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Volume 43 Number 2

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Markets and operations (pages 149–63)

Research and analysis (pages 164–227)

This article reviews developments in sterling and global financial markets, UK market structure and the Bank's official operations since the Spring *Quarterly Bulletin*.

Research work published by the Bank is intended to contribute to debate, and does not necessarily reflect the views of the Bank or of MPC members.

What caused the rise in the UK terms of trade? (by Karen Dury and Laura Piscitelli of the Bank's International Economic Analysis Division, Maria Sebastia-Barriel of the Bank's Structural Economic Analysis Division and Tony Yates of the Bank's Monetary Assessment and Strategy Division). The UK terms of trade rose by 15% from 1995 Q3 to 2003 Q1. This article looks at alternative explanations of why this happened, and what they mean for the likelihood that the terms of trade increase will endure.

Long-run equilibrium ratios of business investment to output in the United Kingdom (by Colin Ellis and Charlotta Groth of the Bank's Structural Economic Analysis Division). Over the past 20 years, the constant-price and current-price ratios of business investment to total output have behaved very differently. In this article we use a simple framework to examine how these two ratios should behave in long-run equilibrium. We investigate the conditions in which each ratio will be constant and, more generally, consider how each might evolve over time.

An analysis of the UK gold auctions 1999–2002 (by Anne Vila Wetherilt of the Bank's Monetary Instruments and Markets Division and Graham Young of the Bank's Foreign Exchange Division). This article examines bidding data for the 17 gold auctions held by the Bank of England on behalf of HM Treasury between July 1999 and March 2002. It employs information on auction participation to evaluate the outcomes of the auctions. Consistent with earlier studies it finds that the prices achieved at the auctions overall were in line with prevailing market prices. The article shows that uncertainty about future gold price movements was an important influence on the outcomes of particular auctions, although no single factor can explain why some auctions resulted in greater demand than others.

Assessing the extent of labour hoarding (by Guillermo Felices of the Bank's Structural Economic Analysis Division). The strength of employment during the recent slowdown is sometimes taken as evidence of labour hoarding. But the extent of such hoarding is difficult to measure. This article reviews different definitions of labour hoarding and a variety of ways of measuring it using aggregate data. Most of these measures indicate that labour has been underutilised during the recent slowdown, implying that firms have indeed hoarded labour to some extent. However, the magnitude of the reduction in utilisation differs across these measures. The evidence also suggests that the recent decrease in utilisation has been limited compared with previous episodes in which labour utilisation was significantly below trend.

Asset finance (by Andrew Hewitt of the Bank's Domestic Finance Division). Asset finance, in its various forms, is widely used in the United Kingdom. Indeed, one survey has shown it is the largest type of funding for almost a quarter of those small and medium-sized enterprises (SMEs) that use external finance. Some forms of asset finance have grown rapidly in recent years, while others have not; and some new asset finance products have been brought in from the United States. This article provides an overview of asset finance from a UK perspective.

Reports (pages 228–39)

Public attitudes to inflation. The market research agency NOP has been carrying out quarterly and annual surveys of public attitudes to inflation on behalf of the Bank since November 1999. As part of a regular series, this article describes the results of the full annual survey that took place in February 2003. It shows that public opinion remains fairly stable on most issues, though expectations of future interest rate movements do of course fluctuate. Those who think rates should stay where they are remain the largest group, but among the rest, the public was evenly divided over whether it would be better for Britain's economy for rates to rise or fall over the next few months. The proportion satisfied with the way the Bank is doing its job of setting interest rates has fallen since last year. But the decline in the approval ratings may have reflected the reduction in awareness of the Bank's policies, when rates were unchanged for a long period.

Foreign Exchange Joint Standing Committee e-commerce subgroup report. This article describes recent developments in electronic trading in the foreign exchange market, based on a report produced by the e-commerce subgroup of the Foreign Exchange Joint Standing Committee. After a brief introduction to e-commerce in the context of the foreign exchange market, it discusses developments in electronic trading, including both single-bank and multi-bank internet-based systems, and explains market initiatives such as 'prime brokerage' and 'white labelling' that have been facilitated by electronic platforms.

Markets and operations

This article reviews developments since the Spring Quarterly Bulletin *in sterling and global financial markets, UK market structure and the Bank's official operations.*⁽¹⁾

- Uncertainty in financial markets relating to the war in Iraq passed.
- Forward interest rates declined globally.
- Equity indices rose, perhaps on reduced uncertainty and lowered perceptions of corporate risk.
- The dollar and, to a lesser extent, sterling continued to depreciate against the euro.
- Work continues to allow settlement of money market instruments in the CREST system and procedures have been announced for their migration into CREST from September 2003.

Since the end of February, government bond yields have declined at almost all maturities, but equity markets have bounced back and credit spreads narrowed further. The US dollar has continued to depreciate against the euro and, to a lesser extent, sterling (Table A).

Table A

Summary of changes in market prices and forecasts

	3 March	30 May	Change						
December 2003 three-month interest n	December 2003 three-month interest rate								
United Kingdom	3.30	3.41	11 bp						
Euro area United States	2.22 1.47	2.02	-20 bp -31 bp						
Ten-year nominal government forward									
rate (per cent) (a)	1 76	4 71	5 hp						
Furo area	5 4 5	5 35	-10 bp						
United States	6.06	5.76	-30 bp						
Equity indices									
FTSE 100 index	3685	4048	9.9%						
Euro Stoxx 50 index	187	205	9.5%						
S&P 500 index	835	964	15.4%						
Exchange rates									
Sterling effective exchange rate	100.1	97.8	-2.3%						
\$/€ exchange rate	1.09	1.18	8.2%						
2003 GDP growth forecasts (per cent) (b)	1								
United Kingdom	2.1	2.0	-0.1 pp						
Euro area	1.1	1.0	-0.1 pp						
United States	2.4	2.3	-0.1 pp						

Sources: Bank of England, Bloomberg and Consensus Economics.

(a) Six-month forward rates, derived from the Bank's government liability curves.

(b) Consensus Economics, surveys conducted 10 March and 12 May.

Fluctuations in uncertainty

Early in March, ahead of the war in Iraq, equity prices fell and bond yields declined globally. While the picture was mixed, many indicators suggested that there was increased uncertainty in financial markets.

In mid-March, however, shortly before the war began, contacts suggest many leveraged market participants closed out positions that stood to gain from falling interest rates and US dollar depreciation. Equity markets rose, the US dollar appreciated, and there was a sharp sell-off in bond markets globally, with short-term forward interest rates rising. For example, sterling money market interest rates, which had fallen in preceding weeks, rose sharply as market participants reported heavy selling of short sterling futures on LIFFE.

In the first instance, this rise in equity prices and market interest rates was accompanied by increases in the implied volatilities derived from option prices on interest rates and equity indices. But, as the outcome of the war became clearer, these measures of uncertainty declined (Chart 1). Oil prices—one key channel through which the war might have had a significant

(1) The period under review is 3 March (the data cut-off for the previous Quarterly Bulletin) to 30 May.

Chart 1 Selected three-month implied volatilities(a)



Sources: Bank of England, Bloomberg, CME, Eurex and NYMEX.

(a) Implied by option prices. Equal weighting where more than one instrument used.

(b) Options on eurodollar and euribor interest rate futures contracts.
 (c) Euro and dollar three-month into ten-year swaptions.

(d) Options on S&P 500 and Euro Stoxx 50.

impact on the global economy—fell and uncertainty about future prices declined (Chart 2). Major equity market indices rose further (Chart 3).

Chart 2 Options-implied price probabilities three months ahead



Equity markets

Over the review period as a whole, the MSCI world equity index rose by nearly 14%. The US S&P 500 increased by more than the Euro Stoxx 50 index in local currency terms, but by a similar amount in common currency terms, suggesting that equity market prices might have adjusted to reflect the effect of the US dollar's depreciation against the euro on the earnings of international companies.⁽¹⁾

(1) See forthcoming June 2003 Bank of England Financial Stability Review, Section I.

(2) Derived from single stock options.

Chart 3 Changes in selected equity indices





(a) The Morgan Stanley Capital International (MSCI) World Index is a capitalisation-weighted index of stocks from around the world.

The rise in the MSCI index was broadly based across subindices of companies in different industry groups (Chart 4), consistent with one or more common factors lying behind the increases. With expectations of GDP growth having been revised downwards in many countries (Chart 5), reduced uncertainty is perhaps the most plausible explanation.

Chart 4

Sectoral performance of MSCI world equity index, 3 March-30 May



Source: Bloomberg

Consistent with this, the implied volatility of the S&P 500 index has declined since the end of the Iraq war, and by more than the market value weighted average of the implied volatilities of the individual stocks in the index.⁽²⁾ The gap between these two

Chart 5 Expected 2003–04 real GDP growth



volatility measures—a measure of implied correlation between stocks, which is increasingly traded in options markets—had narrowed earlier in the year, suggesting an increase in the relative importance of general uncertainty, affecting all stocks more or less equally, compared with idiosyncratic uncertainty affecting particular stocks (Chart 6). The subsequent widening of this gap, as implied volatilities have declined, might be linked to reduced war-related uncertainty.

Chart 6





Sources: Bank of England, Bloomberg, Standard & Poor's and Thomson Financial Datastream.

General uncertainty might also have declined if investors were somewhat less concerned about corporate risk following balance sheet restructuring, cost cutting and actions to address failings in corporate governance and accounting standards. This would be expected to have reduced perceptions of credit risk, and yield spreads of corporate bonds over swap rates have narrowed (Chart 7). Retail investor flows into corporate bond funds, particularly high-yield funds in the United States, have remained at high levels on both sides of the Atlantic.

Chart 7

Spreads over swaps of international investment and sub investment-grade corporate bonds



At the beginning of the period, the term structure of the implied volatility of the FTSE 100 index, derived from options prices, had been downward sloping, suggesting expectations that the high actual volatility at that time would be short-lived. As one-month implied volatility has declined, this curve has become less inverted. The FTSE 100 volatility 'smile'-which plots implied volatility across options with different strike prices-has remained negatively sloped (Chart 8). Since mid-2002, it has been more negatively skewed than that of the S&P 500 (Chart 9).⁽¹⁾ One possible interpretation is that market participants associate a sharp fall in UK equity prices with greater price volatility, perhaps because of concerns that UK life insurers would have to liquidate equity holdings in such circumstances. But the higher implied volatilities—reflecting higher prices charged by dealers-might also indicate strong demand for downside protection from buyers that would suffer

(1) On a constant-maturity basis. For details about how the Bank derives implied risk-neutral probability density functions for assets upon which options contracts trade, see Clews, R, Panigirtzoglou, N and Proudman, J (2000), 'Recent developments in extracting information from options markets', *Bank of England Quarterly Bulletin*, February, pages 50–60.





Sources: Bank of England and LIFFE.

(a) European options expiring June 2003.

- (b) European options expiring September 2003.
- (c) The at-the-money (ATM) implied volatility is for an option with a strike price equal to the FTSE 100 index future. Delta is the rate of change of the option price with respect to the underlying asset price, and its absolute value falls as strikes move further out-of-the-money. Increasingly out-of-the money put (P) options (low strikes) are shown to the left and call (C) options (high strikes) to the right.

Chart 9 Six-month implied FTSE 100 and S&P 500 skews



significant welfare losses if the market fell to those levels.

Anecdotally, UK life insurers, which have, at least until recently, held a larger proportion of their assets in equities than those in the United States and most other European countries, have been significant buyers of out-of-the-money put options, often financed by selling out-of-the-money calls or even more deeply out-of-the-money puts.⁽¹⁾ More recently, with equity markets rising, some institutions have reportedly bought back calls that they had written, leading dealers to purchase equities in order to unwind delta hedges.

Although implied volatilities of the major US and European equity indices have fallen, they remain higher than in the early to mid-1990s (Chart 10). One underlying macroeconomic reason for this might be continued uncertainty about the sustainability of the pick-up in US productivity growth in the late 1990s; whether the benefits of the associated technological advances could extend beyond the United States over time; and the extent to which this would translate into future corporate earnings. Such considerations may particularly affect technology stocks. Their share of the market capitalisation of the S&P 500 has declined sharply since 2000, but it remains higher than in the mid-1990s, probably increasing the implied volatility of the index.





Sources: Bank of England, CME, Eurex and LIFFE.

(a) 30-day moving averages

Fixed-income markets

The rise in equity markets since early April stands in contrast to downward revisions to consensus expectations for the path of near-term GDP growth (Chart 5). But lower growth expectations are consistent with declines in short-term market interest rates. Broadly, the rise in rates in mid-March has unwound steadily since the end of the Iraq war. Over the review period as a whole, euro and US dollar rates have fallen, and sterling rates have changed little (Charts 11 and 12). Money market yield curves suggest expectations that official sterling, euro and perhaps US dollar interest

 A put (call) option is out-of-the-money when its strike price is below (above) the current price of the underlying asset. There is no incentive to exercise an out-of-the-money option, since this would result in a negative payoff.

Chart 11 Changes in short-term interest rate expectations^(a)



Source: Bloomberg.

(a) As implied by short-term interest rate futures contracts.

Chart 12 Changes in implied nominal forward rates^(a)



(a) Six-month forward curves derived from the Bank's government liability curves. (Estimates of the UK curve are published daily on the Bank of England's web site at: www.bankofengland.co.uk/statistics/yieldcurve/main.htm.)

rates will be reduced further in the next twelve months⁽¹⁾ and that the subsequent pace of interest rate rises will be gentle.

Chart 13 shows the difference between three-year spot sterling real interest rates (r_S) and five-year real rates five years forward (r_L), constructed both from index-linked gilts and by subtracting survey-based inflation expectations from nominal forward rates derived from conventional gilts. Short-maturity real rates (r_S) will be affected by the current outlook for economic growth, including the expected monetary policy response, whereas longer-maturity real rates (r_L) are likely to be

Chart 13 UK short versus long-maturity forward real interest rates



affected rather less by the cyclical position of the economy.⁽²⁾ Assuming that the real rate term structure is broadly flat in steady state, it is possible to trace out the path, implied by the yield curve, for short and longer-maturity real rates to reconverge.⁽³⁾ This implied path has not altered greatly over the review period, with yields on short-dated index-linked bonds falling only a little, and this path does not suggest short and long real rates reconverging for some time. Short-term inflation expectations also fell slightly, but remained fairly close to the Bank of England's 2.5% inflation target.

Declines in implied forward interest rates have been significant at medium and long as well as short maturities (Chart 12). Long-term sterling real forward rates, derived from index-linked government bonds, have also fallen since early April, having risen in March. But moves in real forward rates have been smaller than in nominal forward rates, so that the fall in long-term nominal rates can be accounted for by both lower forward real interest rates and lower inflation expectations.

A weaker cyclical outlook for global economic growth over the next few years should not of itself lead to lower longer-term forward rates. Rather these might reflect changes in the balance of saving and investment in the economy or, more narrowly, the supply of and demand for government bonds. Or they might follow reassessments by market participants either of the underlying potential for economic growth or of monetary policy frameworks. For example, market

(1) On 5 June 2003, shortly after the end of the review period, the European Central Bank reduced its official interest rate by 0.5 percentage points to 2%.

- (2) See Haldane, A and Read, V (1999), 'Monetary policy and the yield curve', Bank of England Quarterly Bulletin, May,
- pages 171-76. (3) Treating real forward rates as expected future real rates ignores the possible presence of term premia.

Variability of nominal forward rates

Over the past ten years, sterling nominal six-month forward rates at 7, 10 and 15-year maturities have declined (Chart A), perhaps suggesting an increase in monetary policy credibility after the Bank was granted operational independence in May 1997.

Chart A





Since early 1999, 7-year forward sterling rates have moved largely in a 4.25% to 5.25% range (Chart B).

There has been more variability at 10 and 15 years, including a period in 1999 when 15-year rates were very low. But this may have reflected the balance of supply and demand for longer-dated gilts, with UK institutional investors needing to match liabilities in the context of the Minimum Funding Requirement at a time of reduced gilt issuance.⁽¹⁾





 See Brooke, M, Clare, A and Lekkos, I (2000), 'A comparison of long bond yields in the United Kingdom, the United States, and Germany', Bank of England Quarterly Bulletin, May, pages 150–58.

contacts have suggested that long-term US dollar interest rates may have fallen partly because of speculation that the Federal Reserve might purchase Treasury bonds if it were to implement so-called 'unconventional' monetary policy measures. They have also reported at times strong flows into longer-dated Treasuries, including by investors willing to take greater duration risk in search of higher yields. Falls in longer-term sterling forward rates have been smaller and not unusual by comparison with previous fluctuations in these rates. The box above shows that seven-year nominal forward sterling rates have been relatively stable since the Bank of England was granted operational independence in 1997.

Sterling money markets

The Monetary Policy Committee (MPC) maintained the Bank's repo rate at 3.75% during the review period. However, the level of interest rates implied by short

Chart 14

Short-term interest rates during the period(a)



Source: Bloomberg.

(a) As implied by short sterling interest rate futures contracts.

sterling futures fluctuated, as market participants reassessed the likelihood of further official rate reductions (Chart 14). In particular, interest rates implied by contracts maturing in 2003 rose following the April and May MPC announcements, with market participants having priced in some expectation of a policy rate reduction prior to these meetings.

But the sharp movements in short sterling futures rates in March were difficult to explain in terms of changes in underlying interest rate expectations. Rather, market movements at that time seem to have been influenced by a build-up of leveraged long positions followed by their somewhat disorderly liquidation ahead of the Iraq war. Falls in the number of June and September 2003 short sterling contracts outstanding (open interest) were greater than in comparable euribor contracts or short sterling contracts at longer maturities (Chart 15). Historical short sterling volatilities were greater than those of three-month interbank deposit rates, although not unusually so (Chart 16).

Chart 15

Open interest in short-term interest rate futures (contracts outstanding)



Chart 16 Volatility of three-month interest rates(a)



Sources: Bank of England and Bloomberg.

(a) Annualised standard deviation of daily changes over a 65-day rolling window.(b) Derived three-month constant horizon.

Options on short sterling futures provide forward-looking indicators of uncertainty about the path of short-term interest rates. The implied volatility of sterling rates has fallen since March, but the decline has been smaller than for equivalent euro and US dollar rates (Chart 17). However, the slope of the term structure of forward implied standard deviations for short sterling futures rates (Chart 18) is, in basis points, similar to its average over recent years.

Chart 17

Six-month option-implied volatility of short-term interest rates



Sources: Bank of England, CME, Eurex and LIFFE.

Chart 18 Option-implied three

Option-implied three-month short sterling forward standard deviations



Sources: Bank of England and LIFFE.

Exchange rates

Interest rate expectations during the review period were at times influenced by changes in the sterling exchange rate index (ERI). The index declined by 3.0% to a low of 97.1 on 27 May, and ended the period at 97.6 (Chart 19). Sterling depreciated by 4.4% against the euro, but appreciated by 3.6% against the US dollar (Chart 20). Euro-sterling implied volatilities increased relative to sterling-dollar implied volatilities, leading the one-year implied euro-sterling correlation to decline (Chart 21).

Chart 19

Sterling effective exchange rate



Chart 20 Sterling exchange rates



Chart 21 One-year implied exchange rate correlations



Movements in sterling, euro and US dollar market interest rates only partially accounted for movements in sterling's exchange rate over the period. Table B decomposes exchange rate movements according to the uncovered interest parity (UIP) condition, which seeks to assess the impact of interest rate news on the exchange rate.⁽¹⁾ Interest rate news here is measured as the change in the differences between ten-year UK and overseas government bond yields. Assuming constant medium-term exchange rate expectations, a fall in relative UK interest rates would be expected to lead to an immediate depreciation in the exchange rate followed by a gradual appreciation. While the appreciation of sterling against the US dollar was consistent with interest rate news being an important factor behind the move, sterling's depreciation against the euro was not.

Table B Exchange rate movements and news: 3 March-30 May

	£ ERI	€/£	\$/£	\$/€
Actual change				
(per cent)	-2.3	-4.4	3.6	8.4
Interest rate news	17	1 5	7 4	2.0
(percentage points)	1./	1.5	5.4	2.0
of which: domestic	-1.5	-1.5	-1.5	-2.9
foreign	3.2	2.9	4.9	4.9

'Carry trades' were said to be popular over the period, including in sterling. Such trades involve borrowing in one currency and investing in a higher-yielding one with the aim of earning the interest differential (the 'carry'). Changes in short-term interest rates and exchange rates relative to the US dollar are shown in Chart 22. The risk in the trade is that the higher-yielding currency depreciates, as suggested by the UIP framework, removing the profit made on the interest differential before the trader can close out the position. In consequence, such trades tend to be more popular if exchange rate volatility is perceived to be low and markets liquid. Positions tend to be built up gradually but can be reversed in the full size of the position, which, at least temporarily, can lead to sharp changes in exchange rates. Sterling's fall against the yen on 7 May (the outcome of the May MPC meeting was announced the following day) was reportedly in part driven by the unwinding of carry trades. Long positions in the Canadian and Australian dollars against short positions in the yen or US dollar were said to have been particularly popular trades with hedge funds and other speculators.

 See Brigden, A, Martin, B and Salmon, C (1997), 'Decomposing exchange rate movements according to the uncovered interest rate parity condition', *Bank of England Quarterly Bulletin*, November, pages 377–89.

Chart 22 Yield differentials and exchange rate movements



The main exchange rate development over the review period was the depreciation of the US dollar against the euro. Possible explanations for dollar depreciation centre around similar issues to those discussed in the previous *Bulletin*: the sustainability of the US current account deficit, overseas demand for US equities, and the degree of uncertainty about productivity growth. Some market commentators suggested that earlier concerns about a war in Iraq acted as a catalyst for the US dollar to move closer to its expected long-term level and that, once closer to this level, there has been little impetus for a reversal.

The expected volatility of exchange rate movements seems to have increased, with a sharp rise in US dollar-yen implied volatility in particular (Chart 23). Despite market speculation about Bank of Japan intervention to sell yen, the US dollar-yen volatility 'smile' is skewed towards yen calls, suggesting market participants are willing to pay more for protection from (or to bet in favour of) a yen appreciation rather than a depreciation. That is said to be linked in part to hedging in the yen-US dollar foreign exchange options market of large positions linked to structured notes (for example, so-called 'power reverse dual currency' notes) sold to Japanese investors in a form of exotic carry trade.

Developments in market structure

This section reports some significant changes in sterling market infrastructure, as well as developments in instruments and trading patterns.

Chart 23 Foreign exchange one-month option-implied volatilities



NIPs Code: undisclosed principal trading

The Foreign Exchange Joint Standing Committee announced on 28 May a change in the Non-Investment Products (NIPs) Code⁽¹⁾ to discourage the practice of undisclosed (unnamed) principal trading⁽²⁾ in the foreign exchange market, a practice which leaves banks potentially unable to assess credit exposures and legal risks.

Under the revised Code, a fund manager should notify the credit and/or compliance functions of its bank counterparty of the identity of the principal for which it is acting. The bank's front office should remain unaware of the principal's identity (a 'Chinese wall' should operate), so market-sensitive information would not be released.

A period of one year to June 2004 has been agreed to implement the change, giving fund managers and banks time to make systems changes and to amend procedures and legal agreements. Among other things, the change should enhance the management of counterparty credit risk in foreign exchange markets.

Settlement of sterling money market instruments

Much has been done in recent years to reduce settlement risks facing banks. In the United Kingdom, work continues on the planned settlement of money market instruments (MMIs) through CREST from September this year, which would bring a welcome

A code of good market conduct for the sterling, foreign currency and bullion wholesale deposit markets, and the spot and forward foreign exchange and bullion markets. See www.bankofengland.co.uk/markets/nipscode.pdf.

⁽²⁾ Undisclosed (unnamed) principal trading typically occurs when a fund manager deals in foreign exchange with a bank but does not disclose full details of the client, ie the principal for which it is acting, because the client wishes to preserve anonymity in the market. For more information, see Bank of England Quarterly Bulletin, Spring 2003, pages 98–99.

reduction of settlement risk in the sterling money markets.⁽¹⁾

On 6 May, HM Treasury laid before Parliament the draft Uncertificated Securities (Amendment) (Eligible Debt Securities) Regulations 2003. Once passed they will pave the way for the integration of non-material money market instruments—to be known as 'eligible debt securities' (EDS)—into the CREST securities settlement system.

Work remains under way on three key strands of legal documentation.

- EDSs will be created under a deed made by the issuer(s). After extensive consultation, *pro forma* terms were discussed at a meeting of the Money Market Liaison Group's Next Steps Group in early June and the terms and an explanatory memorandum finalised.⁽²⁾
- To become a 'participating issuer' of EDS in CREST, an issuer must submit an Issuer Application Form; CRESTCo has recently published a standard form. Issuers must also be party to an agreement with an Issuing and Paying Agent (equivalent to a Central Moneymarkets Office (CMO) lodging agent). It is envisaged that versions of these documents will be sent to existing issuers via their current CMO lodging agents.
- In addition, CRESTCo requires issuers incorporated or established outside the United Kingdom to provide legal opinions as to the validity and enforceability of the EDS arrangements and the capacity of the issuer to enter into those arrangements. To make this process as simple as possible, CRESTCo has announced that it is willing to accept capacity opinions from in-house lawyers; and the Bank and CRESTCo have been discussing with the Association of Foreign Banks how the market might co-ordinate the gathering of jurisdictional opinions.⁽³⁾

The Bank and CRESTCo invited eligible banks to attend seminars on 11, 12 and 13 June to discuss preparations and documentation required by accepting banks and drawers of eligible bills. More than 50 banks attended. Procedures for the migration of MMIs into the CREST settlement system are set out in the CREST *White Book* (Migration of MMIs from the Central Moneymarkets Office into CREST). From 15 September the CMO counter will be closed to lodgements and all new issuance will take place in CREST. Remaining euro-denominated securities in CMO will migrate on 22 September, HM Treasury bills on 29 September, bankers' acceptances on 6 October and certificates of deposit (CDs) on 13 October. The *White Book* explains that CMO members should make bilateral arrangements to ensure that all collateral is returned to the entitled owner by the Friday before the relevant migration day, although it will be possible to return collateral early on the migration day.

In line with these procedures, the Bank proposes that counterparties with outstanding repos in open market operations (OMOs) collateralised by HM Treasury bills or eligible bank bills at the respective migration dates substitute other eligible security types for them.⁽⁴⁾ It will be possible to substitute CMO instruments with EDS issued into CREST. In the interests of an orderly migration, counterparties are asked to perform substitutions ahead of the migration dates where possible. The Bank will manage the migration of HM Treasury bills and eligible bank bills purchased on an outright basis in OMOs.

CDs in particular are used as collateral for stock borrowing of other securities, including gilts. CRESTCo and the Bank are consulting market participants to seek to ensure that the migration of CDs occurs without widespread recalls of outstanding stock loans, which could have an adverse effect on, for example, gilt repo market liquidity.

Developments in the gilt repo market

In the gilt repo market, the Bank's quarterly repo and stock lending (RSL) survey found the level of outstanding business at the end of February to be £126 billion, some £10 billion lower than at the end of November (Chart 24). Neither the RSL survey nor data for banks only⁽⁵⁾ suggest any clear trends in gilt repo outstanding since early 2000. And there has been little change in RSL survey stock borrowing volumes over the same period. This contrasts with the euro repo market,

⁽¹⁾ See Bank of England Quarterly Bulletin, Winter 2002, pages 367–68 and Spring 2003, page 15.

⁽²⁾ Available on the Bank's web site: www.bankofengland.co.uk/markets/money/mmfuture.htm.

⁽³⁾ Pro forma opinions and other documentation are available from CRESTCo's web site: www.crestco.co.uk/home.html#news/cmo-migration.

⁽⁴⁾ A list of OMO eligible security types can be found in the Operational Notice (www.bankofengland.co.uk/markets/money/mmopnot.pdf).

⁽⁵⁾ See Bank of England Monetary and Financial Statistics, Table B1.2. (A sharp increase in gilt repo amounts outstanding in Murch 2007 suffected a sharp in the supervision superline in the supervision of the supervision o

in March 2003 reflected a change in the reporting population.)

Chart 24 Gilt repo amounts outstanding



which appears to have grown since 2000, at least up to mid-2002.⁽¹⁾

Market participants have suggested a number of reasons for the apparent lack of expansion in the gilt repo market. CDs are often used to collateralise gilt borrowing, and lower spreads between general collateral gilt repo and sterling CD rates may have made it less attractive for banks and securities dealers to borrow gilts from potential stock lenders. One influence on this spread may have been relative supply. The value of CDs outstanding has been fairly steady over this period, while relative gilt availability may have increased following the extension in late 1999 of collateral eligible in the Bank OMOs and the sterling stock liquidity regime to include euro-denominated European Economic Area (EEA) government debt securities.

Other possible explanations for lack of expansion of gilt repo market outstandings include a decline in 'specials' activity⁽²⁾ and the increased popularity of derivatives, including overnight indexed swaps (OIS), to hedge or create interest rate positions.

Calculation of SONIA

Sterling OIS are referenced to the Sterling Overnight Index Average (SONIA), a weighted average of rates on unsecured sterling overnight cash transactions broked in London. On 2 June, after extensive consultation, the Wholesale Markets Brokers' Association (WMBA) broadened the definition of qualifying transactions used in the calculation of SONIA. The calculation had previously been based only on interbank transactions.⁽³⁾ This has been extended to all sterling overnight cash transactions with a minimum size of £25 million, irrespective of counterparty status.

For a period prior to the extension, the WMBA calculated SONIA on both definitions. The average difference between calculations was less than 3 basis points, and the average value of transactions captured was around 50% higher than under the previous definition (Chart 25). This shows that there is significant non-bank involvement in the sterling overnight wholesale deposit market.

Chart 25 SONIA rates and volumes



Source: Wholesale Markets Brokers' Association.

Derivatives volumes

According to a Bank for International Settlements survey, the notional outstanding amount of sterling over-the-counter (OTC) interest rate derivatives was \$7.4 trillion at end-December 2002, compared with \$7.0 trillion in June 2002 (Chart 26), an annual growth rate of over 10%. Over the past two years, the amount outstanding has increased by over 50%, a similar increase to the notional amount outstanding in all currencies. The growth of interest rate derivatives has far outpaced that of other OTC derivative products (Chart 27).

⁽¹⁾ See, for example, the International Securities Market Association (ISMA) European Repo Market Survey, December 2002, and the European Central Bank Euro Money Market Study 2001. The ISMA survey includes non-government debt collateral but around 90% of repo reported has been against government debt securities.

⁽²⁾ For an explanation of 'specialness' in repo, see Bank of England Quarterly Bulletin, Winter 2002, page 360

^{(3) &#}x27;Section 43' listed money market institutions and their overseas branches. The Financial Services Authority Section 43 regime ceased on 1 December 2001.

Chart 26







Chart 27 Notional amounts outstanding of OTC derivatives by type of underlying



(a) Estimated positions of non-regular reporting institutions.

The growth in OTC interest rate derivatives is not surprising. Interest rate swaps are bilateral transactions used to take interest rate views and hedge interest rate positions. When dealers want to adjust or close out a position, they will typically enter into a new offsetting transaction rather than cancel the original trade. As time has passed, the number of swap contracts outstanding has therefore increased. But the existence of overlaid swaps increases operational costs and risks. This has led to market initiatives to introduce the early termination of interest rate swaps, or 'tear up' facilities.⁽¹⁾

SFD designation of London Clearing House

On 23 April 2003, following consultation with the Bank of England on payment aspects, the Financial Services Authority designated the London Clearing House (LCH) under the Financial Markets and Insolvency (Settlement Finality) Regulations 1999, which implement the European Union Settlement Finality Directive (SFD) in the United Kingdom.

SFD designation reduces the disruption to a system arising from insolvency proceedings brought against a participant located in the EEA. Together with the protection provided in the United Kingdom by Part VII of the Companies Act 1989, LCH's designation provides protection to the system in the event of default arising from the insolvency of one of its participants.

Four other high-value payment and settlement systems are already accorded SFD protection through a designation under UK law: CHAPS Sterling, CHAPS Euro, CREST and Continuous Linked Settlement.⁽²⁾

Bank of England official operations

Changes in the Bank of England balance sheet

Both the foreign currency and sterling components of the Bank's balance sheet increased between 26 February and 28 May (Table C). $^{(3)}$

On 18 March 2003, the Bank auctioned a further \in 1.0 billion of the 2006 note as part of its euro-denominated notes programme. The auction was covered 2.7 times and the average accepted yield was 2.858%, some 18.5 basis points below the three-year swap rate. This increased the total nominal value of the 2006 note outstanding in the market to \in 2.0 billion, and the total nominal value of Bank three-year euro notes outstanding in the market to \in 6.0 billion.

⁽¹⁾ For example, TriOptima's TriReduce product terminated euro-denominated interest rate swaps of over €420 billion nominal value in its first production run on 25 April. TriOptima expects to extend this service to sterling interest rate swaps in the coming months.

⁽²⁾ Continuous Linked Settlement, operated by CLS Bank International, settles bought and sold currencies on a 'payment-versus-payment' basis. See Bank of England Quarterly Bulletin, Autumn 2002, pages 257–58 and Winter 2002, pages 365–66, and Bank of England Financial Stability Review, December 2002, pages 82–85.

⁽³⁾ For an explanation of the main components of the Bank of England's balance sheet, see page 18 of Bank of England Quarterly Bulletin, Spring 2003.

28 May

21

13

3

11

49

26 Feb.

19

13

4 11

47

Table C

Simplified version of Bank of England consolidated balance sheet as at 28 May 2003(a)

£	bil	lions	5

Liabilities	28 May
Bank note issue Settlement bank balances Other sterling deposits, CRDs and the Bank of England's capital and reserves Foreign currency denominated liabilities	33 <0.1 5 11
Total (b)	49

(a) Based on published weekly Bank Returns.(b) Figures may not sum to totals due to rounding.

The Bank maintained the nominal value of its three-month and six-month euro-denominated bills outstanding at \in 3.6 billion, rolling over maturing bills at auctions held monthly during the period.

Growth in the sterling components of the Bank's balance sheet over the period as a whole largely reflected increased demand for bank notes. During the period, there were seasonal peaks in demand for currency, at Easter and the May Bank Holidays.

Bank notes represent by far the Bank's largest liability, making growth of the note issue a key underlying determinant of changes in the size of the overall balance sheet. In recent years, expansion of the note issue has been mirrored by an increase in the size of the Bank's stock of refinancing (SoR) via open market operations (OMOs), mainly two-week reverse repos of government securities. The difference between note issue liabilities and the SoR is largely accounted for by the 'Ways and Means' (W&M) loan, an illiquid advance to HM Government, held constant since the transfer of responsibility for UK central government cash management to the United Kingdom Debt Management Office (DMO) in April 2000. Prior to the transfer, W&M fluctuated with the level of government expenditures and receipts, requiring the Bank to adjust the scale of its OMOs each day to offset cash flows between the government and the private sector; the DMO now offsets those fluctuations through its cash management (Chart 28).

Over recent years there have been changes in the composition of the collateral against which the Bank's monetary operations are secured. In particular, reverse repos of euro-denominated securities issued by EEA governments have increasingly accounted for a larger share (Chart 29). The choice of collateral to deliver in OMOs varies from counterparty to counterparty, depending on a number of factors: technical capacity to deliver and substitute collateral in different settlement systems; the composition of a counterparty's asset book; and the relative cost of different eligible collateral types.

Chart 28

Assets

Total (b)

Stock of refinancing

26 Feb.

31

11

47

< 0.1

Bank notes in circulation, the stock of refinancing and 'Ways and Means'

Ways and Means advance to HM Government

Other sterling-denominated assets

Foreign currency denominated assets



The cost of collateral can be proxied by the spread between the rate at which it can be repoed (ie the return on cash placed against it) and the unsecured interbank cash rate at the same maturity. A measure of the relative cost of collateral in different currencies is, therefore, the spread of those spreads. Chart 30 suggests that there is some correlation between the cost of euro-denominated EEA debt relative to gilts and use of EEA debt by counterparties in the Bank's OMOs.

Chart 30 Relative cost and delivery in OMOs of euro-denominated EEA government securities^(a)



Source: Bloomberg.

(a) Relative cost calculated as difference between one-month BBA repo and Libor fixing spread and one-month European Banking Federation repo and euribor spread. A larger spread indicates a lower cost of repoing euro-denominated debt relative to repoing gilts.

There was slightly less recourse to the Bank's overnight lending facilities than in the previous period (Chart 31). This may have contributed to greater use of euro-denominated securities, because the Bank's 15.30 overnight facilities are restricted to sterling-denominated securities as a result of settlement system timetable constraints. It also had the effect of increasing the average maturity of the SoR, thereby decreasing the size of the banking system's average daily liquidity shortage in March-May compared with November-February (Chart 32).

