

Paul Tucker: Macro, asset price, and financial system uncertainties

Text of the Roy Bridge Lecture delivered by Mr Paul Tucker, Executive Director Markets and Member of the Monetary Policy Committee of the Bank of England, at the Bank of England, London, 11 December 2006.

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It is a great privilege to give this lecture, named in honour of Roy Bridge, for many years a very distinguished head of foreign exchange at the Bank of England and the first President of your association, the ACI.

The world in which Bridge worked was so very different from ours that, although my responsibilities cover the same part of the Bank, I cannot really imagine what he would have made of three striking features of the current environment which I plan to review this evening.

First, while monetary authorities are commonly given some of the credit for the return of macroeconomic stability, central bankers themselves devote a great deal of effort to conveying what they see as risks to the outlook. Second, while some distinguished commentators see a puzzle in lower macro volatility not having been matched by an equally large decline in asset price volatility, central bankers by contrast worry publicly that many financial asset prices imply unusually low future volatility. And third, while central bankers and others in the official sector celebrate the gains in risk transfer and efficiency brought by recent changes in the structure of the financial system, they also issue warnings about associated threats to systemic stability.

These three arenas of uncertainty – macroeconomic, financial asset pricing, and the financial system – are of course intertwined, but I shall initially find it convenient to unbundle them.

Macroeconomic and monetary policy uncertainties

The characteristics of the Great Stability, as some economists call it¹, are by now familiar. Essentially, low inflation on average; much less persistence in deviations of inflation from central banks' explicit or implicit targets; and much lower volatility in both output growth and inflation². Some of the credit is typically given to better monetary regimes, and I believe it should be.

Yet policy makers also stress a wide range of uncertainties, threatening at least interruptions to the benign conditions of the past decade or so. This is not just an occupational disposition of central bankers. To varying degrees, these uncertainties do feature in real-world policy debates. I have argued previously³ that some risks – such as those posed by global current account imbalances – could not sensibly be factored in to policy settings ahead of their crystallising. But uncertainties about the structure of the economy and how monetary policy works do somehow have to feature in our policy judgments, as I can illustrate with the thinking behind my vote at the MPC's November meeting⁴. Essentially, I balanced two quite different, but quite likely, views of the outlook, which I shall label Orthodox and Alternative.

Under both stories, private sector demand growth has been reasonably robust and looks, according to surveys and the Bank's regional Agents, to continue to be robust for a little while at least. Notwithstanding the US slowdown, world growth weighted for its significance to UK trade has remained solid, due largely to recovery in the euro area. Business investment appears to be

¹ In the US, 'Great Moderation' is preferred, because low inflation had been achieved in an earlier decade. Bernanke, B S (2004), 'The Great Moderation', remarks at the meetings of the Eastern Economic Association, Washington 2004.

² See Benati L. (2005), 'The inflation-targeting framework from an historical perspective', Bank of England *Quarterly Bulletin*, Summer 2005, pp 160 – 168; and Tucker P M W (2005), 'Monetary policy, stability and structural change', speech to the Confederation of British Industry, March 2005, Bank of England *Quarterly Bulletin*, Summer 2005, pp 247-55.

³ Tucker P M W (2006), 'Reflections on operating inflation targeting', speech at the Chicago Graduate School of Business, May 2005, Bank of England *Quarterly Bulletin* Summer 2006, page 217.

⁴ This lecture is being given before publication of the minutes of the Committee's December meeting, and so I am not at liberty to discuss my contributions to that meeting.

recovering. And consumption, although in the near term subject to upside risks from the housing market but downside risks from household debt, looks most likely to grow close to its average rate. Surveys and anecdotal information point to firms operating close to capacity, but profit margins have been squeezed in recent years, essentially by the rise in energy prices. There is some slack in the labour market. That is deliberately broad brush; the point is that it is common to both stories.

On the Orthodox Story, in conditions of robust aggregate demand, firms operating close to capacity are likely take opportunities to restore their margins by raising prices, pushing upwards on CPI inflation. So the Orthodox Story commanded a policy response to prospective inflationary pressures from excess demand.

Under the Alternative Story, the outlook for inflation may be quite different due to developments in the labour market, notably from inward migration. There might well be more slack in the labour market than allowed for in the Orthodox Story. And, most potently, if more workers were to be attracted in to the country as aggregate demand expands, the economy's productive capacity would expand as well. In that case, it would probably be harder for firms to raise prices, although they may still be able to restore margins by bearing down on costs, especially labour costs. (That is in aggregate; we would probably see further increases in skill shortages and in the premium for highly skilled labour in the professions.) On the Alternative Story, the outlook for inflation is highly uncertain – and not necessarily weaker, although that may seem the most obvious implication.

Indeed, under the Alternative Story, there could well be challenges for monetary policy, which in its modern mode operates essentially by using Bank Rate to regulate aggregate demand relative to aggregate supply, exploiting a short-run trade off between growth and inflation so long as inflation expectations are well anchored. If aggregate supply were to become endogenous in the way I have described, the short-run trade off might well be less pronounced for a while. That would make it harder to judge inflationary pressures from gauging the amount of slack in the economy; and harder for the Bank to achieve our 2% inflation target by broadly steering demand conditions. In that scenario, it would matter enormously that wage and price setters continued to act on the basis that CPI inflation would remain in line with the 2% target over the medium term.

For me, both the Orthodox and Alternative Stories are plausible. In that sense, I think the outlook is 'bimodal' – in terms of there being two main stories. The Orthodox Story, to which I gave most weight in my November vote, required a small tightening. The implications of the Alternative Story for policy were less clear. I concluded that it was essential for the MPC to act in a way that was most likely to keep inflation expectations anchored. With headline inflation tangibly above target in the run up to the main, New Year wage bargaining season and with the market clearly expecting that policy would be tightened, a small increase in Bank Rate was, on balance, warranted to avoid any misperception that our reaction function had altered.

