David Miles: Monetary policy and financial stability

Speech by Mr David Miles, Member of the Monetary Policy Committee of the Bank of England, at the Bristol Business Forum, Bristol, 14 July 2010.

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Monetary Policy in the UK has never been as expansionary as it is today. Just over 15 months ago the level of Bank Rate was reduced to what is – to all intents and purposes – its floor. As Chart 1 rather starkly shows, this is the lowest level to which Bank Rate has fallen since the Bank of England was established at the end of the seventeenth century. Bank Rate has not been changed for 16 consecutive meetings of the MPC. That is not so unusual. In fact, as the Chart reveals, between 1720 and 1820 Bank Rate did not move from 5%. Had a Monetary Policy Committee then met each month, as it does now, it would have decided at 1200 consecutive meetings not to change the level of interest rates. So it is far from unusual for the interest rate set by the Bank to remain constant for over a year. And for much of the period since rates fell to the floor, policy has been actively changed – asset purchases have built up to now stand at around £200 billion.

Chart 1

Bank rate from 1694
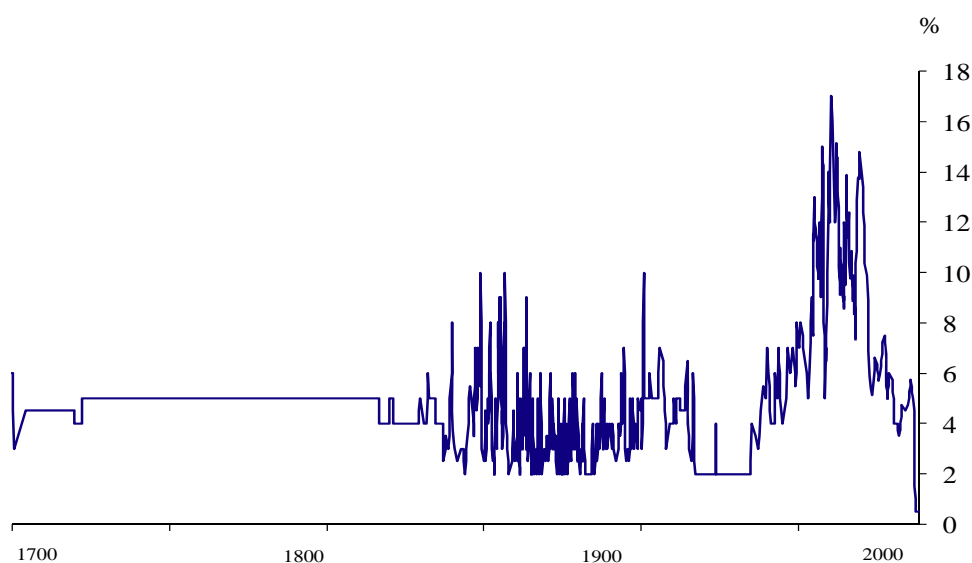
So it is the level to which interest rates have fallen that is unprecedented. I believe it has been right to loosen aggressively the stance of monetary policy because of the scale of the deflationary and recessionary forces unleashed by the remarkably rapid downturn that followed the crisis in the banking sector. This crisis intensified dramatically in the autumn of 2008 when the banking system came close to total collapse. That would have been an outcome comparable in its impact to the failure of the system for electricity supply. Many now argue that monetary policy should be set in a different way so as to reduce the chances of this sort of banking crisis. That is one of the issues I want to discuss today. The argument that the aims of monetary policy need to be broadened beyond a focus on inflation is one

that deserves to be taken seriously because the damage done by extreme financial instability is great. If there were no tools better suited to help preserve financial stability than varying interest rates then the case for broadening the goals of monetary policy would be strong. But I believe there are tools better suited to make the financial system more robust and I want to consider one of them – capital requirements – and how they might in future interact with monetary policy.

More immediately, problems and fragilities in the banking sector remain and pose risks that the recovery in demand and activity we have seen across Europe – including in the UK – falters. But in the UK we have also seen CPI inflation rise to a level that is significantly above the inflation target. In recent months CPI inflation has begun to fall, but remains well above the 2% target level and that makes setting monetary policy difficult. We continue to face the problem of balancing risks: risks that inflation of 1.0pp–1.5pp above target lasts long enough to become ingrained in expectations and affect behaviour so that it is hard to bring down, versus risks that the recovery in output becomes weaker and then disappears, leaving inflation pressures lower than is consistent with the target further ahead.

Since the financial crisis towards the end of 2008 economic policy has been unusually hard to manage. Both monetary and fiscal policy have been exceptionally expansionary. There has been an extremely large fiscal deficit. Fiscal policy is now being tightened. I look forward to the day when it will be appropriate to tighten monetary policy since a return to more normal levels of interest rates would be a welcome sign that economic conditions were also more normal. But I do not think that is where we are today.

So since I joined the MPC just over a year ago I have not voted to increase interest rates – despite the fact that inflation has more often than not been above the target. But even though price rises over the past year have been running at relatively high levels, the underlying domestic inflationary pressures are not strong. Wage rises – despite a move up in household inflation expectations – remain low. Without a pick up in wage inflation I find it hard to think it at all likely that inflation being significantly above target is sustainable. Of course wage pressures may build significantly over the next year or so, though I do not believe this is the most likely outcome. And risks of an extended period of low growth – which would further weaken those pressures – are real.