Chart 31 Refinancing provided in the Bank's open market operations



Chart 32

Average maturity of stock of refinancing and average daily shortage



Forecasting the liquidity shortage

Uncertainty about demand for bank notes increased over Easter and with the possibility of industrial action by staff at one of the companies responsible for their distribution. This led the Bank between 14 and 28 April to increase from £200 million to £400 million the amount of the banking system's forecast liquidity need held over from the 9.45 to the 14.30 round of OMOs in order to minimise the risk of oversupplying liquidity intraday. Partly as a result of this greater uncertainty, revisions to the 9.45 liquidity forecast were larger in April than in surrounding months (Table D).

Table D Intraday forecasts versus actual shortages

Mean absolute difference (standard deviation), £ millions

	9.45 forecast	14.30 forecast	16.20 forecast
2000 (a) 2001 2002 Jan. 2003 Feb. 2003 Mar. 2003 Apr. 2003 May 2003	$\begin{array}{cccc} 121 & (96) \\ 98 & (205) \\ 83 & (107) \\ 79 & (82) \\ 93 & (81) \\ 67 & (57) \\ 167 & (183) \\ 114 & (119) \end{array}$	$\begin{array}{cccc} 99 & (64) \\ 56 & (51) \\ 43 & (82) \\ 41 & (56) \\ 54 & (61) \\ 42 & (46) \\ 68 & (119) \\ 46 & (37) \end{array}$	$\begin{array}{cccc} 103 & (56) \\ 30 & (73) \\ 30 & (73) \\ 24 & (25) \\ 49 & (37) \\ 26 & (24) \\ 39 & (51) \\ 46 & (43) \end{array}$

(a) From April 2000

Over a longer period, the size of errors in the Bank's final, 16.20, forecast has remained fairly steady since the transfer of central government cash management to the DMO. The typical level of settlement banks' overnight balances at the Bank has also declined (Chart 33). This has occurred without an increase in the incidence of negative individual end-of-day balances.

Chart 33 Settlement account balances(a)



Settlement banks may also have improved the quality of their own liquidity forecasting in recent years. One piece of evidence for this has been a decline in average flows in the End of Day Transfer Scheme (EoDTS, Chart 34). Settlement banks aim to achieve small end-of-day credit balances on their settlement accounts at the Bank, but failed settlements or incomplete

Chart 34 End of Day Transfer Scheme volumes(a)



information about customer flows may leave some banks unexpectedly long or short.

Every day, settlement banks report their balances to the Association for Payments Clearing Services after the close of CHAPS. Transfers of long and short balances then take place across settlement banks' accounts at the Bank of England to achieve a smoother distribution of end-of-day settlement account positions.⁽¹⁾

(1) Further details on the EoDTS can be found on the APACS web site: www.apacs.org.uk/downloads/EoDT.pdf.

What caused the rise in the UK terms of trade?

By Karen Dury and Laura Piscitelli of the Bank's International Economic Analysis Division, Maria Sebastia-Barriel of the Bank's Structural Economic Analysis Division and Tony Yates of the Bank's Monetary Assessment and Strategy Division.

The UK terms of trade rose by 15% from 1995 Q3 to 2003 Q1. This article looks at alternative explanations of why this happened, and what they mean for the likelihood that the terms of trade increase will endure.

Introduction

The UK terms of trade—the price of UK exports relative to the sterling price of UK imports—rose by 15% between 1995 Q3 and 2003 Q1. Whether this terms of trade rise—which, other things being equal, represents an increase in the purchasing power of UK consumers endures could have important implications for the outlook for UK demand. That in turn may depend on what caused the rise in the first place. For example: over the same period, UK final domestic demand increased by an average of 0.9% a quarter, compared with 0.6% during 1970 Q1–1995 Q2. It is conceivable that whatever caused the terms of trade to rise also led to the increase in the growth of demand. So the path of the terms of trade over the future could be a key factor in the outlook for domestic spending.

This article sets out several possible explanations for the increase in the terms of trade, explores how they measure up to the evidence and tries to draw some inferences about how likely it is that the increase will endure.

Context, accounting and measurement

Before turning to look at explanations that economic theory might suggest for the rise in the terms of trade, this section sets out some salient facts about the recent rise: how unusual it was in recent economic history; how the terms of trade have evolved relative to other statistics on the macroeconomy; and what literally 'accounts' for the rise in statistical terms. This section also discusses whether the movements in the terms of trade are simply an artifice of bad measurement.

How unusual is the recent rise in the terms of trade?

If the recent rise is a continuation of clearly visible historical trends, it might reasonably be assumed to persist. Alternatively, if it is historically more novel, we might think it more likely that the terms of trade will fall back again in the future. Chart 1 shows the movements in the terms of trade since 1995 and Chart 2 shows what has happened since 1955.⁽¹⁾



(a) The sharp dip in the services terms of trade shown in Chart 1 reflects the effect of 11 September 2001 on the insurance sector. The value of insurance sector output is measured by recording the difference between premiums (revenues) and claims (costs). Estimates of the claims (from particularly US firms, on UK insurers) associated with 11 September were allocated to 2001 Q3. For this period, the measured value of output becomes negative. The volumes of output are assumed to be unaffected, and the volatility is therefore reflected in the export deflator.

The terms of trade are at their highest level since 1955. Yet though the 15% rise since 1995 is dramatic, the level of the terms of trade is only 4.8% higher than in 1972 Q2 and 7.7% higher than in 1992 Q2 (the two most recent peaks). So whether the terms of trade look

(1) This is the longest time series for which we have closely comparable data on the terms of trade.





trended or not depends to some extent on what time period we look at. Since the mid-1970s the terms of trade appear to be trended (this is true for the overall and the non-oil terms of trade, which rules out the possibility that the trend over this period was an oil price related phenomenon). If we go back as far as the late 1950s there is no clear trend apparent in the data.

Whether there is a tendency for the UK terms of trade to rise or not over time, it is certainly the case that there have been many large and persistent movements in the terms of trade before the most recent episode in 1995. For example, between 1974 Q2 and 1978 Q2, the terms of trade rose by 16% and between 1986 Q4 and 1992 Q2 they rose by around 11%. Large rises and falls are not unusual.

What are the macroeconomic circumstances surrounding the rise in the terms of trade?

Recent UK data are consistent with a story that has consumers and firms buying more imports in response to an increase in purchasing power associated with the rise in the terms of trade. Final domestic demand grew by 0.9% a quarter over the period 1995 Q3 to 2003 Q1, compared with an average of 0.6% a quarter prior to this (1970 Q1–1995 Q2). Expenditure on imports was such that the net trade contribution to GDP growth fell from about zero to about -0.2 percentage points per quarter over these same two periods. These correlations show up at higher frequencies. For example, when the terms of trade rise, the saving ratio falls, and the amount that net trade (the difference between imports and exports) subtracts from GDP growth increases. Of course in the same period that the terms of trade rose, there was also a large rise in the nominal sterling effective exchange rate index (ERI): a rise of about 22% between 1995 Q3 and 2003 Q1. But the quarter-on-quarter correlation between the ERI and the terms of trade, unsurprisingly positive since 1995 Q3, was actually negative prior to this (1979 Q1 to 1995 Q2).

In the past, movements in the world price of oil have affected the terms of trade significantly, particularly following the two OPEC price increases of 1973–74 and 1979. But the rise in the terms of trade since the 1995 Q3 trough has not been an oil-related phenomenon. Chart 1 makes this clear, comparing the terms of trade for goods with the terms of trade for goods excluding oil. The movements in these two series have been very close.

Which industries account for the rise in the terms of trade?

The rise in the terms of trade has been more marked for services than for goods, as Chart 1 shows. In 2003 Q1 the terms of trade for goods were 12.8% higher than in 1995 Q3, compared with a rise of 17.2% for services over the same period. Despite this, and because goods make up over 70% of the expenditure basket on imports and exports combined, goods still made the largest contribution to the rise in the terms of trade.

It is interesting to note that the rise in the goods terms of trade was accounted for entirely by the rise in the terms of trade for information, communications and technology⁽¹⁾ (ICT) goods, as shown in Chart 3. (Although within the 'non-ICT' sector there were rises and falls for different goods that offset each other.)



Chart 3 UK terms of trade (goods)

(1) ICT includes office machinery, computers and processing equipment, electronic components, TV transmitters and telephony and radio, sound and video.

Is the rise in the terms of trade due to a change in import or export prices or both?

For both the goods and services sectors, the relative price of exports to imports rose over the period 1995 Q3 to 2003 Q1. The rise in relative prices for the services sector occurred because export prices rose while import prices stayed broadly flat, as shown in Chart 4. But the story is different for the goods sector, where both export and import prices fell, though import prices fell by more than export prices (20% compared with 10%), as shown in Chart 5, resulting in a rise in the relative price of exports to imports of goods.

Chart 4

UK services prices and terms of trade



Chart 5



Is the rise due to changes in relative prices or the composition of trade?⁽¹⁾

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There are two kinds of reasons (in an accounting sense) why the terms of trade can rise. The first is that export

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prices rise relative to import prices, holding expenditure shares constant. The second is that expenditure on imports shifts towards goods or services whose prices rise by less than the average; or that the share in export sales of items whose prices increase by more than the average rises. We can gauge the extent to which expenditure shifts explain the terms of trade change by comparing price series that hold expenditure shares constant with those that have varying expenditure shares.⁽²⁾ Chart 6 does this for goods, the only series for which both types of index are available. It shows that since 1995 the 'variable-weight' series (which is our benchmark series, and used to plot Charts 1 and 2) has risen by more than the 'fixed-weight'⁽³⁾ series. This suggests that expenditure shifts in either imports or exports have contributed to the rise in the terms of trade for goods.

Chart 6 UK terms of trade (goods)



Against which countries have the UK terms of trade risen?

Chart 7 shows that the rise in the UK goods terms of trade has been predominantly against non-EU countries (16% compared with a rise of 6% against EU countries between 1995 Q3 and 2002 Q4). Looking at how the terms of trade for other countries have moved since 1995 Q3, we find that since 1995 Q3 the United States and Germany saw a small rise in their respective terms of trade of about 3%, but non-EU countries such as Japan, Korea and Thailand (all net exporters of ICT goods) have experienced falls in their terms of trade of 15%, 31% and 14% respectively (up to 2002 Q4). In

2000 02 - 95

0.70

1988

90

92

 $[\]sum w_i^x \cdot p_i^x$ where w_i denotes expenditure weights, p_i denotes prices, (1) Formally, the terms of trade are given by $\sum w_i^m \cdot p_i^m / e$

m superscript denotes imports (expressed in foreign currency), x superscript denotes exports (expressed in pounds), e is the exchange rate written as foreign currency units per pound.

Fixed-weight series are only available for goods; and only from 1963 Q1.

⁽²⁾ Weights are fixed to 1995 expenditure shares. (3)

France and Italy, the terms of trade were broadly flat.⁽¹⁾ It might seem that this does not add up, as we would expect a counterpart to the rise in the UK terms of trade. If there were only one other country in the world, the terms of trade of that country would fall by the same amount as those for the United Kingdom would rise. However, in reality trade with the United Kingdom forms only a small part of the trade flows for each other country.

Chart 7





Is the rise in the terms of trade an artifice of imperfect measurement?

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It is conceivable that some of the rise in the terms of trade does not reflect a genuine economic phenomenon, but is instead a consequence of imperfect measurement. There are three problems in measuring traded prices and drawing inferences from how they move.

First, direct measures of the price of imports and exports are not available for services, only for goods.⁽²⁾ For imports and exports of services, broad indicators of inflation, such as changes in average earnings or retail price indices, are often used as proxies. For goods, about 76% of expenditure on exports involves prices derived from surveys of importers and exporters and 45% of expenditure on imports. The other prices are proxied using (among other things) domestic producer price indices and world market prices. A second measurement problem arises because the trade prices used to compute measures of the terms of trade are not derived from annually chain-linked National Accounts.⁽³⁾ When there are large changes to the relative prices of goods that make up an aggregate series like those we are studying, data that are not annually chain-linked can be misleading.⁽⁴⁾ In fact, approximate calculations of annually chain-linked series show that the change in the terms of trade since 1995 is not a result of mismeasurement of this kind: estimates of the changes in annually chain-linked series look very similar to changes in our benchmark series (ie those that use 1995 prices to calculate expenditure shares, shown in Charts 1 and 2, for example).

A final potential problem is not so much a measurement problem as one that affects how we interpret the terms of trade data. The prices of imports and exports are the prices of goods that are a bundle of some non-traded inputs and some traded inputs. For instance, exports sold abroad reflect the price of land, machinery and labour. A change in the relative price of 'imports' and 'exports' (our measure of the terms of trade) could come about because there is a change in the price of those non-traded inputs in the United Kingdom relative to abroad. This complicates how we interpret the likely cause and consequences of a terms of trade rise. For example, if there were a reduction in labour supply (a non-traded input), the price of exports could rise relative to imports. Such a change would be unlikely to lead to an increase in the incomes of typical UK consumers (the typical UK household in this scenario would be working fewer hours and earning less).

It is conceivable that the improvement in the terms of trade since 1995 is an artifice of some of these measurement problems, and not a phenomenon that requires any economic explanation. By construction, we cannot tell without better measures of the terms of trade. But, putting that possibility aside, the rest of the article seeks to explain the data on the assumption that they are capturing a genuine economic change.

There is also no obvious counterpart to the rise in the UK non-oil terms of trade.
 For more information about the methodologies used for the construction of trade prices, see Ruffles and Williamson

⁽¹⁹⁹⁷⁾ and Ruffles (1997).

⁽³⁾ The ONS has chain-linked the national accounts every five years, the latest base year being 1995. However, it will switch to annual chain-linking from September 2003. The impact of chain-linking on the National Accounts was discussed in a box on pages 14–15 of the May *Inflation Report*.

⁽⁴⁾ Currently, the change in prices is calculated by weighting together the change in prices of items in the (import or export) basket. These weights are based on shares in 'real expenditure', where the real expenditure on each good is nominal expenditure deflated by 1995 prices. An annually chain-linked series would use expenditure weights that reflected changes in prices over time. The problem with infrequently chain-linked series like those we have occurs if there is a large relative price change between goods within (say) the import basket. A large relative price fall of one good in the import basket, for instance, would bring with it, other things being equal, a decline in the share of expenditure taken by that good. Weighting using base-year prices would not capture this fall in expenditure, and so the price fall would be given too high a weight in the aggregate series, and the fall in the overall import price index would be overstated. See Tuke and Ruffles (2002) and Beadle and Tuke (2003).

What might have caused the rise in the UK terms of trade?

There are several potential economic explanations for the recent rise in the terms of trade. This section describes each one in turn and examines empirical evidence to determine whether or not it was the likely cause of the rise in the UK terms of trade since 1995 Q3.

An increase in demand for UK exports

One possibility is that global demand may have shifted towards UK exports. If this were to happen, the price of UK exports would be bid up, and the terms of trade would rise. Returns in the UK export sector would rise and this would increase UK income per head relative to abroad. UK consumers would gain from the rise in profits, and from the fact that they could buy more imports for the same amount of exports. This increase in UK incomes would lead to a rise in the price of non-traded goods in the United Kingdom relative to abroad. As consumers became richer, their demand for non-traded goods and services (like, for example, land) would increase. And since the terms of trade and the price of non-traded goods in the United Kingdom relative to abroad would rise, this amounts to saying that the real exchange rate (crudely, the sum of the two) would rise.⁽¹⁾

Recall that the terms of trade increase came about because the fall in the price of imports exceeded the fall in the price of exports (Charts 4 and 5).⁽²⁾ So, for this story to fit the facts, we need some other explanation (perhaps an increase in the productivity of traded sectors in all countries) why both prices fell, and for this to have been coupled with a shift in demand towards UK exports to mean that the fall in UK export prices was more muted.

The evidence for the idea that global demand for UK exports increased is mixed. As noted above, spending of UK firms and consumers accelerated following the terms of trade increase, consistent with an improvement in UK purchasing power. The average quarterly growth rate of total domestic demand in the United Kingdom between 1995 Q3 and 2002 Q4 was 0.9%: demand in the major six (M6) international economies grew by 0.5% on average per quarter.⁽³⁾ The real exchange rate rose by 32% over the period.⁽⁴⁾

One possibility is that this increase in global demand took the form of an increase in the demand for services, in which the United Kingdom has a comparative advantage. (This can only be a part of the explanation for the rise in the terms of trade, since most of that increase was due to goods.) One fact that might support this possibility is that the share of UK exports in world exports grew over the period 1995 Q3-2002 Q2.⁽⁵⁾ And looking at the United States, which accounts for about 23% of total UK exports of services, we see that the US terms of trade for services have fallen by approximately 5% since 1995. As we document later, there is some evidence that the United Kingdom has become more 'specialised' in services.

But the hypothesis that there has been an increase in demand towards UK exports does not fit all the facts. Charts 8 and 9 show striking similarities between the shares of different goods in UK imports and exports, and how they have evolved over time. At this level of disaggregation, there appears to be no significant difference between the composition of UK imports and exports of goods. This is also the case for imports and exports of services. The shares of imports and exports of services (in total imports and exports respectively) have remained broadly unchanged since 1988 (about 20% for imports and 25% for exports). The fact that the import and export baskets are similar implies that any shift in global demand towards some good should affect the price of imports and exports equally. Of course, it is possible that at some finer level of disaggregation the import and export baskets do differ.(6)

The increase in income per head in the United Kingdom would also mean an increase in the UK demand for imports. (1)However, given the size of the UK economy, it does not seem likely that this increase in demand could affect world prices, driving up the price of UK imports. It is also worth pointing out that in the very long run, the shift in global demand towards the UK export sector would cause that sector to grow, as new firms set up employing workers who formerly worked in other sectors. As the supply of UK exports rose, the terms of trade would begin to fall back. (2) The goods and services export deflator fell by about 5% whereas the goods and services import deflator fell by 17%

from 1995 Q3 to 2003 Q1 (3) Proxied by the M6 countries plus the United Kingdom.

According to the IMF definition. (4)

Over the period 1995 Q3-2002 Q2 the share of the nominal value of services exports of M6 countries (Canada, (5) France, Germany, Italy, Japan and the United States) plus the United Kingdom accounted for by UK exports grew from 11.7% to 14.4%. Source: National Institute for Economic and Social Research (NIGEM database).

Later in the article, we discuss Michaely indices of specialisation for the United Kingdom, which do reveal some (6) differences in the import and export bundles (see Chart 10). These figures are based on values, while the figures in Charts 8 and 9 are based on volumes.

Chart 8 UK import shares in goods

Material manufactures Machinery and transport equipment and other miscellaneous manufactures excluding ICT ICT Miscellaneous Chemicals Fuels Basic materials Food, beverages and tobacco Per cent 100 90 80 70 60 50 40 30 20 10 C 1990 92 94 96 98 2000 02

Chart 9

UK export shares in goods



An increase in the efficiency of other countries' export sectors

A rise in the terms of trade could have been due to an increase in supply in foreign export sectors, which reduces the price of foreign exports (the price of UK imports). That could have come about because foreign productivity rose relative to the United Kingdom, or because foreign exporters became more competitive: monopoly power in those sectors could have fallen, or regulations loosened, or there may have been some fall in tariff or other non-price barriers to trade.

If this were the explanation, UK consumers would have enjoyed the increase in purchasing power induced by the improvement in the terms of trade but they would not have acquired the transfer of income that a change in tastes towards UK exports would have brought. Instead, foreign consumers would experience a rise in their income per head. This would increase their demand for UK exports, which would drive up the price of UK exports, reinforcing the effect on the UK terms of trade. It is not clear what would happen to the real exchange rate: it could rise or fall. So we cannot use evidence of that sort to evaluate this theory.⁽¹⁾ The fact that the real exchange rate rose is consistent with—but not really evidence in support of—this theory.

There is evidence that foreign productivity rose relative to the United Kingdom at the same time as the rise in the terms of trade took place. Average annual total factor productivity growth was a little over a half of that in the United States and four fifths of that in Germany.⁽²⁾ Table A sets out data on the growth in labour productivity per head for the traded and

Table A

Average annual labour productivity growth rates in the traded and non-traded sector^(a)

	United Kingdom	United States	Japan	Germany	France	Italy	Canada
Traded sector							
1992–95 1996–99	5.1 1.3	$3.7 \\ 4.3$	1.6 2.8	4.8 2.1	4.6 2.8	4.5 2.0	3.2 -0.1
Non-traded sector	r						
1992–95 1996–99	2.7 1.7	0.5 2.4	$0.0 \\ 0.1$	0.9 1.2	0.1 0.7	1.7 0.0	$0.8 \\ 0.1$

Sources: Bank calculations, OECD

(a) Growth rates in the latter period for Japan and France are 1996–98 and for Canada is for 1996–97.

(1) Whether the real exchange rate would rise or fall turns on how close a substitute are UK and foreign traded goods. If they are close substitutes, then any increase in the terms of trade we see could have been brought about by quite a small productivity improvement abroad. That in turn would mean that the increase in real incomes abroad would be small, and this would mean that the price of foreign non-traded goods (like land, for instance) would not be bid up much. If that is the case, the UK real exchange rate could rise, since the rise in the terms of trade is only partially offset by the fall in the price of UK non-traded goods relative to non-traded goods abroad. Conversely, if UK and foreign traded goods are not very close substitutes, a larger productivity improvement would have been needed to bring about the improvement in the terms of trade, and that in turn would mean that the increase in foreign incomes could bid up the price of non-traded goods abroad, by enough to mean that the overall real exchange rate for the United Kingdom falls.

⁽²⁾ Total factor productivity is defined as the amount by which output growth exceeds growth in the quantity of labour and capital used in production. Source: NIESR productivity database. Referred to in O'Mahony, M and de Boer, W (2002). Database available on www.niesr.ac.uk/research/prodc.htm. Calculations by Bank of England authors.

non-traded sectors for the United Kingdom and a number of its major trading partners. The United Kingdom's average annual growth in labour productivity per head in the traded sector over the period 1996–99 was 1.3%, substantially lower than that of our major trading partners, with the exception of Canada. The table also ties in with the observation that the rise in the UK terms of trade was mainly against non-EU countries: the slowdown in UK productivity is more marked against non-EU than EU countries. The EU countries have also experienced a relative slowdown in productivity but not to the same extent as the United Kingdom.

One fact noted above is indicative of the productivity explanation. Almost the entire rise in the United Kingdom's terms of trade for goods can be accounted for by a rise in the terms of trade in ICT goods. This would suggest that there has been a rise in productivity in prominent ICT-exporting countries, their export prices for ICT goods (UK import prices of ICT goods) have fallen, and that there has been a fall in their terms of trade. Indeed ICT import prices into the United Kingdom fell by 57% between 1995 Q3 and 2002 Q4. And prominent ICT exporters, such as Thailand and Korea, did experience a significant fall in their terms of trade over the same period (14% and 31% respectively).⁽¹⁾ A fall in the price of ICT imports would have a significant effect on the UK terms of trade if the United Kingdom was a significant importer of ICT goods. In fact ICT imports account for a large share of total UK imports of goods (an average of 22% since 1995 Q3). The United States is also a large importer of ICT goods (ICT goods accounted for an average of 13% of total US imports of goods since 1995 Q3) and experienced a rise in the terms of trade in ICT goods. The US terms of trade in 'computers, peripherals and parts' rose by 15% from 1995 to 2001.

However, this explanation by itself also has problems fitting some of the facts. Demand by foreign consumers and firms fell relative to that in the United Kingdom, not what we would expect if foreign incomes had risen relative to ours. Moreover, if there had been a productivity shock in some sector, regardless of the country, we might have expected it to have affected import and export prices in the same way, since, as we have pointed out the UK import and export bundles appear to be very similar at the levels of disaggregation available. Finally, if what has happened is related to an improvement in the productivity of the ICT sector, it is striking that it affected the United Kingdom differently from the euro area.⁽²⁾

The fall in foreign export prices could, as noted above, have been due to changes in tariffs. There is some partial evidence to support this hypothesis. UK import tariff rates have fallen by nearly 44% since 1995 compared with a trade-weighted average fall of 32% for both the United States, Japan and Canada (since the implementation of the single market in 1992 there have been no tariffs on flows of goods between the United Kingdom and the European Union).⁽³⁾

A shift in the composition of demand or supply in the United Kingdom

A shift in the composition of demand and supply could have contributed towards a terms of trade improvement.

First, it is possible that there was an increase in the demand of UK buyers for goods that, for whatever reason, subsequently saw a relative price fall. This demand change would mean that UK budgets would go further, and amount to an increase in effective real incomes. Total UK consumption could rise.

Alternatively, there could have been a shift in the share of UK export sales towards goods that (for whatever reason) subsequently saw a relative price increase. That might happen because of changes in the pattern of foreign demand, or because of changes in the United Kingdom—perhaps changes in the regulatory environment, for example.

There is some supporting evidence that some type of expenditure shift has taken place since 1995 Q3. About one third of the rise in the terms of trade for goods since 1995 Q3 can be accounted for by expenditure

⁽¹⁾ It may be that the fall in the terms of trade in countries such as Thailand and Korea was due to the significant

<sup>currency depreciations these countries experienced, although it is difficult to assert this with any confidence.
(2) To figure out why this was the case, we would need data on trade in ICT goods between the euro area and the rest of the world. That would enable us to determine whether the euro area imported ICT goods in different quantities, or of different types, or from different places than the United Kingdom (and carry out the same analysis for euro-area exports of ICT goods). Unfortunately, we do not have these data readily available.</sup>

⁽³⁾ Source: UNCTAD Handbook of Statistics. This figure is for the European Union as a whole, so we are assuming that the United Kingdom can be taken to be similar to the average EU country. To the extent that the pattern of trade of the United Kingdom with non-EU countries differs from the trade flows for other EU countries, this figure may not be very precise.

shifts. Chart 6 showed this, by comparing the rise in a fixed-weight terms of trade series with one that re-weights as the shares of different goods in expenditure change.

Charts 8 and 9 show there has been an expenditure shift towards ICT goods in both imports and exports, the category of goods that 'accounts' for the change in the terms of trade for goods. Moreover, within the ICT category, there has been a greater shift in expenditure towards computers (which have seen the largest increase (about 70%) in the terms of trade) within imports than in exports. In 1990 44% of ICT imports were of computers (and related equipment). By 2002 this figure had risen to 65%.⁽¹⁾

An expected productivity improvement in the United Kingdom

If firms and consumers expected the United Kingdom to be (permanently) more productive in the future, the terms of trade could rise. Consumer demand would increase in anticipation of the extra income to come. and firms would start to invest to acquire more machines to take advantage of the new opportunities to make profits. Some of this demand would be for goods produced by the UK traded goods sector, which also supplies foreign markets. This would bid up the price of those goods. If the increase in demand of UK buyers for goods produced by the UK traded sector was greater than the increase in UK demand for foreign goods, the UK terms of trade would rise. The increase in real incomes for the United Kingdom would also bid up the price of UK non-traded goods like land and labour, so the real exchange rate would also rise.

Once the future productivity improvement was realised, (and if some of it occurred in the traded sector) the terms of trade improvement would reverse: the extra supply to the market would push down UK export prices.

There is some evidence that supports this explanation for the terms of trade improvement. As discussed earlier, UK domestic demand rose relative to its trading partners.

However, the difficulty with this explanation is that the expectation of the productivity rise would have been formed at a time when UK productivity was actually falling relative to its trade partners. It is conceivable

that it was precisely the slowdown in *actual* productivity relative to other countries that led to the anticipation of a future productivity *increase* as the United Kingdom caught up. But this seems a little far-fetched. In the past, productivity differences across countries have proven very persistent.

A rise in the relative degree of impatience of UK consumers or an easing of credit conditions

Another possible explanation for a rise in the terms of trade is that UK consumers became more 'impatient' something changed for them that meant that saving was less attractive than before—and wanted to borrow more heavily against future income. This would increase current demand, and would generate the same set of effects as the increase in expected future productivity discussed above. Alternatively, it may simply have become easier for consumers to borrow, as credit conditions eased. This in turn may have been because of some change in the financial sector such as regulatory reform or an increase in competition.

It is hard to rule this explanation in or out. The rise in UK demand relative to abroad, the rise in the real exchange rate, and the rise in UK asset prices are all symptoms consistent with these types of effects, but they are consistent with many of the other explanations put forward. There is also no hard evidence that it is easier to borrow than before. For example, there is no clear trend since 1995 in spreads on personal sector lending (either secured or unsecured). And although there has been a good deal of financial deregulation that made borrowing easier for consumers, that took place in the 1980s and is not so plausibly related to the period we are focusing on: the second half of the 1990s. Against this, the rise in house and equity prices itself may have eased credit constraints for those who do not have alternative sources of borrowing, and by more than for consumers and firms in other countries.

Globalisation

One conception of the world economy is that it has become increasingly 'globalised' in some sense, and that the pace of this globalisation has increased recently. Globalisation could refer to many things, but it should be explicable in terms of the kinds of theories we have already discussed—since these amount to a typology of

⁽¹⁾ This compares with 41% for exports of computers in total ICT exports in 2002.

all the 'real' factors that could have shifted the terms of trade.

First, globalisation could result in significant increases in the supply of foreign exports, reducing their price and increasing the UK terms of trade. In an increasingly globalised world economy, costs such as transport costs and barriers to entry fall, and thus prices of internationally traded products fall. These changes may affect global production such that the basket of goods and services that the United Kingdom imports becomes cheaper relative to the basket of goods and services the United Kingdom exports. The fall in export and import goods prices experienced by the United Kingdom as well as the rest of the developed world is evidence that some improvement in competition has taken place across at least the traded goods sectors of the world economy.

Second, globalisation may have brought about an increase in actual or expected world income per head. As poorer countries become richer, it is conceivable that their preferences may shift towards goods that tend to be produced by richer countries. Globalisation could therefore have generated an apparent shift in demand towards UK exports. There is evidence to support this. GDP per head has increased more in the least developed countries than in the rest of the world since 1995 (2.2% compared with a world average growth rate of 1.4%).⁽¹⁾

Third, globalisation may lead to specialisation. The effect of that on the terms of trade is not really clear. It could mean that export firms become more efficient, and sell goods at lower prices (in which case the terms of trade should fall if this specialisation affects the United Kingdom more than our trading partners). But it could also lead to an increase in demand for some goods in which the United Kingdom has a lead, as more foreign buyers switch to buying these goods from abroad, than producing at home, and this should bid up the terms of trade. One example might be services like insurance, accounting and consulting.⁽²⁾ Charts 10 and 11 report the Michaely index of specialisation across sectors for the United Kingdom and a combination of large economies, respectively.⁽³⁾ An index like this records 'specialisation' as being high when a sector's exports take a larger share in total exports than its imports take in total imports. There is some evidence that the United

Kingdom is more specialised in certain financial services than other countries and that it has become increasingly so over the recent past.

Chart 10 Michaely index for the United Kingdom



Includes insurance and financial services, royalties and license fees. (a)

other business services (b) Includes transportation, travel, communication services, information services, personal services

Chart 11 Michaely index for the United States, France, Germany, Italy and Japan

- IFRO (a)
- Mining and quarrying Other services (b) Electricity, gas and water supply
- Agriculture, hunting, forestry and fishing



Source: OECD STAN database

(a) Includes insurance and financial services, royalties and license fees, other

business services (b) Includes transportation, travel, communication services, information services. personal services

There are difficulties with associating the UK terms of trade improvement with the globalisation argument.

The index is computed as the difference between the export share of a sector in national exports and the import share in national imports. A positive value indicates specialisation in that specific sector (see Michaely (1962)). Economies included are the United States, France, Germany, Italy and Japan.

Source: World Bank's World Development Indicators (WDI). UN classification is used for defining the least (1)developed countries group

Though with insurance, the United Kingdom's predominance in this field surely predates 1995. (2)

What caused the rise in the UK terms of trade?

Countries that have been more affected by globalisation, such as China and the former communist countries, still account for a small share of world GDP and do not appear to have markedly increased their imports from the United Kingdom. Moreover, as noted above, for globalisation to have a positive effect on the UK terms of trade it has to have different implications for the United Kingdom than its major trading partners. This could happen if the baskets of imports and exports of the United Kingdom and our major trading partners were significantly different. However, the share of different industries in UK and world imports has remained remarkably similar and evolved in the same way over the recent past (see Tables B and C).⁽¹⁾

Monetary explanations: price stickiness and the nominal exchange rate

It is also possible that the terms of trade could have risen for reasons connected with the appreciation of the nominal exchange rate in (and following) 1996. For example, suppose that sterling rose because of a fall in the exchange rate risk premium. (Suppose, in other words, that sterling was suddenly perceived to be less risky, or that the correlation of the returns from sterling with investors' needs became more advantageous.) Suppose too that prices are only changed every so often, and that all firms set prices in their own currency: UK firms selling abroad print price lists in sterling. If sterling rises, the price to foreigners of sterling exports rises in terms of their own currency. And the price of imports into the United Kingdom falls. The terms of trade rises. When the time comes to adjust prices, however, the terms of trade will return to the level before the exchange rate moved: real demand and supply conditions in traded goods markets have not changed.

If firms that export set prices in the foreign currency, however, the terms of trade would fall (the rise in sterling would mean that the sterling value of UK exports would fall and the sterling value of UK imports would remain the same). It is clear that how firms set prices is crucial to whether the nominal exchange rate rise can explain the rise in the terms of trade. In reality, it is likely that there are some firms which set prices in their own currency, and some that set prices in the foreign currency. It turns out that for the terms of trade to improve following a nominal exchange rate appreciation, there has to be a larger proportion of firms in the United Kingdom pricing their exports in sterling than there are those abroad pricing their exports into the United Kingdom in sterling. If this holds, the sterling price of exports would fall by less than the sterling price of imports, thus increasing the terms of trade.

There is no direct evidence on the extent of home versus foreign currency pricing by firms in the UK export sector, and firms exporting into the United Kingdom, so this explanation cannot easily be verified. However, there are two facts that make this an unlikely explanation for the terms of trade rise. First, the path of the terms of trade since 1995 Q3 suggests that this explanation is unlikely to be behind what was seen in

Table B UK import shares by industry

	Food, live animals, beverages and tobacco	Crude materials	Mineral fuels	Chemicals	Manufactured goods equipment	Miscellaneous manufacturing	Commodities	Machinery and transport	Services
1988	8.18	4.61	3.88	7.18	15.17	11.08	1.12	30.91	17.86
1996	7.73	3.08	3.06	8.14	12.85	11.26	0.70	34.08	19.11
1999	6.90	2.38	2.09	7.74	11.16	11.96	0.68	36.30	20.78

Source: OECD.

Table CWorld(a) import shares by industry

	Food, live animals, beverages and tobacco	Crude materials	Mineral fuels	Chemicals	Manufactured goods equipment	Miscellaneous manufacturing	Commodities	Machinery and transport	Services
1988	7.67	5.41	8.34	6.31	12.63	10.80	2.25	26.81	19.78
1996	6.69	3.73	8.00	6.44	10.44	11.75	2.75	29.27	20.92
1999	5.90	2.97	6.44	6.82	10.10	12.23	3.17	32.80	19.56

Source: OECD

(a) The world is proxied by the United States, Japan, Germany, France and Italy.

the data. The theory described so far would predict that the terms of trade should rise by a large amount, at the same time as the exchange rate appreciation, and then fall back. In fact, the terms of trade increase has been gradual, and persistent.⁽¹⁾ Second, the terms of trade improvement was accounted for predominantly by a rise against non-EU countries: yet the rise in the nominal ERI was accounted for predominantly by a rise against EU currencies (see Chart 12).

Chart 12 Sterling effective exchange rate



Conclusions

Between 1995 Q3 and 2003 Q1 the price of UK exports relative to the price of imports—the terms of trade rose by 15%. Whether they remain at this high level or not could have implications for the outlook for demand in the United Kingdom. The rise in the past was associated with, and may have contributed to, an increase in the growth of demand. If the terms of trade were to fall back, it is therefore conceivable that spending would be lower than otherwise. Whether the terms of trade fall back or not may depend on what caused them to rise in the first place.

In an accounting sense, the rise was almost entirely accounted for by a rise against non-EU countries. The rise was more marked in services than in goods, but because goods make up over 70% of the import and export baskets, the rise in the terms of trade for goods was the largest contributor to the overall rise. In the case of goods, the rise in the terms of trade reflects the fact that export prices fell by less than import prices; for services, export prices rose and import prices were broadly flat. It is not clear whether the post-1995 rise reflects a recent shock or if it is the continuation of an older trend. From the mid-1970s, the terms of trade appear to be trended upwards. Looking further back than that, to the early 1960s, it is plausible to argue that there is no upward trend in the terms of trade. Throughout the past few decades, the terms of trade have seen many large fluctuations. Overall, it is hard to draw precise conclusions from looking at the history of the terms of trade as to whether they will remain at their current high level or not.

The article suggested several economic reasons for the terms of trade increase: a shift in global demand towards UK export goods; an increase in the efficiency of foreign export sectors; a shift in the composition of either demand for imports by UK consumers towards goods that became cheaper, or in the supply of UK exports towards goods that became more expensive; an increase in expected future income in the United Kingdom; increasing impatience by UK consumers or firms seeking to borrow more against future income, or a relaxing of credit constraints leading to more borrowing; the terms of trade rise could be associated with ongoing 'globalisation' of production; or, finally, it could have been caused by the sharp appreciation of the nominal exchange rate in 1996.