Strategically, the significance of this account is in the uncertainty injected by structural change; in this case, from migration. Of course, there is a host of demand-side uncertainties: about consumption, export growth and so on. But they fit comfortably into the MPC's framework of producing a conditional forecast of probability ranges around a central projection. The supply-side uncertainties are something else – much harder to calibrate and potentially going to how we read and act on the economy.

Inward migration is just the most obvious reason the monetary transmission mechanism might have altered. In reviewing globalisation more generally, others have described how the short-run relationship between aggregate demand and inflation may be weakened by firms' enhanced capacity to switch production between countries, including via outsourcing, in the face of capacity and cost pressures.

As policy makers discuss these issues it could become a commonplace that, in such an environment, central banks would have no choice but to respond more aggressively whenever inflation deviates from target; that, compared with the past, we would need to make bigger changes in interest rates, since bigger shifts in demand would be needed to bring inflation back to target. I should make clear that, as put, I would not go along with this completely. It would all depend on whether medium-term inflation expectations were well anchored. So long as they were, the central bank would have a wider choice than a one-item menu of having, putting it crudely, to generate a material downturn in the short term to contain inflation; or, symmetrically, a boomlet to raise inflation. Another possible choice might be to tighten (loosen) modestly but for longer, allowing inflation to return to target over a longer

horizon; and if the policy maker explained the considerations behind the likely path of policy, price and wage setters might act in a way that helped to bring inflation back to target⁵. Acting aggressively without need could endanger the political economy foundations of any central bank's authority. It has to be a judgment based on the particular circumstances.

In terms of my central theme this evening, this is a world in which monetary regimes truly are better, but in which policy makers are having to face some fresh challenges.

Asset pricing uncertainties

If central bankers see possible interruptions to the Great Stability, there is arguably conflicting evidence as to whether financial markets are giving it insufficient weight or – at the opposite pole – taking stability for granted.

In an intriguing paper, Ken Rogoff has shown that output and inflation volatility have declined by considerably more over recent decades than the volatility of returns on a range of financial assets (Table 1).⁶ As Rogoff discusses, there could be a number of explanations. Financial markets might believe that the Great Stability will not last. Or it may be taking them a while to price in lower macroeconomic volatility. Or the beneficial effects of macroeconomic stability may be being offset by something else.

In the third category, Rogoff discusses the possibility that, with the lower level of risk-free rates that have accompanied the Great Stability, a given change in the yield curve now has a bigger proportionate effect on asset prices. I am not sure this would be my own best bet.

Common v. idiosyncratic volatility

But first, some facts. In the case of equity markets, we need to separate the dominant common (or macro) component of index returns from that attributable to variability in the firm-specific (or idiosyncratic) component. Comparing the period from 1980 to 1992 with that since 1992, when inflation targeting was introduced in the UK, the common component – proxied by the average correlation between returns on pairs of equity index components – has fallen by around 25%⁷ (Chart 1). Forward-looking measures, derived from option prices, imply that these pairwise correlations are not expected to fall much further. All told, this seems consistent with some beneficial effect on asset volatility from the Great Stability, but with Rogoff's puzzle intact.

Possible explanations: risk premia

Another vantage point can be gained from decomposing changes in the level of the equity market into changes in (estimates of) the risk-free rate, projected earnings growth, and the equity risk premium⁸. For both the FTSE100 and the S&P, this suggests that the decline in real rates has been an important driver of the rise in the equity market since the early 1990s, but that the market is not materially more sensitive to changes in real rates now than it was on average over the past 15-20 years (Chart 2). This may be because, as part of better monetary policy regimes, risk-free real rates have been slightly less

⁵ See Woodford, M., 2003, 'Interest and Prices: Foundations of a Theory of Monetary Policy', Princeton University Press, Chapter 7; Tucker P M W (2006), 'Reflections on operating inflation targeting', speech at the Chicago Graduate School of Business, May 2005, Bank of England *Quarterly Bulletin* Summer 2006, page 217.

⁶ Rogoff, K. (2006), 'Impact of Globalization on Monetary Policy, paper prepared for a symposium on 'The New Economic Geography: Effects and Policy Implications', Jackson Hole Wyoming August 2006.

⁷ As for the volatility in individual-firm equity returns, some extreme episodes aside (for example, the 1987 Crash), the firm-specific component inevitably dominates. For the UK market, the common component seems to have fallen slightly, on average, since 1992. The idiosyncratic component rose during the second half of the 1990s, but then fell back. On the face of it, that would seem to square with the dotcom/telecom boom and bust. At least for the UK market, it does not obviously lend support to the suggestion in some earlier papers that there may have been an underlying increase in idiosyncratic volatility. For example, see Campbell J, M Lettau, B G Malkiel and Y Xu (2001), 'Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk', *Journal of Finance*, vol 56, no. 1 pp 1-43, which covered the period from 1962 to 1996 for the US market.

⁸ Using a Dividend Discount Model. Further information on the Dividend Discount Model can be found in Panigirtzoglou N. and R. Scammell (2002), 'Analysts' earnings forecasts and equity valuations', Bank of England *Quarterly Bulletin*, Spring 2002, pp 59-6.

volatile than in the past. Another candidate explanation is related to the possibility that the other component of the discount rate – the equity risk premium – may have risen since the late 1990s. If, as a result, the overall discount rate were broadly unchanged, a given shift in the default-free curve would not necessarily have a greater proportionate effect on equity prices than in past decades.