In talking about the possibility of an extended period of low, or no, growth I may sound blasé about inflation risks. But the point about risks is that more than one can exist. There are risks that inflation stays well above the target level; there are also risks that demand in the economy falls even more below supply capacity so that inflation further ahead drifts below the target. In considering how to balance these risks there is a need to look through short run and potentially transitory factors. Reacting to today's inflation rate (which reflects where the level of prices is now relative to 12 months ago), rather than where inflation will be looking ahead, is *not* the right thing to do. The inflation rate can move a lot in a short period. Inflation was barely 1% less than a year ago.

But this is a difficult situation to have to deal with. I dislike clichés so will resist the temptation to talk about the ship having being blown near to the rocks and now having to steer a difficult course in treacherous waters with rather out of date maps that have not been updated since no-one expected we would be in such a place. But it is a temptation since it is not a bad analogy.

How we came to be in this difficult situation is something on which many books have already been written. At the heart of the problems has been a banking system which proved catastrophically fragile. That fragility reflected the fact that many banks had come to have very high leverage – a lot of debt relative to capital – which made them vulnerable to concerns about losses on their assets.

This poses a big and obvious question: how do we reduce the fragility of the banking system in a way that does not come at too high price – a price may come in the form of a lower level of overall economic activity? And should we change the goal of monetary policy to include a wider range of objectives that include maintaining the stability of the banking sector?
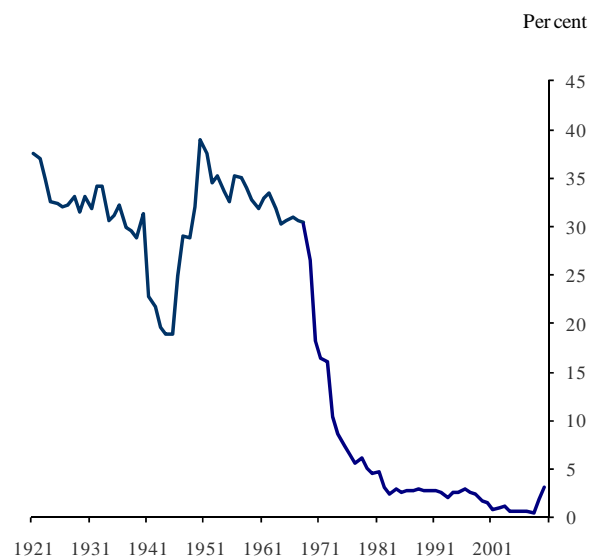
Why were banks so fragile?

On the eve of the crisis we had come to be in a situation where the capital of UK banks, relative to their assets, was around half the level that was typical fifty years earlier and probably around one third the level that was usual one hundred years ago (Chart 2). In the US the decline in bank capital over the past one hundred years is quite probably even larger.

<table>
<tr><td style="text-align:center">Chart 2

Capital levels relative to total holdings for UK banks</td><td style="text-align:center">Chart 3

Liquidity ratio of the UK banking sector</td></tr>
</table>
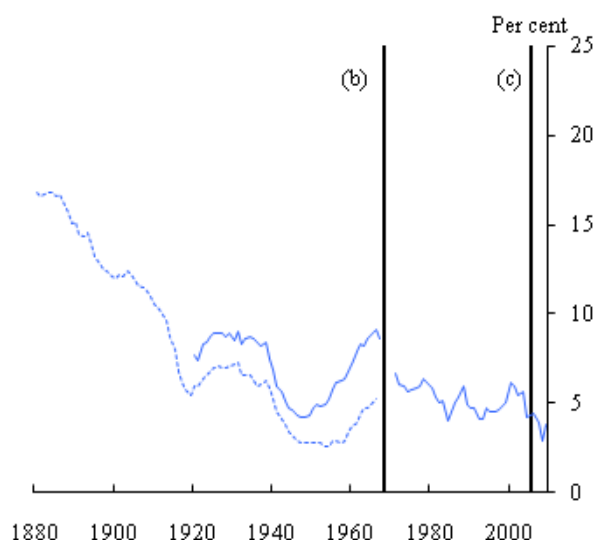
Sources: United Kingdom: Sheppard, D (1971), The growth and role of UK financial institutions 1880–1962, Methuen, London; Billings, M and Capie, F (2007), "Capital in British banking", 1920–1970, Business History, Vol 49(2), pages 139–162; BBA, published accounts and Bank calculations. (a) US data show equity as a percentage of assets (ratio of aggregate dollar value of bank book equity to aggregate dollar value of bank book assets). (b) UK data on the capital ratio show equity and reserves over total assets on a time-varying sample of banks, representing the majority of the UK banking system, in terms of assets. Prior to 1970 published accounts understated the true level of banks' capital because they did not include hidden reserves. The solid line adjusts for this. 2009 observation is from H1. (c) Change in UK accounting standards. (d) International Financial Reporting Standards (IFRS) were adopted for the end-2005 accounts. The end-2004 accounts were also restated on an IFRS basis. The switch from UK GAAP to IFRS reduced the capital ratio of the UK banks in the sample by approximately 1 percentage point in 2004.

Sources: Bank of England, Financial Stability Report June 2009 and "The British Economy, Key Statistics 1900–1970", published for the London & Cambridge Economic Service. From 1968 the liquidity ratio is: Cash + Bank of England balances + money at call + eligible bills + UK gilts as a percentage of banks' total asset holdings. Prior to 1968 the ratio is calculated as the liquid assets of the London Clearing Banks as a percentage of gross deposits, as defined in "The British Economy, Key Statistics 1900–1970".

