short sterling futures rate curves^(a)



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

Chart 13
Sterling interbank interest rates (4.30 pm)^(a)



(a) Middle-market rates.

Table C
Probability of the sterling three-month interest rate implied by the December 1996 short sterling futures contract being less than or equal to 5³/₄% on specified dates^(a)

Per cent	Expected rate (b)	Probability of the rate implied by the contract being 5 ³ / ₄ % and below
1 July (5.86%) (c)	5.90	41.27
10 July (5.81%) (c)	5.77	53.10
7 August (5.81%) (c)	5.84	45.40
22 August (5.81%) (c)	5.70	59.70
3 September (5.81%) (c)	5.73	55.45
30 September (5.95%) (c)	5.98	17.40

(a) See the August 1996 *Quarterly Bulletin* and the *Inflation Report* for explanations of the use of probability distributions of future asset prices implied by options prices.
 (b) The expected rate is, for the date specified, the interest rate implied by the price of the December 1996 short sterling futures contract.
 (c) Sterling three-month market interest rate on the date specified.

implied rate of 5.87%. Further along the short sterling curve implied rates were generally around 30–50 basis points lower than three months earlier. The structure of implied interest rates at the end of September was consistent with a very low expectation of any further reductions in official rates, coupled with reduced expectations of the extent of the eventual tightening in official rates. Within the period, some of the sharpest movements in implied interest rates in the United Kingdom were directly related to shifts in interest rate expectations and to changes in official interest rates elsewhere. The reduced probability financial markets came to attach to a tightening of US monetary policy, and the round of official interest rate reductions in continental Europe, resulted in lower implied rates in the United Kingdom. Domestically, the publication of the Bank's *Inflation Report* on 7 August, and on 18 September of the minutes of the 30 July Monetary Meeting, resulted in sharply higher implied rates.

Table C shows, for specified dates, the three-month market interest rate; the interest rate implied by the price of the December 1996 short sterling contract; and the probability the market attached to the three-month interest rate implied by the contract being less than, or equal to, 5³/₄%. The table is consistent with the market having revised upward its expectation of the path of interest rates over the period as a whole. Within the quarter, the table shows the change in sentiment between the publication of the *Inflation Report* on 7 August and the Bundesbank's rate cut on 22 August, when expectations of the path of UK rates were revised down sharply. However, by the end of the period, the market attached a much lower probability to the December short sterling contract settling at an implied rate of 5³/₄% or less.

Bank's operations in the sterling money markets

It had been expected that the future profile of daily shortages⁽¹⁾ would rise during July, because of a forecast negative central government borrowing requirement—CGBR—(on account of the concentration of tax receipts in this month) and settlement of the dual gilt auction held at the end of the month. Accordingly, the Treasury bill tender had been reduced twice in June, by £200 million on each occasion, to £600 million. In the event, the inflows to the Exchequer were larger than expected, which resulted in relatively large daily shortages in July and tight technical conditions. A further reduction in the Treasury bill tender took effect from 16 September, against the prospect of a further rise in shortages (with another dual auction and large tax receipts, in October, likely to be important influences).

Against this background, participation in the twice-monthly gilt repo facility reached a peak of £4.6 billion after the rollover on 7 August. This demonstrated the operation of the facility as a safety valve reducing pressure on the daily operations. During the period the Bank introduced phased provision and return of funds via the facility over the three days following application, as had been announced in June.

The evolution of the Bank's operating techniques

This continued as a period of evolution in the Bank's operating techniques, reflecting changes in the sterling money markets and

(1) See the box in the February 1995 *Quarterly Bulletin* for an explanation of the factors influencing the daily shortages.

Table D
Influences on the cash position of the money market

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

	1996/97		1996/97	
	Apr.–June	July	Aug.	Sept.
CGBR (+)	8.7	-1.6	5.8	3.6
Net official sales of gilts (-) (a)	-9.3	-4.4	-2.6	-2.9
National savings (-)	-1.8	-0.4	-0.4	-0.5
Currency circulation (-)	-0.6	0.9	-1.5	1.5
Other	2.6	-0.4	-0.8	0.3
Total	-0.4	-5.9	0.4	2.1
Increase (+) in the stock of assistance	2.2	3.9	-2.1	-2.1
Net increase (-) in £ Treasury bills in the market (b)	-1.6	1.8	1.8	0.9
Increase in bankers' balances at the Bank	0.2	-0.3	0.1	0.8

(a) Excluding repurchase transactions with the Bank.

(b) Excluding repurchase transactions with the Bank (market holdings include Treasury bills sold to the Bank in repurchase transactions).

the framework for monetary policy introduced in September 1992, after sterling's withdrawal from the ERM. The market has come to expect that changes in official rates will be made only as a result of a Monetary Meeting, as the new framework for monetary policy has become more familiar. This has not altered the Bank's aim in implementing monetary policy, which remains to achieve and to maintain a structure of market short-term interest rates consistent with the level of official interest rates. But there have been evolutionary changes to the Bank's operating techniques designed to maximise the Bank's influence over the general pattern of short-term market interest rates and to achieve greater stability in very short-term rates.

One key change was the introduction of the twice-monthly gilt repo facility, which has enabled a wide group of market participants—banks (including discount houses), building societies, and gilt-edged market-makers—to mobilise gilts to obtain central bank funds. It has proved a very useful operating instrument alongside the Bank's daily operations in the bill market, the growth of which has not kept pace with bank balance sheets in recent years. One effect has been a pronounced fall in the volatility of very short maturity market interest rates.

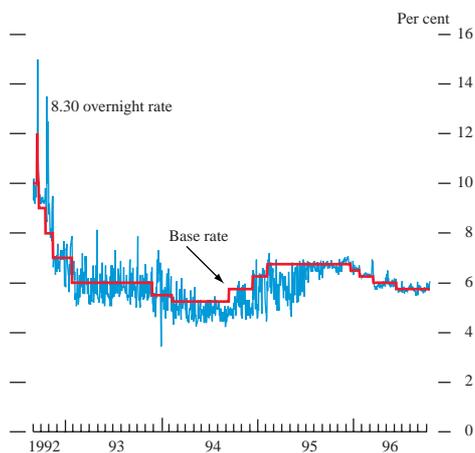
On 19 June 1996, the Bank announced a technical change to the operation of the gilt repo facility with the introduction of phased provision and return of funds over the three days following application. This change smooths the flow of funds to and from the money market, and so reduces the potential for large increases or decreases in participation to have a disruptive impact.

Over recent months, the Bank has made a number of other technical changes with the same general aim of promoting more stable money-market conditions. On 25 April 1996 the Bank re-introduced bill repurchase agreements in its daily operations against a forecast money-market shortage of £2.1 billion. Prior to this, for over a year there had been no necessity to offer bill repos, as shortages had, in general, been adequately relieved through the purchase of bills on an outright basis only. In the succeeding months, the Bank offered bill repos in its daily operations on progressively smaller forecast shortages as the technique again became familiar to the market.

On 18 June 1996 the Bank announced that, in future, invitations to repo bills in its daily operations would be extended to incorporate repo of Floating Rate Gilts (FRG), on the basis that the trading characteristics of FRGs are similar to the assets that the Bank already accepted. This change increased the pool of assets available for use in the Bank's daily operations by around £9 billion, and allowed a wider range of market participants access, via the discount market, to the Bank's operations. FRGs comprised 23% of repos, and 6.5% of all liquidity provided in the daily operations between July and September. At its peak, between 30 August and 4 September, the amount of FRG held by the Bank on repo was over £2.4 billion.

The Bank has also continued to manage actively the pace at which it provides money-market liquidity during the day in order to ensure that it has the maximum impact on the market rates which it aims to influence. In the last few years, the Bank has found this aim is best

Chart 14
Clearing bank base rates and the interbank overnight interest rate^(a)



(a) Middle-market rate at 8.30 am.

achieved by ensuring that it is able to operate throughout the day. More recently, however, the Bank has been able to reduce the market's recourse to its late lending operations. This was done in response to periodic tightness in short-term interest rates, but the ground had been laid by the technical adjustment to the Bank's bill dealing rates at the time of the interest rate reduction on 8 March 1996. This aligned the Bank's bill dealing rates more closely with its desired level for interbank rates, and so allowed for more effective management of market interest rates.

A further key development in the sterling money markets was the introduction at the beginning of the year of the open gilt repo market. As Chart 14 suggests, its advent appears to have coincided with a further reduction in the volatility of market overnight interest rates. One possible explanation is that, by removing restrictions on the ability to repo, borrow or lend gilt-edged stock, the gilt repo market has made it easier for holders of gilts to fund their inventory by repointing out their stock.

The evolutionary changes the Bank has made in the last four years have achieved a fair degree of success. It is now contemplating changes which might be made to its money-market operating techniques following the introduction of gilt repo trading. In addressing these issues, the Bank is considering the ability of the repo market to provide an effective channel for its operations, as well as the range of instruments in which it might deal and the counterparties with whom it might have a money-market dealing relationship. As the Bank has already indicated, if it should decide that the gilt repo market does give it the opportunity to make further changes, it would first consult market participants. (The development of the repo market is summarised in the accompanying note.)

Gilt financing

Gilt sales and financing requirement

Gilt sales to the end of September amounted to £22.3 billion, of which £4.3 billion (19%) was raised via index-linked sales and the remainder through conventional gilt sales. Within conventionals, the distribution of sales was slightly skewed towards long-dated gilts, which accounted for 40% of conventional sales as opposed to around 30% each for short and medium-dated gilts. This reflects the fact that in the first six months of the fiscal year three auctions of long-dated gilts were held, compared with two each in the short and medium-dated areas. As in the previous quarter, auctions accounted for the vast bulk of conventional sales: conventional taps raised less than £500 million to end-September, consistent with the aim of reserving such issues for market management purposes.

Gilt sales to end-September more than kept pace with the rising funding target for the year. During the period, the gilt sales target rose from £34.9 billion to £39.9 billion. £4 billion of this increase related to the upwards revision to the CGBR forecast in the Treasury's Summer Forecast, published on 9 July.⁽¹⁾ The remainder arose through the authorities' decision, announced on 26 July, to call the 6³/₄% 1995–98 stock for redemption on 1 November; such double-dated or 'callable' stocks give the authorities the option to

Table E
Official transactions in gilt-edged stocks

£ billions: *not seasonally adjusted*

	1996/97		1996/97	
	Apr.–June	July	Aug.	Sept.
Gross official sales (+) (a)	11.1	4.4	2.6	4.2
Redemptions and net official purchases of stock within a year of maturity (-)	-1.8	0.0	0.0	-1.3
Net official sales (b)	9.3	4.4	2.6	2.9
<i>of which net purchases by:</i>				
Banks (b)	-0.1	0.2	0.7	0.7
Building societies (b)	0.4	-0.3	0.2	0.0
M4 private sector (b)	6.4	4.2	0.8	1.8
Overseas sector	2.1	0.3	1.0	0.5
LAs and PCs (c)	0.5	0.0	0.0	-0.1

(a) 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.

(b) Excluding repurchase transactions with the Bank.

(c) Local authorities and public corporations.

(1) See Table C in the August 1996 *Quarterly Bulletin* for further detail. Table G shows the financing arithmetic as at end-September.

Table F
Issues of gilt-edged stock

	Amount issued (nominal £ millions)	Date	Average price	Average yield	Cover (a) at auctions	Tail (b) at auctions (basis points on yield)	Date exhausted (c) (taps)
Auctions							
8% Treasury 2000	2,000	24.7.96 (d)	102.94	7.20	4.81	0	
8% Treasury 2015	1,500	26.7.96 (d)	97.91	8.21	1.88	2	
7½% Treasury 2006	2,500	29.8.96 (d)	97.16	7.90	2.69	1	
8% Treasury 2021	3,000	26.9.96 (d)	98.44	8.14	1.73	2	
Index-linked Taps							
2½% Index-Linked 2009	200	21.6.96	163.97	3.80 (e)			01.07.96
2½% Index-Linked 2013	200	11.7.96	140.34	3.78 (e)			01.08.96
2½% Index-Linked 2001	150	11.7.96	180.56	3.52 (e)			18.07.96
2% Index-Linked 2006	150	29.8.96	185.72	3.59 (e)			06.09.96
2½% Index-Linked 2020	200	29.8.96	143.81	3.78 (e)			13.09.96
2½% Index-Linked 2003	200	27.9.96	178.97	3.42 (e)			01.10.96
2½% Index-Linked 2016	250	27.9.96	152.34	3.68 (e)			27.09.96
Conventional Taps							
8% Treasury Stock 2002/2006	50	11.7.96	100.66	7.90 (f)			11.07.96
7½% Treasury Stock 2006	200	27.9.96	99.19	7.61 (f)			27.09.96

(a) Total of bids divided by the amount on offer.

(b) Difference in gross redemption yield between the weighted average of successful competitive bids and the lowest accepted competitive bid.

(c) Taps are exhausted when the issue is no longer operating as a tap.

(d) The auction is held on the day before the stock is issued.

(e) Weighted average real rate of return, based on the actual price at which issues were made, assuming 5% inflation.

(f) Gross redemption yield, based on the price at which the issue was made.

Table G
1996/96 financing requirement

£ billions

	Original remit	At end-September
CGBR forecast	24.1	28.1
Net change in official reserves	0.0	0.0
Gilt redemptions	11.5	12.5
Under/overfund from 1995/96	0.0	2.1
Financing requirement	35.6	42.7
Assumed contribution from national savings	3.0	3.0
Expected contribution from certificates of tax deposit	0.0	-0.2
Gilt sales required	32.6	39.9

redeem the stock on any day within the date-range, subject to three months notice. At the time of calling the 1995–98 stock, market yields had fallen to the point where cost savings could be made through calling and refinancing the stock.

Auctions

The second quarter of the fiscal year contained, in July, the first ever ‘double-headed’ auction in the United Kingdom (auctions of two separate stocks held in close succession), together with the first auction held in the holiday month of August since 1992. Both were introduced this year with a view to moderating the size of individual auctions.

As a previously untried venture, the authorities approached the July double auction with caution, scheduling a total of £3.5 billion for sale rather than the maximum £4 billion allowed for such dual auctions under the Bank’s financing remit, and choosing two stocks at opposite ends of the maturity spectrum so as to appeal to a wide investor base and to provide protection against yield curve shifts. The results of the auctions during the period are shown in Table F. Seen as a whole, the double auction passed off comfortably, with weighted cover of 3.6 times. However, this mainly reflected the outcome of the first, short-dated auction. The 4.8 times cover on this auction was a record—even exceeding the 4.5 times cover for the floating-rate gilt in June—and the range of accepted bids was very tight (no tail). It is likely that the sharp widening of the gilt/bund spread from mid-July, in particular at the short end, contributed to interest in the auction. Spreads also widened in the 20-year area—the maturity of the second auction—but more modestly, and cover on this auction (1.9) was below the average for auctions in the first six months of 1996/97. However, the volume of bids was in line with the long-term average cover for auctions (1.95 since 1991) and above the average cover figure for long-dated auctions (1.7 since 1991). The auction was, in duration-weighted terms, twice as large as the short-dated auction two days earlier. There is some evidence that market-makers did not begin to focus on the second auction until the first was out of the way; the stock saw little repo activity and trading during the When Issued (WI) period was concentrated on the day before the auction. This might

have affected the price discovery process, and seems to have led to a higher dispersion of bids (as evidenced by the yield tail of two basis points). This year has seen a trend towards lighter activity in both the auction stock itself and the parent stock (if an existing stock is being re-opened) during the week leading up to the auction, and for this activity to be concentrated towards the end of the WI week (see below).

In August, the authorities auctioned less than the £3 billion maximum allowed for single auctions in the remit, reflecting a cautious assessment of possible demand given the holiday season. Futures market volumes were relatively low, and the decision on the amount of stock was generally welcomed by the market. In the event the auction produced another strong cover statistic (2.7), and below-average tail (one basis point).

In September, the authorities reverted to announcing the maximum £3 billion of stock on offer. Activity in the auction stock, 8% 2021, was subdued ahead of the auction; the market was generally cautious about positioning itself before knowing the outcome of the US FOMC meeting on the afternoon before the auction. However, market strength after the Federal Reserve's decision not to raise rates, together with underperformance by the gilt market *vis à vis* European markets, helped generate interest in the auction, and cover of 1.73 was in line with the long-term average for long-dated auctions.

At the end of September, the quarterly announcement of maturity ranges for the following quarter confirmed that the October auction would be another double-headed auction (with maturity bands of 2001–03 and 2014–16, both intended to be existing stocks). The date for the December (post-Budget) auction was announced as 4 December, and the intended stock as a new issue in the maturity range 2001–03.

Table H
Auction participation and results: 1991 to date

	Long-term average (a)	Average 1995/96	Average April-Sept. 1996
Cover	1.95(b)	1.75	2.9
Tail	1.8(b)	3.3	1.4
GEMMs' competitive own account bids (as percentage of stock on offer)	146(c)	144	182
Customer competitive bids (as percentage of stock on offer)	40(c)	31	100
GEMMs' allotments as percentage of bids	60(c)	62	39
Customer allotments as percentage of bids	55(c)	61	35
<i>GEMMs' cumulative shortening of positions during WI period (as percentage of stock on offer)</i>			
As at close of business two days prior to auction eve	17.5(c)	11.5	5.0
As at close of business day before auction	31(c)	23	17

(a) All averages are unweighted.
(b) Since April 1991.
(c) Since January 1993.

Table H brings together various statistics on auction participation and outcomes, comparing the first six months of 1996/97 with the 1995/96 financial year and with the long-term record. It indicates continuation of a number of developments touched on in the August *Quarterly Bulletin*, some of which may signify a change in the way the market approaches gilt auctions. Cover is significantly higher this year than last year, and than the long-term average. At the same time, yield tails this year have so far, on average, been smaller than last year and slightly smaller than over the long term. The higher cover stems from increased competitive bidding by GEMMs (as well as use of their new, higher, non-competitive allowance) but, more significantly, from an increase in competitive bids submitted by customers via the GEMMs. These have gone from a long-term average of 40% of the stock on offer (and less than that last year) to 100% of the stock on offer. The increase is significant even if the June auction of a floating-rate gilt (which has tended to attract a high level of customer bids) is excluded. Finally, as far as bidding patterns are concerned, although customers still tend to get a smaller proportion of their bids allotted in auctions than do market-makers, the gap between their 'success rate' and that of the market-makers has narrowed slightly (from 5.6 percentage points as a long-term average to 3.9 percentage points in the six months to September).

These developments are to be welcomed. Wider participation by end-investors in auctions is likely to make the auction process more robust. Market-makers should also benefit from widening participation, at least those who see the customer orders, as this is likely to give them better information on the pattern of demand for the stock.

The increased participation by end-investors may in part be a substitution for buying activity which used to take place in the week before the auction. Table H shows that shorting by GEMMS of positions in the auction stock plus parent over the course of this week has declined; on average in the first six months of this year their positions have shortened, up to auction eve, by only 17% of the stock on offer, compared with a long-term average of 31%. In addition, any shortening activity tends to be concentrated on the two days immediately before the auction (over two thirds, compared with less than half on a long-term average basis).

Conventional taps

Two conventional stocks were tapped during the period: £50 million of 8% 2002–06, issued on 11 July, and £200 million of 7½% 2006, issued on 27 September. The former stock is popular with small retail holders, and at the time of the tap had become exceptionally tight in the repo market; some failures to deliver were reported as the stock became unborrowable. The tap was exhausted in the initial tender at a one-tick premium to the certified price. The second stock was tapped in response to demand and outperformance, evidenced also in the tap being exhausted in the initial tender at a one-tick premium. Financing raised via conventional tap sales in the financial year to end-September amounted to around 2% of total gilt sales.

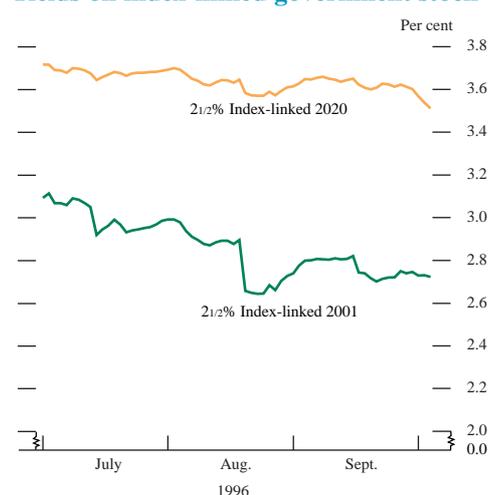
Index-linked

Sales of index-linked gilts during the quarter raised £2.1 billion in cash terms, bringing the cumulative total for the first half of the financial year to £4.3 billion—over 70% towards the aim of making approximately 15% of total gilt sales in index-linked stocks on the current financing requirement forecast. The index-linked sector was tapped on three occasions, with six individual stocks issued of between £150 million and £250 million nominal each.

Index-linked yields fell in this period, partly reflecting the general strength of sterling and sterling asset markets (particularly the equity market), but also increased demand for the sector itself. Real yields in Canada and Australia also declined over the period. Shorter-dated index-linked stocks may also have benefited from re-investment of the proceeds from redemption of 2% Index-linked Treasury Stock 1996 on 16 September: the yield on Index-linked Treasury Stock 2001 fell 35 basis points over the period.

The US Treasury announced, on 25 September, plans to auction ten-year Inflation-linked Notes on a quarterly basis, starting on 15 January 1997. Auctions will be in a single-price format; the principal and interest payments on the Notes will be adjusted by changes in the US consumer price index, and the Notes will be repaid at par, even if the consumer price index falls; and the Notes will be strippable, but the coupons will not be fungible.

Chart 15
Yields on index-linked government stock



Sectoral investment activity

With gross gilt sales in the period of £11.2 billion, and with only one relatively small redemption, net purchases by investors remained at the high levels seen in the previous quarter. The M4 private sector (which includes the large domestic institutional investors such as pension funds and insurers) continued to be the largest buyers of gilts, although their share of net purchases during the period (69%) was below their estimated percentage holdings of outstanding gilts as at end-December 1995 (73%). The share of net purchases during the period by both the overseas sector and the monetary sector was higher than their estimated share of holdings as at end-December 1995; in the case of banks and building societies, this was despite the fact that only one of the four auctions in the period was for a short-dated gilt, which the monetary sector generally finds most attractive.

The latest figures from the ONS show that institutions continued to invest heavily in gilts in the period from April to June 1996, with almost £5 billion put into gilts. As a proportion of total net investment, investment in gilts by institutions has exceeded the overall share of gilts in institutional portfolios for the past 19 quarters; this in part reflects issuing patterns, but also a move to increase gilt holdings by pension funds. The increasing maturity of funds is thought to have contributed to this increase.

Technical developments

It was announced on 13 August that all strippable gilts would pay dividends on a gross basis to holders from 7 June 1997 (the date of their first dividend in 1997). As the precise timing of the start of the strips facility has not yet been fixed—it is expected to be operational in the first half of 1997—this announcement clarified for the market the tax status of the strippable gilts for next year. At the end of September, the nominal amount of outstanding gilts which will be strippable when the strips facility starts was £52 billion, or 22% of total conventional gilts.

Also on 13 August, the Bank announced a conversion offer from 13½% 2004–08 into 8½% 2005, with terms to be fixed on 27 August and the operation to be effected on 26 September. This was the first conversion offer since December 1990, and was undertaken with a view to building up the pool of strippable stocks in advance of the start of the official strips facility. Such offers had been foreshadowed in the Bank's financing remit for 1996–97.

The vast majority (92.4%) of the holders of 13½% 2004–08 (by value) accepted the offer, which resulted in nearly £1.5 billion being added to the 8½% 2005 stock, building it up to over £10 billion. The 13½% 2004–08 was reduced to under £100 million in size, putting it on the list of small illiquid stocks for which the Bank is prepared to offer a price to market-makers to ensure that a two-way market can continue for remaining investors.

In September, the timetable of the Central Gilts Office (CGO) settlement service was amended, following a period of notice, to extend the period for delivery-by-value (DBV) transactions; the afternoon period for inputting member-to-member (MTM) transactions was reduced to enable this; DBVs deliver a bundle of

unspecified gilts to a specified value and are used by some participants for general collateral gilt repo transactions and for the provision of collateral against stock loans. The Bank made the change in response to requests from market participants to encourage members to input trades as early in the day as possible and to allow more time for DBVs to be input. The change followed a period of consultation with the market.

UK Government foreign currency borrowing

Government dollar issuance

During the quarter, the UK Government launched two five-year issues in the international bond market for routine debt management purposes—to refinance the UK \$4 billion floating-rate note issue which matured on 30 September 1996. The first issue, launched on 15 July, was a \$2 billion fixed-rate $6\frac{3}{4}\%$ bond maturing on 19 July 2001; the issue was underwritten and jointly lead-managed by Goldman Sachs International and SBC Warburg as joint lead managers and a syndicate of other leading international firms. The bond was launched at a spread of 5 basis points above the comparable five-year US Treasury bond. The issue sold out on the day of launch, and the spread immediately tightened to 4 basis points over Treasuries in the days after launch. Most recently the issue has been trading in a range of 1–2.5 basis points above the comparable Treasury. The bond was sold to a wide range of international institutional and retail investors and has been among the most actively traded international bond issues since its launch.

The second issue was a \$2 billion floating-rate note launched on 19 September and maturing in October 2001. The FRN was underwritten by Barclays de Zoete Wedd Limited (bookrunner), HSBC Markets and NatWest Markets as joint lead managers, and a syndicate of other leading investment banks. The FRN was sold at a discount margin of 19 basis points below three-month US dollar Libor and was taken up by a wide range of international investors. The issue sold out on the day of its launch, and has since tightened in margin to trade at between 19 and 20 basis points below Libor.

ECU issuance

The United Kingdom continued to hold regular monthly tenders of ECU 1 billion of ECU Treasury bills during the quarter, comprising ECU 200 million of one-month, ECU 500 million of three-month and ECU 300 million of six-month bills. The tenders continued to be oversubscribed, with issues being covered by an average of 2.2 times the amount on offer, compared to an average of 2.4 times during 1995. Bids were accepted at average yields up to 6 basis points below the ECU Libid rate of the appropriate maturity. There are currently ECU 3.5 billion of UK Government ECU Treasury bills outstanding. Secondary market turnover in the third quarter averaged just over ECU 2 billion per month, unchanged from levels of activity earlier in the year.

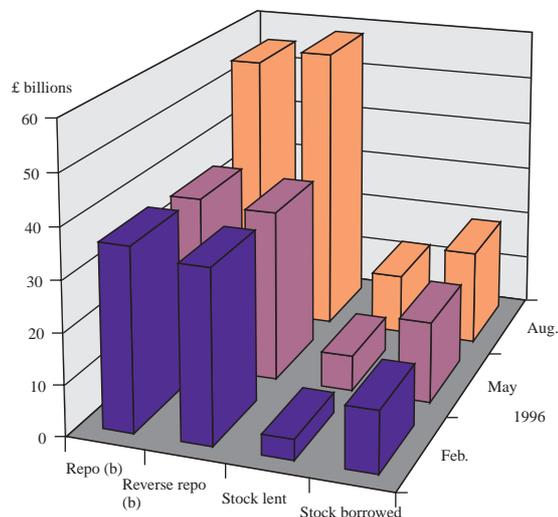
On 16 July, the Bank reopened the United Kingdom's ECU Treasury Note maturing in 1999 with a further tender for ECU 500 million, raising the amount outstanding with the public of this Note to ECU 1.5 billion. There was strong cover at the auction

of three times the amount on offer, and accepted bids were in a tight range of 5.41%–5.44%. The total of Notes outstanding with the public under the UK ECU Note programme thus rose from ECU 5.5 billion to ECU 6 billion.

Developments in the gilt repo market

There was substantial growth in the overall size of the gilt repo and stock lending market over the summer months, and an increase in specials⁽¹⁾ activity. The data collected by the Bank from about 80 institutions, on a voluntary basis, for the three-month period to end-August showed an increase in outstanding repo and stock lending from around £50 billion at end-May to nearly £80 billion.⁽²⁾ Reported repo outstandings accounted for most of this increase, rising from around £35 billion to nearly £60 billion.

Chart 1
Growth in outstanding amounts^(a)

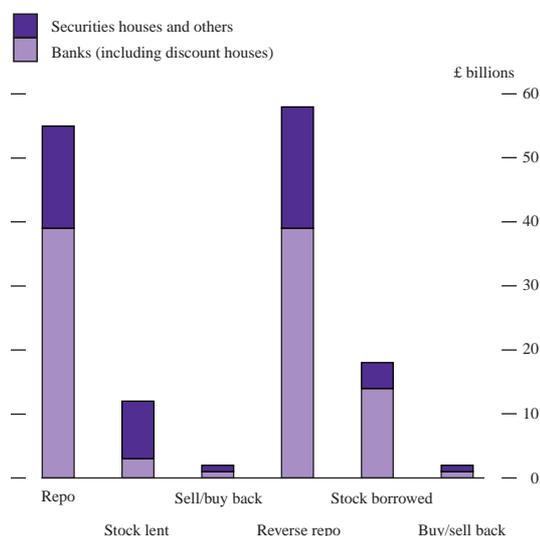


- (a) Transactions entered into, but for which the second leg has not yet settled.
 (b) Sell/buy back and buy/sell back transactions conducted under an annex to the Gilt Repo Legal Agreement are included under repos and reverse repos respectively.

We cannot know how far the actual market exceeds these reported figures; it is thought that the data for repo activity capture a very substantial share of the market; but stock lenders are poorly represented among the reporting population, accounting for the discrepancy of around £7 billion between reported stock lending and borrowing. Banks, including discount houses, continue to account for a large proportion of reported repo, reverse repo, and stock borrowing activity.

The monetary statistics, compiled by the Bank, give a picture of repo activity in the monetary sector that is consistent with the figures for the overall market. Banks (including discount houses) and building societies recorded £33 billion and £40 billion outstanding of repos and reverse repos respectively. (Like the repo market monitoring data,

Chart 2
Outstanding amounts by practitioner: end-August



these figures exclude gilts repoed to the Bank as part of the Bank's provision of liquidity to the money markets.) Almost all banks with repos or reverse repos in excess of £100 million outstanding now report market monitoring data to the Bank. The differences between the two sets of data can therefore probably largely be accounted for by the fact that the market monitoring data on repos are reported gross, whereas the monetary data may in principle be reported with some repos and reverse repos with the same counterparty netted out. Between May and August, both sets of data showed a sizable increase, though the monetary data do not, of course, capture the large increase in reverse repo activity by non-banks (except to the extent that it may be reported as repos by banks). The end-September monetary statistics show a further increase in outstandings, with repos and reverse repos reported at £35 billion and £43 billion respectively.

Maturities of outstandings

The market monitoring data provide an end-period snapshot of the residual maturity of outstandings. Between end-May and end-August the residual maturity of trades outstanding lengthened. Repo trades with maturities of between two days and one month now account for about 65% of market outstandings, and maturities of between nine days and three months for about 40%. This lengthening of maturities is observable in both repo transactions and, to a lesser extent,

- (1) 'Special' repos are repos where the rate paid on the cash received in return for repoing out a specific stock is well below that paid on the cash received against a repo of 'general collateral' (GC), ie non-specific stock. The owner of a hard-to-borrow stock could thus earn a net return by repoing out the stock and paying a 'special' low repo rate on the cash received in the repo, and investing this cash in GC repo at the higher rate available against stocks that are *not* hard-to-borrow.
 (2) For each repo or stock loan transaction there must, by definition, be a reverse repo or stock borrow transaction, even if it is not reported to the Bank, so estimates of market size should always focus on the largest figures.

in stock lending and borrowing transactions, and is consistent with market anecdote of liquidity beginning to extend further out along the curve, and also of a small number of medium to long-term stock loan transactions in hard-to-borrow stocks.

Table A
Outstanding amounts at end-August by residual maturity

£ billions

	On call and next day	2–8 days	9 days–1 month	1–3 months	3–6 months	Over 6 months	Total (a)
Repo	10	18	18	6	2	0	55
Stock lent	10	1	1	0	0	0	12
Sell/buy back	0	1	0	1	0	0	1
Total out (a)	21	19	19	7	3	1	69
Reverse repo	17	15	15	7	3	1	58
Stock borrowed	14	2	1	1	0	0	19
Buy/sell back	0	0	0	0	0	0	2
Total in (a)	32	17	17	9	3	1	79

(a) Totals may not sum due to rounding.

The maturity discrepancy between reported repos and reverse repos gives a further indication of the extent of underreporting, for example because corporates using repo to borrow funds would be unlikely to be reporting this to the Bank.

Market liquidity

The repo market monitoring data suggest turnover in gilt repo of at least £15 billion per day in the June-August period, which was more than double the value of daily cash gilt turnover of less than £7 billion a day in the same period; many market participants believe the actual repo market figure to be even higher than this. Turnover by value in cash gilt trades reported to the London Stock Exchange (excluding repo transactions, which are not reportable to the Exchange) increased in the third quarter (to end-September). Reflecting this, and the surge in turnover at the start of the year, the twelve-month rolling average value of daily cash gilt trades rose to a new peak of £7.2 billion in September. The average bargain size of cash gilt trades reported to the Exchange remained at historically high levels, perhaps supported by repo activity. In the general collateral (GC) repo market, trades are commonly £50 million to £100 million, although trade sizes of £500 million or more are not unknown.

The number of transactions settled through the Central Gilts Office (CGO) settlement system (both cash and repo trades) increased substantially in the third quarter. Reflecting this increased throughput, CGO tariffs were reduced in September, for the second time this year. For the first time since the start of the gilt repo market in January 1996, the number of delivery-by-value (DBV) transactions through the system was up on the same period a year earlier, with the growth in GC repo and other transactions more than offsetting the decline caused by the combination of disintermediation of some of the previous intermediaries in stock loans, the switch from stock loans (collateralised by DBVs) to special repos (against cash), and the increase in average transaction size. The growth in DBVs is believed

by participants to be associated with the growth in the size and liquidity of the GC repo market.

Turnover data reported to the Bank capture the original maturity of repo transactions during the period. These suggest that nearly 70% of repo trades mature on call or next day, of which a substantial proportion may be DBVs. A large proportion of next-day transactions are rolled. Almost one third of repo turnover is in maturities of between two days and one month.

Table B
Percentage breakdown of turnover in June-August by maturity

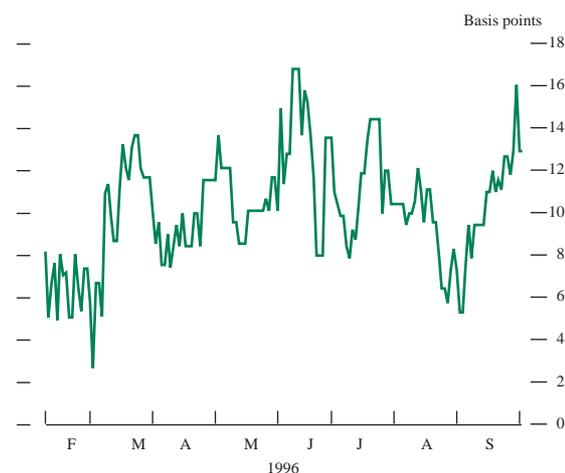
Per cent

	On call and next day	2–8 days	9 days–1 month	Over 1 month	All maturities	Percentage of total (a)
Repo	69	23	6	2	100	87
Stock lent	85	12	3	0	100	12
Total out	70	22	6	2	100	100
Reverse repo	69	23	5	3	100	87
Stock borrowed	88	8	3	1	100	11
Total in	71	21	5	3	100	100

(a) The residuals are accounted for by buy/sell back and sell/buy back transactions.

The Bank also follows developments in the gilt repo market on a daily basis, collecting data on repo and stock lending rates, as well as anecdotal evidence on the development of the market. Chart 3 shows the spread of the interbank rate over the GC rate. Three-month GC repo rates have continued to trade several basis points below the interbank rate, probably reflecting mainly the creditworthiness of gilts

Chart 3
Three-month interbank rates minus three-month gilt repo general collateral rates^(a)



(a) Middle rates at 10.15 am.

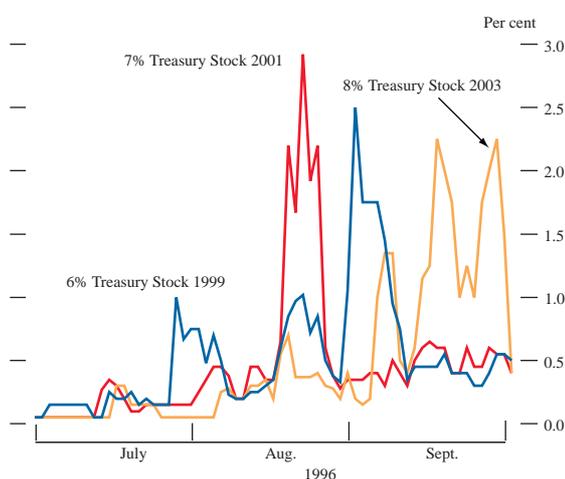
as collateral, but also the value to the reverse repoer of owning stock that may potentially go special at some point during the three-month period. Since it is cheaper than unsecured finance for many borrowers, gilt repo can be a valuable financing tool not only for firms with large inventories to finance, but also for firms or banks who find it expensive or difficult to raise sufficient unsecured finance.

The specials market

The Bank's data do not differentiate between general collateral (GC) repos and special repos, since stock can move in and out of being special very rapidly, even within minutes; it was decided that to ask for firms to distinguish between outstandings of specials and GC transactions would be both too onerous and too prone to reporting error. But it is clear that the third quarter of the year saw much greater activity in specials than previously.

Chart 4 illustrates the extent to which some stocks have recently traded special. Showing the extent to which the repo rates on special stocks traded 'through' (ie below) the comparable GC rate facilitates comparison of special rates over time, since the prevailing level of GC interest rates should not influence the specialness of the stock (although on days when money-market rates are tight, there tends to

Chart 4
Special rates on short stocks^(a)



(a) The one week repo rate for selected stocks, expressed in percentage points below the one week general collateral repo rate.

be less specials activity). The relatively high volume of private sector sterling bond issuance over 1996 (see *Financial market developments* in this and previous issues) may have contributed to a number of gilts going special. Underwriters of some of these issues shorted gilts of similar maturities in order to hedge their long corporate bond positions. Demand for interest rate swaps increased with this private issuance, causing demand for certain gilts as a hedge. Traders were also active in taking a view on the spread between swaps rates and gilt yields (mostly of three to seven years' maturity), and between unsecured short-term interbank rates and the repo rate. Long stocks have generally not traded with special value, except on occasion in the run-up to auctions, when traders tend to short the stock in anticipation of its cheapening up relative to the market ahead of the auction.

The Bank has undertaken a preliminary econometric analysis of the relationship between cash market prices and specific repo rates for stocks that have traded special.

This showed a statistically significant positive correlation between changes in a stock's estimated 'deariness' relative to a theoretical yield curve (in other words, the extent to which it has a lower yield than might be expected), and changes in the degree to which a stock trades special. This is what theory would predict; traders maintain short positions which have high associated financing costs only if the anticipated fall in the price of the stock is still large enough to give an expected profit. (One implication is that longer duration stocks would tend to be less dear (expensive) for a given specials premium. This is because their prices are more sensitive to changes in yields and therefore a given rise in yields will give a trader with a short position a higher profit to offset any increase in the cost of repo.)

The analysis suggests that the link between deariness in the cash market and specialness in the repo market can flow in either direction: in some cases changes in deariness have preceded changes in specialness and in other cases the sequence has been the other way round. Both chains of cause and effect can be explained. Sometimes stocks may be perceived as dear (expensive), for example following an auction announcement, because of the anticipated supply effect. This would create a greater demand for short positions, and so greater demand for the stock in the repo market in order to cover these positions. At other times the stock may go tight in the repo market. It would then tend to be bid higher in the cash market as traders sought to close out existing short positions that had become expensive to cover, and also as traders and investors chose to buy it outright, having seen that it would be cheap to finance the stockholding by reposing it out. In both cases, the stock would remain expensive in both repo and cash markets until existing holders took profits by either selling their stock or making it available for repo or lending.

The efficiency with which stock is made available to meet market demand will depend on information flows; if a stock is trading special or with a stock lending premium, a holder of that stock needs to be aware of this before the incentive to release their stock can be realised. Information flows in the gilt repo market so far have reportedly been variable, with stocks at times trading special without all stock holders being aware of the special status, and therefore either unable to respond, or lending the stock without being able to benefit fully from the special rates on offer. As greater specials activity attracts more participants into the gilt repo market, information flows might also improve, further promoting the efficiency of the market.

The increased specials activity in certain stocks has improved the extent to which the demand and supply of gilts in the market, for both outright and temporary purchase, is cleared through the price mechanism. The Bank welcomes this development, to the extent that this arises as a natural result of market supply and demand, while reserving the right for market management purposes to reopen or repo a stock if it were being squeezed by market participants, or if conditions were disorderly.

Outlook

With the growth in both specials and GC activity over recent months, the gilt repo market has moved on from its phase of consolidation in the late spring, helping to attract new participants into the market. A contributory factor in this recent growth, suggested by some market participants, may be market uncertainty over short-term interest rate prospects, with large 'matched-book' players putting on repos and reverse repos of different maturities in order to take a position on interest rates.

The development of the market has also supported the operation of the Bank's twice-monthly gilt repo facility, which has been providing liquidity at the Bank's dealing rate for fixed terms of between two and five weeks since

1994, and which is used by some of the players who are now active in the gilt repo market. Since June, the Bank has also been willing to accept floating-rate government stock alongside Treasury and eligible bank bills in any repo operations that it conducts as part of its daily operations. (See the main text of *The operation of monetary policy* in this edition of the *Quarterly Bulletin* for a description of recent developments in the Bank's money-market operations.) While the level of gilt repo activity (particularly GC repo), and the volume of applications for the Bank's existing gilt repo facility, will tend to vary over time, depending *inter alia* on interest rate expectations, recent information on the market tends to confirm that it has developed sound and stable foundations, and that gilt repo has already become one of the most actively traded instruments in the sterling financial markets.

The international environment

- *This article reports on developments in the major overseas economies since the August 1996 Quarterly Bulletin. However, since UK exports to the G7 account for slightly less than 50% of UK exports, it is also important to consider developments beyond those economies (see box on page 382).*
- *In Germany, the pause in growth, which started in the middle of 1995, now appears to be over. There is less sign of a revival in activity in France and Italy. Output and employment have continued to grow rapidly in the United States. The recovery in the Japanese economy that started around the end of last year has continued, albeit at a moderate pace.*
- *Inflation in the major overseas economies has been low in recent years. There are some signs of a slight pick-up in the United States, but the evidence is mixed. Inflation has fallen further in most European countries and remains negligible in Japan. Producer price inflation is very low in almost all the industrialised countries.*
- *Interest rates were trimmed in Germany and other European countries in September, continuing the recent shift in policy mix towards tighter fiscal and looser monetary policy. Official interest rates were left unchanged in the United States and Japan.*
- *Growth in Asia has moderated during 1996, but this has been broadly offset by strengthening activity in Mexico and Africa.*

Table A
Contributions to German GDP growth^(a)

Quarter-on-quarter contributions	1996 Q1	1996 Q2
GDP growth	-0.5	1.5
Consumption	0.3	0.5
Investment	-1.3	1.5
Government	0.1	0.3
Stocks	0.3	-1.5
Domestic demand	-0.5	0.8
Net trade	0.0	0.7

(a) Contributions may not sum due to rounding.

A recovery in German activity seems to be confirmed

At the end of the first quarter of 1996, German GDP was only 0.3% higher than a year earlier. But the picture in the first part of the year was distorted by the exceptionally severe winter, which depressed output, particularly in the construction sector. Some bounce-back was expected in the second quarter, but the strength of second-quarter output—the largest quarterly rise in GDP since reunification—suggested that a more widespread recovery was under way. As Table A shows, investment, consumption and net external trade all contributed to GDP growth.

Data for the third quarter suggest that there has been further growth of activity. Industrial production, which increased very strongly in the second quarter, accelerated further in July and August. Orders were also up. And the IFO survey of business confidence showed sentiment in manufacturing improving sharply over the third quarter, although the level was still low.

But the growth rate in the second half of the year is unlikely to be as strong as in the second quarter. Consumer confidence is still low, (see Chart 1) and unemployment remains above 10%. These factors are likely to constrain domestic demand. And the pattern of investment by German companies, which has over the recent past been concentrated outside Germany, is unlikely to create as much employment as in previous recoveries.

Chart 1
Consumer confidence and consumption
in France and Germany

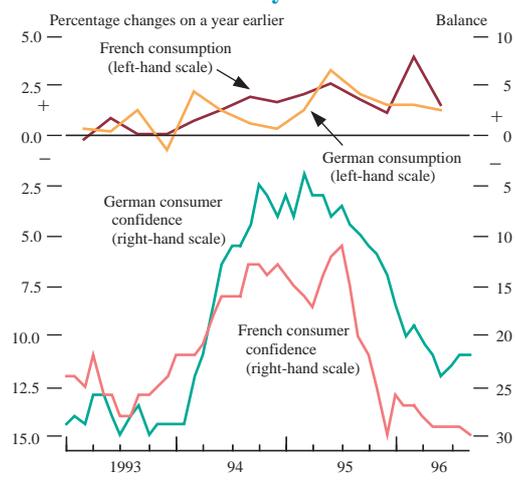


Chart 2
European GDP growth

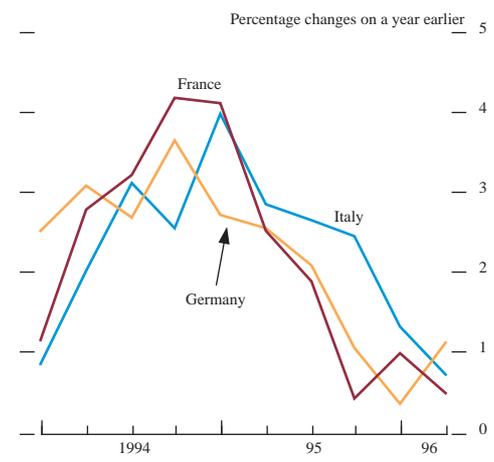


Table B
Contributions to French GDP growth^(a)

Quarter-on-quarter contributions	1996 Q1	1996 Q2
GDP growth	1.1	-0.4
Consumption	1.5	-0.5
Investment	-0.1	-0.1
Government	0.1	0.1
Stocks	-1.0	0.5
Domestic demand	0.5	0.0
Net trade	0.6	-0.4

(a) Contributions may not sum due to rounding.

While German GDP fell in the first quarter and rose sharply in the second, the opposite occurred in France. Taking the first half of the year as a whole, growth was very similar in both countries (see Chart 2). GDP growth in France in the first quarter was boosted by a number of special factors, as noted in the August *Quarterly Bulletin*. Second quarter data were weak, even after allowing for the unwinding of these factors, reflecting a fall in most of the main components of demand (see Table B). Consumption may have been held back this year, as fiscal and social levies have been increased. (See section below on fiscal policy.) The saving ratio is still high, possibly because unemployment remains a serious problem; the unemployment rate rose further to a record 12.6% in August. Business confidence picked up in August and September after reaching a trough in July, but consumer confidence deteriorated further in September (see Charts 1 and 3).

In the second half of the year, production may be boosted by stockbuilding; stocks were at extremely low levels by mid-year. Household spending rose in the third quarter, but this was almost all due to purchases of cars as consumers took advantage of a government incentive scheme. This scheme finished at end-September, so consumption in the fourth quarter is likely to be weaker.

The German and French governments have both revised up their forecasts for GDP growth in 1996 to a little over 1%. In Italy, on the other hand, forecasts have been revised down in the light of a weaker-than-expected first half year. Fiscal and particularly monetary policy have been comparatively tight in Italy over the past couple of years. Exports have been the main source of growth since mid-1994, but they slowed sharply this year, reflecting the stronger lira and weaknesses of some export markets. Imports have slowed even more sharply, reflecting the weakness of domestic demand, with the result that the trade surplus—particularly with non-EU countries—widened in the first part of the year. Investment slowed as temporary tax incentives were withdrawn. Unemployment has remained stable at slightly over 12% in 1996.

Growth in the European Union as a whole has been rather better than in the major three continental economies, which perhaps, in part explains the relatively good UK export performance in the first half of the year. The Irish and Dutch economies, both important export markets for the United Kingdom, grew robustly in the first half of the year. Both these economies have implemented structural reforms in the labour market with some success. About 100,000 new jobs are expected to be created in the Netherlands this year.

Unemployment has also fallen in Denmark (see Chart 4), where domestic demand has remained robust. Growth in Sweden and Finland was stronger than forecast in the first half of the year, led by exports and investment. Consumer spending was more subdued, but may have picked up in the third quarter. Fiscal tightening over the remainder of 1996 and during 1997, and a poor employment situation, are likely to constrain consumer spending, however. The picture in Norway is brighter; GDP growth should be over 4% this year, according to official estimates.

Switzerland, Austria and Belgium have experienced weak growth in 1996 as a result of falling exports to the European Union, and weak domestic demand, but should benefit from a recovery in Germany.

Chart 3
Industrial output growth and business confidence

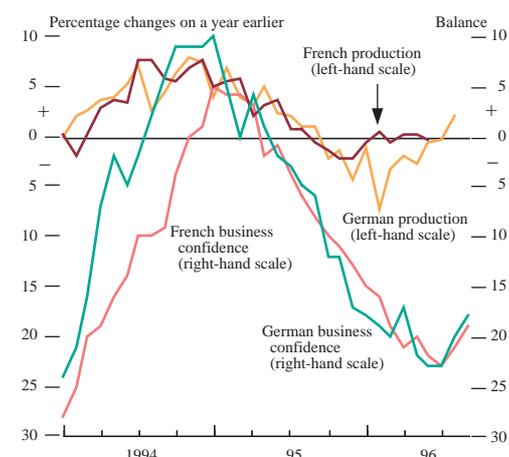


Chart 4
European unemployment

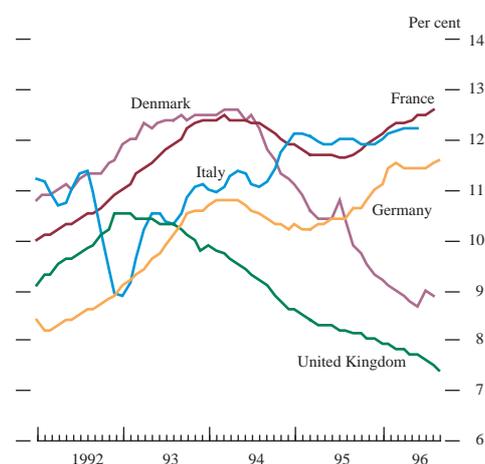


Table C
Contributions to US GDP growth^(a)

Quarter-on-quarter contributions

	1996 Q1	1996 Q2
GDP growth	0.5	1.2
Consumption	0.6	0.6
Investment	0.4	0.3
Government	0.1	0.4
Stocks	-0.3	0.2
Domestic demand	0.8	1.5
Net trade	-0.2	-0.2

(a) Contributions may not sum due to rounding.

Table D
Contributions to Japanese GDP growth^(a)

Quarter-on-quarter contributions

	1996 Q1	1996 Q2
GDP growth	2.9	-0.7
Consumption	1.4	-0.8
Investment	1.4	0.6
Government	0.3	-0.1
Stocks	0.1	-0.2
Domestic demand	3.2	-0.5
Net trade	-0.3	-0.2

(a) Contributions may not sum due to rounding.

Growth in Spain and Portugal has been stronger than in several other European countries, although it has slowed since 1995.

The US economy remains very buoyant

In the United States, GDP growth in the first quarter of 1996—at 0.5%—was stronger than most commentators had expected at the turn of the year. Second quarter growth was stronger still, at 1.2%. As Table C shows, consumption was the main source of growth, although investment and government spending were also important. Employment growth in the first half of the year was above trend.

The key issue since mid-year has been whether the economy would slow to a sustainable growth rate without the need for a tightening of monetary policy. A slowdown was expected because of higher long-term interest rates and slower income growth. Early data for the third quarter showed little sign of a slowdown except in durable goods orders. Chain store sales and housing starts were firm in July. Industrial production which barely rose in July, rose quite strongly in August. Later data suggested a slowdown was underway. Housing starts fell in August and September. The National Association of Purchasing Managers' index of manufacturing activity slipped back a little in September, but that still left the average for the third quarter higher than in the second consistent with the 1.1% quarterly rise in industrial production in the third quarter. After above trend growth in July and August, employment fell in September, reflecting lower government and manufacturing employment.

A moderate recovery continued in Japan

There were signs in the fourth quarter of 1995 that the Japanese economy was recovering after four years of stagnation. Growth in the first quarter of 1996 was exceptionally strong, distorted by a number of special factors. As in France, an unwinding of these factors resulted in a fall in GDP in the second quarter (see Table D). Nonetheless, the underlying picture is one of moderate recovery.

The recovery in Japan has been stimulated by large fiscal packages and very low interest rates. A main concern has been the extent to which private sector activity can sustain the momentum of recovery once the effects of the fiscal policy stimuli fade. There remain a number of macroeconomic problems, including the continuing fragility in parts of the banking system, still-falling land prices and high unemployment. Nonetheless, the strength of GDP growth in the first half—over 6% at an annualised rate—has led most forecasters to revise up their projections for growth for the year to around 3¹/₄%–4%.

Evidence for activity in the third quarter has been mixed. Annual growth in department store sales fell in July, but rebounded in August. Consumer spending was affected by an unseasonably cool summer, and a food poisoning scare. Industrial production was volatile: it rose strongly in July but fell in August.

The September Tankan survey was weak—indeed the unexpected fall in business confidence was the first in a recovery cycle for 25 years—suggesting that production in a number of basic industries had faltered as stocks had piled up to high levels. In general, small and medium-sized companies appear to be facing

Developments outside the largest overseas economies

The main part of the international environment article focuses on developments in the major overseas economies. Those provide an indication of prospects for UK export growth. However, UK exports to the G7—the United States, Canada, Japan, Germany, France and Italy—account for less than 50% of total UK exports. That suggests that the rest of the G7 countries do not give a complete indication of demand for UK exports. Several countries outside the G7, notably the Netherlands and Belgium, account for a higher proportion of UK exports than either Canada or Japan. Other European countries, particularly Ireland and the transitional economies of eastern Europe are growing markedly faster than Germany, France and Italy (EU3). South East Asia is becoming increasingly important to UK exporters, though its share of UK exports is still small.

EU growth

The fastest growing economy in the European Union at the moment is Ireland which has been largely unaffected by the recent EU downturn. This is partly because of its close trading links to the United States and the United Kingdom, where growth has been relatively strong during this period, and partly due to its success at attracting inward investment throughout the last decade.

The Netherlands is the United Kingdom's fourth largest export partner (although its share might be overstated because of re-routed exports through Rotterdam). In common with the EU3, it experienced a slowdown in 1995 H2. However, GDP grew by 1% in 1996 H1, and confidence is strengthening, suggesting that growth is recovering sooner than in the EU3.

The other European G10 countries—Sweden, Switzerland and Belgium—seem more in step with the rest of the European Union (Sweden slightly stronger, Switzerland slightly weaker). So, developments in the EU3 appear to be a reasonably proxy for this group at the moment.

Per cent	UK export weight (a)	Average growth 1991–95	Forecast GDP growth (b)	
			1996	1997
EU3	29.1	1.6	1.3	2.4
Netherlands	7.5	1.9	2.2	2.5
Belgium	5.6	1.3	1.4	2.4
Switzerland	1.9	0.2	0.0	1.5
Sweden	2.5	0.0	1.6	2.0
Ireland	5.1	4.7	7.0	5.5
Central and eastern Europe (c)	1.5	-2.0	4.2	4.7
South East Asia	8.8	8.4	8.0	7.5

(a) 1991–95 average.
(b) Source: IMF.
(c) Excluding the ex-Soviet Union.

According to the IMF, the outlook for the other EU countries is markedly stronger than the EU3 countries in 1996.

Growth elsewhere in the world

The emerging market economies in South East Asia have roughly doubled their share of UK exports since 1980. This is partly because the United Kingdom has gained a higher share of South East Asian imports, but also because their economies have been growing much faster than those in the industrialised world. In 1995, they accounted for 5.8% of UK exports, more than Italy, and well over twice as much as Japan.

Growth in the emerging market economies is not closely correlated with that of the major industrialised economies. Japan, which had the closest correlation with them, now serves as an extremely poor proxy for their growth. That reflects a number of developments, including the growing importance of China in Asian growth, the increasing outward investment by Japanese firms in South East Asia, and greater access to global capital markets by South East Asian firms.

Another area where economic growth has been very fast recently is the transitional economies in eastern Europe and the ex-Soviet Union. Those economies contracted sharply following the move towards capitalism, but have since strengthened to the point where collectively they are likely to grow more quickly than the rest of the industrialised world in the next few years.

The chart shows that the industrialised countries grew by a very similar rate to that of the global economy in the late 1980s, but that the growth rates have diverged recently. This gap is likely to increase: in the very near term, because EU growth is expected to be significantly stronger than that in the EU3; and in the longer term, as the faster growing areas assume greater importance to the United Kingdom. In conclusion, growth in the rest of the G7, which used to be a close proxy for UK export markets as a whole, is likely to increasingly underestimate world growth, and hence prospects for UK exports.