On the face of it, since the nominal appreciation of sterling was predominantly against the EU countries, and the terms of trade rise was predominantly against non-EU countries, this does not look like the explanation.

To the extent that we believe that the rise in the terms of trade is likely to have a 'real' explanation, we can at least conceive, though by no means be certain, that it will endure for some time.

It is hard to rule any of the other explanations in or out. All are consistent with some of the evidence yet none are consistent with all of it. It is probable, therefore, that there is no single cause of the terms of trade rise.

It is plausible that there could have been a change in tastes, which increased global demand for some UK exports. The most plausible candidate for this is the services sector. Moreover, the fall in the US services

⁽¹⁾ One possibility that could reconcile this theory with what happened is that initially, firms thought that the rise in sterling was temporary. So UK exporters, for instance, were prepared to price in foreign currency units and accept a fall in their sterling export prices. As time wore on, some of those firms switched to pricing in sterling in an attempt to restore profit margins, and this caused the terms of trade to rise.

terms of trade provides a counterpart to the UK increase.

There is also striking evidence that productivity rose in foreign traded sectors relative to the UK export sector. But if this is the source of the terms of trade improvement for the United Kingdom, it remains to be explained why domestic demand increased relative to our major trading partners when in fact the opposite should occur. The terms of trade increase for goods was accounted for by the rise in the terms of trade for ICT products, and it is possible that improvements in foreign productivity in that sector are behind that. The same terms of trade improvement in ICT seems to have been manifest in the United States. And the terms of trade fell for prominent ICT exporters like Thailand and Korea. Yet it is not clear why the improvement in foreign ICT sectors did not bring about the same change in the EU terms of trade.

An anticipated productivity improvement in the United Kingdom relative to our trading partners could have caused the terms of trade improvement, but it seems odd that an expectation of a productivity improvement took hold at the same time as UK productivity growth slowed relative to that abroad.

Changes in the composition of the demand for UK imports towards lower priced products, or changes in the supply of exports towards higher priced products could

also explain the terms of trade improvement. About a third of the rise in the terms of trade for goods has been due to changes in the composition of trade, rather than changes in relative prices. As an example, the share of ICT goods in imports has risen in the United Kingdom since 1995 Q3, and to repeat, this is exactly the category of goods that accounts for the rise in the terms of trade for total goods.

It is plausible that the terms of trade rose because of an acceleration in borrowing—caused in turn by an increase in the desire of consumers to bring forward future consumption, or a loosening of credit constraints. It is certainly true that demand and borrowing accelerated after 1995: but whether this was simply a result of some other event (for example, a shift in global demand towards UK exports, pushing up UK incomes) or an independent explanation is not clear. The rise in house and equity prices relative to the United Kingdom's major trading partners, however caused, would itself have relaxed credit constraints for some UK consumers and firms.

The notion that the terms of trade increase has been related to the increasing globalisation of production is at first sight appealing but it is hard to see how globalisation should have affected the United Kingdom so differently from its major trading partners: the United Kingdom's import and export bundles look remarkably similar to those of other larger countries.

References

Beadle, J and Tuke, A (2003), 'The effect of annual chain-linking on Blue Book 2002 annual growth estimates', *ONS Economic Trends*, No. 593.

Michaely, M (1962), *Concentration in international trade, contributions to economic analysis*, Amsterdam, North-Holland Publishing Company.

O'Mahony, M and de Boer, W (2002), *Britain's relative productivity performance: updates to 1999*, Final report to the DTI/Treasury/ONS, available at www.niesr.ac.uk/research/prodc.htm.

Ruffles, D (1997), 'Statistics on trade in goods', ONS Methodological Series, No. 10.

Ruffles, D and Williamson, K (1997), 'Deflation of trade in goods statistics. Derivation of price and volume measures from current price values', *ONS Economic Trends*, No. 521.

Tuke, A and Ruffles, D (2002), 'The effect of annual chain-linking on components of the expenditure measure of GDP', *ONS Economic trends*, No. 587.

Long-run equilibrium ratios of business investment to output in the United Kingdom

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Over the past 20 years, the constant-price and current-price ratios of business investment to total output have behaved very differently. In this article we use a simple framework to examine how these two ratios should behave in long-run equilibrium. We investigate the conditions in which each ratio will be constant and, more generally, consider how each might evolve over time.

Background

Over the past 20 years, the ratio of business investment to output measured at constant prices has been rising while the ratio measured in current prices has been falling (see Chart 1).⁽¹⁾ In the most recent data, the current-price ratio is close to the lowest on record, while the constant-price ratio is significantly above its long-run average. The different patterns in these two ratios have been discussed by Bloom and Bond (2001) and in the February 2003 *Inflation Report* (Bank of England (2003a)). Furthermore, as noted in the minutes of the Monetary Policy Committee (MPC) meeting in December 2002, '...it [is] unclear whether the nominal share or the constant price share [offers] the best guide to the sustainable level of investment' (Bank of England (2003b)).





Past work at the Bank of England has focused on explaining UK business investment using econometric methods, eg Bakhshi and Thompson (2002). In this article we examine how the two ratios of business investment to output should in theory behave in long-run equilibrium. We discuss what determines the long-run behaviour and which ratio is easier to interpret. As such, our work complements the previous work by Bakhshi and Thompson (2002), in addressing the same question from a different perspective.

What determines long-run business investment to output ratios?

In this section, we explore the determinants of the behaviour of the two investment to output ratios. Throughout the article we use the following definitions:

- *I* constant-price investment
- *Y* constant-price aggregate output
- *H* the price of investment (capital) goods
- *P* the price of aggregate output

It follows that the constant-price investment to output ratio is I/Y, and the current-price ratio is HI/PY. It is shown in the appendix that the long-run equilibrium paths of the constant-price and current-price investment to output ratios, $(i - y)^{kp}$ and $(i - y)^{cp}$ respectively, are given by the following relationships:

$(i-y)^{kp} + \sigma(h-p) = \psi$	(1)
$(i-y)^{cp} + \sigma(h-p) - (h-p) = \psi$	(2)

where lower-case letters denote natural logarithms.

These relationships indicate that the first of the two key elements that determine the long-run equilibrium path of the investment to output ratios is h - p, or the price of investment goods relative to the price of aggregate

(1) The two ratios cross in 1995 as this is currently the year in which the constant-price data are 'benchmarked' against the current-price data.

output. We will refer to this as the relative price of investment. The second key element, σ , is the elasticity of substitution between capital and labour. This parameter determines the extent to which the investment to output ratios respond to changes in the relative price of investment goods. The long-run equilibrium path also depends on ψ , which is a function of structural parameters and variables.

Intuitively, we can think of the long-run equilibrium investment to output ratios as reflecting a 'demand' effect and a 'price' effect. If σ is high, there is a strong 'demand' effect on the investment to output ratios: firms' demand for investment goods increases rapidly when the relative price of investment falls. For the current-price ratio, there is also an offsetting 'price' effect to take into account: as the relative price of investment goods falls, nominal spending on investment falls in relation to nominal output, for any given quantity of investment.⁽¹⁾

In the rest of this article we discuss each of these three elements in the long-run equilibrium relationships, starting with the relative price of investment goods. We then discuss the elasticity of substitution, and finally the structural parameters and variables represented by ψ . Having discussed these three elements, we then construct some simple long-run equilibrium ratios for the current-price and constant-price investment to output ratios.

The relative price of investment

There has been a marked fall in the relative price of business investment over the past 20 years: as Chart 2 shows, it has fallen by almost 40% since 1980 Q1.⁽²⁾ To analyse the downward trend in the relative price, it is useful to look at asset-level data. These are only available for whole-economy investment and not for business investment;⁽³⁾ at current prices, business investment accounted for 79% of whole-economy investment (excluding dwellings) in 2002, with the difference between these two series mainly consisting of government investment. Like the relative price of business investment, the relative price of whole-economy investment (excluding dwellings) has also been falling over the past 20 years (see Chart 3), and the correlation between movements in the two series is high.⁽⁴⁾ So we

Chart 2 The relative price of business investment



Chart 3 The relative price of whole-economy investment



could reasonably expect the findings regarding the whole-economy investment (excluding dwellings) deflator to apply to the business sector as well.

For an asset breakdown of whole-economy investment (excluding dwellings) we use the data constructed by Bakhshi, Oulton and Thompson (2003). These encompass five different asset categories: vehicles, buildings, intangibles, computers and other plant and machinery.

Chart 4 shows that the relative price of computer investment has fallen much faster than the relative price of whole-economy investment, excluding computers and dwellings. However, it is interesting that the trend in the relative price of investment *excluding computers* is similar to the relative price including computers until the last five years of the sample. Chart 5 shows the

⁽¹⁾ The demand effect is identified by the term $\sigma(h - p)$ in both relationships, while the price effect is identified by -(h - p) in the current-price investment to output relationship.

⁽²⁾ Technically, the charts in this article show the investment deflators relative to the GDP deflator. Deflators may differ

from true prices if there are compositional changes within the aggregates.

⁽³⁾ Whole-economy investment is referred to as 'Gross fixed capital formation' in the National Accounts.

⁽⁴⁾ The correlation between quarterly movements in the two series since 1980 is 0.5.

Chart 4 Relative price of computer investment



Chart 5

Relative price of investment asset types



relative price of two other asset categories, buildings (excluding dwellings) and plant and machinery (excluding computers). The relative price of plant and machinery fell during the 1980s, and there was a sharp fall in the relative price of buildings in the early 1990s. This fall does not represent falling land prices, since the price of land does not affect the buildings deflator. Instead, it partly reflects a large fall in real wages in the construction sector between 1990 and 1994.

The contribution of each asset to the fall in the relative price of whole-economy investment includes both price effects and quantity effects: changes in both the relative price of an individual asset and in its share of total investment will affect the asset's contribution to the fall in the relative price. The total contribution of each asset is shown in Table A, which breaks our sample into five subperiods.

In the early periods, the contribution of computers to the fall in the relative price of whole-economy

Table A Contributions to the change in the relative price of whole-economy investment excluding dwellings(a)

Percentage points

	Buildings	Vehicles	Computers	Plant and <u>machinery</u>	Intangibles	Total
1976–79 1980–84 1985–89 1990–94 1995–present	2.4 -6.5 4.5 -11.5 5.5	-0.1 -0.1 1.0 0.4 -1.4	0.2 2.2 0.9 -2.8 -15.9	-4.4 -3.7 -7.2 3.2 1.4	-0.1 -0.4 0.1 0.0 0.1	-2.1 -8.6 -0.7 -10.7 -10.4
Whole sample: 1976-present	-5.7	-0.2	-15.5	-10.8	-0.4	-32.5

(a) Components may not sum to total due to rounding.

investment excluding dwellings was small, even though the relative price of computer investment was falling, as the share of computers in investment expenditures was small. In contrast, computers contributed strongly to the fall in the relative price of investment in recent periods. Other plant and machinery contributed strongly to the fall in the relative price during the 1980s, and buildings made a notable contribution in the early 1990s.

Another way of examining the fall in the relative price of investment goods is to consider imported and domestically produced investment goods separately. The relative price of investment has probably been affected by the exchange rate, as the import share of investment is significantly higher than that of consumption (see Table B). We might expect a negative correlation between the exchange rate and the relative price of investment: as sterling appreciates, imports of investment goods become cheaper. Chart 6, however, exhibits no simple long-run relationship between the relative price of whole-economy investment and the nominal exchange rate.

Table B

The import content of consumption and investment^(a) Per cent

	Consumption	Investment
1984	21.9	33.7
1990	20.3	31.8
1995	20.3	35.9

(a) Data from the ONS input-output tables. The investment data refer to whole-econom investment including dwellings, and the import content of business investment (which excludes dwellings) is likely to be higher

Chart 7 shows the relative prices of imported capital and consumption goods (excluding cars) over the past 15 years, together with the effective exchange rate index.⁽¹⁾ Following the appreciation of sterling since 1996, the relative price of imported capital goods has

(1) The relative price of imported capital goods is measured as the deflator of imported capital goods (only available from 1988) divided by the GDP deflator, and the relative price of imported consumption goods is measured in the same way.

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Chart 7 The relative price of imported consumption and capital goods



fallen much more sharply than that of imported consumption goods. Also, the relative price of capital goods rose between 1992 and 1994, when sterling depreciated. This suggests that the relative price of imported capital goods may have been more sensitive to movements in the exchange rate than that of imported consumption goods over the past few years, although there may also have been other factors at work.

To evaluate the extent to which the fall in the relative price of investment reflects a fall in the price of imported capital goods, Table C shows the contributions of imported and domestically produced capital goods to the fall in the relative price of whole-economy investment (excluding dwellings). The contributions are calculated in the same way as those for asset-level investment in Table A, under the simplifying assumption that all imported capital goods are investment goods. The relative price of imported capital goods is available only from 1988, and we break our sample into two separate periods.

Table C Contributions to the change in the relative price of whole-economy investment excluding dwellings^(a)

Percentage points

	Imported capital goods	Domestic capital goods	Total
1988–94 1995–present	-1.3 -23.1	-16.0 15.0	-17.3 -8.1
Whole sample: 1988–present	-24.5	-1.0	-25.4

(a) Components may not sum to total due to rounding.

The table suggests a very strong pattern in the contributions: in the earlier period, falling relative prices of domestically produced capital goods led to a fall in the relative price of whole-economy investment excluding dwellings, while the contribution of imported capital goods was negligible. This was because the relative price of domestically produced capital goods fell at a fast rate, when the share of domestic goods in investment was high (around 80%). In contrast, imported capital goods have driven the fall in the relative price of investment since 1995, due to a fast fall in their relative price (see Chart 7) and an increasing share in overall investment expenditure. Since 1995, the relative price of domestically produced capital goods has actually risen. This could partly explain the increasing share of imported capital goods in total investment.

To sum up, a fall in the relative price of plant and machinery investment was the main contributor to the fall in the relative price of whole-economy investment during the 1980s. During the 1990s, computer investment prices accounted for further reductions in the relative price of aggregate investment, and there was also a sizable effect from a sharp fall in the price of buildings in the first half of the 1990s. The import content of investment is high, and changes in the price of imported capital goods, which are partly driven by exchange rate movements, have contributed strongly to the fall in the relative price of investment since 1995.

Returning to our two long-run equilibrium relationships, we know that the current-price and constant-price investment to output ratios depend crucially on the relative price of investment. As discussed, the relative price has been falling since 1980, although this aggregate picture masks different relative price trends for different types of capital goods, and for imported versus domestically produced capital goods. For simplicity we will use a smoothed measure of the relative price, one which falls at its average rate of 0.5% a quarter since 1980 (see Chart 8), to calculate our

Chart 8 Smoothed relative price of investment



estimates of the long-run equilibrium ratios. By smoothing, we hope to exclude the impact of temporary or cyclical changes in relative prices.

If we wanted to project forward the long-run equilibrium investment to output ratios, we would also need to project a path for the relative price. In particular, whether or not the relative price continues to fall and at what rate would be crucial.

The elasticity of substitution in production

The second of our determinants of the long-run investment to output ratios is the elasticity of substitution between capital and labour. Economic models are of course simplifications of the real world. Production functions, which describe how firms use inputs to make output, are no exception. One common approach is to assume that firms produce output using just two inputs to production: labour; and capital, including machinery in factories (and factories themselves), but also photocopiers, computers and other office equipment. In the short run, firms may be unable to change the amount of labour or capital they use. But it is common to assume that, in the long run, firms can vary the amount of both capital and labour used in the production process.

One assumption that we make here is that firms face constant returns to scale (CRS) in the production process. This means that when firms double the amount of capital and labour used in production, the amount of output produced also doubles exactly.⁽¹⁾ Another key factor is the elasticity of substitution between capital and labour in production: this measures how easy it is to change the mix of capital and labour while producing the *same* amount of total output.

As noted earlier, this elasticity of substitution (σ) determines the extent to which the investment to output ratios respond to changes in the relative price of investment goods. In other words, it determines how sensitive the two ratios are to the 'demand' effect from a change in the relative price, discussed earlier. If capital and labour are easy to substitute, σ is high and the demand effect will be high—firms will substitute capital for labour as the relative price of capital (investment) falls. But if firms cannot substitute between capital and labour at all (σ equal to zero), there will be no demand effect: a fall in the relative price of investment will not make firms buy more capital, as the extra capital cannot be used instead of labour.

Different degrees of substitutability will thus imply different paths for the investment to output ratios. A common simplifying assumption is that the elasticity of substitution does not change over time: this is referred to as constant elasticity of substitution (CES) technology. But although the elasticity may be fixed, the degree of substitutability may take a range of values.

As mentioned above, one assumption is that it is not possible to substitute between capital and labour *at all* in the production process. This means that if firms use some extra labour in production but not any extra capital (or *vice versa*), total output produced is unchanged. This is called Leontief technology.

One way to represent the CES assumption about production technology is to plot the different combinations of capital and labour that result in the *same* level of total output. These lines are called isoquants. For Leontief technology, the isoquants are L-shaped, as extra capital or labour does not increase total production, as represented by the blue line in Chart 9.

Leontief technology is an extreme assumption and implies an elasticity of substitution of zero, as capital and labour cannot be substituted. The other extreme is that capital and labour are perfectly substitutable in the production process. This is called linear production technology, and has an infinite elasticity of substitution: the firm can change to using relatively more capital than

(1) If firms faced increasing returns to scale, output would more than double, but faced with decreasing returns to scale output would increase by less than double when firms doubled all inputs to production.

Chart 9 Isoquants for different production technologies



labour (or *vice versa*) with no loss of output. The isoquants are straight lines, as capital and labour are completely interchangeable.

A common alternative to these two extremes is Cobb-Douglas technology, where the elasticity of substitution is equal to one. This means that a 1% decrease in the *price* of capital relative to labour is matched by a 1% increase in the *amount* of capital used in production relative to labour (and *vice versa*).⁽¹⁾ As a result, Cobb-Douglas isoquants are convex curves between the straight-line isoquants of linear technology and the L-shaped isoquants of Leontief technology. The green line in Chart 9 is an illustrative example of a Cobb-Douglas isoquant.

Research suggests that the elasticity of substitution may not in practice be unity for the United Kingdom. For example, Barrell and Pain (1997) report an estimate of 0.48 for the UK private sector, and Hubert and Pain (2001) report well-determined estimates of around 0.5 for a panel of manufacturing industries. Recent work by Ellis and Price (2003) at the Bank of England estimated a slightly lower elasticity of 0.44.⁽²⁾ These estimates suggest that capital and labour are *less* substitutable than under Cobb-Douglas technology. An example of an isoquant when the elasticity of substitution is less than one is shown as the red line in Chart 9: note that the isoquant is more L-shaped than with Cobb-Douglas technology.

In the analysis of the long-run equilibrium investment to output ratios, we will examine the impact of three different assumptions about the elasticity of substitution: CES with an elasticity of substitution of a half; Leontief technology, as an example for less substitutability; and Cobb-Douglas, which implies more.

Other parameters and variables

The variable ψ in our two long-run equilibrium relationships is a function of structural parameters and variables. These include the depreciation rate of capital, the discount rate, the price elasticity of demand for the firm's output, a parameter that determines the distribution of income between capital and labour, and the long-run growth rates of both the capital stock and the price of investment goods. It also depends on tax rates and allowances.

Some components of the variable ψ are analysed in more detail by Bakhshi and Thompson (2002). For simplicity, we will assume here that it is constant over time. In a true long-run equilibrium, we would by construction expect ψ to be constant. However, this may not be true over our sample, for example in the case of the discount rate. But from experimenting with alternatives we think the effect of this assumption is small.

In the analysis of the long-run equilibrium path for the investment to output ratios, we consider two different methods for obtaining a value for ψ . Given that the relative price of investment has been falling since around 1980 (see Chart 2), one possible assumption is arbitrarily to assume that the investment to output ratios were in long-run equilibrium at that point. This means that, for given initial values for the investment to output ratios and the relative price of investment, and given an assumed value for the elasticity of substitution, we can calculate the value of ψ from (1) and (2). As an alternative method, we choose a best-fitting value of ψ over the sample period by simple regression techniques: this will be the value of ψ that minimises the gap between the observed ratios and our estimated equilibria.

Estimating equilibrium paths of the business investment to output ratios

The long-run equilibrium paths for the business investment to output ratios, using the smoothed relative price series (see Chart 8) and different assumptions about production technology, are shown for constant-price (KP) data in Chart 10 and for

⁽¹⁾ Or, analogously, the expenditure shares on capital and labour are constant.

⁽²⁾ These estimates are all obtained from demand equations for the inputs to production (capital and labour): the elasticity of substitution is one of the estimated parameters.

current-price (CP) data in Chart 11. The structural variable ψ has been calculated using the initial values (observed in 1980 Q1) for the investment to output ratios and the relative price of investment.

Charts 10 and 11 illustrate the key role of the technology assumption in judging whether either investment to output ratio is above or below equilibrium. With Leontief technology, we would expect the equilibrium constant-price ratio to be constant: in this case, a simple measure of equilibrium would be a long-run average.

Chart 10



Chart 11

Current-price business investment to output ratios



But with Cobb-Douglas technology, we would expect the equilibrium current-price ratio, rather than the constant-price ratio, to be constant. In this case, a measure of how far away we are from equilibrium would be to compare the current-price ratio with a long-run average.

Between these two cases, the long-run equilibrium behaviour cannot be characterised by an average of either ratio: given the falling relative price, neither the constant-price nor the current-price ratio would be constant in equilbrium.

Our baseline case, CES with an elasticity of substitution of a half, is of this type. And Charts 10 and 11 could also be taken to confirm that it is the most plausible, as it appears to be the one on which the data converge. This could be misleading, of course, as it could reflect our choice to fix the constant ψ by starting the equilibrium from 1980.

An alternative way is to choose a best-fitting constant by simple regression techniques, as mentioned in the previous section. The resulting equilibria from this method are shown in Charts 12 and 13. Based on these charts, it is less obvious that the Cobb-Douglas assumption is wrong, as the green equilibrium lines seem to fit the data more closely than in Charts 10 and 11.





Chart 13 Current-price business investment to output ratios



The different assumptions about technology also have implications for where the investment to output ratios stand relative to equilibrium at the moment. Under Cobb-Douglas technology, both ratios are significantly below equilibrium in the latest data. In contrast, under Leontief technology both ratios are above it. In our baseline case, with an elasticity of substitution of a half, both ratios are slightly below equilibrium, but not as much as under Cobb-Douglas technology.

The equilibrium lines in Charts 10 to 13 are based on simple assumptions and methods, but they are useful examples of how we would expect the equilibrium to evolve over time. Looking forward, the outlook for both equilibrium investment to output ratios depends on whether the relative price of investment continues to fall or not. If the relative price continues to fall, we would expect the equilibrium constant-price investment to output ratio to continue to rise, although the above charts illustrate that the deviations around this equilibrium can be large and long-lived. The mirror image of this is that the equilibrium current-price investment to output ratio would continue to fall. But if the relative price were to stop falling, both the constant and current-price equilibrium ratios would then stop rising and falling, respectively. On the other hand, if the relative price were to start rising, the trends in the equilibrium constant and current-price ratios would reverse.

Conclusion

Over the past 20 years, the constant-price and current-price investment to output ratios have behaved very differently. In this article we have set out how the ratios behave in long-run equilibrium, using a simple framework. The long-run equilibrium paths depend on the relative price of investment, which has been falling over the past 20 years, and the elasticity of substitution between capital and labour in the production process. In our baseline case, with an elasticity of substitution of 0.5, neither ratio is obviously more informative than the other, and both ratios were slightly below our baseline long-run equilibrium measures in the recent past.

Appendix

This appendix derives the two long-run relationships described on page 177. The expressions are derived from a simple model with a single capital good and a constant returns to scale (CRS), constant elasticity of substitution (CES) production function. In addition to the variables listed on page 177, we define K as the capital stock, W as labour cost and N as labour input. As before, lower-case variables denote natural logarithms. The CES production function may be written:

$$Y^{s} = \left[\alpha K^{-\theta} + \left(1 - \alpha\right)\left(Ne^{at}\right)^{-\theta}\right]^{-\frac{1}{\theta}}$$

and firms face a constant-elasticity demand curve

$$Y^D = P^{-\varepsilon}$$

Firms are assumed to maximise the infinite stream of future profits subject to the capital accumulation identity, so the Lagrangean is:

$$L = \sum_{t=0}^{\infty} \left(\frac{1}{1+\beta}\right)^t \left[P_t Y_t - H_t I_t - W_t N_t - \lambda_t \left(K_{t+1} - \left(1-\delta\right)K_t - I_t\right)\right]$$

т

where δ is depreciation, $1/(1 + \beta)$ is the nominal discount rate and t = 0 is the current time period. The first-order conditions with respect to investment and capital yield:

$$\left(1-\frac{1}{\varepsilon}\right)P_{t}Y_{K,t} = \left(1+\beta\right)H_{t-1} - \left(1-\delta\right)H_{t}$$

where Y_K denotes the first-order derivative of the production function with respect to capital, given by:

$$Y_K = \alpha \left(\frac{Y}{K}\right)^{1+\theta}$$

After substituting and re-arranging we have:

$$\alpha \left(1 - \frac{1}{\varepsilon}\right) \left(\frac{Y_t}{K_t}\right)^{1+\theta} P_t = \frac{H_t}{1 + g_t^H} \left[\beta + \delta - (1 - \delta)g_t^H\right]$$

where g^H is the rate of increase of investment prices. We can rewrite the capital accumulation identity as:

$$K_t = \frac{I_t}{\delta + g_t^K}$$

where g^{K} is the growth rate of capital. Using this to substitute out for capital, and taking natural logarithms, we find:

$$i_t - y_t = -\sigma \left(h_t - p_t\right) - \sigma \ln \left\{\frac{1}{\alpha} \frac{\varepsilon}{\varepsilon - 1}\right\} - \sigma \ln \left\{\frac{1}{1 + g_t^H} \left[\beta + \delta - \left(1 - \delta\right)g_t^H\right]\right\} + \ln \left(g_t^K + \delta\right)$$

where σ is the elasticity of substitution, equal to $1/(1 + \theta)$.

To simplify, we assume that the structural parameters (α , β , δ and ε) are fixed in long-run equilibrium: technically this is a behavioural assumption. In addition, if we assume that the growth rates of capital and the price of investment are also fixed in long-run equilibrium, we can put most of the right-hand side of the expression into a constant term. This simplification allows us to focus on the relative price and elasticity of substitution. Bakhshi and Thompson (2002) examine some of the components that we assume are fixed, eg depreciation, in more depth: we deliberately do not replicate their analysis here.

Dropping time subscripts, our assumptions about long-run equilibrium allow us to rewrite the equation as:

$$(i-y)+\sigma(h-p)=\psi$$

where ψ is a constant. The first term in brackets in this expression is the constant-price investment to output ratio, written as $(i - y)^{kp}$ on page 177. The current-price investment to output ratio, $(i - y)^{cp}$, is given by:

$$(i-y)^{cp} = (i-y) + (h-p)$$

so we can also express this as:

$$(i-y)^{cp} + (\sigma-1)(h-p) = \psi$$

These are the two long-run equilibrium relationships.

References

Bakhshi, **H**, **Oulton**, **N** and **Thompson**, **J** (2003), 'Modelling investment when relative prices are trending: theory and evidence for the United Kingdom', *Bank of England Working Paper no. 189*.

Bakhshi, H and Thompson, J (2002), 'Explaining trends in UK business investment', *Bank of England Quarterly Bulletin*, Spring, pages 33–41.

Bank of England (2003a), Inflation Report, February.

Bank of England (2003b), Monetary Policy Committee Minutes and Press Notices, February.

Barrell, R and Pain, N (1997), 'Foreign direct investment, technological change, and economic growth within Europe', *Economic Journal*, November.

Bloom, N and Bond, S (2001), 'UK investment: high, low, rising, falling?', *Institute for Fiscal Studies Briefing Note*, No. 18.

Ellis, C and Price, S (2003), 'UK business investment: long-run elasticities and short-run dynamics', *Bank of England Working Paper*, forthcoming.

Hubert, F and Pain, N (2001), 'Inward investment and technical progress in the United Kingdom manufacturing sector', *Scottish Journal of Political Economy*, Vol. 48.

An analysis of the UK gold auctions 1999-2002

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This article examines bidding data for the 17 gold auctions held by the Bank of England on behalf of HM Treasury between July 1999 and March 2002. It employs information on auction participation to evaluate the outcomes of the auctions. Consistent with earlier studies it finds that the prices achieved at the auctions overall were in line with prevailing market prices. The article shows that uncertainty about future gold price movements was an important influence on the outcomes of particular auctions, although no single factor can explain why some auctions resulted in greater demand than others.

Introduction

On 7 May 1999, HM Treasury (HMT) announced a restructuring of the UK government's foreign currency and gold reserves involving the sale of part of the gold reserves through a programme of auctions.⁽¹⁾ The first of the auctions, which were on a single or uniform-price basis,⁽²⁾ was held in July 1999. Thereafter, auctions were held at approximately two-month intervals until March 2002; there were 17 auctions in all. In the announcement, the government said that its intention was to reduce its holdings of gold, then around 715 tonnes, to around 300 tonnes in the medium term. Approximately 395 tonnes of gold were sold via the auctions, at an average price of around \$275 an ounce.⁽³⁾

HMT has published a *Review of the sale of part of the UK gold reserves* (October 2002).⁽⁴⁾ The *Review* describes, among other things, the rationale for the sales programme; the reasons why it was decided to sell gold by means of auctions, specifically uniform-price auctions; and the impact of the sales on the risk characteristics of the reserves portfolio. None of those issues is discussed in any detail in this article. Reports on the gold sales programme have also been produced by the National Audit Office (NAO) (January 2001),⁽⁵⁾ and by the House of Commons Public Accounts Committee (December 2001).⁽⁶⁾ The focus of those reports was on assessing whether the sales programme had achieved value for money for the UK taxpayer.

This article uses the detailed bidding data for the auctions, market price data, and measures of price uncertainty to conduct an analysis of the auction outcomes. The first section describes the design of the auctions and the administrative arrangements that governed them. The second explains the main features of the wholesale gold market, and developments within it, and in the gold price, during the course of the auction programme. The third section describes the aggregated bidding data and compares them across auctions. The fourth compares the outcomes of the auctions overall against a range of market price benchmarks in order to assess whether the auction prices were in line with those benchmarks. The fifth section analyses the outcomes of particular auctions in the context, in particular, of measures of uncertainty about the gold price.

Auction arrangements

The Bank of England acts as Agent for HMT in managing the Exchange Equalisation Account (EEA), the account which holds the United Kingdom's official foreign

⁽¹⁾ See www.hm-treasury.gov.uk/newsroom_and_speeches/press/1999/press_77_99.cfm.

⁽²⁾ The box on page 189 discusses auction design issues, including the concept of uniform-price auctions.

⁽³⁾ The trading unit for gold is the fine troy ounce; throughout this article 'ounce' shall refer to the fine troy ounce.

There are 32,150.7465 ounces to the tonne. The average auction price was \$274.9 per ounce and the revenue generated by the sales programme was therefore approximately \$3.5 billion. The proceeds were retained within the foreign currency reserves and invested in interest-bearing assets.

⁽⁴⁾ This is available at www.hm-treasury.gov.uk/media//9efef/goldreserves.pdf.

⁽⁵⁾ *The sale of part of the UK gold reserves.* This is available at www.nao.gov.uk/pn/00-01/000186.htm.

⁽⁶⁾ This is available at www.publications.parliament.uk/pa/cm200102/cmselect/cmpubacc/396/39602.htm.

Auction theory and design

Economists have long been interested in the design of auctions. This interest reflects both the wide range of economic situations in which auctions are employed as a selling mechanism (ranging from, for example, art works to telecommunication bandwidth) and the variety of auction formats that exist. Gold auctions, like government bond auctions, occupy a distinct category in that multiple units are sold (as opposed, for example, to a specific painting) and individual bidders typically have common knowledge about the valuation of the auctioned good. In the case of gold, potential bidders would all have been aware of the market price prior to the auction and were likely to have been influenced by common factors in establishing their expectations of the future market price. In such a situation, bidders are said to have common valuations.

Auctions of products such as government bonds are typically conducted via sealed bids (as opposed to the open bidding mechanism employed in many art house auctions). Bidders submit demand schedules, which consist of a price at which they are willing to buy and a quantity they are willing to buy at that price. In uniform or single-price auctions, all successful bidders pay the same price, generally the lowest accepted bid (or sometimes the highest rejected bid, or an average of all accepted bids). In discriminatory-price auctions, successful bidders pay the price they submitted in their own bids. Bids are accepted at successively lower prices, starting with the highest price, until the amount on sale is covered.

Auction theory suggests that bidders' strategic behaviour influences auction outcomes.⁽¹⁾ For example, in multiple-unit auctions, bidders generally have an incentive to lower (or 'shade') their demand schedules below their true valuations, that is, reduce the amount they bid for at each price. This is because a successful bidder is likely to conclude that his personal valuation was above the market consensus. This is referred to as the winner's curse. A rational bidder would be expected to take this into account when determining his bid price, and submit a demand schedule that is lower than his true demand schedule. In theory bid shading may occur in both uniform and discriminatory auctions.⁽²⁾ The expected degree of shading is likely to be greater in a discriminatory auction, but auction theory cannot conclusively say which auction method will produce the greatest revenue for the seller, because bidders may also adjust the quantity demanded.⁽³⁾ Under certain circumstances, expected revenue is greater in the case of a uniform auction, while in others it is greater in the case of a discriminatory auction. In the absence of any compelling theoretical arguments to favour one format over another, Binmore, in his report for the NAO, concluded that the use of a uniform-price format for the gold auctions made sense on the grounds of simplicity (bidding in uniform auctions is less complex) and market sentiment (market participants generally prefer uniform auctions).⁽⁴⁾

Both single and discriminatory-price auctions have been used in gold and government bond auctions, and their outcomes examined to assess the effects of different auction formats. For example, between 1976 and 1980, the International Monetary Fund conducted 45 gold auctions, ten as single-price auctions, and the remainder as discriminatory-price auctions. Research by Feldman and Reinhart (1995a and 1995b) concluded that shading was more prevalent in the discriminatory-price auctions, where auction prices achieved were, on average, about 1% below pre-auction market prices. Research on Swedish and Finnish Treasury auctions also suggested the presence of shading, but it was no more pronounced in the (Swedish) discriminatory-price auctions than in the (Finnish) single-price auctions.⁽⁵⁾ Evidence from US Treasury bill auctions conducted in the early 1990s suggested that switching to a single-price method led in some cases to a drop in revenue, and in others to an increase.⁽⁶⁾

⁽¹⁾ See for example Binmore and Swierzbinski (2000).

⁽²⁾ Practical, behavioural and market microstructural factors may nonetheless make auctions an attractive method of selling an asset such as gold. Some of these reasons are briefly discussed, in the case of gold, later in this article. NAO and HMT also note that auctions were a sales method well suited to meeting HMT's objectives for the sales programme of, among other things, selling in a transparent manner, and selling fairly. See NAO (2001), page 5, and HMT (2002), page 17.

⁽³⁾ See for example Binmore and Swierzbinski (2000).

⁽⁴⁾ See NAO (2001), Appendix 3, pages 40-44. HMT (2002), pages 18-20, sets out the reasons why a uniform-price format was chosen for the UK gold auctions.

⁽⁵⁾ See Nyborg, Rydqvist and Sundaresan (2002) on the Swedish auctions and Keloharju, Nyborg and Rydqvist (2002) on the Finnish auctions.

⁽⁶⁾ See for example Nyborg and Sundaresan (1996).

currency and gold reserves.⁽¹⁾ It was therefore the Bank that conducted the auctions on behalf of HMT. The Bank issued an Information Memorandum on 11 June 1999⁽²⁾ setting out the arrangements for, and the terms and conditions governing, the gold auctions. The salient features are described below.

The auctions were conducted on a uniform-price basis, such that all successful bidders paid the same auction-clearing price. This price was determined as the lowest accepted bid price that allowed the Bank to allocate all gold on offer for sale.⁽³⁾ All bids above the auction-clearing price were allotted in full, while bids made at the clearing price were pro-rated, if necessary. The pro-rata allocation was known as the 'scaling factor'.

Those entities eligible to bid were members of the London Bullion Market Association (LBMA),⁽⁴⁾ central banks and other international monetary institutions that held gold accounts at the Bank.⁽⁵⁾ The population of potential direct bidders was therefore limited. However, others wishing to bid were able to do so via one of the commercial banks that were eligible to bid directly.