Indeed, a bigger question would seem to be how to square the possibility of a rise in the equity risk premium with apparent falls, since the turn of the century, in term premia on default-free government bond yields and in credit risk premia across a wide range of assets. It must be cautioned that the true equity risk premium is unobservable, and so estimates may well be wide of the mark. But there is a possible story, related to changes in the global distribution and management of savings. The managers of the now massive official foreign exchange reserves in Asia have a clear preference for fixed-income securities, both absolutely and relative to say the US household sector. And in the West, defined-benefit pension fund trustees and managers have been placing greater weight on matching the duration of their quasi-fixed income liabilities with holdings of bonds. In both cases, there may have been a *de facto* shift in global demand from equities to fixed-income securities of various kinds. That would tend to alter relative risk premia⁹.

All told, this seems to reduce the candidate explanations for Rogoff's puzzle. For equities, fluctuations in equity risk premia may have been a factor, driven by the dotcom/telecom fad and shifts in global investor preferences. For financial assets more generally, perhaps the best provisional view is that volatility in asset returns may have been elevated for a while by the effect on prices of the reductions in default-free rates, term premia and credit-risk premia associated with the Great Stability. As well as adding to volatility temporarily, that will also have raised *ex post* returns, in which case it would be important that market participants did not act on the basis that they were easily sustainable.

Forward-looking uncertainty

This is where my own second puzzle kicks in: whilst we can busy ourselves trying to identify why realised asset price volatility has not fallen more over the past decade, central bankers seem to expend quite a lot more energy worrying about the low level of future volatility implied by options on a range of financial assets.

So, on the one hand, members of my community variously enumerate risks from low risk premia and the Search for Yield; global imbalances; energy prices; household balance sheets and house prices in a number of countries; releveraging of the corporate sector via Leveraged Buy Outs; flatter Phillips Curves; and so on¹⁰. On the other hand, implied volatilities derived from options, with a range of expiry dates, on long-term yields, equities, and exchange rates are all well below levels around the turn of the century (Chart 3). And in recent months, at least for short expiry options, they have dipped below the averages for the first part of the 1990s.

But implied volatilities may not be the best measure of the market's forward-looking assessment of risks. They represent one standard deviation (sd) in the market's underlying probability distribution, whereas arguably central bankers are worrying about greater-than-one-standard deviation events. The market's assessment of such risks can perhaps be gauged by looking at how much of the current option-implied distributions lie beyond one sd compared with option markets in the past, and with historical outturns.

For bonds and equities, a little bit more of the probability mass implied by options¹¹ is currently in the lower tail (beyond one standard deviation) than is the case over fairly long-runs of historical outturns¹² (Table 2). But for equities, bonds, and dollar exchange rates, the lower probability mass is pretty well in line with the average 'tail' implied by options markets in the past (Charts 4 - 5). That does not suggest much sensitivity to the various risks preoccupying the official sector.

⁹ This is a different point from that, advocated for example by Chairman Bernanke, explaining a fall in long-maturity risk-free rates in terms of an *ex ante* imbalance of global savings and investment. The two explanations are not mutually exclusive, as the observed fall in yields on indexed government bonds could reflect a combination of a fall in the risk-free rate and falls in term premia.

¹⁰ For example see Bank of England *Financial Stability Report*, Overview, July 2006, pp 5-13 and Bank of England *Inflation Report*, November 2006, Chapter 5.

¹¹ Using three-month expiry options.

¹² Since the 1930s for equities; 1960s for bonds; and 1970s for exchange rates.

Market contacts offer various explanations for this – some of them, I should make clear, sceptically. One – and here bear in mind my earlier remarks – is that not much really nasty will happen given the collective wisdom of the world's monetary authorities. Another is that, in an environment where investors are chasing yield, collecting the premium income from writing options has become a prevalent way of sustaining returns in the hope that nothing too bad happens; and that if it does, today's liquid capital markets will contain the volatility anyway. In other words, they base their explanation on what has been going in the financial system.

Financial system uncertainties

Big, perhaps fundamental, changes have been underway in banking and capital markets for a few years now, with implications for how we gauge money and credit conditions, and assess the resilience of the financial system as a whole.

Discussions typically jump to the second, financial stability issue. But I want to look first at some monetary indicators in the light of these structural changes.

Broad money growth

As has recently attracted a good deal of attention, UK broad money is up around 15% on a year ago, and more than 25% since the beginning of 2005 – much more than elsewhere in the G7 (Chart 6). Of this increase, almost half – or around £140bn – is accounted for by the money holdings of so-called Other Financial Corporations¹³. Central bankers have to ask whether that represents a threat to inflation and stability or, rather, a shift in the demand for money that is a symptom of structural change in the financial system.

There is relatively little research on the macroeconomic significance of OFC money.¹⁴ The central question is typically seen as whether institutional investors, such as pension funds and life insurance companies, are holding an unusually large amount of money in their asset portfolios, in which case any 'excess' might be expected sooner or later to flow into financial markets, pushing up asset values, which in turn would tend to boost aggregate demand and so add to inflationary pressures.

Well, since 2003, institutional investor M4 has accounted for less than a fifth of the near doubling in total OFC money holdings. And the share of money in their asset portfolios has remained in a 3-5% range (Chart 7). Moreover, some contacts have suggested that with pension funds and life companies making greater use of derivatives to manufacture long-duration assets, some cash is now held to manage collateral calls or to generate a LIBOR-based stream of payments. Such money holdings would not be readily available to invest in financial assets.