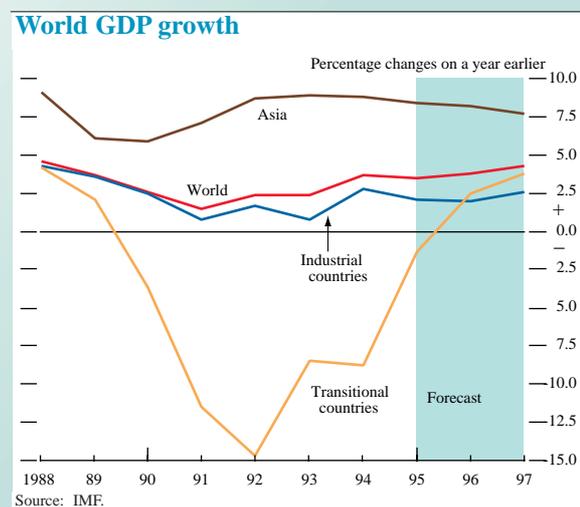


Chart 5
Consumer price inflation

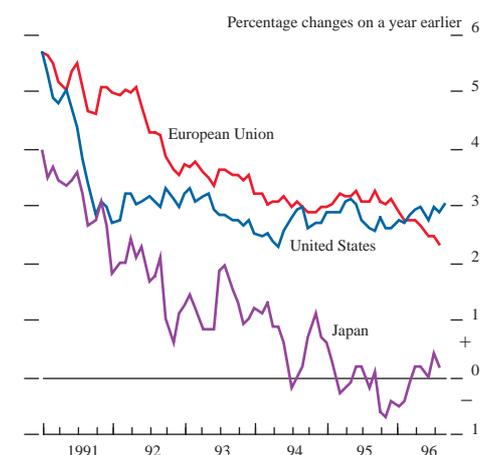


Chart 6
Producer price inflation

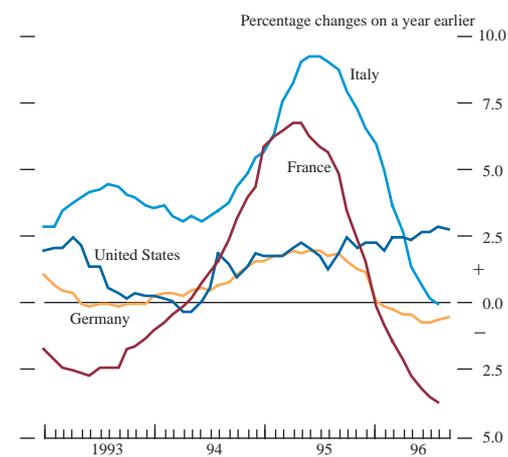
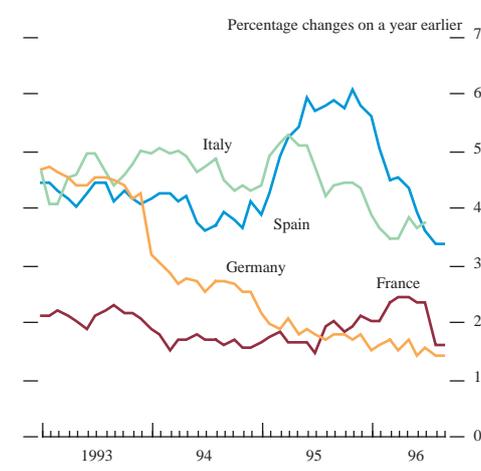


Chart 7
EU consumer price inflation



more difficulties than the large manufacturers. The evidence of a moderate and patchy recovery raises questions for fiscal policy (see below). The authorities have to judge whether a recovery in private sector demand will be able to offset the contractionary effects of fiscal consolidation due for 1997.

Growth in the emerging market economies

The European Union, North America and Japan together account for about 50% of world GDP, but 75% of UK exports. But, as the box on page 382 discusses, Asia and central and eastern Europe are rapidly growing markets.

Growth in industrialised countries in recent years has been helped by exports to the fast growing emerging market countries. In the course of 1996 there was some moderation of growth in Asia, but this was broadly offset by a pick-up in Mexico and Africa.

Central and eastern European economies, which are important export markets for Germany and others, are expected to show robust growth over the next year or so.

Inflation remains low in the industrialised countries

With the possible exception of the United States, there is little sign of inflationary pressure in the industrialised economies. Indeed, annual consumer price inflation for the European Union as a whole was 2.6% in July, continuing the downward trend seen over the 1990s (see Chart 5). Convergence of inflation rates among individual countries has also continued; eleven of the 15 EU countries had inflation rates of under 3% in July/August; among the other four, inflation in Spain, Italy and Portugal was below 4% and falling. The outlier was Greece, with an inflation rate of around 8½%.

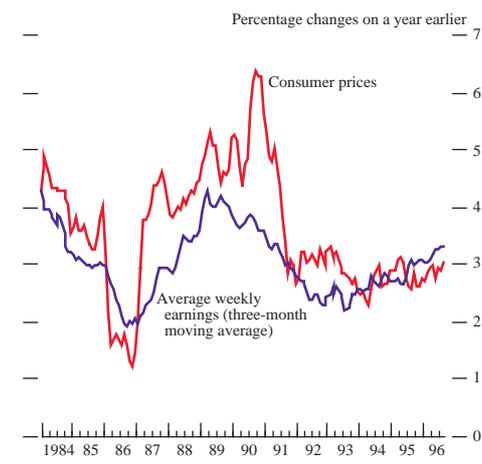
Producer prices in Europe were even more subdued (see Chart 6). Weak domestic demand has meant that in Germany—and more particularly France—prices are lower than a year ago, while the year-on-year rate of producer price inflation in Italy fell by around nine percentage points in the year to July.

Special factors, some of them country specific, have contributed to the general fall in inflation since the beginning of the year. Increases in VAT in 1995 pushed up measured inflation in Italy, Spain and France. These price rises dropped out of the year-on-year comparisons, producing a step fall in the inflation rate: in the first quarter for Spain and Italy, and in August for France (see Chart 7). Lower prices of public sector goods have also contributed to lower inflation in France and Italy.

The relative weakness of domestic demand and the fall in producer prices suggest that inflation may fall further in Europe over the second half of 1996. The main upside risk, which is not confined to Europe, is the rise in oil prices over the summer months. That was partly offset by weaker copper and food prices, however.

Japan has a longer recent history of price deflation and weak activity. Measured consumer price inflation has turned mildly positive this year and was around ¼% year-on-year in August, as strengthening domestic demand and yen depreciation underpinned prices.

Chart 8
US price inflation and wage growth



In the United States, a feature of the current conjuncture has been that above-trend growth has not been accompanied by a clear increase in inflation. Consumer price inflation has remained remarkably steady over the past three years at around 3%. The main threat to low inflation is widely perceived to come from the labour market. Unemployment was 5.2% in September; below most estimates of the 'natural' rate, or the rate below which inflation begins to accelerate. One possibility is that structural changes in the labour market have reduced the natural rate. A related argument is that job insecurity has reduced the extent of wages pressure associated with a given level of unemployment.

There is, in fact, some evidence of a pick-up in average earnings growth, which historically has had a fairly close relationship with consumer price inflation (see Chart 8). In September, annual average earnings growth was 3.5%, up from 3.2% in the second quarter and 3.0% in the first quarter. A possible explanation for the lack of any direct feedthrough from earnings to prices is that reductions in the cost to employers of health care provision have offset the increase in earnings so that total labour costs have not risen. More fundamentally, it is not clear whether wage setters take account of past price increases, or prices setters take account of past wage increases in the United States. In the former case, a pick-up in earnings has no particular implications for inflation.

Official interest rates were reduced in Europe, but left unchanged in Japan and the United States

Low inflation, slowing M3 growth, and international considerations were the reasons cited by the German Bundesbank for the 30 basis point cut in the repo rate on 22 August. That was the first cut in the repo rate since February 1996. The Lombard and Discount rates were left unchanged. After the German cut, the Bank of France reduced its intervention rate by 20 basis points, and by a further

10 basis points in September to 3.25%. Belgium, Denmark, Finland, Holland and Portugal also cut their interest rates. The Special Advances Rate in the Netherlands is now 2.5%, and interest rates at all maturities are lower than in Germany. Interest rates were also cut in Sweden and Spain, and have since been cut again. In mid-October, the Bank of Italy cut interest rates by 75 basis points, taking the official discount rate to 7.5% and the Lombard rate to 9.0%. The Bank of Italy cited the decline in inflation and inflation expectations as the reason for the cut.

Interest rate expectations for the G3 economies were volatile in the third quarter. At the end of June, market expectations were for an increase in short-term interest rates in each country by the end of the year. German interest rate expectations were revised down as money supply data and inflation outturns improved. But, at the end of September, the March 1997 contract implied an increase in German short-term interest rates in the first quarter of 1997.

US interest rate expectations were more or less unchanged over the quarter as a whole (although they were very volatile during the quarter as the market speculated whether the Federal Reserve Board would tighten policy at each successive Federal Open Market Committee—FOMC—meeting).

With the exception of the United States, ten-year bond yields in the

major industrialised economies fell in the third quarter. In the United States, nominal forward rates rose across all maturities and in Germany nominal forward rates fell across all maturities. The UK/German yield differential widened in the third quarter of 1996 to 177 basis points.

Comparing current bond yields with those prevailing at the start of the year, German, UK and the US rates are all higher, whereas French and Italian rates, which both fell over the quarter, are lower.

Money supply

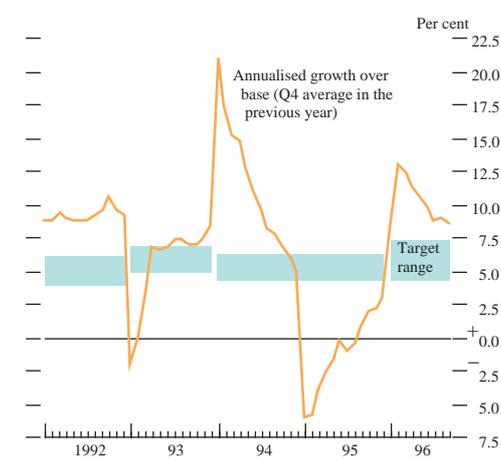
The weighted averages of both narrow and broad money growth in the G7 economies fell slightly in the twelve months to July to 4.4% and 5.1% respectively. That ended a period of accelerating monetary expansion in the G7 which started in April last year.

Narrow money

Japan continued to show the highest narrow money growth rate among the major industrialised countries in the second quarter. M1 accelerated again in the second quarter before falling in August. The strong growth may be related to very low interest rates which give agents little incentive to hold their savings in bank time deposits.

Growth of currency in circulation in the United States slowed down in the second quarter, but has since returned to rates more in line with those observed earlier this year. Compared with the second quarter of 1994, however, the growth rate of US currency has decreased considerably. This may be related to the declining use of US dollars as a vehicle currency relative to Deutsche Marks.

Chart 9
German M3 growth



Broad money

Broad money growth in the United States was above the upper limit of the monitoring range in the first half of the year. That may be related to the easing of monetary policy earlier this year. The FOMC provisionally left the monitoring ranges for M2 and M3 for 1997 unchanged at 1%–5% and 2%–6%, respectively.

As noted earlier, the cut in the German repo rate to 3% on 22 August was partly motivated by the slowdown in M3 growth (see Chart 9) and the expectations that monetary growth would continue to fall into this year's target range of 4%–7%. In August, however, broad money accelerated again slightly to an annualised rate of growth of 8.7% relative to the fourth quarter of 1995, largely due to an increase in sight and savings deposits.

Fiscal policy

Fiscal policy in Europe has increasingly been dominated by the Maastricht convergence criteria, which will be applied to data for 1997. Japan's fiscal position has deteriorated rapidly in the 1990s, and, in common with continental Europe, Japan faces medium-term problems associated with an ageing population.

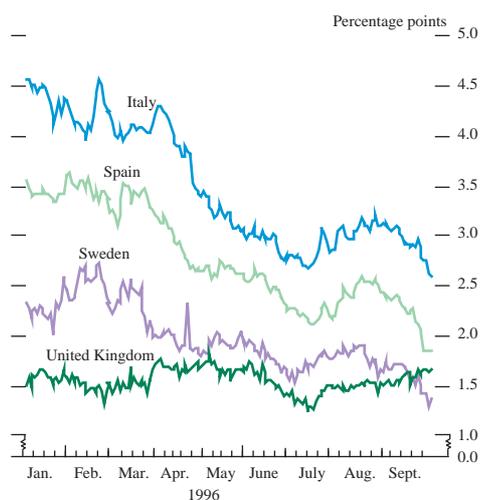
Fiscal consolidation can have indirect as well as direct effects on economic activity. If markets view the longer-term fiscal position as more credible as a result of current fiscal measures, long-term interest rates should fall, so offsetting, at least to some

Table E
Deficit/GDP ratios in the European Union

	1995	Forecasts	
		1996	1997
Germany	3.6	3.6	2.5
France	5.0	4.0	3.0
Italy	7.2	6.1	3.0
Spain	5.8	4.4	3.0
Holland	4.0	2.6	2.2
Belgium	4.5	3.3	2.9
Sweden	8.1	4.0	2.6
Denmark	1.5	1.6	0.5
Finland	5.6	2.9	1.4
Austria	5.9	4.5	3.0
Portugal	5.1	4.2	2.9

The 1995 data are provisional and may be subject to revisions.

Chart 10
Ten-year bond yield (spread over Germany)



extent, the contractionary effect of fiscal policy. The other main indirect effect is on consumption. The extent to which consumers adjust spending patterns when the fiscal stance changes depends on whether changes such as tax increases are seen as temporary or permanent.

All twelve of the 15 EU countries which have announced their 1997 budgets (since the August *Quarterly Bulletin*) have a target deficit/GDP ratio of 3% or less for 1997 (see Table E). The United Kingdom, Greece and Ireland have not yet announced their 1997 budgets.

In Germany, several of the measures announced in the DM 70 billion April savings package have become law, chiefly relating to spending on pensions and health. Final resolution of the 1997 budget is not expected before December. Waigel, the Finance Minister, has indicated that further savings may be needed at Federal level. Meeting the Maastricht criteria will also need considerable savings at *länder* and local level, yet to be agreed.

The French budget projected a deficit of 3% of GDP next year. The central government deficit will be reduced by only FFf 4 billion in 1997. Cuts in other public spending, including a reduction in the number of civil service jobs, amounting to FFf 60 billion were announced. Partly offsetting this, income taxes are to be cut by FFf 25 billion. Almost half of the deficit cut projected in 1997, which amounts to 1% of GDP, comes from exceptional receipts, notably a FFf 38 billion receipt from the privatised France Telecom in exchange for the assumption by the Government of France Telecom's pension liabilities.

The Italian budget reduced the 1997 target for the fiscal deficit from 4.5% of GDP to 3%. Savings worth Lit 62.5 trillion are planned, including Lit 25 billion in expenditure cuts, with further measures to be announced later this year. There is also a one-off 'tax increase for Europe', in the form of a temporary increase in income tax. Tax evasion measures are expected to increase revenue, along with as yet unspecified 'treasury operations'.

In Spain, a fall in the deficit/GDP ratio of 1.4 percentage points is envisaged between 1996 and 1997, partly as a result of higher GDP growth—the official forecast is for 3% in 1997—but mainly via spending cuts of Pta 800 billion (1% of GDP), together with tax increases on insurance premiums. Public sector wages, which account for 50% of government spending, are to be frozen, and public sector employment will be reduced by natural wastage. That is budgeted to save Pta 200 billion. A further Pta 250 billion worth of cuts are to be made in public investment and subsidies to firms. Social expenditure has largely been protected, however, contrary to earlier indications.

The yields on Italian and Spanish government bonds fell after the announcement of the budget proposals, in Italy's case to about 2½ percentage points over German government bonds, compared with around 3¼ percentage points a month earlier (see Chart 10).

Financial market developments

- *Bond and equity prices rose slightly in most major financial markets, probably reflecting a market view that the interest rate and inflation outlook in the major economies was more favourable than previously thought.*
- *Issuance and secondary market turnover remained high in bond and equity markets, as did activity in over-the-counter (OTC) and exchange traded derivatives.*
- *Prospects for Stage 3 of EMU remained a major influence on participants in most markets in the third quarter, and there is evidence of a continuation of convergence-related positioning as well as some convergence of European bond yields.*

Background

Yields on government bonds generally fell in the major economies in the third quarter. US ten-year government bond yields fell only marginally (three basis points), but were volatile throughout the quarter. German and Japanese ten-year government bond yields both fell by 34 basis points this quarter; ending September at 6.08% and 2.82% respectively. This slight rally in prices probably reflected, at least in part, a market view that both current and future interest rates were more likely to be favourable to bonds than previously thought. Over the quarter, interest rate expectations implied by market prices fell in both the United States and Germany; at the end of the third quarter, the price of three-month eurodollar futures implied an increase of around 25 basis points in US rates by the turn of the year.

Speculation about the possibility of a substantial fall in the major equity indices—particularly in the United States—was not borne out. In the United States, the S&P 500 rose by 2.5% over the quarter, reaching a record high of 687.3 on the last day of September. In Europe, the FT-SE 100 also recorded an all-time high, and both the French and German equity market indices rose.

Bond issuance remained strong in the third quarter (see Table A) and both issuance and turnover on equity markets remained high. Turnover on derivatives exchanges was also sizable, at least in Europe: for example, on the London International Financial Futures and Options Exchange (LIFFE), July, August and September all set records for those months. Finally, activity in the OTC derivatives markets was reported to be strong, particularly when the traditional summer lull is taken into account.

Trades based on the convergence of European interest rates ahead of Stage 3 of EMU reportedly remained popular in bond and derivatives markets and may be a factor in the longer-term changes in yields on European government

Table A
Total financing activity:^(a) international markets by sector

\$ billions; by announcement date

	1994	1995	1996				
	Year	Year	Q3	Q4	Q1	Q2	Q3
International bond issues							
Straights	320.2	378.4	100.2	97.7	145.1	123.2	125.0
Equity-related	35.4	24.1	7.7	5.8	12.4	13.3	8.1
<i>of which:</i>							
Warrants	11.7	6.7	1.5	3.2	4.2	3.6	2.6
Convertibles	23.7	17.4	6.1	2.6	8.2	9.8	5.5
Floating-rate notes	126.4	100.1	30.4	25.2	38.0	44.4	44.6
Total	482.0	502.6	138.3	128.7	195.5	180.9	177.7
Credit facilities (announcements)							
Euronote facilities	196.8	293.3	68.8	64.6	100.5	95.2	61.8
<i>of which:</i>							
CP (b)	36.4	50.3	6.4	18.6	23.3	30.6	16.9
MTNs	160.4	243.0	62.4	46.0	77.2	64.6	44.9
Syndicated credits	548.3	785.0	151.0	220.1	164.8	226.1	167.6
Total	745.1	1,078.3	219.5	284.7	265.3	321.3	229.4
Memo: amounts outstanding							
All international							
Bonds (c)	2,020.8	2,224.9	2,199.7	2,224.9	2,230.4	2,251.0	2,305.1
Euronotes (b)	378.7	595.2	555.8	595.2	647.5	710.9	758.2
of which, EMTNs	259.4	461.0	426.4	461.0	504.6	555.0	607.2

Source: IFR, Euroclear, BIS.

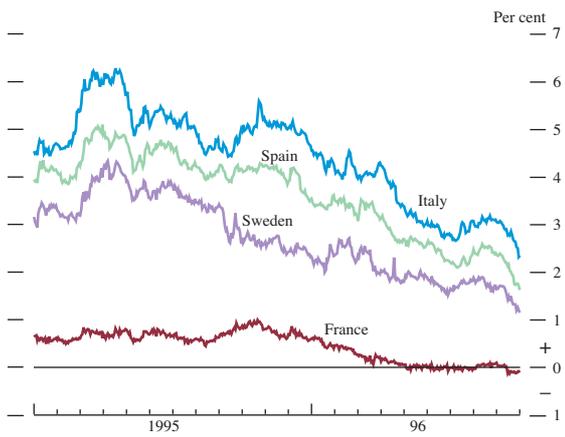
(a) Maturities of one year and over. The table includes euro and foreign issues and publicised placements. Issues which repackaged existing bond issues are not included. Figures may not add to totals because of rounding. Bond total includes issues from MTN programmes.

(b) Euroclear figures.

(c) BIS-adjusted figures, including currency adjustment. Includes issues of fixed-rate bonds and floating-rate notes.

bonds. The yield on the French government OAT fell below that of the ten-year Bund in May this year and was 11 basis points below it at the end of the third quarter. Meanwhile, spreads over Bunds for traditionally higher-yielding European sovereign bonds have fallen markedly over the past two years (see Chart 1). But EMU is only part of the story: in France, for example, strong demand from domestic institutional investors for bonds of 8–12 year maturities has also encouraged a convergence in long-term yields with Germany, where domestic demand for similar maturities has been low. In the traditionally higher yielding European countries, investors' apparent preference for bonds

Chart 1
Spread of ten-year government bonds over Bunds



with a higher nominal yield in a time of generally low interest rates in the major economies, and a relatively sustained period of political stability and low inflation, will have had the same effect.

Bonds

International issues

Gross issuance of international bonds, at \$177.7 billion (\$191.2 billion on a seasonally adjusted basis), was still very high in the third quarter but did not reach the record of the first quarter this year. This may be because some borrowers had found the conditions earlier in the year sufficiently attractive to accommodate their planned borrowing. After the strength of the last two quarters, redemptions, at \$71.9 billion, fell back towards the average for the last two years.

The average maturity of international bond issues, at 6.0 years, was little changed from the second quarter and so remains significantly lower than in the first quarter (6.6 years). The share taken by floating-rate notes (FRNs), at 30%, was also little changed and remains historically high. But equity-related bond issuance fell back to \$8.1 billion in the third quarter—about the same as in the third quarter of 1995—after high issuance in the first half of this year.

Table B
Industry classifications of international bond issues

Industry	1994		1995		1996		
	Year	Year	Q3	Q4	Q1	Q2	Q3
Banks	39.1	36.8	37.2	33.6	40.5	37.1	37.7
International and commercial companies	24.0	29.0	28.7	33.3	27.4	33.4	27.0
Central governments	14.1	12.0	10.6	10.3	11.2	10.0	14.8
International agencies	6.5	7.7	7.4	7.1	8.4	6.8	7.4
Other	16.3	14.5	16.1	15.7	12.5	12.7	13.1
Total (US \$ billions)	482.0	502.6	138.3	128.7	195.5	180.9	177.7

Source: IFR Omnibase.

Asset-backed securities⁽¹⁾

International issuance of asset-backed securities continued on the upward trend that started at the beginning of 1995, with \$22.3 billion issued in the third quarter. While the market remains dominated by US issuers (which accounted for 90% of issues in the third quarter), European participation has grown. For example, the third quarter saw the first fixed-rate Deutsche Mark-denominated international asset-backed security; and NatWest securitised \$5 billion (£3.2 billion) of corporate loans, the first example of this type of transaction in the United Kingdom.

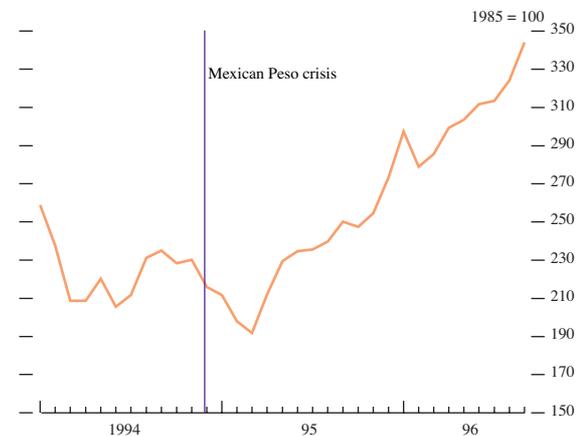
Samurai market⁽²⁾

Samurai issuance in the third quarter, at \$10.3 billion, was strong and slightly above that in the second quarter. Retail investors' demand for higher yielding assets continued to encourage emerging market borrowers to issue Samurai bonds. However, changes to the regulation of yen-denominated eurobonds—in particular, the almost total removal of lock-up periods⁽³⁾ and the possible removal of the withholding tax exemption on them—mean that they may become closer substitutes for Samurai bonds; that may affect issuance patterns.

Emerging markets⁽⁴⁾

The Salomon Brothers Brady Bond Index (see Chart 2) reached a new high in the third quarter, 36% higher than a year earlier. The prices of other types of emerging market

Chart 2
Salomon Brothers Brady Bond Index



Source: Bloomberg.

bonds also rose, continuing the upward trend established soon after the Mexican peso crisis. The secondary market in emerging market debt recovered quickly and strongly from that crisis because of demand from investors for bonds with high nominal yields, against the background of low interest rates in the major economies.

Strong issuance accompanied this rise in price although, following the Mexican peso crisis, investors appear to have

(1) Asset-backed securities referred to here do not include mortgage-backed securities.
 (2) A Samurai bond is a yen-denominated bond issued in the Japanese domestic market by a foreign issuer.
 (3) A lock-up period follows the issue of a security; during it certain investors cannot buy that security.
 (4) 'Emerging markets' are the World Bank's middle and low-income countries, excluding Gibraltar, Greece, the Isle of Man, Malta and Portugal.

been making greater distinctions between countries in Latin America, resulting in—for example—a differentiation of Mexico, Argentina and Brazil in terms of yield.

The development of central and east European markets— noted in previous *Financial market development* articles— continued, with the first two Slovakian koruna-denominated international bonds, issued by the EBRD and the IFC. The first Lithuanian litas-denominated international bond was also issued, by the Republic of Lithuania.

Table C
Currency composition of international bond issues

Per cent

Currency denomination	1994	1995	1996				
	Year	Year	Q3	Q4	Q1	Q2	Q3
US dollar	38.4	39.2	40.8	42.2	39.3	48.0	45.9
Yen	17.2	18.4	19.1	17.2	12.1	13.7	15.6
Deutsche Mark	10.9	13.9	11.7	15.0	16.1	8.6	11.0
Sterling	6.5	4.3	3.5	4.3	7.6	6.1	4.5
French franc	5.4	2.7	1.7	2.3	5.5	6.4	4.4
Swiss franc	4.5	6.1	6.8	5.3	4.5	3.3	4.2
Italian lira	3.6	2.4	1.5	1.7	2.8	4.5	3.4
Ecu	1.6	1.8	2.7	0.2	0.8	0.2	1.0
Other	11.9	11.2	12.2	11.8	11.3	9.4	10.0
Total (US \$ billions)	482.0	502.6	138.3	128.7	195.5	180.9	177.7

Source: IFR Omnibase.

Among Asian countries, the benchmarking process discussed in the August 1996 *Financial market developments* continued, with the Indonesian central bank issuing a Yankee bond⁽¹⁾ to aid the pricing of future Yankee bonds issued by Indonesian private sector borrowers.

In addition, the re-packaging of Brady bond debt continued in the third quarter: after Mexico's successful re-packaging in the previous quarter, Venezuela securitised some of their Brady bonds to create a DM 150 million international asset. The institutional investor base of the Brady bond market is reported to be broadening beyond dedicated emerging market funds; how permanent that change is will be clearer when the 'search for yield'—investors' apparent preference for bonds with a higher nominal yield at a time of low interest rates in the major economies—becomes less of a factor. If there has been a permanent increase in demand for emerging market securities, investors in emerging markets will eventually need to widen their demand to include instruments other than just Brady bonds because once a country's Brady bonds mature it cannot issue any more.

Sterling issues

Total fixed-rate issuance in the third quarter was £4.0 billion, of which £2.0 billion was short-dated, £1.0 billion was medium-dated, and £1.1 billion was longer-dated, including a perpetual issue of £30 million. All the fixed-rate issuance was in Eurosterling form, with no domestic debenture issues.

There was a broad range of fixed-rate issuers, almost half of which were from overseas. Overseas borrowing was mainly

short-dated paper issued by European financial institutions, but there were also two sovereign issuers (Argentina and Sweden). UK corporations seeking to build longer-term capital structures issued £1.1 billion in medium and longer-dated fixed-rate debt; these included recently privatised industrial companies (National Power, Hyder and Railtrack) and City Greenwich Lewisham Rail Link, the consortium which is to build the Lewisham extension to the Docklands Light Railway under the Private Finance Initiative.

UK financial institutions issued £1.2 billion of fixed-rate debt. About a half of that was in longer maturities as part of various capital restructurings, notably by building societies: Woolwich launched a £200 million 25-year subordinated issue ahead of its flotation; Northern Rock issued a £150 million 25-year bond in preparation for its conversion to a bank; and Britannia launched a £100 million 15-year structured issue to boost its regulatory capital. Lloyd's TSB issued a £150 million 15-year bond to top up its capital base ahead of its acquisition of the remaining stake in Lloyd's Abbey Life.

FRN issuance in the third quarter was £1.4 billion; roughly 60% was issued by building societies, with all five issues by such entities at a maturity of five years. Lloyd's TSB issued a £100 million ten-year FRN to accompany its fixed-rate issue. In addition there were two asset-backed FRNs: a seven-year FRN backed by car hire purchase receivables; and a ten-year FRN backed by consumer loans.

Spreads on sterling issues widened at the start of the period due to the increase in supply but narrowed again for two possible reasons: first, as a result of the pause in issuance in August; and second, because of further demand from continental investors for sterling assets. Despite renewed issuance in September, the benign credit outlook and strong institutional appetite for sterling paper has led to spreads tightening further.

Total outstanding sterling commercial paper (CP) fell to £6.5 billion by the end of the third quarter, £200 million lower than at end-June. Outstanding sterling medium-term notes rose by £1 billion to £19.4 billion at end-September.

Other developments

There were a number of structural changes in the G3 domestic bond markets—which together account for almost three quarters of the world's total outstanding bonds⁽²⁾—in the third quarter. First, the German authorities started to issue short-term government debt on a regular basis. The Second Financial Reform Bill of 1994 set up a legal framework for money-market funds, which are expected to be major investors in this type of instrument (a perceived lack of potential investor demand had previously been an obstacle to creating a liquid money market). Separately, the German authorities plan to introduce the capacity to

(1) A Yankee bond is a US dollar-denominated bond issued in the US domestic market by a foreign issuer.
(2) Salomon Brothers 'International Bond Market Analysis'.

strip some ten-year and 30-year Bunds during the course of 1997.

Second, the US Treasury announced that it will auction ten-year inflation-indexed notes, starting in January 1997. Both interest and principal on the notes will be adjusted for changes in the consumer price index. As well as potentially lowering the government's financing costs, the Treasury's move will provide a new means for measuring the market's inflation expectations.

Third, the practice of Japanese government bonds (JGBs) settling only on so-called *gotobi* days (those numbered days of the month that are divisible by five) has ended. Since 1 October, JGBs settle on a T+7 basis and there are plans to reduce this down to T+3 in spring 1998, which would make the settlement of JGBs comparable to bonds settled on Euroclear and Cedel.

Note markets

The third quarter was the least active quarter for some time in euromedium-term note (EMTN) markets, with announcements totalling only \$44.9 billion, down 29% on the same period last year. The growth of total announcements of commercial paper (CP) over the last two quarters stalled somewhat in the third quarter, with announcements of \$16.9 billion. This is, however, still considerably higher than the same period in 1995 (\$6.4 billion); announcements of CP in the first three quarters of 1996 have totalled \$70.8 billion, compared with \$50.3 billion in the whole of 1995 and \$36.4 billion in 1994.

International syndicated credits

Syndicated credit announcements continued to follow the saw-tooth pattern established in the first quarter of 1995, as Chart 3 shows. The third quarter's borrowing was 26% down on the second quarter's, but 11% higher than the third quarter of 1995. Spreads on syndicated loans continued to remain low, probably because many banks being relatively cash and (regulatory) capital rich, wish to increase the size

Chart 3
International syndicated loan announcements



Source: IFR Omnibase.

of their balance sheets and are more comfortable investing in loans than securities.

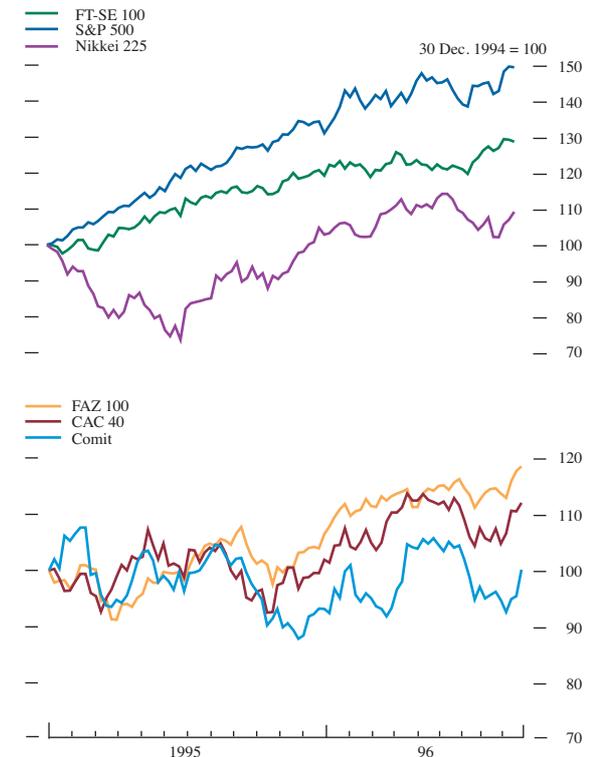
The international syndicated loans market has now provided easier access to capital for lower credit-rated borrowers than the bond markets for several quarters; among issuers this quarter were several Turkish banks, for example. Many emerging market borrowers find that the syndicated credits market is their only available source of international capital and its popularity is helped by the fact that many firms, from both emerging markets and developed countries, are more familiar with loan financing than securities financing. Some borrowers use the syndicated credits market to gain name recognition with investors prior to issuing bonds.

Equity markets

Prices

The US equity market, as measured by the S&P 500 index, rose 2.5% during the third quarter, bringing its rise in the first three quarters of the year to 11.6% (see Chart 4). The NASDAQ index, which is more heavily weighted towards the technology sector, rose 3.5% (16.6% in the first three quarters of the year). The early part of the quarter saw

Chart 4
Equity indices^(a)



Source: Individual exchanges.

(a) End-week prices; data to 27 September 1996.

prices decline amid two major concerns: first, that inflationary economic growth would necessitate a rise in interest rates; and second, that company earnings would not grow as quickly as earlier projections had suggested. However, in the latter part of the quarter, economic data and company results allayed both these fears, at least in the short

term, resulting in the S&P closing at an all-time high of 687.3 on the last day of the quarter.

Japanese equity prices failed to retain the momentum they achieved in the first half of the year, and fell 4.3% over the third quarter. Sentiment was fragile, with the slowness of the country's economic recovery disappointing investors. In addition, the prospect of a strengthening dollar, which would decrease dollar returns on Japanese equities, discouraged foreign investment.

After its relatively weak performance in the first half of the year, the UK equity market, as measured by the FT-SE 100 index, rose sharply in the third quarter, recording a gain of 6.6% (7.2% so far this year) and reaching a then record high of 3,977.2 on 16 September (before rising above 4,000 in October). The rising US market underpinned sentiment in the United Kingdom, but equity market analysts' view that a rise in interest rates is unlikely before the next election was reportedly another important factor.

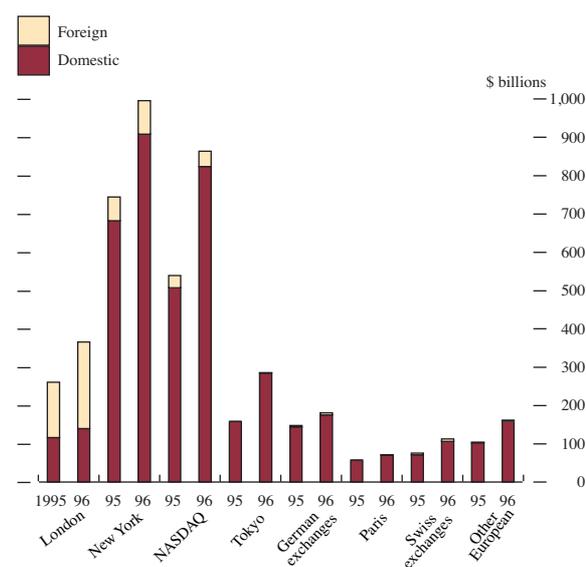
Most continental European equity markets were less buoyant than the United Kingdom during the third quarter, but strong nonetheless. The German equity market, measured by the FAZ index, rose 2.2% over the quarter, with the repo rate cut in late August seen as positive for both economic growth and exporting companies. The cut also helped French equities, which were weak until the end of August, but closed September 0.4% up on the quarter. The Italian equity market was the weakest in Europe, falling 3.3% over the quarter, while Scandinavian markets were strong over the quarter: Finnish equities rose 8.2%; and Swedish equities 5.5%. Throughout continental Europe, equity market analysts have become preoccupied with the likelihood of the various countries meeting the Maastricht criteria.

Turnover

Turnover in equities was strong in the second quarter of 1996 (the most recent data available). As Chart 5 shows, all major exchanges recorded a rise of at least 25% compared with the same quarter in 1995. Tokyo saw the strongest rise, after comparatively low turnover last year; trade in domestic equities almost doubled. Volumes of US equities traded continued to rise with NASDAQ volumes 65% higher and New York Stock Exchange volumes 40% higher. Despite the increased volumes in European markets, the number and proportion of foreign equity trades on the London Stock Exchange continued to rise: 62% of equity turnover in the United Kingdom was for non-UK equities, compared with 57% in the second quarter.

Tradepoint—the computerised order-driven market in UK equities which started operation a year ago—recorded its highest quarterly turnover to date in the third quarter, with £102 million of shares traded, compared with £64 million in the second quarter. Despite this, Tradepoint's share of the UK equity market remains low, at under 0.5%.

Chart 5
Turnover of domestic and foreign equities on major stock exchanges^(a)



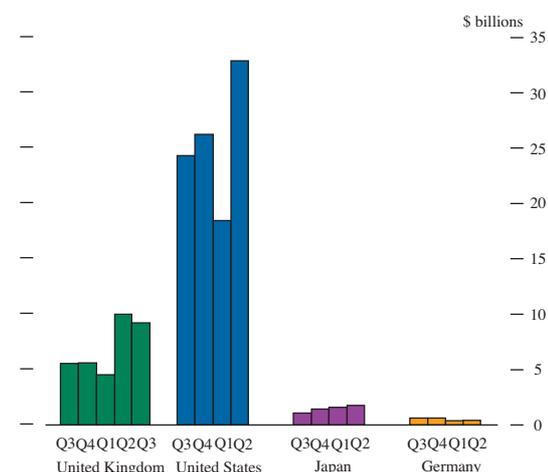
Source: Individual exchanges.

(a) Turnover in the second quarter of year indicated.

Equity issuance

Equity issuance outside the United Kingdom rose significantly in the second quarter (the most recent data available) compared with the first (see Chart 6). Issues of new equity in the United States totalled \$33 billion, a third

Chart 6
Equity capital raised in major stock exchanges



Source: Individual exchanges.

of which was in the form of initial public offers. Issuance picked up slightly in Japan, with \$1.8 billion of new equity raised in the second quarter, over 90% of which was by companies already listed on the Tokyo Stock Exchange. Issuance in Germany continued to be subdued, at \$0.4 billion; one possible reason for that was the planned DM 15 billion Deutsche Telekom flotation which is to be launched on 18 November and which might have been crowding out other prospective issuers.

Issuance in the United Kingdom in the third quarter of 1996 was very strong, with £3.2 billion raised during the quarter, compared with £3.0 billion for the whole of 1995, despite the third quarter being traditionally the quietest of the year. The total for new issues has already reached £8.5 billion this year. The issuance figures for 1996 have been boosted by two large privatisation issues—Railtrack (£1.9 billion) in May and British Energy (£1.4 billion) in July—but, even without these issues, 1996 issuance has already comfortably exceeded that of 1995. Similarly, buoyant issuance is evident on the alternative investment market (AIM), with new issues of £314 million in the first nine months of 1996, compared with £76 million for the whole of 1995.

Other developments

The London Stock Exchange’s new electronic trading platform—Sequence 6—went on-line at the end of August. That had two immediate effects. First, it introduced an electronic link for trade reporting; second, it led to a large increase in Exchange members with access to the extended Stock Exchange Automated Trading system (SEATS plus), the electronic order book for stocks on AIM and stocks with fewer than two market-makers. In due course, the Sequence 6 platform will also be the basis for an order book for FT-SE 100 shares, which is likely to be introduced towards the end of 1997.

In July, the Chancellor of the Exchequer announced changes to the stamp duty relief on share transactions. The existing exemption for market-makers and broker dealers will no longer be practicable when the order book trading begins and market making (as a defined activity) comes to an end. The changes will be introduced during the 1997/98 financial year and the exemption will in future apply to intermediaries on any UK recognised investment exchange or European Economic Area regulated market. As a result, the London Stock Exchange’s earlier proposal for the creation of Registered Principal Traders to support order book trading and who would receive exemption in return for various obligations, has been withdrawn. The Exchange is now considering the functioning of the order book itself and has formulated detailed proposals on this issue in the light of responses of market participants to a consultation document issued in May.

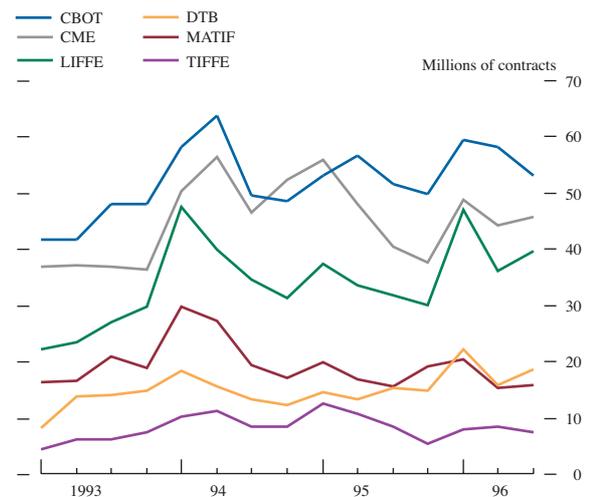
EASDAQ, a new pan-European market for the securities of smaller companies, opened in late September. The market is based on a quote-driven system modelled on NASDAQ, with share prices advertised on screens and traded by intermediaries using telephones. EASDAQ will operate alongside the domestic small company markets set up elsewhere in Europe, including AIM in the United Kingdom and the Nouveau Marché in France. Separately, AIM—the London Stock Exchange’s market for smaller companies—is conducting a review of nominated advisors to its traded companies as it moves into its second year of operation.

Derivatives exchanges

Volumes

Turnover on the major European derivatives exchanges in the third quarter of 1996 was higher than in the second quarter (see Chart 7). However, volumes were lower on a number of exchanges outside Europe; nevertheless, worldwide turnover was higher than in both the previous quarter and the equivalent period last year. Turnover in interest rate futures contracts showed a bigger increase over

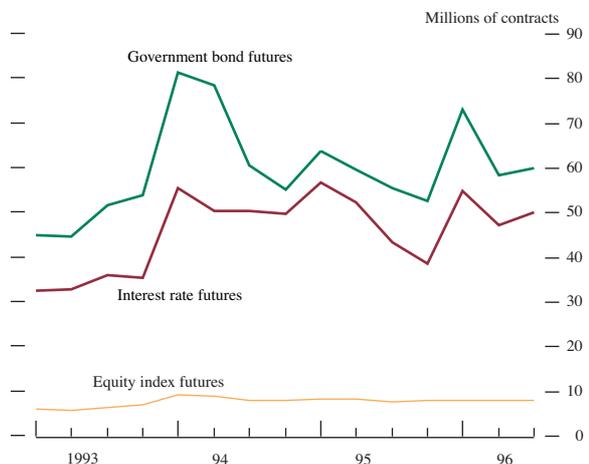
Chart 7
Quarterly turnover on major derivatives exchanges



Sources: FIA, individual exchanges.

the third quarter than turnover in government bond futures (see Chart 8). The stronger growth in the former probably reflected hedging business from the OTC markets, in particular the hedging of trades based around EMU convergence; that also probably encouraged the growth in volumes on European exchanges.

Chart 8
Quarterly turnover of futures by type^(a)



Sources: FIA, individual exchanges.

(a) Turnover in the major futures contracts listed on the CME, CBOT, LIFFE, DTB, MATIF and TIFFE.

Total volumes on LIFFE⁽¹⁾ increased by 9% from the second quarter to the third, and by 25% on a year-on-year basis, mainly because of the performance of its interest rate contracts. July, August and September all saw record volumes for those months and open interest on the exchange increased by 9% from end-June 1996 to end-September.

Turnover on the Deutsche Terminborse (DTB) increased strongly, by 19% compared with the previous quarter, and by 23% year on year, mainly because of growing volume in the Bobl contract. Quarterly volumes on the DTB have exceeded those on the *Marché à Terme International de France* (MATIF) since the start of this year. In the third quarter, turnover on MATIF increased by 5% on the previous quarter and by 3% compared with the same time last year. Volumes in the PIBOR contract grew by 28% over the third quarter, boosted by particularly strong activity in August.

In the United States, volumes on the Chicago Mercantile Exchange (CME) increased by 3% on the previous quarter and by 13% compared with the same period last year. The CME's Eurodollar contract, the world's most actively-traded futures contract, saw volume growth of 8% over the third quarter and 13% over the equivalent period last year. Turnover on the Chicago Board of Trade (CBOT) declined by 8% compared with the second quarter, but increased by 4% year on year. Turnover on the Tokyo International Financial Futures Exchange (TIFFE) declined by 12% both on a quarterly basis and compared with the same time last year.

Other developments

The members of the London Clearing House (LCH) endorsed the new ownership and guarantee proposals, by which the LCH's ownership transferred on 10 October from six UK clearing banks to the clearing house's clearing members and the three derivatives exchanges—LIFFE, the London Metal Exchange (LME) and the International Petroleum Exchange (IPE)—for which it clears. Share capital has been increased from £15 million to £50 million; the £150 million back-up provided by the shareholder banks has been replaced by a £150 million Member Default Fund as well as an additional insurance tranche for £100 million, which is initially in place for three years.

Links between derivatives exchanges were strengthened in the third quarter. First, LIFFE's merger with the London Commodity Exchange (LCE) took effect on 16 September, consolidating London's exchange traded derivatives business (though former LCE contracts will continue to be traded on the existing site, separate from the other LIFFE contracts, for the present).

Second, MATIF has confirmed that it is in talks with the Singapore International Monetary Exchange (SIMEX) and the CME over plans to establish joint trading links to rival the link agreement between LIFFE and the CBOT. The proposal

also reflects exchanges' increasing efforts to maximise their prospects for capturing Euro business after Stage 3 of EMU. This follows the termination of MATIF's trading link agreement with Germany's DTB.

Third, the Board of Trade Clearing Corporation (BOTCC)—the clearing arm of CBOT—and the CME have signed a letter of intent to pursue a common banking initiative. Common banking will enable clearing firms that do business on both exchanges to settle their trades with a single transaction through a common account at a bank, reducing firms' expenses. The CME and the New York Mercantile Exchange (NYMEX) have already signed a similar letter of intent to provide common banking.

Separately, as part of its review of the LME and the metals markets following problems associated with trading losses at Sumitomo Corporation (see the August 1996 *Financial market developments*), the Securities and Investments Board (SIB) published a consultation document in August and is currently assessing responses. The purpose of the paper was to seek views on issues relating to the rules and trading practices of the LME in the context of the wider global metals markets. A final report is expected to be published at the end of this year.

OTC derivatives markets

Recent statistics on the OTC derivatives markets are scarce, but indications are that volumes remained high in the third quarter, particularly given the traditional seasonal lull. In particular, trades motivated by the likelihood of Stage 3 of EMU occurring—and therefore on the likelihood of interest rates, especially those in Germany and France, converging—are reported to have remained popular. Participation in these markets may also be changing: some smaller users have reportedly left the market, but there are indications that asset managers are making more use of derivatives to enhance yields against the background of low interest rates in the major economies.

According to supervisory data,⁽²⁾ UK banks'⁽³⁾ notional principal amounts in OTC derivative contracts held as part of their trading activities totalled £6.1 trillion at the end of the second quarter (the most recent data available), an increase of 16% on the end of the first quarter. Replacement cost—a measure of the amounts at risk from counterparty default—was £78.2 billion (only 1.3% of notional principal amounts), an increase of 2% on the first quarter.

Of the total notional principal amount, 72% was in interest rate contracts and 27% in foreign exchange contracts. Of all contracts, 57% of the total notional principal amounts was in contracts with a residual maturity of under or equal to one year, 34% in contracts with a residual maturity of between one and five years and 9% in contracts with a residual maturity of over five years.

(1) Excludes commodity figures.

(2) Aggregated from individual Capital Adequacy Returns (Trading Book), otherwise known as Forms CAD1. These forms are completed by UK incorporated institutions authorised under the Banking Act 1987. These data are not directly comparable with previously published supervisory data—because the basis of reporting has changed—or with the results of the 1995 central bank survey of OTC derivatives markets.

(3) UK incorporated institutions authorised under the Banking Act 1987.

Interpreting sterling exchange rate movements

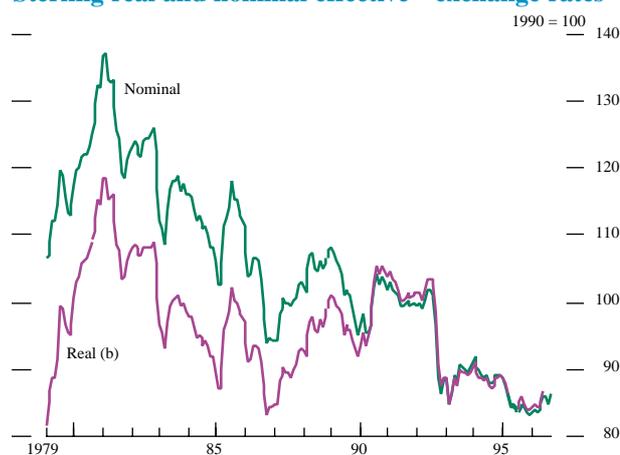
By Mark S Astley and Anthony Garratt of the Bank's Monetary Assessment and Strategy Division.

This article considers the analysis and interpretation of exchange rate fluctuations. It stresses the importance of identifying the sources of exchange rate movements, and recognising the many channels through which they can affect consumer prices. It reports empirical results which confirm that there is no simple relationship between the exchange rate and inflation. Sterling exchange rate depreciations are not necessarily associated with rises in UK consumer prices relative to prices overseas. In particular, UK prices may fall relative to those overseas if the depreciation is caused by increases in aggregate supply or falls in real spending, but rise if it is caused by increases in the money supply.

Introduction

Sterling exchange rate movements have long attracted intense discussion and analysis. Several factors have contributed to this. First, sterling nominal and real⁽¹⁾ exchange rates have fluctuated markedly since the break-up of the Bretton Woods fixed exchange rate system in early 1973 (see Chart 1). Second, the exchange rate plays several important roles in an open economy like the United Kingdom. In particular, sterling exchange rates provide a channel through which overseas developments may be transmitted to the UK economy and vice versa. And *real* exchange rates determine the terms on which UK companies compete in international markets.⁽²⁾ Finally, the exchange rate plays an important role in the transmission of domestic shocks, including shifts in monetary policy, through the UK economy.

Chart 1
Sterling real and nominal effective^(a) exchange rates



(a) Trade-weighted indices.
(b) Based on relative consumer prices.

These factors help to explain the importance that successive UK monetary policy frameworks have attached to the exchange rate.⁽³⁾ Indeed, the United Kingdom has a long, intermittent, history of formal exchange rate targeting—from the international Gold Standard, through Bretton Woods to the European exchange rate mechanism (ERM). In the current policy framework, sterling's external value is one of several indicators monitored by the authorities when assessing progress towards the Government's inflation target. It is in this context that Section 2 of the *Inflation Report* analyses movements in sterling.

This article discusses the factors that are central to the analysis and interpretation of exchange rate movements. A key issue when interpreting an exchange rate movement is to identify the *source* of its change so that informed inferences can be made about the price movements that are likely to accompany it. The article outlines recent Bank research that attempts to quantify these considerations.

Some considerations in analysing exchange rates

In analysing and interpreting exchange rate movements, it is important to recognise that exchange rates are *endogenous* macroeconomic variables. Their value is determined within the economic system, by the interaction of domestic and foreign macroeconomic (real and financial) variables. Many other macroeconomic variables—such as consumer prices or GDP—that typically concern policy-makers are also endogenous. Movements of endogenous variables are caused by changes in—or shocks to—the structural parameters of the economy. But shocks can affect any endogenous variable both directly and via their impact on other endogenous variables.

(1) This article analyses the real exchange rate defined as the nominal exchange rate deflated by the ratio of domestic to foreign prices. They thus represent a common-currency measure of the price of domestic goods relative to their foreign equivalents. Of the various price indices that can be used, this article analyses real exchange rates based on relative consumer prices. But a different real exchange rate can be defined as the ratio of tradable goods prices to non-tradable goods prices. Real exchange rates calculated in this way aim to reflect the relative incentives for producers to operate in the tradables and non-tradables sectors of the economy.
(2) Authors such as Buiter and Miller (1983) and Bean (1987) have commented on the large effects that pronounced sterling real exchange rate movements have had on UK industry.
(3) George (1994, 1996) discusses sterling's role in past and current UK monetary policy frameworks. King (1994) outlines the current policy framework.

The endogeneity of exchange rates and consumer prices means that any observed *correlations* between these two variables should not be interpreted as exchange rate changes *causing* price movements, or vice versa. Such correlations are likely to reflect an exogenous shock moving both these endogenous variables in the same direction. But several factors may weaken this conclusion. First, exchange rate changes can directly affect the imported goods, materials and services components of domestic consumer prices. The strength of this ‘import price channel’ may, however, be weaker than is commonly perceived: there is substantial evidence that foreign exporters ‘price to market’—holding the sterling price of their exports steady in the face of exchange rate movements in order to maintain UK market share.⁽¹⁾ Second, exchange rate movements are likely to *cause* consumer price fluctuations if the authorities allow this ‘first-round’ effect to feed through to wage and price-setting behaviour.

The distinction between endogenous variables and exogenous shocks is especially important for exchange rates. Exchange rates are *asset prices*, whose value is determined by the *expectations* of the *future* path of the exogenous shocks, and their effects on the other endogenous variables.⁽²⁾ This forward-looking characteristic means that exchange rates are likely to change by more following *unanticipated* than *anticipated* developments. This is because, to rule out unexploited profit opportunities, exchange rates can only move in discrete steps—‘jump’—following an unanticipated development. If arbitrage opportunities are exploited fully, any development which is expected beforehand will have been preceded by an exchange rate change at the moment when a piece of information first caused a revision of expectations. Expected trend movements in relevant economic variables can, however, produce smooth exchange rate movements.⁽³⁾

It is also important to recognise that the shocks that produce exchange rate movements can affect relative consumer prices⁽⁴⁾ through a number of channels. For example, consumer prices will be affected by a shock’s impact on the level of excess supply or demand in the economy. And, depending on the type of shock, the impact via these channels can either reinforce or offset the impact via import prices. This will become clearer if, like the May 1995 *Inflation Report*, we consider how the relative consumer price movements associated with a sterling nominal exchange rate depreciation may differ depending on its cause.

Three broad classes of shock underlie movements in macroeconomic variables such as the exchange rate, consumer prices and GDP. First, *real* aggregate supply shocks. These are developments—such as productivity movements—that shift the potential output of an economy. Second, *real* spending shocks, such as shifts in fiscal policy, consumption, investment and changes in tastes between home and foreign goods. Third, shifts in money supply or money demand schedules—money shocks.⁽⁵⁾

Consider each of these in turn:

- First, if a positive aggregate supply shock⁽⁶⁾—such as an improvement in UK productivity relative to its foreign equivalent—underlies the depreciation, it may be associated with a *fall* in UK relative consumer prices. The increase in potential—and actual—output generated by the supply shock is likely to be less than fully matched by an increase in UK aggregate demand.⁽⁷⁾ The supply shock therefore creates an excess supply of UK goods, which is eliminated by an increase in foreign demand for UK goods. The *real* exchange rate depreciation required to stimulate foreign demand is, for a broad range of parameter values in the economy,⁽⁸⁾ achieved partly through a nominal depreciation. And the excess supply also exerts downward price pressure, producing a *fall* in UK relative consumer prices,⁽⁹⁾ which is partly offset by the rise in sterling import prices.
- Second, if a negative real spending shock—such as a shift in tastes away from UK goods—underlies the depreciation, it is again likely to be associated with a *fall* in UK relative consumer prices. The negative real spending shock will temporarily decrease output below its long-run supply-determined potential, putting *downward* pressure on UK relative consumer prices. But the shock also causes UK nominal interest rates to fall below their foreign equivalents. This generates a capital outflow and hence a sterling nominal exchange rate *depreciation*.⁽¹⁰⁾ This depreciation, together with the fall in UK interest rates, eventually raises output back to its unchanged equilibrium level.
- Third, if a positive money shock—such as a one-off increase in the United Kingdom’s money supply relative to that abroad—underlies the depreciation, it will eventually be associated with a *rise* in UK relative consumer prices. Consumer prices increase because the money shock stimulates aggregate demand.⁽¹¹⁾ And the increase in aggregate demand also raises the demand for

(1) See *inter alia* Hooper and Mann (1989), Krugman (1987,1989) and Mann (1987,1989).

(2) Black (1973) is an early example of the asset price approach to exchange rate. Empirical papers attempting to quantify these responses include Dornbusch (1978, 1980), Frenkel (1981), Eichenbaum and Evans (1993), Grilli and Roubini (1993) and Clarida and Gali (1994). Frankel and Rose (1995) provide an overview.

(3) But these movements must be accompanied by compensating cross-country interest rate differentials.

(4) Defined in the empirical work as the log of UK consumer prices minus the log of an index of foreign consumer prices.

(5) Real spending shocks and money shocks are often combined into aggregate demand shocks.

(6) The aggregate supply shocks we consider are ones which have roughly equal effects on all sectors of the economy and whose direct supply effects are not exceeded by any wealth effects that may be associated with them. Our analysis differs from that in the May 1995 *Inflation Report* by allowing for permanent real exchange rate changes.

(7) For example, if the marginal propensity to consume is less than one.