Furthermore, in recent years the quality of banks' capital deteriorated as banks exploited the availability of new hybrid capital instruments which often had the tax advantages of debt. In practice hybrid capital did not absorb banks' losses despite being treated for regulatory purposes as if it was like equity.

The liquidity of banks, as measured by the ratio of their most liquid assets (central bank reserves, gilts and Treasury bills) relative to total assets, was a fraction of what had been

normal twenty years earlier and a tiny fraction of what had been normal before the 1970's (Chart 3). And banks had also become larger. Their assets, relative to the size of the economy, had grown very sharply. Relative to GDP, they had roughly doubled in the 10 years up to 2007 (Chart 4).

The UK banking sector had low capital, illiquid assets and was very large when fears about the value of its assets increased. The combination of those things accounts for the scale of the damage that ensued.

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Chart 4

**UK monetary and financial institutions,
assets as % of nominal GDP**
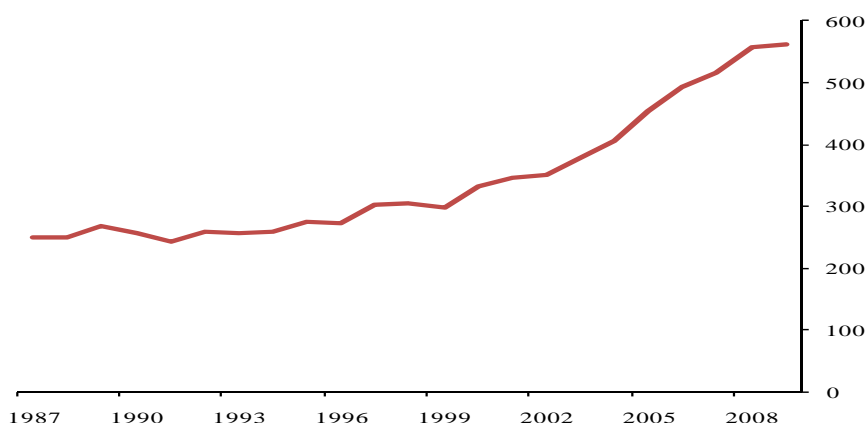
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Note: Monetary and financial institutions do not include insurance companies, pension funds and other financial intermediaries.

Source: Bank of England, Monetary and Financial Statistics.

There are many different proposals to build a more robust banking sector. Some of these involve using conventional monetary policy, that is interest rates. But most proposals are about changes to the way banks do business. These range from those requiring banks to hold somewhat higher capital and liquidity ratios to much stricter capital and liquidity requirements; but they also include more fundamental changes to the financial architecture that would preclude banks from undertaking many types of business. It may seem inappropriate to present these alternative proposals on a continuous spectrum. Some are about altering balance sheet structure (capital and liquidity requirements) and others focus on limits on the activities banks can pursue. But in practice I think many of the proposals can be seen to lie on a continuous spectrum. This is because stopping a bank from undertaking an activity and insisting that it be (in the limit) completely equity financed are quite close. One can think of a bank as an entity that finances its acquisition of assets with substantial use of debt finance. By setting capital standards on a type of business high enough one prevents it being financed with much debt; that comes close to making it an activity banks cannot do.

Amongst the most radical proposals for creating a less fragile financial structure are those of Laurence Kotlikoff[1]. The Kotlikoff proposal is – in essence – to turn the funding of the vast majority of what are now assets on bank balance sheets (largely loans) into equity claims. This could be seen as equivalent to imposing 100% capital ratios. It would mean that banks

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[1] Kotlikoff, L. (2010) "Jimmy Stuart is Dead: Ending the World's Ongoing Financial Plague with Limited Purpose Banking", Wiley Press.

would, to the extent they continued to hold the loans that they make, be more like unit trusts with an origination arm rather than banks.

So many – in fact almost all – of the proposals to make banks less fragile will mean they would come to hold more equity capital. I think this is right. And I believe it is the most fundamental response to banking fragility because it directly deals with solvency problems – risks that people who have lent money don't get it back. I believe that those risks – real or perceived – have been the fundamental drivers of the financial disasters of the past few years. Other problems, which are sometimes described as funding or liquidity problems, often arise because of fears about solvency.

I do not want to imply that other measures to make the financial sector more stable – including liquidity requirements and changes to the way asset values are assessed and reported – are not important. But I want to consider whether changes in capital are a powerful tool to make the banking sector robust and whether it is right to see them, rather than monetary policy, as a more natural means to that end.

Some are sceptical that higher capital requirements can work because banks may be able to avoid (or evade) them. If capital requirements are increased significantly, but only on some activities, banks may re-classify assets to switch their business into forms where the capital requirements are no higher than today. To me that is an argument for thinking about very substantial rises in required bank capital pretty much across the full range of their activities. Of course if this is very costly it will create two problems: it would create big incentives to avoid them and potentially big costs to the wider economy, because of the impact on the price and availability of bank loans.

Two issues are important. First, the scale of the impact on bank funding costs from higher capital requirements. Higher funding costs would push up on the cost of bank loans to households and non-financial companies and affect lending and investment, which in turn could require a monetary policy response; those costs will also affect the incentives to avoid (or evade) capital requirements. The second issue is how much more robust the financial sector, and banks in particular, become with different amounts of extra capital.