Over the past year, the largest contributions to OFC money growth have, in fact, come from two other groups (Chart 8): "securities dealers and other" (8pp)¹⁵; and what the statisticians label "Other Financial Intermediaries" (contributing a whopping 17 pp).

I would hazard a guess that a significant portion of the money holdings of securities dealers stems from their so-called 'matched' repo books. Although technically these entail secured deposits with banks, they are not money holdings that get spent (on assets or goods), and are matched pretty well by secured (repo) loans to other parts of the financial system.

The 'OFI' category is somewhat amorphous, including for example both private equity funds and Special Purpose Vehicles. Collectively, their holdings of bank deposits have been growing at an annual rate of over 40% for the past two years. It is extremely difficult to judge the macroeconomic significance of this, not least because no breakdown is available of the money holdings of different types of 'OFI'. On the one hand, it may be uninvested cash, reflecting for example the wave of fund raising by the private equity industry. That is most definitely cash to be invested in the equity market, but such fund raisings are highly publicised and conceivably may already have been discounted in

¹³ 'Other' in the sense of not being a member of the monetary sector (commercial banks and building societies).

¹⁴ Chrystal K A and P Mizen (2001), 'Other financial corporations: Cinderella or ugly sister of empirical monetary economics', Bank of England *Working Paper*, No. 151.

¹⁵ The other intermediaries grouped with securities dealers include financial leasing companies and bank holding companies.

equity prices via M&A speculation. As for SPVs, they are used for all sorts of purposes. Some effect transactions within banking groups, and should ideally be netted off. Some are used for securitisations, where investors obtain returns linked to the credit risk on a portfolio of assets. Regular cash-market securitisations, with a full transfer of the underlying assets, shrink bank balance sheets. But synthetic securitisations, which have become prevalent over the past couple of years, can involve increased money holdings¹⁶. It is not obvious that such deposits would be of macroeconomic significance over and above any effect on asset prices/risk premia stemming from the prior associated demand for (synthetic) credit.

But we should pause before concluding firmly that the money data are benign. First, their counterpart, bank lending, has been growing at around 15% (although the 3-month annualised rate is somewhat lower). Second, the money holdings of non-financial companies have recently been rising rapidly, perhaps signalling on upside risk to the outlook for business investment in an environment of robust profits and aggregate demand.

Third, looking at UK OFC money may be too narrow if we are trying to assess whether there is an upside risk to asset prices, and so to aggregate demand, from money growth. Given that asset prices are today determined in global capital markets, global rather than domestic money (and credit) growth may be just as relevant. On one measure, the rate of growth of 'world' broad money¹⁷ has slowed from around 15% to around 8% since 2003 (Chart 9), perhaps consistent with the gradual withdrawal of monetary accommodation in the US and elsewhere. However, the treatment of OFCs varies a lot across the G7¹⁸, and so their data are not strictly comparable with the UK M4 numbers. More important, so far as I can tell, most current calculations of world money growth¹⁹ simply add up domestic money supplies, and so leave out cross-border money holdings. That might be a material omission. For example, external holdings of sterling deposits with the UK banking system have increased by more than domestic money since the late 1990s; and by around 15% over the past year. How much of this growth is attributable to non-bank financial groups, whether based in the UK or overseas, is not known.

Like much of the monetary analysis of the early 1980s, I fear that this is rather inconclusive, other than underlining that one has to get one's hands dirty in analysing the money numbers. It is plausible that a decent chunk of recent UK M4 growth should be seen in the light of structural change in the financial system. Essentially, some types of non-bank financial intermediation have become more significant, and seem to have entailed higher money holdings on the definitions currently employed. If so, recent OFC money growth does not of itself obviously have malign implications for money spending and inflation.

Originate and distribute: what's going on on bank balance sheets?

Much of the debate about this renewed process of disintermediation has revolved around whether the burgeoning growth of, for example, structured credit vehicles and hedge funds increases or impairs the resilience of the system. This is equivalent to asking about the significance to stability of the pronounced shift in the business model of many large banks to 'originate and distribute'. If they are not holding on to the loans and other assets they originate, one might draw the inference that bank balance sheets would have shrunk.

Nothing could be further from the truth. The balance sheets of the largest and most complex financial institutions (LCFIs) have ballooned. Both in the US and in Europe (including the UK), their holdings of equities and of debt instruments (bonds and loans) have grown more rapidly than the underlying markets (Chart 10). That does not exactly look like disintermediation.

¹⁶ In a synthetic securitisation, the SPV still issues 'cash' securities to its investors, but rather than investing the proceeds in the credit portfolio, it holds a high-quality liquid asset, which can be a bank deposit. It gains its credit exposure via a credit default swap. In a recent speech, RG Rajan of the IMF attributed the compression in risk premia to a shortage of assets. The growth in demand for synthetic exposures is consistent with that. Rajan, R G (2006), 'Is there a global shortage of fixed assets?' remarks at the G-30 meetings in New York, December 2006.

¹⁷ World broad money is a weighted average of individual country M2 or closest national substitute, using market exchange rates.

¹⁸ Included in the Euro area; partly included in Japan; excluded in the US.

¹⁹ See box on 'Excess global liquidity, asset prices and inflation, Bank of England *Inflation Report*, February 2006, page 5.