(8) See Astley and Garratt (1996) for details of the relevant parameters.

(9) That is, relative consumer price movements also play a role in achieving the required real depreciation. But the ‘stickiness’ of prices means that nominal exchange rates are likely to change by more than relative consumer prices in the short run.

(10) The associated rise in sterling import prices again partly offsets the fall in relative consumer prices.

(11) This occurs through several channels. First, through the fall in nominal interest rates attendant on the money supply expansion. Second, while goods market prices remain sticky, the nominal depreciation is also a real depreciation, making UK goods more competitive on international markets. And, of course, the rise in the sterling price of imported goods and materials following the nominal depreciation directly raises consumer prices.

foreign goods and hence for the foreign currency. This leads to a rise in the price of the foreign currency—a nominal sterling *depreciation*. The rise in relative prices and nominal exchange rate will eventually completely offset each other, ensuring that purchasing power parity—an unchanged real exchange rate—is maintained in the long run.⁽¹⁾ This occurs because nothing ‘real’ has happened to change the relative price of the two countries’ goods.

These considerations imply that, as the May 1995 *Inflation Report* stated, ‘there is no simple relationship between exchange rate changes and subsequent inflation’. The *Report’s* analysis was framed on a model where purchasing power parity held in the long run. The present analysis, which is based in a richer model, has confirmed the *Report’s* conclusion. In particular, we have shown that a nominal depreciation may be associated with a *fall* in relative consumer prices if it is caused by aggregate supply or real spending shocks, but a *rise* in relative prices if it is caused by a money shock.

As such, the common assertion that depreciations are unambiguously associated with rises in consumer prices is flawed. Of course, if monetary policy allows wage and price-setting behaviour to be revised upwards following depreciations, ‘second-round’ effects are generated. These add to the (‘first-round’) effect of exchange rates on import prices. Monetary accommodation therefore increases the monetary element of *any*—real or money—shock, making relative price rises more likely.

In summary, an exchange rate analysis should take place in a framework that takes account of two factors. First, the framework needs to be able to identify the type of shock underlying an exchange rate movement. Second, it needs to be able to recognise the many channels through which these shocks can affect prices. We now turn to an empirical approach that does both of these things.

Quantifying these considerations

This section outlines a method for estimating the relative importance of the three types of exogenous shocks described above as *sources* of movements of sterling bilateral exchange rates, UK relative consumer prices and UK relative GDP.⁽²⁾ The relative formulation is employed because the bilateral exchange rates examined are relative prices linking two economies. This means that only the effects of asymmetric shocks—hitting one country but not the other—are considered. The approach also generates empirical estimates of the dynamic effects of each of the three types of shock on exchange rates, relative consumer prices and relative GDP. This allows a quantification of the relative price (and output) movements which have, on

average, been associated with exchange rate movements in the past. In reporting these results, we concentrate on the exchange rate and relative price interactions.

Empirical method

A Structural Vector AutoRegression (SVAR) approach is used to explore these interactions. SVARs are dynamic simultaneous equation systems that allow a quantification of the dynamic impact of exogenous shocks on endogenous variables. Unfortunately, the exogenous shocks—and their dynamic effects on the endogenous variables—are unobservable. But the data allow movements in each endogenous variable to be represented as responses to past movements in all the endogenous variables. And by applying assumptions, or restrictions, to this representation we can obtain estimates of—or identify—the dynamic effects of the unobservable exogenous shocks. These identification issues are familiar from the Vector AutoRegression (VAR) methodology.⁽³⁾ The advantage of the SVAR approach is that the identifying restrictions employed are explicitly grounded in economic theory.⁽⁴⁾

In our case these restrictions are formulated in terms of the *long-run* effects of shocks on endogenous variables. In particular, we impose the conditions that neither real spending shocks nor money shocks have long-run effects on the level of relative output. These two restrictions mean that long-run relative output fluctuations are attributed entirely to aggregate supply shocks. Finally, we restrict money shocks to have zero long-run effects on the level of the real exchange rate. The advantage of these restrictions is their generality. This means that the empirical quantification is not tied to one particular theoretical model. The technical appendix discusses these issues in more detail.

SVAR models were estimated for the United Kingdom relative to four major countries—France, Germany, Japan and the United States—on quarterly data between 1973 and 1994. This sample period was chosen to cover the post Bretton Woods era. As there was little qualitative variation in the results across country pairs, only the results from the UK-German system are reported below.⁽⁵⁾

Sources of sterling exchange rate and UK relative consumer price movements

This section outlines the estimates of the relative importance of the three shocks as sources of movements in sterling bilateral exchange rates and in UK relative consumer prices. They are determined by the proportion of the movements of each of the endogenous variables between 1973 and 1994 which can be attributed to each of the exogenous shocks. And these proportions can be calculated at various time periods—or horizons—after the impact of the shock.⁽⁶⁾ We

(1) Dornbusch (1976) showed that the presence of slowly adjusting goods market prices means that in the short run the nominal exchange rate will depreciate by more than it does in the long run; the exchange rate ‘overshoots’ in the short run. The overshooting reflects the fall in UK interest rates below their foreign equivalents following the money supply expansion, which must be offset by an expectation of an *appreciation* of sterling. This is only consistent with the long-run sterling depreciation if the currency over-depreciates in the short run.

(2) This approach is based upon the Clarida and Gali (1994) analysis of US dollar exchange rates.

(3) See Dale and Haldane (1993) and Henry and Pesaran (1993) for overviews of the VAR approach.

(4) The restrictions employed in VARs are more restrictive and are often difficult to reconcile with structural economic models—see Cooley and LeRoy (1985).

(5) More detailed results are presented in Astley and Garratt (1996).

(6) These proportions relate to the endogenous variable movements *directly* due to the initial shock.

report both the central—or point—estimate of the relative importance of the shocks and, in parentheses, the 95% confidence intervals surrounding these point estimates. These confidence intervals allow us to test whether the contribution of a particular shock is significantly different from zero.⁽¹⁾

Table A presents the results for the *real* DM/£ exchange rate (similar results were obtained for the nominal DM/£ rate). According to those estimates, real spending shocks—such as shifts in consumers' tastes or fiscal policy—accounted for the majority of real (and nominal) DM/£ exchange rate movements between 1973 and 1994. Real aggregate supply shocks, such as cross-country productivity differentials, were usually the second most important source of those movements, while money shocks were usually the least important.

Table A
Percentage of real DM/£ exchange rate variation accounted for by each of the shocks; 95% confidence intervals in parentheses

Quarters after shock	Aggregate supply shock	Real spending shock	Money shock
1	9.3 (1.3–17.3)	72.0 (55.7–88.3)	18.7 (4.2–33.2)
2	11.2 (2.4–20.0)	74.9 (59.9–89.9)	13.9 (2.3–25.5)
4	13.6 (2.9–24.4)	78.2 (64.2–92.2)	8.2 (0.0–25.5)
8	15.7 (2.9–28.5)	80.3 (66.4–94.2)	4.0 (0.5–7.5)
12	16.7 (3.0–30.4)	80.9 (66.6–95.2)	2.5 (0.4–4.6)
16	17.1 (2.8–31.4)	81.1 (66.5–95.7)	1.8 (0.4–3.2)
20	17.4 (2.8–32.0)	81.2 (66.4–96.0)	1.4 (0.3–2.5)
40	17.9 (2.9–32.9)	81.4 (66.8–96.0)	0.7 (0.2–1.2)
60	18.1 (13.1–33.1)	81.4 (66.9–95.9)	0.5 (0.2–0.8)

It is interesting to set these results against the predictions of alternative approaches to (real) exchange rate determination. We consider two mainstream approaches. First, the 'sticky price' approach.⁽²⁾ That approach focuses on the slow adjustment of goods market prices. This means that nominal exchange rate movements also constitute real exchange rate changes. And since money shocks affect nominal exchange rates, they should play a role in real exchange rate movements, at least in the short run when prices are 'sticky'. Second, the 'equilibrium' approach.⁽³⁾ That approach focuses on *real* shocks, which are largely permanent, as determinants of real exchange rate changes. Such a predominance of *permanent* real shocks implies that a high proportion of real exchange rate changes represent permanent shifts in the equilibrium real exchange rate.

On balance, our results that *real* spending and aggregate supply shocks were the most important sources of sterling exchange rate fluctuations—particularly in the long run—are more *consistent*⁽⁴⁾ with the 'equilibrium' approach. And the roles that our results that indicate real shocks played in relative price and output movements suggest that they may indeed have had large permanent components. But the 'sticky price' approach also receives some support. In particular, our finding that the role of money shocks was largest in the first few quarters following the shock, before

declining thereafter, is consistent with that approach. And the estimated dynamic responses (discussed below) indicate that relative prices respond comparatively slowly to shocks.

Table B reports the results for UK-German consumer prices. According to these estimates, most of the movements in UK-German consumer prices between 1973 and 1994 were accounted for by money shocks. This is consistent with the view that inflation is essentially a monetary phenomenon.

Table B
Percentage of UK-German consumer price variation accounted for by each of the shocks; 95% confidence intervals in parentheses

Quarters after shock	Aggregate supply shock	Real spending shock	Money shock
1	32.7 (11.7–53.7)	16.4 (0.0–33.5)	50.9 (31.2–70.6)
2	27.0 (17.8–46.2)	16.3 (0.0–32.8)	56.7 (37.8–75.6)
4	22.3 (4.3–40.3)	16.0 (0.0–32.4)	61.7 (43.1–80.3)
8	19.6 (2.2–37.0)	15.6 (0.0–32.0)	64.8 (46.1–83.5)
12	18.7 (1.4–36.0)	15.5 (0.0–31.9)	65.8 (47.0–84.6)
16	18.3 (1.1–35.5)	15.5 (0.0–31.9)	66.2 (47.4–85.0)
20	18.1 (0.9–35.3)	15.4 (0.0–31.8)	66.5 (47.7–85.3)
40	17.8 (0.6–35.0)	15.4 (0.0–31.8)	66.8 (47.9–85.7)
60	17.7 (0.6–34.8)	15.4 (0.0–31.8)	66.9 (48.0–85.8)

And the increasing dominance of money shocks at longer time periods following the shock is consistent with this being a long-run theory of price determination. But, importantly, real (aggregate supply and spending) shocks also played a significant role in explaining UK relative price movements. This is most apparent in the first few quarters after the shock—especially for aggregate supply shocks—but is also present a considerable period thereafter. For example, real shocks are estimated to account for nearly a third of the UK-German consumer price movements due to the shocks fifteen years after their impact.

A comparison of the results from Table A with those from Table B suggests that different types of shocks were the sources of the movements in sterling exchange rates and UK relative consumer prices between 1973 and 1994. The real spending shocks that accounted for most of the sterling exchange rate fluctuations over that period played a much smaller role in the associated UK relative consumer price movements. This suggests that sterling exchange rate fluctuations did not constitute an important channel through which exogenous shocks eventually fed through to changes in UK relative prices over this period. UK relative consumer price movements were instead accounted for primarily by money shocks that were unimportant sources of sterling exchange rate movements.

The theoretical considerations discussed above suggested that sterling depreciations (appreciations) were likely to be associated with falls (rises) in UK relative consumer prices if aggregate supply or real spending shocks were the primary source of the exchange rate fluctuations. And,

(1) This was first proposed by Runkle (1987). But many practitioners do not strictly apply this test, because VARs are not meant to be parsimonious representations. As such, the degree of uncertainty associated with the point estimates could easily be reduced.

(2) Due to Dornbusch (1976), the approach usually only considers money shocks.

(3) Due to Stockman (1987, 1988).

(4) Our empirical results cannot be used to formally discriminate between alternative exchange rate theories.

according to our results, such real shocks were the main source of sterling exchange rate movements between 1973 and 1994.⁽¹⁾ But this does not necessarily imply that sterling depreciations (appreciations) were in the past associated with falling (rising) UK relative consumer prices. This is because such inferences relate to the dynamic interactions between exchange rates and relative prices.⁽²⁾ We turn to this issue next.

Dynamic relationships between sterling exchange rate and UK relative consumer price movements

The estimated systems allow us to trace out the dynamic effects of each of the three exogenous shocks on each of the endogenous variables. From these we can infer the stylised dynamic interactions between sterling exchange rate and UK relative price movements between 1973 and 1994.

Chart 2 plots the response (in per cent) of each of the variables in the UK-German system to a 1.0 percentage point *positive* innovation in each of the exogenous shocks. The real and nominal exchange rates are defined so that a rise represents an appreciation. The point estimates are represented by the dark lines, while the lighter lines represent the 95% confidence intervals (error bands).⁽³⁾

The dynamic responses of each of the endogenous variables following each of the shocks are consistent with the theory outlined above. This, importantly, suggests that the SVARS are more than statistical representations of the data; they also have considerable economic content. For example, a *positive* real spending shock produces a temporary rise in UK-German GDP, an *appreciation* of the (real and nominal) DM/£ exchange rate and a *rise* in UK-German consumer prices. Thus nominal DM/£ *depreciations* are associated with *falling* UK-German prices following *negative* real spending shocks. Likewise, nominal DM/£ depreciations are found to be associated with *falling* UK-German consumer prices following *positive* aggregate supply shocks. In contrast, and as expected, nominal DM/£ depreciations were found to be associated with *rising* UK-German consumer prices following *positive* money shocks.

Combined with the result that real spending and aggregate supply shocks were the primary sources of sterling fluctuations, these point estimate responses suggest that sterling depreciations were largely associated with *decreases* in UK relative consumer prices between 1973 and 1994.

But taking account of the error bands associated with the point estimates in Chart 2 considerably weakens that conclusion. In particular, the error bands suggest that the relative consumer price responses to real spending and aggregate supply shocks are not significantly different from zero. The relative consumer price responses following money shocks are, however, significantly different from

zero. So if a sterling exchange rate depreciation was caused by real spending or aggregate supply shocks—which the results indicate was the case for most of sterling's movements between 1973 and 1994—it was unlikely to be associated with any significant change in UK relative consumer prices. But if the sterling depreciation was caused by a money shock—which the results indicate was the case for a small proportion of sterling's fluctuations over the past two decades—it was likely to be associated with a statistically significant rise in UK relative consumer prices.

Using these results

The estimated interactions between shocks and endogenous variables should not be applied mechanically to each movement in sterling exchange rates. But they constitute a useful way of quantifying the theoretical considerations central to exchange rate analysis. And the stylised results have several potential uses.

First, the results can help us to understand past exchange rate, relative consumer price and relative output fluctuations. SVARS are particularly useful in this respect because they allow the decomposition of endogenous variable movements over distinct historical episodes into that attributable to each of the shocks. In general, we find that the historical periods during which the estimated SVARS indicate that a particular shock was most important correspond sensibly to observed macroeconomic developments. This again indicates that the SVARS have considerable economic content.

For example, our results suggest that the real DM/£ appreciation in the late 1980s (see Chart 1) largely reflected real spending shocks. And this may be related to the observed shift in relative domestic demand towards the United Kingdom over that period. In contrast, our results suggest that real aggregate supply shocks played a large role in the real DM/£ depreciation following sterling's departure from the ERM. This may be linked to the improvement in UK relative productivity—partly reflecting the negative short-term effects of German reunification on German productivity—which occurred over that period. And these positive supply shocks also, according to our results, played a large role in the improvements in UK relative inflation witnessed over that period. This contrasts with previous experience; our results indicate that the rising UK-German consumer prices observed in the 1980s largely reflected money shocks. And this may be traced to UK monetary aggregates growing quicker than their foreign equivalents over that period.

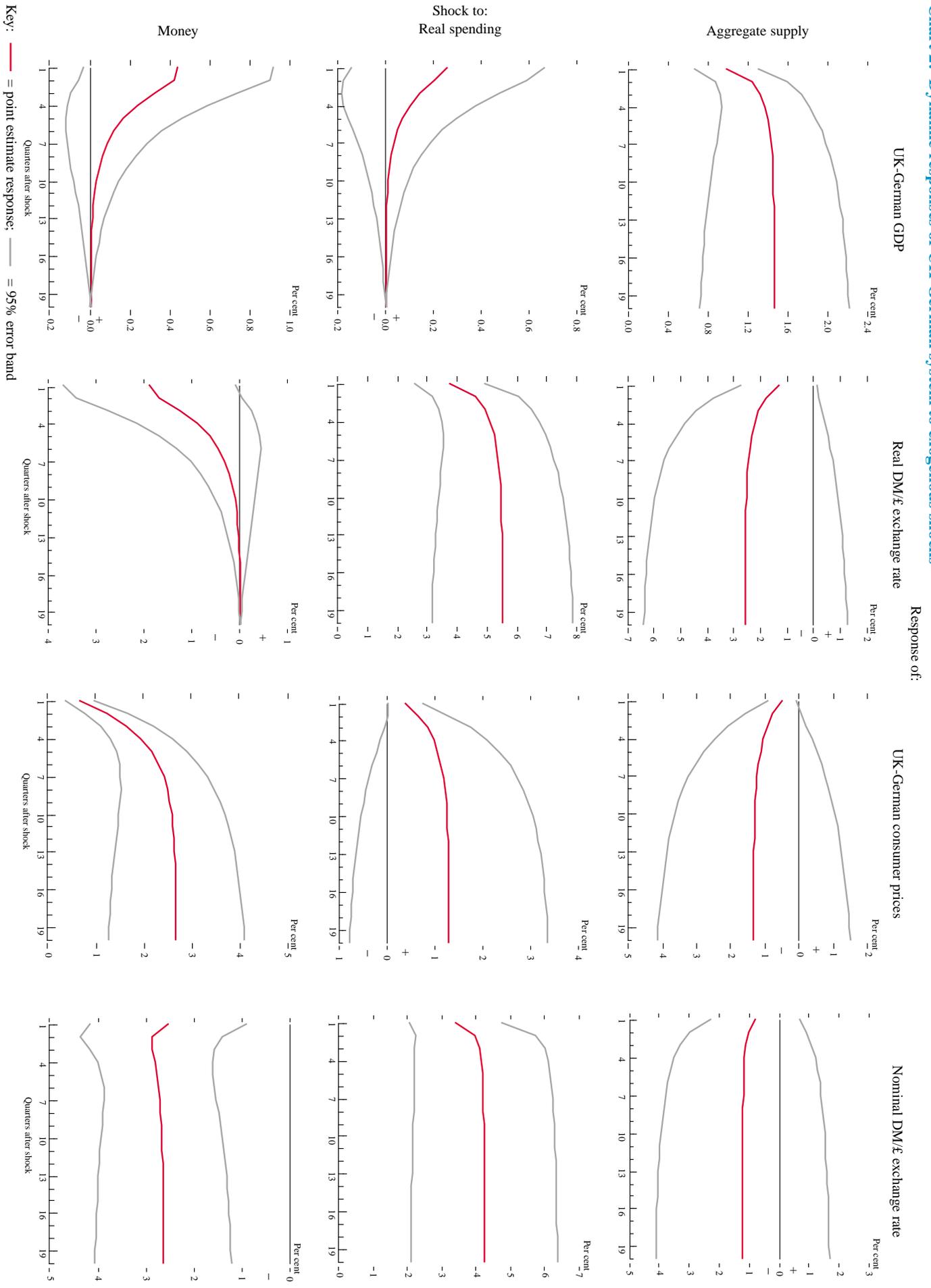
Second, a better understanding of the past can aid the interpretation of current developments. For example, the result that real shocks underlay most of sterling's fluctuations between 1973 and 1994—and the implications for relative consumer price movements—might be

(1) The technique cannot easily detect if different shocks underlay exchange rate depreciations and appreciations.

(2) Moreover, it is possible that the association of *nominal* exchange rate depreciations with falling relative prices following (positive) aggregate supply shocks may not hold for some values of parameters in the economy.

(3) Chart 2 only plots the first 20 quarters of responses because the lines are flat thereafter.

Chart 2: Dynamic responses of UK-German system to exogenous shocks



extrapolated to more recent movements. But several caveats must be borne in mind. First, these stylised results are based upon past interactions between variables. It is well known that in general such past relationships will not necessarily hold outside the sample period, especially if policy-makers attempt to use these past relationships.⁽¹⁾ Moreover, this out-of-sample problem is especially pronounced in exchange rate modelling.⁽²⁾ Second, these stylised results represent the *average* dynamic interactions over the sample period. So they will not necessarily apply to each and every exchange rate movement, either inside or outside the sample period.⁽³⁾ Third, the results apply only to sustained exchange rate movements, rather than to erratic quarter-to-quarter changes. This is because non-macroeconomic factors—such as foreign exchange market participants' trading strategies—may have an impact on exchange rate movements, especially in the short run.⁽⁴⁾ Fourth, the results reported above have been obtained in one of many potential empirical frameworks.⁽⁵⁾ As such, they should not be regarded as definitive.

Conclusions

This article has emphasised the importance of identifying the sources of exchange rate movements and of taking account of the many channels through which such developments can affect consumer prices and activity. Both these tasks are extremely difficult. But analyses conducted without the discipline of this type of framework are more likely to be misleading. In particular, this article has demonstrated that, both theoretically and empirically, it should not be presumed that sterling exchange rate depreciations will necessarily be associated with rises in UK relative consumer prices. Relative consumer prices are likely to fall if either aggregate supply or real spending developments underlie the depreciation, but rise if monetary developments underlie it. The empirical approach outlined above represents one way of obtaining empirical information on the complex interactions between exogenous disturbances, exchange rates and the other endogenous variables in the economy.

(1) The Lucas (1976) critique of the use of econometric models to inform policy.

(2) Meese and Rogoff (1983a, b) demonstrated that a simple random-walk out-performed the out-of-sample forecasts of a number of mainstream economic models.

(3) This is, however, the best that we can do. Any average result will not, by definition, apply to every occasion.

(4) There is a large literature that suggests that exchange rate movements are little related to macroeconomic 'fundamentals'. See *inter alia* Kirman (1995), DeGrauwe (1994) and Rose (1994).

(5) The SVAR approach employed was chosen for its ability to obtain information on the links between shocks and endogenous variable movements. It also aimed to avoid the problems associated with traditional exchange rate modelling. The lack of problems uncovered by various diagnostic tests of the SVARs is reassuring in this respect. But SVARs employing different restrictions—based upon different theoretical models—could potentially uncover different stylised relationships.

Technical appendix

The endogeneity of macroeconomic variables such as exchange rates, consumer prices and GDP means that it is appropriate to think of them as fluctuating in response to unanticipated exogenous shocks. This may be represented as:⁽¹⁾

$$y_t = C_0 \varepsilon_t + C_1 \varepsilon_{t-1} + C_2 \varepsilon_{t-2} + \dots + C_n \varepsilon_{t-n} + \dots \quad (1)$$

where y_t is a (3 by 1) vector of our endogenous economic variables (relative GDP, the real exchange rate and relative consumer prices), ε_t is a (3 by 1) vector of exogenous shocks and the C 's are (3 by 3) coefficient matrices which can be given economic interpretation. While the endogenous variables (y_t) are observable, the exogenous shocks (ε_t)—and their effects on the endogenous variables (C_i)—are not. Instead, movements in each of the endogenous variables can be modelled as a function of past movements in all of the endogenous variables:⁽²⁾

$$y_t = \Phi_1 y_{t-1} + \Phi_2 y_{t-2} + \dots + \Phi_p y_{t-p} + e_t \quad (2)$$

Where e_t is a vector of residuals and Φ are again parameter matrices, but with considerably less economic content than the C 's. The aim of the SVAR method is to move from the easily estimated form of (2) to an estimate of the form of (1), which has considerably more economic content. The first stage in this is to notice that (1) may be inverted to obtain:

$$A_0 y_t = A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + \varepsilon_t \quad (3)$$

It is clear that (2) and (3) are of similar forms. In particular, $A_i = A_0 \Phi_i$, for $i=1, \dots, p$, and $\varepsilon_t = A_0 e_t$. It can be shown that n^2 restrictions (n is the number of variables in y_t) are required to achieve a unique transformation from (2) to (3) (and hence back to (1))—to 'identify' the model. Six of the nine restrictions required in our case are provided by the variances of the structural shocks (ε_t) being normalised to unity and the assumption that the structural shocks are uncorrelated with each other. This zero correlation means that each of the structural shocks is viewed as distinct economic phenomenon.

The final three restrictions are derived from economic theory. In our case this takes the form of specific shocks having zero *long-run* effects on the levels of certain endogenous variables. These *long-run* restrictions, which were first implemented by Shapiro and Watson (1988) and Blanchard and Quah (1989), have several strengths. First, they are grounded explicitly in economic theory. Second, they are usually very general. This means that the empirics are not tied to one particular theoretical model. Third, they avoid the need to impose restrictions on the short-run reaction of variables to shocks, which are often more contentious.

The three long-run restrictions we impose are derived from the Obstfeld (1985) stochastic two country version of the Dornbusch (1976) model. The first two of these are that both goods market shocks and money shocks have zero long-run effects on the level of relative output—which is entirely determined by aggregate supply shocks. Finally, we restrict money shocks to have zero long-run effects on the level of the real exchange rate.

Identifying the model—extracting an estimate of (1) from the data—allows us to extract several useful pieces of information on the dynamic interactions between shocks and movements in the endogenous variables.

First, we can determine the average *relative* importance of each of the shocks in accounting for movements in the endogenous variables over the estimation period. This information is obtained through what are known as *Forecast Error Variance Decompositions*. These test the relative importance of each of the shocks by considering their role in the h -step ahead forecast errors of the endogenous variables:

$$a_{t \setminus t-h} = y_t - y_{t \setminus t-h} \quad (4)$$

where $a_{t \setminus t-h}$ is the h -step-ahead forecast error of y_t and $y_{t \setminus t-h}$ is the h -step-ahead forecast of y_t made using information available at time $t-h$. For small (large) values of h , $a_{t \setminus t-h}$ can be interpreted as the short-run (long-run) movements in y_t . The relative importance of a shock is then determined by the fraction of the variance of the forecast error ($a_{t \setminus t-h}$) that it explains.

(1) This is known as the structural moving average representation.
 (2) This is known as the Vector AutoRegression (VAR) representation.

These forecast errors are determined by both the exogenous shocks hitting the system and the response of the endogenous variables to these shocks (C matrices). A unique decomposition can only be obtained if, as is assumed, the exogenous shocks are uncorrelated with each other. It can be shown that the proportion of the variance of the i -th variable accounted for by the j -th shock at horizon h ($R_{ij,h}^2$) is:

$$R_{ij,h}^2 = \frac{\left[\sigma_j^2 \sum_{k=0}^{h-1} c_{ij,k}^2 \right]}{\sum_{m=1}^n \left[\sigma_m^2 \sum_{k=0}^{h-1} c_{im,k}^2 \right]} \quad (5)$$

Where σ_j^2 is the variance of the j -th structural shocks and $c_{ij,k}$ ($c_{im,k}$) are the individual elements in the C matrices—the response of the i -th variable following the j -th (m -th) shock after k periods.

Second, we can examine the dynamic responses of each of the endogenous variables to each of the exogenous shocks. These functions, which are known as *impulse responses*, are obtained from the sequence of $c_{ij,k}$ s.

Third, we can decompose movements in each of the endogenous variables over distinct historic periods into that attributable to each of the shocks. These functions, which are known as *historical decompositions*, are described in Burbridge and Harrison (1985).

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The demand for Divisia money by the personal sector and by industrial and commercial companies

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This article updates previous Bank analysis of Divisia money. It assesses the demand for Divisia money by the personal sector and by industrial and commercial companies (ICCs). Divisia money weights the component assets of M4 according to an estimate of the transactions services they provide. As an index of total liquidity in the economy Divisia might therefore be more closely related to spending than simple-sum monetary aggregates. The article concludes that a sectoral analysis of Divisia money can contain important information about future spending.

Introduction

Since 1993, the Bank has published time-series for a Divisia index of money for the economy as a whole, as well as for the personal and corporate sector separately, dating back to 1977 Q1.⁽¹⁾ These Divisia measures are part of the set of information variables used for the assessment of future developments in spending and inflation.⁽²⁾ The Bank monitors Divisia money alongside simple-sum monetary aggregates, such as M4, because transactions balances as measured by Divisia money might be expected to feed into spending more quickly and more directly than M4 balances—which are held both for payments and savings purposes.⁽³⁾ This article considers what determines the demand for personal sector and industrial and commercial companies' (ICCs) Divisia money (using a similar approach as for sectoral M4)⁽⁴⁾ and how this information may be used in formulating monetary policy. It updates previous Bank analysis of Divisia money.⁽⁵⁾

Over the past 20 years, target and monitoring ranges for the growth of various definitions of money have been published in the United Kingdom. Under the new monetary framework (announced in October 1992) the government has adopted an inflation target of 2.5% or less over the medium term. To achieve this target, a wide range of economic indicators is used to provide information about future developments in nominal demand and inflation. As part of this set of indicators, monitoring ranges for M0 and M4 have been set so as to be consistent with the government's inflation target.

The usefulness of monetary aggregates for policy purposes should be assessed on the basis of whether they

have a close and predictable relationship with activity and inflation. M0 and notes and coin are very narrow aggregates, and do not capture all the liquidity services money provides. And broad money balances are increasingly held for savings purposes, thereby sometimes obscuring M4's relationship with current nominal spending.⁽⁶⁾

In principle, Divisia money should not suffer from these drawbacks, since it weights the components of aggregate and sectoral M4 to reflect estimates of the extent to which these assets provide transactions services. For example, interest-bearing time deposits are likely to be held primarily for savings purposes and carry a low weight in Divisia money, whereas notes and coin are used largely for transactions purposes and so carry a higher weight. The liquidity of an M4 component asset is proxied by its opportunity cost—the asset's rate of return relative to the interest return on a benchmark asset which offers no transactions services. The Divisia weights are two-period moving averages of expenditure on each component asset relative to expenditure on all components in the Divisia index. Expenditure on an asset is proxied by the product of the asset's opportunity cost (which is effectively a shadow price) and the value of balances held in that asset.⁽⁷⁾ The growth rate of Divisia money then measures the growth in transactions services provided by the M4 component assets by adding their growth rates, with the weights of all assets adding up to one, although individual weights can vary over time.⁽⁸⁾ If liquidity is critical to the relationship between money and activity and inflation,⁽⁹⁾ then Divisia indices should in principle be more closely related to total spending and inflation than are M0 and M4.⁽¹⁰⁾

(1) See Fisher, P, Hudson, S and Pradhan, M (1993a, 1993b), (referred to as FHP in this article). Central banks in Canada, Germany, Japan, the Netherlands, Spain, Switzerland and the United States have also analysed and become increasingly interested in Divisia indices.

(2) See the Bank's *Inflation Report* for details of this assessment.

(3) See Thomas, R (1996).

(4) Thomas, R, *op cit*.

(5) See FHP.

(6) The demand for M0 and M4, both of which do not take into account the differing degrees of liquidity of monetary assets, has been discussed in recent *Quarterly Bulletins*; see Janssen, N (1996) and Thomas, R, *op cit*.

(7) See FHP for a formal specification of the Divisia weights.

(8) The Divisia index then approximates transactions balances in the economy relative to a base period.

(9) The credit channel may also be an important mechanism through which monetary policy affects activity and inflation, see Ganley, J and Salmon, C (1996).

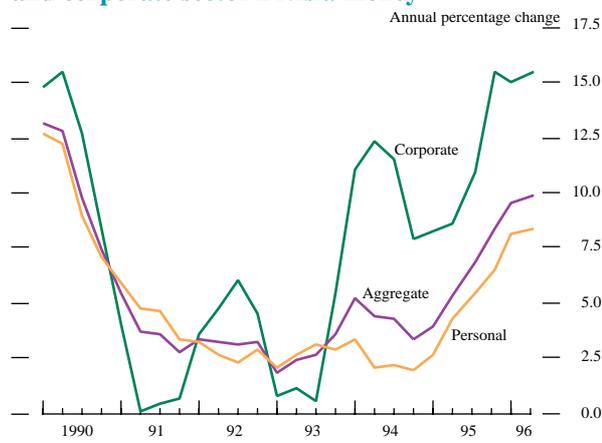
(10) FHP discuss some of the problems with Divisia as a proxy for transactions money. Spencer, P (1994) provides evidence of a close long-run relationship between aggregate Divisia and economic activity and prices.

Divisia money as a proxy for transactions balances

Although Divisia money might be expected to be more closely correlated with nominal demand⁽¹⁾ than is M4, the two are not directly comparable because the Divisia measure only provides a proxy for the *liquidity of holdings* of monetary assets in index number form. The Divisia measure of liquidity is well-founded in economic theory, as it assumes that agents derive utility from holding liquid monetary assets. For monetary policy purposes it would be useful to have a measure of the *value* of monetary assets held as transactions balances. But if we were to derive a value measure for Divisia, we would have to determine a base period in which most of M4 balances were held for transactions purposes, and assume that the sterling value of Divisia equalled total M4 holdings in that period. Since this procedure always contains a highly arbitrary element, Divisia is only useful as an index number of liquidity.

Aggregate Divisia's annual growth rate has been increasing steadily since 1994 Q4 and was 9.9% in the year to the second quarter of 1996 (see Chart 1), similar to the increase in aggregate M4. The two sectoral measures of Divisia

Chart 1
Annual growth rates of aggregate, personal and corporate sector Divisia money



money have also accelerated in recent years. But over the past three years, corporate sector Divisia has consistently grown around twice as fast as personal sector Divisia; in the year to 1996 Q2, corporate sector Divisia increased by 15.5% and personal sector Divisia by 8.4%.

In both the personal and the corporate sector the gap between M4 and Divisia has increased almost continuously since the mid 1980s. This suggests that the average liquidity of M4 holdings has fallen gradually and that M4 balances have become increasingly held for savings purposes. Since the beginning of the year, however, personal sector Divisia has grown at a faster rate than M4, indicating a rise in average liquidity of personal sector M4 balances.

As a result of increased competition between banks and building societies, building society deposit rates had risen relative to other rates in the mid 1980s. This was reflected in lower weights of building society deposits in the personal sector Divisia index, although the transactions services of these deposits had not changed. Consequently, personal sector M4 recorded higher growth rates than Divisia at the time. Hence, the Divisia measure does not always provide a perfect approximation of transactions services in the economy. Since the early 1990s, however, the weight of building society deposits in personal sector Divisia has increased significantly, due to the decreasing return on building society deposits relative to bank time deposits and the benchmark asset, and the growing stock of building society deposits. This suggests that personal sector holdings of building society deposits have been used increasingly for transactions purposes and bank time deposits more for savings purposes. This seems reasonable because TESSAs, which offer a higher rate of return and which are not included in the Divisia measures, have been available to the personal sector since 1991 as an alternative store of value.

The gap between personal sector M4 and personal sector Divisia has generally been smaller than the corresponding gap for the corporate sector. This may be partly explained by the lower interest rates that the personal sector receives on most of its monetary assets compared with the corporate sector. Loan demand was weak in the early 1990s, while personal savings were high. The optimal strategy for banks and building societies may have been to reduce interest rates offered on personal sector deposits, because this sector is the least interest sensitive. The lower interest rates on personal sector deposits imply that opportunity costs of interest-bearing assets are higher than in the corporate sector. The weights of interest-bearing deposits are consequently also higher in the personal sector. And because most of the growth in M4 has been in interest-bearing assets, the gap between M4 and Divisia has been smaller in the personal sector than in the corporate sector.

Within the corporate sector, other financial institutions (OFIs) in particular have increased the proportion of their M4 balances which appear to be held for savings, rather than transactions purposes since about 1985. If a large part of OFIs' M4 balances is related to merger and acquisition activity, their transactions balances as measured by Divisia might have been expected to have increased at a slower rate than M4, in particular over the past two years.

The relationship between personal sector and ICCs' Divisia money and nominal demand

Previous Bank research into Divisia adopted a single equation framework to analyse the demand for Divisia money at the aggregate and sectoral level. Divisia has also been tested as a leading indicator of nominal GDP and RPIX

(1) See FHP for evidence on this.

growth using Granger-causality tests.⁽¹⁾ But estimates of the long-run relationships between Divisia money and real variables were not very conclusive in the single equation approach.⁽²⁾

To understand better the implications of Divisia money growth for future nominal spending, we may need to look at the fundamental determinants of Divisia money and its interactions with other real and financial variables. That means modelling the demand for Divisia money jointly with these variables and adopting an approach similar to that used recently in the Bank when modelling sectoral measures of M4.⁽³⁾ Here, estimates are derived for personal sector and ICCs' Divisia money; OFIs' transactions balances as measured by Divisia are excluded from the analysis, because research has shown that OFIs' deposits are unlikely to be directly related to real activity.

Personal sector

In this section we discuss how a model of the demand for Divisia money (reported in the Appendix) may be used to determine whether transactions money is likely to feed through into future spending. Because Divisia's main function is as a medium of exchange, personal sector Divisia money is modelled jointly with consumption, in line with previous Bank work on personal sector M4. In the long run, personal sector Divisia appears homogeneous⁽⁴⁾ in consumption and gross (financial and tangible) wealth. If we consider wealth a proxy for permanent income, the demand for Divisia money may increase as wealth rises, because a higher permanent income induces agents to increase their transactions. Additionally, personal sector Divisia is modelled as a function of two opportunity cost terms. The first opportunity cost variable is an *ex post* real interest rate (the three-month Treasury bill yield minus the annual inflation rate), which proxies the opportunity cost of holding Divisia money rather than real assets. The second is the dual user-cost index of personal sector Divisia money. This is essentially a weighted interest differential between the three-month local authority rate⁽⁵⁾ and the own rates on the components of Divisia. It measures the opportunity cost of holding wealth in liquid form rather than in non-monetary (interest-bearing) assets.

The long-run consumption function is similar to the one estimated jointly with personal sector M4; it depends on real disposable income, wealth, and short-term real interest rates. There is no evidence of a 'precautionary saving' effect on consumption, because such saving is likely to be in interest-bearing assets, which should receive a low weight in the Divisia index as a proxy for transactions money.

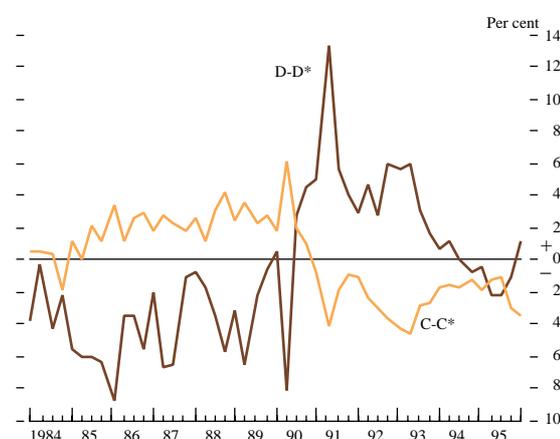
As theory suggests, the main difference is that wealth is less important for the demand for Divisia money than for personal sector M4 in the United Kingdom. Due to

substitution between financial and real assets an increase in real interest rates leads to a shift into interest-bearing financial assets, which may increase financial wealth. This in turn causes indirect wealth effects for Divisia money. Alternatively, the positive effect from *ex post* real interest rates could be interpreted in combination with the Divisia user-cost effect. Then the results suggest that the demand for Divisia money depends positively on its weighted own rate, and negatively on annual inflation as a proxy for the return on real assets.

The dynamic interactions between Divisia money and consumption (see the Appendix) are similar to those between personal sector M4 and consumption. In the short run, the demand for Divisia money is found to decrease when consumer spending rises. This provides additional evidence that a rise in consumption is initially financed by a reduction of transactions balances (as measured by the Divisia index), suggesting that transactions balances are used as a buffer against short-term fluctuations in spending. In the short run consumption function, however, there is a strong positive relation between Divisia money and consumption, as would be expected.⁽⁶⁾ This means that an increase in personal sector Divisia money allows agents to spend more.

The estimated Divisia model for the personal sector may be used to assess the likely consequences of recent Divisia growth for future spending. The long-run relationships for Divisia and consumption allow us to derive proxies for the deviations of actual Divisia money and consumption from their respective desired equilibrium levels, which depend on the determinants of the long-run functions. Chart 2 shows how personal sector Divisia money and consumption interact in the long run; it appears that Divisia money (denoted by D) is generally above equilibrium (D*) when consumption (C) is below its equilibrium (C*). This may be

Chart 2
Personal sector: Divisia money and consumption relative to long-run equilibrium



(1) FHP and Astley, M S and Haldane, A G (1995).

(2) See FHP.

(3) Thomas, R, *op cit*.

(4) This means that the coefficients on consumption and gross wealth add up to one.

(5) The three-month local authority rate is the benchmark interest rate on a non-monetary asset used in the construction of Divisia. See FHP for a discussion of the importance of the benchmark interest rate.

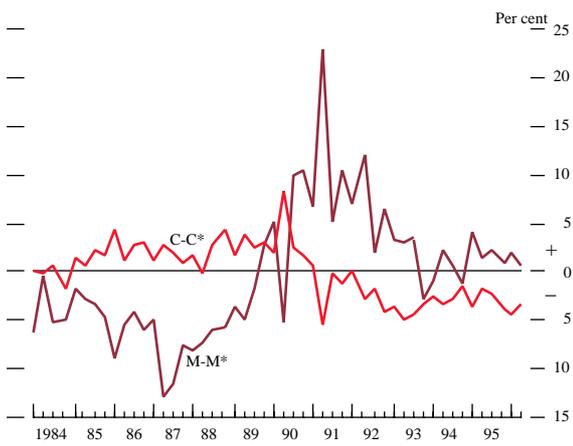
(6) The dynamic relationship between personal sector Divisia and consumption appears stronger than found in Astley, M S and Haldane, A G, *op cit*.

expected, because Divisia measures transactions money, which is likely to fall when spending increases and may rise when consumption is reduced.

The recent increase in average liquidity of personal sector M4 may be due to a portfolio shift towards more liquid assets. It is also in line with personal sector M4 balances having been above equilibrium for some time now, as Chart 3 shows (where $M-M^*$ indicates the deviation of personal sector M4 holdings from their equilibrium).⁽¹⁾

Chart 3

Personal sector: M4 and consumption relative to long-run equilibrium



Industrial and commercial companies

The demand for Divisia money by ICCs is analysed in a similar framework to that used for ICCs' M4. This implies joint modelling of ICCs' demand for Divisia money with ICCs' investment and the real cost of capital.⁽²⁾⁽³⁾ The estimates (see the Appendix) show that, in the long run, ICCs' real Divisia money is homogeneous in real GDP and also depends on the real cost of capital and the dual user-cost index of ICCs' Divisia money, which proxies the opportunity cost of ICCs holding wealth in liquid form rather than in non-monetary (interest-bearing) assets. The most distinctive result of the Divisia model for ICCs is the absence of wealth effects, which are unlikely to be as important for a measure of transactions money as they are for M4. ICCs' investment (measured by real whole-economy gross fixed capital formation) is modelled to be homogeneous in real GDP, and depends negatively on the cost of capital and the three-month Treasury bill rate, which proxies the return on short-term financial assets. The cost of capital is a constant in the long run, as it is in the model for ICCs' M4.

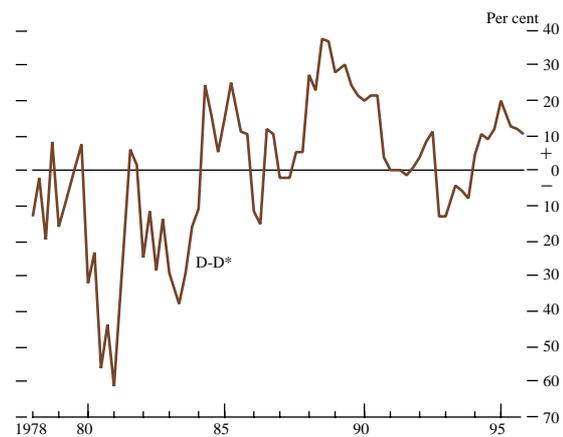
The real cost of capital has a strong negative effect on ICCs' demand for Divisia money. If a high cost of capital indicates an undervalued stock market, it may lead firms to expand their business by taking over other companies rather than by investing in real assets. The long-run Divisia

function can be interpreted as suggesting that ICCs finance a considerable part of this take-over activity by drawing down transactions balances as measured by the Divisia index. The negative effect of higher short-term interest rates on ICCs' investment may indicate some substitution between real and financial investment, possibly due to wealth effects. The dynamics of the Divisia model for ICCs suggest that excess transactions balances have real effects. A positive shock to ICCs' demand for Divisia money reduces the cost of capital, which in turn increases investment in the short and longer term.

Chart 4 shows that ICCs' Divisia money (D) has been above its desired level (D^*) almost continuously since 1987. Since the Divisia index proxies transactions money in the economy, the sustained excess liquidity of ICCs may feed into future spending (and into investment in particular) more directly than do excess M4 holdings,⁽⁴⁾ part of which are also held for savings purposes. In general, the risks to nominal demand may materialise sooner when Divisia money is above its desired level than when M4 is above equilibrium, because of Divisia's nature as a proxy for transactions services.

Chart 4

ICCs' Divisia money relative to long-run equilibrium



Overall, the estimated sectoral Divisia models suggest that the demand for Divisia money is slightly less predictable than the demand for M4, although aggregate Divisia can be modelled more easily than aggregate M4.⁽⁵⁾

Summary

In the United Kingdom's current monetary framework, the major role of monetary aggregates is to provide information about future trends in nominal demand and inflation. The Bank's Divisia indices of transactions money weight the broad money components according to the liquidity services they provide. As measures of transactions money, Divisia aggregates may have a closer relationship with spending and inflation than do M0 and M4.

(1) Chart 3 is derived from the model for personal sector M4, as discussed in Thomas, R, *op cit*.

(2) Drake and Chrystal (1994) estimate the demand for ICCs' Divisia money with a single equation.

(3) Stockbuilding and mergers and acquisition activity, which may also partly explain ICCs' demand for Divisia money, are not specifically analysed in this system.

(4) Astley, M S and Haldane, A G, *op cit*.

(5) This is consistent with results reported in FHP.

The econometric analysis of personal sector and ICCs' demand for Divisia money—modelled jointly with other real and financial variables—largely corroborates the results for sectoral M4. But at a sectoral level the demand for Divisia money appears slightly less predictable than the demand for

M4, reversing the findings at the aggregate level. The models for the personal sector and for ICCs may be used to draw inferences about the interaction between Divisia money and consumption, and between Divisia money and investment, respectively.

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Appendix

Estimates of the demand for Divisia money by the personal sector and ICCs

The analysis for M4 suggests that the demand for Divisia money is also best modelled at a sectoral level and jointly with other real and financial variables. The methodology used is the ‘encompassing VAR’ approach, which was described in detail for M4.⁽¹⁾

Personal sector

Real personal sector Divisia money (D_p/P_c) is modelled jointly with real consumption expenditure (C). All real variables in the analysis of personal sector Divisia are deflated by the consumer price deflator (P_c). The estimated personal sector system also consists of: real disposable income (Y_d), real gross financial and tangible wealth of the personal sector (W_p/P_c), the user-cost index for personal sector Divisia money (ρ_p),⁽²⁾ short-term interest rates (i) as measured by the three-month Treasury bill yield, and annual consumer price inflation (π_c). All data except interest rates are seasonally adjusted and \ln indicates the natural logarithm of a variable. The personal sector model is estimated over the sample period 1978 Q1 to 1996 Q1 and suggests that there are two long-run relationships in the data; one of them can be interpreted as a demand for Divisia money function and the other as a consumption function:

$$\ln D_p/P_c = 0.75 \ln C + 0.25 \ln W_p/P_c + 1.30 (i - \pi_c) - 0.01 \ln \rho_p$$

$$\ln C = 0.9 \ln Y_d + 0.1 \ln W_p/P_c - 0.44 (i - \pi_c)$$

In the long-run relationships, Divisia money and consumption have been constrained to be homogeneous in the sum of consumption and wealth, and in the sum of disposable income and wealth, respectively. Weak exogeneity tests suggest that the dynamic relations for Divisia money and consumption can be modelled simultaneously. The resulting error-correction model consists of the following variables (with ECM_D and ECM_C denoting the deviations of actual Divisia money and consumption from their long-run levels, Δ indicating first differences and time subscript t):

$$\Delta \ln D_p/P_{ct} = -0.69 \Delta \ln C_t - 0.23 \Delta \ln D_p/P_{ct-1} + 0.31 \sum_{i=0}^1 \Delta \ln Y_{dt-i} + 0.18 \Delta \ln W_p/P_{ct} \quad (0.37) \quad (0.14) \quad (0.13) \quad (0.05)$$

$$+ 0.07 \Delta \ln W_p/P_{ct-1} + 0.11 \Delta \ln W_p/P_{ct-2} - 0.06 \Delta i_t - 0.36 \Delta i_{t-2} - 0.24 \Delta \pi_{ct} + 0.02 \Delta \ln \rho_{pt} \quad (0.05) \quad (0.04) \quad (0.12) \quad (0.14) \quad (0.05) \quad (0.01)$$

$$+ 0.02 \Delta \ln \rho_{pt-2} - 0.13 ECM_{Dt-1} - 1.28 \quad (0.01) \quad (0.03) \quad (0.30)$$

$$\Delta \ln C_t = 0.59 \Delta \ln D_p/P_{ct} + 0.23 \Delta \ln D_p/P_{ct-3} + 0.14 \Delta \ln Y_{dt} + 0.13 \Delta \ln Y_{dt-1} \quad (0.11) \quad (0.07) \quad (0.04) \quad (0.07)$$

$$- 0.14 \Delta \ln Y_{dt-2} + 0.05 \Delta \ln W_p/P_{ct-1} + 0.05 \Delta \pi_{ct} - 0.01 \Delta \ln \rho_{pt} - 0.21 ECM_{Ct-1} + 0.01 \quad (0.04) \quad (0.03) \quad (0.03) \quad (0.01) \quad (0.05) \quad (0.01)$$

Figures in parentheses are coefficient standard errors. The model is estimated under FIML and passes all misspecification tests, though sometimes only marginally. The standard errors of the equations are similar as in the M4 model, although the standard error of the dynamic Divisia equation is slightly larger than that for personal sector M4. This could imply that the demand for

(1) Thomas, R, *op cit*.

(2) The user-cost index for Divisia is constructed using the same weights as in the Divisia index of transactions money. It adds the weighted changes in the M4 component assets' opportunity costs to obtain the change in the user-cost index. This change can easily be transformed into the level of the user-cost index. The Divisia user-cost index should be interpreted as the weighted opportunity cost of transactions money as measured by Divisia.

Divisia money is less predictable than for M4, which may be explained by the imperfect approximation of the amount of transactions services in the economy that Divisia can provide.

ICCs

The model used for the demand for Divisia money by ICCs consists of: ICCs' real Divisia money (D_i/P_g) (all real variables are deflated by the GDP deflator P_g), real GDP (Y), real whole-economy gross fixed capital formation (I), a term in capacity utilisation (cu)—the percentage of firms reported to be working below capacity from the CBI survey, an equity based measure of the real cost of capital (c_k), the three-month Treasury bill rate (i), the dual user-cost index of ICCs' Divisia money (ρ_i), and annual GDP inflation π_g . The model for ICCs is estimated over the sample 1978 Q1 to 1994 Q4 and suggests that there are three long-run relationships in the data; one of them can be interpreted as a demand for Divisia money function, one as an investment equation and the other is the cost of capital (Divisia money and investment have both been constrained to be homogeneous in GDP):

$$\ln D_i/P_g = \ln Y - 10.18 c_k - 0.53 \ln \rho_i$$

$$\ln I = \ln Y - 1.75 c_k - 0.44 i$$

$$c_k = \overline{c_k}$$

We proceed with a three equation dynamic error-correction model for ICCs' demand for Divisia money, investment and the real cost of capital. ECM_D , ECM_I and ECM_C denote deviations of actual Divisia money, investment and the cost of capital from long-run equilibrium.

$$\Delta \ln D_i/P_{gt} = 0.82 \Delta c_{kt-1} - 0.06 \Delta \ln \rho_{it} - 0.04 \Delta \ln \rho_{it-1} - 1.15 \pi_{gt} - 0.96 \pi_{gt-1}$$

(0.46) (0.04) (0.04) (0.44) (0.46)

$$- 0.31 cu_{t-1} - 0.24 ECM_{Dt-1} - 1.53$$

(0.05) (0.04) (0.26)

$$\Delta \ln I_t = 1.30 \Delta i_t - 0.94 \Delta i_{t-1} + 0.16 \Delta \ln I_{t-1} - 0.11 \Delta \ln \rho_{it}$$

(0.37) (0.28) (0.09) (0.04)

$$- 0.18 cu_{t-1} - 1.23 \Delta c_{kt} - 0.32 ECM_{It-1} - 0.36$$

(0.03) (0.72) (0.06) (0.07)

$$\Delta c_{kt} = -0.01 \Delta \ln D_i/P_{gt-1} + 0.21 \Delta i_t + 0.15 \Delta i_{t-1} - 0.21 \pi_{gt-1} - 0.21 \pi_{gt-2}$$

(0.02) (0.08) (0.09) (0.10) (0.10)

$$- 0.14 ECM_{Ct-1} - 0.04 ECM_{Dt-1} + 0.05 ECM_{It-1} - 0.18$$

(0.06) (0.01) (0.02) (0.05)

Figures in parentheses are coefficient standard errors. The model is estimated under FIML and passes all misspecification tests. As for the personal sector the Divisia model for ICCs has larger standard errors than the M4 system.

International monetary policy co-ordination: some lessons from the literature

By Charles Nolan and Eric Schaling of the Bank's Monetary Assessment and Strategy Division.

This article provides a brief survey of the academic literature on monetary policy co-ordination. Particular attention is given to identifying any guidance it may offer on how best to arrange the nominal framework between EU countries in the run up to, and following, EMU.⁽¹⁾

Introduction

Economic theorists and policy-makers have long been aware that the results of a country's choice of monetary stance depend in part on the choices that other countries make. For example, in 1752 David Hume outlined an approach to monetary links between economies that has a clear echo in modern approaches to open-economy macroeconomics. On the policy front, the international Gold Standard and its close relation, the Bretton Woods system, were thought to provide a coherent framework for domestic macroeconomic policy within the context of international constraints. And questions regarding the appropriate form and degree of monetary policy co-ordination are relevant today, particularly in the context of prospective European Economic and Monetary Union (EMU). This article takes a brief look at some of the key lessons from the modern theory of international monetary policy co-ordination and relates them to recent discussions on EMU.⁽²⁾

Co-ordination versus co-operation

The modern academic literature on macro-policy co-ordination can be traced to Cooper (1969). He defined *co-ordination* as the extent to which policy-makers in one country recognise the objectives and prospective actions of policy-makers in other countries in determining their own actions. He distinguished two polar cases: no co-ordination and full co-ordination. Cooper argued that as economies become more interdependent, perhaps because of a high dependence on foreign trade and/or because of increased capital mobility, a lack of policy co-ordination may be increasingly costly because it makes national objectives more difficult to attain. The model, however, provided little guidance on how particular spill-over effects might affect different economies and thus on appropriate policy responses.

A major analytic step forward was made by Hamada (1976). His use of game theory gave firmer substance to, and permitted extensions of, the earlier work.⁽³⁾ In his world there are two countries with a fixed exchange rate. Disequilibrium in the balance of payments occurs when the demand for money differs from its supply. There are two channels of international interdependence:

- (1) the world rate of inflation is the weighted average of domestic and foreign credit expansion; and
- (2) one country's trade surplus is the other country's deficit.

Each government is assumed to aim for target levels of inflation and trade surpluses. When one country ignores the other country's objectives (which here are similar to its own) the result is worldwide *deflation*. The myopia regarding the other country's monetary stance means that both countries continue tightening monetary policy in an attempt to achieve a trade surplus until the losses from deflation become too high. Alternatively, if both countries aim for a trade deficit, the result will be an excessive rate of global monetary expansion and worldwide inflation. That is called the *non-co-operative* solution.

In the case of *co-operation*, the two countries are assumed to collaborate and decide jointly on policy in both countries, with the result that they both achieve a better outcome. Although this example is a little *ad hoc*, some have argued that it bears some relation to reality. For instance, Hamada (1985) interprets the Bretton Woods system from the mid-1960s to the early 1970s as a situation of asymmetric preferences in which the United States wanted to run a larger trade deficit than the (collective) trade surplus desired by the rest of the world. The key question which remains is that if gains from co-operation are available, why are they

(1) The authors would like to thank Andrew Hughes Hallet for helpful comments on an earlier version of this article.

(2) Economies can be interdependent in a number of ways. Monetary links operate via capital markets, exchange rates and interest rates. In addition, there may be real income links where increased demand in one economy increases the income of another economy via an increase in demand for its exports. There may also be relative price spill-over effects and terms of trade links. Related to this, there may be fiscal links working through tax policy which can affect either the terms of trade directly or the net of tax return on internationally mobile capital. This latter topic is extensively surveyed in a recent article by Persson and Tabellini (1995b). This article focuses primarily on monetary policy links. However, the theoretical and empirical studies reviewed are rarely concerned exclusively with monetary variables and monetary interactions between economies.

(3) Game theory is an approach to analysing interactions between agents under different assumed scenarios. An example is the well known 'Prisoners' Dilemma'. Assume two accomplices in a crime are being questioned separately by the police. The police confront both criminals with a simple proposition: confess and provide evidence against their colleague and the sentence will be light. However, both criminals know that if they do not say anything then the police, for want of evidence, will have to free them. The optimal strategy for the criminals is to say nothing and walk free. However, they are not allowed to consult one another and both know that if the other confesses and implicates the other, then they will face a hefty sentence while their former colleague gets off relatively lightly. With nothing to ensure the *co-operative* (say nothing) game, both confess and both go to prison. The *non-co-operative* strategy is played in the absence of incentives to support the co-operative solution.

not collected? The literature which grew out of the above models points to a number of possible explanations. First, countries may not trust each other to deliver on an agreed policy stance. Second, as a technical matter, countries may not be able to decide on which policy variables they should co-ordinate—should they take joint decisions on their money supplies, interest rates, exchange rates, and so on? And, even if they can decide on which variables they should co-ordinate, they must then have a set of institutional arrangements to allow co-operation to work effectively. Finally, in practice, the gains from co-operation may not be very large and, as a complicating factor, may be asymmetrically distributed. Our focus will be primarily on the first and third of these. We shall touch briefly on the second issue towards the end of this article when we look at the lessons which this literature offers for EMU.