Bids could be submitted either by authenticated SWIFT⁽⁶⁾ message or in paper form, physically delivered to the Bank's banking counter. Bids were required to be received by the Bank not later than 11.30 am UK time on the day of the auction. The minimum bid size was 400 ounces (the approximate weight of a standard gold bar) and bids were required to be for multiples of 400 ounces. Prices bid were required to be in multiples of five cents per ounce bid. There was no limit to the number of bids that might be submitted by a single bidder, except that each bidder was permitted to submit no more than five bids in the ten minutes prior to the auction closing.⁽⁷⁾ The Bank published the results of each auction at 12.15 pm on the day of the auction, that is, 45 minutes after the auction had closed. In addition to the clearing price, the Bank published the cover ratio—that is the ratio of the sum of gold validly bid for to the amount on offer—and the scaling factor. The auctions settled two working days after the auction date. Settlement was by means of transfers from the gold account of the EEA to the accounts of the successful bidders.

With the exception of auctions held between September 1999 and September 2000, for which approximately four months' notice was given, precise auction dates were announced approximately two months ahead. At each of the first eleven auctions (held between July 1999 and March 2001), 25 tonnes of gold were offered for sale. At each of the final six auctions (held between May 2001 and March 2002), 20 tonnes were offered for sale.

The wholesale gold market and market developments during the auction programme

Comparative international data for turnover by centre are sparse, but London is generally considered to be the most significant international centre for spot⁽⁸⁾ and forward⁽⁹⁾ dealing, lending, and trading of OTC⁽¹⁰⁾ derivatives in gold. Certain commercial banks have the status of market-making members of the LBMA.⁽¹¹⁾ In terms of their activities in gold, market-making members are expected to provide two-way bid and offer quotations for spot and forward sales and purchases, options, and loans or deposits, throughout the London trading day.

Turnover data are available for activity in London, in the form of clearing statistics published by the LBMA. These data, shown in Chart 1, provide the total ounces transferred, both physically and in the form of account transfers, between those LBMA members that are part of

 Policy decisions about the reserves portfolio are taken by HMT. The Bank provides analysis and advice to assist HMT in making those decisions, implements the decisions that HMT makes, and manages the reserves on a day-to-day basis

(2) The first Information Memorandum specified the arrangements for the auctions due to take place during the financial year 1999–2000. Subsequent Memoranda were published for the sales due to take place during the financial years 2000–01 and 2001–02 respectively. Other than described below, the arrangements did not change significantly.

- (3) The Bank reserved the right to allot less gold than was offered for sale; it was of course also possible that the total amount of gold bid for at an auction might have been less than the amount on offer. Neither of these possible outcomes transpired during the programme.
- (4) The LBMA is the main trade association for the international wholesale bullion market. A list of its members is available from its web site at www.lbma.org.uk. Those holding gold accounts at the Bank are chiefly commercial and investment banks.
- (5) The Bank stores in its vaults gold belonging to a number of other central banks, international monetary institutions, and LBMA members.
- (6) SWIFT is a secure electronic messaging system used in the wholesale financial markets. The great majority of bids was received by this means rather than in paper form.
- (7) This restriction was imposed solely for logistical purposes.
- (8) That is, for settlement in two working days' time.(9) That is, for settlement beyond two working days' time.

(11) A list of the current market-making members is available on the LBMA's web site.

^{(10) &#}x27;Over-the-counter', that is, a contract agreed bilaterally rather than transacted on a recognised exchange.

Chart 1 LBMA gold clearing data^(a) (January 1999–March 2002)



(a) Monthly data.

Chart 2





⁽a) Weekly data.

the London clearing system for wholesale transfers. They are not a precise measure of overall market activity at any particular point in time since certain market transactions, such as forwards and options, may give rise to relatively small transfers of gold at the time they are executed, or none at all, or may not generate transfers until they mature.

The most significant centre for exchange-traded contracts in gold futures and options is Comex, a division of the New York Mercantile Exchange (NYMEX), although there are other exchanges that offer gold products, notably Tocom, the Tokyo Commodities Exchange. Comex data for the 'open interest' on gold futures contracts are shown in Chart 2. This is the total number of contracts entered into by members of the exchange at a given point in time and not yet offset by transaction, delivery, exercise, etc. It is notable that most of the available measures of turnover or market depth show a declining trend throughout the period of the auctions. This is consistent with comments from market participants that the liquidity of the market (in the sense of the size of transaction that could be executed without significantly moving the market price) and, perhaps relatedly, the amount of risk-capital allocated to trading activity in gold by participant institutions, were declining at this time. This was reflected in a reduction in the number of LBMA market makers, from twelve at the end of 1999 to nine at the end of 2001, and in the decision to reduce the amount of gold on offer from 25 tonnes to 20 tonnes at the final six auctions.

The standard market benchmark gold price is the London fixing price. The fixing takes place twice every business day, at 10.30 am (the 'AM fixing') and 3.00 pm (the 'PM fixing') UK time. The five fixing members, who are commercial banks active in the wholesale market, declare their interest (if any) to buy or sell gold, and the price is adjusted until their interests are approximately matched. At that point the price is 'fixed', and the fixing price published. As noted above, LBMA market makers, and other market participants, will quote gold spot prices throughout the trading day. Fixing prices are typically close to spot mid-prices prevailing around the time of the fixing. Differences may occur, for example because the fixing process itself reveals information relevant to price formation.

The London AM fixing was within a range of \$252.90-\$326.25 per ounce during the period of the auction programme. As can be seen from Chart 3, there

Chart 3 The gold price during the auction programme^(a) (January 1999–March 2002)



(a) London AM fixing

were certain sharp movements in the price. The first, and most notable, followed the announcement of the Central Bank Gold Agreement (CBGA) on 26 September 1999.⁽¹⁾ Under the CBGA the signatory central banks agreed that, during the five-year term of the Agreement, they would not enter the market as sellers, with the exception of sales already determined; that such sales would total no more than 2,000 tonnes in total and no more than approximately 400 tonnes per annum; and that they would not expand their gold lending or their use of gold futures and options. The Bank, on behalf of the UK government, was a signatory to the CBGA.

The second sharp rise in the price of gold occurred in February 2000, and was associated with market speculation that certain gold producers who had previously followed strategies to sell their output forward might have changed their approach.

A description of the auction data

In this section, aggregated bidding data are examined and compared across auctions. Table A presents information on participation in the 17 auctions. The number of bidders ranged from 15 to 23, with an average of 19. The number of bids per auction averaged 113, but varied considerably between auctions, from a low of 63 to a high of 197. Bidders at a particular auction tended to submit more than one bid. Very often these bids were at different prices. Such bundles of bids by the same bidder at a particular auction can be interpreted as demand schedules. Across all the auctions there were 317 such demand schedules, of which 275 consisted of more than one bid. The average number of bids in a demand schedule was six. Finally, the average bid size per auction, measured as a proportion of the total amount of gold on offer, varied from a low of 1.7% to a high of 5.2%, with an average of 3%. These averages mask a variety of bidding practices. Some bidders typically submitted a large number of small bids, while others tended consistently to submit a smaller number of larger bids.

The *cover ratio*, defined as the ratio of the sum of gold validly bid for to the amount on offer, is commonly used as a measure of auction interest. However, some care is required in interpreting this measure for the UK auctions, for a number of reasons. In particular, as noted above, the amount of gold on offer altered from 25 tonnes in each of the first eleven auctions to 20 tonnes in each of the final six. It is reasonable to assume that potential bidders adjusted their bidding behaviour in the light of the reduced amount of gold on offer; but it remains the case that, for a given sum of gold bid for, the cover ratio would have been higher in any of the final six auctions than in any of the first eleven. From Chart 4, it can be seen that all 17 auctions had a cover ratio greater than one, that is they were oversubscribed. The average cover ratio was 3.5, the maximum 8, and the minimum 1.3. It should be noted that the various minima and maxima noted in Table A (panel A) were not necessarily observed at the same auctions.

Rank correlations, shown in panel B of Table A, indicate that the level of the cover ratio was influenced more by the number of bids and the average bid size than by the number of bidders.⁽²⁾

Table A Summary statistics

Panel A: Summary statistics	Average	Minimum	Maximum
Cover ratio Number of bidders per auction Number of bids per auction Number of bids per bidder Average bid size per auction (per cent) (a)	3.5 19 113 6 3.0	1.3 15 63 1 1.7	8.0 23 197 33 5.2
Panel B: Rank correlation coefficients			
Cover ratio, number of bidders per auction Cover ratio, number of bids per auction Cover ratio, average bid size (a)	n 0.53 0.73 0.79		
Source: Bank of England.			

(a) As a proportion of total gold on offer.







(1) The 15 signatories were the European Central Bank, eleven euro-area National Central Banks, the Swedish Riksbank, the Swiss National Bank, and the Bank of England. The Agreement is available at www.ecb.int/press/pr990926.

⁽²⁾ Spearman's rank correlation coefficients in Tables A-C compare the rankings of two sets of variables. For example, the measure allows us to establish whether auctions with a higher cover ratio also tended to be auctions with a greater number of bidders. A high and positive coefficient would tell us that this was indeed the case. A negative coefficient would suggest that auctions with a high cover ratio were more likely to be those with a low number of bidders. Finally, a coefficient close to zero would indicate little relationship between the rankings of the two series.

As an alternative indicator of auction interest, one can construct aggregate demand curves that relate the prices and amounts bid for by all auction participants. The shape of the demand curve can be informative, as it provides a detailed picture of the range of prices auction participants were considering. Chart 5 shows examples of three such aggregate demand curves, chosen from among those auctions with relatively high, medium and low cover ratios respectively. The chart clearly shows that the auction with the higher cover ratio was characterised by a flatter curve, reflecting not only the greater amount bid for, but also a tighter range of bid prices.

Chart 5 Aggregate demand schedules



Source: Bank of England.

(a) Bid prices were scaled by the auction-clearing price.

Evaluating the auction outcomes overall

As explained in the box on page 189, auction theory suggests that bidders may bid below their personal valuations in order to avoid the winner's curse. This is because successful bidders, by definition, have made the highest bids, and may therefore conclude that the market 'consensus' was below their own valuations. For this reason, bidders may lower their bids below their true valuations (this is referred to as 'shading'). If all bidders engage in this practice, then the auction price will be a downwardly biased estimate of the true value, and auction revenues will be lower than fair value would imply.

However, there may also be reasons why a potential bidder would rationally be prepared to pay a premium over the prevailing market price to buy gold through the mechanism of an auction. One potential advantage of an auction is that bidders need only reveal their identity to the seller, rather than to others in the market. This could be attractive, for example, when a buyer is intent on purchasing a relatively large quantity of gold, and may be concerned that to do so openly in the market would move the market price against him. More broadly there is an argument that the selling of an asset such as gold by an official seller in a transparent and predictable manner, such as via auctions, may increase revenue, relative to other sales methods, by reducing the risk premium priced in by the market, encouraging participation, and allowing investors to plan their strategies ahead of the sale.⁽¹⁾

Since bidders' true valuations are of course unobservable, it is customary to estimate the amount of undervaluation (shading) or overvaluation in an auction price by measuring the difference between auction prices and market prices prevailing just before or after the auction. However, it is important to note that this comparison is at best imperfect. The gold market is relatively small, so that the amounts sold by the United Kingdom were not an insignificant proportion of market turnover during the day or even the week of the auctions. It is therefore possible that the benchmark market price would have been different had the UK sales taken place through a different mechanism.

Chart 6 and Table B (panel A) show the differences between auction and pre-auction prices, using the AM London fixing as a benchmark.⁽²⁾ On average, auction prices were 0.2% below the AM fixing on the day of the auction. In nine auctions the auction price was below the AM fixing (the largest discount being 1.5%), whereas in the other eight auctions, the auction price was slightly higher (the maximum premium being 0.3%).

Table B (panel B) shows a positive and reasonably close correlation between measures of the difference (or margin) between auction and pre-auction prices in particular auctions, and the cover ratios of those auctions. This positive rank correlation coefficient shows that those auctions with positive (or less negative) margins between auction and pre-auction prices tended to have higher cover ratios, whereas those with more negative margins tended to have somewhat lower cover

⁽¹⁾ These issues are discussed in HMT's Review (2002), pages 17-18. There is a general discussion of transparency in

O'Hara (1995) and Ganley et al (1998).

⁽²⁾ Again, it should be noted that the various minima and maxima noted in panel A of Table B were not necessarily observed at the same auctions.

Chart 6 Auction price relative to AM fixing(a)



Sources: Bank of England and Bloomberg.

(a) Computed as the difference between the auction price and the AM fixing, scaled by the AM fixing.

Table B Auction prices

Panel A: Summary statistics	Average	Minimum	Maximum
Auction price (\$ per ounce)	275.2	255.75	296.5
Auction price relative to AM fixing (per cen Auction price relative to PM fixing (per cen Auction price relative to 1 pm mid price (a)	t) -0.2 t) 0.1	-1.5 -1.2	0.3 1.4
(per cent)	-0.1	-0.7	0.4
AM fixing - PM fixing (b) (per cent) (confidence interval (c))	0.1 (-1.0 to 1.2)		
Panel B: Rank correlation coefficients of co	wer ratio (d)		
Auction price relative to AM fixing Auction price relative to PM fixing Auction price relative to 1 pm mid price (a)	0.72 0.12 0.10		

Sources: Bank of England and Bloomberg.

(a) The mid price is the average of the bid and ask prices.

(b) Calculated as the difference between the AM and PM fixing prices scaled by the average of the AM and PM fixing prices.

(c) Two standard deviations above and below mean.
(d) In panel B, a positive correlation coefficient indicates that a larger cover ratio was

associated with less undervaluation or more overvaluation.

ratios. In other words, the higher the cover ratio, the less was the amount of undervaluation. This suggests that auction participants were less likely to bid away from their true valuations when bidding interest was high.

An alternative way of measuring the prevalence of either undervaluation (shading) or overvaluation is to examine the difference between the auction price and a post-auction market price. If the market price immediately after the auction were significantly higher than the auction price, that might indicate that auction bidders systematically bid below their true valuations, although it could also of course be the case that the outcome of the auction (both the auction price and the cover ratio) contained new information not previously reflected in market prices. Chart 7 uses the PM fixing

Chart 7 Austion price relative to

Auction price relative to PM fixing(a)



(a) Computed as the difference between the auction price and the PM fixing, scaled by the PM fixing.

on the day of each auction as a post-auction price benchmark. On average, auction prices were 0.1% above the PM fixing. The variance of the margins between the PM fixing and the auction price was somewhat greater than the variance of the margins between the AM fixing and the auction price, ranging from -1.2% to 1.4%.

A third possible benchmark is the spot market price just after the announcement of the auction results. This comparison is shown in Chart 8 below for the spot market price at 1 pm on the day of each auction. On average, this price was 0.1% below the auction-clearing price. Spot market prices at 1 pm were below the auction price in six out of 17 auctions, though the range of price differences was small.

Chart 8 Auction price relative to 1 pm spot price^(a)



Sources: Bank of England and Bloomberg.

(a) Computed as the difference between the auction price and the 1 pm spot price, scaled by the 1 pm spot price.

The rank correlation coefficients of the cover ratio and the margin between auction prices and post-auction prices in Table B are much lower than that using pre-auction prices as the benchmark, implying a weaker relationship between post-auction price movements and auction interest.

Further evidence that auction prices did not deviate substantially from prevailing market prices can be obtained from comparing the above differences with typical intraday price movements. The average daily percentage change between the AM and PM fixing prices has been calculated for this purpose, together with a confidence interval. Both are reported at the bottom of panel A in Table B. According to this, the differences shown in Charts 6 to 8 were not inconsistent with typical price movements.

Analysing particular auction outcomes

The evidence in the previous section suggests that on average the auction prices achieved were close to their respective benchmarks.⁽¹⁾ But it also revealed some differences in the outcomes of individual auctions. This section investigates the extent to which the behaviour of auction participants, and conditions in the broader market, explain these differences.

Auction theory predicts that the more uncertain bidders are about the accuracy of their own valuations, the greater their concern about the winner's curse is likely to be. Their exposure to the winner's curse may be mitigated in three ways. First, bidders may shade their bids more, leading to greater discrepancies between auction prices and relevant benchmarks. Second, they may reduce the quantity demanded. And third, they may increase the range of their bid prices (recall that bidders can submit multiple bids or demand schedules).

Submitting a wide range of bid prices provides bidders with additional protection against the winner's curse.⁽²⁾ This follows because, *ex post*, bidders would like to obtain more units of the auctioned good when the auction-clearing price (which summarises all bidders' valuations) is high relative to their own valuations, and fewer when the clearing price is low. With a wider range of bid prices, bidders have a greater probability of achieving this desired outcome: they will win more bids when the auction price is above their own average bid, and fewer bids when the auction price is below their own average bid. When uncertainty is greater, there is more value in this form of insurance and, consequently, bidders are likely to increase the dispersion of their bid prices.

In sum, auction theory suggests that as uncertainty increases, bidders are likely to increase the degree of undervaluation in their bids (or reduce the degree of overvaluation), reduce the quantity they demand, and/or submit a wider range of bid prices.⁽³⁾

Auction theory also suggests that the number of bidders directly affects the auction price. Individual bidders face a trade-off as a result of competition from other auction participants.⁽⁴⁾ If, on the one hand, a bidder decides to submit a higher demand schedule (ie increase the prices of all his bids), then he is more likely to win the auction, but he is also more exposed to the winner's curse, as in doing so he will have bid up the auction price. If, on the other hand, he lowers his demand schedule, then he reduces his chances of winning, but also lowers the auction-clearing price. This trade-off is less severe when the number of auction participants is larger, and the competition greater. Hence, theory predicts that auction participants will scale down their bid prices less in better-attended auctions, and more in less-attended ones. For similar reasons, the presence of a greater number of bidders is likely to encourage bidders to demand greater quantities and to submit a tighter range of bid prices. These propositions are tested below.

Uncertainty about future gold prices can be measured by the implied volatility derived from the prices of gold options. This is a forward-looking measure of investor uncertainty. For completeness, the analysis has been repeated with a historical volatility measure, using daily spot prices.⁽⁵⁾ Chart 9 shows that implied volatility peaked a number of times, most notably after the

⁽¹⁾ This is consistent with the finding of the National Audit Office (NAO) that the auction prices achieved at the first nine auctions were in line with prevailing market prices. The NAO compared the auction prices with the PM fixing. See *The sale of part of the UK gold reserves*, page 19. HMT's *Review of the sale of part of the UK gold reserves* (page 22) extended this analysis to the entire auction programme and concluded that 'the prices achieved were competitive and in line with what might have been expected had an alternative route been chosen for the sale of gold'.

⁽²⁾ Related to the winner's curse is the so-called champion's plague, which arises in multiple-unit auctions only and describes bidders' dissatisfaction at obtaining more units than their competitors.

⁽³⁾ See for example Nyborg *et al* (2002).(4) See for example Kremer and Nyborg (2002).

⁽⁵⁾ This is computed from daily spot prices, using a Garch statistical model.

Chart 9 Implied gold price volatility



Source: UBS.

September 1999 and January 2000 auctions. The background to this price volatility is set out on pages 191–92 above.

Table C (panel A) suggests that greater uncertainty about the gold price ahead of particular auctions was associated with a greater degree of undervaluation (compared with prevailing market prices) at those auctions. The degree of association was stronger when historical volatility, rather than implied volatility, was used as a measure of uncertainty. Related to this, Table C (panel A) and Chart 10 show that uncertainty (as measured by implied volatility) was higher in the week leading up to some of the auctions with relatively lower cover ratios.

Table C Rank correlations

Panel A: Uncertainty (a)	Implied volatility (b)	Historical volatility (c)
Auction price relative to AM fixing Bid dispersion (d)	g 0.32 0.44	0.47 0.26
Average bid size Cover ratio	0.38 0.44	0.30 0.45
Panel B: Number of bidders (e)		
Auction price relative to AM fixing Bid dispersion (d) Average bid size	8 0.46 -0.12 0.13	
	(C	

(a) In panel A, a positive correlation coefficient indicates that greater uncertainty was associated with a greater discount or a lower premium relative to the AM fix, greater bid dispersion, lower bid size and lower cover.

) Measured as the average of daily implied volatility one week prior to auction.) Measured as the average of daily historical volatility one week prior to auction

(c) Measured as the average of daily historical volatility one week prior to auction.
(d) Computed as the difference between the highest and lowest bid price scaled by the average bid price.

(e) In panel B, a positive correlation coefficient indicates that a larger number of bidders was associated with a lower discount or a greater premium relative to the AM fix, lower bid dispersion and higher bid size.

Bid dispersion is shown in Chart 11, which plots the average bid price, together with the highest and lowest bid prices, for each of the 17 auctions. The chart

Chart 10 Cover ratios and implied volatility^(a)



Sources: Bank of England and UBS.

(a) Average implied one-month volatility in week preceding auction.

Chart 11 Dispersion of bids



Source: Bank of England.

demonstrates that bid price dispersion varied substantially between auctions. Rank correlation coefficients in panel A of Table C indicate that these differences in price dispersion were related to differences in uncertainty, in that greater implied volatility was associated with more pronounced bid dispersion. Finally, Table C finds some evidence of correlation between uncertainty and average bid size.

Table C next relates the auction outcomes and the number of bidders. The results in panel B suggest that the number of bidders had some influence on the amount of over or undervaluation, but little influence on either price dispersion or average bid size.⁽¹⁾

(1) Nyborg, Rydqvist and Sundaresan (2002), and Keloharju, Nyborg and Rydqvist (2002) reach similar conclusions.

Conclusion

This article has examined the outcomes of the 17 gold auctions conducted by the Bank of England on behalf of HM Treasury between July 1999 and March 2002. In line with previous research, it has found that, on average, the prices achieved in the auctions were in line with prevailing market prices. Drawing on insights from the theoretical literature on auction design, the article has gone on to examine factors that may have affected the outcomes of individual auctions. It has found that greater uncertainty about the gold price at the time of particular auctions was associated with a greater degree of undervaluation (compared with prevailing market prices) at those auctions, with lower bid sizes and with a wider dispersion of bid prices. There is some evidence that the presence of a relatively greater number of bidders at particular auctions was associated with less undervaluation at those auctions. But other aspects of bidder behaviour were unaffected by the number of auction participants.

References

Binmore, K and Swierzbinski, J (2000), 'Treasury auctions: uniform or discriminatory?', *Review of Economic Design*, Vol. 5, pages 387–410.

Feldman, R and Reinhart, V (1995a), 'Auction format matters: evidence on bidding behavior and seller revenue', *International Monetary Fund working paper 95/47*.

Feldman, R and Reinhart, V (1995b), 'Flexible estimation of demand schedules and revenue under different auction formats', *International Monetary Fund working paper 95/116*.

Ganley, J, Holland, A, Saporta, V and Vila, A (1998), 'Transparency and the design of securities markets', *Financial Stability Review*, Spring, pages 8–17.

HM Treasury (2002), Review of the sale of part of the UK gold reserves.

House of Commons Public Accounts Committee (2001), Sale of part of the UK gold reserves.

Keloharju, M, Nyborg, K and Rydqvist, K (2002), 'Strategic behaviour and under-pricing in uniform price auctions: evidence from Finnish Treasury auctions', London Business School, *mimeo*.

Kremer, I and Nyborg, K (2002), 'Underpricing and market power in uniform price auctions', London Business School, *mimeo*.

National Audit Office (2001), The sale of part of the UK gold reserves.

Nyborg, K, Rydqvist, K and Sundaresan, S (2002), 'Bidder behaviour in multiple unit auctions: evidence from Swedish Treasury auctions', *Journal of Political Economy*, Vol. 110, pages 394–424.

Nyborg, K and Sundaresan, S (1996), 'Discriminatory versus uniform treasury auctions: evidence from when-issued transactions', *Journal of Financial Economics*, Vol. 42, pages 63–104.

O'Hara, M (1995), Market microstructure, Blackwell Publishers.

Assessing the extent of labour hoarding

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The strength of employment during the recent slowdown is sometimes taken as evidence of labour hoarding. But the extent of such hoarding is difficult to measure. This article reviews different definitions of labour hoarding and a variety of ways of measuring it using aggregate data. Most of these measures indicate that labour has been underutilised during the recent slowdown, implying that firms have indeed hoarded labour to some extent. However, the magnitude of the reduction in utilisation differs across these measures. The evidence also suggests that the recent decrease in utilisation has been limited compared with previous episodes in which labour utilisation was significantly below trend.

Introduction

Firms are said to hoard labour when they choose not to adjust their employment of labour in line with short-run fluctuations in demand for their product and, instead, allow their utilisation of labour to vary over the cycle. Such behaviour would be sensible if firms face costs in adjusting the size of their workforce. It would result in employment being less volatile than output, and this in turn could explain why labour productivity, in the United States and the United Kingdom, tends to vary positively with the economic cycle.⁽¹⁾

There are several reasons why the study of labour hoarding is important. Because the utilisation of labour falls when labour is hoarded, accounting for changes in labour utilisation can help provide a more accurate measurement of changes in labour input. This in turn leads to better estimates of the inputs that account for output growth, and hence to more accurate measures of total factor productivity.⁽²⁾ Hoarding of labour might also affect wage pressures: if firms can increase their labour input during an upturn without recruiting extra staff, then wage pressures might be more muted.⁽³⁾ Measurement of the variation of labour hoarding can therefore be an important part of assessing the state of the labour market, and so a useful input into decisions on monetary policy. The possibility of labour being hoarded by firms during the recent slowdown in GDP growth is indicated by the continuing strength of employment growth. Over the period 2000 Q1 to 2002 Q1, total employment (measured by the Labour Force Survey) increased at an average rate of 0.9% a year and the employment rate remained close to 74.4%, its average over this period, whereas annual GDP growth fell from 3.4% in 2000 Q1 to 0.7% in 2002 Q1. The steady growth of employment contrasts with the falling and erratic evolution of average hours worked during the recent slowdown (see Chart 1).⁽⁴⁾

Chart 1 Employment, average hours and GDP growth



⁽¹⁾ Basu and Kimball (1997) and Basu and Fernald (2000), among others, have studied this correlation extensively. Basu and Fernald (2000) point out that other explanations for the procyclical behaviour of labour productivity are technological progress, imperfect competition, increasing returns and resource reallocation.

⁽²⁾ Total factor productivity is calculated by subtracting the weighted growth of factor inputs (capital and labour) from

output growth and it is often used as a measure of the rate of technological change in the economy. (3) Darby, Hart and Vecchi (2001) argue that this 'intensive' measure of unemployment, together with the 'extensive'

unemployment rate, add to our understanding of the wage/unemployment relationship.

⁽⁴⁾ The data used in this article do not include 2003 Q1 because some of the underlying series were not available at the time of publication. This does not create a major problem as the analysis focuses on the behaviour of labour hoarding during the latest slowdown in GDP growth, which approximately covered the years 2000 and 2001.

Chart 2 illustrates the strong procyclicality of output and labour productivity growth. The procyclical behaviour of labour productivity per person reflects the fact that employment adjusts less than output over the cycle. This simple indicator is a commonly used measure of labour utilisation, as it is assumed that labour intensity increases with labour productivity. The recent slowdown would then point to lower labour utilisation. Indeed, year-on-year growth in labour productivity calculated from employment (using Labour Force Survey data) fell from 2.2% in 2000 Q1 to 0.1% in 2002 Q1. The behaviour of labour productivity in hours, however, was rather different. In particular, labour productivity in hours has been higher than its per-person counterpart for most of the period between 2000 and 2002, and has remained higher since. This is the result of the persistent downward trend in average hours worked evident in Chart 1.

Chart 2 Labour productivity and GDP growth



At first sight, this pattern is consistent with firms 'hoarding' labour to some extent. Furthermore, in the face of a slowdown, firms may face an incentive to reduce average hours, especially if they decide to hang on to scarce skilled labour. But average hours worked have been falling for many years, and since 1996 at an average annual rate of 0.4% (see Chart 1). So they do not appear to be responding only to cyclical factors, and may have been trending downwards for structural reasons. In recent years, these reasons include the effect of the Working Time Directive⁽¹⁾ and, possibly, workers' preferences for fewer and more flexible hours, or for part-time work. The rest of this article examines the concept of labour hoarding in more detail and looks at several ways of measuring it. The next section compares two definitions of labour hoarding. This is followed by a discussion of the method used to measure 'normal' labour utilisation, and an assessment of the extent of labour hoarding in recent years for a variety of measures. The final section presents the main conclusions.

Labour hoarding in heads or hours?

Labour input can be measured either in terms of the number of people employed, or the total number of hours worked. So one can think of both heads and hours-based measures of labour hoarding. According to Hamermesh (1993), labour hoarding can be defined as 'a less than proportionate decrease in worker hours⁽²⁾ in response to a negative demand shock.' However, he goes on to argue that 'we can be fairly sure that labour hoarding in response to negative shocks is the result of slower adjustment of heads employment than of hours'. Horning (1994) interprets labour hoarding as the 'retention during recessions of workers not needed for current production', as an optimal response to the costs firms face to hire and fire labour. Becker (1975) mentions the incentive to retain workers with specific training in response to temporary negative demand shocks, as an example of these firing costs.⁽³⁾

Labour hoarding is a reflection of the intensity with which labour input is used when the amount of labour is costly to adjust. So the key point of interest is how labour utilisation evolves over the cycle. Labour utilisation can differ depending on whether we assume labour is being hoarded in heads or hours. Labour input can be characterised as the product of N, the number of people employed; *h*, average hours worked per head; and e, the level of effort with which total hours worked (Nh) are applied. If one defines labour input as total hours worked, then the labour utilisation rate can be thought of as the (average) effort rate, e, applied by the workforce over those hours. However, if one defines labour input in terms of the number of people the firm employs, then the utilisation rate of that labour will be the product of the average number of hours worked and the effort rate that applies in those hours, he. Although both definitions should be related,

The Working Time Directive, which came into effect in October 1998, introduced a 48-hour limit on the number of hours an individual can be asked to work in a week.

⁽²⁾ Worker hours refer to total labour input or, in other words, total hours worked.

⁽³⁾ A review of studies that seek to measure labour hoarding using micro data includes Fay and Medoff (1985), Oi (1962), Becker (1975), Parsons (1972) and Mincer (1962). Most studies at the macro level use labour hoarding to explain part of the cyclical variation of productivity. The most relevant are Summers (1986), Basu and Kimball (1997), Imbs (1999), Basu and Fernald (2000), Basu, Fernald and Shapiro (2001), and Larsen, Neiss and Shortall (2002).

they may differ if there are costs of adjusting average hours and if the behaviour of average hours changes significantly over time. Indeed, the latter definition will probably trend downwards over time given the long-term decline in average hours worked.

Measuring labour utilisation empirically is further complicated by the fact that labour effort is not observable. By contrast, average hours worked and the number of people in employment are observable and commonly used labour market statistics. The problem then boils down to proxying labour effort with observed variables in order to assess labour utilisation over the cycle.

How can normal utilisation be measured?

Since there are costs to adjusting input quantities (capital and labour), it is the input utilisation rate, not the input quantities, that adjusts to economic shocks in the short run. Given costs of changing heads employment, firms will in the first instance alter the intensity with which the labour input is used. So variations in labour utilisation away from its long-run or normal level can be interpreted as variations in the extent of hoarding: the more intensely the labour input is utilised, the less hoarding one should expect there to be.

Chart 3 illustrates a simple way of assessing whether labour utilisation is above or below its long-run level, taking labour productivity as the proxy for labour utilisation.⁽¹⁾ In the chart, labour productivity, measured as output per head, varies around an upward-sloping linear trend that could reflect its long-run equilibrium. If this were the case, then labour productivity above this line would reflect labour utilisation above its long-run trend, or conversely, labour hoarding below trend. Chart 4 shows the difference between labour productivity and its fitted linear trend. Data points above the zero line represent labour intensity above trend (hoarding below trend). Similarly, underutilisation of the workforce (higher hoarding) occurs when the data lie below zero.

A critical issue with this approach, of course, is whether a straight trend line is a good measure of the 'true' level of productivity consistent with long-run utilisation of the workforce.⁽²⁾ Despite its simplicity, a linear trend is not necessarily the best representation of the long-run behaviour of labour productivity. A time-varying trend appears to be a more suitable way of tracking the long-run changes in labour productivity over time. A Hodrick-Prescott filter provides estimates of such time-varying trends.⁽³⁾ Chart 3 shows the trend calculated using this procedure. A 'filtered' series is then obtained by subtracting the non-linear trend from the productivity series. Chart 4 shows the cyclical behaviour of the 'filtered' labour utilisation series. The resulting series measures the percentage deviation of the logarithm of the series from the estimated trend. Needless to say, the implications for labour utilisation over the cycle can be quite different from those derived on the basis of a linear trend.





Chart 4





⁽¹⁾ The assumption behind this measure is that labour is utilised more intensely when labour productivity is higher.

⁽²⁾ A variant of this method has previously been used by Darby, Hart and Vecchi (2001), Fair (1985), and Fay and Medoff (1985). These authors interpolate straight lines between the peaks in the sample.

⁽³⁾ One can choose the smoothing parameter of the Hodrick-Prescott filter to affect the curvature of the trend. We use a smoothing parameter of 1600 for quarterly data, following standard practice. One should bear in mind that this filter has a greater margin of error at the beginning and end of the sample period, therefore the filtered series for the 1992–2002 period would leave us uncertain about labour utilisation movements around the end of the early-1990s' recession.

The main drawback associated with the labour productivity per person measure of labour utilisation is that it is affected by the downward trend in average hours worked. Analysing labour productivity *per hour* avoids this criticism, but other potential problems affecting both measures remain. In particular, labour productivity measures neglect the effect of other factors of production that may affect labour productivity for reasons other than cyclical movements in labour utilisation. Cyclical changes in total factor productivity, the capital stock and its utilisation rate, as well as the returns (increasing or decreasing) associated with the different inputs might affect labour productivity in heads or hours, for reasons unrelated to changes in labour intensity.

Productivity measures might also be affected by the fact that aggregate output data include only regular production of marketable output and do not consistently include other necessary work which supports production, such as painting the factory or repairing the machinery. This type of work can be particularly important during downturns. Measured labour productivity could therefore fall due to output mismeasurement and not necessarily due to firms hoarding labour.

An alternative to these measures is average hours worked. If firms face relatively high costs of altering the size of their workforce, then one should expect effort and average hours to move together as they are relatively cheaper to adjust. Given that effort is not observable, then (detrended) average hours should represent a good proxy for effort.

These three measures are *ad hoc* in the sense that they are based on commonly used series that proxy labour utilisation. Two additional measures are also studied here. These are based on optimising models that can be used to derive effort series. All of these measures assume that workers, and not hours, are hoarded, except for the labour productivity per hour measure, and the one based on the consumption to output ratio.

As in the previous example, these series are detrended using a Hodrick-Prescott filter to calculate the percentage deviations around the long-run trend representing 'normal' utilisation. These deviations are then standardised to express them as a fraction of the maximum absolute deviation in the sample period. This facilitates comparisons across measures. All of these series are compared with the logarithm of GDP, which is filtered and detrended in the same way as the utilisation series. The exact functional forms of the utilisation series are presented in the appendix.

Was labour hoarded in the latest downturn?

This section compares our five measures of labour utilisation in order to assess the extent of labour hoarding in recent years. Chart 5 presents these measures using quarterly data for two different time periods. The charts on the right-hand side compare the measures from 1992 to 2002, while the charts on the left use data from 1970 to 2002 (or from 1984 to 2002, depending on data availability). The main reason for this split is the lack of quarterly hours data prior to 1992.

Annual hours data are available from 1984 to 1991; therefore, we interpolate them to extend the sample period as much as possible.⁽¹⁾ The pre-1992 data provide a longer time span and a lower margin of error in the filtering process. Nevertheless, their reliability could be affected because they have not yet been officially adjusted using the results of the 2001 Population Census. This in turn could lead to some inaccuracy when comparing the extent of labour hoarding pre and post-1992.

Ad-hoc empirical measures of utilisation

Utilisation measure based on labour productivity in heads

This measure assumes that labour is utilised more intensely when labour productivity in heads is higher. The first chart on the right-hand side of Chart 5 shows that the utilisation of the workforce has been below trend for most of 2001 and 2002. The chart on the left confirms this result, despite the minor discrepancy observed in 2002 due to the fact that it uses a different underlying employment series.⁽²⁾ This chart also shows that the extent of labour hoarding in recent years could be small compared with previous episodes. As explained earlier, the main drawback of this measure is that movements in average hours due to structural reasons

⁽¹⁾ We interpolate the annual observations from 1984 to 1992 using a series for hours worked in manufacturing. Total hours worked are the product of average hours and the number of people in employment. The latter is not available from the Labour Force Survey (LFS) prior to 1992. Therefore, we interpolate the annual observations from the LFS using the quarterly pattern of the series for Workforce Jobs.

⁽²⁾ The 1970-2002 series uses the Workforce Jobs (index) series, while the 1992-2002 series uses LFS data. The latter series is not available on a quarterly basis before 1992.







could be driving the behaviour of labour productivity per worker. Moreover, labour productivity is an imperfect measure of utilisation as it absorbs changes in the capital stock (and its utilisation), the rate of technological progress and the skill composition of the labour force. Labour productivity can also be affected by factors such as the degree of competition in the final goods market, and the quality and composition of the labour force.