How to square this with 'originate and distribute'? Basically, in contrast to the pre-Big Bang world in the UK, today's prevailing business model entails a significant commitment of capital by investment banks. This manifests itself in a wide range of on-balance sheet assets on top of the more traditional bond and equity books held as part of 'market making'. For example, bridge loans are extended to finance Leveraged Buy-Outs prior to more permanent debt instruments being placed via the capital markets. Similarly, there is an intermediate stage between origination and distribution of securitised portfolios, during which they are warehoused on banks' balance sheets. As I just described, *synthetic* securitisations, by contrast, can involve investment banks permanently holding corporate bonds and loans to hedge synthetic short positions, where the risk is transferred elsewhere. And loans against a very wide range of collateral are provided to finance hedge funds²⁰; this effectively amounts to writing deeply out-of-the-money options, where the risk flows back to the financier in adverse states of the world²¹.

So investment banking does use balance sheets, but in non-traditional ways. Beyond that, there is an extra ingredient for the commercial banks. As is apparent from the money numbers, they are very much still in the deposit-gathering business. On top of maintaining their central role in the payments system, this means that, even if operating an 'originate and distribute' model in their investment banking business, commercial banks still have substantial funds to employ in asset portfolios. This can be achieved in a number of ways: for example, holding onto originated assets, buying assets after they have been securitised by other banks, or entering the principal investment business. All three are underway to a greater or lesser degree. In the UK, until quite recently large banks probably held on to more loans than their peer group²². In the US and parts of Continental Europe, the commercial banking sector acquired massive portfolios of securitised assets in the first half of the decade, possibly diversifying sectoral or geographical exposures. And a range of banks have been entering or re-entering the principal investment business.

What to make of all this? Well it certainly underlines the difficulty of using the growth or composition of bank balance sheets as the sole basis for judging credit conditions. With so much credit distributed and traded via capital markets, quantity data have to be put alongside prices (yield spreads) and, ideally, qualitative information. It is in that context that the Bank is planning to introduce a formal survey of credit conditions next year. This important initiative is designed to help us get behind the money and credit data.

A second, rather obvious and by now familiar conclusion is that, in a narrow sense, it may have become more difficult to identify where risk resides, although we should not make too much of that as interest rate, currency and equity risk has been transferred around the financial system via derivatives for almost two decades. For me, it is more interesting that, in big picture terms, many banks have in effect concluded that they are better at, or will be better rewarded for, managing market risk – and its sister, counterparty credit risk – than managing 'buy and hold' credit risk; and that if they are going to hold illiquid assets, they should provide a higher return than bog-standard loans.

This suggests that stability relies on the liquidity of capital markets – primary as well as secondary markets – proving durable under stress. Indeed, contacts suggest that one of their main worries is that something – they don't know what – could cause primary markets to shut for a few months, leaving them holding loans and warehoused portfolios needing to be marked down over quarterly reporting dates. Another theme is reliance on secondary markets to shed complex forms of market risk, especially when it is hard to be confident about the robustness of correlation assumptions incorporated into some pricing models and risk measures. Although there is a spectrum of opinion, many take encouragement from the way the system has weathered a series of shocks in recent years, including lately the Amaranth episode. Its non-energy portfolios were liquidated smoothly; prime brokers largely released the resulting 'excess collateral' in a timely manner; and other parts of the hedge fund industry provided a pool of capital to take on the risk in the natural gas contracts. I would not want to play that down but, inevitably, some caution may be warranted too. Amaranth's ability to build up highly

²⁰ Synthetic financing, via eg Total Return Swaps, does not show on bank/dealer balance sheets beyond any net mark-to-market derivative exposure.

²¹ In really adverse states of the world, collateral values would not cover all of the bank/dealer's exposure, and the net asset value of the hedge fund would have fallen too.

²² 'Private equity: a discussion of risk and regulatory engagement', Financial Services Authority Discussion Paper No. 06/6, November 2006.

concentrated positions in centrally cleared markets was a reminder of some earlier lessons, dating back to the 1987 stock market crash²³, about the detection of large trader positions. More generally, this year's Counterparty Risk Management Group Report, produced by a group of leading practitioners, identified a range of issues for the industry to tackle.

Macro and financial market uncertainty

As will have been apparent, the issues I have been discussing are not really separable. There are, to be clear, a lot of reasons for confidence in monetary and financial stability being sustained. Monetary regimes are much improved. Banks are generally regarded as well capitalised. Innovation has enabled risk to be dispersed more widely, including outside the banking sector. And capital markets are deeper.

Nevertheless, it is a potential concern that, looking forward, financial markets may not be pricing for – which means that investors may not be insuring themselves against – the range of uncertainties that preoccupy the official sector. Maybe the official sector is wrong. Or may be there is an underestimation of risks in the market, perhaps associated with the widely discussed Search for Yield, and possibly also with overconfidence in the capacity of monetary authorities or liquid capital markets to smooth out all shocks.

This poses three questions. Whether the risks will crystallise. Whether, if they were to, any such crystallisation would be orderly or disorderly in financial markets. And whether if asset markets were disorderly, that would feed back into the financial system in ways that both seriously amplified the adjustment and created serious threats to systemic stability.

I fear that the answers are unknowable. But the task for central banks is nevertheless clear enough. Working with our partners in regulatory organisations and in other central banks, we must seek to understand today's global banking system and capital markets well enough to tell the difference, if and when called upon to do so, between a problem requiring solely a macroeconomic policy response and a more complex financial stability problem. And, most important of all, central banks must strive to maintain the medium-term credibility of monetary policy, as an essential pre-condition for the stability in which both the real and financial economy can thrive. Not pretending that the world is simpler or safer than the reality is one small part of that endeavour.

²³ See, for example, the US Brady Report, and the report of the Hong Kong Securities Review Committee, 1987.