Several estimates of the cost of higher bank capital exist. The Institute for International Finance (IIF) suggest that proposed regulatory reform which could be part of the Basle III system could reduce the path of average annual GDP growth in the US, euro area and Japan by 0.3pp for the next ten years[2]. This implies that the level of GDP would ultimately be around 3% lower. If we use a real discount rate of 2.5% a year, the present value of a permanent fall in output of 3% is in excess of 100% of current annual GDP. This is at the high end of estimates of the cost of higher capital requirements. Recent analysis by economists from the National Institute of Economic and Social Research (NIESR), commissioned by the FSA, puts the present value of the costs of permanently raising capital requirements by 1% at approximately 2.7% of current GDP[3]. And illustrative estimates in the most recent Bank of England Financial Stability Report (FSR) indicate, under certain conservative assumptions, that the long run costs could amount to 4% of current annual

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[2] "Interim Report on the Cumulative Impact on the Global Economy of Proposed Changes in Banking Regulatory Framework", Institute for International Finance, 2010. The report assumes: a three-fold increase in the risk weights assigned to trading book assets; a 2pp increase in the minimum Tier 1 and overall regulatory capital ratios, to 6% and 10%, respectively, to take place at the end of 2012; capital redefinition effects including exclusion of minority interest from Tier 1; higher holdings of liquid assets as a result of the minimum Liquidity Coverage Ratio being increased; a greater reliance on longer-term over short-term wholesale funding, as a result of the Net Stable Funding Ratio at 100%.

[3] See Barrell, R, Davis, E, Fic, T, Holland, D, Kirby, S, and Liadze, I (2009), "Optimal regulation of bank capital and liquidity: how to calibrate new international standards", FSA Occasional Paper 38. The paper indicates that a 1% rise in capital requirements could reduce output by 0.08% of GDP in the long run. Discounted at a rate of 3% this would imply a 2.7% reduction in current GDP.

GDP in present value terms, though it also finds that the GDP benefits from increasing capital requirements from their current level substantially outweigh these costs[4].

The NIESR and FSR estimates look much lower than the IIF figure. But the IIF estimate is for the impact of a range of adjustments which include a more than 1% rise in bank capital. Nonetheless that estimate looks likely to be higher than the illustrative calculation in the FSR. But rather than seeing the FSR calculations as generating a very low estimate of the cost of higher capital requirements, I think they are more likely to be a conservative assessment that reflects the care taken not to underestimate the cost of higher bank capital.

The costs of extra bank capital

Many assessments from commentators and practitioners, though often not precisely quantified, suggest that the costs of significantly higher capital requirements for banks are very substantial. I am rather sceptical about the claims that substantially higher capital requirements must mean significantly higher costs of funds for those who borrow to invest and that total investment and output in the economy will be significantly lower.

There are two reasons for my scepticism.

First, a simple historical point. In the UK and in the USA economic performance was not obviously far worse when banks held very much higher levels of capital. Investment – relative to GDP – was not lower. This is prime facie evidence that much higher levels of bank capital do not cripple development, and the financing of investment. Conversely, there is little evidence that investment or the average (or potential) growth rate of the UK economy picked up as spreads on bank lending narrowed over the past decade, and the volume of bank credit expanded sharply (Chart 5).

Chart 5

UK GDP growth
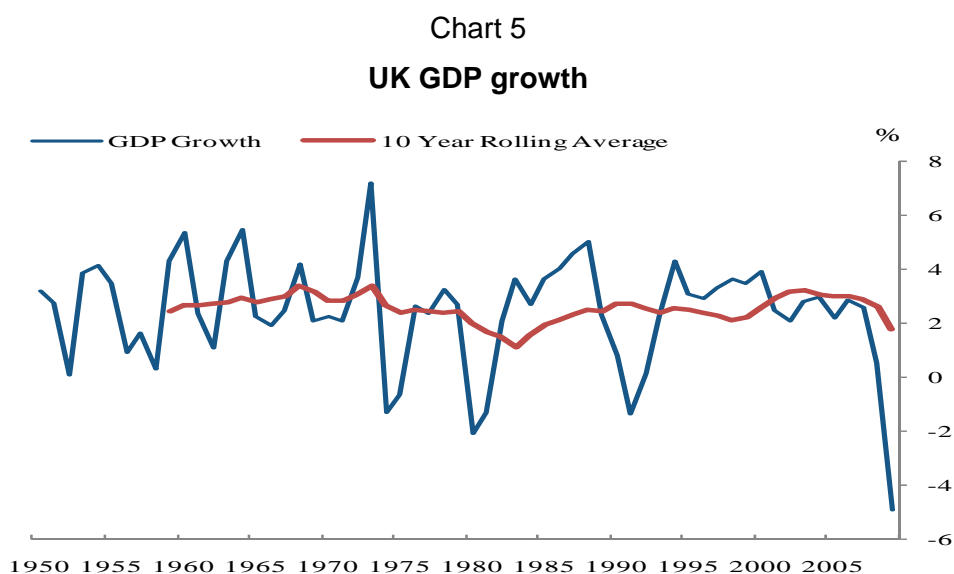
Source: Bank of England, Monetary and Financial Statistics.