Utilisation measure based on labour productivity in hours

As with the previous measure, this measure assumes that total hours worked are utilised more intensely when labour productivity in hours is higher. Hence, lower labour productivity implies higher labour hoarding. The second chart on the right-hand side of Chart 5 shows that utilisation decreased in the slowdown, though for a shorter period than in the case of labour productivity per worker. Furthermore, it appears to have reverted to trend in recent quarters. Although this measure factors in the behaviour of average hours (by dividing output by total hours worked), it still shares the other drawbacks of the previous measure. The chart on the left shows that recent deviations from trend are quite small compared with previous ones. One should bear in mind, however, that the hours data prior to 1992 are not absolutely reliable as they are based on interpolated annual data that have not yet been adjusted for the results of the Census.(1)

Utilisation measure based on average hours worked

Basu and Kimball (1997) argue that, in the presence of heads adjustment costs, the choice of average hours worked and effort by cost-minimising firms must be closely related.⁽²⁾ This is because the cost of altering effort and hours is believed to be cheaper than changing heads employed. Labour effort is not directly observable, but average hours worked are; so they can be used as a reliable proxy for factor utilisation. The third chart on the right of Chart 5 shows a decline in utilisation in 2002 that lags GDP, unlike the previous measures. The left chart shows that the latest deviation from trend is small, relative to the previous data.

Detrending the average hours series allows one to control (imperfectly) for the downward trend observed

in recent years. The pre-1992 data are particularly useful in this case because the filtering process captures the fall in average hours during the early-1990s' recession. The post-1992 data, however, only cover part of this recession, hence the dip is not fully captured by the filtering process. Another advantage of average hours over other measures is that they are not affected, at least directly, by changes in the capital stock (and its utilisation) and the rate of technological progress. These characteristics make average hours a more reliable proxy for labour utilisation, despite the difficulty of removing the downward trend observed in recent years.

Model-based measures of labour utilisation

Utilisation measure based on total hours worked

In a recent Bank of England working paper, Larsen, Neiss and Shortall (2002) (hereafter LNS) develop a version of the model of Burnside and Eichenbaum (1996) (hereafter BE) in order to measure factor utilisation. Both studies assume that firms hoard workers in the short run. They further assume that individuals work a fixed number of average hours, so changes in effort will capture movements in labour utilisation. The resulting effort series in LNS is mainly driven by total hours worked. It is also a function of other variables, such as the capital stock, government expenditure and a technology shock. The fourth chart on the right indicates that labour utilisation increased in 2002, contrary to all the other measures. The erratic behaviour of the series could be reflecting the effect of total hours, which are in turn determined by the opposite movement of heads and average hours. This is the main drawback of the series, despite the advantage of it being derived from a fully optimising model.

Utilisation measure based on ratio of output to consumption

Based on a model similar to BE, Imbs (1999) develops a model that allows for labour hoarding in hours, to construct series on input utilisation rates for ten OECD countries.⁽³⁾ Unlike LNS and BE, his measure of labour effort is a function of the ratio of output to consumption and two estimated parameters of the optimisation problems of households and firms. The intuition behind this measure is as follows. Given that effort is chosen

(1) The utilisation measures and the GDP series on the second and third charts on the left have been filtered using different sample periods. The relative size of the measures compared with that of GDP could be affected by the filtering process. The qualitative properties of the series, which we rely on mostly for the analysis of these measures, will remain unchanged.

(2) This paper shows that variable capital and labour utilisation explain 40%–60% of the cyclicality of the Solow residual in US manufacturing. In a more recent study, Basu and Fernald (2000) decompose labour productivity into technology shocks, factor utilisation, imperfect competition, increasing returns, and resource reallocations. They find that variable utilisation and resource reallocations are particularly important in explaining procyclical productivity.

(3) The model also assumes variable capital utilisation.

optimally, the household's marginal loss of supplying effort (measured in units of consumption) has to be equal to the marginal output extracted by firms from this additional effort. Hence, movements of output relative to consumption (shaped by these key parameters) should proxy movements in the equilibrium level of effort. This formulation takes advantage of the consumption data by combining consumption and labour supply decisions of households with the profit maximisation decisions of firms.

The last row of Chart 5 displays the results. Labour intensity decreased between 2001 Q2 and 2002 Q2, showing signs of labour hoarding during the slowdown. The advantage of this measure is that it does not rely on hours data, therefore the left panel offers a consistent long-run utilisation series. The recent fall in utilisation could, therefore, be interpreted as the first indication of labour hoarding since the early-1990s' recession. Although this measure and the one based on total hours worked share the advantage of backing out labour utilisation series from optimising models, they also share the constraint of being dependent on parameter estimates and structural equations that have to be assumed to build these series.

Concluding remarks

This article has attempted to measure the extent of labour hoarding by comparing the cyclical behaviour of different measures of labour utilisation based on aggregate data. It compared five measures of labour utilisation, contrasting their relative merits and their ability to measure labour hoarding. Three of them are *ad hoc*, in the sense that they provide empirical measures of labour utilisation that are not derived from any optimisation problem. The other two measures are based on optimising models that back out labour utilisation as an effort variable that is part of the labour input.

Most of these measures indicate that labour was underutilised during the recent slowdown, implying that firms hoarded labour to some extent. However, the magnitude of the reduction differs between the measures, and the measures themselves are subject to various limitations. One other feature of the results was that the recent decrease in utilisation appeared to be quantitatively small compared with previous episodes where labour utilisation was significantly below trend, and the volatility of all the measures appears to have been lower in the past decade. These features could indicate that the labour market has become more flexible, allowing for more hiring and firing and hence less variation in utilisation. It might also be related to greater stability of inflation and output, associated with the new macroeconomic policy framework. The relative importance of these effects is, however, a matter for future research.

Technical appendix

Ad-hoc measures of labour utilisation

Utilisation measure based on labour productivity in heads

The utilisation (effort) measure based on labour productivity in heads takes the form:

 $e_t = Y_t / N_t$

where *Y* is GDP at factor cost and *N* is heads employment.

Utilisation measure based on labour productivity in hours

The utilisation (effort) measure based on labour productivity in hours takes the form:

$$e_t = Y_t / N_t h_t$$

where Y is GDP at factor cost, N is heads employment, and h is average hours worked.

Utilisation measure based on average hours worked

The utilisation (effort) measure based on average hours worked takes the form:

 $e_t = kh_t$

where *h* is average hours worked and *k* is a positive constant. For simplicity, the article assumes k = 1, as this value will not affect the calculations of the measures compared here.

Model-based measures of labour utilisation

Utilisation measure of Larsen, Neiss and Shortall

The utilisation measure of Larsen, Neiss and Shortall takes the following form:

$$e_t^* = \pi_0 \bar{H}_t^* + \pi_1 H_t^* + \pi_2 K_t^* + \pi_3 G_t^* + (\pi_3 - \pi_4) X_t^*$$

where an asterisk denotes the growth rates of the variables, and where \overline{H}^* is effective total hours, H^* is total hours, K^* is capital, G^* is government expenditure, and X^* is total factor productivity. Using calibrated parameter values the authors find that $\pi_0 = -0.50$, $\pi_1 = -0.01$, $\pi_2 = -0.49$, $\pi_3 = 0.49$, $\pi_4 = 0.06$. The model assumes that total hours are costly to adjust over time. Effective total hours equal total hours minus this adjustment cost. The authors estimate this cost to be quite small. As a result, the behaviour of effective total hours and total hours is almost the same. The high and negative value of π_0 and the small value of π_1 therefore imply that total hours drive the effort series inversely.

Utilisation measure of Imbs

The utilisation measure of Imbs takes the form:

$$e_t = \left(\alpha \frac{Y_t}{C_t}\right)^{1/(1+\theta)}$$

where *Y* is the level of GDP, *C* is private consumption, α is the share of labour in output, and θ measures a representative household's disutility associated with providing effort. As in Imbs (1999), this article assumes $\alpha = 0.793$ and $\theta = 0.231$.

References

Basu, S and Fernald, J (2000), 'Why is productivity procyclical? Why do we care?', *NBER Working Paper Series*, No. 7040.

Basu, S, Fernald, J and Shapiro, M (2001), 'Productivity growth in the 1990s: technology utilisation or adjustment?', *NBER Working Paper Series*, No. 8359.

Basu, S and Kimball, M (1997), 'Cyclical productivity with unobserved input variation', *NBER Working Paper Series*, No. 5915.

Becker, G (1975), Human capital, 2nd edition, Chicago: University of Chicago Press.

Burnside, C and Eichenbaum, M (1996), 'Factor hoarding and the propagation of business cycle shocks', *American Economic Review*, Vol. 86(5), pages 1,154–74.

Darby, J, Hart, R and Vecchi, M (2001), 'Wages, work intensity and unemployment in Japan, UK and USA', *Labour Economics*, Vol. 8, pages 243–58.

Fair, R (1985), 'Excess labour and the business cycle', American Economic Review, Vol. 75, Issue 1, pages 239-45.

Fay, J and Medoff, J L (1985), 'Labour and output over the business cycle: some direct evidence', *American Economic Review*, Vol. 75, pages 638–55.

Hamermesh, D (1993), Labor demand, Princeton: Princeton University Press.

Horning, B (1994), 'Labor hoarding and the business cycle', International Economic Review, Vol. 35, No. 1.

Imbs, J (1999), 'Technology, growth and the business cycle', Journal of Monetary Economics, Vol. 44, pages 65–80.

Larsen, J, Neiss, K and Shortall, F (2002), 'Factor utilisation and productivity estimates for the United Kingdom', *Bank of England Working Paper no. 162*.

Mincer, J (1962), 'On the job training: costs, returns and some implications', *Journal of Political Economy*, Vol. 70, pages 50–79.

Oi, WY (1962), 'Labor as a quasi-fixed factor', Journal of Political Economy, Vol. 70, pages 538-55.

Parsons, D O (1972), 'Specific human capital: an application to quit rates and layoff rates', *Journal of Political Economy*, Vol. 80, pages 1,120–43.

Summers, L (1986), 'Some skeptical observations on the real business cycle theory', *Quarterly Review: Federal Reserve Bank of Minneapolis*, Vol. 10, pages 23–27.

Asset finance

By Andrew Hewitt of the Bank's Domestic Finance Division.

Asset finance, in its various forms, is widely used in the United Kingdom. Indeed, one survey has shown it is the largest type of funding for almost a quarter of those small and medium-sized enterprises (SMEs)⁽¹⁾ that use external finance. Some forms of asset finance have grown rapidly in recent years, while others have not; and some new asset finance products have been brought in from the United States. This article provides an overview of asset finance from a UK perspective.

Introduction

Asset finance is a generic term often used to describe the three main elements—invoice finance, leasing and hire purchase and, more recently, asset-based lending (ABL). The term derives from the fact that the finance is based on specific assets of the borrower, about which the asset financier has specialist knowledge. This article describes the basic characteristics of the three main elements of asset finance and outlines some advantages and disadvantages of asset finance compared with traditional bank finance. It then examines the current usage of asset finance in the United Kingdom, and discusses some recent trends in the market. Finally the relevance of asset finance to smaller firms is considered.

Definition and basic characteristics of asset finance

Factoring and invoice discounting, together known as invoice finance, are primarily used as a form of short-term working capital finance. Leasing and hire purchase typically provide longer-term fixed capital finance. ABL may be used to finance fixed or working capital and is usually part of a bigger package of finance. Except in some forms of ABL, financiers gain or retain ownership of the assets concerned for the duration of the contract. Unlike traditional bank lending, where future cash-flow projections for the business as a whole play a pivotal role in the lending decision, asset financiers' decisions are primarily based on the value of specific assets. More detailed explanations of the three main types of asset finance are given in the box on page 208.

Invoice finance

This may be provided on a 'recourse' basis, where the financier has recourse to demand repayment by the vendor of any advances made against a debt which has subsequently gone bad. Alternatively, it may be conducted on a 'non-recourse' basis, where for an additional fee the financier assumes the risk that the debtor does not pay.⁽²⁾ Thus, non-recourse invoice finance is a form of funded trade credit insurance.⁽³⁾

Recourse invoice finance is recorded on the borrowing firm's balance sheet in much the same way as ordinary short-term bank finance, as it is essentially a short-term secured advance and the borrower remains liable for the sum advanced until the borrower's customer pays the amount due on the invoice. The situation with non-recourse finance is more complicated and depends on whether the borrower has any potential liability at all to the financier in the event of non-payment (eg a dispute between the borrower and its customer about the actual performance of the contract). Table A shows the (simplified) effects of bank lending, recourse and non-recourse invoice finance on the balance sheet of a company seeking £100 in working-capital finance and holding an invoice worth £100. It should be noted, however, that the quantity of non-recourse invoice finance (in this illustrative case the prepayment was £85, representing a typical advance rate of 85% of the

⁽¹⁾ Competition Commission (2002)—see also Table C below.

⁽²⁾ Delayed payment due to disputes between the vendor and the debtor is excluded from the cover.

⁽³⁾ That is, insurance against the loss or deterioration of book debts. For an overview of trade credit insurance, see Dowding (2002).

The three main types of asset finance

Invoice finance

Both invoice discounting and factoring involve the assignment by a vendor to its financier of the proceeds due on outstanding invoices (receivables), in return for an immediate payment of up to around 85% of the invoices' face values and the remainder (less fees and finance charges) upon payment of the debts by the vendor's customers. Thus, the finance is extended for the length of the trade debt (the average payment period in the United Kingdom was around 55 days in 2002).⁽¹⁾ The main difference between factoring and invoice discounting is that in the latter the vendor retains control of its sales ledger and remains responsible for collecting debts, whereas factoring involves the transfer of this function to the financier. Partly for this reason, larger firms tend to use invoice discounting, whereas factoring is more suitable for many smaller firms.

Asset-based lending

This is finance for the acquisition of assets such as raw materials, unsold stock and plant and machinery. For stock finance, the financier may provide a monthly revolving facility secured on the pool of assets. For fixed and intangible assets, the finance is similar to a secured term loan. In some cases, the financier may take ownership of the assets and sell them to the firm on credit terms.⁽²⁾ ABL is almost invariably a minority part of a finance package centred on invoice finance.

Leasing and hire purchase

A lease is a contract between a lessor and a lessee that gives the lessee possession and use of a specific asset for a period of time in return for paying rentals to the lessor.⁽³⁾ The lessor retains ownership of the asset for the duration of the lease, retains the right to any capital allowances associated with the purchase of the asset (although the lessee is allowed tax relief on the rent payments), and the lessee does not generally have the right to purchase the asset when the lease terminates.

A hire purchase arrangement is a rental agreement that allows the hirer to purchase the asset at the end of the rental period. If the payment for this is nominal (as it almost always is in the United Kingdom), capital allowances—which always accrue to the buyer of the asset—will accrue to the hirer, because the hirer is effectively purchasing the asset by taking the option to buy at a cost far below market price.

Credit Management Research Centre (2003). Normally, invoice financiers would not extend credit beyond 90 days.
For a more detailed description, see Hawkins, Peers and Wilde (2000), pages 15–19.

(3) PriceWaterhouseCoopers (2001).

Table A(a)Balance sheet effects of invoice finance compared withbank lending

	Assets	Liabilities
Normal bank lending	100 (debtors)	100 (short-term bank finance)
Recourse invoice finance	85 (cash) 15 (debtors)	85 (short-term invoice finance) 15 (short-term bank finance)
Non-recourse invoice finance	15 (debtors)	15 (short-term bank finance)

(a) Assuming for non-recourse invoice finance that the borrower has no liability to the financier. Such circumstances are not common.

invoice's face value) must be disclosed in the notes to the accounts.

The Factors and Discounters Association (FDA)⁽¹⁾ estimates that around 80% of its members' invoice discounting business is conducted on a confidential basis, where the financier agrees not to make buyers aware that their supplier is using his services. This desire for confidentiality arose during the time when many held the view that factors and discounters were exclusively 'lenders of last resort' for struggling businesses, although perceptions are now changing to meet the reality that invoice finance is used by many viable and prospering businesses. It has generally not been possible to conduct confidential factoring, because it is very difficult for financiers to pursue debts without revealing their identity to debtors, although confidential factoring is now becoming available from some financiers.

Asset-based lending

Many UK invoice financiers now provide asset-based lending (ABL), a product imported from the United States in the 1990s. ABL differs from traditional bank finance in two respects. First, a monthly revolving

(1) The FDA is the trade association for the invoice finance industry in the United Kingdom and also covers the Republic of Ireland. It estimates that its 40 members provide around 95% of invoice finance in the United Kingdom. facility for financing stocks may be more flexible than an overdraft, the limit on which is normally only reviewed annually. Second, asset financiers may be prepared to lend more than a bank would through a normal term loan and/or to accept a wider range of assets as security.

ABL arrangements are usually part of a package of finance centred around a core invoice discounting facility, which would typically constitute around 70% of the package. This proportion may vary widely, particularly for larger deals where the financier may also include some finance based on cash-flow projections. Some larger deals may also involve some element of equity finance, although this is by no means essential. Advance rates against fixed assets and current assets other than receivables will typically be lower than those in the invoice discounting facility (see Table B)—raw materials, for example, are unlikely to attract an advance of more than 50% of their value because there is no guarantee that they will be converted into finished goods and subsequently sold.

Table B Indicative maximum advance rates in asset-based lending^(a)

Per cent

	GE Capital	GMAC
Receivables	90	90
Plant and machinery	80	80
Finished goods	60	50
Commercial property	50	70
Raw materials	30	Not specified

Sources: GE Capital, GMAC Commercial Finance.

(a) GMAC Commercial Finance advance rates on plant and machinery for up to 90 days and on property for up to 365 days. Figures for both companies are indicative maxima only.

Leasing and hire purchase

There are essentially two forms of lease in the United Kingdom: the finance lease and the operating lease. Finance leases confer upon the lessee substantially all the economic risks and rewards of ownership of the asset, because the lessee repays substantially all of the asset's cost to the lessor. At the end of the lease, the lessor may sell the asset and pay to the lessee most of the proceeds. Alternatively, the lessee may continue to lease the asset at a nominal 'peppercorn' rental. Under an operating lease, the lessor retains some or all of the economic risks and rewards of ownership. This is mainly because the economic life of the asset is likely to be longer than the length of the lease. When an operating lease terminates, the asset is simply returned to the lessor, who may lease it out again.

Assets subject to hire purchase arrangements are recorded on the lessee's balance sheet in much the same

way as if it were a finance lease, provided that the cost to the lessee of exercising the option to purchase the asset is negligible (which, in the vast majority of cases in the United Kingdom, it is).

Advantages and disadvantages of asset finance compared with traditional bank finance

Advantages

First, asset finance gives financiers better security, because the financier is the legal owner of the assets financed (receivables or leased equipment), rather than simply holding a charge over them. This mitigates the information asymmetries inherent in lending and can make an asset financier more willing to provide finance than a traditional lender.

Second, asset financiers often possess a high degree of specialist knowledge on the value of the assets concerned, and how best to realise that value. Invoice financiers build up large databases on the creditworthiness of their clients' trading partners and are therefore in a strong position to determine accurately the likelihood of delayed or non-payment. Lessors often specialise in providing certain forms of capital assets, and therefore have a good knowledge of conditions in the market for those assets, old or new. This specialist knowledge may also mean that an asset financier is more willing to provide finance than a traditional lender, who may lack specialist knowledge of the borrower and of the assets used to secure the loan.

Third, asset finance may be more suited to new, growing businesses. These may lack the track record or assets that a traditional lender may require. For example, an invoice financier may be better able to help such a firm, because its credit risk is based on the firm's customers, rather than the firm itself; and a lessor will finance the whole of a fixed-asset acquisition whereas a traditional lender will only lend part. Furthermore, as the business grows, the asset finance provision can grow automatically with it (subject to the creditworthiness of the customers and/or the market for the particular fixed assets sought).

Fourth, small, growing firms are often not yet profitable, and leasing allows them to benefit from tax allowances available on the purchase of new capital equipment even though their taxable income may be inadequate. Because the lessor buys the asset, the capital allowance accrues to it, but the lessor may pass on part of the allowance to the lessee, in the form of reduced rental rates.

Fifth, asset financiers often offer 'value added' non-financial services alongside finance facilities, which would not normally be available from traditional bank lenders. Many of these services allow firms to outsource non-core functions related to the assets financed to the specialists. For example, lessors of computers and vehicles often include maintenance contracts as part of the package; and invoice financiers may offer credit control advice, debt collection services and even logistical support.

Sixth, the use of asset finance can also allow firms to transfer some risks to the specialist financier. This is particularly true in the case of operating leasing, where the lessee carries no residual value risk and simply returns the asset to the lessor at the end of the contract. International factoring and invoice discounting also allow clients to mitigate the exchange rate risk by receiving the bulk of monies owed immediately rather than at a later date.

Finally, asset finance can provide valuable competition to mainstream banks in the small and mid-corporate market. There are a significant number of non-bank providers of asset finance, particularly among lessors.

Disadvantages

Asset finance has, however, some disadvantages compared with traditional bank lending. First, it is not available in all sectors. For example, invoice finance is not available for: businesses that invoice in stages (such as the construction industry); sales to the general public; sales done on a sale-or-return basis; or firms whose goods or services are complex in nature (because there may be a high level of rejection by customers or a need for considerable after-sales service). Leasing of highly specialist equipment may also pose difficulties, because the secondary market may be particularly thin.

Second, one of the principal disadvantages of asset finance most often cited by users of business finance is that it is expensive. The fixed costs involved in asset finance (invoice finance in particular) make it unsuitable for the smallest firms, and smaller firms will be most affected by the fees financiers charge for use of the facilities because they are typically high relative to the low values of finance required by such firms. However, comparisons between the costs of asset finance and traditional debt are complicated by the possible additional services that may be provided with asset finance.

Third, a problem commonly associated with invoice discounting is fraud by the financiers' clients. This can include the swapping of fictitious invoices between colluding firms, issuing fictitious invoices and issuing invoices before the goods have been dispatched. Anti-fraud measures by invoice discounters can be expensive and off-putting for legitimate businesses.

Current usage of asset finance in the United Kingdom

At end-2002, advances from FDA members totalled £8.2 billion. A further £432 million was advanced by FDA members through asset-based lending. At that time, members of the Finance and Leasing Association (FLA)⁽¹⁾ had £65.8 billion outstanding to business clients. These amounts compare with bank lending to private sector non-financial corporations of £255.1 billion.⁽²⁾ Thus, the total outstanding on asset finance facilities was just under 30% of that on bank facilities (see Chart 1).

Invoice finance

The breakdown of the total amount of invoice finance advanced at end-December 2002 by product type (see Chart 2) shows that domestic invoice discounting accounts for the great majority (80%). However, Chart 3 shows that domestic invoice discounting is used by only 37% of firms. This is because, as noted above, larger firms mainly use this form of invoice finance. Domestic factoring, which is more prevalent among smaller firms, is used by 52% of client firms but accounts for only 16% of the total amount advanced.

In total, FDA members financed client sales of $\pounds 104.4$ billion in 2002, the highest annual figure to date. Just over 10% of invoice finance was with no recourse to the client, ie effectively a form of trade credit insurance.

⁽¹⁾ The FLA is the main UK trade body for the leasing and consumer finance industries. It currently has over 50 members providing business finance in the United Kingdom.

⁽²⁾ Figure includes lending by deposit-taking institutions only; as such it excludes the leasing activities of banks'

asset finance subsidiaries but will include, for example, Barclays' asset finance activities because they are carried out within Barclays plc.

Chart 1 Asset finance and bank finance outstanding, end-2002



Sources: Bank of England, Factors and Discounters Association and Finance and Leasing Association.

Chart 2 Total invoice finance advances, by type of product, end-2002



Source: Factors and Discounters Association.

Chart 3 Invoice financiers' client numbers by product, end-2002



Leasing and hire purchase (HP)

FLA members, whose finance is typically extended for longer periods than invoice finance, completed some

Chart 4 Leasing/HP new business by product type, 2001



Source: Finance and Leasing Association.

Chart 5





Source: Finance and Leasing Association.

£23.5 billion of new business in 2001 (£21.4 billion if international business is excluded). HP agreements were the single most common form of finance provided by FLA members, accounting for around a third of all new business (see Chart 4), closely followed by finance leases (29%) and operating leases (25%). However, there has been a trend towards the increasing use of operating leases (see below). Around two thirds of all FLA member finance was provided to firms in the service sector (see Chart 5).

Recent trends in asset finance

As Chart 6 shows, invoice finance has increased rapidly in the past decade, growing by over 300% in real terms between 1993 and 2002. The leasing and HP industry, by contrast, grew by around 50% in real terms up to the mid-1990s, but has remained roughly stable since 1998. By comparison, bank lending to private non-financial corporations grew in real terms by 43% between 1993 and 2002. It should be remembered that, although invoice finance has experienced much stronger growth, it was from a much lower base than leasing and HP.

Chart 6

Real growth in business finance provided by invoice financiers and lessors (at 1993 prices)



Invoice finance

Overall, growth in the invoice finance industry seems to have been driven both by an increase in the number of businesses using invoice finance and by the growth in sales experienced by those client businesses (see Chart 7). Indeed, the growth in clients' sales has exceeded the growth in GDP in every year since 1987, except for 1991 (see Chart 8).

There are a number of potential explanations for these trends. First, there is anecdotal evidence⁽¹⁾ that. following the early-1990s' recession, when banks suffered significant losses on traditional term lending and overdraft business, many banks encouraged overdraft customers to transfer to invoice discounting products in order to improve the banks' security. More recently, the Brumark judgement⁽²⁾ may have helped sustain and strengthen this trend, by questioning whether fixed charges taken by banks over receivables could be effective. Second, advances in IT have made it possible to provide invoice finance on a cost-effective basis to more smaller businesses. Finally, the industry has had some success in countering its previous image as a 'lender of last resort' for failing businesses.

The main contributor to the growth in invoice finance has been invoice discounting, as shown in Chart 9.(3)

Chart 7 Numbers of businesses using invoice finance and sales by those businesses



Chart 8 Growth of UK invoice finance, at 2002 prices and as a percentage of GDP



Sources: Bank of England, Factors and Discounters Association, Hawkins (1993) and Office for National Statistics.

(a) Calculated by dividing percentage annual growth in clients' sales by percentage annual growth in GDP. A result of 1 indicates equal growth in clients' sales and GDP, 2 that clients' sales grew at twice the rate of growth in GDP, etc.

Chart 2 above showed that invoice discounting now accounts for 80% of invoice finance. This has not always been the case: in the industry's infancy in the 1970s and 1980s, the proportion was well below 50%. This growth in invoice discounting may reflect the fact that an increasing proportion of client sales is accounted for by the industry's largest customers, who generally do not

See, for example, comments made by David Marsden of RDM Factors and former FDA Chairman in Breakell (2002).
The Brumark decision was given by the Judicial Committee of the Privy Council on 5 June 2001. The judges decided that a debenture over book debts that are still available to the borrower to collect and use the proceeds freely could not create a fixed charge for the lender over those assets. Rather it could create only a floating charge—a claim junior to preferential creditors in the event of an insolvency. By migrating customers to invoice discounting, banks can retain their fixed charges over borrowers' book debts by demonstrating that control over those assets rests with the lender rather than the borrower. For more information, see Bank of England (2002), pages 29–30.

⁽³⁾ Data for years 1986–92 in Chart 8 and 1987–92 in Chart 9 extrapolated from chart on page 205 of Hawkins (1993), and refer to clients of Association of British Factors and Discounters member firms only.

Chart 9 Real growth of UK invoice finance by value



require factoring: between 1996 and 2002 the proportion of invoice finance accounted for by clients with an annual turnover in excess of £10 million grew from 25% to 44%.

As noted above, the proportion of clients' sales financed on a 'non-recourse' basis was just over 10% in 2002 Q4. This proportion has declined since 1995, when it was just under 20%—see Chart 10. This may be associated with growth in the use of invoice finance by larger firms, who may feel less need for the credit protection offered by non-recourse finance, because they have in-house credit control functions. Relatively low company failure rates in the mid to late-1990s may also have led some clients to shy away from the more expensive credit-protected option—turnover insured by specialist trade credit insurers did not grow in real terms between 1997 and 2001, despite rapidly falling premiums.

Chart 10 Non-recourse (credit protected) client sales



Finally, as competition in the industry has become more intense—there are now over 50 invoice finance providers—players may have taken on riskier propositions to gain and maintain market share. This may have led to a reduction in financiers' willingness to advance funds on a non-recourse basis.

Asset-based lending

ABL is growing in importance, particularly in larger deals. Between end-1997 (when data were first collected) and the end of 2002 Q1, the amount lent by invoice financiers on assets other than receivables grew from £98 million to £629 million, although this has fallen back to £432 million by end-2002 (see Chart 11). Anecdotal evidence suggests that this recent decline in lending was due to borrowers' reluctance to take up the full amount of credit facilities offered to them by the invoice financiers, a result of depressed demand.





Leasing and hire purchase

The leasing business is cyclical, because it relies on potential lessees' decisions about capital investments. In its infancy in the 1960s and 1970s, the UK leasing industry had been tax-driven. Leasing largely allowed banking groups with large tax capacity to obtain the benefits of 100% first-year capital allowances for plant and machinery which lessees with lower taxable profits could not. However, the benefits were reduced in 1984, with changes in tax rules and accounting standards.⁽¹⁾ Nonetheless, the leasing industry grew from 1984 to 1989 (see Chart 12): during that time the penetration

 A reduction in first-year capital allowances to 25%, reductions in corporation tax rates and the introduction of SSAP 21 (obliging lessees to capitalise finance leases).

Chart 12 FLA business investment penetration



ratio (the proportion of gross domestic fixed capital formation (GDFCF) financed through leasing) increased by around 8 percentage points to 31% in 1989. New leasing business subsequently fell in the early 1990s, as a result of the recession depressing capital investment.

The leasing industry recovered in the mid-1990s, with penetration reaching a peak of 31.9% of total GDFCF in 1996. However, in that year the government introduced further measures to curb the remaining tax advantages in leasing. Writing-down allowances on long-term leases (25 years and over) were reduced to just 6% and lessors were required to apportion allowances over time, so that a purchase of an asset the day before the lessor's year-end would attract only 1/365th of the writing-down allowance available. These changes have contributed to the low (in real terms negative) growth in new leasing business and to a declining penetration ratio in the past five years (see Chart 12).

Chart 13 shows that, while the use of finance leases has declined in recent years, the use of operating leases has increased. As well as the effect of the tax changes mentioned above, which removed some of the advantages of finance leasing in particular, the change could also be due to the trends towards outsourcing non-key assets through the use of operating leases—by utilising a serviced operating lease a business can reduce its balance sheet, remove risks associated with assets' residual values and allow the specialists to assume responsibility for maintaining the asset.⁽¹⁾ Alternatively,

Chart 13 FLA new business volumes by product 1997–2001



a firm may choose to outsource the asset entirely, in which case the contractor may choose to lease the asset in order to provide it to its client.

Asset finance and smaller firms⁽²⁾

Asset finance may be particularly appropriate for SMEs. First, they may be less able than larger companies efficiently to manage or maintain non-core assets such as trade debts or complicated computer equipment. There may, therefore, be a particularly significant efficiency gain for small firms in the 'outsourcing' of such tasks to specialist providers. Second, as discussed above, some small firms' ability to raise sufficient traditional debt may be constrained by their lack of a track record.

Lasfer and Levis (1997) support this view in respect of leasing.⁽³⁾ They found that the proportions of small (first decile), medium (fifth decile) and large (tenth decile) companies making some use of leasing/HP over time were roughly equal, varying from 52.3% of large companies, to 55.7% of small companies. However, the propensity to lease (HP/lease finance as a proportion of total debt) varied inversely with firm size: for small firms it was 33.9%, for medium-sized firms 22.2% and for large firms just 12.8%. They also suggest that less profitable small firms make more use of leasing than more profitable ones; and that small firms' leasing decisions are not (unlike those of large firms) driven by tax considerations. These results suggest that leasing is important for small firms because it allows them access to finance that they would otherwise face difficulties in

⁽¹⁾ See Higson (2002).

⁽²⁾ This section draws on the work of Higson (2002), to whom the author is indebted.

⁽³⁾ The study was of published machine-readable accounts data on 3,008 companies for the period 1982–96.

Table CSMEs with external finance:proportions with differenttypes of external finance

Type of external finance	Percentage of SMEs using that type of finance	Percentage of SMEs for which that type is largest source
Loan	38	28
HP	22	10
Leasing	22	9
Overdraft	23	8
Overdraft facility	24	6
Commercial mortgage	7	5
Invoice discounting	5	3
Factoring	3	1
Other	19	10
Don't know	16	18
Total (a)		100

Source: Competition Commission (2002).

(a) Components may not sum to total due to rounding

obtaining. Evidence from the United States (Sharpe and Nguyen (1995)) also supports these findings.

Much less work has been done on the importance of invoice finance to small firms. As noted above, because of the fixed costs involved it is probably not appropriate for the smallest firms. However, invoice finance may be particularly appropriate for SMEs with high growth potential that do not have the internal resources or expertise to manage their growing sales ledgers or make sophisticated credit risk assessments. It may also be utilised by smaller firms experiencing difficulties accessing bank finance, although, as also noted above, it is necessary for them to generate invoices to obtain the finance.

Recently published empirical evidence confirms that UK small firms continue to make use of asset finance. The Competition Commission Report (2002) on the supply of banking services to SMEs found that HP or leasing together constituted the largest source of external funding for 19% of SMEs surveyed (see Table C).⁽¹⁾ In comparison, bank loans were the largest source of external funding for 28% of firms surveyed, and overdrafts or overdraft facilities were the largest source for 14%. Factoring or invoice discounting were the largest source for 4%.

Cosh and Hughes (2000)⁽²⁾ had earlier found similar results: 45% used some form of HP/leasing finance and 9% used factoring (approximately three out of four used some form of bank finance). They also found that 'small' firms (10–99 employees) made more use of asset finance than micro (<10 employees) or medium-sized firms (100 to 199 employees).

Small firms' importance to the asset finance industries is shown in Chart 14. Some 89% of invoice financiers' clients had annual turnovers of less than £5 million and these accounted for 41% of the funds advanced. Just over half of lessors' new business finance was provided to firms with turnovers below that amount.

Chart 14

FDA clients and amounts outstanding (end-2002), and FLA new business (2002), by client turnover



Sources: Factors and Discounters Association and Finance and Leasing Association.

Conclusion

Asset finance offers a viable alternative to other more traditional forms of finance, both for investment projects (leasing/HP) and working capital (invoice finance and ABL), because it allows firms fully to exploit the value of their assets in securing finance. For new or smaller firms that lack a trading record or are otherwise unable to convince traditional (cash-flow based) lenders that theirs is a solid proposition, asset finance may present an alternative source of funding. It also allows firms to outsource effectively the management of non-key assets. The main constraints on its use are lack of suitability in some sectors and, in some cases, cost. In terms of actual usage, invoice finance has seen particularly strong growth over the past ten years, albeit from a low base, and asset-based lending has also grown significantly. Leasing has remained popular, and accounts for over 25% of capital investment in the United Kingdom, as the attraction of the addition of extra services has partly offset the effect of eroding tax advantages.

Competition Commission (2002), Vol. 2, page 37. 1,211 SMEs with annual turnovers of up to £25 million were surveyed in September 2000.

⁽²⁾ They surveyed 2,520 firms with fewer than 500 employees in 1999. A total of 1,309 responses were received.
References

Bank of England (2002), Finance for small firms: a ninth report.

Breakell, D (2002), ABL in 2002: a survey of the asset-based lending market, DLA.

Competition Commission (2002), *The supply of banking services by clearing banks to small and medium-sized enterprises*, HMSO.

Cosh, A and Hughes, A (2000), 'Profitability and finance in UK SMEs', *British Enterprise in Transition*, ESRC Centre for Business Research.

Credit Management Research Centre (2003), The Credit Management Quarterly Review, January.

Dowding, T (2002), *Current issues in short term credit and political risk insurance 2002*, International Credit Insurance and Surety Association.

Hawkins, D (1993), The business of factoring, McGraw Hill.

Hawkins, R, Peers, R and Wilde, E (2000), Asset-based working capital finance, Financial World Publishing and Factors and Discounters Association.

Higson, C (2002), Asset financing, Finance and Leasing Association.

Lasfer, A and Levis, M (1997), The role of leasing in the financing of small and medium-sized companies, PFI projects and inward investments, City University Business School.

PriceWaterhouseCoopers (2001), Tolley's leasing in the UK, Third edition.

Sharpe, S and Nguyen, H (1995), 'Capital market imperfection and the incentive to lease', *Journal of Financial Economics*, Vol. 39, pages 271–94.

Import prices and exchange rate pass-through: theory and evidence from the United Kingdom

Working Paper no. 182

Valerie Herzberg, George Kapetanios and Simon Price

The appreciation of sterling that began in 1996 appeared to feed through into import prices slowly, although there has been considerable downward pressure. Importers appear to have taken the opportunity to raise their margins. This is the topic examined in this paper. We begin by discussing competing theories to explain this phenomenon. We then estimate a model capturing some aspects of the process, focusing on the role of competitors' prices.