Theoretical analyses of the gains from co-ordination

In this section we look at the circumstances which may or may not lead countries to co-operate.

Canzoneri and Gray (1985) focused on structural differences between economies (for example, one economy may have a higher propensity to import than another), rather than differences in preferences of the policy-makers. They analysed a two-country model in which the respective governments are concerned with both the inflation rate and the level of output. Both countries are assumed to face a common supply shock. The authorities then face a trade-off between inflation stabilisation and monetary accommodation of the shock.

Canzoneri and Gray consider cases where a monetary expansion is a *beggar-thy-neighbour* policy (that is, a monetary expansion causes increased output in the home country at the expense of lower output in the other country; the spill-over effects are said to be negative); a *locomotive* policy, where the spill-overs are positive; and an *asymmetric* case where a foreign monetary expansion is a *beggar-thy-neighbour* policy while a boost in the home money supply is a locomotive policy. The transmission of monetary policies across countries can occur through a number of channels: capital mobility, foreign trade, and wage indexation; the overall transmission effect of policy depends on the relative importance of these channels.

Depending on which of the three cases prevail—ultimately an empirical matter—the gains from co-operation will differ. In any event, this analysis implies that there are a variety of co-operative outcomes that are superior to the non-co-operative outcome. But one problem with all of these better outcomes is that they provide incentives for one or both of the players to renege on an existing agreement. This is because if one country can convince the other country that it is co-operating when in fact it is just

maximising its own interests then this can yield an even higher pay-off for that country than the co-operative solution.⁽¹⁾

Canzoneri and Henderson (1988, 1991) develop this analysis in a model in which there are also periodic supply-side shocks affecting the economies. In this model, worldwide monetary expansion turns out to be too low in the absence of policy co-ordination. Central banks try to limit the inflationary consequences of a negative supply-side shock without taking into account its adverse consequences (a real exchange rate depreciation of the foreign currency) on the other country. However, once the shock ends the conflict also ends and the problems associated with a lack of policy co-ordination prove to be limited and transitory. But if the conflict is continuous (for instance, there may be ‘disagreement’ over the appropriate level of the real exchange rate), then unco-ordinated policy-making implies a common *deflationary bias* as both countries try to appreciate their currencies (so as to boost the purchasing power of their national income). In this example the desirability of co-operation is clear, but there may be no incentive to bring it about.

However, this pessimistic conclusion may be altered if the models are extended to include repeated games in which the policy-maker can establish a reputation for acting in a particular way. Where countries interact repeatedly they may have a stronger incentive to maintain the goodwill of their partners. So an interest in long-term co-operation may overcome the incentive to seek an immediate advantage through non-co-operation. Therefore, under some conditions, it might be reasonable to suppose that players might change their strategy and play a less ‘opportunistic’ game. As Barro and Gordon (1983) found in a closed economy context, establishing a reputation for playing co-operatively can improve everyone’s outcome. If countries interact repeatedly then Canzoneri and Henderson conclude that non-co-operative policy-making need not be harmful. However, some institutional forum for countries to discuss with each other their current and prospective policies may still be necessary.⁽²⁾

Frankel and Rockett (1988) are pessimistic about the gains from co-ordination. They investigate, using theory and simulations on a number of macroeconomic models, the gains from co-ordination when the true structure of the economy is unknown. They find that, even though policy-makers can agree on a joint policy stance, the outcome is as likely to be detrimental to the countries as to be beneficial. However, that may also be too pessimistic a conclusion. What is central to the conclusion, as the authors recognise, is countries’ failure to identify the true model and alter their bargaining strategy to cope with this risk. Subsequent studies⁽³⁾ have reversed this result. For instance, if policy-makers, perhaps through ‘trial and error’ or through constructive disagreements with other policy-

(1) For an illustration of a related point in the context of the credibility of domestic monetary policy, see Schaling (1995), pages 29–32.

(2) Repeated games can produce many different welfare improving outcomes over the non-co-operative outcome. So countries may need help co-ordinating on any one of these.

(3) Gosh and Masson (1991) and Holtham and Hughes Hallett (1992).

makers, can learn about the structure of the economy, the success rate for co-ordination improves substantially on the Frankel-Rockett results. On this view, then, co-operation is seen in a better light.

An example where co-operation does *not* pay was suggested by Rogoff (1985).⁽¹⁾ He noted that a surprise inflation leads to a real exchange rate depreciation, which may exacerbate the initial inflationary impulse. This will encourage countries to avoid what de Groof and Schaling (1991) call *beggar-thy-self* policies. But if two countries agreed to co-ordinate policies and inflate together, this exchange rate depreciation can be avoided. As a consequence, the incentives to inflate are greater with co-ordination than without, although the stabilisation policy may be more efficient since the exchange rate externality is internalised. As Romer (1993) pointed out, the intuition behind that result is straightforward: by co-ordinating policy, the two countries turn themselves into a single, larger and less open economy. In doing so, these countries reduce the harm due to the surprise inflation (the consequent real depreciation). However, the upshot is that the equilibrium rate of inflation rises.⁽²⁾

Although these theoretical studies provide important insights, it is clear that they offer few unambiguous results on the necessity or desirability of international policy co-ordination. Researchers have therefore turned to econometric models of the economy to conduct policy 'experiments'. These have generally taken the form of 're-running history' assuming some kind of co-ordination scheme was in place. We now review the key conclusions of that branch of the literature.

Empirical estimates of the gains from co-ordination

Frankel and Rockett (1988) suggest that we should be cautious when assessing quantitative analyses since these tend to take the form of simulations on large macroeconomic or small calibrated models, the findings of which may not be robust across models. Nonetheless, the empirical studies which have been undertaken have generally found the benefits to be significant but not large, in part because the spill-over effects in empirical (as opposed to calibrated) models tend to be rather low.⁽³⁾ Oudiz and Sachs (1984) estimated that the welfare gains from co-operation among the group of three largest countries (G3) in the period 1984–86 would be equal to about 0.2% higher GNP over the three year period for the United States, compared with the best non-co-operative outcomes. Similar calculations for Japan and Germany show welfare gains equivalent to 1% and about 0.3% of GNP respectively. Later studies have suggested that the

gains from co-ordination among the OECD economies may be larger. In a more general analysis which allowed for dynamic decision-making,⁽⁴⁾ Hughes Hallet (1986a, b, 1987), looking at the period following the 1973 oil price shock, found that the total gains for the United States were equivalent to around an extra 0.5% annual GNP growth over five years. The corresponding figure for the EEC⁽⁵⁾ was 1.4%. The author concludes, however, that most of these gains are not due to co-ordination as such, but to policies being set in a manner which takes account of other countries' intentions. This suggests that information exchange (on, for example, policy intentions) between countries might play an important role in the formation of optimal policies. Currie, Levine and Vidalis (1987) have also suggested relatively small gains in the absence of major shocks, or continuing conflict, based on calculations from versions of the Liverpool and OECD models for the United States and the European Union or OECD respectively.

The distribution of gains from co-ordination

The distribution of the gains from co-operation might also be important.⁽⁶⁾ Studies generally find that such gains are not evenly distributed. Oudiz and Sachs (1984), for example, found gains distributed roughly 2:1 in favour of Germany relative to the United States for two different models. Hughes Hallett's (1986b) study of the United States and EEC in the mid-1970s, using a range of bargaining models, suggests gains distributed 2:1 in favour of the EEC, consistent with the earlier finding.⁽⁷⁾ Currie and Levine (1993) conclude that, whatever the overall gains, it will be hard to secure and maintain a co-ordination agreement in the face of significant uncertainties; and if those who reap the gains and those who shoulder the burden of adjustment are different players, there may be political difficulties in securing any agreement. However, care should be taken in assessing distributional issues, since it is not whether gains are evenly distributed that matters, but whether or not countries are better off compared with the best non-co-operative solution.

Policy co-ordination in practice

In practice, mechanisms for monetary policy co-operation generally take the form of exchange rate arrangements in which countries undertake to fix the value of their currency, to a greater or lesser extent, against some 'anchor' currency. Canzoneri and Gray (1985) and Canzoneri and Henderson (1991) model this by letting one country, the anchor of the system, set its domestic monetary policy independently, with the other country fixing its exchange rate accordingly. In the terminology of game theory this is known as a *Stackelberg* or *leader-follower* framework. These and other models of exchange rate regimes can give differing results. Abstracting from credibility effects,⁽⁸⁾ the more symmetric

(1) A similar example, which we do not describe, has been suggested by Oudiz and Sachs (1985).

(2) Whether or not this is a realistic case depends on what mechanisms support a country's 'membership' of such a scheme. Although the two policy-makers benefit from co-operation, they do so at the expense of the private sector.

(3) And even when spill-over effects are large, this does not always imply that co-operation and non-co-operation will lead to very different outcomes. See Canzoneri and Minford (1988).

(4) Dynamic aspects include considerations about the timing of policy changes and temporal shifts in the policy response elasticities.

(5) Importantly, for the purposes of this study, the EEC was treated as a single country with a single economic policy.

(6) This refers to the *positive* issue of actual distributions, and not the *normative* aspect of the distribution as implied by the Nash bargaining solution.

(7) For more details about various empirical results see Canzoneri and Henderson (1988) and Bryant (1993).

(8) See Giavazzi and Pagano (1988) for an analysis of these issues.

economies are (that is, the more similar are the structures of the economies and the policy-makers' preferences over, say, output and inflation) and the more that economies face the same shocks, then it is likely that such exchange rate regimes will be welfare enhancing. But if shocks tend to be region specific then fixing exchange rates becomes less attractive.⁽¹⁾⁽²⁾

It should be clear that exchange rate fixing will fall short of the full joint-optimisation exercise across countries depicted in the literature. There has therefore been much research into how far partial co-ordination schemes—such as exchange rate target zones—go in attaining the benefits from full co-ordination.⁽³⁾ This predominantly empirical research indicates that targeting improves economic performance only marginally compared with the best non-co-operative policy. And this performance, in turn, is very close to the fully co-operative outcome. The conclusion of this research seems to be that policy-makers might better expend effort in attaining the benefits of better balance in domestic policies before chasing what appear to be the marginal gains from co-ordination schemes. However, Hughes Hallet (1992) concludes that these results are not necessarily arguments against exchange rate targeting arrangements since these may provide a useful framework for the setting of policy and a highly visible yardstick against which to measure policy.⁽⁴⁾

'Ins' and 'outs'

The policy co-ordination literature reviewed here may provide some clues on how to arrange the nominal framework between EU countries in the run up to, and following, EMU. For example, what is the optimal arrangement between the 'ins' and the 'outs'? Recently,

Persson and Tabellini (1995a) have recommended a system of inflation targets for both the 'ins' and the 'outs'. They suggest that their proposal solves the co-ordination problem of monetary policy in Europe, especially in the period immediately following unification. In particular, they argue that it is superior to an 'asymmetric' regime where the 'outs' peg their currencies to the euro,⁽⁵⁾ and that this solves the credibility problem without any further formal restraints on the discretion of individual policy-makers. This proposal, however, might in effect be similar to the exchange rate target zone proposal mentioned above, in that any benefits from such a scheme are the result of a better balance in domestic macroeconomic policies rather than the degree of co-ordination.

Conclusions

Theoretical analyses often suggest that, in their own interests, countries ought to set policy co-operatively. Not doing so risks economic outcomes which are likely to benefit no one. Empirical analyses indicate that the incremental benefit to such co-operation over the welfare outcome associated with the best non-co-operative policies, is probably positive but also likely to be limited. There are two basic reasons for this. First, the links between economies are generally such that the spill-over effects are small. Second, empirical work suggests that poor economic performance in the past often has at its root poorly designed domestic policies and not primarily a lack of policy co-ordination. In designing a nominal framework for the 'ins' and the 'outs', EU policy-makers should therefore aim to ensure domestic stability across individual member countries. A free exchange of information about policy intentions is important since taking account of other countries' intentions will yield benefits.

(1) When there are asymmetries in preferences or the stochastic structures of the respective economies, this conclusion can be reversed. See Hughes Hallet (1993,1994).

(2) It can also be shown that the distribution of the welfare gains will depend on who is the leader and who is the follower. For an illustration of this point see Canzoneri and Henderson (1991), pages 27–31.

(3) See Currie and Wren-Lewis (1989) and Hughes Hallett (1992).

(4) There are, however, problems with using the exchange rate as a measure of policy stance. See the discussion in Canzoneri, Nolan and Yates (1996).

(5) The desirability of a common nominal framework seems to be a general result from this literature, and is intuitively plausible since, as Canzoneri and Henderson (1988) point out, although one country's choice of instrument does not affect its own policy trade-offs it will affect other countries'. For example, if one country targets growth in a monetary aggregate then domestic velocity shifts may be transmitted to other countries through the exchange rate. If that country is targeting the exchange rate, such a velocity shock may have important implications for policy. For more discussion on the choice of instrument, see Canzoneri and Henderson (1988), pages 119–21.

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The external balance sheet of the United Kingdom: recent developments

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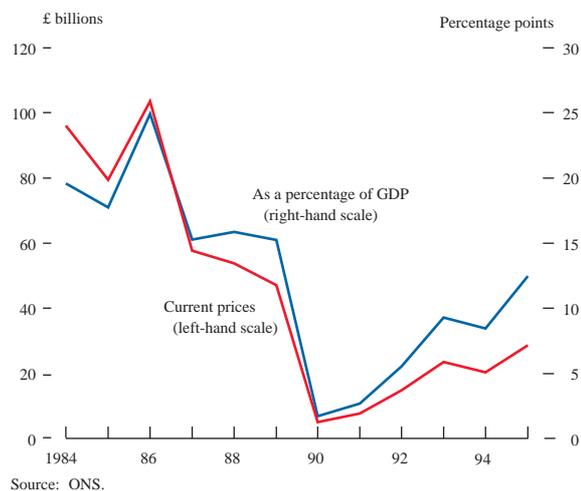
Continuing the annual series which began in 1985, this article summarises the changes to the net external asset position of the United Kingdom during 1995.⁽¹⁾

The article describes the principal influences on the external asset position of the United Kingdom arising from capital flows and from the impact of valuation changes to existing assets and liabilities. It includes an international comparison of external asset positions and also reviews developments in the United Kingdom's net investment earnings from abroad. In addition, the boxes on pages 420 and 422 describe the preparation for an internationally co-ordinated survey of cross-border holdings of portfolio assets, and recent evidence of the scale of UK-based repo business in foreign securities.

Overview

The United Kingdom had net external assets of £49.9 billion at the end of 1995 (see Chart 1). This represents the difference between external assets of £1,617 billion and external liabilities of £1,567 billion. To set these data in context, GDP in 1995 was £700 billion.

Chart 1
Net identified external assets at current prices and as a percentage of annual GDP



The net asset position at the end of 1995 was £16 billion higher than at the end of 1994 (see Table A).⁽²⁾ This increase was a result of valuation changes due both to price and exchange rate movements. The latest data indicate that the net asset position rose by a further £11.5 billion in the first half of this year.

Table A

UK external assets and liabilities^(a)

£ billions

	Stock end-1994	Identified capital flows	Net valuation effect (b)	Total change in stock	Stock end-1995
Non-bank portfolio investment:					
Assets	278.7	16.5	37.0	53.6	332.2
Liabilities	192.9	15.6	21.7	37.3	230.2
Direct investment: (c)					
Assets	174.5	25.3	8.8	34.1	208.6
Liabilities	129.6	20.5	0.3	20.8	150.4
UK banks' (d)(e) net liabilities in:					
Foreign currency	4.0	-15.4	9.9	-5.5	-1.5
Sterling	27.0	3.7	-0.2	3.4	30.4
Public sector:					
Reserves (assets)	30.7	-0.2	1.3	1.1	31.8
British government stocks (liabilities)	44.2	-0.5	2.6	2.1	46.3
Other net public sector assets	-5.7	-1.2	-0.9	-2.1	-7.8
Other net assets	-46.7	-17.0	4.5	-12.5	-59.2
Total net assets	33.9	-0.4	16.5	16.0	49.9

Sources: ONS and Bank of England.

- (a) The sign convention is not the same as in the balance of payments: a transaction that increases an itemised stock is + and one that decreases it is -.
- (b) Residual component.
- (c) UK banks' external borrowing from overseas affiliates is treated in the published data as an offset to outward direct investment, but it is treated here as part of the banks' net foreign currency liabilities.
- (d) Estimated take-up of UK banks' bonds appears indistinguishably from foreign investment in other UK company securities in the published data, but is treated here as part of banks' net foreign currency liabilities. Banks' holdings of foreign currency bonds are treated as foreign currency lending.
- (e) UK banking sector plus certain other financial institutions.
- (f) Columns and rows may not sum due to rounding.

UK residents held foreign portfolio assets of £481.9 billion and direct investment assets of £213.8 billion at the end of 1995. Both holdings were higher than at the end of 1994 and exceeded the equivalent foreign holdings of UK assets by £173 billion and £63.4 billion respectively. However,

(1) Using figures published in the *United Kingdom Balance of Payments*, (the *Pink Book*), Office for National Statistics, 1996.

(2) Direct investments are recorded at book rather than market value. Cliff Pratten of Cambridge University has estimated that the net direct investment stock was underestimated by about £60 billion in 1993. See Pratten, C. (1994) 'The valuation of outward and inward direct investment', Department of Applied Economics (DAE), University of Cambridge, unpublished report to the (then) Central Statistical Office, available on request from the DAE.

UK residents were net borrowers of funds from the rest of the world with the deficit on outstanding sterling and foreign currency borrowing rising to £223.7 billion. The net asset position of general government was little changed over the year at £37.1 billion.

Other points to note from the 1995 data include:

- the positive effect on the United Kingdom's balance sheet due to increases in prices of foreign securities;
- record direct investment in UK companies; and
- increased net investment income for the United Kingdom, although the earnings of UK banks fell.

Revaluation effects on the external balance sheet of the United Kingdom

The United Kingdom recorded a balance of payments current account deficit in 1995. This should normally reflect net capital inflows such that either foreign holdings of UK assets increase or UK holdings of foreign assets decline. But, in 1995, recorded net capital inflows were much smaller than implied by the current account position, just £0.5 billion. The £2.4 billion balancing item (see Table B) highlights the measurement problems but does not indicate whether these arise more from an underrecording of net capital inflows or from any misrecording of current account credits or debits.

Table B
UK balance of payments: transactions data^(a)

£ billions	1990	1991	1992	1993	1994	1995
Increase in UK assets (-)/increase in UK liabilities (+)						
Current account						
Trade in goods	-18.8	-10.3	-13.1	-13.5	-10.8	-11.6
Other current account	0.1	2.4	3.0	2.7	8.4	8.7
of which:						
Services	3.7	3.6	5.0	5.5	4.7	6.1
Investment income	1.3	0.2	3.1	2.2	8.7	9.6
Transfers	-4.9	-1.4	-5.1	-5.0	-5.0	-7.0
Current balance	-18.7	-8.0	-10.1	-10.8	-2.4	-2.9
Financial account	18.8	8.0	10.2	10.8	2.4	2.9
of which:						
Direct and portfolio flows	2.6	-12.1	-4.4	-46.1	39.0	-28.5
Banking and other flows (b)	14.0	19.6	9.4	59.2	-41.7	29.0
Balancing item	2.2	0.5	5.2	-2.3	5.1	2.4

Source: ONS.

- (a) Columns may not sum to totals due to rounding.
 (b) Includes UK residents' net lending/borrowing and external assets/liabilities of general government (other than portfolio and direct investment).

Notwithstanding these uncertainties, a net capital inflow contrasts with the £16 billion increase in the United Kingdom's net external assets in 1995, and implies that the growth in the net asset position was more than accounted for by changes in the value of existing assets and liabilities (see Table C and Chart 2). The value of UK residents' holdings of overseas investments and other assets is estimated to have grown by £228 billion in 1995 with £104 billion of this increase due to revaluation effects. The

value of foreign holdings of UK assets also increased during the year, but by only £212 billion. A smaller estimate for revaluations—just £88 billion—accounts for the difference.

Table C
Change in identified net external assets

£ billions	Average (a) 1982–91	1992	1993	1994	1995	1996 H1 (b)
A Current balance (deficit -)	-5.9	-10.1	-10.8	-2.4	-2.9	-2.6
B Identified capital flows (inflows -) (c)	-4.1	-5.0	-13.1	2.7	-0.4	6.7
C Revaluations	2.0	16.3	28.1	-6.1	16.5	4.8
of which:						
Exchange rates		63.4	3.9	0.4	9.4	-12.6
Portfolio investment		28.0	0.1	0.5	7.2	-7.2
Direct investment		27.3	2.9	1.8	6.5	-8.3
Other net assets		8.1	0.9	-2.0	-4.3	2.9
Securities price effect		-15.6	25.5	2.6	7.7	12.9
Other (d)		-31.6	-1.4	-9.1	-0.7	4.5
D Change in identified net assets (increase +)	-2.2	11.4	15.0	-3.4	16.0	11.5
E Net asset level (end-year)	10.9	22.3	37.3	33.9	49.9	61.4 (e)
F Balancing item (f) (inflows/credits +)	1.8	5.2	-2.3	5.1	2.4	9.3

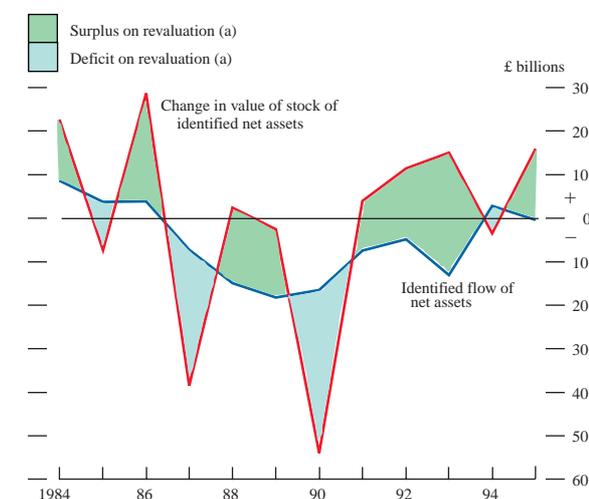
Sources: ONS and Bank of England.

- (a) End-year net asset level refers to end-1991.
 (b) Not seasonally adjusted.
 (c) Note the difference between this sign convention and that of the balance of payments statistics.
 (d) Including revaluations to direct investment stocks relating to write-offs, profitable disposals of assets etc as well as residual error.
 (e) This is a preliminary estimate of the net stock position at the end of the second quarter of 1996.
 (f) F = B-A.

Revaluations of assets and liabilities can result from changes in the foreign currency value of sterling, from changes in the prices of securities, from revaluations of direct investments, and from write-offs. The lack of detailed information about the geographical location, currency of denomination and type of investment involved makes it difficult to quantify these separate effects with any precision. So the estimates presented in Table C should only be regarded as broadly indicative.

Increases in securities prices had a marked effect on the United Kingdom's external balance sheet in 1995. This

Chart 2
Contribution to changes in net external assets



- (a) Residual component—difference between changes in recorded net stock and identified net flows.

The co-ordinated portfolio investment benchmark survey

An IMF working party reported in 1992 on the measurement of international capital flows,⁽¹⁾ recommending that consideration be given to a periodic benchmark survey of portfolio assets and liabilities. The report was approved by the IMF Executive Board which agreed that the Fund would assist in co-ordinating and following up such a survey. An IMF balance of payments committee was formed following the report and it has taken forward the benchmark survey proposal, setting end-1997 as the reporting date. In 1995, the United Kingdom consented in principle to participate in the survey, insofar as it is consistent with the government's commitment to limit the statistical reporting burden on businesses. This box reports on the United Kingdom's assistance with the survey's aims.

The IMF publishes global balance of payments statistics annually. In 1994, there was a discrepancy on the financial account of some \$102 billion, much of which derived from portfolio investment. The imbalance on the current account has declined in recent years but still amounted to \$79 billion in 1994, again associated particularly with income from portfolio investment. These continuing inconsistencies motivated the recommendation of a benchmark survey. It will involve the collection of comprehensive information on the participating countries' stocks of cross-border assets in the form of equities and bonds as at the end of 1997.

To encourage countries to participate in the survey, the IMF has sought to limit the associated costs. The survey will therefore focus only on outward stocks of portfolio assets, as this is where the gaps in the data are most pronounced. When the survey has been completed, the IMF will assist with the bilateral exchange of the data collected. So, statistics on external liabilities, as well as associated financial flows and investment income data, will be improved indirectly by exchange of the survey results, because countries will receive data from their counterparts on non-resident investment in their own domestic securities.

The reconciliation of international portfolio stocks and flows data is problematic because of the different bases on which many countries compile their balance of payments statistics. In order to be a valuable exercise, providing reliable information on international holdings of securities, the survey must be internationally co-ordinated or based on a common collection method. A common collection method was not favoured because the compliance cost would prevent countries with different collection methods from participating. The IMF

therefore established a task force to prepare for an internationally co-ordinated survey.

The task force decided that although a common collection method was not practicable, the survey had to have certain minimum core requirements to which all participating countries must adhere. The survey will require a full geographic breakdown of outward stocks of portfolio assets according to the country of issuer, subdivided into bonds and notes, and equities. In obtaining these data, countries may tailor their collection methods to their own particular national systems, again limiting compliance costs. So national compilers may adapt or extend the survey to meet their specific data needs, encouraging increased participation.

To ensure the co-ordination of the survey, the IMF has sought to produce common concepts, definitions and classifications for participants to use. Both the Bank of England and the Office for National Statistics (the ONS) have been closely involved in the IMF's work to develop a guide for this purpose; a finalised version has now been produced.

The IMF has drawn on work done under the auspices of the European Monetary Institute (EMI) to harmonise the treatment of portfolio investments by participating countries. The Bank of England was asked by a task force of the EMI to establish a Financial Terminology Database (FTD) for the use of national balance of payments compilers. Using information gleaned from capital markets, coupled with balance of payments methodology, such a database has been set up and is updated periodically. It details different types of portfolio security, distinguishing between bonds, notes, money-market instruments, equities and financial derivatives. The FTD is not intended to be a comprehensive guide to balance of payments accounting but provides information to enable national compilers to decide how to treat particular securities within their national accounts.

The survey task force included representatives of the Organisation for Economic Co-operation and Development, the Bank for International Settlements and the EMI. It is hoped that the survey will enable international institutions to harmonise more closely their collection and development of statistics. Countries which have agreed to participate in the survey will benefit from improved statistics on external assets and, through data exchange, an opportunity to establish who are the non-resident holders of their domestic securities. And the IMF hopes that the survey will reduce the imbalance between external assets and liabilities globally.

(1) 'Final report of the IMF working party on the measurement of international capital flows' (The 'Godeaux Report'), IMF, September 1992.

reflects the high level of equities held by UK residents, particularly resulting from investments by UK pension funds. Equity prices in Germany, the United States and the United Kingdom rose during the year, as did those in Japan, although in this latter case with more volatility. In addition, bond yields in most major economies decreased in 1995. As a result, the capital gains on UK holdings of assets outstripped the capital gains on foreign holdings of securities in the United Kingdom.

Preliminary data for the first half of 1996 show that the net external asset position of the United Kingdom has increased by a further £11.5 billion since the end of 1995. Securities prices continued to raise the value of the United Kingdom's external assets but this was largely offset by changes in the foreign currency value of sterling. The interpretation of the increased net external asset position is currently obscured by a balancing item of £9.3 billion, reflecting significant unrecorded flows.

Capital flows

Portfolio investment

Following net sales of foreign securities in 1994, UK residents made net purchases in 1995 (see Chart 3). International interest rates at all maturities generally fell during 1995. Relative to this pattern, bond yields in the United Kingdom were more stable, with yields on longer-term bonds little changed over the year. The declining yields on overseas securities imply that there were capital gains to be made. UK investors made net purchases of £40.3 billion of overseas securities in 1995, more than offsetting net sales of £18.0 billion in 1994. Both banks and other financial institutions (OFIs) made net purchases of

portfolio assets during the year of £23.8 billion and £17.1 billion respectively.

Transactions by non-residents in UK securities resulted in net disinvestment of £1.6 billion in the first quarter of 1995. The rest of 1995 saw a return to the more usual pattern of net investment, although the flow of inward portfolio investment for the year as a whole—£16.9 billion—was only half that recorded for 1994 and the lowest since 1990.

Within this total, there was a marked distinction between investments in corporate and government issues. Non-residents made net purchases of UK company securities, although the £17.2 billion invested in 1995 fell short of the £26.9 billion in 1994. By contrast, there were net sales of £0.5 billion of British government stocks in 1995, compared with net purchases of £3.1 billion the previous year.

The fall in non-residents' purchases of UK company securities was almost entirely accounted for by a £9.0 billion reduction in acquisitions of corporate bonds with a small £0.6 billion decrease in investments in ordinary shares. This occurred despite the steady increase during 1995 in the FT-SE 100 index, which closed the year at a record level.

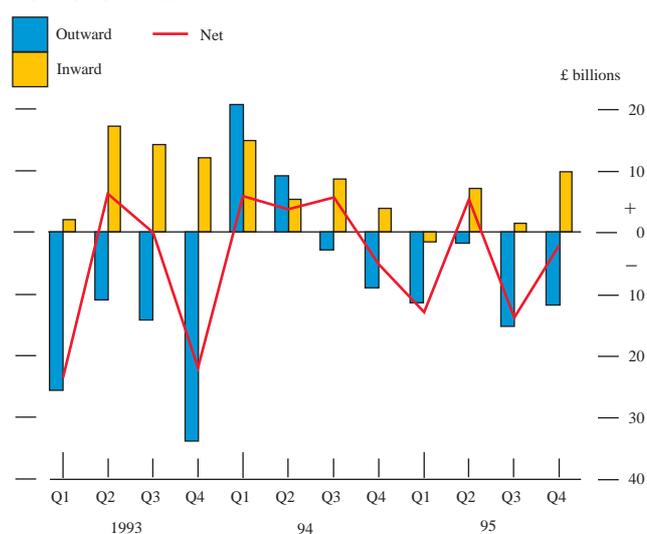
Direct investment

Direct investment is broadly defined as cross-border financial transactions by an economic agent resident in one economy to acquire a lasting interest in an enterprise resident in another economy.⁽¹⁾ In 1995, outward direct investment by UK residents increased by 40% to £25.5 billion, exceeding inward direct investment by £5.1 billion. The comparable net balance in 1994 was £11.5 billion. Inward direct investment was the highest recorded to date: a net inflow of £20.5 billion.

There was considerable cross-border merger and acquisition activity in 1995. Purchases of UK non-oil companies accounted for some 60% of the total inward direct investment. The most significant individual transactions were the purchases of Fisons plc by Rhone Poulenc Rorer Inc for £1.7 billion, Boots pharmaceutical businesses by BASF for £850 million and Gardner Merchant by the French company Sodhexo for £730 million.

UK merchant banks were a particular focus of attention for cross-border take overs and mergers in 1995. The purchase of Barings by the Dutch group ING was accompanied by an inward investment to cover the losses incurred in Singapore. The purchases of SG Warburg & Co by Swiss Bank Corporation and of Kleinwort Benson by Dresdner Bank

Chart 3
Portfolio investment^(a)



(a) Includes banks' investment. + = increase in liabilities.

(1) See the IMF *Balance of payments manual*, (fifth edition), 1993, paragraph 359. Hitherto, the United Kingdom has applied a minimum shareholding of 20% as the benchmark for a direct investment relationship. However, internationally, the OECD and the IMF now recommend a 10% threshold to which the United Kingdom is moving. The Bank of England is currently conducting a review of the statistics collected from the UK banking sector. When this review is implemented, UK banks will be asked to report any holding of 10% or more in a non-resident company as an outward direct investment. Inward direct investments will also be reported on a threshold of 10%. This accords with the OECD's *Detailed benchmark definition of foreign direct investment* (third edition) and the IMF's *Balance of payments manual* (fifth edition).

Measurement issues: cross-border repos

This box focuses on Bank of England estimations of the size and importance of the cross-border repo market in foreign securities. A sale and repurchase agreement, or repo, is a sale of stock with a simultaneous agreement to repurchase that stock, or equivalent, for a specified price on a fixed date. These agreements enable parties to raise or lend short-term cash: the stock effectively secures the cash loaned.

In December 1995, the Bank implemented changes to the statistical reporting requirements for UK banks. These changes enabled the separate identification of liabilities and claims arising from repos and similar business.⁽¹⁾ They were primarily motivated by the need to monitor the repo market in British government stocks.⁽²⁾ So, repos in foreign securities with non-residents are not identified separately and a method of estimating these data has been devised. This box explains how these estimations have been made and it discusses the conceptual issues and possible alternative treatments of repos in balance of payments accounting.

Conceptual issues

The introduction of an open gilt repo market in London provided the catalyst to consider how such business should be recorded in the United Kingdom's national accounts. National accounts compilers had come to account for repo-type business in one of two ways. First, the agreement may be treated as two distinct transactions: the initial agreement to sell stock is treated as an outright sale and is followed at some fixed date in the future by the outright purchase of that stock, or

equivalent. Alternatively, repos may be thought of as analogous to transactions in which stock is used to secure a loan. The United Kingdom used to follow the former convention but has now adopted the collateralised loan approach. This approach has also been recommended by international organisations including the International Monetary Fund and the European Monetary Institute.

The adoption of compatible standards both within Europe and internationally has been complicated by the perceived differences between repos and other comparable forms of contract, such as buy/sell back agreements. Buy/sell backs also involve reaching an agreement to borrow cash in return for securities and for the reverse transaction to take place on a fixed date in the future. But the differences are that for the duration of a repo, the holder of the security must pass any coupons or dividends received to the original holder of the security, a so-called 'manufactured dividend'. Buy/sell back agreements do not automatically provide for manufactured dividends, the benefit of the coupon being passed back to the original 'seller' by adjusting the price at which the second leg of the deal is closed out, including reinvested earnings. Nor do buy/sell backs automatically provide for marking to market, collateral substitution or margining.

Analysis of the repo market in the United Kingdom

The Bank of England now obtains detailed information on the market in repos of British government stocks and

(1) Including, indistinguishably, repos, buy/sell-backs and bonds loaned against cash.

(2) See the box on 'The open gilt repo market' on page 131 of the May 1995 *Quarterly Bulletin*.

also contributed significantly to inward direct investment in 1995.

There was a general retrenchment of Japanese direct investment internationally and inward investment in the United Kingdom by the Japanese fell in 1995.

Other capital flows

The syndicated credit market was one of the most active sectors of the international financial markets, with 27% more facilities arranged than in 1994.⁽¹⁾ This increase was in part the result of significant mergers and acquisitions financing activity but there was also more refinancing of outstanding loans at lower costs. This was because there was a greater volume of funds available for loan in the international banking market and intense competition among lenders encouraged very low margins for borrowers. US and UK corporate entities were by far the most active borrowers.

International comparison of net external assets

Table D offers an international comparison of net external assets and shows that the trends in France, Germany, Japan and the United States in recent years continued in 1995.

The United Kingdom continues to be the exception to the general observation that increases in net external assets are generally linked to current account surpluses. With the exception of 1994, the United Kingdom has consistently increased its net external asset position, expressed in US dollars, in recent years despite having a current account deficit.

The explanation lies partly in the composition of the United Kingdom's external asset portfolio. This has a higher proportion of equities than those of other major economies. Consequently, the rise in equity prices in 1995 significantly

(1) Using data published by the Bank of International Settlements (BIS), Basle, in *International banking and financial market developments*, May 1996.

less detailed data relating to repo-type business in other securities. These data are only in their infancy, but initial indications are that the market has been increasing steadily since its introduction.⁽³⁾

As part of its preparatory work for the Co-ordinated Portfolio Investment Benchmark Survey,⁽⁴⁾ the United Kingdom has followed the recommendations in the IMF's Guide to completing the survey. The Guide suggests, *inter alia*, that national compilers obtain some idea of the importance of the repurchase market in their economy and investigate the extent to which residents conduct repo transactions with non-residents in non-resident securities. Given that the changes made by the Bank of England to the statistical returns were intended primarily to monitor the market in British government stocks, repos of other bonds are not further disaggregated. Consequently, a method of estimating repo transactions with non-residents in non-resident securities has been devised.

An estimate of the total value of turnover in the quarter is obtained by multiplying the levels reported on the balance sheet by the number of times that the portfolio is turned over in the period.⁽⁵⁾ Using the foreign currency element of the reported gilt repo claims and liabilities produces a proxy for total claims on and liabilities to non-residents in foreign securities. Multiplying these levels by estimates of quarterly turnover produces estimates of the total value of trades with non-residents in overseas securities in the quarter.

Estimates made using the first data received as at the end of December 1995 suggested that the size of the market

in foreign currency denominated repos and reverse repos with non-residents was between £560 billion and £740 billion. More recent data show that the market has expanded significantly: similar calculations performed on data as at the end of July 1996 resulted in estimates of between £860 billion and £1,100 billion.

In assessing the extent to which UK residents conduct repo transactions with non-residents in non-resident securities, the Bank of England has also estimated the geographical spread of this market. A sample of UK banks reports a breakdown of principal classes of assets and liabilities into 16 major currencies with a residual category for other foreign currencies. These data have been used to proxy the country of issuer in the absence of a directly collected geographical analysis. From these estimates, the major currencies involved appear to be the US dollar, the Deutsche Mark, the French franc, the Spanish peseta and the Italian lira.

In the absence of hard data on the type of securities, (other than gilts) involved in cross-border repo business, the Bank sought information from significant market participants. Their anecdotal evidence suggested that most trading in repos takes place in securities issued in national currencies so, for example, repos with a counterparty in the United States will be in dollar-denominated stocks, repos with Germany are predominately in Deutsche Marks and so on. Given the testimony of banks that transactions are almost exclusively in non-resident government securities, it seems reasonable to infer that the non-sterling, non-gilt data probably do relate overwhelmingly to non-resident government securities.

(3) The Bank's Gilt-Edged & Money Markets Division has conducted a survey of the gilts market; see 'Plans for the open gilt repo market', Bank of England, March 1995, and subsequent updates. See also, 'Gilts and the gilts market: review 1995-6'.

(4) See the box on 'The co-ordinated portfolio investment survey' on page 420.

(5) Using information obtained from major market participants and from aggregate data reported for supervisory purposes.

Table D
Comparison of external net asset positions internationally^(a)

End-years	1981	1985	1990	1993	1994	1995
United States						
\$ billions	374.3	139.1	-251.1	-503.5	-580.1	-814.0
Percentage of GNP	12.3	3.4	-4.6	-7.7	-8.4	-11.3
Japan						
\$ billions	10.9	129.8	327.5	615.3	669.9	741.7
Percentage of GNP	1.0	10.0	10.2	15.1	14.6	16.7
Germany						
\$ billions	29.2	52.8	349.5	237.4	209.5	182.0
Percentage of GNP	4.0	9.0	21.3	13.0	9.8	7.6
France						
\$ billions	56.4	6.1	-71.2	-60.2	40.9	116.1
Percentage of GNP	8.6	1.0	-5.7	-5.1	3.0	7.4
United Kingdom						
\$ billions	62.2	102.6	13.3	55.2	52.9	77.3
Percentage of GNP	11.9	22.4	1.3	5.9	5.0	7.1

(a) The data underlying this table are taken from national sources, the IMF *International Financial Statistics Publication* (GNP figures) and OECD *Financial Statistics Part 2*. National sources may use differing methodologies.

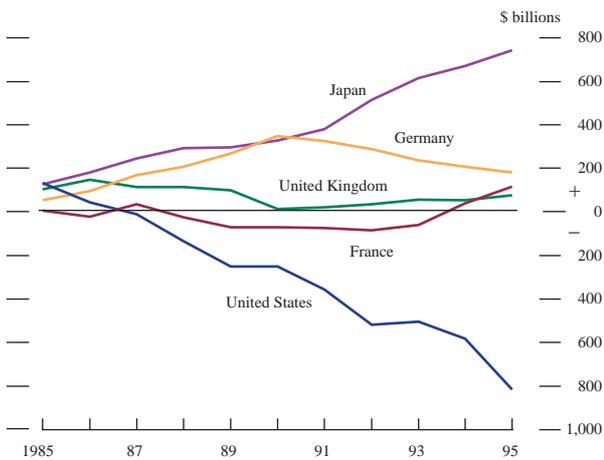
increased the United Kingdom's external assets. For those countries where portfolio investments include a higher

proportion of bonds, the effect of rising securities prices was less marked. For countries with net external portfolio liabilities, such as the United States and Germany, the increased bond and equity prices were also one factor that further reduced their net asset positions (see Chart 4).

Table D shows the large net external debt of the United States. Its net external liabilities continued to increase in 1995, as in each of the last ten years. Japan had a similar net asset position to the United States in 1985, but has increased its net asset position in every year since. These movements are reflected in the persistent current account surplus of Japan and deficit of the United States.

The US dollar's general decline in 1995 H1 was associated with an appreciation of the Deutsche Mark. For the year as a whole, there was a continuation of the decline in Germany's net external assets. Expressed in US dollars, the German net asset position has declined every year since 1990 when the current account moved into deficit following the country's reunification.

Chart 4
Comparison of external net asset positions internationally^(a)

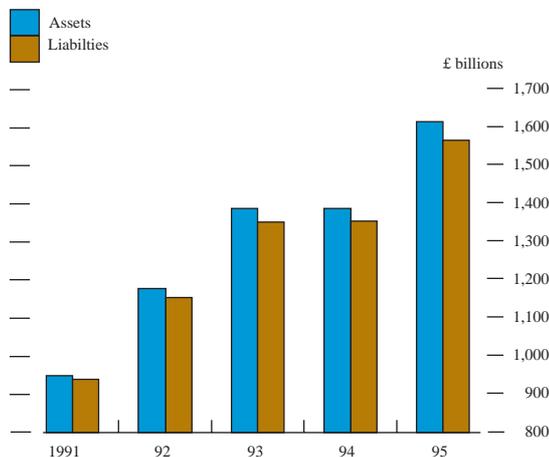


(a) The data underlying this table are taken from national sources, the IMF and OECD.

Revisions

The identified net asset position of the United Kingdom at the end of 1994 has been revised upwards by £16.2 billion between the publication of the 1995 and 1996 *Pink Books*. While revisions of this scale are large when set against the net asset position, they are modest in relation to the gross holdings of cross-border assets and liabilities (£1,617 billion and £1,567 billion respectively at the end of 1995; see Chart 5). This latest revision primarily affected the

Chart 5
Gross external assets and liabilities



Source: ONS.

recorded assets and liabilities positions of the UK private sector and was equally spread between portfolio and direct investments.

Investment income

The United Kingdom's income from its overseas assets increased by 15% in 1995 to £47.1 billion (see Table E). Payments to non-residents on their holdings of UK assets also grew strongly, but from a lower base, so that net investment income rose to £9.6 billion from an already high £8.7 billion in 1994.

Table E
Investment income (II)

£ billions

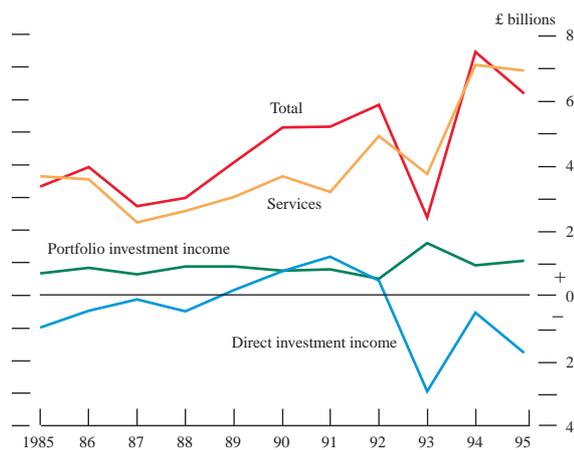
	Annual average 1982-91	1992	1993	1994	1995	1996 H1
Earnings on assets						
Portfolio (a)	3.1	7.7	9.9	8.7	9.5	5.3
Direct	10.4	13.4	16.9	20.9	24.8	14.0
Other non-bank private sector	2.3	4.0	4.8	4.4	4.9	2.6
Public sector (b)	1.2	1.6	1.4	1.6	1.6	1.0
UK banks' spread earnings on external lending	1.6	1.7	2.0	5.5	6.2	1.8
Total (c)	18.5	28.3	35.0	41.1	47.1	24.8
Payments on liabilities						
Portfolio (a)	2.3	6.9	7.9	9.2	10.8	5.6
Direct	6.6	5.3	10.5	9.5	12.0	6.7
Other non-bank private sector	2.6	6.8	8.9	9.1	8.5	4.2
Public sector (d)	1.9	3.2	3.3	4.0	4.4	2.2
Banks' cost of net liabilities	2.4	3.0	2.3	0.7	1.8	0.7
Total (c)	15.8	25.1	32.8	32.4	37.5	19.5
Net II earnings (e)	2.8	3.1	2.2	8.7	9.6	5.3 (e)
Net II excluding spread earnings	1.2	1.4	0.2	3.2	3.4	3.4

Sources: ONS and Bank of England.

- (a) Non-bank private sector.
 (b) Including official reserves.
 (c) May not sum due to rounding.
 (d) Including gilts.
 (e) Not seasonally adjusted.

Higher net investment income for the OFIs sector more than offset lower net earnings within the UK banking sector. The fall in the net earnings of UK banks largely resulted from a net outflow of earnings on direct investments and from increased net funding costs on international borrowing (see Chart 6). Within the OFIs sector, the net investment earnings of securities dealers also fell in 1995 but these were more than offset by an increase in the investment income of the insurance sector, where net earnings rose by £2.0 billion to £6.0 billion.

Chart 6
Banks: portfolio investment income costs^(a)



(a) Source: British Invisibles 'City Table' 1995.

All of the main investment income components increased. Income from direct investments abroad was particularly buoyant in 1995 and accounted for nearly two thirds of the growth in total investment income. But while the United Kingdom recorded an increased net credit on its direct investment income and payments, the growth in portfolio investment income was insufficient to prevent a widening of the deficit in these flows during the year,

notwithstanding the United Kingdom's larger holdings of these assets.

Early indications suggest that the deficit on portfolio investment income has been narrowing this year. In the first half of 1996, portfolio income was £5.3 billion. While this is still a little below the estimate for portfolio payments, it represents a sizable turnaround since the first half of 1995. Direct investment income was also higher in 1996 H1, contributing to an estimated net investment income total of £5.3 billion, substantially higher than for the corresponding period in 1995.

Capital gains and full rates of return

Table F expresses the investment income and full rates of return on specific assets in recent years. The investment income rate of return is calculated by taking earnings as a percentage of the stock of investment. The full rate of return includes investment income, plus any capital gains/losses, again expressed as a percentage of the stock. The full rate of return on UK overseas assets fell in both 1993 and 1994, having been unusually high in 1992. Rising securities prices in 1995 resulted in higher returns on total assets, but particularly on portfolio investments, where the full rate of return had been negative in 1994. The effect of changes in UK securities prices on foreign-owned investments in the United Kingdom was even more marked, with the full rate of return exceeding that on UK portfolio

Table F
Estimated investment income^(a) and full rates of return^(b)
on identified assets and liabilities

Percentage points

	Total		Portfolio		Direct		Banks		Sterling	
							Foreign currency			
	II (c)	Full (d)	II	Full	II	Full	II	Full	II	Full
1991	8.1	10.1	3.8	13.0	10.2	7.4	9.8	8.8	15.2	11.6
1992	5.8	18.2	3.9	15.4	9.0	17.3	6.1	21.5	9.8	8.0
1993	5.3	9.3	3.7	15.2	10.0	12.2	5.8	5.9	7.1	7.3
1994	5.6	3.1	3.9	-0.8	11.6	7.2	5.4	9.2	6.1	7.4
1995	5.8	12.2	4.0	12.3	11.6	15.7	5.7	18.1	6.9	8.6

	Total		Portfolio		Direct		Banks		Sterling	
							Foreign currency			
	II (c)	Full (d)	II	Full	II	Full	II	Full	II	Full
1991	8.2	9.0	6.4	12.7	3.8	2.5	9.3	8.6	13.6	11.5
1992	5.7	16.9	5.6	17.8	4.3	-1.5	5.6	21.5	9.2	7.2
1993	5.3	7.1	4.5	14.3	8.2	4.1	5.5	5.1	6.1	6.9
1994	5.1	3.0	5.2	-3.0	7.3	3.4	4.6	4.5	4.4	0.4
1995	5.3	10.9	5.2	13.3	8.0	8.2	5.1	13.5	5.6	6.1

Source: ONS.

- (a) Investment income earnings as a percentage of the stock.
 (b) Investment income earnings plus stock revaluations as a percentage of the stock.
 (c) Investment income
 (d) Full rates of return

investments abroad. Nonetheless, the full rate of return on all UK external assets remained above that on liabilities, reflecting the larger overall effect of revaluations on the assets side of the United Kingdom's external balance sheet.

Public sector debt: end-March 1996

By Nick Parish of the Bank's Monetary and Financial Statistics Division.

This article continues the annual series analysing the public sector debt position and the composition and distribution of the national debt. It has been compiled with the help of the Office for National Statistics (ONS) and others. Its main points are:

- In 1995/96, the nominal value of the net debt of the public sector rose by around £33 billion, while market holdings of the national debt rose by around £38 billion. As a proportion of GDP, these measures increased by 2.7 and 3.4 percentage points respectively, to 44.6% and 47.5%.
- In the twelve months to the end of March 1996, the ratio of general government consolidated gross debt to GDP (calculated on a Maastricht basis) rose by 3.3 percentage points to 53.8%, remaining well below the 60% reference level specified in the Maastricht Treaty.

Public sector debt

This article looks at developments in the net and gross debt⁽¹⁾ position of the public sector in the financial year to the end of March 1996. The debt stock position reflects the cumulative effect of past financial deficits and surpluses and for this reason the change in debt over a financial year normally corresponds closely to the public sector borrowing requirement (PSBR).⁽²⁾ Trends in the ratio of public sector debt to GDP give a guide to the sustainability of the current fiscal stance. Interest payments on the debt are a current payment arising from past borrowing and can influence fiscal policy. If interest payments rise, other government spending net of receipts—the primary deficit—would need to fall to meet a given target for the PSBR. Public sector debt interest payments in 1995/96 rose for the fourth

successive year to £25.2 billion (8.2% of public sector current and capital expenditure), although as Chart 1 shows this is still low by recent historical standards.

At the end of March 1996, net public sector debt was £322.7 billion (see Table A), an increase of £32.6 billion (11.2%) on a year earlier. Net debt as a percentage of GDP has continued to rise from its low point of 27.0% (£153.3 billion) in 1990/91 to 44.6% in 1995/96, its highest level for ten years (see Chart 2). The rate of increase has slowed over the past two years; in 1995/96 this was due to

Chart 1
Public sector debt interest

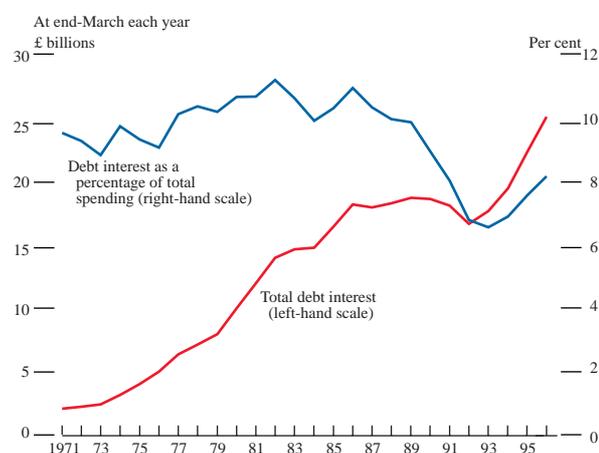
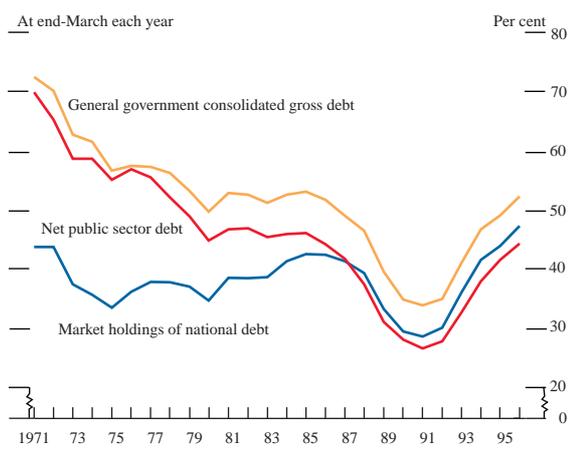


Chart 2
Measures of public sector debt relative to GDP



a fall in the PSBR from £35.9 billion to £32.2 billion (see Table B). Concern about the trend in the public sector finances led the Government to set in motion a programme tightening its fiscal policy stance in the two 1993 budgets.

(1) Net debt is gross debt less liquid assets (see notes and definitions for further explanation of terms). Full definitions are at the end of the article. All figures are at nominal value and include accrued uplift on index-linked gilts unless otherwise stated.
 (2) The box on page 428 outlines the main reasons for the difference between the two.

Table A
Net public sector debt^(a)

£ millions, nominal values (b); percentages in italics

31 March	1995	1996	Changes 1995-96
Central government			
Market holdings of national debt <i>as a percentage of GDP</i>	305,917 <i>44.2</i>	343,942 <i>47.5</i>	38,025 <i>3.4</i>
Net indebtedness to Bank of England			
Banking Department	869	0	-869
Savings banks	1,446	1,432	-14
Accrued interest and indexing on national savings	3,316	3,517	201
Notes and coin in circulation	21,771	23,427	1,656
Other	391	349	-41
Total central government gross debt	333,710	372,667	38,957
Local authorities			
Total gross debt	49,255	49,563	308
<i>less holdings of other public sector debt:</i>			
Central government holdings of local authority debt	40,707	41,266	559
Local authority holdings of central government debt	149	153	4
General government consolidated gross debt <i>as a percentage of GDP</i>	342,109 <i>49.4</i>	380,811 <i>52.6</i>	38,702 <i>3.2</i>
Public corporations			
Total gross debt	26,854	27,291	437
<i>less holdings of other public sector debt:</i>			
Central government holdings of public corporation debt	26,217	26,670	453
Local authority holdings of public corporation debt	3	0	-3
Public corporation holdings of central government debt	4,066	6,050	1,985
Public corporation holdings of local authority debt	911	215	-696
Public sector consolidated total debt <i>as a percentage of GDP</i>	337,766 <i>48.8</i>	375,167 <i>51.8</i>	37,401 <i>3.1</i>
Public sector total liquid assets (Table C) <i>as a percentage of GDP</i>	47,660 <i>6.9</i>	52,464 <i>7.3</i>	4,804 <i>0.4</i>
Net public sector debt <i>as a percentage of GDP</i>	290,106 <i>41.9</i>	322,703 <i>44.6</i>	32,597 <i>2.7</i>
Memo item:			
General government consolidated gross debt (Maastricht basis) <i>as a percentage of GDP (ESA) (c)</i>	340,897 <i>50.5</i>	379,435 <i>53.8</i>	38,538 <i>3.3</i>

(a) Data from 1970 to 1996 are published in the *Bank of England Statistical Abstract 1996*, Part 1, Table 19.1.
(b) Figures shown may not sum to totals because of rounding.
(c) See footnote on page 428.

Consolidation of the public finances has continued (albeit at a reduced pace from that originally envisaged) in the last two budgets, resulting in a slowing of the rate of growth of public sector debt. The Treasury's 1996 Summer Economic Forecast estimated that the rate of growth of public sector debt would continue to fall over the next two years, with the level of debt peaking at 46.5% of GDP in 1997/98.

The principal element of the rise in public sector debt was an increase of around £39.0 billion in central government gross debt to £372.7 billion, of which £38.0 billion was a rise in market holdings of national debt. The largest component of this was an increase in market holdings of gilts of £29.2 billion (see Table C). In addition, holdings of national savings increased by £5.0 billion and holdings of Treasury bills also rose. The rise in public sector gross debt was partially offset by an increase of £4.8 billion in public sector liquid assets (see Table D). Most of this was due to an increase in gold and foreign exchange reserves of £2.1 billion and a rise of £1.5 billion in central government's claims under the market's gilt repo agreements with the Issue Department of the Bank.