Second, the most straightforward and logically consistent model of the *overall* impact of higher equity capital (and less debt) on the total cost of finance of a company implies that the effect is zero. The Modigliani Miller (MM) theorem implies that as more equity capital is

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4   See Box 7 in chapter 5 of Bank of England, Financial Stability Report, June 2010. The 4% cost is for a 1% rise in banks' capital as a proportion of risk-weighted assets.

raised the volatility of the return on that equity falls, and the safety of the debt rises, so that the required rate of return on both sources of funds falls. It does so in such a way that the weighted average cost of finance is unchanged[5]. It is absolutely NOT self-evident that requiring banks to hold more capital has to substantially increase their costs and must mean that they need to charge substantially more on loans to service the providers of their funds.

There are certainly reasons why the Modigliani Miller result is unlikely to hold exactly. The Modigliani-Miller theorem may not hold for banks because of asymmetric information problems in financial markets. But I will argue that one of the most obvious reasons why it does not hold (differential tax treatment of debt and equity) need not imply that there is a wider economic cost to be paid for higher capital requirements on banks.

Indeed, recent research suggests that the Modigliani-Miller theorem might not be a bad approximation even for banks. Kashyap et al find that the long-run steady state impact on bank loan rates from increases in external equity finance is modest, in the range of 25–45 basis points for a ten percentage point increase in capital requirements[6]. They also find that the costs of capital requirements are greater if they are phased in very quickly.

I want to briefly describe some ways of trying to calibrate the costs and benefits of higher capital requirements – which do not assume the MM theorem holds. The method I use follows that outlined in the recent Bank of England FSR[7]. The methodology followed in the FSR seems to me very sensible. The idea is to calculate the impact of a given change in equity capital – that is an equity for debt swap – on a typical bank's cost of funding. I assume, as in the FSR, the higher cost of bank funding is passed on in the form of a higher cost of bank loans. To assess what effect that has on the wider economy we then make an educated guess at the effect of a rise in the cost of bank loans on the overall required return on investment. That in turn will affect the stock of capital and economic activity. This impact on economic activity is the cost of higher capital requirements.

The illustrative estimates in the FSR indicate that conservative assumptions about effects of higher bank capital on the costs of bank funding and lending generate a marginal cost of about 4% of annual GDP, in present value terms, for a 1% of risk-weighted assets rise in capital. The FSR notes that by relaxing these assumptions the cost may be lower, so that the estimates are probably an upper bound[8].

The starting point for my calculations is the case presented in the FSR. This is that the cost of a 1% rise in banks' capital relative to their risk weighted assets would reduce annual GDP by about 0.1%. At a discount rate of 2.5% this implies that the present value of this loss in output over all future periods is 4.25% of current annual GDP[9]. I illustrate that less conservative assumptions imply a much smaller estimated cost of higher bank capital requirements. Specifically, I sequentially take account of:

[5]   See Modigliani, F.; Miller, M. (1958). "The Cost of Capital, Corporation Finance and the Theory of Investment". American Economic Review 48 (3): 261–297.

[6]   See Kashyap, K., Stein, J. and Hanson, S. "An Analysis of the Impact of "Substantially Heightened" Capital Requirements on Large Financial Institutions", Working Paper.

[7]   See in particular box 7 in chapter 5 of Bank of England, Financial Stability Report, June 2010.

[8]   In particular, it notes that the costs may be over-estimated because the calculations assume that the Modigliani-Miller theorem does not hold and because they use a Cobb-Douglas production function to compute the reaction of output to changes in firms' cost of capital.

[9]   Underlying these calculations are assumptions that the cost of equity and debt are 10% and 5% respectively and remain fixed. Our baseline calculations are similar, but slightly higher than those in the June 2010 Financial Stability Report.

1.   the possibility that if a bank has more equity capital the return on equity is less variable lowering the required rate of return. (This is a partial allowance for the mechanism underlying the Modigliani-Miller result.)

2.   the likelihood that the extra tax revenue that accrues to the government as banks are forced to switch to equity that is less favourably treated is used to offset any resultant rise in the cost of finance for companies using bank debt. (For example the government could use the extra revenue to increase capital allowances so that the negative impact on investment from a higher cost of bank debt is neutralised.)

3.   the likelihood that the relative importance of bank funding for investment is lower than the baseline conservative estimate that banks account for 1/3 of private, non-financial companies (PNFCs) external finance.

4.   the likelihood that the sensitivity of investment and the capital stock to a rise in the cost of funds to non-financial firms is lower than the value assumed in the baseline (where an assumption of a unit elasticity of substitution between capital and labour is used).

Suppose we first allow the cost of equity to fall as more capital reduces its volatility. I only allow for a partial offset relative to what the Modigliani Miller theorem implies – in fact I assume the offset is only 30% as great, which means that the weighted average cost of cost of capital rises by 70% of the baseline[10]. Making this adjustment reduces the estimated present value of the cost of permanently higher bank capital by about 1% of annual GDP – from just over 4% to 3%.