The presence of nominal rigidities has often provided a useful explanation for short-run variations in the real exchange rate. But in order to explain the persistent failure of import prices to fall fully in line with the exchange rate, we need more than simple nominal rigidity. Such persistent changes in the real exchange rate suggest the presence of pervasive market segmentation across countries. This is defined as the ability of firms to charge different prices for an identical good in different markets, or alternatively as the ability of firms to price to market (PTM). International market segmentation and imperfect competition then imply that there may be relatively little pass-through of exchange rates to import prices.

On the time series properties of the data, real exchange rate movements are well known to be volatile, but are also highly persistent. Furthermore, there is evidence that most of the real exchange rate variability is due to *traded* goods prices. Moreover, the new open economy macro models show that when such structures are embedded in complete general equilibrium models, there are profound implications for the monetary transmission mechanism. It seems that variable margins, sticky prices and (implicitly) transport costs are crucial elements in explaining the persistence in relative price changes, although not everything can be explained.

One possible implication for firms' import (and domestic) price setting is that competitors' prices affect the mark-up over marginal costs, and it is on this that we focus in this paper. Some of the factors supporting pricing to market may also introduce non-linear responses to exchange rate shocks. That is, small changes in the exchange rate may leave the prices of imported goods unchanged in sterling terms, but large changes that cross a 'threshold' may trigger an adjustment. However, although this kind of behaviour is plausible for firms, the case for aggregate effects is less certain. Aggregation may lead to smooth non-linearities, however, and we discuss ways of testing for this.

We establish that there is evidence for pricing to market and a role for competitors' prices by estimating a mark-up equation with a role for UK prices. The mark-up is over the major six (M6) countries unit labour costs, which implies that the underlying technology is Cobb-Douglas. The mark-up is affected by domestic demand, measured by a measure of capacity utilisation, and by domestic prices. The Johansen results suggest that there is no cointegration, but the method is known to be sensitive to the maintained assumptions and specification. Given weak exogeneity, single-equation methods are a robust method, and we are able to show that the explanatory variables are indeed weakly exogenous to the long-run relationship. The equation gives a weight of 0.36 to labour costs and 0.64 to UK prices, so PTM appears to be dominant. It is possible that some import pricing may be characterised by purchasing power parity (PPP), although the adjustment coefficients in the system's individual equations suggest this is not a major factor, so we think of our estimates as offering an upper bound on the degree of PTM.

There are potential identification problems. In particular, if PPP held then our equation might conflate the firm's mark-up equation with the PPP relationship. But there is no evidence for multiple long-run relationships. And the evidence from the adjustment coefficients supports PTM as well, as the direction of causality indicated by the adjustment coefficients is from the long-run relationship to import prices. Thus we are confident that there is indeed some pricing to market in UK imports.

By contrast, there is no evidence for non-linearity, either in extreme threshold behaviour or smooth-transition models. We base this conclusion on the results of general tests that are powerful against a range of non-linear alternatives: a specific on-off threshold model where there is an abrupt transition between regimes; a simple spline model allowing differential adjustment speed at positive and negative disequilibria; and a flexible smooth-transition model that allows for continuous variation between regimes, but still nests the extreme case.

Capital flows to emerging markets

Working Paper no. 183

Adrian Penalver

Capital flows to emerging market economies have historically occurred in cycles of enthusiasm and despair. During the upswing, confidence is high and countries may overborrow relative to the set of profitable investment opportunities, thereby creating the conditions for a financial crisis and capital outflow. Countries might be better off if they borrowed at a steadier rate and avoided these cycles in capital flows. If borrowing exceeded this optimal rate, policy-makers could take steps to restrain capital inflows or promote them if borrowing fell below this rate. But what is the optimal rate of capital flows to emerging markets? Economic theory has had very little to say on the matter. To help answer the question, this paper investigates an open-economy growth model adjusted to make it appropriate for analysis of emerging market economies. This model is then calibrated using the results of a simple econometric equation and some assumptions about the other parameters. From this, estimates of optimal capital flows to a selection of emerging market economies are reported.

Two sorts of capital are used to produce output in the theoretical model. Some capital, such as factories, ships or pipelines, can be used as collateral for international loans. This is because the assets can be owned by foreign investors so that in the event the borrower defaults, an international lender can claim the collateral and recover the money. Other capital, such as human capital, cannot be used as collateral because the asset cannot be bought or sold. For example, a creditor cannot seize the education or health of a bankrupt debtor and sell it to someone else. The first sort of capital can be used to borrow money internationally, the second sort cannot.

A capital-scarce emerging market country will borrow to invest in the first sort of capital as much as it can. However, it needs to generate resources internally to invest in the second sort of capital. But citizens of the country will also want to consume now, so the growth rate is determined by the trade-off between the desire to consume now and investing to consume more in the future. Both forms of capital are assumed to be complementary in production, so the accumulation of capital that can be used as collateral will depend on the rate of investment in capital that cannot be used for this purpose. Therefore, the rate of international borrowing can be estimated by deriving the rate of growth in capital that cannot be used as collateral.

One feature of emerging markets is that a significant proportion of the labour force does not use internationally collateralisable capital, for example those engaged in agriculture or rural industry. This paper extends a model by Barro, Mankiw and Sala-i-Martin by adding a 'traditional' sector which does not use collateralisable capital in production. Other things being equal, the larger the traditional sector, the slower the economy will grow. However, there are other fundamental factors which also determine the growth rates of emerging market economies. To help calibrate the model, an econometric equation is presented that estimates the effect of these factors. By combining the theoretical model, the econometric equation and some additional assumptions, estimates of capital flows to a selection of emerging market economies are calculated. These estimates provide a benchmark against which to compare observed capital flows. The capital flows derived from this exercise are lower than those observed over the estimation period (1988-97), suggesting that actual capital flows might have been too high. However, the results are sensitive to the parameters chosen. Therefore, larger flows than the benchmark are not necessarily a signal of overlending. They do suggest, however, that policy-makers should take a closer look at the fundamentals of the economies concerned. Substantially higher flows can be consistent with the theory, but require confidence in underlying parameter values outside the normal range. These results cannot replace judgment on the strengths and weaknesses of an economy's fundamentals, but they can suggest where these judgments need to be made.

The effect of payments standstills on yields and the maturity structure of international debt

Working Paper no. 184

Benjamin Martin and Adrian Penalver

Financial crises appeared to become more prevalent and more severe over the 1990s. In response, policy-makers have sought mechanisms to reduce the probability of crises occurring and to limit the costs when they do occur. One such mechanism is the temporary suspension of debt payments: a standstill.

Standstills offer potential benefits in both liquidity and solvency crises. In a liquidity crisis, a standstill would play a role similar to a bank holiday in the domestic bank run case. As such, standstills could forestall a liquidity crisis, thus preventing a liquidity crisis from degenerating into a solvency crisis. In both liquidity and solvency crises, standstills pre-empt the creditor co-ordination problem by temporarily imposing a collective solution. A common criticism of standstills, though, is that they will lead creditors to lend over shorter maturities to be well placed for a 'rush to the exits' if there is a risk of a standstill being called. This would raise the proportion of short-term debt and so could increase vulnerability to a liquidity crisis rather than reduce it. It would also potentially, then, increase the cost of capital for emerging markets.

This paper develops a simple model to analyse the effects of standstills, using comparative statics between a regime with and without standstills. The three-period model comprises an emerging market debtor and risk-neutral international creditors. The debtor needs to borrow to finance production and can issue either short or long-term debt. The key assumptions of the model are that the probability of crisis increases in the level of short-term debt, that crises have costs that spill over into the next period, and that orderly crisis resolution through the use of standstills will reduce the cost of crisis. There is full information and a competitive market for funds. A standstill is depicted as an orderly rollover of short-term debt from the first period into the second period in the event of a crisis. Investors are impatient and so dislike being caught within a standstill, which is reflected in the interest rates they charge. The debtor can choose strategically to default, but this will reduce output in the following period because investors can distinguish between incapacity and unwillingness to pay. The debtor will maximise expected net output, by choosing the optimal level of short-term debt, from which the other variables are determined.

A numerical example is considered to demonstrate the intuition of the model. The level of short-term interest rates for a given level of lending is higher under standstills, reflecting investors' impatience if caught within a standstill. But long-term interest rates are initially lower under standstills, because the lower cost of crisis reduces the risk of investing in bonds. Faced with higher short-term interest rates and lower long-term interest rates, a debtor country will lengthen the maturity of its debt, which reduces the probability of crisis. This comes at a cost of lower output.

One of the main assumptions underlying the analysis in this paper is that standstills mitigate some crisis costs. Although the reason is not modelled here, this reflects a view that disorderly resolution of financial crises imposes costs on the economy through channels such as loss of market access, reputational costs, a credit crunch, disruptions to the payments system and so on. If the crisis resolution effect is strong, standstills could raise expected output compared with the no-standstills regime. If the crisis resolution effect is weak, standstills cannot improve on the no-standstills regime, because the debtor is fully disciplined in taking risks through market prices. Expected output, however, may not be the appropriate welfare measure if crises have wider social costs than forgone output. If the national authorities were prepared to trade off expected net output and the probability of crisis, then standstills could still improve social welfare.

In summary, the model looks at the implications of standstills for yields and the maturity structure of international debt. The model suggests that creditors will not 'rush for the exits' by lending over shorter maturities. Creditors will charge interest rates that reflect the risks they face. As a result, debtor countries will tend to issue longer maturity debt if they face a tilting of the yield curve. Standstills have the benefit of reducing the proportion of short-term loans and so the probability of crisis will fall. But the cost generally is lower expected output. A country considering introducing a standstills regime would have to weigh up the welfare benefits against the potential output cost.

What does economic theory tell us about labour market tightness?

Working Paper no. 185

Andrew Brigden and Jonathan Thomas

The aim of this paper is to offer a coherent framework for examining the underlying drivers of labour market tightness, and the relationship between labour market tightness and inflation. Our motivation stems from the fact that although the phrase 'labour market tightness' is frequently used in the economics literature, it is rarely defined. Nonetheless, a variety of empirical evidence on labour market quantities and prices, such as unemployment and average earnings growth, is often cited as evidence of changes in the tightness of the labour market. Without a clear definition of the phrase it is difficult to evaluate the usefulness of any evidence offered; and a proper understanding of the relationship between tightness and inflation is also problematic.

In our view 'labour market tightness' can be defined in terms of its implications for the labour share of income. This follows from the notion that the labour market is tight (loose) when there is an imbalance between labour demand and labour supply, which will exert upward (downward) pressure on real unit labour costs, or equivalently on the labour share. Because the words tight and loose imply a degree of imbalance, we assert that the labour market can only be considered tight or loose out of steady state. This has two important implications. First, no shock can cause the labour market to become tight or loose unless it pushes the labour market away from its steady state. In practice, this is not too restrictive, since the kinds of rigidity that are present in most popular macro-models are sufficient to do this. Second, any shock that alters the steady-state value of the labour share cannot be said to have made the labour market permanently tighter or permanently looser. This is because movements in the steady-state do not involve any change in the balance between the demand for, and supply of, labour.

We use our definition of labour market tightness and its associated properties to examine the tightness implications of several popular labour market models. We start with the basic competitive model, and then work through models of efficiency wages, insider power, skill mismatch and matching frictions. A key message of this exercise is that the implications of much-cited indicators of changes in labour market tightness, such as unemployment, depend critically upon both the underlying economic shock and any market rigidities. For example, in the model of insider power a positive shock to nominal money balances leads to a tightening of the labour market that is accompanied by a decline in unemployment, which subsequently rises over time back to its unchanged steady-state value. On the other hand, an adverse labour supply shock in the perfectly competitive or efficiency-wage models leads to a tightening of the labour market that is accompanied by a rise in unemployment to a higher steady-state value.

We then turn to the relationship between tightness and inflation. By our definition, a tightening of the labour market will cause the labour share of income to rise. Since labour market tightness is a real phenomenon, it will have no implications for inflation unless the economy is subject to some form of nominal rigidity. Examples of such rigidities that could plausibly underpin a link between tightness and inflation include sticky price expectations, and restrictions on the frequency with which firms can alter prices. If such frictions are present, it is possible for out of steady-state movements in the labour share to influence inflation. A key lesson from this analysis is that any attempt to infer the relationships between labour market tightness, various market indicators of it, and inflation, requires both a clear definition of tightness and depends on the specific model of the labour market.

Ready, willing, and able? Measuring labour availability in the UK

Working Paper no. 186

Mark E Schweitzer

The unemployment rate is the standard measure of labour availability. This research investigates broader summary measures that account for the substantial role that people who are regarded as economically inactive, can play in employment growth. Inactivity includes people who are studying, sick or disabled, taking care of family members, and retired early. While most people in these groups are less likely to start working in the next three months than the recently unemployed, they often do take up work. So they can serve to augment the unemployed pool as a source of workers, particularly as the unemployment rate declines in an expansion. This paper examines the extent to which they have done so in the current expansion.

The approach taken here is to focus on people who are actually getting jobs (including all inactive categories), rather than limiting the analysis to those who are categorised as unemployed (ie searching and available for work). The models estimate the expected number of transitions to employment from the full set of working-age non-employed, allowing the data to indicate who is relevant. If the behaviour of the inactive were unpredictable, or did not vary over the business cycle, an expanded reference group would add little to our understanding of likely labour market pressure. However, both of these conditions are rejected by the data. The paper considers several alternative models based on different sets of explanatory variables, including the reasons for the individual's non-employment and their personal characteristics, including age, sex and education. The models are all estimated on the same set of non-employed individuals, but include various levels of information about the individuals. For example, the unemployment-rate model only includes a single indicator of the individual's status: 1 for being unemployed and 0 for all other non-employed groups. The model in that case predicts a transition rate for both groups and an aggregate transition rate for the economy as a whole. By building models in this manner, the same yardstick can be used to compare distinct groups of available labour.

The model comparisons suggest three major conclusions. First, a model of availability relying only on the unemployment rate is based on a false premise that other categories of the non-employed are considerably less relevant to labour supply. Second, models that combine information on the classification of the inactive with demographic information do best in explaining labour supply. Finally, models based on the unemployment rate tend to overstate the recent falls in amount of labour available for employment.

Sovereign debt workouts with the IMF as delegated monitor—a common agency approach

Working Paper no. 187

Prasanna Gai and Nicholas Vause

Countries experiencing financial crises usually look to official and private sector lenders for new credit to help them meet their financing needs. Often new loans are extended, but on conditions that various domestic adjustments also be made. This is an example of principals (the creditors) offering an incentive scheme (the conditional credit) to an agent (the debtor country). Since a country faces many different creditors with different goals, the inability of creditors to cooperate can place conflicting demands on a debtor, which may affect its ability to satisfy each creditor. In environments such as debt workouts, where creditor non-cooperation is significant, the conditions placed by official creditors (often through an IMF programme) influence the lending behaviour of the private sector. This paper uses principal agent theory to examine how the design of IMF conditionality influences the behaviour of private lenders and debtors and clarifies the influences on the provision of financial support for countries in trouble.

There are three key features to the model. First, official and private sector creditors are treated as separate entities with different goals that tend to pull the debtor country in different directions. For example, if private lenders are interested only in ensuring that the debtor meets its short-term obligations, they might press for actions that raise finance quickly, such as the sale of state assets. At the same time, if the official sector ('the IMF') is promoting long-term debt sustainability, it might encourage the debtor country to pursue various economic stabilisation policies as well as structural reforms. Second, the official sector is assumed to extend credit before the private sector. It is often the case that the debtor countries in trouble approach the IMF to assist with rollovers of credit lines. And third, the official sector observes performance measures, which are, to some degree, aligned with the actual outcomes that result from a debtor's adjustment effort. The provision of IMF credit is linked to a country's performance criteria. But since performance measures (such as ceilings on net domestic assets) are themselves surrounded by uncertainty, they cannot be too narrowly defined. Appropriate conditionality must therefore balance the controllability of a performance measure with its alignment to actual outcomes.

Since creditors are unable to observe a debtor's actions perfectly, a debtor has an incentive to side step the conditions stipulated by creditors during crisis management. We show how this 'ex post moral hazard' is exacerbated by the lack of creditor co-operation. Our results suggest that IMF intervention in the debt workout, where it has seniority rights over its loans with respect to other types of creditors, can mitigate some of the inefficiencies due to creditor non-cooperation. Delegating the task of policy-conditional lending to an agency like the IMF leads to a more efficient outcome characterised by increased lending and rollovers by the private sector. But the ability of the official sector to do this depends critically on the focus of the IMF programme. Our findings highlight the importance of 'result-based' conditionality and mechanisms that enhance the ability of the official sector to monitor and enforce good policy behaviour and exercise leadership during debt workouts.

The role of asset prices in transmitting monetary and other shocks

Working Paper no. 188

Stephen P Millard and Simon J Wells

This paper aims to improve our understanding of both the information contained in asset prices, and their response to monetary policy. In particular, we concentrate on the fundamental determinants of asset price movements, and rule out asset price bubbles or speculation. To be more specific, we are interested in the following questions about asset prices:

- (a) What is the response of asset prices to monetary policy?
- (b) What information do asset prices contain about fundamental shocks affecting the economy?

Although (a) and (b) are essentially different issues, our approach is to build a common framework in which to answer them. We first estimate an empirical model to characterise the data. Then, we construct a dynamic stochastic general equilibrium (DSGE) model that enables us to address our questions at a fundamental level. Using this dual approach, we are able to uncover interactions between asset prices and monetary policy that are theoretically and empirically congruent. The DSGE model is then used to uncover the interactions between key economic variables and assets in the face of fundamental economic shocks that are difficult to identify empirically. This allows us to draw robust conclusions about the role of and informational content of fundamental asset prices and their role in the transmission mechanism.

The empirical model is a fairly standard vector autoregression (VAR) that identifies a monetary policy shock. The empirical model serves two purposes: by plotting the response of asset prices to monetary policy shocks it gives an entirely empirical answer to question (a), and it provides a benchmark with which to evaluate a theoretical model. We find that output falls after a contractionary monetary shock and exhibits a 'hump-shaped' response. Base money and the price level also fall. But, as is often found in this type of analysis, the effect on the price level is small. There is a short-lived rise in the exchange rate, which then follows a UIP path and gradually depreciates back to base. Short-run nominal interest rates rise after the shock. However, we find a small but significant fall in the long rate. This implies a clockwise rotation in the yield curve. House prices fall, but more quickly and by a larger amount than the general price level. There is also a short-lived fall in equity prices.

The baseline for the theoretical model is an open-economy 'Consumption CAPM' model, based on a representative rational agent who can hold a portfolio of various assets: domestic real and nominal bonds, foreign nominal bonds and shares in domestic firms. Agents select their portfolios to maximise the present value of their lifetime utility. The model is fairly standard with consumers exhibiting habit persistence over their consumption of traded and non-traded goods and housing services. In order to obtain housing services, they combine time spent in household production with the existing housing stock. Their derived demand for housing together with exogenous housing supply generates interesting dynamics for house prices. Our interest in house prices is motivated, in part, by empirical studies that have shown house prices to be a useful indicator for inflation. Firms combine labour and capital services to produce both traded and non-traded goods. We assume that investment decisions in the non-traded sector are subject to convex 'costs of adjustment'. The model is calibrated for the United Kingdom. By shocking variables in the model, and plotting the response of asset prices to shocks, we can answer our two questions at a fundamental level.

We first examine the responses of variables to an exogenous monetary policy shock in the theoretical model. We find that the theoretical model is able to produce responses qualitatively similar to those uncovered from the data, although we also find some differences. We take the general congruence between model and data to be an encouraging sign.

We then use our model to show how a given fundamental shock may imply a unique pattern of asset price movements in the periods immediately after the shock. Therefore, observing patterns of asset prices and comparing them with the movements implied by our model might reveal the nature of shocks currently hitting the economy. There are, however, several important reasons why this information should only be used tentatively and to corroborate other evidence. First, the results presented in the paper are dependent on the monetary policy response to shocks. That is, they depend crucially on the monetary policy rule that we assume being a reasonable characterisation of the monetary reaction function, and that this is fully known by market participants. Second, asset prices often move for reasons not obviously related to economic fundamentals; we should be careful not to assume that any movement in asset prices is driven by fundamentals.

Modelling investment when relative prices are trending: theory and evidence for the United Kingdom

Working Paper no. 189

Hasan Bakhshi, Nicholas Oulton and Jamie Thompson

Recent research in the United States has shown that aggregate economic models fail to explain the investment boom in real plant and machinery in the second half of the 1990s. In contrast, a disaggregated modelling approach does much better. This appears to reflect two factors. First, aggregate models do not capture the increase in replacement investment associated with compositional shifts in the capital stock towards shorter-lived assets, such as computers. Second, aggregate models invariably find little or no role for the real user cost of capital, so they understate the positive effects of falls in the relative price of computers on investment in computers.

The United Kingdom also experienced a boom in real plant and machinery investment in the second half of the 1990s. But undertaking similar research is beset with difficulties in the United Kingdom, not least because of the relative paucity of disaggregate investment data in the published National Accounts. In this paper, we carefully construct a data set for the United Kingdom that is consistent with the National Accounts. We then use these data to investigate the ability of different investment equations to account for the UK investment boom in plant and machinery. We report results similar to those for the United States. In particular, the traditional aggregate modelling approach completely fails to explain the investment boom in plant and machinery in the second half of the 1990s.

Our analysis consists of two main elements: a theoretical section setting out the relationship between aggregate and disaggregated approaches to modelling investment; and an empirical analysis setting out our econometric results.

In our theoretical analysis, we first derive the relationship between firms' desired capital stocks and the real user cost of capital, as predicted by standard economic theory. We show how that relationship breaks down in the presence of a trend decline in the relative price of investment goods. Such a trend has been a particularly important feature of investment in recent years. In contrast, we show that well-specified relationships exist at the disaggregated level.

Our empirical exercise involves using time series cointegration methods to model investment at disaggregated and aggregate levels. We compare the ability of the two approaches to explain the boom in plant and machinery investment. Recognising that cointegration techniques can have low power, particularly in small samples, we further evaluate the comparative performance of the two approaches by conducting out-of-sample forecasting exercises.

In all cases, our empirical results support the theoretically superior disaggregated modelling approach. First, compositional shifts in the capital stock towards shorter-lived computer assets appear to have been important in the United Kingdom too in the second half of the 1990s. That explains some, though not all, of the inability of the aggregate model to explain the investment boom. The second factor behind the strong investment growth has been a decline in the relative price of computers. Echoing findings for the United States, we find that firms' investment in computers appears to be highly sensitive to falls in the real user cost of computers. And interestingly, our models suggest that the increase in the size of firms' computer capital stocks in the second half of the 1990s is fully accounted for by the sharp falls in the real user cost of computers.

Given the great uncertainties surrounding measures of the real user cost of capital and the price of investment goods in particular, we investigate the sensitivity of our results to alternative measures of the real user cost of capital. The paper's results are reassuringly robust. Overall, they provide strong support to attempts to model and forecast investment at the disaggregated level.

What caused the 2000/01 slowdown? Results from a VAR analysis of G7 GDP components

Working Paper no. 190

Vincent Labhard

The recent slowdown in the world economy has rekindled interest in the major shocks affecting the business cycle, both at a global and country level. While this interest is not unusual at the current phase in the cycle, there are other factors that explain why this time it has been more intense than usual. First, the recent slowdown came at the end of one of the longest expansions on record. Second, it seemed to have affected several countries at the same time, so one question is whether the slowdown was due to common shocks. And third, there was a perception that the international transmission of shocks has changed.

Using a method first developed by Olivier Blanchard, this paper conducts an analysis of the shocks to GDP components, which in our case include private and public consumption, residential, business and government investment, exports, imports and changes in inventories. Such an analysis has two main benefits. First, it provides a counterpart to stories cast in terms of component developments, for example the role of revisions to expected future profitability, especially in the information, communications and technology sector, or the role of the millennium changeover. Second, it provides a more detailed picture of developments during the slowdown than can be obtained by looking only at GDP, and thus a useful cross-check on work aimed at identifying the shocks affecting GDP.

The analysis is based on a vector autoregression of GDP components, which is used to account for their interrelationships and to provide series of corresponding innovations. There are potentially other variables explaining the behaviour of GDP components, but using only components data has the advantage of capturing empirical regularities in a parsimonious set-up. The innovations are then used to extract component-specific shocks, which form the basis for the analysis. These shocks capture the movements in the components that are not explained by the components' history and exclude the factor common to all components. So the shocks are a catch-all of a range of potential structural factors. This analysis is applied to the G7 countries individually and as a group, thereby extending previous research to a cross-sectional dimension. The paper obtains estimates of the shocks during the slowdown in 2000/01, the expansion preceding it, and the previous slowdown in 1990. A second set of estimates of the shocks during 2000/01

explicitly takes into account the stance of monetary policy and the oil price.

The estimates indicate that there were shocks to several components and several countries during 2000/01. While some of the shocks were similar across the three largest G7 economies, consistent with the perception of a highly synchronised slowdown, other shocks were more country-specific. For example, there were differences in the shocks affecting Germany relative to the other countries of the euro area. Among the components, the largest and most persistent shocks in 2000/01 affected business investment, inventories and net trade. There were also large shocks to private sector consumption, but these occurred mainly in the early and late stages of the slowdown. The pattern of shocks during the preceding expansion was much more subdued. Though consumption shocks did play a role, for example, they were smaller in size and showed less persistence. More generally, the paper finds that shocks were less persistent and on average smaller (due to smaller size and offsetting signs) during the expansion, especially over a longer period. While this need not be significant, it is consistent with the common perception that expansions tend to be longer and have a slower pace than contractions.

There are several differences between the shocks during 2000/01 and those during the previous slowdown in 1990. These relate to the overall balance of shocks (which was negative for much longer in 2000/01), the major shocks (despite the shock in 2001 Q3, shocks to private sector consumption seem to have been more persistent in 1990) and the extent to which shocks were correlated across the G7 countries (while some shocks were similar for the United States, Japan and Germany in 2000/01, the United States experienced a specific pattern of shocks in 1990). Finally, when the analysis also accounts for the stance of monetary policy and oil prices in 2000/01, it appears that about half of the balance of shocks can be attributed to these factors. Their impact though varies over the period of the slowdown. Whereas they contributed considerably in the early stages of the slowdown, they became less important as the slowdown wore on, and eventually started to contribute to the recovery, a reflection of the declines in interest rates and the oil price that was under way at that time.

Endogenous price stickiness, trend inflation, and the New Keynesian Phillips curve

Working Paper no. 191

Hasan Bakhshi, Pablo Burriel-Llombart, Hashmat Khan and Barbara Rudolf

During the 1990s the UK economy, along with several other industrialised countries, has moved to a low-inflation environment. The aim of this paper is to examine the implications of this structural change for firms' pricing decisions. We look in particular at the Calvo model of price-setting that underlies optimising small structural models and the New Keynesian Phillips curve (NKPC) in the presence of positive trend inflation. The Calvo model assumes that firms' prices are sticky, but the timing and frequency with which firms adjust prices is exogenous and constant. In recent years this model has provided an important framework for examining inflation dynamics, monetary policy rules and stabilisation policies.

In this framework it is typically assumed that trend inflation (or steady-state inflation) is zero. This assumption is particularly restrictive when examining the effect of changes in the inflation environment for firms' pricing decisions. For example, in a moderate to high trend inflation environment, firms with fixed nominal prices experience larger erosion in their relative prices and are likely to reset their prices more frequently. Hence, inflation dynamics should differ from those in a low-inflation environment. In the Calvo model, however, firms do not choose when to change prices. As trend inflation rises this assumption becomes increasingly unrealistic. Consequently, it is unclear what the upper bound of trend inflation is, below which the Calvo price-setting assumption is a good approximation, and how the structure of the NKPCthat has come under serious empirical scrutiny as a model of inflation dynamics—is affected with positive trend inflation. The answers to these questions are important when applying this framework to examine the implications of structural changes for inflation dynamics in the United Kingdom.

We consider an optimising model with Calvo price-setting that is most suitable for monetary policy analysis—one with both nominal and real rigidities (or equivalently, 'strategic complementarities')—and examine the consequences of positive trend inflation for the NKPC. We build on earlier work that also considers positive trend inflation, but ignores real rigidities. In the presence of real rigidities (for example, firm-specific factor inputs, input-output linkages, cyclical (desired) mark-ups, variable capital utilisation), firms are reluctant to adjust relative prices in response to demand shocks and consequently amplify the effects of nominal rigidities.

The Calvo assumption that firms cannot choose the timing and frequency of price changes places an upper bound on the trend inflation rate for which the model can be solved. For standard calibration, this upper bound is influenced by the interaction of nominal and real rigidities. The paper also examines the implication of positive trend inflation for the slope of the NKPC. In an environment in which firms' price-setting behaviour is also influenced by the monetary policy regime that determines the trend inflation rate—ie firms adjust their nominal prices more frequently at higher trend inflation rates to avoid the erosion of their relative prices—this intuitively appealing extension of the Calvo price-setting has important bearing on both the upper bound and the slope of the NKPC.

Our results show that the Calvo price-setting model is well defined under annualised trend inflation rates of 5.5% or lower. Above that bound, the model implies that firms should stop production completely. This upper bound is below the average actual inflation rate for the United Kingdom over the period 1960–2000. For several other countries, the upper bound is also below the average actual inflation rates during the 1970s and 1980s. When strategic complementarities are ignored, as in earlier work, the upper bound is approximately 13%. The paper shows that, over the range of trend inflation for which the model is defined, the slope of the NKPC rises when trend inflation falls. This implies that a rise in demand pressure has a larger effect on inflation when the economy is in a low-inflation environment than when it is in a high-inflation environment. This feature sits oddly with the stylised facts and conventional wisdom that Phillips curves are flatter in a low-inflation environment.

These results can be explained intuitively by firms not choosing when to change their prices in the Calvo model. The presence of trend inflation makes firms more concerned about the future erosion of their mark-ups (and hence losses in profits). In other words, their effective discount factor rises towards unity as trend inflation increases (ie they care more about the future) and consequently their current mark-up is relatively less important. The constraint that discount factors cannot exceed unity places the upper bound on the trend inflation rate for which the model can be solved. Because the current mark-up is less important, the current output gap has a smaller effect on inflation in the NKPC.

The main conclusions from this research may be summarised as follows: (i) the low upper bound on trend inflation makes the exogenous Calvo price adjustment framework a less appealing description of how firms set prices, even in low-inflation environments; (ii) endogenous price stickiness, or more generally state-dependent price stickiness, that allows firms to choose the timing of their price adjustment to shocks, not only avoids the limitations of the standard model, but also provides a useful and promising extension of the standard Calvo model to examine structural changes.

Capital stocks, capital services, and depreciation: an integrated framework

Working Paper no. 192

Nicholas Oulton and Sylaja Srinivasan

This paper presents an integrated framework to measure capital stocks, capital services, and depreciation. Much of the difficulty of deriving good measures of aggregate capital, whether stocks or services, derives from two empirical facts. First, the relative prices of different types of asset are changing. Second, the pattern of investment is shifting towards assets with shorter economic lives. So we cannot treat capital as if it were composed of a single homogeneous good. To some extent, these two facts are aspects of the shift in the pattern of investment towards ICT assets. The relative prices of these assets are falling rapidly and their economic lives are much shorter than those of most other types of plant and machinery.

The wealth concept of capital, while appropriate for some purposes, is not the right one for a production function or for a measure of capacity utilisation. For the latter purposes, we need a measure of aggregate capital services. The volume index of capital services (VICS) answers this need. In principle, the VICS measures the flow of capital services derived from all capital assets, of all types and all ages, in a sector or in the whole economy. The main difference between the VICS and wealth-type measures of capital is in the aggregation of different types and ages of assets. In the VICS, each item of capital is weighted by its rental price. The rental price is the (usually notional) price the user would have to pay to hire the asset. In wealth measures of the capital stock each item is weighted by the asset price. A VICS measure gives more weight than a wealth measure to assets like computers and software for which the rental price is high in relation to the asset price.

We review the theory of, and empirical evidence on, depreciation. The assumption that depreciation is geometric greatly simplifies the theory and seems consistent with the facts. We also consider whether this assumption is appropriate for assets like computers, which do not suffer much from physical wear and tear, but have very short lives due to 'obsolescence'. Though, in principle, our framework encompasses obsolescence, in practice depreciation rates may be somewhat overstated owing to failure to control fully for quality change.

We adopt the geometric assumption in our empirical work for the United Kingdom. Because of the uncertainty about asset lives and the pattern of depreciation in the United Kingdom, we calculate wealth and VICS measures under various assumptions. We test the sensitivity of our results in three ways. First, we compare results using both US and UK assumptions about asset lives. Second, we compare results based on a coarse breakdown of assets into four types only, with results derived from a breakdown that distinguishes computers and software separately. Third, we compare the effect of US versus UK price indices for computers and software. Our main findings for wealth and the VICS are as follows:

1. Using the conventional National Accounts breakdown of assets into buildings (excluding dwellings), plant and machinery, vehicles, and intangibles, the *growth rates* of wealth and the VICS are insensitive to variations in depreciation rates (ie, asset lives). In these experiments the rates for each asset are assumed constant over time.

- 2. However, the *level* of wealth is quite sensitive to variations in depreciation rates.
- 3. Still sticking with the conventional asset breakdown, wealth and the VICS grew at similar rates over the period as a whole. In the 1990s, the gap between the two measures widened a bit, with the growth rate of the VICS higher.
- 4. The effect on the estimates of separating out computers and software is complex. First, larger differences appear between the growth rates of the VICS and wealth. Second, the growth rate of wealth tends to be slower, though that of the VICS is not necessarily faster. But under the assumptions closest to US methods, the growth rate of the VICS is raised, relative to the VICS with computers and software included with other asset classes.

These results suggest that the treatment and measurement of investment in computers and software is an empirically important issue. The relative price of these assets has been falling, so it is in principle correct to separate them out explicitly—and it matters in practice. The conclusions about the growth rates of both the VICS and wealth turn out also to be sensitive to the price index used for computers and to how the level of software investment is measured.

We also estimate aggregate depreciation (capital consumption) for the same range of assumptions. We study the sensitivity of the aggregate depreciation rate and of the ratio of depreciation to GDP to the assumptions, and compare our estimates with ones derived from official data.

- 1. Using the conventional asset breakdown and our assumptions about depreciation rates at the asset level, there is no tendency for the aggregate depreciation rate to rise over the past two decades.
- 2. Separating out computers and software has less effect than expected: even the use of US methods raises the aggregate rate only slightly, and again there is no sign of an upward trend. The reason is that, even by 2000, the share of computers and software in wealth was only about 4% in the United Kingdom. By contrast, the aggregate depreciation rate in the United States has trended smoothly upwards since 1980, illustrating the much greater scale of ICT investment in the United States.
- 3. Assumptions about asset lives have a large impact on the estimated ratio of depreciation to GDP. The UK National Accounts measure has been drifting down steadily since 1979. In 2001 it stood at 8%, but using shorter US asset lives and the conventional asset breakdown, the ratio was over 10%. Separating out ICT assets and using US methods, the ratio rises to nearly 13%, similar to that in the United States. In neither country was there any upward trend in the ratio, except perhaps in the past couple of years. The reason is that, although the quantity of high-depreciation assets has been growing faster than GDP, this has been offset by their falling relative price.

Public attitudes to inflation

The market research agency NOP has been carrying out quarterly and annual surveys of public attitudes to inflation on behalf of the Bank since November 1999. As part of a regular series, this article describes the results of the full annual survey that took place in February 2003. It shows that public opinion remains fairly stable on most issues, though expectations of future interest rate movements do of course fluctuate. Those who think rates should stay where they are remain the largest group, but among the rest, the public was evenly divided over whether it would be better for Britain's economy for rates to rise or fall over the next few months. The proportion satisfied with the way the Bank is doing its job of setting interest rates has fallen since last year. But the decline in the approval ratings may have reflected the reduction in awareness of the Bank's policies, when rates were unchanged for a long period.

Introduction

The Bank of England believes that the monetary policy framework established in 1997 will be most effective if it is accompanied by wide public understanding and support, both for the objective of price stability and the methods used to achieve it. So one of the key strategic objectives for the Bank set by Court (the Bank's board of Directors) is 'to build public support for price stability, and public understanding of the Monetary Policy Committee's approach to its remit'.

MPC members use a variety of methods to explain themselves to the public, including the publication of minutes of their monthly meetings, the quarterly *Inflation Report*, speeches and lectures, research papers, appearances before parliamentary committees, interviews with the media, visits to the regions, and an education programme that includes the 'Target 2.5' schools competition.

The Bank decided that one way to quantify the impact of its efforts to build public support for price stability was to carry out quarterly sample surveys of public opinion and awareness. After trials between November 1999 and November 2000, the current version of the survey questions has been in use since February 2001. The results between November 1999 and February 2001 were described in the first annual article in the Summer 2001 edition of the *Quarterly Bulletin*, and this article updates the results to February 2003.