Table B
Composition of the PSBR

£ millions; percentages in italics

	1994/95	1995/96
Central government borrowing requirement (CGBR):		
on own account	38,278	35,648
for on-lending to local authorities	-392	473
for on-lending to public corporations	458	-656
CGBR	38,344	35,465
Local authorities' net borrowing from markets (adjusted)	-572	-1,616
Public corporations' net borrowing from markets (adjusted)	-1,874	-1,681
Public sector borrowing requirement (PSBR)	35,898	32,168
Alternative analysis:		
CGBR on own account (CGBR[O])	38,278	35,648
Local authority borrowing requirement (LABR)	-964	-1,143
Public corporations' borrowing requirement (PCBR)	-1,416	-2,337
<i>As a percentage of GDP:</i>		
CGBR	5.7	5.0
<i>CGBR (on own account)</i>	5.7	5.0
LABR	-0.1	-0.2
PCBR	-0.2	-0.3
PSBR	5.3	4.5

Although the net debt of the public sector provides a method of looking at the public sector accounts, it is only one of several accounting frameworks. Net debt fails to take into account factors that have an affect on the balance sheet of the public sector, such as the level of illiquid public sector assets and depreciation of public infrastructure. Other frameworks can take account of this by considering the net worth of the public sector, rather than its debt alone, by building up a public sector balance sheet. This allows transactions such as privatisations to be incorporated. These

Table C
Market and official holdings of national debt^(a)

£ millions, nominal values; percentage of market holdings in italics

	End-March 1995		End-March 1996	
Market holdings				
Sterling marketable debt:				
Government and government-guaranteed stocks:				
index-linked	39,201	12.8	46,127	13.4
other	185,191	60.5	207,439	60.3
Treasury bills	7,888	2.6	10,781	3.1
Sterling non-marketable debt:				
National savings:				
index-linked	7,090	2.3	7,620	2.2
other	39,990	13.1	44,411	12.9
Interest-free notes due to the IMF	5,598	1.8	5,544	1.6
Certificates of tax deposits	1,612	0.5	1,222	0.4
Other	2,435	0.8	4,009	1.2
Total	289,005	94.5	327,153	95.1
Foreign currency debt: (b)				
North American government loans	822		788	
US dollar floating-rate note	2,399		2,559	
Ecu Treasury bills	2,863		2,883	
Ecu 9 ¹ / ₈ % 2001 bond	2,045		2,059	
Ecu Treasury notes	4,499		4,118	
Deutsche Mark 7 ¹ / ₈ % 1997 bond	2,245		2,219	
US dollar 7 ¹ / ₈ % 2002 bond	1,843		1,966	
Debt assigned to the government	196		198	
Total	16,912	5.5	16,789	4.9
Total market holdings	305,917	100.0	343,942	100.0
Official holdings	43,618		47,244	
Total debt	349,535		391,186	

(a) Data from 1970 to 1996 are published in the *Bank of England Statistical Abstract 1996*, Part 1, Table 19.2.
(b) Sterling valuation rates:
31 March 1995: £1 = US \$ 1.6280, Can \$ 2.2833, ECU 1.2224, DM 2.2271.
31 March 1996: £1 = US \$ 1.5262, Can \$ 2.0798, ECU 1.2142, DM 2.2531.

Table D
Public sector liquid assets

£ millions, nominal values

31 March (a)	1995	1996	Changes 1995-96
Central government			
Official reserves	28,330	30,463	2,133
Commercial bills, including bills held under sale and repurchase agreements	1,726	1,093	-633
Claims on British government stocks under sale and repurchase agreements (b)	989	2,465	1,476
Loans against export credit and shipbuilding paper	84	286	202
Net claim on Bank of England Banking Department	0	135	135
Bank deposits	1,795	1,801	6
Total	32,924	36,243	3,319
Local authorities			
Bank deposits	5,408	6,020	612
Building society deposits	3,927	4,205	278
Other short-term assets	2,621	2,826	205
Total	11,956	13,051	1,095
Public corporations			
Bank deposits	2,650	3,117	467
Other short-term assets	130	53	-77
Total	2,780	3,170	390
Public sector total liquid assets	47,660	52,464	4,804

(a) Data from 1970 to 1996 are published in the *Bank of England Statistical Abstract 1996*, Part 1, Table 19.1.

(b) Excludes repos between public sector bodies. Claims arise in connection with the Bank of England's provision of liquidity to the money markets through its gilt repo facility. Take-up of liquidity is variable, depending on the prevailing and expected level of interest rates and forecasts of money-market liquidity.

transactions clearly impact on the net worth of the public sector, but cannot be encompassed by use of the net debt

Reconciliation

The PSBR figure relates to transactions and is calculated on a cash-flow basis. The debt figure is a stock and its change is calculated on a nominal, accrued basis. This results in slight differences between the change in debt and the PSBR, on account of the following:

- Changes in exchange rates affect the value of foreign currency liabilities and assets independently of transactions.
- When British government stocks (gilts) are issued (or bought in ahead of their redemption date) at a discount or premium, the borrowing requirement is financed by the actual amount received or paid out, while the level of debt is deemed to change by the nominal value of gilts issued (or redeemed).
- The borrowing figures include the uplift on index-linked gilts only when it is paid out, while the figures for debt outstanding include it as it accrues over the life of the stock.

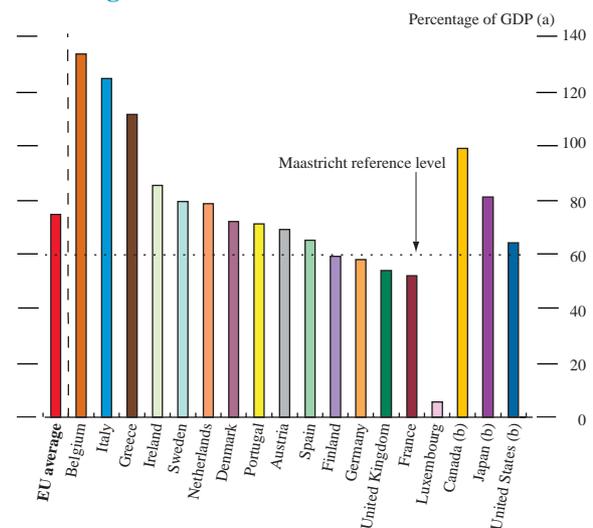
concept. No such wider balance sheet statistics currently exist in the United Kingdom.

General government debt

The measure used in the debt criterion to be met by countries wishing to participate in Stage 3 of Economic and Monetary Union (EMU) is general government consolidated gross debt on a European System of Accounts (ESA) basis⁽¹⁾ (shown as a memo item in Table A). Article 104c of the Maastricht Treaty states that countries should avoid excessive government deficit and debt levels. Although the Treaty itself does not specify what constitutes 'excessive', a protocol to the Treaty establishes reference levels. For debt, 'excessive' is defined as greater than 60% of GDP unless the ratio is sufficiently diminishing and approaching 60% at a satisfactory pace.

The position of each EU member state against this reference level will be an element in considering membership of the proposed EMU, although protocols to the Maastricht Treaty note that both the United Kingdom and Denmark will not move to the third stage of EMU unless they notify the European Council that they wish to do so. To assess fiscal discipline, each state is required to report and update its annual debt and deficit levels to the European Commission at the beginning of March and September every year. At the end of December 1995, the United Kingdom's reported debt to GDP ratio on an ESA basis was 54.1% (£377.7 billion), well within the reference value for debt. By the end of March 1996 it had fallen to 53.8% (£379.4 billion), but is forecast to rise to 55.25% by end-March 1997. This still compares favourably with the EU average of 74.8% (see Chart 3).

Chart 3
General government debt: at 31 December 1995



Source: European Commission report on government debt and deficit levels unless otherwise stated.

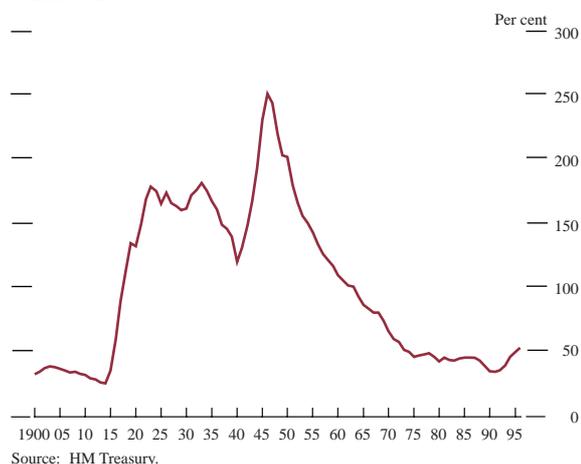
- (a) GDP as defined by the European System of Integrated Accounts.
(b) Data from *OECD Economic Outlook 59*, June 1996.

(1) In accordance with the ESA, IMF interest-free notes are excluded from the calculation of general government debt on a Maastricht basis. As they are a liability of the National Loans Fund, however, they are included in government debt in the other measures used in this article. There are other miscellaneous instruments included in government debt on an ESA basis but excluded on a domestic basis since they are not a liability of the National Loans Fund.

The national debt

By twentieth century standards, current debt levels remain low (see Chart 4).⁽¹⁾ Although at its highest for over two decades, the ratio of national debt to GDP is still lower than at any time between 1914 and 1972. It is useful

Chart 4
Gross national debt as a percentage of nominal GDP: 1900–96

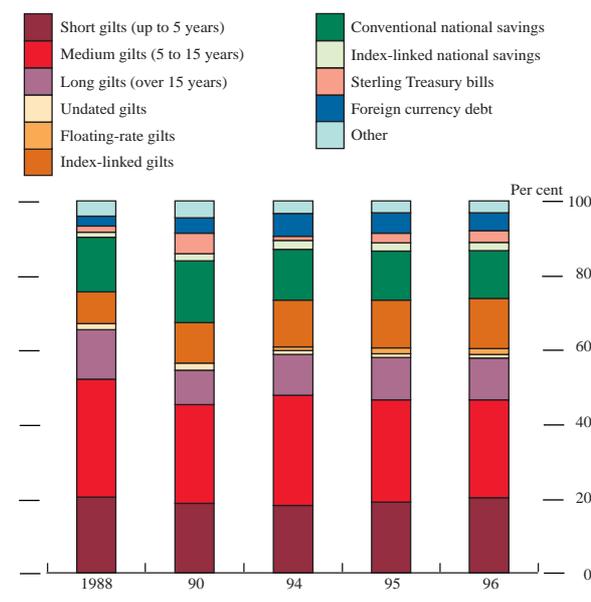


to express public sector debt as a proportion of nominal GDP because nominal GDP is closely related to the tax base of the economy and hence the economy's theoretical ability to redeem the debt; however, this masks the impact of inflation. Since public sector debt is largely denominated in nominal terms, inflation reduces the real value of the government's debt. During the 1970s, public sector debt as a percentage of GDP fell by 24 percentage points, despite a substantial increase in the nominal debt stock over the period. The reason for this was the high level of inflation in the 1970s, which led to increases in nominal GDP, which more than offset the rise in the debt stock. In recent years the debt to GDP ratio has risen sharply due to high financial deficits, with increases in the debt stock not being offset by large rises in nominal GDP.

Total debt outstanding

The national debt is almost entirely comprised of six types of instrument: gilt-edged stocks, Treasury bills, national savings, interest-free notes due to the IMF, certificates of tax deposit and foreign currency debt. The total nominal value of the national debt rose by £41.7 billion to £391.2 billion (54.1% of GDP) in 1995/96 (see Table C). Most of the rise was accounted for by market holdings (up by £38.0 billion) with a £3.6 billion increase in official holdings. The proportion of debt in market hands that is marketable (instruments which can be traded in a secondary market—including gilts, Treasury bills and some foreign currency instruments) remained unchanged at 81%. There were few significant changes in the share of market holdings of individual instruments (see Chart 5).

Chart 5
Composition of market holdings of national debt by instrument



Analysis of debt by instrument

Gilt-edged stocks

Gilt-edged stocks are the largest single component of the national debt by instrument, accounting for 74% of market holdings of national debt and 91% of marketable debt, with £253.6 billion outstanding in market hands at the end of March 1996. A total of £32.7 billion nominal of gilts were issued in 1995/96, of which £5.5 billion (including £2.4 billion of accrued uplift) was index-linked. Two new conventional stocks were created: 7½% Treasury 2006 and 8% Treasury 2021. Of the conventional stock, £25 billion was issued via nine auctions of between £2 billion and £3 billion each. The remaining £2.2 billion, including £600 million of Floating Rate Treasury 1999 stock, was issued by tap, as were all issues of index-linked stock. Four stocks, with a total nominal value of £4.3 billion, were redeemed over the year.

The structure of the gilt market altered substantially during 1995/96. Debt issuance was made more transparent by the advance announcement of auction dates for the first time and quarterly pre-announcements of the maturity ranges of the stocks to be issued. In addition, with the introduction of gilt repo trading in January 1996, previous restrictions on the borrowing and lending of gilts were removed. The tax regime was also changed to allow most investors to receive gilt dividends gross of tax. Reform of the market is to continue, with a gilt stripping facility to be introduced in 1997. These changes are all designed to enhance the attractiveness and liquidity of the gilt market. Increasing demand for gilts should have the effect of reducing gilt yields, making it cheaper for the Government to service public sector debt.⁽²⁾

(1) The differences between the national debt and net public sector debt are explained in the notes and definitions at the end of this article.

(2) For further details on the gilt market reform programme, see 'Gilts and the Gilt Market: Review 1995-6', available from the Bank's Gilt-Edged & Money Markets Division (telephone 0171-601 5535), and the Press Notice of 13 August 1996 on taxation of strippable gilts.

As Table E indicates, the gilt portfolio at end-March 1996 had a shorter maturity structure than the previous year's. The average maturity⁽¹⁾ of all stocks in market hands fell from 10.4 to 10.1 years while the average maturity

Table E
Average remaining life of dated stocks in market hands

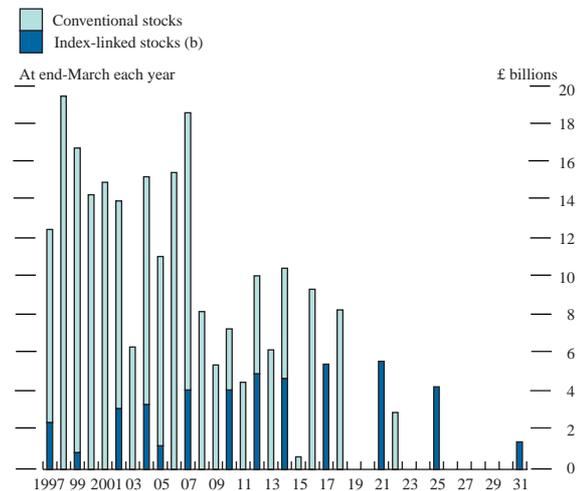
Years to maturity at 31 March:

	1990	1991	1992	1993	1994	1995	1996
Assumptions (a)							
Latest possible redemption: (b)							
All dated stocks (c)	10.2	9.9	10.0	10.8	10.6	10.4	10.1
Excluding index-linked stocks	8.4	8.0	8.4	9.4	9.1	9.1	8.8
Earliest possible redemption date:							
All dated stocks (c)	10.1	9.6	9.8	10.5	10.4	10.2	9.9
Excluding index-linked stocks	8.2	7.7	8.1	9.0	8.9	9.1	8.8

(a) No conversions (no conversion options were available between 1990 and 1994).
 (b) Table is as at 31 March 1996 and so does not include the early call of 6 $\frac{1}{2}$ % Treasury 1995-98 announced on 26 July 1996.
 (c) Index-linked stocks are given a weight reflecting capital uplift accrued to 31 March.

excluding index-linked stocks also fell by 0.3 years. Chart 6 gives the maturity profile of dated stock. The proportion of short (up to 5 years), medium (5 to 15 years) and long-dated (15 years and over) gilts outstanding in market hands was virtually unchanged (see Chart 7).⁽²⁾ In accordance with the Government's funding requirement and remit to the Bank for 1995/96, an approximately equal proportion of each maturity band was issued in 1995/96. The prospective maturity profile for gilt issuance included in the Government's remit for 1996/97 specified that once again an approximately equal proportion of short, medium and long gilts would be issued.

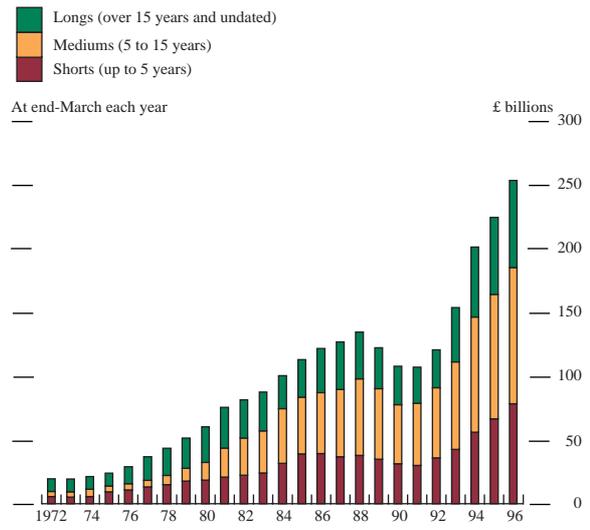
Chart 6
Maturities of dated stocks in market hands^(a)



(a) The chart is as at 31 March 1996, so does not include the early call of 6 $\frac{1}{2}$ % Treasury 1995-98, which was announced on 26 July 1996.
 (b) Figures include accrued uplift to 31 March 1996.

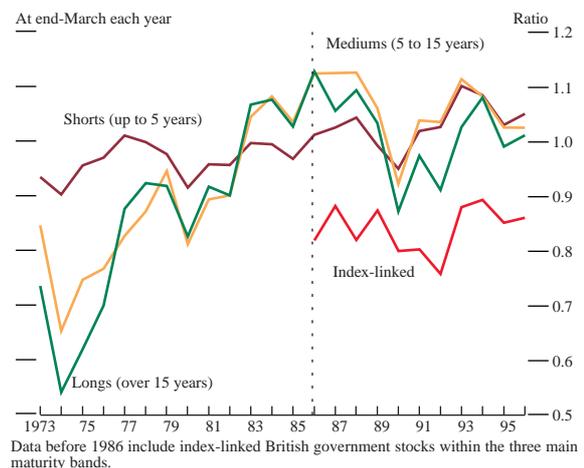
The market value of all gilts in market hands was £250.4 billion at end-March 1996, 1.3% lower than the nominal value. This compares with a discount of 2.3% at end-March 1995, reflecting a slight rise in gilt prices over the year. The discount is inflated by undated stocks such as

Chart 7
Breakdown of market holdings of British government stocks



3 $\frac{1}{2}$ % War Loan which trade at a large discount, usually less than half their nominal value. The ratio of market to nominal value rose most significantly in long gilts (see Chart 8), which edged back up to a small premium at 1.01, and short gilts. The ratio for medium-dated gilts continued to fall, albeit by a small margin. Index-linked gilts continued to trade at a large discount because real yields on conventional stocks are higher than the low nominal yields available on index-linked gilts.

Chart 8
Market value/nominal value ratios of fully-paid dated British government stocks in market hands



Data before 1986 include index-linked British government stocks within the three main maturity bands.

As shown by the rise in overall market prices, yields tended to fall over the year, most markedly at the short end of the yield curve. The average daily yield on the benchmark five-year stock as calculated on the last working day of the financial year fell by 0.8 percentage points to 7.70%, while the yield on the ten-year benchmark also fell, by

(1) The aggregation of index-linked and conventional stock for the purpose of measuring average maturity presents a conceptual difficulty (see the December 1982 *Quarterly Bulletin*, page 540).
 (2) This article adopts the same definition of short and medium-dated gilts as in the National Loans Fund accounts. In the financing requirement, however, and in general market usage, short-dated gilts are defined as 3-7 years and medium-dated as 7-15 years.

CGO survey of beneficial gilt ownership 1995

To improve its knowledge of the sectoral distribution of holdings of government stocks, the Bank conducts a survey of Central Gilts Office (CGO) members at the end of each year. CGO members accounted for 89% of gilts outstanding by market value at end-December 1995. The results of the survey are amalgamated with the remaining gilts registered directly to give a sectoral breakdown of total gilt holdings as shown in the table below.

Survey of distribution of gilt-edged stocks

	31 December 1994		31 December 1995	
	£ billions	Per cent	£ billions	Per cent
Total UK market holdings	173.7	81.7	215.1	85.6
<i>of which:</i>				
Public sector	3.3	1.6	4.6	1.8
Banks	17.4	8.2	24.9	9.9
Building societies	4.9	2.3	2.1	0.8
Other financial institutions	124.8	58.7	155.3	61.8
<i>of which:</i>				
Insurance companies	68.1	32.0	80.5	32.0
Pension funds	36.8	17.3	52.4	20.8
Other	19.9	9.4	22.4	8.9
Industrial and commercial companies	3.6	1.7	3.5	1.4
Persons	19.7	9.3	24.7	9.8
Overseas holdings	38.8	18.3	36.3	14.4
Total market holdings	212.5	100	251.4	100
Official holdings	8.2		7.9	
Market value of all gilts	220.7		259.3	

As a percentage of total market holdings, the most significant increases were those of banks, pension funds and the personal sector. The increase in pension funds' holdings was particularly marked, rising by £15.6 billion to £52.4 billion. This may be due to the increased maturity of pension funds or a reassessment of optimal

asset allocation in the light of the minimum funding requirement. As a result of that increase, insurance companies and pension funds now account for just over half of all gilts in market hands. Banks' holdings increased by £7.5 billion; they now hold just under 10% of the total market holding of gilts. Those sectors that increased their holdings did so largely at the expense of overseas residents. This confirms that overseas residents' holdings of debt have fallen as a percentage of the total (see Table F).

The figures in Table G calculate holdings at market value using broad nominal/market value ratios which draw on maturity data whereas the CGO survey obtains figures direct from account holders at market value. In addition the CGO survey is undertaken at end-December to allow direct comparison with National Accounts data. However, the CGO survey provides an important cross check on the distribution of the gilts element of the national debt. The main differences between the two are the holdings of insurance companies, banks and the personal sector. One reason for the differences is that many CGO accounts are held via nominee companies, making it difficult for respondents to identify the sector of the beneficial owner. Much of the data in Table G are obtained by surveying companies in each sector directly, avoiding the problem. However, the CGO survey has the advantage of deriving all its data from the same source at market value, as opposed to the variety of sources from which Tables F and G are compiled. This avoids the problems of a large residual figure (see Table G).

0.37 percentage points to 8.13%. The yield on a liquid 20-year stock fell by only 0.05 percentage points, meaning that the yield spread between short and long-dated stocks widened considerably during the year. Current practice is to issue gilts at coupons close to the yields available in the market; in line with this, 99% of stock issued at fixed coupons in 1995/96 had a coupon of between 7% and 8%.

National savings

Total national savings rose by £5.1 billion to £57.0 billion in 1995/96, well above the initial assumption of £2.5 billion made in the funding remit for 1995/96. The total outstanding includes deposits with the National Savings Bank and accrued interest and index-linked increments, which are not included in the national debt (although they are included in the debt of the public sector). Adjusting for this, the national savings component of the national debt grew by 10.5% (£5.0 billion) to £52.0 billion. Of the ten instruments currently on sale, three accounted for all but £0.1 billion of this growth. Holdings of Pensioners' Guaranteed Income Bonds, introduced in 1992/93, increased by £2.3 billion, more than doubling in size for the second successive year. This followed a reduction in the qualifying

age limit from 65 to 60 and an increase in the holding limit. Holdings of National Savings Certificates increased by £1.2 billion and of Premium Bonds by £1.5 billion. The assumption for national savings in the 1996/97 financing requirement is £3.0 billion.

Sterling Treasury bills

Market holdings of sterling Treasury bills increased by £2.9 billion to £10.8 billion in 1995/96. This reflected an average weekly tender of £1.2 billion compared with an average of £0.5 billion in 1994/95. It is not planned that net Treasury bill issuance will contribute to financing the Borrowing Requirement in 1996/97, although the stock of Treasury bills and the pattern of issuance will fluctuate in the light of the needs of money-market management.

Foreign currency debt

The sterling value of debt denominated in foreign currency fell slightly over the year to £16.8 billion. As a proportion of total market holdings of national debt this meant a fall of 0.6 percentage points to 4.9%. This was largely due to an

ECU 500 million nominal fall in the amount of Ecu Treasury notes outstanding, the only significant change in the nominal value of foreign currency debt. Sterling fell against the Ecu, US dollar and Canadian dollar, meaning that debt denominated in those currencies rose in sterling terms, while its appreciation against the Deutsche Mark reduced the sterling value of the 7 $\frac{1}{8}$ % 1997 Deutsche Mark bond.

Sterling debt: analysis by holder (Tables F and G)⁽¹⁾

Insurance companies and pension funds remain by far the largest holders of debt, having increased their holdings by £22.6 billion over the year. The long-term liabilities of such institutions incline them towards medium and long-dated gilts and away from instruments such as Treasury bills. Banks, by contrast, prefer more short-term debt. They continue to be the largest holders of Treasury bills but have shifted towards gilts in their overall holdings of debt, having increased their holdings of medium-dated gilts by £4.5 billion. The total sterling debt held by individuals and private trusts increased by £4.5 billion, almost entirely as a

Table F

Distribution of the sterling national debt: summary^(a)

£ billions; percentage of market holdings in italics

	Amounts outstanding at 31 March (b)				Change in 1995/96
	1995		1996		
Market holdings					
Public corporations and local authorities	3.4	<i>1.2</i>	5.3	<i>1.6</i>	1.9
Banking sector	22.5	<i>7.8</i>	26.8	<i>8.2</i>	4.3
Building societies	5.3	<i>1.8</i>	7.8	<i>2.4</i>	2.5
Institutional investors:					
Insurance companies and pension funds	129.4	<i>44.8</i>	152.0	<i>46.5</i>	22.6
Other	3.3	<i>1.1</i>	3.2	<i>1.0</i>	-0.1
Overseas residents	41.1	<i>14.2</i>	43.3	<i>13.2</i>	2.2
Individuals and private trusts	53.4	<i>18.5</i>	57.9	<i>17.7</i>	4.5
Other (including residual)	30.6	<i>10.6</i>	30.9	<i>9.4</i>	0.3
Total market holdings	289.0	<i>100.0</i>	327.2	<i>100.0</i>	38.2
Official holdings	42.0		45.7		3.7
Total sterling debt	331.0		372.9		41.9

(a) See Table G for more detailed analysis. Data for 1970 to 1996 are published in the *Bank of England Statistical Abstract 1996*, Part 1, Table 19.3.
(b) Figures shown may not sum to totals because of rounding.

result of increased holdings of national savings. Overseas residents' holdings rose by £2.2 billion, but for the second year in succession fell as a percentage of total market holdings.

Table G

Estimated distribution of the sterling national debt: 31 March 1996

£ millions, nominal values (a)

Market values in italics (b)

	Total debt	Percentage of market holdings	Treasury bills	Stocks (c) Total	Market value	Up to 5 years to maturity	Over 5 years and up to 15 years	Over 15 years and undated	Non-marketable debt
Market holdings									
Other public sector:									
Public corporations	5,149		93	977		489	488	0	4,079
Local authorities	155		0	155		77	39	39	0
Total	5,304	2	93	1,132	979	566	527	39	4,079
Banking sector: (d)									
Discount market	414		192	222		220	1	1	0
Other	26,391		7,156	19,091		5,540	12,024	1,527	144
Total	26,805	8	7,348	19,313	19,758	5,760	12,025	1,528	144
Building societies	7,808	2	1,620	6,187	6,400	5,088	657	442	1
Institutional investors:									
Insurance companies	95,783		41	95,742	95,648	10,348	44,539	40,856	0
Pension funds	56,206		532	55,674	51,900	4,462	28,337	22,875	0
Investment trusts	1,716		0	1,716	1,744	349	377	990	0
Unit trusts	1,474		0	1,470	1,501	224	979	268	4
Total	155,179	47	573	154,602	150,793	15,383	74,231	64,988	4
Overseas holders:									
International organisations	6,457		0	913	933	158	750	5	5,544
Central monetary institutions	14,992		782	14,210	14,642	8,571	4,028	1,611	0
Other	21,852		271	21,581	22,263	13,370	6,361	1,850	0
Total	43,301	13	1,053	36,704	37,838	22,099	11,140	3,465	5,544
Other holders:									
Public trustee and various non-corporate bodies	236		0	236	240	50	126	60	0
Individuals and private trusts (e)	57,909		0	10,868	11,106	3,701	5,399	1,768	47,041
Industrial and commercial companies	7,533		94	1,446	23,316	25,756	2,759	-3,990	5,993
Other (residual)	23,079		0	23,079					0
Total	88,757	27	94	35,629	34,662	29,507	8,284	-2,162	53,034
Total market holdings (d)	327,153	100	10,781	253,566	250,429	78,402	106,863	68,301	62,806
Official holdings (d)	45,704		821	8,695	8,738	2,720	4,647	1,329	36,189
Total sterling debt	372,857		11,602	262,262	259,168	81,122	111,510	69,630	98,994

Owing to the rounding of figures, the sum of separate items will sometimes differ from the total shown.

- (a) For explanations see the notes to similar tables on pages 439–40 of the November 1992 *Bulletin*.
(b) Some of these estimates are based on reported market values; certain others rely on broad nominal/market value ratios.
(c) A sectoral analysis of gilt holdings from 1970 to 1996 is published in the *Bank of England Statistical Abstract 1996*, Part 1, Table 19.4.
(d) Official holders include the Bank of England Issue Department and exceptionally, the Banking Department.
(e) Direct holdings only.

(1) Compiled from a variety of sources, although the majority of the data are taken from the ONS' quarterly and annual survey data of various financial and non-financial companies.

Notes and definitions

The national debt

The *national debt* comprises the total liabilities of the National Loans Fund. The total excludes accrued interest (including index-linked increases) on national savings, Consolidated Fund liabilities (including contingent liabilities, *eg* coin) liabilities of other central government funds (notably the Issue Department's note liabilities, Northern Ireland government debt and stocks issued by certain central government funds), and sundry other contingent liabilities and government debt.

The national debt includes the whole nominal value of all issued stocks, even where there are outstanding instalments due from market holders; in such circumstances a counter entry is included in public sector liquid assets. The nominal value of index-linked gilt-edged stocks has been raised by the amount of index-linked capital uplift accrued to 31 March each year where applicable. Definitive figures for the national debt will be published in the *Consolidated Fund and National Loans Fund Accounts 1995/96 Supplementary Statements*. Provisional figures (some of which are revised in this article) are from *Financial Statistics*, September 1996.

Market holdings of the national debt, etc

Market holdings exclude holdings of other bodies within the central government sector (principally the funds of the National Investment and Loans Office, the Exchange Equalisation Account, government departments and the Issue Department of the Bank of England) and of the Banking Department of the Bank of England (together called 'official holders'). They include Issue Department's holdings under repo agreements; such holdings are therefore included in Table D as a central government liquid asset. The term 'market' includes local authorities and public corporations as defined for national income statistics.

Gross domestic product (GDP)

The percentage data shown in Table A (with the exception of the memo item) and Chart 4, are based on the average measure of GDP at current market prices in four quarters centred on 31 March. The data in Table B are based on GDP for the financial years 1994/95 and 1995/96.

Net indebtedness to the Bank of England Banking Department

The Banking Department's holdings of central government debt (principally sterling Treasury bills and British government stocks) less its deposit liabilities to the National Loans Fund and the Paymaster General.

Savings banks

This comprises deposits on ordinary accounts of the National Savings Bank.

Notes and coin in circulation

Excludes holdings by the Banking Department of the Bank of England which are subsumed within the figure for 'Net indebtedness' (see above).

Other central government gross debt

Comprises market holdings of Northern Ireland government debt (principally Ulster Savings Certificates) and the balances of certain public corporations with the Paymaster General.

General government consolidated gross debt

This includes not only market holdings of the national debt but also any market holdings of other central government gross debt (*qv*). In addition it includes all local authority debt. All holdings of each other's debt by these two parts of the public sector are then netted off to produce a consolidated total—which is the total of general government debt held outside general government.

Public sector consolidated total debt

This includes not only market holdings of the national debt but also any market holdings of other central government gross debt (*qv*). In addition it includes all local authority and public corporation debt. All holdings of one another's debt by these three parts of the public sector are then netted off to produce a consolidated total, which is the total of public sector debt held outside the public sector. Further estimates of this (and a fuller analysis) are published each year by the Office for National Statistics in Table S1 of *Financial Statistics*.

The net debt of the public sector

This is derived from the consolidated debt of the public sector by deducting the public sector's holdings of liquid assets.

Official reserves

These are at the official dollar valuation (see notes and definitions to Table 8.1 in the February 1996 *Bulletin*) converted into sterling at the end-March middle-market closing rate.

PSBR

Figures are taken from *Financial Statistics*, September 1996.

How should central banks reduce inflation? —conceptual issues

Mervyn King, Executive Director and Chief Economist of the Bank, discusses⁽¹⁾ how quickly a central bank should reduce inflation to its desired level following an inflationary episode. He argues that a central bank is unlikely to wish to move immediately to price stability, since there are costs to disinflation and these costs increase more than proportionally with the rate of disinflation. These costs, which arise because economic agents have to learn about the central bank's commitment to price stability, also mean that a central bank may wish to react to shocks to output as well as to inflation. But Mervyn King stresses that any such response should be cautious in the period in which the private sector is still learning about the central bank's commitment to price stability.

1 Introduction

It is tempting to give a very short answer to the title of the session—raise interest rates and reduce monetary growth. But when and by how much? That raises two questions which are central to the design of monetary policy. First, starting from an inflationary episode how quickly should inflation be reduced to its desired level? Second, should monetary policy react to shocks to output as well as to inflation? The two questions are closely related, and are the subject of this paper.

Both questions were faced by the United Kingdom following departure from the exchange rate mechanism in September 1992. At that time the latest published inflation rate (retail price inflation excluding mortgage interest payments) was 4.2%, but that was following a recession during which output fell, relative to trend, by almost 10%, and the sterling effective exchange rate had just depreciated by 13%. The policy challenge was to prevent the depreciation having second-round effects on wages and prices, and to keep inflation falling during a recovery in output that had already started.

The exchange rate link was replaced by a domestic monetary framework defined in terms of an inflation target. The objective was to achieve 'price stability' in the long run, defined by the then Chancellor as a measured inflation rate of 0%–2% a year. But the aim was not to bring inflation down to below 2% by the next month, or even the next year. It was to approach price stability gradually. In October 1992 a wide band of 1%–4% for the target range of inflation was announced, with the additional objective of reaching a level below 2½% by the end of the Parliament, a date then some four to five years ahead. The implicit assumption was that it would take approximately five years to make the transition to price stability. In the event inflation fell below 2½% in March 1994, remained below that level for ten months, but then rose again to just over 3%. In August 1996 inflation was 2.8%.

In 1995 the target was modified. Monetary policy would aim consistently to achieve an inflation rate of 2½% or less some two years ahead. Shocks would mean that inflation would sometimes be above and sometimes below that figure. But in the long run, if policy were successful in achieving the target, inflation would average 2½% or less. The stated objective of monetary policy was permanently low inflation. There was no mention of output as an explicit consideration in setting monetary policy.

Other countries have shown an equal reluctance to move quickly to price stability. Table A shows those countries which have in recent years adopted an explicit inflation target. Except for Australia, in all cases target inflation was below the existing rate of inflation. And in most cases there was planned to be a gradual transition to price stability. A good example is that of Canada which planned to bring inflation down from over 6% to a range of 1%–3% over four years. New Zealand is a contrast in which the aim was to move quickly from an inflation rate of 7% to a range of 0%–2%.

Table A
Countries with inflation targets

Country	Price index	Date of introduction	Inflation rate at date of introduction (per cent)	Inflation target
Australia	CPI	1993	1.8	Average of 2%–3%
Canada	CPI	February 1991	6.2	1%–3% from 1995
Finland	CPI	Early 1993	2.6	2% from 1995
Israel	CPI	December 1991	18.0	8%–11% for 1995
New Zealand	CPI	March 1990	7.0	0%–2%
Spain	CPI	November 1995	4.4	Below 3% by 1997
Sweden	CPI	Early 1993	4.8	2% ± 1% from 1995
United Kingdom	RPIX	October 1992	4.2	2.5% or less

Table B shows average inflation rates in each decade since 1950 for the G3 countries and the seven industrialised countries which adopted inflation targets. From a peak in the 1970s and 1980s inflation declined steadily. But only in Germany, Japan and New Zealand was there anything other than a slow adjustment to low inflation. Chart 1 compares the path of the inflation rate since 1950 for the G3 countries

(1) Paper prepared for the Symposium on 'Achieving Price Stability' sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole. The author is grateful to the two discussants and to Andrew Haldane and Neal Hatch for helpful comments and suggestions.

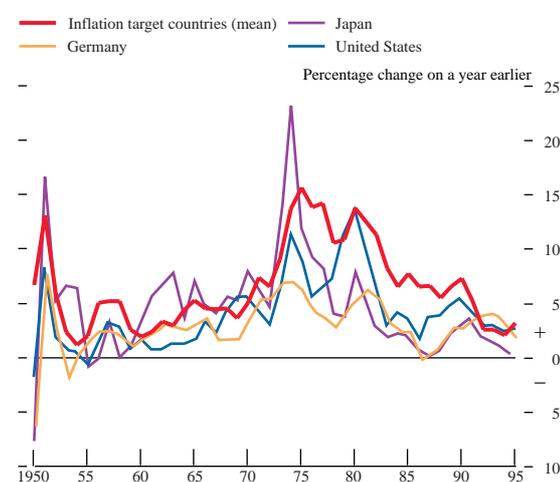
Table B
Inflation by decade in selected countries

Per cent

Country	Average of:				1990–95
	1950s	1960s	1970s	1980s	
Countries with inflation targets					
Australia	6.5	2.4	9.8	8.4	3.3
Canada	2.4	2.5	7.4	6.5	2.7
Finland	6.2	5.1	10.4	7.3	2.7
New Zealand	5.1	3.3	11.5	11.9	2.7
Spain	6.2	5.8	14.4	10.3	5.3
Sweden	4.5	3.8	8.6	7.9	5.0
United Kingdom	4.3	3.5	12.7	6.9	4.6
G3 countries					
Germany	1.1	2.4	4.9	2.9	3.2
Japan	2.9	5.3	8.9	2.5	1.6
United States	2.1	2.3	7.1	5.5	3.5

Note: Inflation is measured in terms of the Consumer Price Index, except in the United Kingdom where RPIX is used, which excludes mortgage interest payments.

Chart 1
CPI inflation in the G3 and inflation target countries, 1950–95



Note: Inflation target countries are those shown in Table A.

and the inflation target countries as a group. Not surprisingly, on average the countries which subsequently adopted an inflation target experienced higher inflation than the G3 over most of the period. It is interesting that following an inflation shock there were rather different speeds of adjustment. Japan, in particular, appears to have brought inflation down more quickly than either the United States or the inflation target countries over the past twenty years.

Is it possible to explain the different responses of the two sets of countries? It is important to distinguish between two speeds of adjustment. The first is the speed at which the inflation target implicit in monetary policy converges to price stability—the optimal speed of disinflation. The second is the speed at which policy offsets a temporary shock to inflation—the flexibility of monetary policy. In countries with a credible commitment to price stability (or to a stable low inflation rate, as in the G3) only the second speed of adjustment is relevant. But in countries attempting to change from a regime of moderate or high inflation to

one of price stability, there is an additional issue of the optimal speed of disinflation. That depends on how rapidly private sector expectations of inflation adapt to the change in regime.

It has been argued that ‘the United States is only one recession away from price stability’. In contrast, it has been suggested that the United Kingdom is only one expansion away from diverging from price stability. Too slow a convergence on price stability, and too great an accommodation of inflation shocks, have their dangers. The ultimate target becomes less credible. So what determines the optimal speed of disinflation and how flexible should monetary policy be in the face of shocks? Those questions are analysed in Sections 2 and 3, respectively. I shall assume that the long-term objective of monetary policy is price stability.⁽¹⁾

2 The optimal speed of disinflation

In this section I examine the speed of disinflation that would be chosen by a central bank in a world in which monetary policy affects real output and employment in the short run but not in the long run. I shall make two points. First, irrespective of the instruments used to implement it, monetary policy is a combination of an *ex ante* inflation target chosen each period and a discretionary response to certain shocks. Those shocks are ones to which the central banks can respond before the private sector is able to adjust nominal contracts. Second, in general it is not optimal to move immediately to a regime of price stability unless that regime can be made fully credible by institutional or other changes.

Following a prolonged period of inflation, why should a central bank not move immediately to price stability? The answer is that there are costs of disinflation, and, moreover, those costs increase more than proportionally with the rate of disinflation. Such costs result from a change in the monetary policy regime—the target inflation rate—because private sector agents cannot easily tell whether the regime has changed or not. Learning takes time. And the longer the period during which inflation was high, the longer it is likely to be before the private sector is persuaded that policy has changed. An unanticipated disinflation will depress output because wages and prices take time to adjust to the new lower price level (relative to expectations). Disinflations in both the United States and United Kingdom in the early 1980s proved costly in terms of lost output and employment.

The speed at which expectations adjust during that transition will influence the magnitude of the output loss. A central bank can lower those costs by reducing the gap between private sector inflation expectations and the inflation target implied by its own monetary policy. A target is credible when the gap is zero. Indeed, ‘rational expectations’ are defined as those where expected inflation is equal to the

(1) The case for price stability was restated at this conference by Fischer (1996); recent estimates of the cost-benefit analysis of moving from moderate inflation to price stability were given by Feldstein (1996).

inflation target. But the mere announcement of a commitment to price stability as the basis for monetary policy is unlikely to generate full credibility quickly. Indeed, in a deeper sense expectations are likely to be influenced by the commitment to price stability among the public at large. Institutional changes such as central bank independence, may improve credibility; but when they do so it is largely because they reflect a commitment among the public to the objective of price stability.

The optimal speed of disinflation depends, therefore, on the real output costs of changing expectations held by the private sector about the intentions of the central bank to reduce inflation. Those costs reflect the existence of a short-term trade-off between inflation and output. Such a trade-off reflects nominal stickiness in wages and prices, which results from the cost of processing information in order to determine the prices which it is optimal to charge, as well as incomplete adjustment of expectations to changes in the monetary policy regime. In a survey of 200 firms, Blinder (1994) found that ‘almost 80% of GDP is repriced quarterly or less frequently’. Both nominal stickiness and slow adjustment of inflation expectations play a role in the analysis set out below. Nominal stickiness means that the central bank can affect output in the short run because monetary policy is able to respond to at least some of the shocks hitting the economy before wages and prices can be adjusted by private sector agents. I do not assume that the central bank has private information—except about its own preferences for price stability. There can be few decisions where the relevant information is more widely available to, and analysed by, the public than monetary policy. But the central bank may be able to respond to a shock before all wages and prices have adjusted, and it is that speed of response which enables monetary policy to influence the extent to which shocks impact on output or inflation. Of course, there will be some shocks to which even the central bank will find it difficult to respond in time, and such shocks introduce a random element into the behaviour of inflation despite the best efforts of central banks to control the price level.

The speed at which expectations adjust to changes in inflation was a key element in the expectations-augmented Phillips curve of Friedman and Phelps. In their model, expectations adjusted slowly to changes in actual inflation, and the central bank could raise output for a time by raising the inflation rate. At a constant inflation rate, expectations would be consistent with actual inflation, and unemployment would be at its natural rate. It was the assumption of rational expectations that enabled Lucas (1973) to undermine the theoretical plausibility of even a short-run trade-off. Monetary policy could not affect output because expectations adjusted immediately. Only when the private sector had incomplete information about monetary policy could changes in money affect output. That is because, in the Lucas model, agents are uncertain about how to interpret changes in nominal prices—do they reflect

changes in the aggregate money stock or are they changes in relative prices? Confusion can exist for a while because neither the money supply nor the aggregate price level are perfectly observable. Such an assumption is not plausible empirically. The world is not short of statistics on money and inflation. But nominal stickiness—nominal contracts which last for several periods—mean that future inflation matters. And agents, although able to observe current money supply, may be uncertain about how the central bank will conduct monetary policy in the future. So differences between actual and anticipated monetary policy will affect output.

A change in the way monetary policy is conducted will alter private sector expectations. It is not sensible to ignore that aspect of a change in monetary policy, as was done in the more extreme Keynesian models. Equally, however, it is too extreme to suppose expectations adjust immediately to a new regime. Learning takes place in real time. As Brunner and Meltzer put it,

‘Both positions are unacceptable. The Keynesians failed to recognise that people learn and are not locked into their beliefs and behaviour. The new classical macroeconomists introduce learning but neglect costs of acquiring information. Neglect of these costs leads them to exaggerate the speeds of learning and response in the market place and the knowledge that people have about the future in a changing and uncertain world.’ (1993, page 132).

Nevertheless, Sargent (1986) has argued that a sharp disinflation may be preferable to gradualism because expectations adjust quickly. There is no doubt that the ‘rational expectations’ approach to understanding changes in monetary regimes has been very important. When governments change behaviour, agents learn. But how do they learn and over what time span? Those are the key questions the answers to which determine the optimal speed of disinflation. In Sargent’s view ‘gradualism invites speculation about future reversals, or u-turns, in policy’ (*op cit* page 150). Excessive gradualism surely does so; but so does excessive radicalism, Sargent’s strictures on gradualism relate primarily to paths towards price stability that are accompanied by large and persistent government budget deficits. On that I fully agree. Unless budget deficits are reduced to levels consistent with price stability, no commitment to price stability is credible. In what follows I shall assume that deficits are on a path consistent with price stability in the long run.

I shall examine the role of learning in a simple model of aggregate demand and supply.⁽¹⁾ For those who enjoy equations a good many are given in the appendix. There are three equations for the three key variables: aggregate supply, aggregate demand, and the money stock. The model is standard—with one exception. In the recent literature on the ‘inflation bias’ of discretionary monetary policy it has

(1) An early analysis of the problem can be found in Taylor (1975).

become fashionable (despite the best efforts of McCallum 1995, 1996) to assume that the central bank aims for a rate of unemployment below the market generated natural rate of unemployment. Put simply, the central bank uses monetary expansions to create jobs which do not exist in the long run. In contrast, I shall assume that the central bank does not use monetary policy as a substitute for microeconomic structural reforms. Because it is not trying systematically to push unemployment below the natural rate, there is no 'time-inconsistency' in monetary policy. By relating monetary policy to macroeconomic rather than microeconomic goals, there is no 'inflation bias' and hence no obstacle to the achievement of price stability.

The model is simple. First, aggregate supply exceeds the 'natural' rate of output when inflation is higher than was expected by agents when nominal contracts were set. Positive price surprises make it profitable for firms temporarily to increase output. Output is also subject to random shocks. These are of two types. The first (type 1 shocks) are shocks which can be observed by the central bank before monetary policy is determined, but which the private sector observes only after wages and prices have been set for that period. Monetary policy can respond to those shocks. The second (type 2 shocks) cannot be observed by the central bank until after policy has been set for that period. They may not be observable until data are published some months after the event. Type 2 shocks will introduce additional randomness into inflation and output, but are not central to the choice of monetary strategy.⁽¹⁾

Aggregate demand is positively related to real money balances and to expected inflation. That is the reduced form of a system in which the demand for money is a function of nominal expenditure and nominal interest rates, the demand for goods is a function of real money balances and the real interest rate, and the real interest rate is equal to the nominal interest rate less the expected inflation rate.

The final relationship describes the process by which the central bank determines the growth of money supply. In the technical jargon, monetary policy is a 'reaction function' which determines policy as a function of changes in observable economic variables. Each period the money supply (or, equivalently, the short-term interest rate) is set by the central bank in full knowledge of the size of the shock to output which it has been able to observe. The expectations of the private sector that influence demand and supply are, however, formed before agents can observe the shock. That reflects nominal stickiness in setting wages and prices. It is possible, therefore, to express the monetary policy reaction function as a choice by the central bank of two variables. The first is an inflation target for that period, defined as the value of the inflation rate which the central bank would like to achieve in the absence of any shock to output. The second term is the discretionary response by the central bank to the observed shock that leads it to choose values for interest rates or monetary growth that are an

appropriate response to the shock. It is shown in the appendix that it is possible to compress the model into two equations—for inflation and output. These are:

$$\text{inflation} = \text{inflation target} + R_I (\text{type 1 shock}) \\ + \text{type 2 shock}$$

$$\text{output} = \text{natural rate} + b (\text{inflation target} - \text{expected inflation}) \\ + R_O (\text{type 1 shock}) + \text{type 2 shock}$$

where R_I and R_O are coefficients which describe the effects of monetary responses to type 1 shocks on inflation and output respectively, and b measures the impact of inflation surprises on output.

There are two points to note. First, any monetary policy can be described as a choice of (i) an *ex ante* inflation target and (ii) an optimal response to observable shocks. An inflation target is not a particular form of setting monetary policy; rather, it is its generic form. That is why the difference between an inflation target regime for monetary policy and a regime based on a monetary target can easily be exaggerated. Choosing the inflation target, however, does not uniquely define monetary policy. There is the subsidiary question of how policy should respond to shocks. It is important to distinguish these two aspects of policy in order to avoid confusion between changes in trend inflation, which are monetary, and changes in price levels caused by real shocks.

Second, inflation can differ from the long-run desired level which corresponds to price stability, for three reasons. First, the inflation target itself may differ, at least temporarily, from zero. Second, it may be optimal to accommodate a temporary inflation shock. Third, there may be other shocks to inflation about which the central bank can do little in time to prevent their feeding through to the final price level. Since the shocks average to zero over a period, it is clear that a central bank can achieve price stability by setting its inflation target to zero (or whatever measured inflation rate corresponds to price stability).

The two equations determine inflation and output as a function of the choices made by the central bank (the inflation target and the discretionary response to a shock), the expected inflation rate, and the shock to output. For any given model of learning by the private sector about how the central bank will set its inflation target it is possible to solve for the actual paths of inflation and output (see the Appendix).

Suppose that inflation has averaged some positive rate for a period, and that both expected inflation and the implicit inflation target are consistent with that rate. If the central bank now announces that it intends to pursue price stability in future, what will happen to inflation and output? That depends on how quickly expectations adjust to the new monetary strategy. Three cases may be analysed

(1) The formal analysis in the appendix ignores type 2 shocks which add only random noise to the paths of output and inflation, and do not alter the optimal speed of disinflation.

corresponding to different models of learning. These are (i) rational expectations, (ii) exogenous learning, in which expectations adjust along a path that is independent of the inflation outcome, (iii) endogenous learning, in which the speed of learning depends on the policy choices made by the central bank.

(i) A fully credible change in regime

A change to a regime of price stability that is fully credible means that private sector expectations are consistent with the adoption of a new inflation target corresponding to price stability. When expected inflation equals the actual inflation target chosen by the central bank, there is no systematic deviation of output from its natural rate. Policy can achieve price stability without any expected output loss. The optimal strategy is to move immediately to a zero inflation target. There is, however, one exception, even in the case of full credibility. In an open economy nominal wage and price stickiness may mean that, after a change to a regime of price stability, the exchange rate rises to a level above its long-run equilibrium corresponding to the new monetary policy, causing a short-term rise in the real exchange rate. Such Dornbusch overshooting of the exchange rate depresses the demand for domestically produced output. In that case the time horizon for a move to price stability is determined by the duration of nominal stickiness.

(ii) Exogenous learning

In general, an announcement by the central bank that in future the inflation target will be consistent with price stability does not command immediate credibility. It takes time for the private sector to be convinced that the target will be chosen to be consistent with price stability. The private sector will try to learn about the true preferences of the central bank. Their pronouncements will not necessarily be taken at face value. Modelling learning is difficult. As Sargent argues:

‘The characteristics of the serial correlation of inflation are inherited from the random properties of the deep causes of inflation, such as monetary and fiscal policy variables.’ (1986, page 113).

There is no unique way to model rational learning. Nevertheless, it seems implausible to suppose that learning takes place immediately upon a switch to a new monetary regime. By moving rapidly to price stability a central bank can hope to demonstrate that it is committed to price stability. Indeed, in a world in which there are only two kinds of central banks—‘tough’ and ‘weak’—it has been shown that a ‘tough’ central bank will disinflate just fast enough to differentiate itself from a ‘weak’ central bank that might otherwise be tempted to pass itself off as a true inflation-fighter (Vickers 1986, Persson and Tabellini 1990). In practice, there is a spectrum of views on inflation that might be held by a monetary authority, and it becomes much more difficult to learn where on that spectrum a central bank lies. Successful regime shifts usually occur when public

opinion is behind the need for a dramatic reform, and hence the sustainability of the reform is more credible. That support is less obvious for a shift from low and moderate inflation rates to price stability than when tackling a hyperinflation. To be credible the change in regime must be widely understood and thought likely to persist. For that to be the case it is insufficient for a central bank to make a public announcement; the change must also be thought acceptable to a wider public. Consider the following example of a clear regime shift suggested by Sargent,

‘It is arguable that pegging to a foreign currency is a policy that is relatively easier to support and make credible by concrete actions, since it is possible to hook the domestic country’s price expectations virtually instantaneously onto the presumably exogenous price expectations process in the foreign country.’ (1986, page 121).

When Britain joined the exchange rate mechanism in 1990 inflation expectations did not jump to those in Germany or other ‘inner’ core members of the ERM. Inflation expectations did fall modestly, and they rose again when Britain left the ERM in September 1992. But the process of learning about the Government’s commitment both to the ERM and to price stability did not stop upon entry to the ERM. That shows that a regime shift may be easier to identify in theory than in practice.

Much of the process of learning about central bank preferences is independent of the actual evolution of inflation itself. Central bank behaviour reflects the degree of external support for its objectives. And since the ultimate basis for a central bank commitment to price stability is a wider public support for that objective, it is not easy to forecast how quickly a central bank will be able or willing to move towards price stability. In practice, learning is continuous. The idea that private agents are trying to learn about a fixed point—the long-run inflation target—misses some important aspects of behaviour. Central banks are not static institutions. There is turnover among members of the governing board, and new ideas about monetary policy are continually injected into the policy debate. Since central banks’ views change, private agents need to learn continuously about those views.⁽¹⁾ The significant reduction in inflation in the industrial countries over the past twenty years surely derives at least as much from the gradual acceptance that there is no long-run trade-off between inflation and unemployment as from changes in preferences about inflation itself. It is worth examining, therefore, the consequences of a learning process that is exogenous to the short-run path of inflation.

If expected inflation exceeds the inflation target then there are systematic output losses during the transition to price stability. It would be costly to pursue price stability from the outset. It is possible to calculate the optimal transition path given the objective of minimising deviations of

(1) The importance of continuous learning was stressed by Balvers and Cosimano (1994).

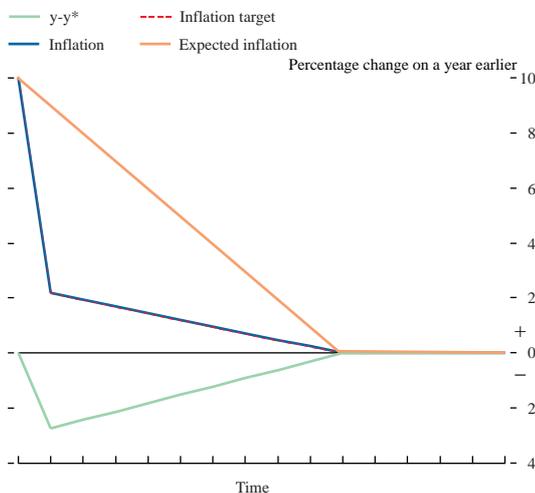
inflation from the desired level of zero and of output from its natural rate. There is a trade-off between the two. Too slow a reduction in the inflation target implies inflation remains high for a long period; too rapid an approach to the long-run target means large output losses.

It is shown in the appendix that when expected inflation converges on price stability at an exogenous rate, then it is optimal to set the inflation target at a constant proportion of the exogenous expected inflation rate. That proportion depends upon (a) the weight attached to the importance of keeping inflation close to price stability relative to keeping output close to its natural rate, and (b) the impact of inflation surprises on output. The inflation target converges gradually to price stability, but is always below expected inflation. Inflation itself also falls gradually.

The ‘gradualist’ path to price stability is, in general, preferable to either a ‘cold turkey’ strategy, in which the inflation target is set to zero from the outset, or an ‘accommodation’ strategy in which the inflation target declines in line with expected inflation. The former involves greater output losses during the transition and the latter involves larger deviations of inflation from price stability.

Chart 2a shows an example in which expectations decline steadily, and linearly, over a fixed period of length T . Both output and inflation adjust to their long-run values gradually over time. If the relative importance which the central bank attaches to minimising deviations of inflation from price stability relative to deviations of output from its natural rate is denoted by a , and b measures the impact on output of price surprises, then the cumulative output loss during the transition to price stability is $[ab / (a+b^2)] \pi_0 (T/2)$, where π_0 is the initial inflation rate.⁽¹⁾ Plausible values are $a = 0.25$ and $b = 0.5$ for quarterly data. Hence the cumulative output loss along the optimal transition path from an initial inflation rate of 10% a year to price stability when learning is complete only after ten years is 12% of the

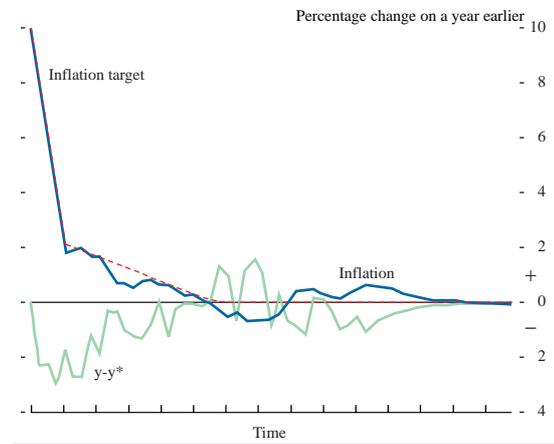
Chart 2a
Inflation and output with exogenous learning



initial level of annual output. That can be contrasted with the cumulative output loss under the ‘cold turkey’ strategy of over 24%.

Random shocks to the economy make the path less smooth than that shown in Chart 2a. It is possible to simulate the shocks, and Chart 2b shows a path both during and after the transition to price stability for parameters of the random process generating shocks fitted to UK data. Chart 2b plots output each quarter and inflation over the previous twelve months since they are the usual definitions of published statistics. Not surprisingly, the twelve-month inflation rate changes more smoothly over time than does quarterly output. The path to price stability contains periods in which inflation rises before converging to zero.