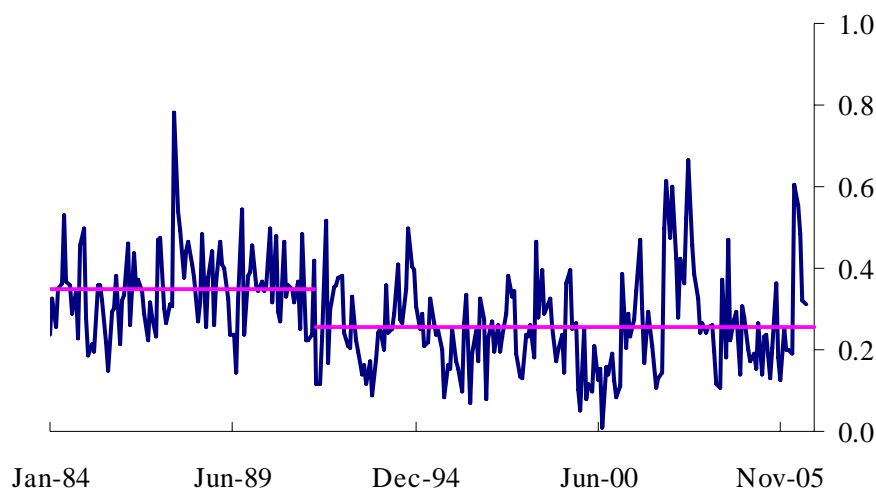
Table 1: Macroeconomic and asset price annual volatility

	1951-59	1960-69	1970-79	1980-91	1992-2005	Percentage change between 60-69 and 92-05	Percentage change between 80-91 and 92-05
UK GDP	1.5	1.6	2.2	2.3	0.9	-41.8	-59
US GDP	3.3	1.7	2.5	2.5	1.1	-36.4	-56
UK Inflation (1)		1.5	5.5	3.4	1.0	-34	-72
US Inflation	1.8	1.2	2.0	2.3	0.5	-55	-76
S&P 500 (2)	14.0	15.7	19.1	12.0	15.2	-3	27
FTSE All Share (2)(3)		20.4	43.3	12.1	15.2	-25	26
10-year UST (2)	3.4	5.4	7.8	15.4	9.6	78	-38
10-year UK gilt (2)(4)		3.1	11.2	7.7	4.9	57	-36
£ ERI (5)			6.9	4.5	2.3		-49
\$ ERI (5)			5.4	4.4	2.9		-34
Yen ERI (5)			9.9	4.3	4.0		-8
€ERI (5)			1.8	3.0	3.0		-3

Notes:

1. UK inflation is consumption deflator inflation; 1960-69 includes 1956-59
2. Nominal returns deflated by consumption deflators.
3. FTSE All Share starts in 1962
4. 1960-69 includes 1956-59
5. Trade weighted real exchange rate indices start in 1975
4. Volatility is calculated as standard deviation of annual growth rates.
5. UST and UK gilts are based on total return indices from Global Financial Database

Chart 1: Average pairwise correlation between historical returns of FTSE 100 constituents



Source: Bank of England

Chart 2: DDM Sensitivity of S&P 500 to a 1pp increase in the risk-free real interest rate

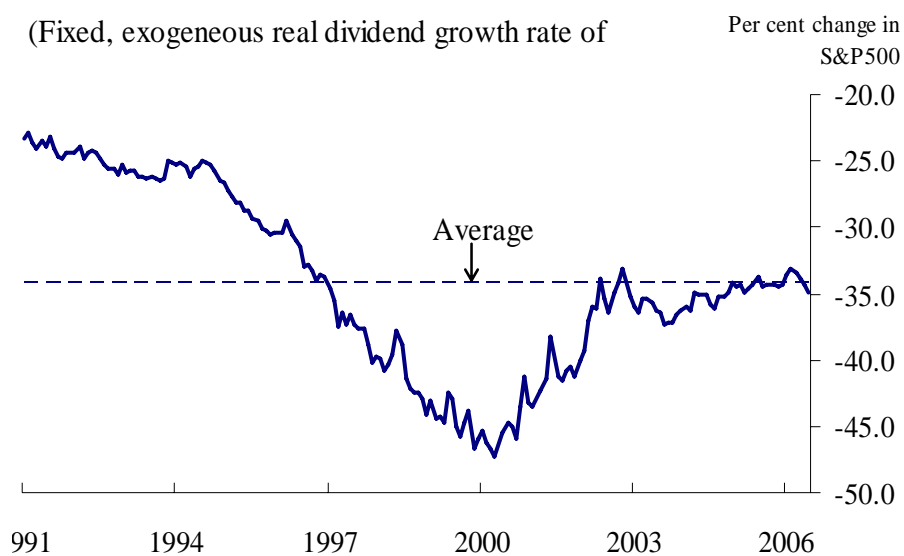
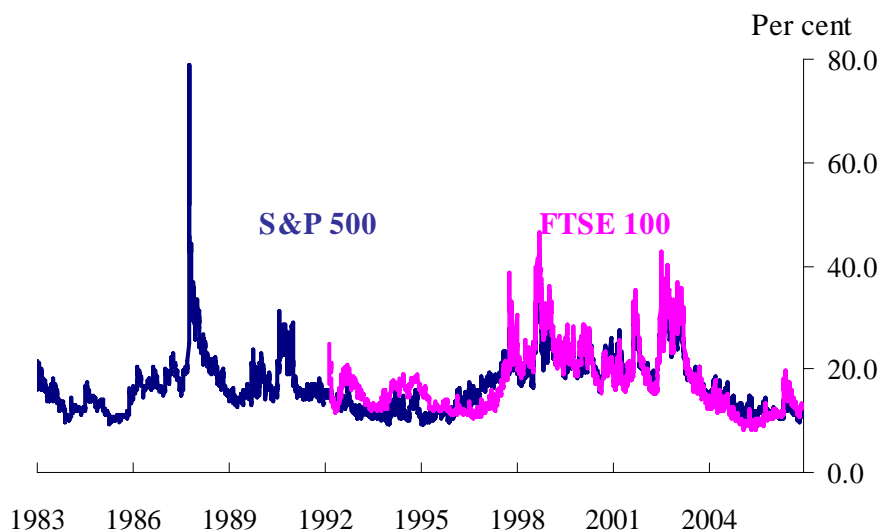