The major part of this remaining cost reflects that fact that we assume that all interest paid by banks on debt they raise is tax deductible at the corporation tax rate (of 28%) while equity capital has to earn the required rate of return out of post tax profits. But in thinking about the wider economic impact of a switch to less tax sheltered funding for banks we need to take account of the extra revenue generated for the government. The government could use the extra tax revenue it gets from banks to shelter the users of bank loans from any knock on impact on their cost of raising finance. This seems a natural assumption to make. And it would mean that we should reduce the estimated negative impact on economic activity. When we allow for this the cost – in terms of the lost output of a permanent change to bank capital of +1% of assets – almost halves from just over 3% of annual GDP to about 1.7%

Next I allow for less than 30% of investment in the economy to be financed by bank lending. PNFCs' liabilities with banks are made up of direct loans from banks', but also banks' holding of corporate bonds and equities, issued by PNFCs. I assume that only PNFCs' bank loans are affected by the increase in banks' funding costs. Chart 5 illustrates that over the past year the share of bank loans in PNFCs financial liabilities has declined from close to 20% to close to its average over the past two decades of 16%.

Allowing for this halves again the estimated cost of higher bank capital – which falls from around 1.7% to 0.8% of annual GDP. This estimate is based on the impact of higher cost of bank lending feeding through to a (Cobb-Douglas) production function, and that implies a high sensitivity of investment to the cost of funds (a unit elasticity of substitution between capital and labour). Bank of England research[11] suggests that this elasticity is probably substantially lower. If that elasticity is 0.4, which looks a central estimate, then the cost of higher bank capital (of 1% of assets) falls from 0.8% of GDP to around 0.3%. Table 1 shows the estimated costs of higher bank capital under various assumptions about the economic environment.
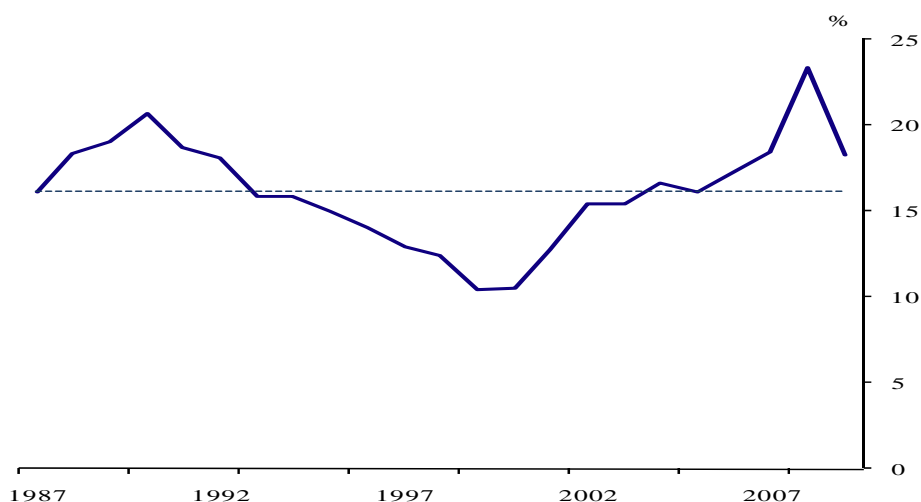
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[10]   This means that the required return on equity falls from 10% to 8.9%.

[11]   See Barnes et al (2008) "The elasticity of substitution: evidence from a UK firm-level data set", Bank of England Working Paper. No. 348.

Chart 6

Share of MFIs in UK PNFCs financial liabilities[12]

Note: Monetary and Financial Institutions do not include insurance companies, pension funds and other financial intermediaries. Here, PNFCs financial liabilities are measured at current market value. This measure excludes PNFCs financial liabilities secured on dwellings which are predominately liabilities with MFIs and account for around 1% of PNFCs total financial liabilities.

Source: Office for National Statistics, UK Economic Accounts.

Table 1

The costs of higher capital requirements

|	Benefits	Costs	Required Marginal Probability	Extra Months in the Average Gap between Crises from 25 years
	present value, % of GDP	present value, % of GDP	of 1% rise in risk weighted capital ratio	
(1) Baseline	55%	4.25	0.077%	5.9
(2) 30% Modigliani-Miller effect	55%	3.25	0.059%	4.5
(3) Tax offset	55%	1.67	0.030%	2.3
(4) More Substitutes to Bank Finance	55%	0.80	0.015%	1.1
(5) Less Sensitive Investment	55%	0.32	0.006%	0.4
Temporary Impact on GDP from Crises	20%	0.32	0.016%	1.2

How do these costs measure against the benefits of a more robust banking sector and a lower frequency of banking crises? I will make the same assumptions as in the FSR, namely that if a bank crisis occurs the initial impact is to reduce output by 10% of GDP. That is almost exactly the amount by which UK GDP is now below the level it would have reached had it continued on the trajectory it was on up to 2007. I assume that three quarters of this reduction lasts for just five years, but that the other 2.5% of lost GDP is gone forever. Under these assumptions, and using the same discount rate of 2.5%, the present value of reducing

the likelihood of a systematic crisis in any one year by one percentage point is around 55% of current annual GDP. If we instead assumed that there are no permanent effects on GDP from financial crises the benefits of reducing the chance of a crisis happening in a year are lower at around 20% of GDP (Table 1, column 2).

The third column in the table shows by how much the chances of a banking crisis would need to fall given a rise in capital of 1% of bank assets so that the benefits of that would match the estimated cost. (Whereas before both benefit and cost are expressed as the present value of lost or gained GDP.) This is the reduction in the probability of a banking crisis required to justify a 1% increase in banks' risk-weighted capital – given the assumptions made on tax, Modigliani Miller offsets and so on corresponding to that row in the Table. Chart 7 illustrates this calculation for multiples of a 1% increase in banks' capital.