Chart 2b
Inflation and output with exogenous learning and shocks

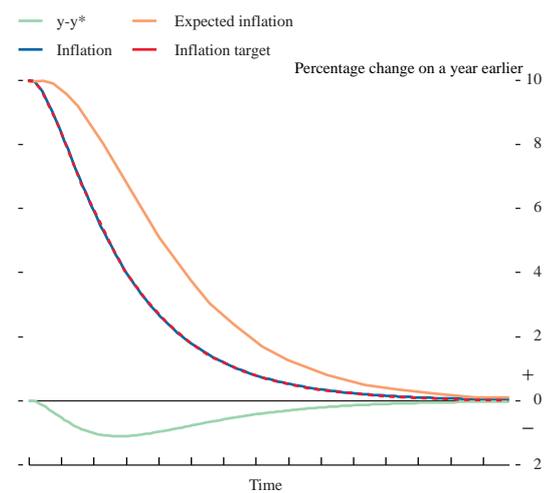


(iii) Endogenous learning

In the previous section it was argued that there are good reasons to suppose that in trying to learn about the future inflation target of the central bank many of the relevant factors are exogenous to the path of inflation itself. But a central bank may try to convince the private sector of its commitment to price stability by choosing to reduce its inflation target towards zero quickly. One might call this ‘teaching by doing’. The choice of a particular inflation target influences the speed at which expectations adjust to price stability. Each period the private sector can look back and infer from the shocks that occurred in the past the inflation target that was chosen in the previous period. It then updates its belief about the current inflation target according to how fast the actual inflation target itself adjusts to price stability. I call this a case of endogenous learning. The optimal speed at which the inflation target approaches zero is derived in the appendix for the special case of a constant updating parameter. As in the case of exogenous learning price stability is reached gradually, and an example is shown in Chart 3. In general, the weight attached to past observations of the inflation target will depend upon the perceived uncertainty of the commitment to price stability. With a stable institutional arrangement for monetary policy

(1) A formal derivation of this result with discrete time periods is shown in the appendix.

Chart 3
Inflation and output with endogenous learning

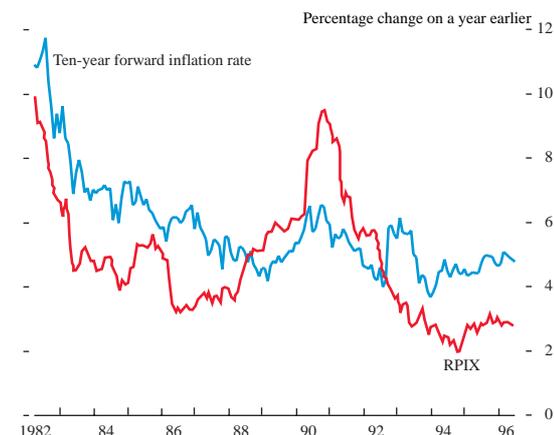


credibility is likely to grow over time. But any uncertainty over the continuation of the new regime, perhaps because of a lack of public support, slows down the acquisition of credibility.

The rationality attributed here to private agents—in which they can observe past shocks and so infer the previous period’s inflation target—means that the optimal degree of flexibility in monetary policy is unaffected by whether learning is endogenous or exogenous. If, however, learning depends on the actual rate of inflation rather than the inferred inflation target, then it may be optimal not to accommodate temporary inflation shocks for fear that doing so might lead to higher inflation expectations in the future. In this case in the early stages of the transition to price stability it is optimal to pursue a much less flexible monetary policy than would be desirable once credibility had been attained.

The general prediction of the learning models is that the inflation target—and hence actual inflation—will fall faster in the earlier years of the transition and will always lie below expected inflation. That appears to have been the UK experience during the 1980s. Chart 4 shows expected inflation derived from a comparison between the yields on nominal and index-linked government bonds and the actual inflation rate. The predicted pattern holds with the exception of the period towards the end of the decade when the pursuit of price stability was temporarily suspended. The data are not ideal for the purpose of making comparisons with the model. Estimates of expected inflation are available only from 1982, some three years after the initial change in regime, and they refer to inflation expected some ten years ahead because of difficulties in estimating accurately the short end of the yield curve. But the general pattern is clear, and seems to have been repeated in the renewed attempt to reach price stability in the 1990s. It is evident that the United Kingdom has not achieved credibility in its stated inflation target. The data in Chart 4 can be used to estimate the learning model given by equation (22) in the Appendix. From 171 observations, the estimated value of the updating parameter ρ is 0.921 with a

Chart 4
UK ten-year forward inflation rate and actual inflation



standard error of 0.023. For the case considered above where $a = 0.25$ and $b = 0.5$, this estimate implies that it takes just over six years before the inflation target falls from 10% to 5% a year.

Table C and Chart 5 provide information on the two speeds of adjustment of inflation discussed above. The upper panel

Table C
Inflation changes over the cycle

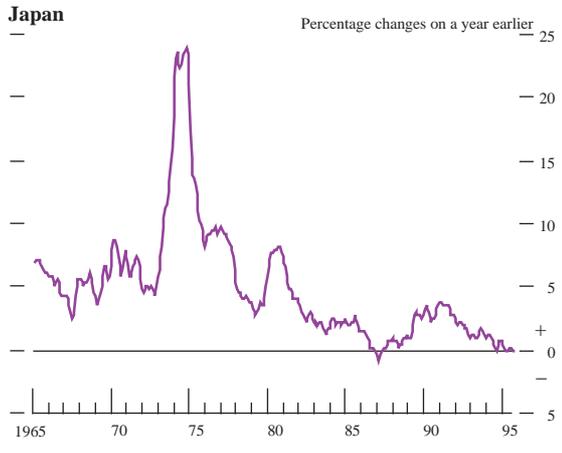
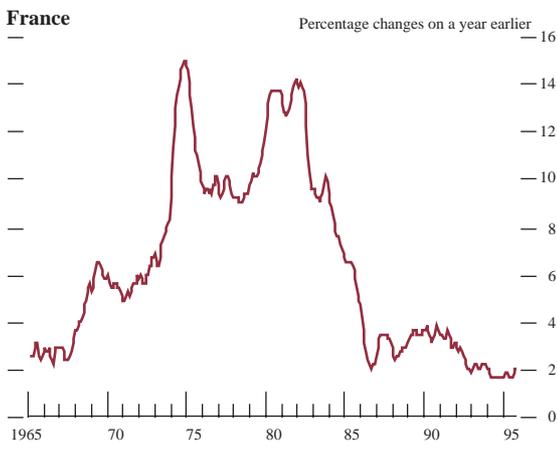
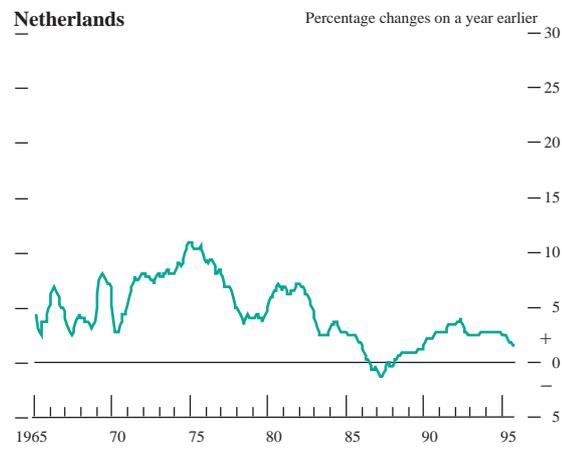
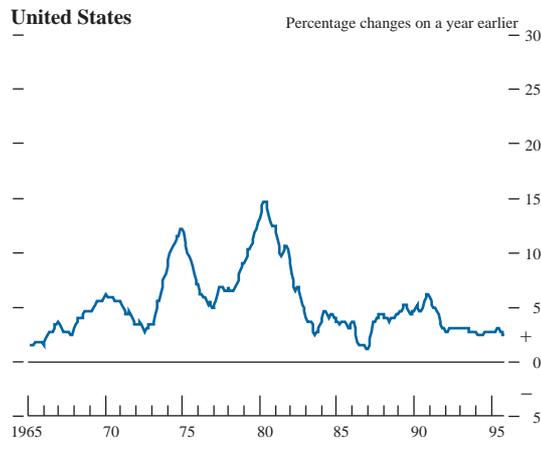
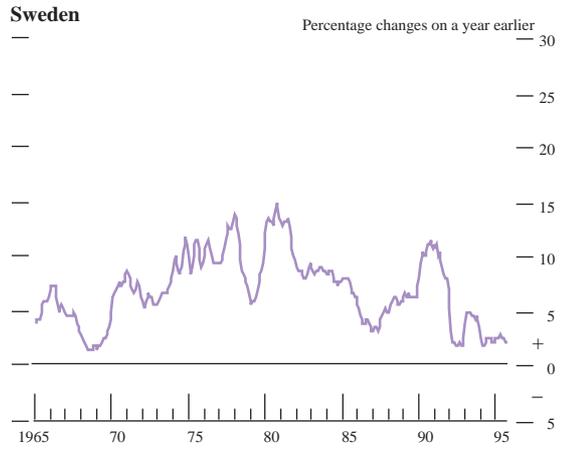
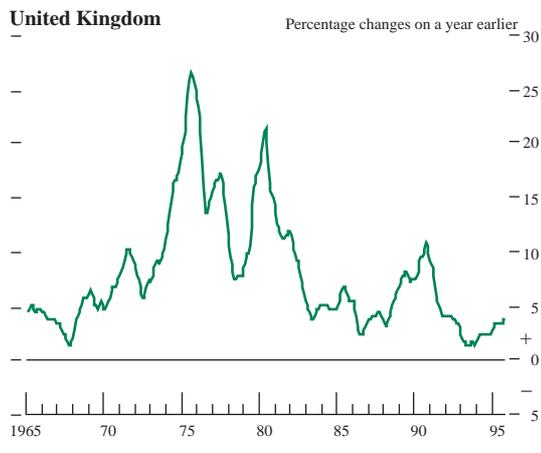
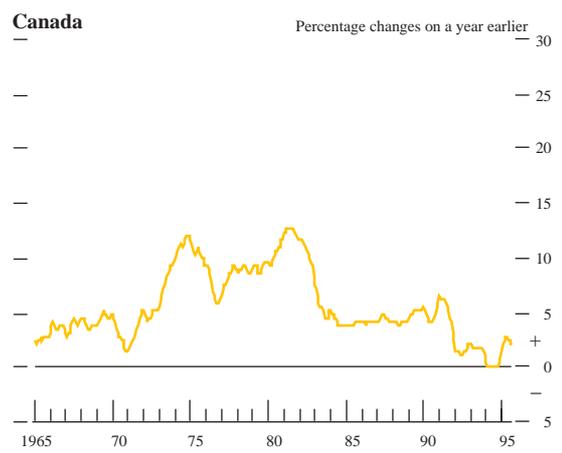
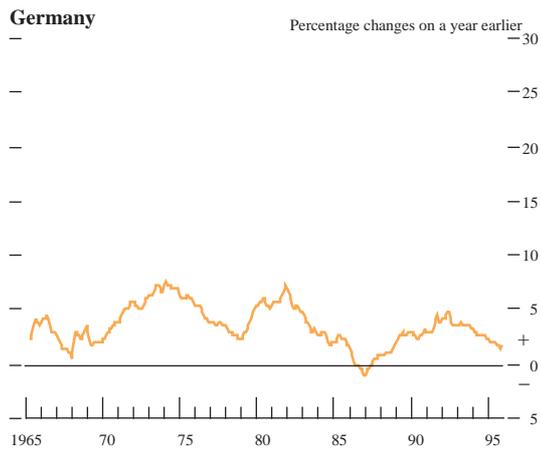
Country	Change from peak to next trough percentage points (1)	Number of quarters (b)(c) (2)	Change in inflation per quarter (1)/(2)	Ranking (a)	Average inflation 1965–95
Germany	-3.8	11	-0.6	6	3.6
United Kingdom	-8.6	6	-1.5	13	8.1
United States	-5.2	10	-0.5	5	5.3
Italy	-6.8	9	-1.1	11	9.2
Japan	-4.7	7	-0.9	9	5.0
France	-3.9	12	-0.3	1	6.4
Canada	-3.2	8	-0.4	2	5.6
Belgium	-5.2	9	-0.5	4	5.0
Netherlands	-4.1	7	-0.7	7	4.5
Sweden	-6.2	8	-0.9	10	7.0
Switzerland	-4.7	9	-0.5	3	3.9
Australia	-6.5	9	-0.7	8	7.0
New Zealand	-8.9	11	-1.2	12	8.7

Country	Change from trough to next peak percentage points (b)(c) (1)	Number of quarters (2)	Change in inflation per quarter (1)/(2)	Ranking (a)
Germany	4.0	11	0.5	1
United Kingdom	8.6	8	1.1	11 =
United States	5.3	9	0.6	5
Italy	7.2	7	1.1	13
Japan	4.3	7	0.7	9
France	3.8	8	0.5	2
Canada	3.1	5	0.6	4
Belgium	4.4	9	0.5	3
Netherlands	3.7	8	0.7	7
Sweden	6.3	9	1.1	11 =
Switzerland	4.6	8	0.7	8
Australia	6.3	11	0.6	6
New Zealand	7.8	10	0.9	10

Source: IFS.

(a) Ranking is from lowest to highest rate of change of inflation.
 (b) For peak-to-trough or trough-to-peak half cycles started and completed between March 1965 and 1992.
 (c) Inflation as measured by the three month moving average of the annual rate of change of the CPI.

Chart 5
Inflation in selected G10 countries^(a)



Sources: ONS for United Kingdom, IFS for other G10 countries.

(a) UK inflation rate is for retail prices excluding mortgage interest payments (RPIX), headline CPI for all other countries.

of Table C shows the change in inflation from a cyclical peak to the next trough in a number of industrialised countries. The speed at which inflation was brought down is shown together with the average inflation rate over the period 1965 to 1995. The data refer to completed cycles over that period. The average speed is a mixture of the speed of disinflation and the rate at which temporary shocks to inflation are allowed to die away. Countries with a credible commitment to stable low inflation have inflation slopes—defined as the reduction in inflation per quarter—of around 0.5. Countries with worse inflation records, such as the United Kingdom, Italy, Sweden, and, over much of the period, New Zealand, show much steeper slopes with an absolute value around unity. There does seem to be evidence that the two speeds of adjustment are different. In the lower panel of Table C similar calculations are presented for the change in inflation from a cyclical trough to the next peak. A similar pattern emerges, reflecting the speed with which the lower credibility countries allowed inflation to rise in the 1960s and 1970s. Chart 5 plots the profile of inflation for selected G10 countries over the period 1965 to 1995. The difference in the inflation slopes is evident.

There is one additional cost of a disinflation in which actual inflation falls faster than expected inflation. With government debt fixed in nominal terms, the burden of the debt rises when there is unanticipated disinflation. At last year's Jackson Hole Conference I called this 'unpleasant fiscal arithmetic' (King 1995). Too rapid a disinflation can, therefore, add to the fiscal burden. But there is a ready solution to hand—the use of index-linked debt.

3 The optimal flexibility of monetary policy

Section 2 discussed the optimal speed of adjustment from some initial inflation rate to price stability. Although the overriding objective of monetary policy is price stability that does not uniquely define monetary policy. Inflation can differ from the target level because of either type 1 or type 2 shocks. Price stability is better defined as a situation in which the inflation target is equal to the expected rate of inflation and both in turn equal zero. That corresponds better with Alan Greenspan's definition of price stability in which inflation does not affect significantly decisions by economic agents, and leaves open the choice of the optimal response to type 1 shocks. In general, it is optimal to accommodate part of any such shock. The fraction that is accommodated depends upon the relative weight attached to deviations of inflation from price stability, on the one hand, and to deviations of output from its natural rate, on the other.⁽¹⁾ As John Crow has argued, a mandate of price stability does not absolve a central bank from taking counter-cyclical actions, but its purpose is 'to ensure that such actions when taken do not build in an inflationary bias, not that they not be taken at all'.⁽²⁾

In most cases the optimal degree of accommodation of temporary shocks is quite separate from the optimal speed of disinflation. But, when learning depends on past inflation, matters are more complicated. Any accommodation of an upward shock to inflation, albeit temporary, affects future expectations of inflation. That in turn increases the output costs of any given inflation target. Hence, especially in the early stages of the transition to price stability, it pays not to accommodate as much of the inflation shock as would be optimal once expectations have adjusted to price stability. A central bank that is embarking on the road to price stability cannot afford to engage in as much flexibility in monetary policy as can a central bank which has established a track record for a commitment to price stability. There is a trade-off between credibility and flexibility. But that trade-off exists only during the transition to price stability. That may explain why there is little empirical evidence of a trade-off between credibility and flexibility in cross-section data.

There is a further reason for caution in a transition to price stability. It is clear from the literature on time inconsistency of monetary policy that a central bank which tries to stabilise output around a level in excess of the natural rate can create an inflationary bias. During the transition it is important for the central bank to convince the market that it is not trying to use monetary policy to achieve a level of output in excess of the natural rate as a substitute for structural reforms. In the absence of a track record of price stability it is quite possible that the market may be suspicious that a central bank is trying to do just that. This is quite distinct from the issue of the speed of learning. And it suggests why central banks are extremely cautious in their use of language to describe how output affects monetary policy. It is easy for economists to make a clear logical distinction between two different models. But it is vital for a central bank to ensure that markets do not suspect it of behaving according to one model rather than the other. And that is not straightforward when the key variables—the natural rate of unemployment and the output gap—are not observable. Hence, even though it may be perfectly rational to accommodate temporary shocks to inflation, the need to ensure that markets do not suspect other motives implies the importance of caution in the language used by central banks about output stabilisation. Words matter. Indeed, actions may be safer than words.

Another aspect of the link between the two elements of monetary policy—the inflation target and the response to shocks—has surfaced in the recent proposal for an 'opportunistic' approach to disinflation, an idea associated with Alan Blinder.⁽³⁾ An analysis of the opportunistic model has been provided by Orphanides and Wilcox (1996). The opportunistic approach implies that when inflation is either too high or too low the approach to price stability is as analysed above. But when inflation is in an intermediate range the inflation target is not reduced any further unless

(1) Details are provided in the appendix.

(2) Letter to the *Financial Times*, 8 January 1996.

(3) Alan Blinder's views were set out in an opening statement at his confirmation hearing before the US Senate Committee on Banking, Housing, and Urban Affairs in May 1994.

there is a negative inflation shock. When such a shock occurs no attempt is made to benefit from a temporary excess of output over trend—the shock is fully accommodated. The inflation target is then ratcheted down. There is an asymmetric approach to positive and negative shocks when inflation is in the intermediate range. Positive shocks are suppressed; negative shocks are accommodated. Why would a central bank behave in this way? Orphanides and Wilcox identify two conditions under which a central bank might pursue such a strategy. First, its attitude to current inflation must depend on the path of inflation in the recent past. To quote the example given by Orphanides and Wilcox

‘an opportunistic policy-maker evaluates a 3% rate of inflation today less favourably if inflation yesterday was 2% than if inflation yesterday was 4%. In the former case, an opportunistic policy-maker might well aim to drive output below potential, whereas in the latter case she would aim simply to hold output at potential.’

Second, the central bank pursues output stabilisation when inflation is low, and price stability when inflation is high. An opportunistic central bank which starts with low inflation will focus on output stabilisation even if inflation drifts upwards for a time.

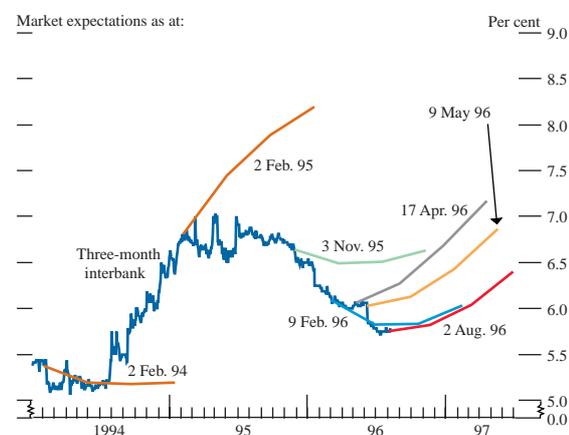
But that strategy may be observationally equivalent to that of a central bank which uses monetary policy to target a level of employment in excess of the natural rate—that is to create jobs that are not there—and incurs the inflation bias of discretion. Equally, a central bank which waits for negative inflation shocks before reducing inflation may also appear similar to a central bank that is trying to achieve unemployment below the natural rate. The loss of credibility may then create output losses when inflation is reduced.

So far I have examined learning by economic agents. But central banks learn also. An optimal monetary strategy can be expressed in terms of a pre-determined rule only if the procedure for updating the policy rule can itself be written as a rule. Since there is no unique optimal learning strategy, that is unlikely. But if discretion is inevitable, then why has it been suggested that several central banks have in fact followed rules, in particular the rule suggested by John Taylor?⁽¹⁾ The Taylor rule implies that nominal short-term official interest rates should be set such that the real interest rate differs from the real interest rate that would hold at the natural rate of output by an amount which is proportional to the excess of output over its natural rate and the excess of inflation over its target rate. It is vital to distinguish between two uses of the Taylor rule. The first is as a normative rule for policy. The second is as a positive description of the behaviour of central banks in practice. The Taylor rule implies a correlation between real interest rates, output and inflation. In the normative sense,

causation runs from interest rates to output and inflation. But such a correlation exists in any economy that behaves according to the simple model presented in this paper. It is easy to show that, for any choice of inflation target and response to temporary shocks, the linear relationship between real rates, output and inflation is identical to the Taylor rule (see the Appendix). Any set of observations can be rationalised as a Taylor rule for a suitable choice of inflation target. Hence, it is impossible to distinguish between those central banks which are following a Taylor rule and those which are not. Differences show up in the time paths of inflation and output, not in the relationship between real interest rates, inflation and output.

The main lesson from the discussion of rules is the importance of trying to ensure that private sector expectations are consistent with the monetary strategy pursued by the central bank. It is the predictability of policy rather than the fact that the policy can be expressed in terms of a rule that is crucial. If the exercise of discretion is inevitable, then predictability implies a significant degree of transparency in the setting of monetary policy. Explanations by the central bank of the rationale for policy help to increase predictability and reduce volatility. Monetary policy in both the United Kingdom and United States in recent years has clearly not followed a simple rule. But it has been somewhat more predictable than at times in the past. One consequence is that quite small changes in official interest rates—or even a decision not to change rates—have led to significant movements in short-term market rates and hence to short-term real interest rates. Charts 6 and 7 show the short end of the yield curve in the United Kingdom and United States, respectively, from January 1994. In both countries modest movements in official rates led to significant changes in expected three-month market interest rates over the following twelve to 24 months. Rates moved in anticipation of future policy changes, and the yield curve did a lot of the work in altering the stance of monetary policy.

Chart 6
UK three-month interest rate expectations^(a)

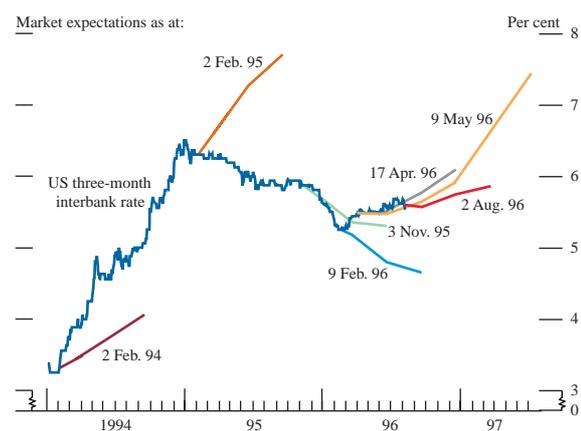


Sources: Bank of England and LIFFE.

(a) Based on a combination of sterling interest rate futures contracts.

(1) Taylor (1993), Clarida and Gertler (1996), Stuart (1996).

Chart 7
US three-month interest rate expectations^(a)



(a) Based on a combination of US dollar interest rate future contracts.

4 Conclusions

The main point of this paper is simple. The design of monetary policy in the transition to price stability must take seriously learning by both economic agents and the central bank. No successful transition can be designed that ignores learning by private sector agents about the implicit inflation target of the monetary authority. Equally, pure rational expectations models are not a good basis for policy because they ignore the process of learning. Models of learning under conditions of bounded rationality are few and far between. As Sargent puts it,

‘We might have prejudices and anecdotes to guide our preferences among transition strategies but no empirically confirmed informed theories.’

(1993, page 1).

The search for a simple policy rule to guide the transition is an illusion. But central banks can try to accelerate the

learning process by ‘teaching by doing’; in other words, making clear their own preferences and explaining their own view of how the economy behaves. Like economic agents, central bankers do not have a fixed stock of knowledge. They learn—especially from conferences at Jackson Hole—and the product of this learning should be communicated to the public at large. That is one reason why transparency is important. A switch in monetary regime from hyperinflation to low and stable inflation is likely to be sufficiently dramatic that the behaviour of inflation itself communicates the change to agents. But the transition from low or moderate inflation to price stability will be more difficult to detect. In those circumstances, transparency can help to speed up learning by both private agents and the central bank.

The overriding objective of monetary policy should be price stability. But two subsidiary questions arise. First, how fast should a central bank disinflate in order to reach price stability? Second, how flexible should policy be in accommodating temporary inflation shocks in order to avoid costly volatility in output. An optimal monetary strategy is a choice of an *ex ante* inflation target and a discretionary response to temporary shocks. In general, the optimal speed of disinflation is a gradual approach to price stability, but one in which the inflation target is always below expected inflation and falling. There should also be some accommodation of temporary shocks. Any response to such shocks should be more cautious in the early stages of a transition in order to speed up learning, by the private sector, of the central bank’s commitment to reducing the inflation target. None of that is surprising. It is merely the best practice of successful central banks which combine a choice of an inflation target with some degree of flexibility in response to shocks. What successful central banks have in common is not a particular intermediate target to guide policy, but rather a common policy reaction function.

Appendix: optimal disinflation

The propositions about the optimal speed of disinflation discussed in the main part of the paper can be demonstrated rigorously in a simple macroeconomic model which combines nominal wage and price stickiness and slow adjustment of expectations to a new monetary policy regime. The model has three key equations—for aggregate supply, aggregate demand, and money supply. This last equation is the central bank's policy reaction function.

Aggregate supply in period t , y_t , is given by a reduced form supply function (or short-run Phillips curve)

$$y_t = y_t^* + b(\pi_t - \hat{\pi}_t) + \varepsilon_t \quad (1)$$

where y_t^* is the 'natural' rate of output, π_t is the inflation rate, $\hat{\pi}_t$ is the private sector's expectation of the central bank's target inflation rate in period t , and ε_t is an aggregate disturbance which is assumed to be white noise. All variables other than inflation and interest rates are measured in natural logarithms.

Aggregate demand is a function of real money balances and expected inflation.⁽¹⁾

$$y_t = c(m_t - p_t) + d\hat{\pi}_t \quad (2)$$

$$\pi_t = p_t - p_{t-1} \quad (3)$$

where m_t is the money stock.

Each period the money supply (or, equivalently, the short-term interest rate) is set by the central bank in full knowledge of the size of the shock to output (the realisation of ε). The expectations of the private sector which influence demand and supply are, however, formed before ε is observed. That assumption reflects nominal rigidities in setting wages and prices, and other nominal contracts.

Given the linear structure of the model, and the serially uncorrelated nature of the supply shock, the most general form of a monetary policy reaction function is

$$m_t = \lambda_{1t} + \lambda_{2t}\varepsilon_t \quad (4)$$

Note that the money supply process is allowed to vary on the transition path to price stability.

For any given policy reaction function, the model can be solved to give paths for output and inflation in each period as a function of private sector expectations, the aggregate shock and the parameters of the model. Substituting (4) into (1)–(3) yields

$$y_t = y_t^* + b\alpha_t + \left(\frac{b(d-c)}{b+c}\right)\hat{\pi}_t + \beta_t\varepsilon_t \quad (5)$$

$$\pi_t = \alpha_t + \left(\frac{b+d}{b+c}\right)\hat{\pi}_t + \left(\frac{\beta_t-1}{b}\right)\varepsilon_t \quad (6)$$

where

$$\alpha_t = \frac{c(\lambda_{1t} - p_{t-1}) - y_t^*}{b+c} \quad (7)$$

$$\beta_t = 1 + \frac{b(c\lambda_{2t} - 1)}{b+c}$$

I shall assume that the central bank has rational expectations in the sense that it understands that output and inflation are generated by (5) and (6). It is possible to rewrite the monetary policy reaction function in terms of the central bank's choice of an inflation target each period. The inflation target is defined as the rational expected value of inflation before ε is realized which is given by

$$\pi_t^* = E\pi_t = \alpha_t + \frac{b+d}{b+c}\hat{\pi}_t \quad (8)$$

Substituting into (5) and (6) yields

$$y_t = y_t^* + b(\pi_t^* - \hat{\pi}_t) + \beta_t\varepsilon_t \quad (9)$$

$$\pi_t = \pi_t^* + \left(\frac{\beta_t-1}{b}\right)\varepsilon_t$$

Monetary policy is a choice of an *ex ante* inflation target, π_t^* , and a response to stochastic shocks described by the choice of β_t .

Consider a switch from a monetary policy regime in which inflation has averaged π_0 to a regime of price stability in which average inflation is zero. What is the optimal transition path? That will depend upon how quickly private sector expectations adjust to the new regime. It is useful to consider three cases:

(1) The aggregate demand function is the reduced form of the three equation system:

(i) Demand for money

$$m_t = p_t + y_t - i_t$$

where i_t is the nominal interest rate

(ii) Demand for goods

$$y_t = \delta(m_t - p_t) - \theta r_t$$

(iii) Definition of the real interest rate

$$r_t = i_t - \hat{\pi}_t$$

Hence in (2), $c = (\theta + \gamma\delta) / (\theta + \gamma)$ and $d = \theta\gamma$.

- (i) a completely credible regime switch: private sector expectations adjust immediately to the new policy reaction function—this is the case of rational or model-consistent expectations;
- (ii) exogenous learning: expectations adjust slowly along a path exogenous to the actual policy choices made in the new regime; and
- (iii) endogenous learning: the speed of learning depends on the policy decisions made in the new regime.

Case 1: fully credible regime switch

With a completely credible regime change, private sector expectations are consistent with the new inflation target:

$$\hat{\pi}_t = \pi_t^* \tag{10}$$

Hence

$$y_t = y_t^* + \beta_t \varepsilon_t \tag{11}$$

$$\pi_t = \pi_t^* + \left(\frac{\beta_t - 1}{b} \right) \varepsilon_t$$

Since the level of output is independent of the inflation target, policy can aim at price stability without any expected output loss. The optimal policy is to move immediately to a zero inflation target.

Case 2: exogenous learning

The central bank announces that it intends to move to a regime of price stability, defined as a regime in which the unconditional expectation of inflation each period is zero. But the private sector adjusts its beliefs about the inflation target only slowly, and at a rate that is exogenous to the monetary policy decisions taken in the transition. From (9) it follows that if expected inflation exceeds the inflation target then there are systematic output losses during the transition to full credibility. It may be costly to pursue price stability from the outset of the new regime. How should the central bank choose the inflation target during the transition? From Case 1 it is clear that once credibility has been established it is optimal to set the inflation target to zero. During the transition optimal monetary policy is a sequence for the pair $\{\pi_t^*, \beta_t\}$. Let the loss function of the central bank be defined over the expected value of the squared deviations of inflation from its desired level of zero and of output around the natural rate.⁽¹⁾

$$L_t = aE\pi_t^2 + E(y_t - y_t^*)^2 \tag{12}$$

Denote the length of the transition to full credibility under exogenous learning by T . Assuming no discount factor, the loss during the transition is

$$L = a \sum_{t=1}^T \left\{ \pi_t^{*2} + \left(\frac{\beta_t - 1}{b} \right)^2 \sigma_{\varepsilon t}^2 \right\} + \sum_{t=1}^T \left\{ b^2 (\pi_t^* - \hat{\pi}_t)^2 + \beta_t^2 \sigma_{\varepsilon t}^2 \right\} \tag{13}$$

Differentiating w.r.t. π_t^* and β_t gives the optimal monetary policy as

$$\pi_t^* = \frac{b^2}{a + b^2} \hat{\pi}_t \tag{14}$$

$$\beta_t = \frac{a}{a + b^2}$$

Provided that learning is exogenous, the optimal transition to price stability is to allow inflation to fall gradually. The inflation target should start out at a fraction of the initial inflation rate, and then decline as a constant proportion of the exogenous expected inflation rate. The expected cumulative output loss in the optimal transition is

$$CYL \equiv \sum_{t=1}^T E(y_t - y_t^*) = b \sum_{t=1}^T (\pi_t^* - \hat{\pi}_t) = - \frac{ab}{a + b^2} \sum_{t=1}^T \hat{\pi}_t \tag{15}$$

The optimal path may be contrasted with the two extremes of pursuing price stability from the outset—a ‘cold turkey’ strategy—and setting the inflation target to accommodate inflation expectations—an accommodation strategy. The ‘cold turkey’ strategy is defined by

$$\pi_t^* = 0 \quad \forall t \tag{16}$$

On average price stability is achieved even during the transition period but only at the cost of an expected cumulative output loss of

$$CYL_{CT} = -b \sum_{t=1}^T \hat{\pi}_t \tag{17}$$

A strategy of full accommodation is defined by

$$\pi_t^* = \hat{\pi}_t \tag{18}$$

It is clear from (9) that such a strategy eliminates any output loss but at the cost of inflation falling only at the exogenous rate of decline of private sector inflation expectations.

In all of these cases it can be seen from (14) that the choice of β_t , the flexibility of monetary policy in the face of shocks, can be separated from the choice of the optimal inflation target during the transition.

(1) Note that the loss function does not assume that the central bank is using monetary policy to target output in excess of the second-best natural rate as is assumed in those models which generate an inflationary bias of discretionary monetary policy.

A convenient representation of exogenous learning is that expectations adjust linearly over a fixed horizon of T years:

$$\hat{\pi}_t = \begin{cases} \left(\frac{T-t}{T}\right)\pi_0 & 0 < t \leq T \\ 0 & t > T \end{cases} \quad (19)$$

With that specification the cumulative output loss under the ‘cold turkey’ strategy is

$$CYL_{CT} = -b\left(\frac{T-1}{2}\right)\pi_0 \quad (20)$$

Along the optimal path the output loss is

$$CYL_{OPT} = -\left(\frac{ab}{a+b^2}\right)\left(\frac{T-1}{2}\right)\pi_0 \quad (21)$$

Case 3: endogenous learning

The speed at which expectations adjust depends on actual inflation experience, and hence on policy choices made during the transition. A convenient representation of this learning process is

$$\hat{\pi}_t = \rho\hat{\pi}_{t-1} + (1-\rho)\pi_{t-1}^* \quad (22)$$

The smaller is ρ the faster is the learning process. For a positive value of ρ expected inflation converges asymptotically to the inflation target. Equation (22) is, however, problematic. For a well-defined change of regime it is likely that ρ will decline over time under rational learning as more weight is placed on the lagged inflation target in the optimal updating rule. But with, for example, Markov switching between regimes ρ may not decline. Even with rational learning, it is unlikely that expected inflation will jump to the new inflation target.

The model of learning in (22) assumes that agents can infer last period’s inflation target by adjusting *ex post* for the effect of the previous period’s shock on monetary policy. That is more rational than assuming that agents look only at past inflation. But if learning does depend on the actual rate of inflation, as would be the case if agents could not observe the shock *ex post*, then the optimal flexibility of monetary policy interacts with the optimal speed of disinflation. Rewriting (22) using the lag operator L .

$$\hat{\pi}_t = \frac{(1-\rho)L}{(1-\rho L)}\pi_t^* \quad (23)$$

Since learning occurs over an infinite horizon the loss function may be defined as

$$L \equiv \sum_{t=1}^{\infty} (1+\theta)^{-t} \left\{ aE\pi_t^2 + E(y_t - y_t^*)^2 \right\} \quad (24)$$

where θ is the time discount rate.

Substituting (9) and (23) into the loss function and differentiating w.r.t. π_t^* yields the following second order difference equation for the optimal inflation target.

$$\pi_t^* = \pi_{t-1}^* \left\{ \frac{2(a\rho + b^2)}{(a+b^2)} \right\} - \pi_{t-2}^* \left\{ \frac{\alpha\rho^2 + b^2}{a+b^2} \right\} \quad (25)$$

The optimal degree of flexibility in monetary policy, measured by β , is the same as in the case of exogenous learning.

When learning is defined over the actual rate of inflation accommodating temporary shocks affects expected inflation in the future. The central bank can invest in credibility by refraining from such stabilisation in the early stages of the transition.

Finally, the model generates data that look as though the Taylor rule had been followed. Under the Taylor rule official nominal interest rates are set so that the short-term real interest rate equals the ‘natural’ rate plus terms related to the deviation of output from trend and inflation from its target rate:

$$r = r^* + \lambda_1(y - y^*) + \lambda_2(\pi - \pi^*) \quad (26)$$

For any monetary policy $\{\pi^*, \beta\}$ it is the case that the model leads to an equation of the form (26) because all three variables (expressed as deviations from their natural or target rates) are proportional to the shock ε . Hence it is crucial to distinguish between a normative and a positive interpretation of (26).

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Developing voluntary domestic markets for government debt

For the Bank of England's 1995 Central Bank Governors' Symposium, Max Fry, Charles Goodhart and Alvaro Almeida (Fry, Goodhart and Almeida 1996) surveyed the objectives, activities and independence of central banks in developing countries. One striking finding was that developing countries suffered considerably higher inflation than the OECD countries. While the proximate cause was more rapid money growth, their work suggested a more fundamental cause was that developing country governments resorted to their central banks much more for deficit financing.

For the Bank of England's 1996 Central Bank Governors' Symposium, Max Fry⁽¹⁾ was asked to investigate in more detail the ways in which governments finance their deficits. A book based on this work, 'Emancipating the Banking System and Developing Markets for Government Debt', is scheduled for publication in March 1997.

Introduction

The four major ways that governments can finance their deficits are:⁽²⁾

- 1 Monetising the deficit by borrowing at zero cost from the central bank.
- 2 Borrowing at below-market interest rates by thrusting debt down the throats of captive buyers, primarily commercial banks.
- 3 Borrowing abroad in foreign currency.
- 4 Borrowing at market interest rates from voluntary domestic private sector lenders.

The typical OECD country finances about 50% of its deficit from voluntary domestic sources, while the typical developing country finances only about 8% of its deficit from this source.

Why this matters is that, for any given persistent government deficit, greater use of the first three sources is associated with higher inflation rates, lower saving ratios and lower rates of economic growth. Government recourse to the central bank inevitably leads to inflation. Indeed, such inflationary finance can be considered a source of tax revenue in that inflation imposes a tax on money holders.

Financial repression, the second way of financing the government deficit, is also tax-like in that it involves forcing captive buyers to hold government debt at interest rates below market yields. By reducing its interest costs, this method reduces the government's recorded deficit. Foreign

borrowing, which for all developing countries implies borrowing and repaying foreign rather than domestic currency, constitutes the third method of financing a deficit. Elsewhere, I demonstrate that excessive reliance on these three ways of financing government deficits impedes economic development (Fry 1996, 1997).

All this conflicts with the views of Barro (1974, 1989) and Buchanan (1976) on Ricardian equivalence. Barro (1989, page 39) states that the Ricardian equivalence theorem, proposed only to be dismissed by Ricardo (1817, pages 336–38) himself, holds that

'the substitution of a budget deficit for current taxes (or any other rearrangement of the timing of taxes) has no impact on the aggregate demand for goods. In this sense, budget deficits and taxation have equivalent effects on the economy—hence the term 'Ricardian equivalence theorem.' To put the equivalence result another way, a decrease in the government's saving (that is, a current budget deficit) leads to an offsetting increase in desired private saving, and hence to no change in desired national saving.'

It also follows that Ricardian equivalence implies that the method of financing government deficits has no impact on the macroeconomy.

While Barro (1989, page 52) interprets the empirical evidence to provide general support for the Ricardian equivalence theorem, the evidence cited is drawn largely from the United States where the assumptions of the theorem are perhaps most likely to hold. For a sample of 61 industrial and developing countries Masson, Bayoumi and Samiei (1995) find that increases in budget deficits are only

(1) Tokai Bank Professor of International Finance, International Finance Group, University of Birmingham. An earlier draft of this paper was commissioned by the Bank of England for its Central Bank Governors' Symposium on 7 June 1996. The author would like to thank Simon Gray and Glenn Hoggarth, from the Bank of England, for many perceptive comments on an earlier version of this paper.

(2) Under cash-based budgets, arrears and other deferred payment arrangements together with unfunded future liabilities such as state pensions, constitute additional techniques of disguising the true magnitude of a deficit.

half offset by higher private savings, rather than fully offset as suggested by the Ricardian equivalence theorem. As Agénor and Montiel (1996, page 127) suggest, ‘In developing countries where financial systems are underdeveloped, capital markets are highly distorted or subject to financial repression, and private agents are subject to considerable uncertainty regarding the incidence of taxes, many of the considerations necessary for debt neutrality to hold are unlikely to be valid.’ Hence, the assumptions on which Ricardian equivalence rests (Barro 1989, pages 39–48) are almost bound to be violated sufficiently to negate the theorem in these countries. Indeed, Agénor and Montiel (1996, page 127) conclude: ‘the empirical evidence [from developing countries] has indeed failed to provide much support for the Ricardian equivalence proposition.’ The empirical evidence presented in Fry (1997, Part II) confirms the Agénor-Montiel position.

Voluntary private sector purchase of government debt is the fourth and final way of financing government deficits. Although government deficits are generally not conducive to economic growth, this way of financing them appears to reduce the damaging effects of any given deficit. Both economic and social efficiencies are improved not only through the use of the market-pricing mechanism but also through the transparent presentation of the costs of government expenditures. When the costs of borrowing are borne openly by the public and not hidden through the use of captive buyers, the true resource costs of government spending can be incorporated into both economic and social choices. Even politicians’ choices can change when they are properly informed.

A move towards developing voluntary domestic markets for government debt appears to offer benefits in terms of lower inflation and higher saving and growth. High growth, in turn, alleviates the deficit. There is, therefore, some hint of a virtuous circle in which greater use of voluntary domestic markets lowers inflation and raises growth, both of which reduce the government’s deficit. In general, developing countries make too little use of voluntary private sector lenders. Hence, I concentrate on some of the practical issues involved in establishing a functional market for government debt in countries that have not so far developed one.

The essential elements

Developing a voluntary market for government debt involves a fundamental change in the approach to financing the government deficit. Typically, the change occurs from a system in which most institutional interest rates are fixed and the government is financed at favourable fixed rates by unwilling captive buyers of its debt. In such a system, bank rate and all other institutional interest rates, including the Treasury bill yield, are simply announced by the Minister of Finance. Captive buyers hold Treasury bills and other government securities to fulfil their liquidity requirements, etc and the central bank takes up any shortfall.

In the process of developing a voluntary market, privileged access and captive buyers are eschewed in favour of a level playing-field philosophy. Government now competes on the same terms and conditions as private agents for available saving and so faces the economy’s opportunity cost of borrowing. The Government has to accept the interest cost consequences of its borrowing and this should exert fiscal discipline that may have been absent when borrowing was kept artificially cheap. The economic principle behind the change is that a level playing field maximises the efficiency with which scarce resources are allocated throughout the economy. This change in approach necessarily involves many practical changes in the way government debt is sold.

A ‘clean’ auction in which all bills are sold at the market clearing price has four advantages: (a) it informs the government of the true opportunity cost of its borrowing; (b) it avoids recourse to the central bank and, thus, the road back to inflationary finance; (c) it provides important feedback signals from the market for monetary policy purposes; and (d) the Treasury bill yield can and soon will be used as a crucial reference rate for the pricing of other financial claims in new markets.

In order to obtain a better understanding of this dramatic and possibly traumatic change to voluntary market financing, it seemed sensible to choose a relatively small number of case studies. Hence, the Bank of England asked the eight central banks in Ghana, India, Jamaica, Malaysia, Mexico, New Zealand, Sri Lanka and Zimbabwe, countries that had recently developed voluntary domestic markets for government debt, to answer some questions about the process of change; all eight central banks responded. Much of the material presented here is based on these questionnaire responses.⁽¹⁾

Perceived benefits

The questionnaire’s first question concerned the perceived benefits from developing voluntary domestic markets for government debt.⁽²⁾ In general, the responses elaborated both the negative effects of inflationary finance and financial repression as well as the positive externalities from developing voluntary markets for government debt.

On the negative side, the absence of voluntary markets was perceived to:

- Divorce the cost of government borrowing from the opportunity cost of funds in the economy, thereby misallocating resources by encouraging larger government deficits.
- Cause distortions because of the need to use credit ceilings, multiple reserve requirements, compulsory deposits at the central bank, interest rate ceilings and other direct methods of monetary control.

(1) More detailed analysis can be found in Fry (1997).

(2) All unattributed quotations in this paper are taken from the questionnaire responses.

- Crowd out private sector borrowing through high reserve and liquid asset ratios on the banks.
- Discourage secondary market trading in government securities.
- Prevent government securities from being used as collateral in financial transactions.

On the positive side, the existence of a voluntary market for government debt was perceived to:

- Finance government deficits in a less inflationary way.
- Impose fiscal discipline on the government and reflect the true market costs of government borrowing. Since 1990, for example, the rapidly rising interest costs of domestic borrowing in Zimbabwe have apparently squeezed budget resources for other purposes.
- Reduce both the tax on the banking system and other financial market distortions thereby improving resource allocation.
- Enable a shift from direct to indirect monetary policy techniques, thereby improving the efficiency and effectiveness of monetary policy implementation.
- Provide a reference rate in the form of the market-determined yield on Treasury bills.
- Enhance the country's attractiveness as an investment centre.

The extent to which such benefits actually accrue is examined in this and the next section. The finding that greater reliance on voluntary private sector purchasers of government debt reduces the inflationary impact of government deficits has already been reported above.

In combination, these perceived benefits suggest that voluntary market financing of government deficits provides, paradoxically, the cheapest form of financing for the government in the long run. Cheap finance from the central bank or through financial repression is a mirage. As Leonard Tumba (Governor, Reserve Bank of Zimbabwe) remarked at the Symposium: 'There are obvious economic costs when central banks validate budget deficits, when governments force purchases of government paper, when they rely too much on external borrowing as a means of financing budget deficits and when governments crowd out the private sector by making disproportionate and growing claims on domestic credit.' In other words, the advantages of cheap credit disappear as soon as the costs of inflation, higher interest rate spreads for the commercial banks and lower central bank profits are recognised. Perhaps the most important benefit is that, by accelerating economic growth, a move to voluntary domestic financing reduces the deficit that has to be financed.

Persuading the main political actors

While central bankers, civil servants and macroeconomists may be convinced of the efficacy of weaning the government from its central bank, Ministers of Finance and other cabinet ministers may see the increased price of financing government deficits as a costly certainty, while viewing the benefits as vague and uncertain. What persuades government to abandon cheap finance?⁽¹⁾

Central banks may well become involved in the debate, since they stand to benefit on at least three counts:

- 1 Getting the government out of the central bank clearly reduces the inflationary threat of deficits.
- 2 Developing voluntary domestic markets for government debt enables the central bank to use indirect market-based instruments of monetary policy.
- 3 By divorcing fiscal and monetary policy in this way, the central bank is bound to attain more independence regardless of any legal provisions.

As Bernie Fraser (Governor, Reserve Bank of Australia) pointed out at the Symposium: 'Central banks have a vested interest in the smooth working of government debt markets for two reasons. First, they usually conduct their policy operations in these markets and rely on them to transmit the effect of their policy actions as effectively as possible. Second, yields on government debt can provide information, such as expectations about inflation, which may be of interest to policy makers.'

The benefits of abandoning the system of captive buyers for government securities in India's case were expounded in the *Report of the Committee to Review the Working of the Monetary System* in 1985, in the Presidential Address to the Indian Economic Association by the Deputy Governor of the Reserve Bank of India in 1988, in the *Report of the Committee on the Financial System* in 1991 and finally in the *Kutty Memorial Lecture on Autonomy of the Central Bank* by the Governor of the Reserve Bank of India in 1993. The Minister of Finance acknowledged the case against automatic monetisation of the government's deficit through the issue of *ad hoc* Treasury bills in the Budget Speech of July 1994 and a formal agreement between the Reserve Bank and the Government of India to phase out this method of financing over a three-year period was signed in September 1994.

The Ghanaian government was made aware of the inflationary nature of central bank deficit financing and of the fact that captive buyers created distortions in the financial markets. In Jamaica, most of the disadvantages of captive buyers and the advantages of market-determined yields on government securities listed above were used to persuade the main political actors of the need for change. By the mid-1970s, both the Banco de México and Mexico's

(1) The evidence presented in Fry (1997) suggests that 'cheap' finance is actually extremely costly in terms of high inflation and low growth.

Ministry of Finance were convinced of the need to abandon interest rate ceilings and the compulsory financing of government deficits. The belief that market mechanisms would reduce inefficiencies and increase the effectiveness of monetary policy was already widespread.

The new government that took power in New Zealand in 1984 was philosophically attracted to market mechanisms. It recognised the benefits accruing abroad from adopting market-based mechanisms (particularly in Australia) and it felt that dramatic change was needed at home. Hence, this government was already convinced of the rationale for change and needed only advice on the technical details.

As in the case of India, the Central Bank of Sri Lanka initiated a dialogue with the Minister of Finance in which the indirect costs and distortionary impact of tapping captive buyers were discussed. At the same time, emphasis was placed on the economic benefits of developing a voluntary domestic market and how this was entirely compatible with the government's overall market-orientated economic philosophy.

In Zimbabwe's case, the planned reduction of the government deficit from double-digit levels to below 5% of GDP was used as an argument that captive buyers of government securities were no longer needed. The point was also made that liberalisation of financial markets was an integral part of the market-based structural adjustment process to which the government was already committed.

Macroeconomic prerequisites

After a lengthy survey of financial systems and development, the World Bank concludes that there are four key prerequisites for successful financial liberalisation: macroeconomic stability, fiscal discipline, improved legal, accounting and regulatory systems for the financial sector, and a tax system that does not discriminate excessively against finance (World Bank 1989, 1). Financial liberalisation is itself a prerequisite for developing voluntary domestic markets for government debt.

Macroeconomic stability

Price stability is a crucial prerequisite for developing markets for longer-term fixed-interest financial claims. High and variable inflation often destroys existing financial markets and prevents many potential financial markets from developing. In Jamaica, for example, continued high inflation has impeded development of the market for fixed-rate government bonds.

On the other hand, certain financial instruments such as indexed bonds can be and have been used to promote stability. Indeed, indexation has been used in Brazil, Chile and Israel to sustain financial markets in the face of ongoing inflation. Among the case study countries, Mexico developed markets for indexed bonds under inflationary conditions. But this can be only a short-term remedy or technique for assisting other stabilisation measures. In

long-run equilibrium, indexation erodes the government's revenue from inflation. Hence, fiscal adjustment must be included as the major component of a stabilisation programme.

Containing inflation requires monetary control and fiscal discipline. Macroeconomic stability also necessitates consistent macroeconomic policies, in particular monetary and exchange rate policies that are consistent with the fiscal stance. Policy co-ordination is stressed repeatedly as essential for successful development of a market for government debt. Without co-ordination, real interest rates can rise, the private sector may be crowded out and government debt-servicing costs can become explosive.

Co-ordination

Co-ordination can take place within three alternative frameworks. In the first, the central bank determines the change in reserve money, which provides partial financing of the government's deficit, and the deficit is then set in the light of the feasible remaining financing possibilities. In the second, the deficit is predetermined and the central bank increases reserve money to finance it. In the third, the change in reserve money and the deficit are set independently, leaving the change in government debt as the residual. But debt can be residual only if interest rates are allowed to find levels at which it can all be sold.

If monetary policy is to be independent, the general level of interest rates must be treated as exogenous to the debt-management process, although there may be some play in the yield curve. Otherwise, monetary control and the development of financial markets are both undermined. The challenge then is to adopt a debt management strategy that is compatible with the broader goals of monetary stability and the development of financial markets. Sundararajan, Dattels, McCarthy, Castello-Branco and Blommestein (1996) suggest that co-ordination within the third framework must involve:

- Limiting central bank credit to the government.
- Establishing a macroeconomic co-ordination committee that includes representatives of the central bank and ministry of finance.
- Sharing information.
- Agreeing rules for dealing with central bank profits and losses.
- Promoting secondary market development.

Lack of co-ordination in the case study countries is exemplified by the experiences of Jamaica, Sri Lanka and Zimbabwe. In Jamaica, a restrictive monetary policy confronted an expansionary fiscal stance. This was resolved partially by the issue of Bank of Jamaica paper and reverse repurchase (repo) agreements, actions that contributed to central bank losses. In 1995, the Central Bank of Sri Lanka

issued its own paper to mop up excess liquidity caused by increased government borrowing and later that year used reverse repos for similar reasons. In Zimbabwe, the government's interest costs have remained unnecessarily high due to poor cash flow forecasting on the part of the Ministry of Finance as well as to the excessive deficit.

Tightening monetary policy

As Dornbusch (1996, page 14) points out, tightening monetary policy can worsen a government's debt problem in four ways:

- It raises the real interest rate so increasing debt service and, *ceteris paribus*, accelerating the growth in debt.
- It reduces the primary surplus by dampening economic activity, at least in the short run, so reducing tax revenue and increasing unemployment-related expenditures.
- It slows the growth rate, so accelerating the rise in the debt/GDP ratio.
- It reduces seigniorage revenue by decelerating the rate of growth in reserve money, implying that a larger proportion of the deficit must be financed by increased debt.

To the extent that a tighter monetary policy reduces inflationary expectations, however, there may be an immediate decline in long-term interest rates that benefits the fiscal situation.

Following Sargent and Wallace (1981), Dornbusch (1996, pages 15–16) concludes that high government deficits and debt destroy credibility in conservative monetary policy. Facing either a big inflation in the future to erode the debt or oppressive taxation to service it,

‘the monetary authorities face a dilemma in that they will be seen as contributing to if not creating single-handedly a major social problem. A fading confidence in the pursuit of hard money is therefore close at hand. The only resolution of the dilemma, as Sargent-Wallace note in their premonition of the Maastricht criteria, is low debt and low deficits.’

In other words, it is not enough to persuade the main political actors that inflationary finance and financial repression are growth-reducing ways of financing deficits. It is also essential to persuade them that debts and deficits must be kept within sustainable bounds after inflationary finance and financial repression are abandoned. Hence, the primary macroeconomic prerequisite for developing voluntary domestic markets for government debt is a sustainable government deficit.

The case study countries

Experience in the case study countries bears out Dornbusch's point. The need for improved budgetary positions was recognised explicitly in the questionnaire responses from India, Jamaica, Sri Lanka and Zimbabwe. However, the outcomes in these countries did not meet expectations. Over the period 1989–93, India's average deficit of 7%, Sri Lanka's of 8.6% and Zimbabwe's of 7.8% are well above average. While the government deficit in Sri Lanka has been reduced from around 16% of GDP in the early 1980s to about 8%, it is well understood that this is still excessive. In 1995, the real yield on Sri Lankan Treasury bills exceeded 10% per annum. It is probably not coincidental that, in general, the highest deficit countries have been least successful in their attempts to liberalise their financial systems and to develop voluntary markets for government debt.

On the Maastricht criterion, Ghana, Jamaica, Malaysia, Mexico and New Zealand have posted deficits well below the 3% ceiling.⁽¹⁾ Although the Ghanaian government ran budget surpluses from 1986 to 1992, high inflation leading to high interest rates exerted substantial pressure on the government budget. The high interest rates also produced political pressure on the government to subsidise credit for priority sectors. The Malaysian government posted surpluses in the last two years, 1993 and 1994, for which data exist. To achieve its aim of reducing the debt/GDP ratio, the New Zealand government has run budget surpluses since 1987, except in 1992. In Mexico, the deficit was reduced from 14% of GDP in 1987 to 0% by 1991; surpluses were posted in 1992 and 1993.

Turning to debt trajectories, New Zealand's government debt declined from a peak of 67% of GDP in 1986 to 54% in 1994.⁽²⁾ The Indian government's debt has remained around 50% of GDP since the mid-1980s, Sri Lanka's has hovered around 90% of GDP since 1988, while Zimbabwe's debt ratio peaked in 1992 at 65% of GDP and has since fallen to 39% in 1995.⁽³⁾

While no data are available on total government debt for the other countries, government plus government-guaranteed *foreign* debt ratios in Ghana (up from 7% of GDP in 1980 to 54% in 1993) and India (up from 10% in 1980 to 29% in 1993) have risen steadily. Over shorter periods, government and government-guaranteed foreign debt ratios have fallen recently in Malaysia (from 55% in 1987 to 22% in 1993), Mexico (from 59% in 1987 to 20% in 1993), Sri Lanka (from 61% in 1989 to 55% in 1993) and Zimbabwe (from 48% in 1992 to 38% in 1994).

On the Maastricht criterion for government debt, therefore, Malaysia, Mexico and Zimbabwe are well under the 60% ceiling, while India is just under. Although debt ratios in Jamaica of over 100% and in Sri Lanka of around 90% have

(1) Although government finance statistics for Jamaica have not been published in *International Financial Statistics (IFS)* since 1985, the Bank of Jamaica provided the relevant data up to 1993 for this study. They indicate government surpluses from 1988 to 1991 and deficits averaging only 1% of GDP in 1992 and 1993.

(2) Debt data for 1992–94 were provided by the Reserve Bank of New Zealand; the data series published in *IFS* end in 1991.

(3) These figures were provided by the Reserve Bank of Zimbabwe; data for Zimbabwe's debt since 1990 have not been published in *IFS*.

stabilised, their levels must give rise to concern. When compared to median debt ratios that have risen in all country groups since 1979, it seems reasonable to conclude that the main political actors in the case study countries were aware of the arithmetic behind the government's intertemporal budget constraint when they embarked on programmes to develop voluntary domestic markets for their government debt. In no case has government debt exploded in the aftermath of liberalisation.