There are 14 questions in all, but the trials showed that the results of five of them varied little over the quarters. So it was decided to ask the other nine questions every quarter and to do a full survey once a year each February covering all 14 questions. The full survey uses a larger sample, to allow more detailed analysis.

The range of questions, as well as seeking information on public knowledge, understanding and attitudes to the MPC process, also covers expectations of interest rates and inflation. The five annual questions (numbers 9–13) cover perception of the relationship between interest rates and inflation, and knowledge of who sets interests rates. The nine quarterly questions, which are also asked in the annual survey, cover expectations of price and interest rate changes, perception of the impact of inflation and interest rate changes on both the economy and the individual, and satisfaction/dissatisfaction with the way the Bank of England is doing its job setting interest rates in order to control inflation.

The surveys are carried out by NOP in its regular Omnibus surveys using a random location sample designed to be representative of all adults in Great Britain, and interviewing is carried out in homes, face to face. In the February 2003 survey, NOP interviewed a quota sample of 3,999 people aged 15 and over in 350 randomly selected enumeration districts throughout Great Britain between 13 and 25 February 2003. The raw data were weighted to match the demographic profile of Great Britain as a whole.

The sample size for the quarterly surveys (which take place after the May, August and November *Inflation Reports*) is 2,000, about half the number for the annual February survey. The May quarterly survey results are being published as a separate News Release at the same time as this article in the *Bulletin*. The quarterly survey results for February were published in March, though the answers to the five annual questions for February are published here for the first time.

Summary of results to February 2003

Nine questions in the survey are asked quarterly, in February, May, August and November:

Question 1 and Question 2

• One in three people are aware that the overall level of prices has risen between 1% and 3% over the past twelve months. That said, there has been a slight rise in perceptions of the current rate of inflation. The median figure is 2.4%, the highest since May 2000. There has been a corresponding rise in expectations of inflation over the next twelve months (*Question 2*), to a median of 2.5%—the highest since this series began in November 1999.

Question 3

• Over half the public now thinks that higher inflation would weaken Britain's economy. The number (53%) is the highest yet recorded—up from 48% in November 2002, and from a low of 44% in May 2002. The proportion that believes that it would strengthen the economy remains below one in ten.

Question 4

 Over half the public (54%) thinks the Government's 2.5% inflation target is about right. This proportion has fallen over the past three quarterly surveys, from a peak of 61%.

Question 5

• Almost half of respondents recognised that interest rates have fallen over the past twelve months. This is affected by the close proximity of the recent cut in the repo rate to 3.75%. Between the February and November 2001 surveys, when rates were cut on a number of occasions, over half of respondents were aware of this. During 2002, when rates were static, the awareness of the earlier rate cuts in 2001 fell as low as 37%.

Question 6

• Almost one in three people believe rates will remain unchanged over the next twelve months,

with only a slightly larger proportion suggesting there will be a small increase.

Question 7

 Public opinion continues to be balanced on whether it would be better for the British economy if rates were to rise or to fall. The largest proportion (36%) continues to believe that rates should remain unchanged.

Question 8

• Asked what would be best for them personally, the greatest proportion of respondents still says they would prefer rates to go down, although one in four now say they would benefit from an increase in rates. The 5 point difference between the two views (29% compared with 24%) is the narrowest recorded in this series.

Question 14

• The proportion satisfied with the way the Bank is doing its job to set interest rates (55%) is virtually the same as in the previous two quarterly surveys and in line with outturns prior to the peak of 62% recorded following the post-11 September 2001 cuts in interest rates.

Five questions in the survey are asked annually, in February only. The answers to these have changed very little since the previous year:

Question 9

• When asked, nearly four in ten respondents agreed that a rise in interest rates would make prices in the high street rise more slowly in the medium term. One in six disagree, over four in ten do not express a view.

Question 10

 Asked to choose between raising interest rates to keep prices down, or keeping interest rates down and allowing prices to rise faster, 62% opted for higher interest rates, while only 16% opted for higher prices.

Question 11, Question 12 and Question 13

• Unprompted, around four in ten knew that the Bank of England, or its Monetary Policy Committee, sets Britain's basic interest rate level (*Question 11*); prompted with a show card, the proportion rose to seven in ten (*Question 12*). When told that the Monetary Policy Committee of the Bank of England sets rates, over one in three were aware that the Committee is an independent body partly appointed by the Government (*Question 13*), though almost one quarter believed the Committee was completely independent. The proportions for all three of these questions have changed little since the start of the series in November 1999.

The following sections look at the answers to the questions in more detail, both in a demographic and historic context.

Knowledge and predictions

Inflation

(Question 1) Respondents were asked to say how much prices had changed in the previous twelve months by selecting from eight banded options on a card. Among the 85% who made a selection, the median figure was 2.4%. (For the purposes of calculating the median, responses are assumed to be evenly distributed within each band.) This is a significant increase on the 2.1% in the November survey and possibly reflects the fact that RPIX inflation (the target measure of inflation) and RPI inflation (the so-called 'headline' rate of inflation) have been consistently above 2.5% and rising, since November 2002. Some of the variation in the answers may be because respondents were thinking about inflation as it relates to their own patterns of spending. In no demographic group did the proportion giving an answer in the 1%–3% range rise much above 40%.

Expectations of future inflation (*Question 2*) have increased in line with perceptions of current inflation; the median figure was 2.5% and again probably reflects the upward trend in recorded inflation over recent months.

On average, respondents expected prices to rise at a similar rate over the next twelve months to that which they perceived during the past twelve months. There is a similar distribution of respondents between the respective bands for Questions 1 and 2. There was a slight increase (from 10% to 13%) in the number of people who expected inflation to be above 5% over the next year.

Interest rates

(*Question 5*) 49% of respondents recognised that interest rates had fallen over the preceding twelve months, with only 17% of people believing that rates had risen in the period. Within these figures, there are a number of demographic splits which suggest that the degree of awareness of interest rate movements is directly correlated with a person's financial circumstances. Six in ten house-owners, both outright owners and those with mortgages, were aware that rates had fallen over the period, compared with only one quarter of council tenants. 70% of the AB respondents (professionals, managers and their adult dependants) correctly identified the fall in rates, compared with only around half of C respondents (C1—non-managerial, eg secretaries, administrative, clerical; C2—skilled manual) and only a third of DE respondents (semi and unskilled workers and those living on state benefits).

Geographically, the Welsh and West regions were notably more aware of rate changes than any other region, with six in ten respondents offering the 'correct' response, whereas in other regions it was closer to half. In Wales and the West only 13% indicated they had no idea, while in Scotland 17% chose this option and in the three English regions an average of 21%.

41% of people expected rates to rise during the next year (*Question 6*), 28% expected no change and 13% expected them to fall to some degree. Within this, a greater proportion of AB respondents (37%) believed rates would be unchanged over the next twelve months than in other groupings (29% C and 21% DE). Almost half the Scottish respondents expected rates to rise while in other regions closer to four in ten expected rate hikes.

The Bank of England

Turning to awareness of the monetary policy process, asked unprompted who sets Britain's 'basic interest rate level' (*Question 11*), 39% were aware that it was the Monetary Policy Committee (4%) or the Bank of England (35%), but 56% of people were unable to give an answer. These outturns are similar to those in February 2002 and February 2001. When respondents were given a show card containing five options (*Question 12*), 69% (a series high, equal to the outturn in August 2000) were able to identify correctly the Bank, though 12% chose 'Government ministers' and 13% had 'no idea'.

The AB respondents were most aware of the monetary policy framework: 87% chose the Bank, while only 75% of C1s, 69% of C2s and 53% of DEs made the correct choice. Within these groups the proportions have been stable over the three annual surveys conducted, with only a slight increase in the awareness of the C1s (from 71% in February 2001 to 75% in February 2003), C2s (from 65% to 69%) and DEs (from 49% to 53%). Within the age groups, 25–34 year olds have increased their awareness from 61% in 2001 to 66% in this survey, while the over-65s have increased their awareness from 66% in 2001 to 72% in the current survey. Over three quarters of house-owners (78% of outright owners and 77% of mortgage holders) chose the Bank, while only 51% of council tenants were aware of the Bank's involvement.

Despite the relatively high level of awareness of the Bank's role in setting interest rates, only 36% were aware that the MPC is an independent body partly appointed by the Government (*Question 13*), while a further 24% believe it to be a wholly independent body. 19% had no idea of its status.

Attitudes

Inflation

The public awareness of the relationship between inflation and economic strength (*Question 3*) increased this quarter, with 53% of people, a series record, believing that the economy would be weakened if prices started to rise faster than currently. The proportion who thought it would make little difference fell (from 25% to 22%), as did the proportion of those who did not know (from 20% to 18%). Although awareness of changes in rates varies significantly across demographic groups, the understanding of the economic relationships underlying *Question 3* varied less.

Asked to assess whether the Government's 2.5% inflation target is at the right level (*Question 4*), the majority (54%) thought it was 'about right'. 21% thought it was too high, while only 10% thought it was too low. Within the group of house-owners, 15% of outright owners and 20% of mortgage holders thought the target was too high compared with 26% of council tenants. Six in ten house-owners were satisfied with the target level while only 45% of council tenants thought it is at the right level.

Interest rates

Asked what movement in interest rates they thought would be best for the economy over the next few months (*Question 7*), the greatest number (36%) suggested no change. For the second quarter in a row, the proportion thinking rates should go up (17%) was the same as that answering they should go down. One fifth of the over-55 age group thought rates should go up, a greater proportion than in all the other groups. In line with this, 23% of those who own their house outright thought rates should go up, although, interestingly, 18% of those with mortgages wanted a rate rise and only 9% of council tenants.

Asked the question of what movement in interest rates would be best for them personally (Question 8), responses were in line with previous quarters. The greatest number (29%) said rates falling would be best for them, while 24% preferred a rise, 20% thought they should remain where they were and 18% did not think it would make a difference to them. These proportions have remained reasonably stable since the start of the survey, with only a slow increase in the numbers saying they would prefer rates to go up (from a low of 16% to the current high of 24%) and with the proportion saying they should stay the same ranging between 15% and 23%. The proportion of those wanting rates to fall peaked at 36% in August and November 2000, during the twelve months when rates were constant at 6%. Again, this has fallen gradually to the current 29%.

Within these figures, there is a wide variation among the demographic groups reflecting the differing financial positions of different sections of the community. Younger people who are mortgage-payers (the two groups obviously overlap considerably) tend to want to keep their borrowing costs down; older people and outright home-owners (again, a large overlap) tend to be savers, more concerned with the size of their pension funds, the growth of their other savings and annuity rates.

Inflation versus interest rates

Public understanding of the main purpose of interest rate changes—to ensure low and stable inflation over the medium term—continues to be limited. As in previous surveys, only a minority agreed with either the statement that a rise in interest rates would make prices in the high street rise more slowly in the short term or in the medium term (*Question 9*). And, in fact, very few people made the distinction between short and medium-term effects. In the latest survey, 37% agreed that prices would rise more slowly in the short term (up 2 points since February 2002), while 39% said prices would rise more slowly in the medium term (the same as a year ago). Offered a trade-off (*Question 10*), most people (62%) would accept higher rates rather than higher inflation (16%).

The Bank of England

Respondents were asked to assess the way the Bank of England is 'doing its job to set interest rates in order to control inflation' (Question 14). 55% were 'very' (8%) or fairly (47%) satisfied, while only 10% were dissatisfied. Within these data, there were a number of demographic variations. If we look at the net satisfaction (proportion satisfied minus the proportion dissatisfied) of the respondents, ie the 'satisfaction index', we see that among male respondents (+54%) it was considerably higher than that of females (+39%). Among the different 'classes', ABs were net 58% satisfied while DEs were only 33% satisfied, and the latter's understanding of the work and goals of the Bank was less. The geographic variation is less varied than the other types of split. Notably, the satisfaction among the mortgage holders (+56%) was higher than for those

owning their houses outright (+49%) and considerably higher than for council tenants (+31%).

There has been a slight decline in the overall satisfaction index since the post-11 September 2001 peak, during which time interest rates have been constant (until the cut in February 2003). This has not, however, been concentrated within any particular age or class group. The net decline from the peak of +54% in the November 2001 survey to +43% in November 2002 (+45% in this survey) has been caused by a movement in the proportion of those satisfied by the Bank's work (+62% falling to +53%), while the proportion of those dissatisfied has remained stable. The satisfaction index does, however, remain above the levels seen in the first five surveys undertaken in 1999/2000, the series low being +24% in February 2000. The decline in the satisfaction index may perhaps be associated with a reduction in awareness of the Bank's policies when rates were unchanged for a long period (Question 5), rather than marking a disapproval of policy.

Public attitudes to inflation

Per cent														
	<u>1999</u> Nov	<u>2000</u> Feb	May	Δ11σ	Nov	<u>2001</u> Feb	May	Διισ	Nov	2002 Feb	May	Διισ	Nov	<u>2003</u> Feb
0.1 Which of these optic	ns hest i	describe	s how n	rices have	e changed	l over the	last 12	months?	<u>100v.</u>	rep.	iviay	<u>Aug.</u>	1100.	<u>rep.</u>
Cone down	11	7	5 HO# P	8	6	7	7	5	8	7	5	6	7	6
Not changed	18	12	10	12	14	15	15	16	18	16	14	13	14	11
Up by 1% but less than 2%	12	11	12	12	13	12	13	13	14	14	12	15	14	12
Up by 2% but less than 3% Up by 3% but less than 4%	16 7	17 11	18 13	20 13	18 13	20 11	19 11	18 11	17 9	19 10	20 12	20 12	17 10	20 13
Up by 4% but less than 5% Up by 5% or more	4 9	8 12	7 13	5 10	6 11	6 12	6 10	6	5 7	7 9	8 10	7 11	6 11	7 10
No idea	17	17	17	12	13	13	12	15	15	11	13	10	15	14
Median	1.5	2.4	2.6	2.2	2.3	2.2	2.1	2.1	1.7	2.0	2.3	2.2	2.1	2.4
Q.2 How much would you	u expect	prices ir	the sh	ops genei	rally to cl	nange ove	er the nex	t 12 mo	nths?					
Go down Not change	10 14	7	4	6	4	5	5	4	5	3	2	4	4 10	3
Up by 1% or less	14	7	7	10	8	9	9	10	10	10	10	10	8	7
Up by 1% but less than 2% Up by 2% but less than 3%	16 17	15 21	14 21	15 19	16 21	16 20	17 20	16 21	18 20	17 22	16 22	20 22	17 20	15 20
Up by 3% but less than 4%	6	12 7	10 7	12	12	11 5	9 7	11 6	9	11	11 8	11	10	12 8
Up by 5% or more	8	10	11	9	11	10	9 17	9	7	9	9	9	10	13
No lice	16	22	10	212	12	2.1	21	2.2	1.0	12	2.7	10	10	15
\mathbf{O}_{3} If prices started to r	1.J	∠.∠ r than th	2.4 ev do n	ow do vo	2.3 ou think I	∠.1 Britain'e d	2.1	2.2 would	1.9	2.2	2.5	2.1	2.1	2.5
End up stronger	8	8	8	6 6	8	7	8	9 g	8	8	9	7	8	7
Or make little difference	28	23	22	23	25	26	27	23	28	27	29	26	25	22
Don't know	$\frac{44}{20}$	48 21	47 23	50 21	49 18	47 20	47 18	48 20	48 15	48 17	44 18	50 16	48 20	18
Q.4 The Government has	set an i	nflation	target o	of 2.5%.	Do you th	ink this	target							
Is too high	19	27	23	22	23	22	20	21	21	18	20	23	20	21
Or about right	6 51	50	52	8 54	58	58	6 61	55	60	61	61	8 57	8 56	10 54
No idea	24	16	18	16	13	14	13	16	12	13	12	12	16	15
Q.5 How would you say i	nterest r	ates on	things s	uch as m	ortgages,	bank loa	ns and sa	vings hav	ve change	d over t	he last	12 mon	ths?	
Risen a lot Risen a little	7 35	18 37	19 37	13 36	10 29	6 16	4 10	5 10	2	4 11	5 13	5 14	6 12	5 12
Stayed about the same	18	12	13	20	26	20 77	12	12	7	13	20	25	24	14
Fallen a lot	4	8 3	2	2	3	3	16	17	29 37	23	28 16	12	13	15
No idea	19	21	22	19	21	21	19	20	17	16	19	18	21	19
All saying 'risen' All saying 'fallen'	42 21	55 11	56 9	49 12	39 15	22 36	14 55	15 54	10 66	15 55	18 44	19 38	18 37	17 49
Net risen	21	44	47	37	24	-14	-41	-39	-56	-40	-26	-19	-19	-32
Q.6 How would you expe	ct intere	st rates	to chan	ge over tl	he next 1	2 months	?							
Rise a lot	7	16 50	10 46	8	6 39	4	4	6 30	5 31	6	6	6	6 34	8
Stay about the same	19	12	19	23	27	26	30	28	30	27	26	27	28	28
Fall a little Fall a lot	$\frac{4}{1}$	4 1	5	6 0	10 0	25 1	21 1	16 1	16 2	1	5	8 1	9	11 2
No idea	18	17	20	16	17	20	20	19	17	16	17	16	22	18
All saying 'rise' All saying 'fall'	59 5	66	56	55	45 10	28 26	28 22	36 17	36 18	49 8	52	49 9	40 10	41 13
Net rise	54	61	50	49	35	20	6	19	18	41	46	40	30	28
Q.7 What do you think w where they are now, or we	vould be ould it m	best for ake no d	the Brit lifferenc	ish econo e either	omy—for way?	interest	rates to g	30 up ove	r the nex	t few mo	onths, o	r to go	down, o	r to stay
Go up	12	12	11	11	9	8	10	13	14	16	17	19	17	17
Go down Stay where they are	21 40	27 33	29 28	27 35	24 42	28 34	$ \frac{24}{40} $	24 37	21 40	$ \frac{16}{40} $	16 41	17 40	17 39	17 36
Make no difference No idea	7	10 18	10 23	9 17	11	10	10 16	10 17	10 14	10 17	10 17	9 15	9 19	11 19
O & And which would be	hest for	10		1/	1.7 aat xataa	17	10	1/	14	1/	1/	15	17	17
Coup	17	10 10	14 14	101 III.er	TTT	19	ეე	20	24	ว ว	ว ว	ງງ	າາ	74
Go down	30	35	33	36	36	33	33	33	²⁴ 32	30	29	30	29	29 29
Stay where they are Make no difference	22 17	15 22	16 22	18 19	19 20	17 22	18 20	16 22	18 21	20 20	21 21	23 19	22 18	20 18
No idea	14	10	13	10	8	10	7	8	6	8	7	6	9	10

Public attitudes to inflation (continued)

Per cent														
	<u>1999</u>	2000				2001				2002				2003
	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.
Q.9 How strongly do you a (a) A rise in interest rates	igree wi would 1	th the fo nake prio	llowing ces in t	stateme he high s	nts? treet rise	more slo	owly in th	e short	term—say	a mont	h or two	D		
Agree strongly					2	2	n.a.	n.a.	n.a.	1	n.a.	n.a.	n.a.	2
Agree					35	32	n.a.	n.a.	n.a.	34	n.a.	n.a.	n.a.	35
Disagree					25	20	n.a. n.a	n.a. n.a	n.a. n.a	20	n.a. n.a	n.a.	n.a. n.a	18 19
Disagree strongly					2	2	n.a.	n.a.	n.a.	1	n.a.	n.a.	n.a.	2
Don't know					21	25	n.a.	n.a.	n.a.	25	n.a.	n.a.	n.a.	24
All agree					37	34	n.a.	n.a.	n.a.	35	n.a.	n.a.	n.a.	37
All disagree					27	22	n.a.	n.a.	n.a.	21	n.a.	n.a.	n.a.	21
Net agree					10	12	n.a.	n.a.	n.a.	14	n.a.	n.a.	n.a.	16
(b) A rise in interest rates	would	make prie	ces in t	he high s	treet rise	more slo	owly in th	ne mediu	m term—:	say a yea	ar or tw	0		
Agree strongly					2	2	n.a.	n.a.	n.a.	1 79	n.a.	n.a.	n.a.	1 79
Neither agree nor disagree					16	19	n.a.	n.a.	n.a.	18	n.a.	n.a.	n.a.	18
Disagree					21	16	n.a.	n.a.	n.a.	15	n.a.	n.a.	n.a.	16
Disagree strongly					1	1	n.a.	n.a.	n.a.	1	n.a.	n.a.	n.a.	1
Don't know					ZZ	2/	n.a.	n.a.	n.a.	26	n.a.	n.a.	n.a.	25
All agree					41	37	n.a.	n.a.	n.a.	39	n.a.	n.a.	n.a.	39
All disagree					22 19	17 20	n.a.	n.a.	n.a.	16 23	n.a.	n.a.	n.a.	17 22
						20	11.a.							
Q.10 If a choice had to be the shops to rise faster, wh	ich wou	either to ild you p	raise i refer:	nterest ra	ates to try	y to keep	inflation	ı down;	or keep in	iterest r	ates do	wn and	allow p	rices in
Interest rates to rise	51	58	52	57	63	62	n.a.	n.a.	n.a.	63	n.a.	n.a.	n.a.	62
Prices to rise faster	17	19	16	15	19	16	n.a.	n.a.	n.a.	16	n.a.	n.a.	n.a.	16
No idea	31	24	31	28	18	22	n.a.	n.a.	n.a.	21	n.a.	n.a.	n.a.	23
Q.11 Each month, a group	of peop	ole meets	s to set	Britain's	basic int	erest rate	e level. I	Do you k	now what	this gro	up is?			
Monetary Policy Committee	7	4	_5	6	5	5	n.a.	n.a.	n.a.	_4	n.a.	n.a.	n.a.	_4
Bank of England	39	29	33	38	29	32	n.a.	n.a.	n.a.	35	n.a.	n.a.	n.a.	35
The Treasury	1	1	1	1	1	1	n a	n a	n.a.	1	n.a.	n.a.	na.	1
Parliament	î	*	*	*	1	*	n.a.	n.a.	n.a.	*	n.a.	n.a.	n.a.	*
Other	1	2	1	2	1	2	n.a.	n.a.	n.a.	2	n.a.	n.a.	n.a.	1
Don't know	4/	62	5/	51	60	5/	n.a.	n.a.	n.a.	54	n.a.	n.a.	n.a.	50
Q.12 Which of these group	os do yo	ou think	sets the	e interest	rates?									
Government ministers	14	15	12	13	16	15	n.a.	n.a.	n.a.	13	n.a.	n.a.	n.a.	12
Bank of England	n.a. 67	n.a. 63	n.a. 63	n.a. 69	n.a. 65	66	n.a. n.a	n.a. n a	n.a. n a	67	n.a. n.a	n.a. n.a	n.a. n a	69
High street banks	3	4	3	2	4	3	n.a.	n.a.	n.a.	3	n.a.	n.a.	n.a.	3
European Central Bank	2	3	3	3	3	3	n.a.	n.a.	n.a.	4	n.a.	n.a.	n.a.	2
No idea	13	14	18	12	12	13	n.a.	n.a.	n.a.	13	n.a.	n.a.	n.a.	13
Q.13 In fact, the decisions Which of these do you thin	s are tal k best d	cen by th lescribes	the Mone	etary Poli Onetary P	cy Commi olicy Con	ittee of t nmittee?	he Bank o	of Englar	nd.					
Part of the Government	11	11	9	10	12	11	n.a.	n.a.	n.a.	11	n.a.	n.a.	n.a.	13
A quango, wholly appointed by the Government	8	8	8	8	9	8	n.a.	n.a.	n.a.	7	n.a.	n.a.	n.a.	7
appointed by the Government	38	39	37	42	37	38	n.a.	n.a.	n.a.	39	n.a.	n.a.	n.a.	36
body No idea	23 20	20 21	22 24	20 20	24 17	24 19	n.a. n.a.	n.a. n.a.	n.a. n.a.	23 19	n.a. n.a.	n.a. n.a.	n.a. n.a.	24 19
Q.14 Overall, how satisfied	d or dis	satisfied	are you	ı with the	e way the	Bank of 1	England i	is doing	its job to	set inte	rest rat	es in or	der to o	control
inflation?			-		-		-	-	-					
Very satisfied Fairly satisfied	7 41	4 37	5 38	6 45	7 48	8 47	9 49	10 45	11 51	11 50	10 49	11 46	11 42	8 47
Neither satisfied nor	26	26	07	25	26	25	07	07	10	20	07	22	07	24
uissatisfied	20 7	28 12	2/ 9	25 9	∠6 8	45 7	25 6	25 6	19	20	25 6	22 7	25 7	24 7
Very dissatisfied	4	5	4	4	3	ź	2	2	2	2	2	ź	ź	ź
No idea	16	14	17	12	9	11	12	14	11	11	11	11	14	11
Total satisfied	48	41	43	51	55	55	58	55	62	61	59	57	53	55
Total dissatisfied	11	17	13	13	11	10	8	8	8	8	8	10	10	10
Net satisfied	37	24	30	38	44	45	50	47	54	53	51	47	43	45

n.a. = not available.

Note: * indicates less than 0.5%.

Data from the start of the series in November 1999 are available on the Bank of England's web site www.bankofengland.co.uk/statistics/iasurvey.

Figures may not add to 100 due to rounding.

Foreign Exchange Joint Standing Committee e-commerce subgroup report

This article describes recent developments in electronic trading in the foreign exchange market, based on a report produced by the e-commerce subgroup of the Foreign Exchange Joint Standing Committee. After a brief introduction to e-commerce in the context of the foreign exchange market, it discusses developments in electronic trading, including both single-bank and multi-bank internet-based systems, and explains market initiatives such as 'prime brokerage' and 'white labelling' that have been facilitated by electronic platforms.

Introduction

The Foreign Exchange Joint Standing Committee (FXJSC),⁽¹⁾ for which the Bank provides a Chair and Secretariat, is a liaison committee consisting of senior staff representing many of the commercial banks active in the London foreign exchange market. The membership of the Committee also includes representatives from brokers, corporate users of the foreign exchange market and the Financial Services Authority. Given the importance of developments in e-commerce for the structure of the foreign exchange market, the FXJSC decided in 2000 to set up a subgroup of experts from this field to monitor them. This article describes recent developments in foreign exchange e-commerce, based on the third in a series of annual reports produced by this subgroup.⁽²⁾

E-commerce in the context of the foreign exchange market

The foreign exchange market is primarily an over-the-counter (OTC) market, ie one where contracts are agreed bilaterally between participants, rather than on-exchange.⁽³⁾ The market consists of different agents, trading for various reasons. 'End-users'—such as corporates, investors and governments—may enter into foreign exchange trades with market intermediaries (usually banks) in order, for example, to facilitate the purchase of foreign currency bonds, or to exchange foreign currency proceeds from exports into their

domestic currency. There is a large professional interbank market that enables intermediaries to manage the risks arising from this activity—at the simplest level, that exchange rate moves change the value, in domestic currency terms, of an asset denominated in foreign currency—by trading to transfer risk between themselves.

Participants in the foreign exchange (FX) market have been executing transactions across electronic messaging or broking systems such as Reuters and EBS, which match buyers and sellers, for many years. But these are proprietary, closed systems, and largely restricted to the interbank market. In contrast, the market between end-users and banks was for many years based on telephone contact. But in recent years internet-based trading platforms have appeared, and are being used by a much broader range of market participants. There are two main types.

First, 'proprietary' or 'single-bank' systems. Here a bank allows its customers to trade with it, on its own internet-based platform, essentially as an alternative to the telephone. There are advantages for both parties: time is saved in processing trades, especially small ones; the system can be linked electronically to each party's in-house systems for recording, settling, accounting and risk-managing trades and therefore reduces the need for re-keying and aids straight through processing;⁽⁴⁾ and it simplifies complex

⁽¹⁾ The FXJSC annual report provides more information on the work of the Committee, and is available from www.bankofengland.co.uk/markets/forex/fxjsc/annualreview2002.pdf.

⁽²⁾ The 2002 report is available from www.bankofengland.co.uk/markets/forex/fxjsc/ecommerce021220.pdf.
(3) For more information on the structure of the global foreign exchange market, see the Spring 2001 *Bank of England*

Quarterly Bulletin article 'The foreign exchange and over-the-counter derivatives markets in the United Kingdom'.

⁽⁴⁾ There is no consistent definition of straight through processing (STP), although it is generally taken to encompass the automation of the entire settlement and processing of a trade, without the need for human intervention, except where there is an inconsistency in trade details between the two counterparties. STP reduces the number of failed trades, and improves overall efficiency.

cross-product transactions (eg some systems can automatically calculate the FX implications of a string of cross-currency securities trades). All these factors should reduce costs.

Second, 'multi-bank' systems or 'portals'. Several of these have been set up, some by consortia of banks and others independently. The key difference between a multi-bank and a single-bank system is that in the case of the former, a number of different banks offer prices-that is quote exchange rates or 'provide liquidity'-on these platforms in competition with one another. In addition to the advantages of single-bank platforms, there is an argument that the multi-bank portals may provide 'finer' prices (that is, narrower spreads between the prices that the bank quotes for buying and selling a currency pair-known as 'bid' and 'offer' prices respectively). They also allow customers to demonstrate, for example to their auditors, that they achieved the best price available.

The newest types of platform involve end-users disintermediating by matching transactions between themselves.

Developments in electronic platforms

During 2002, as described in the subgroup's previous report, the market's attention was clearly on multi-bank portals, in part reflecting the closure of Atriax, one of the major multi-bank portals. But in 2003, proprietary bank systems have been back in focus again. The most interesting e-commerce developments have been in 'prime brokerage', 'white labelling' and 'liquidity-exchange'⁽¹⁾ models, to which proprietary systems are central. Further, banks that have aggressively marketed their proprietary platforms have reportedly seen much higher volumes across these platforms than through their participation in the multi-bank portals. A clear trend across all banks is that e-commerce volumes have continued to grow.

Multi-bank portals

Market participants suggest that the market leaders are widely perceived to be FXall, Currenex and FXConnect, as was the case in 2002. The ownership structure of these portals varies. A consortium of banks owns FXall; Currenex is independently owned; and FXConnect is owned by a single bank, State Street (although it is a multi-bank system in that other banks are able to offer prices). FXall and Currenex have tended to attract corporate customers whereas FXConnect has tended to attract fund managers. All systems are reportedly looking to expand their customer base into other sectors, further increasing competition between the portals.

According to one survey⁽²⁾ the daily volumes through these portals are estimated to have risen rapidly, from \$7 billion per day in May 2002 to \$14 billion per day by October 2002. Anecdotal evidence suggests that volumes have continued to grow into 2003.

- FXall reported that its average daily trading volume in April 2003 was \$7.5 billion.⁽³⁾
- FXConnect reported that its average daily trading volume in April 2003 was \$10 billion.⁽⁴⁾
- Currenex has not released turnover data.

However, these volumes are small in the context of the overall foreign exchange market. The survey quoted above estimated that trading over multi-bank portals accounted for around 7% of wholesale foreign exchange market turnover.⁽⁵⁾ There are geographical differences in foreign exchange e-trading take-up. In Europe and North America, 35% of larger organisations (defined as those that trade more than \$2.5 billion in foreign exchange in a year) are estimated to trade electronically, compared with 25% of such organisations in Japan.⁽⁶⁾

A new development is end-user to end-user matching systems, such as Hotspot FXi. These enable participants to post bid and offer prices anonymously, and to accept market prices posted by others. Banks can provide liquidity by posting bid and offer prices but are not

⁽¹⁾ These terms are explained below.

⁽²⁾ Client Knowledge, quoted in FXWeek 'Online FX: a revolution in the making, 25 November 2002.

⁽³⁾ FXWeek—'Multi-bank platforms reap e-forex growth rewards', 21 April 2003, and interview with Mark Warms, Chief Marketing Officer for FXall.

⁽⁴⁾ FXWeek—'Multi-bank platforms reap e-forex growth rewards', 21 April 2003, and interview with Simon Wilson-Taylor, head of State Street's Global Link portal, which hosts FXConnect.

⁽⁵⁾ Client Knowledge, quoted in FXWeek 'Multi-bank portals fight for viability', 25 November 2002.

⁽⁶⁾ Greenwich Associates survey of e-commerce quoted in FXWeek, 21 April 2003.

permitted to accept prices placed by end-users. This model is attractive primarily because it offers end-users, such as institutional funds, hedge funds⁽¹⁾ and corporates, the opportunity to trade with each other rather than via an intermediary such as a bank, which should therefore be cheaper for them.

The multi-bank portals are considered to have strong brand names, and market participants believe that they may in due course expand into other products, such as money market instruments. Some market participants expect there to be further consolidation among the multi-bank portal businesses at some point. Such consolidation, should it occur, is considered unlikely to affect the broad trends described above.

Prime brokerage

This is an arrangement under which the foreign exchange deals of an end-user (often an institutional fund or a hedge or leveraged fund) are transacted with a single bank counterparty (the prime broker), even though they may initially be agreed between the end-user and a third-party bank. The prime broker is usually a large, highly-rated bank. It allows the end-user, in this example a fund, to initiate trades, subject to credit limits, with a group of predetermined third-party banks in the prime broker's name. This process is set out diagrammatically below. The end-user first agrees a transaction with a third-party bank, in the name of the prime broker (1); this transaction is then recorded by the prime broker (2); and finally a reciprocal transaction is entered into between the end-user and the prime broker (3).



This process has administrative advantages for the end-user, in that legally its transactions are conducted with a single counterparty, the prime broker. The end-user's net position with the prime broker may be rolled forward by means of daily foreign exchange swaps until the end-user reverses its original trade; or it may be settled at regular intervals, for example at month-end. It will generally be subject to collateralisation. But prime brokerage also allows the end-user, who may have a low credit rating, to initiate trades with a broader range of counterparties, because it is in effect 'borrowing' the credit rating of the prime broker bank. That means, among other things, that it can be confident of dealing at an attractive rate. The prime broker process separates the provision of liquidity (in the example above provided by Bank X) from the provision of credit (in the example above provided by the prime broker).⁽²⁾

The attraction for the prime broker bank is that the business provides a stream of fee income in return for the use of its balance sheet and credit assessment facilities, which it may view largely as fixed costs. The third-party bank may also welcome the prime brokerage arrangement because it enables it in effect to accept the end-user's business without having to incur credit risk to it—only to the prime broker.

Until recently prime brokerage was a niche product and a manually intensive process for the prime broker. However, developments in e-commerce—notably the automation of the process by which the initial trade is communicated to and recorded by the prime broker have led to STP benefits and encouraged the growth of prime brokerage services.

Hedge funds make widespread use of prime brokerage, but there are a few examples of other institutions such as corporates and small banks doing so too. At present, prime brokerage is more common in the United States than in Europe, but some market participants expect the practice to grow in Europe if the number of leveraged funds based there continues to increase.

White labelling and outsourcing

White labelling is the name given to an arrangement whereby a bank uses an e-commerce platform to allow its customers to trade at prices quoted by a third-party

To generalise, an institutional fund, such as a pension or insurance fund, will need to transact in foreign exchange to the extent that it has assets or liabilities in foreign currency, in order to undertake cross-currency transactions and manage the resulting foreign exchange risk. A hedge fund, which is an asset management firm that is typically smaller than an institutional fund but may expand its balance sheet ('leverage') by means of borrowing, may transact in foreign exchange for the same reasons, but may also seek to generate returns directly from foreign exchange position-taking.
 The foreign exchange transactions concerned are generally purchases or sales of currency on a forward basis. These deals involve credit risk since, if the counterparty defaults before maturity, the deal might have to be reinstated with a

deals involve credit risk since, if the counterparty defaults before maturity, the deal might have to be reinstated with a different counterparty on less attractive terms, exchange rates having moved in the interim (this is called 'replacement cost risk'). As with any foreign exchange transaction there may also be 'settlement risk'—the risk that, at the maturity of the deal, a party delivers the currency it is selling without receiving delivery of the currency it is buying.

bank. Again, this is explained in a diagram below. First, the end-user deals with its preferred bank counterparty (1), hereafter referred to as the 'white-label' bank, via an e-commerce system. Second, an equivalent deal is automatically generated between the white-label bank and the third-party bank known as 'the liquidity provider' (2) to pass the foreign exchange risk to the latter. The effect of this is that the white-label bank retains the credit risk to the end-user, while the liquidity provider takes on the foreign exchange risk (in this context termed 'liquidity provision').



White labelling differs from prime brokerage in the nature of the client and the service provided. Prime brokerage is targeted at end-users and allows them to conduct their foreign exchange business with a single counterparty, while retaining the capacity to initiate transactions with a broad range of banks. White labelling, on the other hand, is targeted at an intermediary—a bank—and allows that bank to offer a foreign exchange trading service to its clients, while transferring the foreign exchange risk associated with that activity to a third party to manage. It is typically attractive to smaller banks who wish to be able to offer their customers a range of services, including foreign exchange trading, but may not wish to manage all the attendant risks in-house, or not at all times.