For example, on the least favourable assumptions about the cost of extra bank capital (corresponding to row 1 in the table) the Chart shows that a 10% increase in banks' capital ratios would require a minimum reduction in the probability of financial crises of 0.8 (the red line) for it to pass a cost-benefit test. If we assume that financial crises would otherwise occur once in every 25 years (an annual frequency of 4%) then a rise in banks capital by 10 of risk-weighted assets would be justified if it reduced the probability of financial crises so that they occurred with an annual probability of 3.2%, or once every 31 years. Alternatively, taking the most favourable assumptions on cost (full tax offsets, partial Modigliani Miller offsets, a lower use of bank debt and lower sensitivity of investment spending) the blue line indicates a 10% rise in capital relative to assets would be justified if it reduced the probability of financial crises from 4% a year to 3.9%, or from once every 25 years to once every 25.4 years. (The final column in the table shows that calculation for each case). Such a small decline in the likelihood of a financial crisis would not appear to be overly ambitious for such a sharp rise in the capital ratio. For typical banks the capital ratio starts out from a level under 10%, so that a rise in capital of 10% of risk assets is more than a doubling in the amount of bank capital.

Chart 7

**Banks capital and the break-even impact
on probability of financial crises**
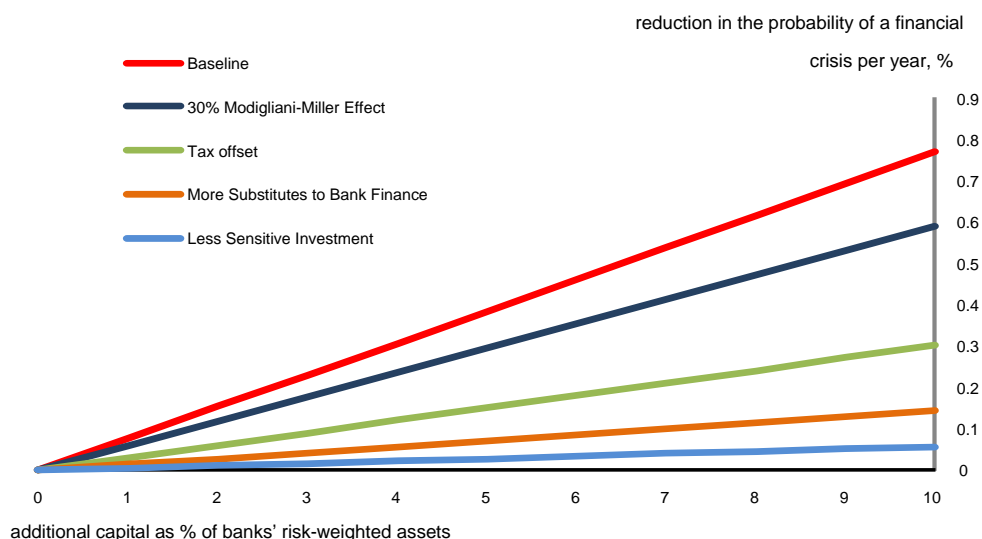
That said, initial increases in banks' capital will probably have a much more pronounced impact on the likelihood of financial crises than successive increases. For example, a 5 percentage point increase in banks capital from 15% to 20% would likely have considerably less impact on the probability of banks' failing than raising capital from 10% to 15%. So it is

important to consider the rate at which the marginal benefits of banks holding more capital will diminish. The June 2010 *Financial Stability Report* provides illustrative estimates that indicate the benefits of additional capital fall to close to zero once a threshold of around 15% of risk-weighted assets is reached.

It is difficult to predict the likely volatility of banks' assets values and the probability of extreme events that could lead to a financial crisis. A natural starting point is to assume that the shocks hitting the economy and banks' asset values follow a normal distribution. However, a distribution with "fatter tails" would imply a greater likelihood of extreme events and hence potentially larger benefits from higher capital requirements.

It seems pretty unlikely to me that the distribution of risks that affects banks follows a normal distribution. A much better way to match the distribution of risks that end up affecting GDP is to assume that most of the time risks – or shocks – follow a normal distribution but that once every few decades a shock comes that is very large. The frequency of such large shocks is very much greater than would be implied by an estimated normal distribution that most of the time matches the GDP data well. This assumption is one made by Robert Barro in a series of important studies of rare events that hit economies[12].

A few years ago I calibrated a version of the Barro model so as to match historical experience[13]. I used a very large sample of countries and data going back some 200 years. Using data on the annual change in GDP for this sample of countries gave over 4000 observations of historical economic growth. The best fit of the data I could find – and it did fit the data extremely well (Chart 8 see below) – implied that 95% of the time the shock to annual GDP was well behaved and came from a normal distribution with a fairly small volatility (a standard deviation of about 3%).

About once every 20 years, on average, a shock came along which could be either very good or very bad; it either increased or decreased GDP by around 12%. Much less frequently there came a very much larger – and always negative – hit to GDP. On average this very bad shock came along about once a century; reducing GDP by over 30%. In this type of model first developed by Barro, the shocks to GDP are permanent and so could be expected to affect asset values by comparable magnitudes. So once we allow for rare – but very big – shocks that do not follow a normal distribution then there will be larger benefits from banks having much more capital. And without allowing for such shocks it is not possible to explain the historical variability of economic activity across countries.