Supervision and regulation

Although some readers of his 1973 book may have assumed otherwise, McKinnon (1986, page 326) states that 'successful liberalisation is not simply a question of removing all regulations.' There has been increasing awareness that a prerequisite for successful financial liberalisation is strong bank supervision. Financial liberalisation involving substantial increases in real rates of interest is bound to produce some casualties. Indeed, this must happen if resource allocation is to be improved by the liberalisation. Supervision is needed to ensure that weak financial institutions are detected early and liquidated or merged in an orderly fashion before their managements start engaging in perverse behaviour—Ponzi-type borrowing—of the kind observed in Chile in the mid-1970s that escalates real interest rates to pathologically high levels.⁽¹⁾

As yet, there exists no analytical framework dealing with the relationship between financial liberalisation and financial regulation for prudential and monetary control. First, there is the tricky theoretical issue of the relationship between financial liberalisation and adequate regulation, which revolves around the theory of the second-best. Then there are the practical problems of differentiating appropriate from inappropriate regulations, delineating appropriate regulatory frameworks, and examining on a case-by-case basis the most suitable supervisory systems to enforce the regulations.

Questionnaire responses highlighted the need for a proper regulatory and supervisory framework for securities' trading (Jamaica) and for strengthening the supervisory powers of the National Securities Commission to improve oversight and dissemination of information on traded securities (Mexico). Many other prerequisites relating to financial infrastructure were mentioned. Some of these are discussed in the subsequent two sections.

Sequencing

Developing markets for government debt has never occurred overnight. As Bernie Fraser suggested: 'The important first step for any country is to gain investor confidence in government debt and to build and maintain a good reputation for issuing and honouring debt.' The process is necessarily one of learning-by-doing as much on the part of the authorities as on the part of the private sector. It is usually also a process of learning from one's mistakes.

Cole, Scott and Wellons (1995, page 19) identify four stages in the typical development process:

- 1 The controlled system.
- 2 Initial liberalisation.
- 3 Retrenchment after crisis.
- 4 More aggressive development.

The first step invariably takes the form of some interest rate liberalisation. The crisis can take various forms: exchange-rate or balance-of-payments problems, recession, excessive liquidity or fraud. The reaction is to 'shoot the messenger' and reimpose controls. After the crisis abates, a second attempt is launched in the light of the previous experience.

In recent years, many developing countries have initiated strategies to develop financial markets by establishing auctions for Treasury bills. For example, Ghana started auctioning 91-day, 180-day, 1-year and 2-year government and central bank paper in 1987. Later, 30-day, 3-year and 5-year maturities were offered. India also started an auction system for 182-day Treasury bills in 1986; both shorter and longer-term maturities were subsequently auctioned. While starting at the shorter end of the maturity spectrum seems obvious, particularly in countries that have recently suffered high inflation, this sequencing was not followed in New Zealand. There, auctions of longer-term government debt had taken place for many years before the introduction of Treasury bill auctions.

A typical element of sequencing has been the reduction in excessive reserve and liquid asset ratio requirements, although abolition has often been resisted on the grounds that such ratios still serve prudential purposes.⁽²⁾ In the case study countries, for example, India adopted a medium-term strategy of reducing the statutory liquidity ratio from 38½% to 25% in phases starting in 1992. To the extent that adoption of a capital-adequacy requirement is feasible, however, this should form a preferable alternative to most balance-sheet ratio constraints.

To the extent that they remain binding, liquid asset ratio requirements maintain captive buyers and so distort price signals emanating from Treasury bill auctions and impede the market development process. In Malaysia, for example, maintaining a required liquid asset ratio increased demand in the primary market but hindered development of the secondary market (Cole, Scott and Wellons 1995, page 35).

In the wake of the foreign debt crisis, Mexico liberalised interest rates in October 1982 in order to create a noninflationary source of government borrowing. The initial measure took the form of a weekly auction of *Cetes* at rates determined by the market. Because of continued high

(1) A Ponzi game is a type of swindle named after Charles Ponzi who promised extraordinarily high returns to investors which he was able to deliver for a time by using funds collected from new investors. It can also refer to a situation in which an insolvent enterprise continues to borrow in order to pay the interest on old debts in the knowledge that it will never be able to repay its debts.

(2) In practice, resistance often springs from reluctance to lose seigniorage revenue.

inflation, Mexico has introduced price and exchange rate-indexed government securities. By 1994 the CPI and exchange rate-indexed bonds had become by far the most popular form of government debt. From a minimal share in the early 1980s, marketable instruments constituted 100% of government debt by 1991.

Much of the basic infrastructure already existed when New Zealand instigated its dramatic measures of financial liberalisation in 1984. Its approach to sequencing was to do what could be done when it was possible to do it. All interest-rate controls, which had been in place for less than a year, were removed immediately. With a framework already in place for calculating required sales of government securities and by adopting a 'clean' tendering system with no floor price from mid-1984, the old system of balance-sheet ratio controls quickly became redundant. These ratio controls were removed along with regulatory barriers on activities across all financial institutions over the following years.

Foreign participation in the New Zealand bond market became significant after withholding taxes were removed; 50% of New Zealand government securities are now held by foreigners. That there would be such a large shift in the government's borrowing from abroad to domestic currency-denominated debt had not been anticipated at the outset. While it reduced the fiscal cost of government debt, this capital inflow led to an appreciation of the exchange rate. At the Symposium, Donald Brash (Governor, Reserve Bank of New Zealand) explained that 'if inflationary pressure is intense in the non-tradables sector and nonexistent in the tradables sector, this downward pressure on interest rates and upward pressure on the exchange rate may not be entirely helpful.' This is New Zealand's monetary policy dilemma in the mid-1990s.

Donald Brash also pointed out that a switch from foreign to domestic borrowing could have unintended signalling effects. When New Zealand tightened monetary policy to achieve its announced policy target of low inflation, this implied an expected appreciation in the exchange rate. In fact, however, uncertainty about the government's commitment and ability to achieve this target kept domestic-currency yields much higher than yields on the New Zealand government's foreign currency-denominated debt. Under such conditions, a policy of switching from foreign to domestic currency-denominated debt could be interpreted by the market as a lack of credibility in its inflation target on the part of the government itself. With a low inflation outcome, the government would be paying higher real rates to borrow in domestic currency than it would pay to borrow in foreign currency. Therefore, a policy of reducing both domestic and foreign currency-denominated debt together with sales of shorter-maturity domestic debt might have been interpreted by the market as more consistent with a belief in its own inflation target. Indeed, the New Zealand government's

funding strategy was revised in the light of this signalling problem.

Sri Lanka started a gradual process of financial liberalisation in the late 1970s as part of an overall economic reform programme; elsewhere I have identified 1978 as a year in which structural change took place (Fry 1990). Various legal changes were required before the development of a primary market in Treasury bills was launched. Subsequently, a secondary market for Treasury bills was developed. The authorities are now planning to develop markets for medium and long-term government debt. However, the statutory reserve ratio has remained high at 15%, initially to counteract the expansionary impact of capital inflows caused by high interest rates, but in 1995 to counteract the considerable increase in the public sector's borrowing requirement.

Zimbabwe's market development programme starting in 1990 comprised the deregulation of interest rates, the reduction in the prescribed asset ratio for banks from 60% to 55%, the removal of the Reserve Bank's and discount houses' obligations to underwrite government debt issues, and the abandonment of the Reserve Bank's daily calculation and dissemination of government stock prices. The Reserve Bank stopped fixing interest rates in 1991 and exchange controls were relaxed in 1993 to enable foreigners to buy government securities in the primary market.

Risk perceptions

Sovereign risk has been studied extensively in the aftermath of Mexico's default in 1982. Inevitably, it takes time for any government to establish a new track record of sound finance. At the start of any initiative to develop voluntary domestic markets for government debt, the authorities are bound to face a suspicious and unwilling private sector. Their record is one of confiscation; the promise of attractive market yields is unlikely to be believed before some credibility has been earned. This implies that market yields on government debt will embody a significant risk premium, mainly taking the specific form of an inflation-risk premium. Once the debt has been sold, the private sector may reason, the government will have an incentive to inflate its way out of its obligations returning to the old confiscatory pattern.

Initially, therefore, voluntary lenders demand a risk premium from government. From the government's perspective, it is paying too high an interest rate immediately after the switch to voluntary domestic market financing. From the private sector's perspective, caution dictates the extraction of a risk premium before it can be enticed to lend. One solution that can help reconcile the government's commitment to turn over a new leaf with the private sector's doubts that this has really happened is for the government to issue debt that is automatically adjusted for changes in the price level, ie index-linked debt, at the outset of its reform.⁽¹⁾

(1) Much of the literature on indexation, (eg Dornbusch and Simonsen 1983, Gleizer 1995, McNelis 1988) concentrates on its role in a stabilisation programme rather than as a specific instrument for use in the process of developing voluntary domestic markets for government debt. For articles focusing more on the market-development and fiscal aspects of price-indexed debt in such countries as Australia, Canada and the United Kingdom, the interested reader may consult the Bank of England (1996).

At the Symposium, Donald Brash said that, in retrospect, one of the important lessons learnt from New Zealand's reform experience was that index-linked debt could have been issued to great benefit at the start of the reforms in 1984. If one of the legacies of past inflation is a high risk premium embedded in nominal yields, then indexed bonds can offer large savings for the government in terms of lower interest costs so reducing the likelihood of igniting a Ponzi game, provided its new commitment to fiscal discipline and price stability is effective. An issue of index-linked debt can also enhance credibility in the new regime: the government can no longer benefit from surprise inflation to erode the real value of its debt, so has less incentive to renege in this way.

It is particularly noteworthy that the experience in New Zealand indicates the existence of a high risk premium after the 1984 reforms. Part of the reform package consisted of making price stability the only objective of monetary policy and in giving the Reserve Bank full independence to achieve this single objective. Furthermore, the Governor's emoluments are dependent on the achievement of this objective. Although these measures undoubtedly contributed to building credibility for low inflation and therefore facilitated the development of the voluntary domestic market for government debt, the erosion of this risk premium occurred only gradually. From levels of 18% to 19% in the mid-1980s, annual yields on ten-year domestic-currency government bonds have fallen to around 8½%. For a few months in 1994, the New Zealand government was able to sell ten-year bonds at a slightly lower yield than the US government.

One problem is that consumer price indices in many developing countries are distorted deliberately through the maintenance of out-of-date weights that over-represent items whose prices are controlled. In other countries where there are no deliberate distortions to the price indices at present, governments may be tempted to tamper with them once they are used to adjust nominal values of government debt. Where there is suspicion about the quality of the price index, however, there may well be even more suspicion that the government may resort to the inflation tax to reduce the value of unindexed debt. Hence, indexation may reduce suspicion overall, even when the price index is dubious.

In some countries, the government statistical office is separated to a reasonable degree from the political process. In these countries, therefore, there would probably be greater confidence in the quality of the inflation data than in the integrity of future governments. Where the statistical office has established a track record for providing reliable and unbiased statistics, the case for issuing index-linked debt at the initial stages of the market development process is extremely strong.⁽¹⁾

While it may be agreed that financial claims indexed to the price level can serve a useful role in the transition from inflationary finance and financial repression to voluntary

domestic financing of government deficits, several participants at the Symposium were worried that this form of indexation could lead to other forms, such as wage indexation, that could easily induce or prolong inflationary pressures. Miguel Mancera (Governor, Banco de México) noted the distinction between indexed securities, which had a limited life and need not be rolled over in the same form, and indexed wage contracts, which were open-ended and could create rigidities in the economy, for example, by making it more difficult to achieve any downward adjustment in real wages. As pointed out by Eddie George (Governor, Bank of England), indexation could well provide a fruitful topic for a future Symposium.

Crowding out?

One important question is whether or not developing a new source of government financing increases government deficits. The response to this question was invariably that primary deficits had been reduced as a result of higher interest costs of debt service. Indeed, for any given operational deficit, crowding out should be reduced. This is because higher interest rates under a liberalised system will elicit more saving in financial form and so increase the aggregate supply of credit in real terms. If the government takes a fixed amount from this aggregate, there must be more for the private sector as a whole, albeit at a higher interest rate than formerly charged to some previously privileged and favoured borrowers.

Recognising that a large deficit fuels inflation which, in turn, increases interest rates and so raises the deficit even more, the Ghanaian government is now introducing specific measures to 'eliminate' its deficit. The Bank of Ghana's questionnaire response claims that the higher interest rates increased the cost of private capital. Therefore, 'government and central bank borrowing on the securities market has led to some crowding out of private sector borrowers.' However, to the extent that credit was cheap but unavailable under the old disequilibrium interest rate system, higher equilibrium interest rates may not be synonymous with crowding out. Indeed, domestic credit to the private sector actually increased from 3% to 6% of GDP between 1984 and 1993.

The decision to pay market interest rates on its borrowing was designed in part to impose fiscal discipline on the Indian government by signalling the real cost of its borrowing. Rising interest costs have exerted pressure on the government to reduce its deficit. Particularly in 1995/96, tax reforms and expenditure controls were stimulated by the higher real interest rates for government borrowing.

In Jamaica, 'it was felt that the higher cost would serve to constrain the size of the budget deficit.' Developing the market for government debt in itself did not crowd out the private sector. Growth in private sector credit occurred together with growth in government debt. However, had tighter monetary policy been pursued to fight inflation, some

(1) I am most grateful to Donald Brash for discussion and correspondence on this issue.

crowding out might have occurred during the stabilisation process.

Since the mid-1980s, the Malaysian government has maintained a policy of fiscal prudence and consolidation in order to strengthen its overall financial position. Since 1993, the government has run overall budget surpluses enabling it to reduce its outstanding debt. Hence, no crowding out has been detected.

Between 1982 and 1987, a period of relatively high and volatile inflation, servicing its debt represented a considerable fraction of the Mexican government's current expenditures and increased the difficulties of controlling government finances. In conjunction with regulated deposit rates in the banking system, high free-market yields on government debt caused disintermediation and crowding out of private sector borrowers.

The reduction in inflation and the consequent decline in nominal interest rates in Mexico since 1987 have facilitated efforts to tighten fiscal discipline. With the liberalisation of bank interest rates in 1989 and the elimination of reserve requirements and other methods of compulsory financing of the government deficit, the private sector's share of domestic credit has increased. The experience of the early 1980s combined with 'the existence of a well-developed market for government debt, in which government securities offer competitive yields, has contributed to imposing fiscal discipline on the fiscal authorities.'

In New Zealand's case, the government was committed to reducing deficits and debt in conjunction with its market development programme. Therefore, although the voluntary system made it easier to finance larger deficits, use was not made of this facility.

The financial community in Sri Lanka became more aware of fiscal management when they found themselves competing with the government for domestic financial resources. Sectors that had previously benefited from subsidised interest rates faced higher interest costs as they now had to compete with the government in an open market. However, the government's rising interest bill constituted one of the major factors behind a major fiscal adjustment in Sri Lanka. By 1995, interest payment on domestic debt had reached almost 25% of the government's current expenditure. Despite the fiscal reform, there is fear that any continuation of high deficits could produce an unsustainable fiscal situation.

The anticipated reduction in the government deficit failed to materialise in Zimbabwe; it has remained in or close to double-digit levels. Real interest rates rose from around -5% in 1992 to positive double-digit levels in early 1995. High domestic interest rates have reduced lending to and encouraged increased foreign borrowing by the private sector. In the year to March 1995, domestic credit increased

for the private sector by 18% (a decline in real terms), by 39% for public enterprises and by 106% for the government.

Implementing monetary policy

Developing markets for government debt provides the central bank with the opportunity to adopt indirect market-based techniques for implementing monetary policy. Abandoning direct controls in favour of indirect market-based techniques can be expected to improve efficiency: all agents face the same market constraint in the form of the market interest rate in their lending and borrowing decisions.⁽¹⁾ This unified market system improves the efficiency with which investible funds are allocated. Formerly, this allocation took place under fragmented market conditions in which agents faced different price signals.

Among the case study countries, development of a market for government debt in Ghana has assisted monetary policy implementation through open-market operations.⁽²⁾ It has also increased central bank independence in that the government now has access to non-bank sources of funds.

The agreement between the government and the Reserve Bank of India to phase out the automatic monetisation of government deficits by 1997–98 has facilitated the adoption of indirect market-based methods of implementing monetary policy. Not only has the Reserve Bank been able to lower reserve requirements, but also it has increased interest rate flexibility. The Reserve Bank's ability to conduct open-market operations has been strengthened considerably. Major innovations in monetary policy implementation included the introduction of Reserve Bank auctions of repos in government long-term securities in December 1992 followed by reverse repo facilities in December 1994.

However, the Indian government's large borrowing requirements in 1995/96 combined with reduced capital inflows have recently circumscribed the extent to which the Reserve Bank could in fact implement open-market operations for monetary policy purposes. To prevent real interest rates from rising to even higher levels, the Reserve Bank acquired 17.3% of the government's primary issues during 1995/96, up from only 1% in 1994/95.

Typically, the use of indirect market-based instruments of monetary policy involves a transition from setting interest rates in the banking system to adopting quantitative targets. For example, Zimbabwe adopted targets for both reserve money and domestic credit in late 1991. Realising that markets cannot develop if rediscount facilities are available without limit at a fixed interest rate approximately equal to the Treasury bill yield, the Bank of Jamaica introduced penal rates at the rediscount window in order to discourage early encashment of government securities and hence also to promote secondary market trading. Development of the market for government debt has enabled the Bank of

(1) See Gray and Hoggarth (1996).

(2) Many monetary authorities in developing countries define Treasury bill auctions as open-market operations.

Jamaica to adopt indirect market-based techniques of monetary control through its acquisition of marketable government debt.

The Banco de México acts as fiscal agent of the government and so handles all the placing and redeeming of government debt. Co-operation with the Ministry of Finance has enabled the Bank to conduct open-market operations entirely with government securities in the secondary market rather than issuing its own paper. Until the Constitutional Reform in November 1993, however, the Banco de México's ability to implement monetary policy was constrained by the government's reluctance to pay market rates at auctions. After the Constitutional Reform, which granted autonomy to the Banco de México and prohibited the government from forcing the Bank to extend it credit, the government has rarely intervened in the auction process. Together with the full liberalisation of interest rates, the Bank has been able to conduct monetary policy through open-market operations using government securities. More recently, however, the reduction in government domestic debt has required the Bank to implement monetary policy through collateralised credit auctions using private sector claims as collateral.

In Sri Lanka, the development of a voluntary domestic market for Treasury bills facilitated a move towards the use of indirect instruments of monetary policy, such as open market operations. It also helped the development of the money market and enabled the Central Bank to minimise the inflationary impact of the government's deficit.

The development of a market for government debt in Zimbabwe has enabled the Reserve Bank to adopt indirect market-based monetary policy techniques. It has also released the Bank from taking up government debt automatically as buyer of last resort.

Pitfalls

Questionnaire responses highlight two major pitfalls experienced by the case study countries. The first was the failure of fiscal reform that in turn seriously impeded the development of voluntary domestic markets for government debt. On the one hand, high and rising deficits raise real interest rates that crowd out private sector investors while, on the other hand, keeping real rates artificially low implies a return to inflationary finance. A continued commitment to fiscal discipline is therefore essential for the success of the lengthy process of developing such markets.

The second major pitfall lay in the pervasive mistrust of market mechanisms among officials steeped in nonmarket systems. On occasion, these gut reactions against market signals hindered market development. For example, the Bank of Jamaica failed to conduct open-market sales of government debt because its selling price was above the market price for lengthy periods. The belief in an 'appropriate rate' also stalled development in Mexico where auctions were abandoned in 1985/86. In Sri Lanka, some

business groups exerted political pressure to limit the rise in interest rates.

The reluctance to let go and to rely on market forces also applies to balance sheet ratio requirements. Maintaining the old system of ratio controls as a safeguard or fallback should things go wrong with the indirect market-based approach to implementing monetary policy has damaged or retarded market development. For example, high liquid asset ratio requirements in Jamaica have distorted the pricing mechanism, particularly when the volume of government debt eligible as liquid assets fell short of the volume needed to satisfy the requirement.⁽¹⁾ Jamaica's cash reserve requirement of 25% and liquid asset requirement of 50% are typical features of financial repression. The 50% liquid asset ratio ensures a strong take-up of Treasury bills and variable-rate bonds that are eligible liquid assets.

Nevertheless, too much innovation at too fast a pace may also be counterproductive. For example, India's experience with the early introduction of repo markets in 1992 indicates that payment and settlement systems may need to be streamlined and computerised before the introduction of such innovative instruments.

In some cases, incipient instability in the early stages of the transition process can be eliminated by installing various safety nets to act as stabilisers. For example, before reducing liquid asset ratio requirements, auctions might be aimed at producing voluntary holdings of Treasury bills at the margin. In other words, banks would be persuaded to hold more Treasury bills than the required minimum. Testing the water in this way could prevent violent swings in Treasury bill yields as the liquid asset ratio requirement was subsequently phased out in, say, increments of five percentage points per month or per quarter. Various other direct controls, such as credit ceilings, can be made redundant through the application of appropriate market-based monetary policy actions before they are actually abolished. Not only do such procedures provide safety nets against unforeseen and unwanted market reactions, but also they can bolster confidence in those who view the whole transition as a perilous venture into uncharted waters.

The case study countries faced two other problems in developing markets for government debt that might be classified as subsidiary pitfalls. The first arises from pervasive vested interests created under controlled market conditions. As pointed out in Fry (1997, chapter 4), financial restriction involves protecting the commercial banks from which government can expropriate significant seigniorage and discouraging direct markets. Not too surprisingly, when the government develops direct markets not only for its own debt but for private debt as well, commercial banks face a competitive threat. Non-bank investors can be intimidated to some extent from participating in direct markets by fear of reprisals in some form or another from their banks. Aggressive competition

(1) Shortages of eligible assets have occurred frequently in several other countries, for example, Mauritius, that maintain high liquid asset ratio requirements after espousing indirect market-based monetary policy implementation.

among banks should prevent such behaviour, so measures to ensure vigorous competition may be needed at the start of the market development programme. Prudential supervision and regulation also has a vital role to play in maintaining stable rather than unstable competitive conditions.

To enhance competition, measures to broaden the investor base from the outset appear crucial. These may include advertising as well as improving access for non-bank participants at Treasury bill auctions. Indeed, if the major investors remain commercial banks, portfolio adjustments by the banking system as whole in response to changing business conditions may be constrained or disruptive. If there are no other holders of Treasury bills, the banking system will have to hold the same volume even though it would now prefer to reduce such holdings in favour of loans to the private sector. In such a case, Treasury bill yields must adjust by possibly large amounts. With a broad and deep market for Treasury bills, however, banks can use these assets as shock absorbers against fluctuations in both deposits and loan demand. Under such conditions, it is typical to find that banks decrease their holdings of government securities and increase their loans during economic upswings (Fry and Williams 1984).

The second subsidiary pitfall concerns foreign participation. For example, India's continued sizable fiscal deficit is held responsible for high real interest rates. These led to strong capital inflows in 1993/94 and 1994/95. In order to prevent a real appreciation of the rupee, the Reserve Bank of India intervened to buy foreign exchange and sterilised the monetary consequences through open-market operations. With the slowdown in capital inflows in 1995/96, however, it has become increasingly expensive to fund the government's borrowing requirements. The result has been a further rise in real interest rates. As Mexico can also attest, sudden and sizable swings in capital flows increase volatility in both domestic interest rates and exchange rates. In New Zealand, foreign capital inflows produced an overvaluation of the real exchange rate after the 1984 liberalisation which may have raised the costs of disinflation. Sri Lanka's continued high government deficit also led to high real interest rates that crowded out domestic investment and encouraged excessive capital inflows. The lesson lies in improved fiscal discipline from the outset.

Conclusion

Despite various unforeseen pitfalls, the general conclusion from the questionnaire responses is that the development of voluntary domestic markets for government debt has been beneficial in two distinct respects. First, it has imposed on government some fiscal discipline that was previously weak or nonexistent. Since 1979, deficits have been reduced substantially in Ghana, Jamaica, Malaysia, Mexico and New Zealand. Second, it has given the central bank greater independence to pursue monetary policy more effectively through indirect market-based instruments.

In several respects, macroeconomic stability in this group of countries appears to have increased. Since 1979, for example, annual inflation has declined substantially in Ghana, Mexico, New Zealand and Sri Lanka, while it has remained in single digits for most years in India and throughout this period in Malaysia. Only in Jamaica, where the ratio of government plus government-guaranteed foreign debt has remained over 100% of GDP, and in Zimbabwe, where government deficits have not been reduced noticeably, has inflation reached record levels in the 1990s.

While other countries have experienced increased ratios of government debt to GDP and many have also suffered accelerating inflation, debt ratios have fallen in Malaysia, Mexico, New Zealand and Zimbabwe and have stabilised in Jamaica, India and Sri Lanka, where real interest rates have been positive since 1992.⁽¹⁾ However, in Jamaica and Sri Lanka debt ratios appear excessive at just under and just over 100% of GDP, respectively. Positive real interest rates in 1993 and 1994 did not prevent and may even have stimulated the decline in Jamaica's debt ratio since 1991.

Perhaps the most dramatic change produced by the development of domestic markets for government debt is the decline in the government's share of total net credit given by the banking system in all eight countries: from 82% to 68% in Ghana, from 62% to 48% in India, from 59% to -30% in Jamaica, from 11% to 3% in Malaysia, from 60% to -6% in Mexico, from 38% to 5% in New Zealand, from 46% to 26% in Sri Lanka and from 45% to 23% in Zimbabwe. Such large declines are difficult to reconcile with any claims that government borrowing has crowded out the private sector, even in Zimbabwe.

As suggested earlier, higher interest rates under a liberalised system elicit more saving in financial form, so increasing the aggregate supply of credit in real terms. If the government does not increase the amount it expropriates from this aggregate, there must be more, albeit at a higher interest rate than formerly charged to some previously privileged and favoured borrowers, for the private sector as a whole. In this country group, there is no evidence of Ponzi-type government behaviour or of any debt explosion.

Once governments are persuaded that cheap finance from their central banks or through financial repression and inflation-unemployment tradeoffs are mere illusions, central banks can then pursue unimpeded their primary monetary policy objective of price stability. Emancipating the banking system in the process of developing markets for government debt should enable every country's financial system to perform its two basic functions—administering the country's payments mechanism and intermediating between savers and investors—effectively and efficiently. The end results should be lower inflation, higher saving ratios and higher growth.⁽²⁾

(1) Jamaica is the sole exception in that it posted a strongly negative real interest rate in 1992.

(2) In addition to substantiating this conclusion, Fry (1997) also contains chapters on the players, market microstructure and roles that central banks can play in the process of developing voluntary domestic markets for government debt.

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Financial Stability Review—a profile of the new publication

In addition to its role in maintaining the integrity and value of the currency, the Bank aims to maintain the stability of the United Kingdom's financial system and to promote the effectiveness of the financial services industry.

Against that background, the Bank, in association with the Securities and Investments Board, launched a new publication, the *Financial Stability Review*, at the end of October. The *Review* will highlight developments, whether in the United Kingdom or overseas, which might affect the stability of the financial system. It will also promote the latest thinking on risk, regulation and market institutions, as well as providing a forum in which ideas about regulatory change can be debated dispassionately.

As well as carrying articles by staff from the Bank and the Securities and Investments Board, the *Review* will include contributions by risk practitioners, management of financial institutions, academics and others with an interest in the financial sector. It will also contain a regular feature describing major regulatory developments in the United Kingdom and overseas.

In the first issue:

Culture of regulation—successful supervision depends not only on having the right rules and tools, but also on getting the culture right. The Deputy Governor of the Bank of England looks at the lessons from the Bank's recent review of supervision.

Building society conversions—a number of major building societies are becoming banks. This article looks at the background to this development, the mechanics of changing status, and implications for the Bank of England as supervisor.

The SIB review of the metals markets—the London Metal Exchange (LME) is the largest exchange trading metal derivative contracts. The Securities and Investments Board is currently carrying out a review of the metals markets. John Mackeonis of the SIB describes how the LME differs from other investment exchanges, and explains the main regulatory issues under discussion.

Electronic money: public policy issues—many types of 'electronic money' are under development, promising more

convenient and efficient ways for consumers to pay, but also with potential risks.

Rating sovereign risk—Christopher Huhne, the Managing Director of sovereign ratings at IBCA, describes the risks in sovereign lending, and how rating agencies try to measure them.

Deposit protection and bank failures in the United Kingdom—bank failures are usually big news. But banks which have failed in the United Kingdom have mainly been small, with a low payout from the Deposit Protection Fund. This article looks at the weaknesses which were found to be present in a sample of bank failures since the Deposit Protection Scheme was established in 1982.

International regulatory co-operation—banks and securities firms are becoming more global, and the distinction between their business more blurred. What practical steps should be taken to ensure that regulatory arrangements for internationally active financial groups keep pace with changes in global finance?

CREST: its recognition and approval—the United Kingdom's new equity settlement system was launched on 15 July 1996. Brian Smith of the SIB explains why the design and implementation of CREST posed issues for regulators.

Bancassurance: European approaches to capital adequacy—banks and insurance companies are increasingly getting involved in each other's business. What capital treatment is appropriate for the banks?

From November 1996, the *Financial Stability Review* may be obtained from the Bank at a cost of £10 for a single copy (£5 for students). Subscriptions can be purchased for calendar year 1997 for £18 (£9 for students), which will cover two issues plus a copy of the *Banking Act Report*. An extra charge will be made to overseas subscribers to cover postage and packing. All enquiries regarding subscriptions should be addressed to Subscriptions, Financial Stability Review, Bank of England, London EC2R 8AH (Tel: 0171-601 5191). Back issues will also be available from the same address.

Research and policy at the Bank of England: the things we'd like to know but never dare ask

The Deputy Governor⁽¹⁾ considers the link between research and policy in three areas of particular interest to the Bank: money, EMU, and regulation of the financial system. In each case, he outlines a range of questions that have preoccupied the Bank and the consequent research conducted by its staff. He argues that research can help to find answers to the questions, even if, in the end, there will still be political judgments to be made.

I intend to focus today on the link between research and policy. How can research feed into the policy-making process? And, equally importantly, how best can policy-makers identify the areas in which they should be encouraging and supporting research? I have become closely involved with this interrelationship since joining the Bank, partly because I chair the editorial board of the *Quarterly Bulletin*.

I am reminded here of that famous quote from Keynes: 'Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist'. Since we know that economists these days do all their creative thinking before the age of 30, all our senior economists are defunct by definition, so we need to plug into outsiders. We are not, of course, primarily a research institute, though we do undertake a lot of research work as you know—most of it, though, what one might describe as 'near-market' work, in other words work which relates reasonably closely to practical policy questions.

I shall comment on the link between research and policy in three areas which are of considerable interest to the Bank and, I hope, to many of you too. These are *money*; *European Monetary Union*; and *regulation* of the financial system. There are some very clear policy questions here, on which research work can provide vital insights. I might mention three in particular: How concerned should we be by the currently strong growth of both narrow and broad money? What are the pros and cons of UK membership of EMU? And what should banking supervision be trying to achieve—indeed should it exist at all? Research can help us to find answers to these questions, even if, in the end, there will still be political judgments to make.

We are interested in money because inflation is essentially a monetary phenomenon. Such a statement can easily end up being repeated like some central banking mantra, to the point where it becomes vacuous. What I think we mean is simply that the price level, by definition, is the price of goods and services relative to money. Inflation, then, is a change in this relative price and can thus have one of two sources: the goods market or the money market. Over the

long run, we think of the supply of *goods* as being fixed by factors beyond the central bank's control—by natural endowments, technology and such like. That then leaves the supply of money—which *is* within the central bank's control (at least central bank money is)—as the crucial determinant of sustained inflationary surges. Now that may sound like a very classical—not to say convenient—conclusion. But over long runs of data—I am thinking of decades and centuries here rather than months and years—the very close correlation between money and prices remains a striking monetary fact. Indeed, it is one of the few monetary facts we have available to us.

I am aware, however, that this simple conclusion conceals a multitude of complexities. The relationship between central bank money, which the central bank can control, and what counts as money in the economy, change over the long run as techniques of money transmission change. And the central bank's control over wider versions of money usually involves influencing the demand for them. So even in the long run it is hard to tell a simple Quantity Theory story about any money stock which is directly under the central bank's control.

And over the shorter term, the relationship between monetary aggregates and other variables, such as activity and prices, is often far from predictable and robust. This has been particularly evident from attempts to model money in this country, where the half-life of a money demand equation has typically been no longer than a year or two.

Nevertheless, at least some money and credit aggregates—and some sectoral components of them—do have reasonably good *leading indicator* properties over future activity and prices; or are *corroborative*, in the sense of confirming the evidence we have from the real economy. Indeed, some of the money-income correlations we have unearthed appear genuinely *causal* in that a clear story can be told about the relationship between money and credit on the one hand, and activity and prices on the other. This is important if we are to improve our understanding of the transmission mechanism of monetary policy. How do changes in monetary policy feed through to the economy? And how,

(1) In a speech given at the Money, Macro and Finance Conference at the London Business School on Thursday, 5 September.

within this process, do money and credit interact with other variables?

A considerable amount of research on these subjects has been undertaken within the Bank over many years. And in doing so we have drawn heavily on the ideas and techniques developed by academics outside the Bank, including many of those closely connected with the Money, Macro and Finance Group.

As an example, consider the article we published on broad money in our *May Quarterly Bulletin*.⁽¹⁾ Indeed, Ryland Thomas, the author of that article, presented some of the more detailed results from our own research at an earlier session of this Conference. In particular, we have recognised the importance of using wealth, as well as income, as a scale variable in broad money equations; and the need to model rates of return on alternative assets, as deposits with banks and building societies have become increasingly close substitutes for holdings of other financial assets. It is also valuable to look separately at the demand for money in different sectors of the economy (in particular individuals, corporates and other financial institutions) and to model sectoral balances in conjunction with real variables (for example personal sector deposits together with consumption, and corporate sector deposits together with investment and stock building). These are theoretical advances which we have made in step with outside academic work. They have helped us to capture important interrelationships and thereby to understand better the transmission mechanism of monetary policy. But we recognise only too clearly that this is an evolutionary process and that we still have a long way to go in understanding broad money.

What use do we make of all this in thinking about policy? Over the last year or so we have attempted to explain the relatively rapid growth of broad money and to examine the implications of this for future activity and prices. Rather than expressing concern merely because broad money is growing at around the top of its 3%–9% monitoring range, we are concerned because we cannot explain adequately the growth of personal sector deposits over the last 18 months in terms of what has been happening to personal sector income, wealth and consumption, and to relative interest rates. We therefore regard the apparent overhang of personal sector liquidity—perhaps around £10 billion, or 2% of total M4—as generating an upside risk to future activity and inflation which is additional to the information available from looking at variables other than broad money. And the recent strength of corporate sector deposits could be a harbinger of future investment growth, again contributing to a pick up in activity.

Of course, given my earlier comments on the robustness of money demand equations, we have to ask how much weight we should place on these empirical results. But this should

be a reason for undertaking more research rather than less and for being honest about what we do and do not know. And we have to remind ourselves that although there are considerable uncertainties surrounding the interrelationships between money and other variables, this is true of all of the other information we look at in forming our judgment about the appropriate stance of monetary policy. The difficulty in measuring the output gap is but one example. Indeed, we have made these many uncertainties explicit by presenting the projections of inflation which we publish in our *Inflation Reports* as probability distributions rather than point estimates.

We also spend a considerable amount of time looking at narrow money. Apart from its importance for our own balance sheet, and schedule planning at the Printing Works, one good reason for doing so is its long-standing statistical property as one of the best single leading indicators of inflation in the United Kingdom. This is a result which extends back at least as far as some pioneering work undertaken by Andrew Crockett⁽²⁾—now the Managing Director of the Bank for International Settlements—when he was a young economist at the Bank. It has always been difficult to provide an entirely convincing theoretical explanation of this statistical result, not least because it is difficult to explain why there is £400 in cash for each man, woman and child in the United Kingdom. But that shouldn't stop us—or you for that matter—continuing to look for one.

More recently, the research task has been to explain why narrow money velocity, which had been growing consistently since 1945, stabilised in the early 1990s and has now begun to fall. That is, why narrow money has been growing in excess of nominal spending. We offered some possible explanations for this in an article in the February *Quarterly Bulletin*.⁽³⁾ These included a slowdown in financial innovation—which might prove to be only temporary, though electronic money still seems difficult to establish with the public—and the move of the United Kingdom to a low-inflation environment. A number of other countries, notably Canada, Ireland, Italy, the Netherlands and Spain, have all experienced a reasonably strong correlation between lower inflation and negative velocity growth in the 1980s.

But the difficulty in explaining the path of narrow money does not mean that we should exclude it when forming our views on monetary policy. Indeed, as discussed in the article on simple policy rules by Alison Stuart in August's *Quarterly Bulletin*,⁽⁴⁾ we include, within the wide range of information variables which we look at, the results of the McCallum policy rule. This is based on the relationship between narrow money—adjusted for medium-term shifts in velocity growth—and nominal income. We find this—and the perhaps more familiar Taylor rule—useful reference points for reflecting upon the appropriate level of nominal interest rates, even if we do not regard either rule as

(1) See Thomas (1996).

(2) See Crockett (1970).

(3) See Janssen (1996).

(4) See Stuart (1996).

providing a monetary policy equivalent of autopilot. My suggestion that they might allow significant person-power reductions in our Monetary Analysis divisions has not been taken up with notable enthusiasm so far.

For what it is worth, neither the McCallum nor the Taylor rules imply paths of money and interest rates which are much off-track at the moment, certainly by comparison with the 1970s or late 1980s. The McCallum rule hints that, most recently, the monetary stance has been a little on the loose side. That squares with the message in our August *Inflation Report*.⁽¹⁾

I should mention for the sake of completeness that we also pay close attention to other monetary aggregates, including Divisia money. And in playing an active part in the preparations for European Monetary Union we have also undertaken some research on EU-wide monetary aggregates, although it has to be said that as yet we do not find any of the statistical results in this area particularly encouraging. The history of EU-wide money demand estimation seems to me like a classic case of measurement and method being put ahead of theory and common sense. That is never the sort of platform upon which effective policy-making is likely to be made or based.

That said, not least because we are a central bank, we have developed close links between research and policy-making in the area of money and credit. I have been unable, however, to find quite such close links in the area I turn to next, namely economic and monetary union. What does research tell us about whether EMU is a good idea and, if it is, whether the United Kingdom should join?

I appreciate, of course, that there has been a lot of academic work on issues such as whether the European Union—or some subset of it—is an optimal currency area; whether individual EU countries might be subject to large asymmetric shocks; and whether fiscal transfers could play a role in smoothing out differences across countries or across regions when nominal exchange rate adjustment is no longer possible. But this research has not completely answered the key questions, partly because the results have been inconclusive, and partly because any move to monetary union must ultimately be a step into an unknown policy regime which may, indeed is likely to, alter prior relationships.

I do not wish to sound negative here. Instead, I think it would be useful to explore the apparent gap between research and policy-making in the EMU context and to ask whether the underlying problem is that the policy-makers' questions are unanswerable or simply that insufficient work has been done to find the answers.

It is worth asking first what we can learn from previous monetary unions. Two of our economists⁽²⁾—Jag Chadha and Suzanne Hudson—have been looking at thirteen

previous monetary unions spanning the last three centuries, ranging from the England-Scotland union of 1707 to the most recent German reunification of 1989. They found it useful to categorise these former monetary unions into three broad types. First, nation-building unions, as for example in the cases of England and Scotland, the United States, Italy and, most recently, Germany. In some cases these involved relatively long transition periods, and they were all categorised by a strong underlying political impetus, including the political will to overcome various economic problems which arose during the process of political and monetary union.

Second, there have been monetary unions based on a leader-follower relationship—such as the union between Belgium and Luxembourg—the former Soviet Union and the CFA franc zone. In these cases the follower nations accepted—albeit with more or less tension and unwillingness—the leadership of a larger country which was also able to support the smaller countries in various ways. Third, some monetary unions have been between more or less equal countries which retained a large degree of national autonomy. These unions, such as the Latin Monetary Union, arose primarily from attempts to exploit the potential benefits of free trade, freedom of capital movements and other aspects of economic interdependence.

One interesting aspect of this historical overview is that it illustrates the extent to which some of the earlier monetary unions were held together for lengthy periods by forces which may be less strong today. These include greater labour mobility, including large-scale migration within Europe and from Europe to the United States and greater (but by no means perfect) price and wage flexibility, again enabling countries within the monetary union to respond more effectively to shocks. But there may also have been a sense in which the sovereignty of national monetary policy was felt less keenly by the public at large—certainly governments in the 19th century had significantly less democratic incentive to concern themselves with the employment and output consequences of monetary policy—and correspondingly less pressure for fiscal transfers between regions and countries as a means of responding to asymmetric shocks.

Many monetary unions did, however, eventually break down as economic conditions across the member countries became less uniform. It seems that the most enduring monetary unions are generally characterised by a clear form of political integration, or a particularly strong and clear leader-follower relationship. In other cases, an unwillingness to give up monetary sovereignty—or a desire to restore it—has tended to lead to a break-up of monetary unions lacking a strong element of political union. This does not necessarily imply that these unions should not have been formed in the first place—just that they may have outlived their usefulness.

(1) See the *Inflation Report*, August 1996, page 3.

(2) See Chadha and Hudson.

Almost all the monetary unions we studied were formed well before economists had developed the theory of ‘optimal currency areas’. But it is not clear that this would have made any difference to the outcome, since the theory of optimum currency areas has proved more useful as a framework for organising how we think about monetary unions than in providing an operational guide for policy-makers. You are probably more familiar than I am with the theory of optimum currency areas and with various attempts to test whether the European Union—or some subset of it—constitutes an optimum currency area. But I would like to share some thoughts with you about some of the puzzles which remain with me as a policy-maker.

I can understand the keen interest in the extent to which EU countries are likely to be subject to asymmetric shocks, or whether, even if they are subject to the same shocks, this could have different effects because of diverse production structures or different levels of wage flexibility across these countries. But the results reported in the academic literature—and some research undertaken at the Bank—do not provide a particularly clear picture. Some of the results suggest that it is possible to identify a core of EU countries—usually including Germany, France, the Netherlands, Belgium and Denmark—which are subject to quite closely correlated shocks. Others, however—including ourselves—have found it much more difficult to identify any clear core of countries which have been subject to reasonably symmetric shocks. Even where a core set of countries can be identified, the constituents of this core can vary quite sharply depending on the choice of methodology and sample period.

Similar difficulties arise in assessing the evidence on the diversity of production structures across EU countries. Most studies have found that production structures tend to be more diverse across US regions than across EU countries. But some have argued that this greater specialisation is, in part, the result of the United States being a monetary union and that greater specialisation will also result within a European Monetary Union. At the same time, of course, we need to remind ourselves that the regions within an individual EU country may not themselves emerge as an optimum currency area when subjected to these sorts of tests. An article in our August *Quarterly Bulletin*⁽¹⁾ shows that there are much more diverse responses to a monetary policy shock across industries within the United Kingdom than are found when analysing cross-country responses to similar monetary policy shocks.

Let us proceed for the moment by assuming the worst, which is that EU countries are likely to be subject to significantly asymmetric shocks, or exhibit significant differences in industrial structure which generate different responses to identical shocks. Does this necessarily imply that it would be inappropriate to move to a monetary union? The key issue now becomes how these countries would adjust to these shocks.

In the early literature on optimal currency areas it was usually assumed that wages and prices were sticky and that the boundaries of an optimum currency area would therefore depend on the area across where there was sufficient mobility of factors of production—labour and capital—to offset the effects of asymmetric shocks. Studies of the European Union have typically found that, although financial capital has become highly mobile as capital controls have been dismantled, imperfections in the European-wide labour market—not least language and cultural barriers—have placed considerable constraints on labour mobility. There certainly appears to be far less labour mobility across Europe than there is, for example, within the United States. And some argue that elements of what is known as ‘social Europe’ may even tend to reduce mobility further. The Posted Workers Directive, for example, requires workers from another member state to be subject to collective wage agreements in the host country, which reduces the scope for workers from high unemployment areas to bid for work elsewhere. Indeed, the whole question of the relationship between social and monetary Europe seems to us to have been insufficiently considered by policy-makers and economists. Otmar Issing, the Bundesbank’s Chief Economist, has made a similar point.

In the absence of sufficient labour and capital mobility, adjustment to asymmetric shocks is likely to require a movement in the real exchange rate. But in a single currency area this can be achieved only through wage and price flexibility. It is generally assumed that wages and prices are not perfectly flexible, especially over the short to medium term. So adjustment to shocks has to take the form of changes in quantities—including employment—rather than changes in prices alone.

But there do not appear to be any accurate, let alone user-friendly, measures of price and wage flexibility. For example, is the degree of wage/price rigidity any greater looking at the same product in different countries than it is looking at different products in the same country? I cannot claim to have any answers here, but I suspect strongly that we are not always sufficiently precise about the nature of price and wage flexibility which is most important when considering adjustments within a single currency area. Moreover, a further important unknown is the extent to which wage and price rigidities in individual countries reflect expectations about future monetary policy, which could change significantly as these countries entered European Monetary Union. Might wage/price flexibility be given a fillip by the act of entering a monetary union?

Yet another possibility would be to make more active use of fiscal policy as a means of offsetting asymmetric shocks. This might take the form of a combination of fiscal transfers *across* countries/regions—that is, an EU-wide fiscal policy—and transfers *within* a single country/region across generations—that is, domestic fiscal policy. But which of

(1) See Ganley and Salmon (1996).

these is the better option? Perhaps neither? Our understanding of the costs and benefits of European Monetary Union would be enhanced by further research on the relative merits of different fiscal policies and the costs these impose.

Another important issue is the extent to which different European economies react differently to interest rate changes. It is sometimes argued by critics of EMU that the United Kingdom, with its preponderance of variable rate housing finance, reacts more sharply to short-term interest rate changes than, for example, does Germany. Some recent work in the Bank casts doubt on that view, and suggests that the impact of interest rate changes on inflation and output is broadly similar in the United Kingdom and Germany, but it is another area in which we would be most interested in the views of other economists.

All of these uncertainties do suggest that there are certainly risks involved in entering a monetary union prematurely. In an ideal world it would be desirable to eliminate as many rigidities in the labour and capital markets as possible before entering monetary union, just as it is desirable to achieve as much nominal convergence as possible. Implementing a common monetary policy across the single currency area would then be a much smaller step to take—at least in terms of economics—since the incentives to retain national sovereignty over monetary policy would be correspondingly smaller.

Nor should we forget that, for a great many countries, national monetary sovereignty has in the past been a poisoned chalice. The freedom to inflate at a different rate than elsewhere has for many countries meant inflating more rapidly. Discretion has led to misbehaviour. So the advantages of locking-in a credible monetary policy should not be overlooked. But at the same time there is a risk that a prospective monetary union may converge not on the *best* inflation performance—read Germany—but on the *average* of all countries in the union. The latter is a much less appetising prospect. But is it likely? Again, answers on a postcard please.

Finally on EMU, I might mention the EMI work underway on the choice of *strategy* for monetary policy—for example, should the future ECB operate money or inflation targets, or some combination of the two? And on the choice of *instruments* of monetary policy—for example, do reserve requirements have a role? The Bank of England clearly has firm views on these issues, as evidenced by our existing approach to the target and instrument problem. But others, judging by *their* existing monetary infrastructure, clearly have different ideas. It would be useful to have some academic arbitration service come in and settle these disputes once and for all—a kind of Eco-Acas. Any volunteers?

Before I conclude, I would like to say a few words about the work of the Bank's Financial Stability Wing and look at the

links between research and policy there. We have established several units within that wing to carry out policy-related research. These span questions of market micro-structure, such as how bond and equity market structures affect the price formation process; research into banking as an industry; as well as research into the economics of regulation.

Today I intend to focus particularly on regulation, where we are currently intensifying our research efforts and building closer links with academics. Economics and finance research has an important role to play in the design and assessment of supervisory methods, in particular whether risks are being adequately captured and whether the regime gives appropriate incentives both to the firms and to the wider public. There are also important wider questions related to the appropriate scope of regulation and the costs and benefits.

As far as the structure of capital requirements for market risk is concerned, we have carried out our own research and also collaborated with academics in order to move towards more risk-based requirements. The first truly risk-based requirements for market exposures in the United Kingdom were those put in place for securities houses by the TSA, the forerunner of the Securities and Futures Authority. These requirements were developed in the mid-1980s and a good deal of the research into the design of the bond requirements was carried out in the Bank. The Bank was also involved in the SIB/LBS work to develop a simplified Sharpe model on which to base the requirements for a portfolio of equity positions. As a Stanford man, once taught by Sharpe and his disciples, I was pleased to learn of that. This early work—plus, of course, an enormous contribution from the Fed—was very influential in the later discussions in Basle on a standard to apply to the market risk of banks and in Europe on the Capital Adequacy Directive which applies to banks and non-banks—although agreement could not be reached on the use of the simplified Sharpe methodology for equity positions. An approach may be right in economic terms but may not always be possible to negotiate internationally. Likewise, the Bank carried out much of the original research behind the Basle requirements to capture counterparty exposures on swap positions.

The debate has now moved on from the setting of risk-based requirements for market exposures by the regulators to reliance on the firms' own in-house value-at-risk models. These use past data on returns to establish the level of capital required to protect against losses on a particular portfolio, subject to parameters (such as the confidence interval) and various safeguards, set by the supervisors. Use of these models within firms is relatively new and it was clearly essential that the supervisors understood the reliability of the model results and their degree of bias before using them to set capital requirements. Joint research⁽¹⁾ was carried out by Bank staff and William Perraudin at Birkbeck to look at this issue and the results were presented at a research conference on risk

(1) See Jackson, Maude and Perraudin (1995).

measurement and systemic risk which the Bank was involved in organising in conjunction with the Federal Reserve, Bank of Japan and BIS. In fact, the work showed that the different approaches to building the value-at-risk models did have a significant effect on their accuracy. The only type of model which delivered the 1% tail probability it was built to achieve was a non-parametric (simulation) approach using long runs of returns data.

Research now needs to move on into new areas such as how models could be built to encompass *credit* risk as well as market risk. We are currently carrying out some work in that area.

As I mentioned earlier, an important question relates to regulatory incentives—are firms given the right regulatory incentives to meet best practice? Clearly moral hazard is an important issue. But a parallel question is whether the incentives for individuals within firms exacerbate risks. We are looking at that question now. Different methods of calculating bonuses can create different incentives with regard to individual traders. In particular, poorly designed schemes could create incentives for individuals to take exposures which are not in the interests of the firm. Our study is looking at how firms actually determine their compensation packages and considers the implications.

Research is also needed into the development of new tools for supervisors. Last year we developed a model to rank banks according to their riskiness. Earlier work had looked at whether options pricing models using data on the equity value and deposits of eight large UK banks would provide a way of looking at the exposure of the deposit protection arrangements to a particular bank.⁽¹⁾ We are also considering whether to finance a study to look at whether neural networks applied to the banking data would help the supervisors to spot anomalies and act as an early-warning system. One of the conclusions of the post-Barings Arthur Andersen Review of Banking Supervision was that even more effort should be placed on building such tools. The French have already pioneered some work on bringing Artificial Intelligence to bear on supervisory issues.

These are all questions about how supervision should be carried out. There are also very important strategic questions which need to be addressed about the boundaries of supervision, and about the costs and benefits of particular approaches. Heroic attempts have been made by various academics to measure the costs of regulation; quantifying the benefits is even harder. It may be more fruitful to focus on the issues which regulation is attempting to address and to consider whether there are other lower cost ways of addressing them.

Perhaps the fundamental question is why financial services firms, and banks in particular, should be regulated by a public agency at all. Not all industries are subject to the kind of regulation we impose. One objective is to deal with externalities—the divergence between private and social

costs. For banks the externalities could be very large because of the vulnerability of the whole financial system—and the real economy—to shocks which undermine confidence in the banking sector. Another objective is to protect investors/depositors. Indeed, this objective is the one stressed in the Banking Act. Again one could ask why depositors need to be protected by regulation of banking firms, whereas consumers in general must exercise buyer beware?

Partly, this is because of the nature of the transactions, where funds are invested for lengthy periods, thereby making investors susceptible to fraud. Asymmetries of information between the bank and its customers are in general greater than is the case with other consumer transactions, which leaves bank customers peculiarly exposed. Depositors cannot easily judge for themselves the strength of a particular bank and its fitness and properness—although one of the issues here is whether more could be done to encourage investors to exercise greater judgment on the basis of more information. We have always favoured a deposit protection scheme which insures only part of any deposit, thereby helping guard against moral hazard problems.

Here the New Zealand approach to banking supervision is interesting, although not easily transferable to a much larger more complex and more international banking market like the United Kingdom's—almost all banks active in New Zealand are parented elsewhere, which is of course not the case here. They are placing much more emphasis on disclosure of information and credit ratings by the banks to the public and on public awareness of the risks in banking. They have also increased the incentives on directors in banks to ensure themselves that systems and controls are adequate.

Another issue is whether it would be possible to test the price which investors would be prepared to pay for regulation. Ideas are put forward from time to time about mechanisms which would do this—for example narrow banking. Would it be possible to establish tightly regulated narrow banks which would invest in low risk assets and which would offer depositors much more security, albeit at a price (a lower interest rate than that offered by non-regulated complex banks)? As only the narrow banks would be members of the payments system, would this protect against systemic problems? Or would this simply engender more instability elsewhere in the banking system? And how could the transition to such a new structure be managed?

I should say that, at present, we are generally satisfied that the regime we impose is not excessively costly, or excessively restrictive, or indeed unjustifiably lax. But a learning organisation, such as the Bank seeks to be, must always consider whether there are other ways of achieving the objectives of regulation with lower cost, particularly because of the danger that every time there is what is

(1) See Maude and Perraudin (1995).

perceived to be a regulatory failure there is pressure to tighten the regulatory screw another notch.

We are currently increasing our research into these wider regulatory questions and into the changing nature of systemic risk. Systemic risk has traditionally been viewed in terms of problems in the banking sector, with the failure of one or more banks leading to a collapse in confidence in other banks with implications for the real economy. One question is whether developments in the industry have substantially changed this risk or the risk of other types of contagion (for example through direct exposures between firms).

The question falls into three parts. The first is whether the risk of a bank failing is now substantially changed. Developments such as greater diversification across product ranges, availability of better hedging and risk control techniques have helped to reduce elements of risk. Against this, internal control issues are raised by the complexity of firms and the speed with which new instruments enable exposures to be built up. Overall, it is not clear that the banks are carrying smaller exposures than was the case hitherto, indeed risks have to be taken in order to make profit.

The second part of the question is whether the risks of contagion between banks have changed. The development of a real time gross settlement system (RTGS) has reduced the extent of exposures between the small group of settlement banks. But substantial (interbank, OTC and FX settlement) exposures between the settlement banks remain and RTGS has not altered the exposures of the very large numbers of other players (both bank and non-bank) to the

settlement banks. Most importantly the risks of confidence contagion remain.

The third issue is whether the links between the banks and the real economy are now looser, which would reduce the systemic impact of any problems. Here our current view is that banks' role in the payments system and as a prime home for transactions balances continues to make them a fundamental part of the functioning of the real economy. They also continue to have a central role in the provision of finance to the personal and small company sectors. Much of the research carried out in the past by the Bank on regulation has not been published, which with hindsight has not helped academic debate. We now intend to rectify this and take a more open approach to the publication of research and thinking in this area. One of the objectives will be to make more material available to researchers working outside the Bank on these issues.

That covers the three areas—money, monetary union and regulation—on which I wanted to touch. The Bank is also undertaking research in a great many other areas—on the real economy and on financial markets to name but two—which I have not had chance to mention here. And I recognise that I have raised more questions than I have provided answers in those areas I have covered. But that is the nature of research. And asking the right questions is at least a good starting point towards providing meaningful policy answers. To end with Keynes again, he observed that: 'Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back'. Whilst I would object to the 'madman' sobriquet, I certainly hope to be distilling some of the ideas from this and future MMF conferences in years to come.

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Practical issues arising from the introduction of the euro

On 16 September, the Bank published its second report in a broadly quarterly series on practical issues arising from the introduction of the euro. Introducing the report⁽¹⁾ the **Governor** explains the background to the Bank's work in this area and the Bank's main aims: to inform people about what is happening, to identify where co-ordinated action is needed, and to stimulate the private sector to plan as necessary for itself. The **Governor** stresses that the report is not about the pros and cons of EMU membership, but about the technical preparations necessary whether the United Kingdom is in or out. He concludes by arguing that, so long as we are properly prepared, the opportunities for the City far outweigh the risks. John Townend, Deputy Director of the Bank, goes on to explain the ground covered in the report, highlighting five key areas: payments, securities settlement, trading, legal aspects, and the work of the EMI.

The Governor's introductory remarks

Let me begin by reminding you that we began exploring the practical issues arising from the introduction of the euro with City institutions in particular at the end of last year—as soon as the Madrid Summit had agreed upon the transition scenario. Before that there was not a lot to talk about. The scenario itself (described in an article in the February *Quarterly Bulletin*⁽²⁾) made, in effect, a crucial distinction between wholesale activity in financial markets in euro—to begin on 1 January 1999—and retail financial activity in euro—which is unlikely to begin in any significant way until euro notes/coin begin to become available—three years later.