Banks can outsource some or all of their liquidity provision in this way. Typically, many will continue to manage foreign exchange risk themselves during their domestic hours of operation, and in their local currency, where they may have specialist skills. The ability to outsource liquidity provision can be particularly attractive outside normal trading hours, and in currency pairs where the bank has no particular expertise. White labelling therefore enables small and medium banks to offer a 24-hour e-commerce service in numerous currencies without the need to have staff available for the whole of this time.

White labelling may involve solely the outsourcing of foreign exchange risk management, or it could also include the outsourcing of technology and trading platforms. The latter involves the liquidity provider or an IT vendor providing an e-commerce platform which is 'branded' with the identity of the white-label bank.

For the liquidity provider, the main attraction of white labelling is the ability to attract greater trade volumes and thereby achieve greater profitability both directly and by benefiting from economies of scale.

Autopricing

One key issue for any bank providing electronic trading systems for its clients is the ability to provide immediate and simultaneous foreign exchange rates (or 'prices') for, potentially, many different distribution outlets. Automation of foreign exchange pricing— 'autopricing'—allows for more timely servicing of customers, and also reduces costs since the foreign exchange rates quoted are automatically generated by an IT system without human intervention. This can make the servicing of smaller deals economic and therefore increase trade volumes, without increasing the number of staff required.

An 'autoprice engine' is used to generate these prices, using a variety of inputs. It needs to know what the current market price is, and whether the bank wants to take a view on that exchange rate. The market price information is typically derived from a number of external sources, such as the rates quoted by electronic brokers and other traders. One result of this is that many institutions could potentially use the same sources of external price information. The 'engine' must also take account of 'deal flow', ie the demand to buy or sell a particular currency pair that is being experienced. An algorithm processes all these inputs to generate a quoted price, without dealer intervention.

A key issue with autopricing is 'latency'—that the published exchange rate may become out of date, exposing the bank to foreign exchange risk. Therefore the speed of reaction of the autoprice engine to market events is of critical importance. The algorithm also needs to be able to handle illiquid or volatile markets. There are examples where institutions have had to suspend autopricing of currencies because of volatility in the foreign exchange market.

Consolidation

There has been some consolidation among foreign exchange market participants over the past decade as a result of bank mergers, centralisation of trading operations within firms, and the launch of the euro, which eliminated trading in 'legacy currencies'. Some market participants believe it possible that the growth of e-commerce within the foreign exchange market could accelerate this trend because of the relatively high fixed costs of some of the technology described above, and increased competitive pressures due to the pricing transparency, and potentially the opportunities for disintermediation offered by the new platforms.

Conclusion

E-commerce is having a considerable impact on the operation of the foreign exchange market. Greater

automation through e-commerce is in some cases reducing staff numbers in banks. The roles of staff within banks are also changing. As trade execution, particularly of smaller trades, is increasingly shifting to e-commerce systems, sales and trading staff are spending more time advising clients rather than processing transactions. Banks are communicating and cooperating to a greater extent on issues relating to infrastructure, technology and e-commerce standards. End-users are also changing their behaviour. They are becoming more attracted towards e-commerce in foreign exchange, primarily because it can enable the delivery of STP.

The Governor's speech at the Islamic Home Finance seminar on 27 March 2003

In this speech,⁽¹⁾ delivered at the morning session of the Islamic Home Finance seminar, the **Governor** draws attention to the work of a group that has investigated and is seeking to overcome the obstacles to the wider use of Islamic mortgages in the United Kingdom. The morning session was chaired by Andrew Buxton⁽²⁾ who has been heavily involved in the Working Group. The **Governor** thinks the reaction of all involved in addressing the obstacles has been very positive.

Thank you, Andrew. It's a real pleasure to be here for this conference, and I am absolutely delighted that we or I should say you—have reached the stage in what has been a long and arduous process, where there is a real possibility of developing a broader market in Islamic mortgages in this country, to the point that it is really useful to share the results of your work with a wider circle of home finance practitioners.

I don't pretend to any technical expertise in the area of Islamic finance—you have others on your programme today who know far more about it than I do. But I became interested in it more than a decade ago when I met a very lovely, deeply religious, Muslim couple who were living in this country with their family, and who had recently bought a house on the back of a conventional mortgage. They told me of their delight in their home, but then they explained to me-not at all in an aggressive way, in fact in sorrow rather than in anger-their regret that they had had to go against their religious principles to finance it. That made a big impression on me. It was clearly troubling their conscience. And that seemed to me to be particularly sad because it struck me as totally unnecessary. Surely, I thought, our very inventive financial system could find ways of meeting the needs of the different sectors of our society so that this kind of problem need not arise.

When I looked into it a bit more, it seemed to me that in fact many of the financial products commonly used in this country—for example current accounts and savings products, such as investment funds or unit trusts, or borrowing through leasing or hire-purchase products already had some, at least, of the characteristics consistent with the teachings of the Qur'an; if only we could come to a better and more precise understanding of the Islamic financial products being talked about at that time—if only we could encourage the Islamic community to develop a more consistent (and desirably more standardised) specification of the products they wished to introduce-then, with a little imagination, we could surely find ways of fitting them in to our legal and regulatory framework in this country, on a par with our more traditional financial instruments. I couldn't see how our essential legal framework needed to be disturbed or why our economic or social objectives needed to be adversely affected on this basis, and it seemed to me, in that case, that the principle of live and let live should apply in an open and tolerant society. Indeed it seemed to me also that, as a matter of general principle, a wider range of financial products would benefit the whole of our community and that Islamic products could prove to be attractive beyond the purely Muslim sector.

Against that background, I didn't take much persuading when, following a meeting to launch the Heart of the City campaign some 2¹/₂ years ago, Dr Pasha, General Secretary of The Union of Muslim Organisations of the UK and Ireland—who, I'm happy to see, is with us here this morning—approached me on the specific subject of Islamic mortgages. And, having discussed it with the Chancellor, I invited Andrew Buxton, as Chairman of the Heart of the City campaign, and indeed who I knew also had an interest in Islamic finance, if he would convene a working group to investigate the obstacles to the wider use of Islamic mortgages in this country.

⁽¹⁾ Given at the Islamic Home Finance seminar organised by the Council of Mortgage Lenders in London on Thursday

²⁷ March. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech193.htm. (2) Former member of the Court of Directors of the Bank of England, former Chairman of Barclays Bank, former President

of the British Bankers' Association.

I cannot thank you, Andrew, enough for the way that you—and the very enthusiastic group that you managed to bring together—have carried the work forward.

The Working Party, which includes representatives of the Treasury and the FSA as well as the CML, a number of banks (including Ahli United Bank, HSBC and Barclays), lawyers including Mr Paracha of Norton Rose, and representatives from the Muslim community, identified a number of obstacles to the wider use of Islamic 'mortgages'. They include:

- First, treatment under Stamp Duty, where—because of the nature of the transaction, involving initial ownership by the financier—Stamp Duty may need to be paid twice (or even more often if the financier changes), or it may be payable at a higher rate than on a conventional mortgage.
- Second, higher regulatory capital charges where conventional mortgages—and indeed Murabaha mortgages—attract a capital risk weighting of 50%, but some Islamic mortgages—Ijara mortgages attract a higher rate of 100%.
- Third, disadvantages under the various public sector home-ownership schemes—such as Right to Buy or Rent to Mortgage, where, because of the involvement of the financier as the owner of the property, the purchaser may be unable to take advantage of the benefits offered under the schemes.
- And fourth, disadvantages in terms of the housing cost element of Income Support or income-based Jobseekers Allowances compared with that which applies in the case of a conventional mortgage, with that cost element based upon interest rates on conventional mortgages.

There are also questions relating to legal costs where it has not been clear whether a single solicitor can advise both the financier and the purchaser in the case of an Islamic product—again because of the ownership role of the financier.

The Working Party, I have to say, has been doing a very commendable, thoroughly professional job in identifying

all of these issues, and then explaining them to and following them up with the many different authorities involved in them-the Treasury and Inland Revenue in the case of Stamp Duty, the FSA in the case of regulatory capital requirements, the Office of the Deputy Prime Minister on Right to Buy, the Ministry of Work and Pensions on the Social Security issues, and the Law Society on the conflict of interest point. What is—or ought to be—a relatively straightforward issue in principle inevitably, in our complex society, becomes highly involved in practice. That's not a veiled complaint against bureaucracythough I'm sure we all yearn for less bureaucracy at times—it's simply a fact that accommodating novel forms of anything within our legal and regulatory framework typically involves careful consideration of all the implications, to ensure that the changes don't either open up unintended loopholes on the one hand, or lead to hugely cumbersome arrangements to prevent them, which themselves add unjustifiably to bureaucratic constraints, on the other. Making progress requires very careful and comprehensive analysis and presentation—it also requires a good deal of patience. And the approach that has been adopted by the Working Party has been exemplary in every respect. And this has paid off.

The good news is that, I think without exception, the reaction of all the different authorities involved has been generally very positive. They have been willing to listen, and to understand the positive purpose of what was being proposed, and they have been constructive in their approach to trying to find solutions.

The Treasury has certainly been actively looking into the question of Stamp Duty—which is perhaps the most immediate concern in relation to Islamic mortgages, and I am hopeful that a way forward can be found at some point, though I dare not speculate on whether it will be covered by the Chancellor's Budget next month.⁽¹⁾

Sir Howard Davies, the Chairman of the FSA, has, in a recent speech in Bahrain, made it clear that he, too, positively welcomes diversity and innovation in the world of finance, and he recognised that we in the United Kingdom have a clear economic interest in trying to ensure that the conditions for a flourishing Islamic financial market are in place in London. In

⁽¹⁾ The Chancellor subsequently announced in his Budget Statement of 9 April that the tax treatment of home purchases funded by alternative mortgage products would be reformed—including Islamic mortgages where in the past home buyers have been charged Stamp Duty twice.

relation to the regulatory capital weighting of Islamic mortgages in particular, Howard acknowledged, in his Bahrain speech, the disadvantageous treatment of Ijara mortgages under the present Basel Capital Accord, but held out the prospect of more flexible treatment—which would probably remove much of the competitive disadvantage—under the new Accord, Basel 2, which we hope to finalise by the end of the year. Even then the new Accord would not become fully effective until 2006—so again we need to be patient.

The other potential disadvantages of Islamic mortgages—while clearly important to those individuals who are potentially affected—are less general in their application. Nevertheless, ways of addressing them are being considered. The Office of the Deputy Prime Minister may not need to change the Right-to-Buy legislation itself—which might open up possibilities for abuse—but it could possibly issue revised guidelines to local authorities on its application. And, while I recognise the pressure of other priorities, I hope that the Ministry of Work and Pensions will find an opportunity within the legislative timetable at some point to introduce what I understand would be a relatively uncomplicated amendment to address the Social Security question.

As far as the question of Islamic mortgage transactions is concerned, I gather that this is largely a question of providing solicitors who are not necessarily familiar with the nature of Islamic mortgages with appropriate guidance, and I believe that the Law Society has taken the issue on board. But it may also involve changes to the documentation of transactions—for example the form of the Certificate of Title.

So all in all, Chairman, I think that you have made tremendous progress on the question of Islamic mortgages over the past year or two—and I congratulate you. Given the constructive response of the many authorities involved—and if, with the help of the CML, evidenced not least by today's conference, we can maintain the momentum you have built up—then I believe that, with a little patience, we will overcome the obstacles you have identified.

That would be a wonderful thing for the peace of mind of concerned members of the growing Muslim community in the United Kingdom. It would represent both a useful business opportunity for those companies involved in the provision of housing finance and a welcome diversification of our financial system. And it would demonstrate in a small, but significant and very practical way a commitment on the part of the authorities in this country, working together with the private sector, financial and professional community and with representatives of our ethnic minority population—in this case our Muslim population—to accommodate differences of religious principle or tradition insofar as we can, without in any way undermining the values or traditions of our indigenous society.

And I'm bound to say, Chairman, that I hope that the work which you started will not end with mortgage finance.

The model that you developed of defining the products, identifying the obstacles, and entering into a properly informed dialogue with the relevant authorities to find ways in which those obstacles might be removed, can, it seems to me, be usefully followed in relation to other Islamic financial products—and indeed much else besides. I can see no reason in principle why that should not lead to the establishment of fully fledged Islamic financial institutions in this country, catering to our own Muslim and wider population but participating, too, in the rapid growth of Islamic finance internationally. Howard Davies, I know, shares this view, and I think you would find that the authorities more generally are willing to listen sympathetically.

But perhaps that's running ahead. Today I think we can derive satisfaction from the progress you have undoubtedly made on Islamic home finance and hope to see that through to its conclusion.

The role of the Bank of England in the gold market

In this speech,⁽¹⁾ Graham Young, of the Bank's Foreign Exchange Division, discusses the Bank's activities in respect of gold and the gold market. These are chiefly the management of the United Kingdom's official reserves of gold on behalf of HM Treasury; the provision of custodial and account management services, primarily to other central banks; and helping to facilitate the self-regulation of the wholesale bullion market in the United Kingdom.

This morning I would like to talk about the role of the Bank of England in the gold market. One element of that is our management, on behalf of the government, of the United Kingdom's official gold reserves, and I'll be saying a little about that. But I will be saying more about other aspects of our involvement in the gold market that may be less familiar to some people in the audience here. In particular I will describe the Bank's provision of custodial and account management services to central banks and to commercial firms active in the London market, reflecting our role in seeking to ensure the efficiency and effectiveness of the UK financial sector. And I will explain the Bank's contribution to the self-regulation of the wholesale gold market. In all these areas we cooperate closely with the LBMA, and I shall explain how that relationship functions.

First, then, the official reserves. The United Kingdom is a little unusual, although certainly not unique, in that the official reserves of foreign currency and gold are held on the balance sheet of the government rather than of the central bank. The Bank of England's role is to manage the reserves portfolio, embracing both foreign currency assets and liabilities, on behalf of the Government, or more specifically the Treasury, our Finance Ministry. We do that according to a Remit which it sets for us each year. Strategic decisions about the reserves portfolio, such as high-level asset allocation, are taken by the Treasury. The Bank provides analysis and advice to assist the Treasury in making these decisions; we implement the decisions that the Treasury makes; and we manage the reserves on a day-to-day basis. I should add that in recent years the Bank's

management of the official gold reserves has also taken place within the framework of the 1999 Central Bank Agreement on Gold, with which I imagine you all to be familiar.

In the context of gold, the most significant strategic move of recent years was clearly the government's decision to reduce the holdings of gold in the reserves by just over half as a portfolio diversification measure. This was achieved through the series of auctions that the Bank conducted between 1999 and last year.⁽²⁾ Now, this is a subject that has already been subject to a considerable amount of comment and analysis, and I don't propose to add much to that here. The Treasury has produced a very comprehensive Review of the gold sales programme, which is available on its web site, and if any of you has residual questions about the programme I am sure you will be able to find the answers there. The United Kingdom remains a significant holder of gold: we have around 315 tonnes, worth $3^{1/2}$ billion at the current price, making us, still, among the 20 largest official holders.

Like many other central banks, whether or not they have the reserves on their own balance sheet, our day-to-day management of the gold holdings in the reserves is aimed at achieving a return on them, by lending a portion to the market. As is increasingly common among central banks, we have a strategic benchmark for this gold lending portfolio, in our case set by the Treasury. The Bank is able, subject to market and credit risk limits, to adjust the maturity distribution of the actual portfolio relative to that of the benchmark, in search of additional returns. The return on the actual

⁽¹⁾ Delivered to the annual conference of the London Bullion Market Association (LBMA), Lisbon, 3 June 2003. This

speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech198.pdf.

⁽²⁾ These gold auctions are analysed in more detail in Vila Wetherilt, A and Young, G (2003), 'An analysis of the UK gold auctions 1999–2002', published in this *Bulletin*, pages 188–97.

portfolio relative to the benchmark measures the value that the Bank has been able to add by this 'active management'.

Recently, of course, gold lending rates have been extremely low. Commentators seem to be in broad agreement as to why that is. There is a low interest rate environment globally, and one might expect that to influence interest rates on gold. But there are also factors specific to the gold market. In particular, much, although not all, gold lending ultimately facilitates the hedging by gold producers of their future output. And, as is well known, producer hedge books have become smaller recently.

Over the past couple of years, a number of central banks have withdrawn some of their gold from the lending market. Gold Fields Mineral Services estimates that outstanding lending by the official sector was 266 tonnes lower at the end of 2002 than a year earlier. In reality, this just reflects lower demand from the ultimate borrowers, communicated via the interest rate. In the context of short-term rates in the single digit basis points one might perhaps have expected official lending to fall further, when allowance is made for the compensation necessary to take account of credit risk and transaction costs.

I have spoken so far about the Bank of England's role as Agent for the Treasury in managing the official gold reserves. I would like to move on now to the broader market in London and the Bank's role in it.

Comparative international data on turnover in the wholesale gold market are sparse, but London is generally considered to be the most significant centre for spot and forward purchases and sales, over-the-counter gold derivatives, and, in particular, for gold lending.

What is the Bank of England's place in this? First, we are a very significant custodian of physical gold. Primarily this is gold that belongs to other central banks, but we also store gold in our vaults on behalf of a number of commercial firms that are active in the market. In fact, most of the gold we store is not our own. We are certainly not unique among central banks in this custodial role. Most notably, the US Federal Reserve also offers this service to other central banks, although not to private sector institutions. The Fed has the advantage of being located on bedrock so it is able to pile its holdings up to the ceiling. We are stuck with London clay, so we are limited to a certain number of bars per pallet!

And there are of course many commercial firms providing vaulting facilities, in London and elsewhere around the world. Most often, however, commercial bank storage services are conducted on an unallocated basis. This means, as many of you will be aware, that the owner has a claim on the commercial bank where it is held for a certain amount of gold, but does not have title to specific bars.

What the Bank provides is an account management service on an allocated basis. That means that those holding gold at the Bank, particularly other central banks, have the reassurance of knowing that they have title to specific bars; but they are also able to mobilise those gold holdings conveniently by making or receiving so-called 'electronic book entry transfers' between their account at the Bank and the account of their counterparty. Such a transfer does not require gold to be physically moved within the Bank's vaults; rather, title to the bars in question is transferred within the Bank's IT systems. We are probably unique in offering this kind of account management service on the scale that we do, and to a large number both of central bank and private sector participants in the market. The significance of this facility is that it provides an important element of the infrastructure that brings market participants together.

This system is one that has grown up organically over a long period of time, and very much in response to representations from our central bank customers and from the London market itself. It has no doubt been a factor in London maintaining its position as the most significant international centre in the wholesale gold market. However, other factors have. I am sure, been even more significant. In particular the establishment, and promotion by the LBMA, of London Good Delivery standards, has been crucial. Many aspects of the wholesale market could not exist in the absence of the fungibility and general acceptability of different bars within the London clearing system. Such is the confidence in this market standard that the term London Good Delivery is recognised and respected worldwide.

A further activity, one that grew out of the Bank's custodial role, is that we are prepared to accept

gold deposits from other central banks, which we lend on to the market in our own name, at a margin to reflect the cost and credit risk incurred. Our central bank customers thereby gain the convenience of being able to generate a return on part of their gold holdings, while only having to manage a single front and back-office relationship. The assets and liabilities denominated in gold on the Bank's own balance sheet derive entirely from this borrowing and lending activity. Since we publish these figures on our web site each month in accordance with the IMF's disclosure standards, anyone who is interested may track this business from there. At end-April it totalled around 45 tonnes, reflecting the current interest rate environment. It has been above 100 tonnes in the past.

We are happy that we have been in a position to assist the development of the market in these ways, but we are not wholly selfless! We do charge fees for the facilities we provide. More broadly, these activities reflect the Bank's role in seeking to ensure the effectiveness of the United Kingdom's financial services, which we do in part by supporting the development of an efficient financial infrastructure.

Finally, I would like to say a word about the Bank's role in the regulation of the gold market in the United Kingdom. This is, in fact, a very limited one. Since the establishment of the Financial Services Authority in 1998, it has been the regulator of individual institutions. The wholesale bullion market is considered to be an inter-professional market, or, in the distinctive parlance of the UK regulatory framework, a 'non-investment products' market. This means that, in general, the principle of *caveat emptor* applies and the market is expected to be self-regulating. The same is true, as it should be, of the foreign exchange and cash money markets in the United Kingdom.

As has always been the case, the Bank of England contributes to the self-regulation of all these markets. Nowadays we do that by facilitating the production of the Non-Investment Products Code, known by its acronym, the NIPs Code. This is a code of good practice for participants in these wholesale, over-the-counter markets, covering such things as dealing procedures and conventions. It provides a framework for market participants to gauge what is, and what is not, reasonable and professional conduct. The NIPs Code is produced and maintained jointly by the London Foreign Exchange Joint Standing Committee, for which the Bank of England provides a Chairman and a secretariat; by the Money Markets Liaison Group, for which we provide a similar service; and by the Management Committee of the LBMA. The Financial Services Authority has also participated in the development of the Code and says that it expects the management of authorised firms to take due account of it. The LBMA has endorsed the NIPs Code on behalf of the bullion market, and is consulted on all proposed changes to the Code.

In fact it should be apparent from much that I have said that the Bank works very closely with the LBMA in a variety of contexts. Representatives of the Bank are invited to attend meetings of the Management and Physical Committees of the LBMA as observers, and beyond that we have a very close ongoing working relationship. It seems to us that the LBMA and its participant firms do an excellent job of promoting the bullion markets, increasingly at a global level rather than solely in London, and it has been a great pleasure for me to be able to speak at the LBMA's annual conference today.

Bank of England speeches

Speeches made by Bank personnel since publication of the previous Bulletin are listed below.

Convergence in insurance and banking: some financial stability issues.

Speech by Sir Andrew Large, Deputy Governor, in London on 12 June 2003. www.bankofengland.co.uk/speeches/speech196.htm.

The role of the Bank of England in the gold market.

Speech by Graham Young, of the Bank's Foreign Exchange Division, at the annual conference of the London Bullion Market Association, in Lisbon on 3 June 2003. www.bankofengland.co.uk/speeches/speech198.pdf. Reproduced on pages 243–45 of this *Bulletin*.

Poverty and worklessness in Britain.

Speech by Stephen Nickell, Member of the Monetary Policy Committee and Professor at the London School of Economics, at the Royal Economic Society Conference at Warwick University given on 8 April 2003. www.bankofengland.co.uk/speeches/speech195.pdf.

Asset prices, financial imbalances and monetary policy: are inflation targets enough?

Speech by Charles Bean, Chief Economist and member of the Monetary Policy Committee, in Basel, Switzerland given on 29 March 2003. www.bankofengland.co.uk/speeches/speech194.pdf.

Islamic Home Finance Seminar.

Speech by The Rt Hon Sir Edward George, Governor, in London on 27 March 2003. www.bankofengland.co.uk/speeches/speech193.htm. Reproduced on pages 240–42 of this *Bulletin*.

Finance and Leasing Association Annual Dinner.

Speech by The Rt Hon Sir Edward George, Governor, in London on 24 March 2003. www.bankofengland.co.uk/speeches/speech192.htm.

Basel II and systemic stability.

Speech by Sir Andrew Large, Deputy Governor, at the British Bankers' Association—Basel II/CAD 3 Conference in London on 13 March 2003. www.bankofengland.co.uk/speeches/speech191.htm.

Contents of recent Quarterly Bulletins

The articles and speeches which have been published recently in the *Quarterly Bulletin* are listed below. Articles from November 1998 onwards are available on the Bank's web site at www.bankofengland.co.uk/qbcontents/index.html.

Articles and speeches (indicated S)

Spring 2001

Sterling wholesale markets: developments in 2000
The Kohn report on MPC procedures
Bank capital standards: the new Basel Accord
The financing of technology-based small firms: a review of the literature
Measuring interest accruals on tradable debt securities in economic and financial statistics
Saving, wealth and consumption
Mortgage equity withdrawal and consumption
The information in UK company profit warnings
Interpreting movements in high-yield corporate bond market spreads
International and domestic uncertainties (S)
Current threats to global financial stability—a European view (S)

Summer 2001

The Bank of England inflation attitudes survey The London Foreign Exchange Joint Standing Committee: a review of 2000 Over-the-counter interest rate options Explaining the difference between the growth of M4 deposits and M4 lending: implications of recent developments in public finances Using surveys of investment intentions Can differences in industrial structure explain divergencies in regional economic growth? Has there been a structural improvement in US productivity? International efforts to improve the functioning of the global economy (S) Monetary stability as a foundation for sustained growth (S) The 'new economy': myths and realities (S) The impact of the US slowdown on the UK economy (S) Autumn 2001 Public attitudes about inflation: a comparative analysis Measuring capital services in the United Kingdom Capital flows and exchange rates Balancing domestic and external demand (S) The international financial system: a new

partnership (S)

Autumn 2001 (continued) 'Hanes Dwy Ddinas' or 'A Tale of Two Cities' (S) Has UK labour market performance changed? (S) Some reflections on the MPC (S)

Winter 2001

The external balance sheet of the United Kingdom: implications for financial stability Public sector debt: end-March 2001 The foreign exchange and over-the-counter derivatives markets in the United Kingdom The Bank's contacts with the money, repo and stock lending markets The formulation of monetary policy at the Bank of England Credit channel effects in the monetary transmission mechanism Financial effects on corporate investment in UK business cycles Why house prices matter The prospects for the UK and world economies (S) Maintaining financial stability in a rapidly changing world: some threats and opportunities (S) Monetary policy: addressing the uncertainties (S) Economic imbalances and UK monetary policy (S) Do we have a new economy? (S) Spring 2002 The London Foreign Exchange Joint Standing Committee: a review of 2001 Provision of finance to smaller quoted companies: some evidence from survey responses and liaison meetings Explaining trends in UK business investment Building a real-time database for GDP(E) Electronic trading in wholesale financial markets: its

wider impact and policy issues Analysts' earnings forecasts and equity valuations On market-based measures of inflation expectations Equity wealth and consumption—the experience of Germany, France and Italy in an international context Monetary policy, the global economy and prospects for the United Kingdom (S) Three questions and a forecast (S)

Twenty-first century markets (S)

Spring 2002 (continued)

The stock market, capacity uncertainties and the outlook for UK inflation (S)

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The monetary policy dilemma in the context of the international environment (S)

Monetary policy issues: past, present, future (S)

Winter 2002

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National Insurance Contributions on wages, prices and employment

Equity valuation measures: what can they tell us? Profit expectations and investment

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Money market operations and volatility in UK money market rates

Winter 2002 (continued)
The Centre for Central Banking Studies
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Public sector debt: end-March 2002
Speech at the Northwest Development Agency/Bank of England Dinner (S)
The inflation target ten years on (S)
The MPC and the UK economy: should we fear the D-words? (S)
Macroeconomic policy rules in theory and in practice (S)

Spring 2003

Market-based estimates of expected future UK output growth Monetary policy and the zero bound to nominal interest rates The measurement of house prices Report on modelling and forecasting at the Bank of England The Bank's regional Agencies A review of the work of the London Foreign Exchange Joint Standing Committee in 2002 Speech at the Chartered Institute of Bankers in Scotland **Biennial Dinner (S)** Economists and the real world (S) Adjusting to low inflation—issues for policy-makers (S) Six months on the MPC: a reflection on monetary policy (S) House prices, household debt and monetary policy (S)

Summer 2003

What caused the rise in the UK terms of trade?
Long-run equilibrium ratios of business investment to output in the United Kingdom
An analysis of the UK gold auctions 1999–2002
Assessing the extent of labour hoarding
Asset finance
Public attitudes to inflation
Foreign Exchange Joint Standing Committee
e-commerce subgroup report
The Governor's speech at the Islamic Home Finance
seminar on 27 March 2003 (S)
The role of the Bank of England in the gold market (S)

Bank of England publications

The Bank of England publishes information on all aspects of its work in many formats. Listed below are some of the main Bank of England publications. For a full list, please refer to our web site www.bankofengland.co.uk/publications.

Working papers

Working papers are free of charge; a complete list is available from the address below. An up-to-date list of working papers is also maintained on the Bank of England's web site at www.bankofengland.co.uk/wp/index.html, where abstracts of all papers may be found. Papers published since January 1997 are available in full, in PDF.

No.	Title	Author
174	Money market operations and volatility of UK money market rates (January 2003)	Anne Vila Wetherilt
175	Equilibrium analysis, banking, contagion and financial fragility (February 2003)	Dimitrios P Tsomocos
176	Rational expectations and fixed-event forecasts: an application to UK inflation <i>(February 2003)</i>	Hasan Bakhshi George Kapetanios Anthony Yates
177	The provisioning experience of the major UK banks: a small panel investigation <i>(February 2003)</i>	Darren Pain
178	The impact of price competitiveness on UK producer price behaviour (March 2003)	Colin Ellis Simon Price
179	A Kalman filter approach to estimating the UK NAIRU (March 2003)	Jennifer V Greenslade Richard G Pierse Jumana Saleheen
180	The role of expectations in estimates of the NAIRU in the United States and the United Kingdom <i>(March 2003)</i>	Rebecca L Driver Jennifer V Greenslade Richard G Pierse
181	Procyclicality and the new Basel Accord—banks' choice of loan rating system (March 2003)	Eva Catarineu-Rabell Patricia Jackson Dimitrios P Tsomocos
182	Import prices and exchange rate pass-through: theory and evidence from the United Kingdom <i>(March 2003)</i>	Valerie Herzberg George Kapetanios Simon Price
183	Capital flows to emerging markets (April 2003)	Adrian Penalver
184	The effect of payments standstills on yields and the maturity structure of international debt <i>(April 2003)</i>	Adrian Penalver Benjamin Martin
185	What does economic theory tell us about labour market tightness? (April 2003)	Andrew Brigden Jonathan Thomas
186	Ready, willing, and able? Measuring labour availability in the UK (April 2003)	Mark E Schweitzer
187	Sovereign debt workouts with the IMF as delegated monitor—a common agency approach (May 2003)	Prasanna Gai Nicholas Vause
188	The role of asset prices in transmitting monetary and other shocks (May 2003)	Stephen P Millard Simon J Wells
189	Modelling investment when relative prices are trending: theory and evidence for the United Kingdom (May 2003)	Hasan Bakhshi Nicholas Oulton Jamie Thompson
190	What caused the 2000/01 slowdown? Results from a VAR analysis of G7 GDP components (May 2003)	Vincent Labhard
191	Endogenous price stickiness, trend inflation, and the New Keynesian Phillips curve (May 2003)	Hasan Bakhshi Pablo Burriel-Llombart Hashmat Khan Barbara Rudolf
192	Capital stocks, capital services, and depreciation: an integrated framework (June 2003)	Nicholas Oulton Sylaja Srinivasan

External MPC Unit discussion papers

The MPC Unit discussion paper series reports on research carried out by, or under supervision of, the external members of the Monetary Policy Committee. Papers are available from the Bank's web site at www.bankofengland.co.uk/mpc/extmpcpaper0000n.pdf (where n refers to the paper number). The following papers have been published recently.

No.	Title	Author
9	The pricing behaviour of UK firms (April 2002)	Nicoletta Batini Brian Jackson Stephen Nickell
10	Macroeconomic policy rules in theory and in practice (October 2002)	Christopher Allsopp
11	The exchange rate and inflation in the UK (October 2002)	Amit Kara Edward Nelson
12	Measuring the UK short-run NAIRU (April 2003)	Nicoletta Batini Jennifer Greenslade
13	UK consumers' habits (May 2003)	Ryan Banerjee Nicoletta Batini

Monetary and Financial Statistics

Monetary and Financial Statistics (Bankstats) contains detailed information on money and lending, monetary and financial institutions' balance sheets, analyses of bank deposits and lending, international business of banks, public sector debt, money markets, issues of securities and short-term paper, interest and exchange rates, explanatory notes to tables, and occasional related articles. Bankstats is published quarterly in paper form, priced at £60 per annum in the United Kingdom (four issues). It is also available monthly free of charge from the Bank's web site at: www.bankofengland.co.uk/mfsd/latest.htm.

Further details are available from: Daxa Khilosia, Monetary and Financial Statistics Division, Bank of England: telephone 020 7601 5353; fax 020 7601 3208; e-mail daxa.khilosia@bankofengland.co.uk.

The following articles have been published in recent issues of *Monetary and Financial Statistics*. They may also be found on the Bank of England web site at www.bankofengland.co.uk/mfsd/article.

Title	Author	Month of issue	Page numbers
A work programme in financial statistics—April 2003 update	Simon Humphries Ben Norman	April	1–5
Prospective change in seasonal adjustment methodology: consultation with users: summary of responses		February	Internet version only
Property prices, measurement and impact: a report on a meeting of the Financial Statistics Users' Group	Andrew Moorhouse Robert Golcher	January 2003	1-3

Financial Stability Review

The *Financial Stability Review* is published twice a year, in June and December. Its purpose is to encourage informed debate on financial stability; survey potential risks to financial stability; and analyse ways to promote and maintain a stable financial system. The Bank of England intends this publication to be read by those who are responsible for, or have interest in, maintaining and promoting financial stability at a national or international level. It is of especial interest to policy-makers in the United Kingdom and abroad; international financial institutions; academics; journalists; market infrastructure providers; and financial market participants. It is available from Financial Stability Review, Bank of England HO-3, Threadneedle Street, London, EC2R 8AH and on the Bank's web site at: www.bankofengland.co.uk/fsr/index.htm.

Practical issues arising from the euro

This is a series of booklets providing a London perspective on the development of euro-denominated financial markets and the supporting financial infrastructure, and describing the planning and preparation for possible future UK entry. Recent editions have focused on the completion of the transition from the former national currencies to the euro in early 2002, and the lessons that may be drawn from it. Copies are available from Public Enquiries Group, Bank of England, Threadneedle Street, London, EC2R 8AH and at the Bank's web site at: www.bankofengland.co.uk/euro/piq.htm.

Economic models at the Bank of England

The *Economic models at the Bank of England* book, published in April 1999, contains details of the economic modelling tools that help the Monetary Policy Committee in its work. The price of the book is £10.00. An update was published in September 2000 and is available free of charge.

Quarterly Bulletin

The *Quarterly Bulletin* provides regular commentary on market developments and UK monetary policy operations. It also contains research and analysis and reports on a wide range of topical economic and financial issues, both domestic and international.

Back issues of the *Quarterly Bulletin* from 1981 are available for sale. Summary pages of the *Bulletin* from February 1994, giving a brief description of each of the articles, are available on the Bank's web site at www.bankofengland.co.uk/bulletin/index.html.

The *Bulletin* is also available from ProQuest Information and Learning: enquiries from customers in Japan and North and South America should be addressed to ProQuest Information and Learning, 300 North Zeeb Road, Ann Arbor, Michigan 48106, United States of America; customers from all other countries should apply to The Quorum, Barnwell Road, Cambridge, CB5 8SW, telephone 01223 215512.

An index of the *Quarterly Bulletin* is also available to customers free of charge. It is produced annually, and lists alphabetically terms used in the *Bulletin* and articles written by named authors.

Bound volumes of the *Quarterly Bulletin* for the period 1960–85 (in reprint form for the period 1960–85) can be obtained from Schmidt Periodicals GmbH, Ortsteil Dettendorf, D-83075 Bad Feilnbach, Germany, at a price of \in 105 per volume or \in 2,510 per set.

Inflation Report

The Bank's quarterly *Inflation Report* sets out the detailed economic analysis and inflation projections on which the Bank's Monetary Policy Committee bases its interest rate decisions, and presents an assessment of the prospects for UK inflation over the following two years.

The *Report* starts with an overview of economic developments; this is followed by six sections:

- analysis of money and asset prices;
- analysis of demand;
- analysis of output and supply;
- analysis of costs and prices;
- summary of monetary policy during the quarter; and
- assessment of the medium-term inflation prospects and risks.

The minutes of the meetings of the Bank's Monetary Policy Committee (previously published as part of the *Inflation Report*) now appear as a separate publication on the same day as the *Report*.

Publication dates

From 2003, copies of the *Quarterly Bulletin* and *Inflation Report* can be bought separately, or as a combined package for a discounted rate. Current prices are shown overleaf. Publication dates for 2003 are as follows:

Quarterly Bu	lletin	Inflation Report				
Spring Summer	21 March 20 June	February May	12 February 15 May			
Autumn	26 September	August	13 August			
Winter	19 December	November	12 November			
Quarterly Bulletin and Inflation Report subscription details

Copies of the Quarterly Bulletin and Inflation Report can be bought separately, or as a combined package for a discounted rate. Subscriptions for a full year are also available at a discount. The prices are set out below:

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	<i>Quarterly Bulletin</i> and and <i>Inflation Report</i> package		<i>Quarterly Bulletin</i> only		Inflation Report only	
	Annual	Single	Annual	Single	Annual	Single
United Kingdom, by first-class mail (1)	£27.00	£7.50	£21.00	£6.00	£10.50	£3.00
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European countries including the Republic of Ireland, by letter service	£33.00	£9.00	£25.00	£7.00	£13.00	£4.00
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Subscribers who wish to collect their copy(ies) of the *Bulletin* and/or *Inflation Report* may make arrangements to do so by writing to the address given below. Copies will be available to personal callers at the Bank from 10.30 am on the day of issue and from 8.30 am on the following day.
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