In summary, even taking a conservative view of the cost of extra bank capital the net benefits of stricter capital requirements are potentially large. But relaxing these conservative assumptions implies the costs of higher capital requirements are likely to be much lower. Furthermore, the benefits of capital requirements are likely to be considerable, especially if one does not assume that the shocks to economic output and banks' asset values follow a normal distribution.

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[12] See for example "Rare Disasters and Asset Markets in the Twentieth Century" by Robert Barro, *Quarterly Journal of Economics,* 2006, 121, no. 3.

[13] "What should equities and bonds be worth in a risky world", by David Miles, Vladimir Pillonca and Melanie Baker, Morgan Stanley research paper, September 2005.

Chart 8

**Annual GDP growth:
Comparing the economic model with actual data (1821–2001)**
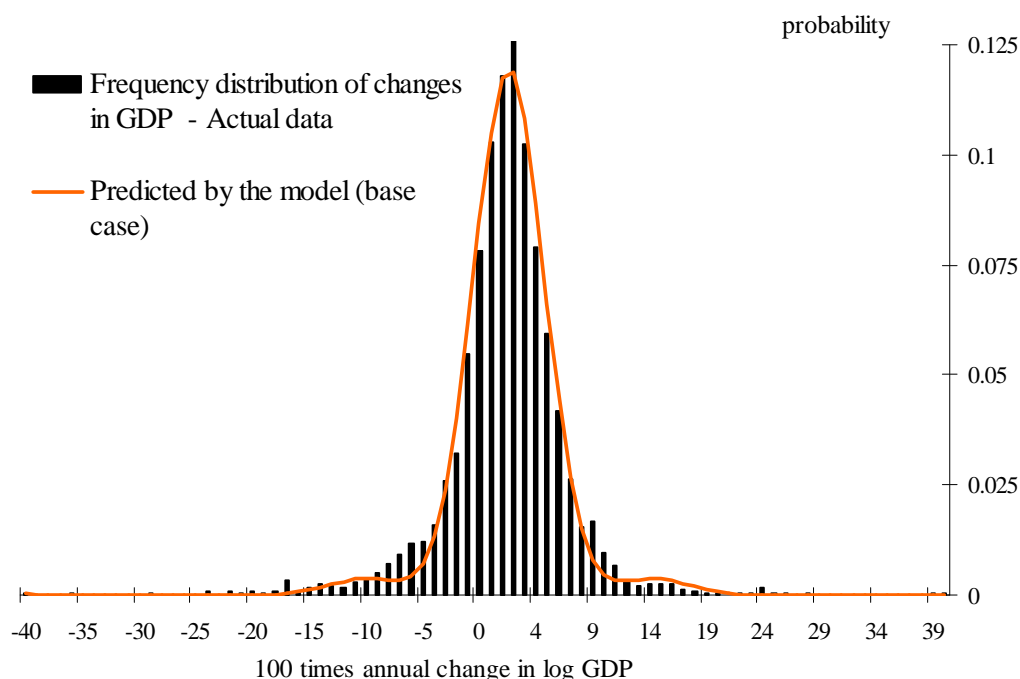
The implications for monetary policy

I conclude from this that there are likely to be substantial benefits in having banks hold much more capital. Under plausible assumptions that would have a relatively low impact on the overall cost of debt in the economy but a big impact on the robustness of the banking system. In all the calculations described above I have been focussing on steady states and looking at the long run impacts of banks coming to have much more capital. I think those results mean that it would be desirable that banks come to hold much more capital. It is conceivable that raising large amounts of additional capital in a short period may be more costly. So the transition to higher levels of capital should probably be relatively long.

Clearly more stringent capital requirements on banks will be part of any new regulatory framework. I believe that moving capital requirements on banks is a very useful tool to work alongside monetary policy in achieving a stable economic environment. But there are other tools such as time-varying liquidity standards or limits on loan-to-value ratios on secured lending that could be used to limit the growth of credit over the cycle. However, it is not my role as a member of the MPC to comment on the exact design of macro-prudential instruments.

But I do believe there is a strong case for having monetary policy tools – which for most of the time means the level of interest rates – set to achieve stability in nominal conditions; which means that they are focused on inflation. Using the interest rate as a tool to maintain the stability of the banking system strikes me as a strange assignment of policy tools to targets. Changes in interest rates have an uncertain impact on financial stability; often it would be unclear in which direction to move interest rates to help make the banking sector more robust. But in the UK changes in interest rates have a powerful – and relatively predictable – impact on the wider economy.

In contrast capital requirements may have a powerful and relatively clear impact on bank robustness and an uncertain – but quite likely relatively small – impact on the wider

economy. So it seems to me natural to use interest rates as the active tool to affect the balance between demand and supply in the economy – and so control inflation pressures – and use capital requirements to maintain stability in the banking sector. Regulating bank capital is a natural means for achieving a stable financial system because it directly affects the fragility of the banking sector.

If banks do come to hold much more capital this would make the job of setting monetary policy easier. It would do so by reducing the chances of banking crises. We have had to live with the effects of such a crisis over the past few years; they have included great variability in output and unusual (by the standards of the previous ten years) volatility in inflation. But it is a non sequitur that because monetary policy would be much more effective if banking crises were much less common then monetary policy is the right tool to make the financial system more robust. Capital requirements are a better means to that end.