At the end of last year I asked John Townend, my alternate on the EMI Council, to take the lead in approaching all the relevant UK organisations (and there are over 50 of them—listed at the back of today's report) to begin preparing the UK financial and business community. The aims are essentially:

- (a) to inform people about what is happening;
- (b) to get the experts engaged in the process of identifying the issues needing to be addressed—they are the specialists in their various technical areas and most of the issues are intensely technical. Because of the sheer bulk of financial activity in the City there is much greater *professional expertise* and specialisation than elsewhere. That is why we need to involve so many different groups—payments experts for payments issues, particular market experts for the various market issues, legal experts, tax experts and so on. I must say that in their respective areas they are all making a tremendous input to the debate—not just within the United Kingdom but within Europe through the Commission;

- (c) to identify where co-ordinated action is needed—either across the City as a whole, or within particular functional areas of the City, or potentially between finance and business and so on, and to ensure that co-ordinated/collective action is undertaken by the right people; and
- (d) to stimulate the private sector to plan for the introduction of the euro on its own account—in a catalytic way.

The first fruits of that activity were reported in a low key way in May—the *First Progress Report*.⁽³⁾

A great deal has happened since May—that's why this *Second Progress Report* is a lot thicker; and people are now much more intensively engaged in the preparations for the euro.

Two main developments explain that:

- (i) Increasing realisation of the *political* commitment to Monetary Union on the Continent, especially on the part of Chancellor Kohl and President Chirac, even though the economic conditions for Monetary Union have remained somewhat unpromising. Overall there is a growing conviction that Monetary Union will occur at least among a core group on 1 January 1999. This is not yet by any means certain, but a prudent planning assumption.
- (ii) An increasing awareness of some of the implications: business associations, market authorities and individual businesses have thought much more about what it will involve for them—encouraged we like to think by John Townend's earlier efforts. But in any event the key issues—whether the United Kingdom is in or out—have

(1) At a press conference to mark its launch.

(2) 'Changeover to the single currency', *Bank of England Quarterly Bulletin*, February 1996, pages 88–90.

(3) 'Practical issues arising from the single currency', *Bank of England Quarterly Bulletin*, August 1996, pages 316–22.

now been more precisely identified by the experts, so there is a great deal more to talk about.

I suspect that this in turn means that some others—who are not so close to it—have suddenly woken up to the fact that a lot of preparation needs to be made, and some of them have started to worry that we will not be ready. The fact that they are worrying in this way is not necessarily a bad thing—it vaccinates us against complacency. But a lot of the concern is because they do not know what is going on and that is why we are giving a higher profile to this *Second Progress Report*.

Be clear, the *Second Progress Report* is not about the pros and cons of EMU; it is not about the pros and cons of UK membership; it is not even about the business implications for the City if the United Kingdom is in or out. It is about the technical preparations that we need to make—initially for wholesale financial market activity in the City—whether we are in or out.

Much of the recent debate has been about the perceived threats to the City if Monetary Union goes ahead and the United Kingdom stands aside. The truth is that with any major development of this sort there are potential risks as well as opportunities for the City. What we have to do, of course, is to minimise the risks and maximise the opportunities and that is the relevance of this exercise to that debate. I have no doubt myself that provided we are properly prepared—as we will be—then the opportunities for the City far outweigh the risks—whether we are in or out.

John Townend's introductory remarks

As the Governor has said, many of the practical issues raised by the introduction of the euro are indeed very technical and I will not attempt to take you through the *Report* in any detail. But let me begin by explaining the ground which it covers—which is essentially three-fold.

- First, progress in developing the United Kingdom's financial infrastructure—the arrangements primarily for making wholesale payments so that euro payments *can* be made in future through the banking system; and separately the preparations to allow the full range of euro financial instruments to be traded in the London markets.
- Second, progress in a number of issues—which we call overarching issues—like the way in which the euro will be introduced under the law; the way in which accounting and tax rules will be applied; and how 'rounding' will work when amounts in present national currencies are translated into euro and vice versa.
- Third, progress in the work of the EMI in Frankfurt, because it obviously helps planning here to be informed about how the future European Central Bank will work, ranging from how monetary operations will

be conducted to what the size of the future euro banknotes will be, and so on.

The Governor has already explained the aims of our work and the way in which we are approaching the task, which is set out in the first chapter of the paper. Much of the technical work is being addressed by the professional associations and organisations across and beyond the City, with cross-industry groups coming together as necessary to address particular issues as they arise. The Bank is directly in touch with all this work, through bilateral contact and direct participation in the various working groups.

Turning then to substantive issues, I would single out five: payments; securities settlement; trading; legal aspects; and the work of the EMI.

The second chapter of the Bank's paper is wholly devoted to *payments* arrangements, covering both the development of the UK real-time gross settlement (RTGS) system to embrace the euro, whether we are in or out; and the future international linking of national RTGS systems known as TARGET.

It is worth making a number of points on this issue since it is a subject on which there has been some considerable confusion.

- While TARGET will link the RTGS systems of countries within the euro area, it is agreed that countries on the outside may also connect their RTGS systems to it. So there is no debate here.
- As a general matter, we would like to see as much use made of TARGET as possible, because RTGS systems remove some of the risks in payments systems and TARGET will extend these advantages across national borders, thereby facilitating payments for trade in goods and services across the entire single market in a less risky way.
- Where there *is* a debate, is about the terms on which central banks outside the euro area may have access to liquidity during the day.
- In our view access to intraday liquidity should be on equal terms for both ins and outs. This is because *intraday* liquidity is only to do with oiling the wheels of the payments system, enabling payments to be made and avoiding gridlock. It is nothing to do with monetary policy.
- But it can begin to affect monetary conditions if intraday liquidity spills over into overnight liquidity—though in practice only, we believe, if any spillover is persistent and in large amounts—and we believe this spillover effect is best addressed by applying a penalty rate to overnight credit, just as most central banks do now.

- At the end of the day this issue is not a ‘show-stopper’, since there are numerous alternative ways of making cross-border payments, which will also continue to exist in future. And trading in the London markets is unlikely in any event to be affected: it is notable that almost one third of global trading in the dollar and Deutsche Mark takes place in the foreign exchange market in London, even though there is no direct facility to make payments in either currency in London.

On *securities settlement*, the Bank is already taking the lead in setting strategy for the United Kingdom, in discussion with the securities industry, including the development of delivery-versus-payment arrangements. The paper—in Chapter 3—points to the need to consider the arrangements for settling euro securities, and making the associated payments, in the United Kingdom. The demand for this kind of facility may clearly be different depending on whether we are in or out.

On *trading*, Chapter 3 also sets out in some detail the way in which the whole range of financial market associations and exchanges have been working and the *kind* of issues on which they have been working. The Bank is involved here to the extent which we judge necessary. As an example of an area where we identified a gap and have acted to fill it, I would single out a working group on the gilt-edged market which we have established involving a wide range of interested parties, from the market-makers to end-investors, to consider all the practical issues raised by the euro. The

kind of issues it is considering include how and when to redenominate the outstanding stock of sterling debt into euro; and a number of issues relating to market conventions—how precisely to calculate interest, how to cope with bank holidays etc—where conventions at present differ between countries. Many of the issues will be relevant only if we are in but some may also apply if we are out.

On *legal aspects*, it is clear that the way the euro is introduced under the law is very important; and of considerable interest to London’s international financial markets, particularly in the area of continuity of contracts. The European Commission and the EMI have done a lot of work; and there is now a draft text of a Regulation which will be discussed at the forthcoming informal ECOFIN in Dublin. A London group of practitioner lawyers has been very active and effective in commenting on the text. Our general sense is that this aspect of the general preparations is coming out satisfactorily, though one or two technical issues remain to be resolved.

Finally on the *work of the EMI*, Chapter 6 sets out the present state-of-play on a number of the major areas, including how the future European Central Bank will conduct monetary operations. We are fully committed to playing our full part in all of the EMI’s preparations.

Copies of the report are available from the Bank’s Press Office; we will be publishing the third paper in our series on 16 December.⁽¹⁾

(1) Please contact Public Enquiries, on 0171-601-4878.

Statistical implications of the single currency

On 10 July, the European Monetary Institute (EMI) issued a booklet explaining the statistical requirements for monetary union. It also published a more detailed reference document to enable central banks to pursue technical discussions with national banking associations and other reporting bodies. These booklets⁽¹⁾ were issued in July in order to accommodate the long lead times inherent in making changes to established statistical reporting systems. On the assumption that Stage 3 of EMU will begin in January 1999, some of the new statistics will be needed from mid-1998 in order to provide the necessary benchmark against which to assess developments after the start of Stage 3.

Because the United Kingdom has the option not to participate in monetary union, it will only collect the money and banking statistics required by EMU if it decides to join. The United Kingdom will implement, in advance, those proposals for harmonising statistics which make sense in a UK policy context and which are cost effective. For the remainder, the Bank of England's intention is to agree, with the British Bankers' Association, a stand-by additional reporting framework for banking statistics for possible introduction from January 1999.

In making the preparations for transition to the third stage of monetary union, the EMI has concentrated on harmonising the key statistics required for the conduct of the single monetary policy. These preparations are being made in full consultation with the national central banks, which are represented by the heads of statistical functions in the EMI's Working Group on Statistics (WGS), and by technical experts on a number of task forces. Although the Treaty on European Union specifies the possibility of the direct collection of data from economic agents by the European Central Bank (ECB), the intention is that the national authorities will continue to carry out the tasks of collecting and compiling the required statistics at national level prior to transmitting aggregated data to the ECB. Legal provisions to protect the confidentiality of individual data will be built into the system to cover occasions when the ECB needs to know the identity of individual reporters in order to verify the end product or understand significant events.

The statistics currently used by the Bank of England in assessing economic conditions in the United Kingdom are similar to those which the ECB is expected to need in order to define and implement the monetary policy of the monetary union. Although there will be

differences in the constitutional and legal framework, the requirements of the end users—from policy-makers to market practitioners and academics—will remain focused on high quality and timely information on monetary and economic developments.

UK banking statistics will need to expand the level of detail on the transactions and positions of residents of the single currency area to broadly the same level of detail as is currently provided for domestic residents. This will be needed to enable proper consolidation of the banking statistics and monetary aggregates at EMU level. The current UK system is broadly compatible with EMI requirements in terms of the monthly statistical coverage of the UK monetary sector (ie banks and building societies combined) and the timeliness of data compilation. The EMI decision to introduce a statistical definition of a bank, known as a monetary financial institution (MFI), will have little structural impact on UK statistics. MFIs will comprise banks, building societies and money-market mutual funds, but the latter are expected to fall below the cut-off size for monthly statistical reporting. The EMI also requires a division of certain assets and liabilities according to their maturity at the time of issue. This is believed, by the WGS, to avoid the need for difficult judgments about the comparability of financial instruments to accommodate the as-yet-undecided definitions of the monetary aggregates (and possibly reserve requirements too).

A detailed balance of payments for the single currency area will be compiled quarterly, in line with the guidance issued in the International Monetary Fund's Balance of Payments Manual. The EMI has also formulated a requirement for key data to be provided monthly, as most EU member states use monthly balance of payments for monetary and foreign exchange policy purposes. At present, the compilation of the UK balance of payments, which is the responsibility of the Office for National Statistics, is in line with the international standards recommended by the IMF. These data are not compiled monthly. The United Kingdom has questioned the need for monthly data for policy and operational purposes in the single currency area in Stage 3, but has undertaken to review its situation in 1998, and meanwhile to make best estimates from the present reporting system. Because of the extra costs involved, and the United Kingdom's view of the limited value of monthly balance of payments statistics for monetary policy purposes, the decision on whether to collect such extra data would be taken at a later stage.

(1) Copies of these booklets can be obtained from the Bank of England's Monetary & Financial Statistics Division, telephone 0171-601 4312.

Economic policy approaches—some reflections

The Governor of the Bank, Eddie George, argues⁽¹⁾ that there is a broad international consensus on the key elements of economic policy—not just in the industrialised countries, but in many of the developing, emerging and transitional economies too. On monetary policy, the consensus emphasises the importance of effective price stability and eliminating inflation as a factor in economic decisions, while on fiscal policy it is best described as fiscal prudence and sustainability which does not place an excessive burden on monetary policy to maintain macroeconomic stability. The Governor notes that macroeconomic policy does not operate in a vacuum. Structural policies, which emphasise that competition increases aggregate activity, act as a stimulus to economic growth and employment.

I am delighted and very greatly honoured to have been invited by Governor Rangarajan to deliver this Ninth Chintaman Deshmukh Memorial Lecture.

I am honoured by the Governor's invitation because it joins me with such a very distinguished list of previous lecturers in paying tribute to Chintaman Deshmukh, the first Indian Governor of the Reserve Bank. I am honoured particularly to have been invited to deliver my lecture this year—which marks the centenary of Governor Deshmukh's birth.

It was never my privilege to meet Governor Deshmukh—I was still in my cradle when he first became associated with the Reserve Bank in 1939 as Liaison Officer to keep the Government of India in touch with the Bank's affairs; and I was still wearing short trousers when, ten years later, he stepped down as Governor to embark upon new phases in his lifetime career of public service—as Finance Minister and subsequently in education. But, in preparing for my lecture, I have come to know and admire Governor Deshmukh as a man of great intellectual curiosity and insight—a true 'renaissance man'. He was also apparently a man of considerable wit. In his celebrated Kale lecture on 'Central Banking in India' delivered in 1948, he discusses the circumstances of his appointment as Governor of the Reserve Bank—an appointment which, it would seem, was opposed by my own illustrious predecessor, the redoubtable Montagu Norman. Governor Deshmukh comments on the episode in these words:

'The Government of India were overruled by the Secretary of State and Deshmukh was appointed Governor in the middle of August 1943. So once again went agley the schemes of mice and M.N..'

The wartime and immediate post-war global economic environment within which Governor Deshmukh operated, during the period of his association with the Reserve Bank, was fundamentally different from the global economic environment we are confronted with today; and so, too, were the accepted approaches to economic policy.

At that time, and for much of the intervening period, while there were marked differences of approach between countries, the economic policy emphasis across much of the world was on more or less detailed government intervention. This extended in the extreme case to comprehensive central planning. But even in many countries which we would have thought of as 'market economies', it included aggregate demand-management, macroeconomic policies targeted directly at growth and high levels of employment, and supported by direct macroeconomic controls of various kinds, on the one hand; and it included extensive government regulation of, or direct involvement in, particular sectors of the economy, on the other.

Today, by contrast, there is a broad international consensus on the approach to economic policy—not just in the industrialised countries, but in many of the developing, emerging and transitional economies too, and endorsed by international institutions such as the IMF and OECD—which puts much less emphasis on government intervention and what it can be expected to achieve. Stability and sustainability are seen as the essential objectives for macroeconomic policy; and more weight is put on structural, supply-side actions, such as deregulation and competition, both nationally and internationally, as means of increasing the underlying rate of growth by broadening the scope for the productive energies of the private sector. In many respects today's consensus is in fact a reversion to an earlier orthodoxy.

In my lecture I should like to explore with you some of the key elements of this economic policy orthodoxy, as it applies today. I will speak from the perspective of a monetary policy practitioner in the United Kingdom, although not specifically or exclusively about our own national experience.

Macroeconomic policy

Let me begin then with some thoughts about macroeconomic policy taken as a whole.

(1) In a lecture given at the Reserve Bank of India on Monday, 14 October 1996.

Some thirty-odd years ago, macroeconomic management was widely seen as something of a balancing act. No real distinction was drawn between its monetary and fiscal dimensions; they were used in combination with each other—and supported by various forms of direct macroeconomic controls—to try to reconcile what were seen as the conflicting objectives of growth and full employment, on the one hand, and a reasonable balance of payments equilibrium and a pegged exchange rate, as well as a tolerable rate of inflation, on the other. Policy was essentially a matter of trading growth and stability off against each other. This involved expanding demand to increase activity and employment, when the stability constraints allowed, but then reining back—often quite abruptly—when the economy began to approach supply-side limits and evidence of imbalances emerged.

In practice, this approach often resulted in substantial economic instability. Put perhaps rather starkly, the go-stop policy cycle produced a boom-bust economic cycle, often marked by financial crisis, and this volatility in turn engendered increasingly distorted, short-term attitudes to savings and investment, and declining long-term economic performance. Even worse, the process was an explosive one as employers, employees and consumers learned to take advantage of the booms while they lasted, driving inflation progressively higher from cyclical peak to cyclical peak and unemployment progressively higher from trough to trough in response to policy restraint.

Given this experience academic, official, and broader public opinion gradually changed, so that the more general perception now is that there is in fact no trade-off between growth and stability in anything other than the short term. Growth and stability on this view are not conflicting objectives. On the contrary, a stable macroeconomic environment—in which economic decisions can be taken with reasonable confidence that they will not be undermined by violent changes in policy, in response to large economic imbalances—is seen as a necessary condition for growth to be *sustained* into the medium and longer term.

This represents a major change—perhaps the major change—in approach to macroeconomic policy. Even so it would be wrong to exaggerate the nature of the change. It does not, of course, alter the fact that growth and employment and rising living standards remain the ultimate objectives of macroeconomic policy. Nor does it mean that there is no longer a role for discretionary management of aggregate demand. What it does mean is recognition that there are limits to what can reasonably be expected of demand management—recognition first, that demand management alone cannot determine the rate of growth of the economy, or therefore the level of employment, that can be sustained, which depends much more fundamentally on structural, supply-side, characteristics of the economy; and recognition, secondly, that demand management, in relation to that underlying, potential, growth rate, needs to look beyond just the short term if erratic policy changes and damaging economic volatility are to be avoided. The

essential aim of macroeconomic management now is to moderate the economic cycle around the sustainable underlying growth rate, where too often in the past the effect had been to aggravate cyclical fluctuations.

Monetary policy

Within the overall framework of macroeconomic policy, monetary policy has increasingly come to be assigned the specific role of achieving and maintaining domestic *price* stability. This is on the basis that, in the longer term, inflation is essentially a monetary phenomenon, which cannot persist unless it is accommodated by monetary expansion beyond that which is necessary to support sustainable real growth. The underlying thought—as in relation to macroeconomic policy more broadly—is that, while you cannot increase the sustainable, potential rate of growth of the economy directly, simply by providing additional monetary stimulus, you can provide for more efficient economic decision-making—in relation to saving or investment, or to resource allocation—by eliminating unpredictable fluctuations in the rate of inflation, which are themselves a reflection of imbalance between monetary demand and the supply capacity of the economy. Ensuring stability in this broad sense is, on this view, the essential contribution that monetary policy can make to promoting economic efficiency—and so to increasing the potential growth rate indirectly.

This, too, is a huge change in policy approach. It is true that most central banks at least would traditionally have regarded controlling inflation as a core responsibility. In some cases—most famously in the case of the Bundesbank—the duty of preserving the value of the currency has long been written into the central bank's statutes. But what is remarkable today is the extent of the international consensus on effective *price stability*—in the sense of eliminating inflation as a factor in economic decisions—as the immediate aim of monetary policy; and this is increasingly reflected in more or less explicit targets for low rates of inflation against which monetary policy performance can be measured.

I do not suggest that the present consensus extends to every detail of monetary policy. Of course, differences of opinion remain, both within and between countries, on particular aspects of monetary policy. There is an on-going debate, for example, about just how rigorously 'price stability' should be *defined* and about the relative costs and benefits of seeking to eliminate inflation altogether rather than settling for just a relatively 'low' rate of, say, up to about 4%. There is debate, too, about the most appropriate *form* of monetary arrangements—about operational independence of central banks, about transparency and accountability within the policy process, and about the respective merits of explicit inflation targets compared with intermediate monetary or exchange rate targets. And there is continual debate finally about the *operation* of policy—about the sensible pace of adjustment to 'price stability' and about the importance of credibility of policy and the degree of flexibility it confers

on policy-makers. All of these questions can have an important bearing on the extent to which monetary policy succeeds, and we could easily spend the rest of the afternoon discussing them. But the key point for my present purpose is the extent of agreement on the broad objective of 'price stability' itself. Beside that all of these other issues are of lesser importance.

Fiscal policy

If price stability is the orthodox objective of monetary policy, there is a similarly broad consensus on the aims of fiscal policy—perhaps best described as fiscal 'prudence' or 'sustainability'. In this case too there is still a good deal of debate about precisely what that means in a quantitative sense. A number of definitions are often discussed. These typically include the objective of a 'balanced budget' over the economic cycle, with limits to the acceptable range of cyclical variation. They include the 'golden rule', according to which only expenditures broadly to be regarded as productive public sector capital expenditures, should be allowed to be financed over the cycle by borrowing. And they include, at the very least, stabilisation of the ratio of public debt to gross domestic product, because of the implications of a progressively rising ratio for future debt servicing costs.

I am not aware of any strong body of analysis that points decisively to one of these measures rather than another as a practical guide to overall fiscal policy. A key consideration is that the fiscal position should be sustainable into the medium and longer term, without the prospective need for continuously rising tax rates that would overburden private sector activity. But it is also important that fiscal policy should not place an excessive load on monetary policy to maintain macroeconomic stability, because that too could lead to distortions to the pattern of economic activity that became unsustainable. In any event, it cannot be assumed that inflation will, in future, erode the real burden of fiscal imprudence as it has in the past, not least because today's more sophisticated markets are liable to impose interest rate penalties more aggressively if they sense a risk of either monetary or fiscal indiscipline.

Again, there are substantial differences between countries on both their precise practice and their performance in relation to fiscal policy. But the crucial point is the extent of agreement on the objective of 'fiscal prudence', which typically—and especially at present within Europe—means substantial further fiscal consolidation.

Direct macroeconomic controls

Finally, in relation to macroeconomic policy let me say a word about the change in attitude to the various kinds of direct macroeconomic controls—ranging from rationing and the physical allocation of strategic materials in the immediate post-war period, to controls over prices and incomes, or foreign exchange or capital market or credit controls of various kinds—which were only finally discontinued in the United Kingdom some 15 years ago.

The motivation for eliminating them was partly a matter of economic efficiency. It became increasingly clear that as the economy developed and became more sophisticated, so the scope for arbitrary resource misallocation between alternative uses through an administrative rather than a market process also increased. But it was importantly also a result of diminishing effectiveness and the increasing practical difficulty of implementation.

If you will allow me a personal reminiscence, one of my early operational tasks at the Bank of England was to administer the queue of new equity issues. In principle I supposed that I was intended to regulate the supply of new equity issues to the capacity of the market to absorb them. I confess to you that this gave me some small sense of self-importance—until I rather quickly realised that I hadn't the foggiest idea of how to assess the absorptive capacity of the market and noticed that the market was quite capable of adjusting to new supply by varying the price! My job was abolished quite soon afterwards!

But in many instances the application of controls had more serious effects. The controls themselves provided incentives for the market to find ways around them, rendering the controls ineffective unless they were shored up by further controls *ad infinitum*. The classic case was direct credit control. This first gave rise to the emergence of less soundly based deposit-taking institutions *outside* the controlled banking system—a number of which subsequently collapsed in the United Kingdom's fringe banking crisis of the early 1970s. It later provoked disintermediation outside the banking system altogether—through the commercial bill market, which we felt unable to bring within the control for fear of simply driving the lending into channels that we would have been unable even to monitor. To attempt to impose administrative controls of this sort in our infinitely more sophisticated and truly global financial markets today would quite simply be a pointless nightmare! Happily we are not required to do so, and along with most other industrial countries today we rely almost entirely on market processes.

Now, to summarise up to this point, today's orthodox economic policy prescription is for macroeconomic stability, involving monetary policy directed to effective price stability, within a framework of overall fiscal discipline, and operating through market processes. It is largely reflected in the terms of the 'Madrid Declaration', adopted by the Interim Committee of the Board of Governors of the IMF two years ago, which calls for

- a strengthening of fiscal consolidation efforts to reduce significantly fiscal deficits beyond the effects of cyclical recovery and to cut debt-to-GDP ratios thereby facilitating lower real interest rates; and
- readiness to adjust monetary conditions to maintain price stability, as a condition for sustaining medium-term growth, including timely increases in

interest rates with a view to preventing the emergence of inflationary pressures.

The same basic philosophy underlies the famous 'convergence criteria' written in to the Maastricht Treaty in 1991 as pre-conditions for membership of the proposed European Monetary Union.

How then should we assess the effects?

Well, in one respect there has been very considerable progress. Inflation in many countries—including most of the industrial world—is lower than it has been for a generation. In the case of some developing countries, and some of the countries in transition where inflation had previously risen to the highest levels, it has fallen quite dramatically. But in other respects the results have recently been more variable. In some industrial countries, notably the United States, but also happily in the United Kingdom, low inflation over the past few years has been combined with relatively steady expansion and falling unemployment—though even there, there are concerns about increasing wage differentials between the skilled and unskilled. Elsewhere, notably in some countries in continental Europe, activity has recently been disappointingly weak and unemployment has risen, despite effective price stability.

Some commentators are inclined to put this uneven performance down to continuing deficiencies of macroeconomic policies, with too much emphasis on stability—in some cases at least—and not enough on the truly good things in life, growth, employment and rising living standards. Now, no one can pretend that macroeconomic management is a precise science. Striking the right balance is not easy, and there will no doubt always be those who urge taking more risks with stability in the interest of higher output in the short term. It is certainly true that you can have too much of a good thing and that macroeconomic caution can be overdone.

But even if one were to allow, for the sake of the argument, that there *may* be something in this criticism—that monetary policy in some cases *may* have been over-rigorous and that the *pace* of fiscal consolidation—driven, for example, by the Maastricht convergence criteria within Europe—*may* be having a depressing effect on activity in the short term, which is not yet being offset by increased confidence and activity in the private sector, that certainly cannot explain the upward drift of unemployment in many industrial countries stretching back over the past 10–15 years. The conventional explanation for this longer-term trend is increasing structural rigidities in product and labour markets, which reduce the underlying, sustainable rate of growth, or increase the 'natural' rate of unemployment, and which cannot be directly addressed simply by macroeconomic means. I should like, therefore, to devote the rest of my lecture to approaches to structural, supply-side aspects of the economy that bear on the sustainable rate of growth and level of activity.

Structural policies

The context everywhere is accelerating economic change, driven by increasingly intense, and increasingly global competition, itself fed by extraordinarily rapid technological innovation. Under the impact of new products which are cheaper or better adapted to meet customer demands, often embodying new concepts, new materials or new production or distribution techniques, and very often involving new skills on the part of both management and the workforce, whole industries, as well as individual firms within industries, appear to rise and fall with remarkable speed.

Now, of course, it is true that not everyone immediately benefits in this environment of intense competition and rapid change. Any new source of competition represents a threat to established producers. Countries may be faced with rising unemployment, businesses may become unviable, and individuals may be made redundant. So it is not surprising that many people see competition—whether domestic or international—as a zero-sum game in which if some people win then others must necessarily lose. And it is not surprising that established producers should over the years, have been tempted to try to hold on to what they have by seeking protection, whether through more or less overt restraints on international trade and investment, or, at the business level, through pressure for administrative barriers against entry or through exclusive tax breaks or subsidies for particular activities, or, at the individual level, through restrictive labour market practices or legislation to protect those in work. There have been endless examples of protective behaviour of this sort—both between countries and within countries—over the years, many of which survive.

Here too—or so it seems to me—perceptions have changed, with a growing understanding that competition increases aggregate activity, so that in reality it is a positive-sum game from which, collectively, we all stand to gain in the longer term. The whole point about open markets and free and fair competition is that they act as a stimulus to economic growth and employment by allocating resources based on comparative advantage, directing savings to where they can be most productively invested and production to where it can be most effectively carried on to meet consumers' needs. This, incidentally, is why I regard the recent rapid economic expansion of the emerging countries and their increasing integration into the world's trade and payments system—especially countries like India and China with their huge populations—as the best possible news, not just for the peoples of those countries but for the world economy as a whole. But what goes for the benefits of international trade and competition, goes in exactly the same way for regional trade and competition and for trade and competition in one's own domestic market.

So, while the temptation to resort to protection inevitably persists not far below the surface, it has by and large been overcome—when push comes to shove—and there is a growing recognition, certainly within Europe, of the costs—in terms of structural rigidities—of unnecessary

intervention. Today's orthodoxy in this area tends to emphasise the crucial role of open markets and the importance of flexibility and adaptability to take advantage of change, rather than action to resist it.

The effect, at the national level, in the United Kingdom has been remarkable. It was epitomised for me a year or so ago when I visited the North East of England and discovered an extraordinary sense of optimism among the business leaders I spoke to, where, less than a decade before, there had been only a sense of irreversible decline. I asked what had produced such a pronounced change in attitude, and one industrialist replied after a moment 'Well I suppose that ten years ago we were looking inwards, and backwards to the past, seeking to defend what we'd had, whereas now, we are looking outwards and forwards to the new opportunities of the future'. His remarks clearly reflected the mood of the other industrialists in the room. One striking consequence has been increased emphasis on specialisation on activities in which individual businesses or employees have a comparative advantage, reflected at the business level, for example in rationalisation and demerging, in management buy-outs, outsourcing of material inputs or the contracting out of specialist services and so on, all in sharp contrast to the tendency to conglomeration a decade or more ago.

What then, against this background, are the implications for structural policy?

I have already implicitly touched upon some of them. The key words, it seems to me, are flexibility and adaptability, and the key contribution that public policy can make to improving the sustainable, potential rate of growth is to promote flexibility and adaptability across the economy as a whole.

More specifically, I suggested a moment ago that this would involve avoiding 'unnecessary' intervention. That, of course, very carefully begged the question of what 'unnecessary' intervention means! It is frankly a question that, as a central banker, I am not at all qualified to answer.

Some forms of government intervention clearly *are* necessary if only in order to ensure effective competition. Legislation against monopolies or various forms of restrictive practices would fall into that category for example. But many other forms of intervention, just as clearly, have a more specifically social purpose. This would typically be true, for example, of many forms of regulation of the labour market, or of measures to provide for health and safety at work or for environmental or consumer or investor protection and so on. The only point I would make in relation to measures of this sort is that, however socially desirable they are in themselves, and while they can often improve market efficiency, they can equally involve burdens on business and restraints on competition, and that in turn can adversely affect the sustainable, potential, rate of growth and level of employment, both directly and by encouraging investment to go elsewhere. Weighing the social benefits of intervention or regulation against the possible economic

costs is, of course, the very stuff of political judgment. As a central banker my role is the much simpler one of pointing out that there can *be* costs as well as benefits.

Somewhat similar considerations apply to decisions relating to public sector provision. No matter what form this takes—defence or transport, health or education, income support or provision for old age and so on—it has to be paid for, within the limits to public sector borrowing which I discussed earlier in the context of macroeconomic fiscal policy, through taxation. And, again, the burden of taxation can adversely affect growth and employment. Here, too, of course, just where the balance should be struck is intrinsically a matter of political judgment, which needs nonetheless to take account of both sides of the ledger.

As you would expect, political priorities in all these areas differ from both country to country and time to time. There nonetheless appear to be a number of common themes. Non-discrimination—on grounds of nationality of ownership or origin, but also on grounds of race or sex or physical disability—for example, is increasingly justified in terms of its economic benefits, by improving the productive capacity and flexibility of the economy, as well as in social terms. Raising the quality and adaptability of the labour force more generally, through lifetime education and training is similarly seen as a means of raising the sustainable growth rate—something which is well understood in the emerging nations of Asia and of which, I am sure, Governor Deshmukh would have strongly approved. Increasingly, too, the public sector is reducing its direct involvement in industrial and commercial activity—through privatisation, and, in our own case, the private finance initiative in relation to new infrastructure provision—in order to take advantage of a 'cheaper lunch' where private sector incentives and disciplines can improve the economic efficiency with which particular goods and services can be provided. Another frequent theme is encouragement of small and medium-sized businesses, which can often respond more flexibly to changes in demand and, which typically employ proportionately more people than larger companies.

But, despite such common themes, it would be misleading to suggest that there is a standard blueprint or orthodox prescription in relation to structural policies, which is anything like as clearly defined as the more technical, macroeconomic orthodoxy that I discussed in the earlier part of my lecture. The Madrid Declaration nevertheless touches on some of the relevant issues in endorsing, as a third element in the common strategy agreed by the Interim Committee:

- structural reforms to eliminate impediments to sustained growth, including steps to dismantle non-tariff trade barriers and to ensure the long-term financial viability of health care and public pension systems. The Committee notes that problems of long-term unemployment and lack of jobs for young and unskilled persons should be addressed by efforts to improve education and training and by fundamental

labour market reforms to reduce disincentives to employment.

These issues are receiving increasing attention in Europe.

Conclusions

Mr Chairman, in my lecture today I have—unusually—strayed well beyond my usual macroeconomic, or more specifically monetary policy, beat. I have done so because I recognise that macroeconomic policy—and within that monetary policy—does not operate in a vacuum.

I very much share the orthodox view that macroeconomic policy should be directed to stability—and that the particular role of monetary policy is to provide permanent price stability—as a measure of underlying balance between aggregate demand and the supply capacity of the economy and as a necessary condition for effective, long-term, economic decision-making. That is the greatest contribution that macroeconomic policy can make—indirectly—to increasing the sustainable rate of growth of activity, to increasing unemployment and to rising living standards.

But I recognise that stability, although a necessary condition, is not in itself sufficient to satisfy wider political and social aspirations—even entirely reasonable aspirations. The

orthodox answer then is structural reform to increase economic flexibility and adaptability in a changing world environment. But it is not easy to apply.

The unemployed or those living in poverty are unlikely to care very much whether their condition is a result of macroeconomic or structural weakness. They simply want relief. I am concerned that if, for whatever reason, stability becomes associated in the public mind with weak growth and high unemployment, then there is likely to be a natural temptation to set the present orthodoxy on one side. The temptation then would be to resort again to forced-draught expansion, notwithstanding the repeated evidence from the past that this is likely only to result in renewed instability and, in the longer term, simply to make matters worse. Or the temptation would be to resort to protection which may bring short-term relief to the particular country or business or group of employees, but to our collective disadvantage over the longer term.

The essential point is that the key elements of today's economic policy consensus—monetary stability, fiscal sustainability, and structural flexibility—must all hang together. If they do not, then, in the famous words of Benjamin Franklin at the signing of the US Declaration of Independence in 1776, we will all most assuredly hang separately.

Risk reduction in payment and settlement systems

*The **Governor** reviews⁽¹⁾ the steps that have been taken to reduce the risks in the UK payments system, and in securities and foreign exchange settlement arrangements, and what more needs to be done. The introduction of real time gross settlement (RTGS) represents a fundamental improvement to the security of the payments system in this country. Likewise, the proposed RTGS system for payments throughout the European Union (TARGET) will reduce the risks in pan-European payments and support closer European economic and financial integration. Also, RTGS opens up the way to real-time final exchange of value (delivery versus payment—DVP) in relation to securities and foreign exchange settlements. The **Governor** notes that for DVP in securities, we now have most of the individual bricks but have yet to build the wall. On foreign exchange risk, the **Governor** commends the recent G10 report, and notes that it proposes a three-point strategy to address foreign exchange settlement risk encompassing action by individual banks, by industry groups and by central banks.*

I am delighted to have been invited—by the Chartered Institute of Bankers and by King’s College—to deliver this year’s Gilbert Lecture. I am delighted not least because it gives me the opportunity to bury the hatchet that came between James William Gilbert and the Bank of England over 160 years ago!

It has to be said that not much love was lost between Gilbert and my predecessors at that time. This was not entirely Gilbert’s fault. His crime was to become the first general manager of the London and Westminster Bank. Now I should like to reassure Mr Derek Wanless—who delivered last year’s lecture—that we no longer regard becoming general manager of NatWest as a crime—at least not in and of itself! The problem in Gilbert’s case was that the London and Westminster Bank was the first joint-stock bank to breach the Bank of England’s monopoly of joint-stock banking in London as a result of a scandalous loophole in the 1833 Act of Parliament renewing the Bank of England’s Charter—and, as its General Manager, Gilbert represented commercial competition.

Somewhat ungraciously the Bank of England initially denied Gilbert a drawing account and declined to discount his bills—and he was refused access to the clearing house. And we were less helpful than we might have been some years later when one of his correspondent banks ran into financial difficulty.

But we take a more benign attitude to commercial banking competition these days. So I am happy to set the record straight by acknowledging the very important contribution that Gilbert made in the 19th century, both in his practice and in his extensive writings, to the development of the principles of banking.

I acknowledge in particular this evening Gilbert’s interest in payments and settlements, which I have taken as the subject of my lecture.

You do not need to look back to the 19th century to be conscious of the awesome process of change that has affected banking and other financial services activity, both in this country and internationally. In the past 10–20 years alone the pace of change has been explosive. Everyone here will be familiar with the dynamic, inter active, pressures of advancing information technology, financial innovation, deregulation, and intensifying competition—all on a global scale.

One—of the very many—consequences of this process has been the exponential growth in the volume and value of financial transactions and the corresponding growth in the volumes and values passing through the world’s payments and settlements systems.

In this country alone the average *daily* throughput of our large value sterling payments system is currently running at almost £120 billion, which compares with some £40 billion only a decade ago. Of that £120 billion, about half represents the sterling side of foreign exchange settlements. In addition, there is another roughly £120 billion of sterling money-market, gilt-edged and equity market transactions settled net daily through securities settlements systems, and that too is a huge increase compared to ten years ago.

As these numbers have increased, so too have the related payments and settlements risks—the risks that the funds, or the other financial assets, which you had been expecting to receive, and on which you may have been relying to honour your commitment to make payments, or transfer assets, elsewhere, do not in fact arrive.

(1) In the Gilbert Lecture organised by the Chartered Institute of Bankers, Tuesday 22 October 1996.

Such a payments or settlements failure could have serious repercussions for an individual or for a non-financial business. For banks and other financial intermediaries they could be catastrophic. A large part of the daily values passing through payments and settlements systems is in fact a result of transactions undertaken by banks and other financial intermediaries directly with each other, whether simply on their own account or to cover transactions undertaken with their customers; and these direct transactions in themselves produce huge payments and settlements exposures within the financial system. But further interbank exposures can arise as a result of transactions directly between their customers, and which the banks may not even know about until they are called upon to settle them.

As the size of these exposures within the financial system, and the interdependence of financial intermediaries, have increased, so too has the risk that a payments or settlements failure by one institution could bring down others, and ultimately disrupt the financial system as a whole.

For many years payments and settlements risk was largely disregarded as an administrative matter for the 'back office'. Perhaps not surprisingly as the numbers have grown, there has, over the past ten years or so, been a growing awareness—among both commercial and central bankers—of its crucial importance, so that it has moved up the agenda, from the back office to the board room. In the rest of my lecture I should like to describe to you the steps that have already been taken to reduce the risks in the payments system, and in securities and foreign exchange settlement arrangements, and what more needs to be done.

The payments system

Let me begin then with the cash payments system—and I will concern myself with large-value payments because that is where the risks in the payments system are largely concentrated.

In his book 'The History, Principles and Practice of Banking' Gilbart describes the origin of the London Bankers' Clearing House which was set up in about 1775 to enable the member banks 'to exchange bills and cheques against bills and cheques, and thus to be able to carry on their business with a less amount of capital'. He describes, in other words, a clearing arrangement in which the banks' mutual obligations were netted off against each other before settlement in currency rather than each obligation being settled individually, gross. Gilbart goes on to describe the great advance made in 1854 when the net settlement in cash was 'superseded by transfer to and from accounts which each member of the Clearing House was obliged to keep at the Bank of England'. In essence, these payments arrangements, involving end-of-day net settlement of clearing balances across accounts at the Bank of England remained unchanged until earlier this year.

There have—it is true—been changes affecting the *form* in which large-value sterling payments were made. In particular there was the introduction of an electronic, same day, credit transfer system (CHAPS) in 1984, to run alongside the existing same-day, large-value debit clearing system for cheques drawn in the City of London (the Town Clearing). But in either case, while the receiving or collecting banker would typically make the relevant funds available to his customer when the CHAPS instruction was received or the Town cheque paid in, he did not receive value from the paying banker until the relevant net settlement was completed at the end of the day.

It would, in principle have been possible for a clearing bank to monitor CHAPS receipts and payments due from or to other clearing banks—during the course of the day, although it is not clear how far this was in fact undertaken in practice. But in the case of Town Clearing cheques the collecting banker would not know the amounts due to him from other banks until he aggregated the cheques for presentation in the clearing; and the paying banker—unless he had made special arrangements for his larger customers to notify him in advance—knew how much he owed only when the cheques were presented in the clearing.

These arrangements were clearly unsatisfactory from many points of view. Apart from the complications they involved for the major banks' treasurers in managing liquidity efficiently, they exposed the banks to unquantified risks *vis à vis* each other. In practice, if a bank found itself unexpectedly short of immediate liquidity at the end of the day it was able to borrow from the other clearing banks or, normally, at a penalty, from ourselves. But if—which God forbid—it had found it impossible to borrow for some reason the chaos that could have been involved in unwinding the clearing is unimaginable.

The Bank began to explore these issues with the other CHAPS member banks some six years ago. We sought first to measure and monitor the extent of the intra-day risks that the banks were incurring *vis à vis* each other through CHAPS; and the result of that exercise—which I have often called the first stage of enlightenment—quickly led, as an interim step, to the imposition of limits on the extent to which a CHAPS bank could build up a net sender position *vis à vis* another CHAPS bank during the course of the business day. Taken together with the termination of the Town Clearing, this meant that the banks not only knew of the extent of their exposures within the system but could impose limits on them—a state that I have described as the second stage of enlightenment. It was a very considerable step forward in ensuring that banks not only monitored their developing positions but had a clear incentive to manage those positions more actively in order to avoid a situation in which their payments instructions, and those of their customers, were delayed as the limit became effective.

But although the introduction of intra-day limits on CHAPS net sender positions was a big step forward, it was always seen as only an interim step on the way to Nirvana in the

payments system—the end objective being to move to individual large-value sterling payments paid gross across accounts at the Bank of England to ensure finality, continuously in real time during the course of the business day. And the movement of CHAPS onto this real time gross payments systems (RTGS) was completed in April this year. It means that you can now ask your bank to debit your account, debit its own account with the Bank of England and credit the corresponding account of the receiving bank, which can then in turn confidently credit the payee's accounts in its books with instantly available funds, all in real time, *eliminating* payments risk all the way along the line—between you and your bank, between the two banks concerned, and between the receiving bank and its customer. It is a gigantic advance—certainly as significant as the last major advance in payments arrangements recorded by Gilbart in 1854. And the fact that it has been accomplished with so little fuss—indeed I suspect that very few people in this country have the slightest idea that it has occurred—is a great tribute to all those at the Bank of England and in the APACS banks who have brought it about. I take my hat off to them.

It does not, of course, mean that banks no longer have exposures to each other—they still trade in each other's paper and borrow from and lend to each other through the interbank market and so on within whatever limits they choose to apply. But they are no longer subject to unintended intra-day exposures to each other arising, outside their control, simply as a function of the operation of the payments system. There is no longer a clearing of large value interbank payments to be unwound in the event of the failure of one of the settlement banks, and the systemic risk of contagion from an initial bank failure *through the payments mechanism* has been removed.

RTGS is in effect equivalent to the earlier CHAPS arrangement but with the limits on net sender (and receiver) positions set at zero; a bank must in other words have cash in its account with the Bank of England before it can make a payment to another bank. This means that unless there is adequate liquidity somewhere, the whole payments system could become frozen as banks wanting to make payments waited in vain for expected receipts from other banks. That is not actually our intention! The necessary liquidity to protect the system against gridlock comes partly from cash balances held with the Bank of England by the banks themselves. But if it were wholly dependent on owned liquidity the system would be likely to be very expensive—for both banks and their customers—compared with alternative possible but less secure payments mechanisms. So the Bank of England itself stands ready to provide the settlement banks with intra-day cash advances, without limit and without charge, but always against first-class security. Such advances (intra-day credit) are repayable before the end of the business day. In effect, they make explicit the intra-day credit extended implicitly during the course of the day under the earlier end-of-day net settlement arrangements but which was not, as I say, until recently even measured or monitored. I am certainly not

aware that it was regarded as having any significant implications for monetary policy. To discourage any tendency for intra-day credit to spill over into overnight credit, which, if it were persistent or on a substantial scale, *could* in principle have a more significant impact on monetary conditions, we would normally charge penal interest on any such cash advances that were not in fact repaid before the close of business. That is to say we would charge a penalty rate compared with that which currently applied to our normal short-term assistance to the money market and which is the key official interest rate for monetary policy purposes. But we have not in practice had to do this on any scale since RTGS began in April; nor do we expect to have to do so.

RTGS, as I say, represents a fundamental improvement to the security of the payments system in this country. But, more than this, it opens the way to real-time final exchange of value—or delivery versus payment—in relation to securities and foreign exchange settlements. It is something that Gilbart could scarcely have dreamed of because it only became possible through the relatively recent advance of information technology.

TARGET

But, before I move on to settlement systems, let me make just a few remarks about present proposals to introduce RTGS into payments arrangements throughout the European Union through the TARGET project, which has been in the news recently.

The idea behind TARGET is straightforward. It is to link together European national RTGS payments systems, denominated in the single currency—the euro—so that large-value payments can be made or received *throughout the European Union area*, with finality and in real time, in exactly the same way as they can at present within those countries with national RTGS systems denominated in national currencies. One of its purposes, we have always understood, is to reduce the risks in pan-European payments—just as RTGS reduces the risks in national payments systems—in support of closer European economic and financial integration. A particular purpose is the integration of the euro money market to ensure that the same short-term euro interest rate—determined by the single monetary policy of the European Central Bank—prevails throughout the region. It is a project which we strongly support.

It is generally agreed that *all* member countries of the European Union may connect national RTGS systems to TARGET. The issue that has arisen relates to the provision of intra-day euro liquidity within countries that are not, or not yet, members of the euro area itself. Some argue that it would be unique for such liquidity to be available beyond the bounds of a single currency area; and that intra-day liquidity should be denied to, or at least restricted in, the non euro member countries, apparently on the grounds that it could otherwise complicate the implementation of the single

monetary policy. Others, including ourselves, argue that it is a natural corollary of the extension of an RTGS system across borders, which is itself unique. They go on to argue that complications for monetary policy arise essentially if intra-day credit spills over, substantially or persistently, into overnight credit, and point out that this, as indeed any conceivable effect of intra-day credit, can occur just as readily in euro-member as in non-member countries. They, therefore, see no grounds for any discrimination, and argue that the potential spillover into overnight credit can be deterred quite adequately through penal interest, as it is in our own present RTGS payments system. The only effect of denying or restricting intra-day liquidity in this case would be to increase somewhat the cost of using TARGET, and so to encourage the use of alternative, less secure, payments arrangements, such as correspondent banking arrangements or the private sector euro net settlement system. It is unlikely to deter the international use of the euro significantly—if that were the objective—any more than lack of direct access to national RTGS systems deters the international use of the dollar or yen or Deutsche Mark now.

A good deal has been made of this issue in the media—perhaps more than is warranted. I would hope that we will be able to resolve the issue through the ongoing technical dialogue in the EMI as we have resolved other issues in the past. We all have a common interest in eliminating payments risk—nationally, regionally and indeed internationally—because the systemic risks of contagion through the payments mechanism are not constrained within national boundaries.

Securities settlement

Let me return now to my main theme and move on to the progress we have made on reducing the risks in securities settlement systems.

My own introduction to the fragilities of securities settlement in this country began in the early 1980s, when I discovered to my horror that huge amounts of gilt-edged stock changed hands in the form of certified and executed transfer forms against Town Clearing cheques that were often out of date and handed over well after the Town Clearing had in fact closed!

Happily the Bank of England and the Stock Exchange were already co-operating to produce more robust settlement arrangements at that time, which resulted, in 1986, in an electronic book-entry transfer system for settling the stock side of gilt-edged transactions called the Central Gilts Office (CGO). The system enabled changes of ownership of stock to be recorded more rapidly and efficiently, and could cope with higher volumes, than the arrangements it replaced; it provided effective certainty of delivery of good title to the securities in the system. At the same time we needed to establish a link between the surrender of title to the stock and the receipt of payment for it. This ‘capital risk’ threatened to impede the development of the gilt market following ‘Big Bang’ because it would otherwise, quite

understandably, have caused several of the potentially most active new participants in the gilt-edged market to impose narrow limits on their exposures to individual counterparties. The obvious solution—simultaneous delivery versus settlement in any literal sense—was not available to us at the time because the payments leg of the transaction remained stuck in end-of-day net settlement. So we had to resort to a system of ‘assured payments’ in which banks providing gilt-edged settlement services *guaranteed* payment on behalf of their customer receiving stock in CGO, taking the stock as collateral, although the payment itself was only made in an end-of-day net payments settlement. This effectively removed the settlement risk for the users of the system. But it left the banks with intra-day exposures to each other which were similar to those that they ran on straightforward payments in the net settlement payments system. One of the reasons why I have been so enthusiastic about the RTGS payments system is, of course, that it now makes it technically possible to move literally to delivery versus payment on a continuous basis during the business day. We have already started to explore this possibility with the banks and representatives of the securities markets.

In co-operation with the main participants in the sterling money market, and building on an earlier project—Londonclear—the Bank, in 1990, introduced a similar service for transferring the ownership of money-market instruments, such as commercial bills, Treasury bills and certificates of deposit, by electronic means rather than by physical delivery of the bearer instruments themselves. We called this system—imaginatively—CMO (the Central Moneymarkets Office)! A complication in this case is that many of the individual instruments held in the central depository at the Bank are not fungible with each other in the same way as holdings of a particular gilt-edged security; they need to be identified and transferred separately. Moreover, under present legislation they cannot be ‘dematerialised’ in the same way. Partly for these reasons it was more difficult for the banks to accept assured payments arrangements along the same lines as in CGO. Nevertheless, CMO has greatly improved the efficiency of trading money-market paper, and eliminated the security risk inherent in the physical movement of bearer instruments around the City; and we will be looking at the available means of providing for delivery versus payment at some point in the future.

The main outstanding gap in improving securities settlement arrangements then was in the area of equity settlement, and a big step towards filling this gap was taken with the inauguration of the CREST service for settling equities and corporate bonds in July this year. It extends to those markets the benefits of improved efficiency through book-entry transfer of ownership and automated links with banks and brokers, and, like CGO, it includes an assured payments mechanism, albeit within customer limits, which reduces capital risk in equity settlements.

All of this represents very considerable progress in relation to securities settlement—which is unrecognisable compared

with a decade ago. But the work is not complete. While we do now have most of the individual bricks we have yet to construct the wall. This should in due course involve harnessing the RTGS payments arrangements that we now have available together with the new settlements systems to provide for genuine real-time delivery versus payment. But it should desirably also involve bringing the individual systems closer together in due course to improve the efficiency of the whole securities settlements function and reduce transaction costs. All this will undoubtedly take time, and we need to proceed step by step to ensure that the separate systems are not disrupted in the process and to avoid overloading the City's capacity for systems development. But we are already taking advantage of the need to upgrade the CGO service, to accommodate recent and prospective innovations in the gilt-edged market, to align CGO and CREST software with an eye to possible future consolidation of those systems, and we will be looking for similar opportunities in other areas.

I have focused very much on settlement arrangements for cash securities, but let me add a word briefly about another very important area—the settlement of derivative transactions. The volume of trading in derivatives, both on and off exchange, has also increased spectacularly over the last 15 years. Although the figures often overstate the amounts genuinely at risk, robust settlement arrangements for derivatives are now crucial to the overall stability of the financial system. In London, the London Clearing House already provides clearing for all three of the derivatives exchanges; but we are seeing a number of proposals to provide similar clearing arrangements for over-the-counter (OTC) transactions. We have broadly welcomed this development, subject to ensuring that the necessary infrastructure—in terms, for example, of law, regulation and systems—is properly in place. I note, however, that such clearing houses, which typically act as a central counterparty to all the participants in the clearing, involve a considerable concentration of risk and in turn give rise to important questions about the necessary level of financial resources and their internal collateralisation and control arrangements.

So far, cash and derivatives clearing, whether on or off exchange, have tended to be put in separate boxes. I think one could reasonably look forward to the day, even if it remains some way off, when the separation becomes less clear cut. But whether or not that is the case, we do now have the technology we need to move towards closer integration of payment and settlement arrangements generally in this country. It is to me an exciting prospect.

Of course, payments and settlements risk does not stop at national boundaries and we will ultimately need to contemplate greater international integration of secure payments and settlements arrangements not only within Europe but embracing also other major financial markets.

In terms of cross-border securities settlement, we see at present a number of different models. One, which will be very familiar, is represented by Euroclear and Cedel and

involves a central system operating in a range of currencies and in securities with different countries of issue, and linked, where necessary, to individual national settlement systems. An alternative to this, but in many ways a variant on the same theme, is the kind of service now provided by major custodian banks who look after, on a kind of one-stop shop basis, the securities handling needs of their customers. Beyond that, there are examples of direct linkages between national securities settlement systems; and also of direct cross-border access by firms in one country to the settlement system in another. All of these are probably, in principle, viable approaches and this is an area of very active competition at present. I do not know what the outcome of the competition will be; but I draw reassurance from the fact that, whatever the particular form, there now seems to be wide recognition that, in a cross-border context too, the objective is to move towards a robust implementation of delivery versus payment.

Foreign exchange settlement

Our more immediate focus, however, has been on the foreign exchange market, and on foreign exchange settlement risk, to which I now finally turn.

The risks involved in foreign exchange settlements were drawn dramatically to the world's attention over 20 years ago with the collapse of Bank Herstatt, which had received value for sales of dollars against European currencies but which failed to make delivery of the dollar counterpart later in the day in New York. Sadly, we have made relatively little progress towards reducing these risks—until quite recently.

The issue was addressed in a report to G10 central bank governors—drawn up by a working party chaired by Mr Bill McDonough, President of the Federal Reserve Bank of New York—and which I commend to you.

It is a disturbing report in that it reveals not only the banks' inability to control and monitor their foreign exchange settlement risks but a limited understanding of the extent to which they were running the risk at all. That situation is worrying in a market where the equivalent of something like \$2½ trillion changes hands every working day.

A bank is exposed to the risk that its counterparty may fail from the moment it issues an instruction to pay the sold currency until it receives the bought currency in final funds. And it does not know that its risk is extinguished until it is informed of the receipt. That exposure is for the full principal amount of the deal—it is like an unsecured loan to its counterparty. The G10 report showed that these risks are not run only within the settlement day, they can run for two, three or more days. In some cases examined in the report a bank's foreign exchange settlements exposures to a single counterparty exceeded its capital.

The G10 report, which was endorsed by the central bank Governors, proposed a three-point strategy to address

foreign exchange settlement risk encompassing action by individual banks, by industry groups and by central banks.

The most immediate progress can be made by individual banks themselves—through improving their ability to monitor their exposures. The risks can be contained by more careful release of payment instructions, and by demanding better service from correspondents both in turn around time for payments and in monitoring and reporting receipts. The best banks are already responding to the G10's report and some have shown that it is possible to achieve very large reductions in the size and duration of exposures in this way. Banking supervisors, including certainly those in the United Kingdom, will be taking an active interest in the progress made by individual banks.

Industry groups too can, and are, taking steps to reduce exposures collectively. Well-founded netting arrangements can help—though it is crucially important that they should be legally secure. For a number of years there have been arrangements to achieve netting of foreign exchange obligations between pairs of counterparties. These bilateral arrangements not only help reduce settlement risk but also reduce the replacement cost risk that arises from open positions between the trade date and the settlement date. If a counterparty fails after a trade has been made but before settlement, a bank is exposed to the cost of replacing the uncompleted deals. This can be reduced if multiple deals are validly netted. But the bigger risks generally arise in the settlement process itself. The sums involved in this process can be reduced still further by multilateral netting and the first clearing house to net foreign exchange transactions multilaterally, ECHO, was established in London last year. A similar US-based scheme called Multinet expects to be operational within a few months. Such multilateral systems do, of course, raise some of the same questions about concentration of risk which is mentioned in relation to derivatives settlement.

In addition, the G20 group of commercial banks has established a project to tackle the issue of foreign exchange settlement risk more comprehensively, and is currently discussing its proposals with the G10 central banks. Its objective is to achieve a form of payment versus payment, a concept similar to that of delivery versus payment in securities markets, but where payment in one currency is linked to the payment in the other. The purest solution to the risks involved in foreign exchange settlement would be a form of payment versus payment which linked together the various national RTGS systems operating in different currencies. This would enable them to exchange matched pairs of payments simultaneously transaction by transaction. As the cost of computing power continues to fall, and as payment systems are open for longer hours within the day,

reducing time-zone problems, this vision may well become more achievable. For the immediate future, however, different solutions are needed and RTGS systems are an important part of the approach for netting and other collective arrangements. RTGS systems make final funds in the relevant currencies available to the clearing houses which, in addition, have to use various forms of collateral to cover the time-gaps in the settlement process. RTGS systems therefore speed the process, reduce the periods of exposure, and provide certainty about the precise timing of payment transfers.

The third strand in the G10's strategy is action by central banks. The approach of central banks to foreign exchange settlement risk is initially to draw the industry's attention more positively to the problem—as I am doing now, and, in conjunction with banking supervisors, to encourage an appropriate response both from individual banks and from the industry groups. If progress is not adequate, central banks and banking supervisors will consider what further action is required to bring about the necessary reduction in risk. The G10 governors look for tangible improvement within two years, and will review the situation next spring and again a year later.

Conclusion

Mr Chairman, I have been able this evening to report to you very considerable progress towards reducing payments and settlements risks—especially in relation to our domestic payments system and in important aspects of domestic securities settlement. That is encouraging—so far as it goes! But you would not expect a central banker to leave you with an unambiguously comfortable message, and so I emphasise in conclusion how much remains to be done.

We are still some way from achieving final delivery versus payments in relation to domestic securities; and we have made very little progress up to this point in addressing Herstatt risk. In a world of increasingly interdependent financial markets it is no time to rest on our laurels.

Gilbart may not have cared much for the Bank of England but I rather suspect he would have been four-square behind us on this issue. To quote again from his 'History, Principles and Practice of Banking', he wrote:

'Banks are not quite in the same position as other business men; they are custodians of immense sums of the public's money, and any relaxation of ... prudent and cautious methods ... would be very regrettable.'

I think that, like some central bankers, he was a master of understatement.