Chart 3: Equity index 3-month option-implied volatility



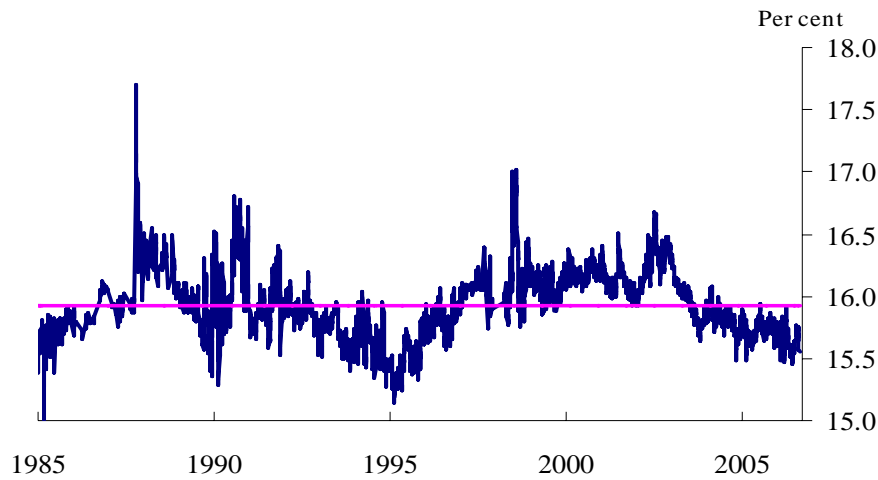
Source: Bank of England

Table 2: Probability masses in financial asset option-implied and historical distributions

<i>Asset</i>	<i>Tail</i>	<i>Option-implied tail</i>	<i>Historical tail</i>	<i>Historical period</i>
USD per GBP	upper (\$ negative)	15	16	1971-2006
JPY per USD	lower (\$ negative)	15	16	1971-2006
USD per EUR	upper (\$ negative)	15	14	1971-2006
SP500	lower	15	11	1931-2006
10-y UST	lower (10y yield negative)	15	10	1960-2006

Source: Bank of England

Chart 4: S&P 500 returns: probability in lower implied pdf tail more than one standard deviation from the mean (3-month horizon)



Source: Bank of England

Chart 5: JPYUSD: probability in lower implied pdf tail more than one standard deviation from the mean (3-month horizon)



Source: Bank of England

Chart 6: Broad money across industrialized countries

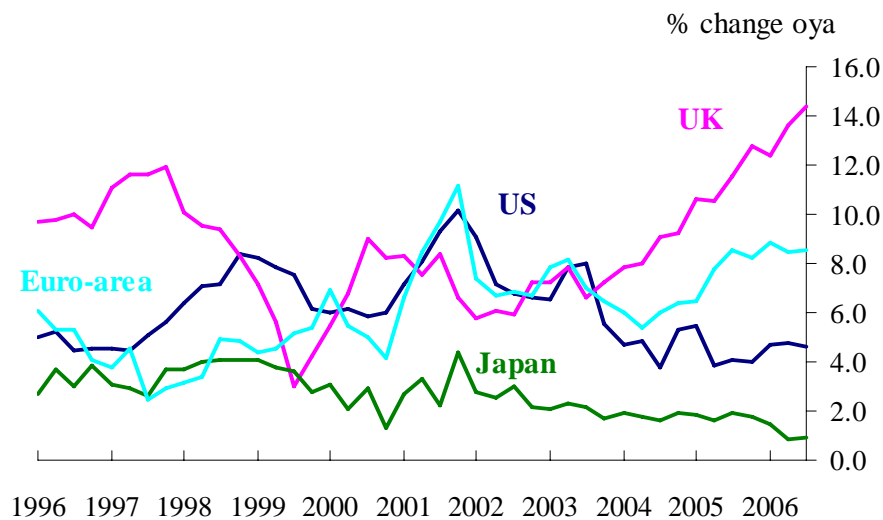


Chart 7: Pension fund and insurance company money holdings as a share of total financial assets

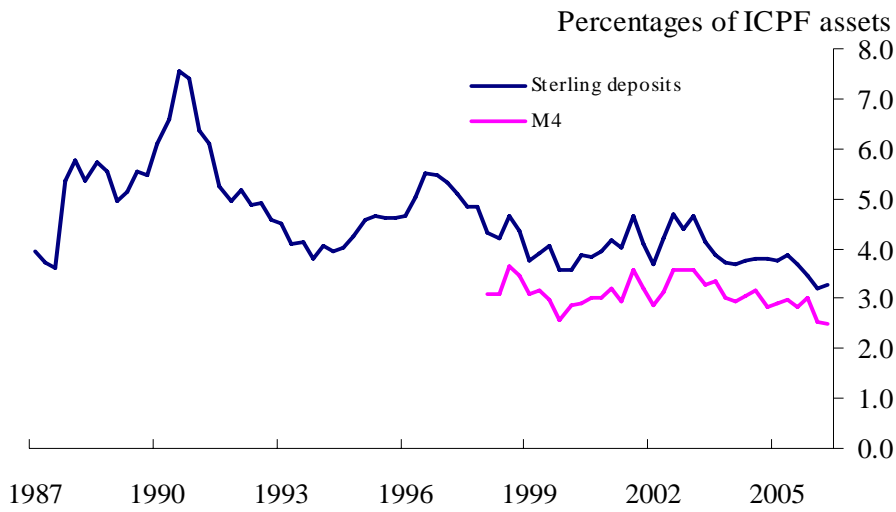


Chart 8: OFC's M4 growth by sub-sector

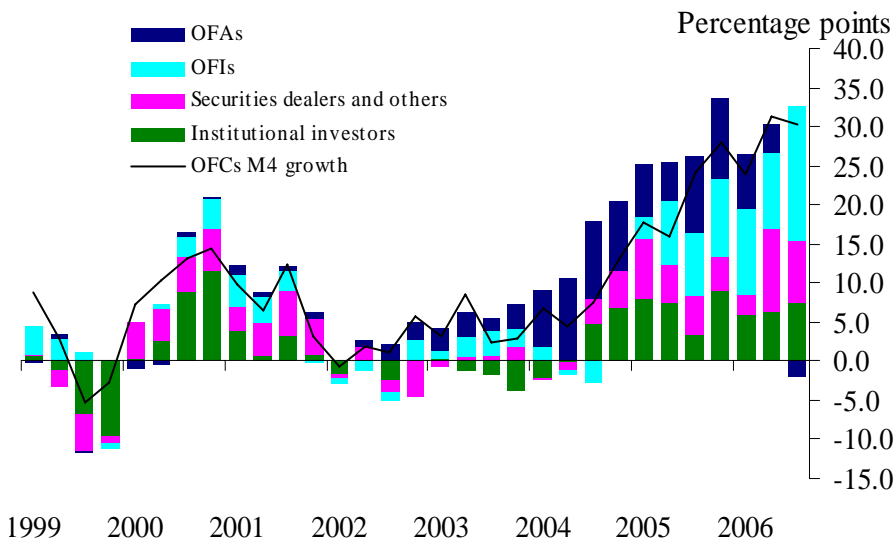


Chart 9: World broad money (M2) growth (individual country M2 (or nearest equivalent) weighted by market exchange rates)

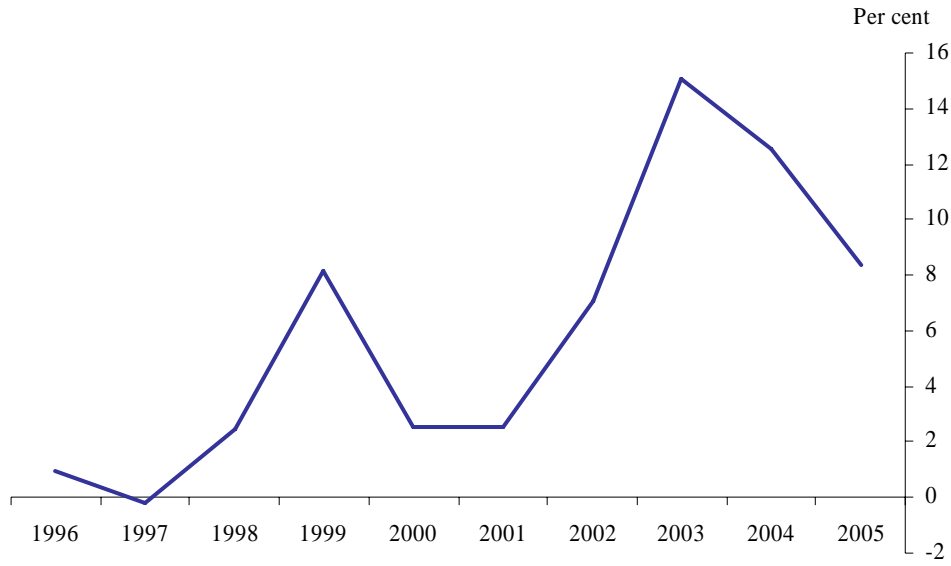
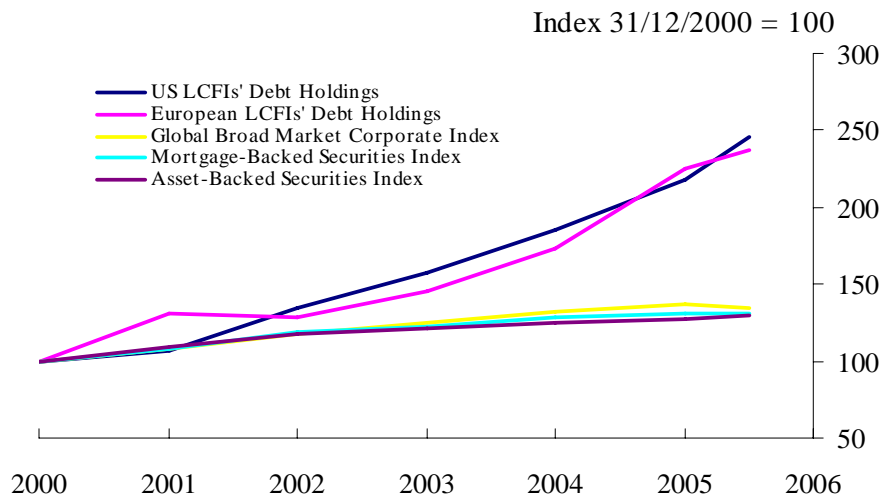


Chart 10: LCFI's debt held for trading versus representative indices



Source: SEC Filings, Published Accounts and Merrill Lynch.

BNP Paribas excluded due to lack of H1 interim data.