TIGHTER FINANCIAL REGULATION AND ITS IMPACT ON GLOBAL GROWTH

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The financial crisis that started in mid-2007 enveloped the world economy and caused a serious recession in most OECD countries. It is widely believed that it has also left a scar on potential output because it will have raised perceptions of risk and hence reduced the sustainable capital stock people wish to hold. It is inevitable that policymakers should ask what can be done to reduce the chances of this happening again, and it is equally inevitable that the banks would answer that it is too costly to do anything. There are four questions one must answer before it is possible to undertake a cost–benefit analysis of bank regulation. The first involves asking what are the costs of financial crises? The second involves asking what are the costs of financial regulation? The third involves asking what causes crises? The fourth, and perhaps the most important, involves asking whether regulators can do anything to reduce the risk of crises? Our overall approach to these issues is spelled out in a report written for the FSA in the aftermath of the crisis (see Barrell *et al.*, 2009).

In this note we discuss the short and long-run consequences of tighter regulation and also throw some light on recent BIS proposals for 'Countercylical Capital Buffers'. We first look at our answer to the other three questions. We also briefly discuss the current state of financial markets in Europe and the 91 major banks going through a stress test.

The causes and consequences of financial crises

The literature on the causes of financial crises is extensive, and we have contributed to it in a number of ways. In Barrell, Davis, Karim and Liadze (2010)[1] we showed for the first time that regulatory factors affected crisis probabilities in a significant way, and that the inclusion of unweighted capital and liquidity ratios, along with lagged effects from rising real house prices, were preferred to the normal variables from previous studies (mainly of emerging markets) which included credit growth, monetary policy indicators, real interest rates, inflation and government deficits. In OECD countries these factors do not affect the probability of a financial crisis happening. In subsequent papers we have shown that including the current account deficit (Barrell, Davis, Karim and Liadze (2010a) and an indicator of off-balance sheet activity (Barrell, Davis, Karim and Liadze (2010b) improves our ability to predict crises. These results are invariant to using a narrower definition of liquidity or including the crises in 2007 and 2008 in our sample. Our robust results suggest that stronger defences through higher capital and liquidity standards significantly reduce the probability of crises, and hence policymakers have tools available to them, and there is a case for using those tools.

A great deal has also been written on the costs of crises, and the National Institute has made two recent contributions. We have set the exploration of the costs of crises in the context of the determinants of productivity, and have factored out other influences. There are articles such as Cerra and Saxena (2008) that do not do this but instead use time-series methods to look at the long-run effects of a variety of crises in a variety of places. They conclude that financial crises in the OECD have had a negative impact on output. Although on average this is clearly the case, as Cecchetti, Kohler and Upper (2009) also show, not all crises have a negative impact, and some may even have had a significant positive impact on long-run sustainable output. This latter paper suggests that of 40 systemic crises in the past few decades nine have had significant permanent negative effects on output.

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Barrell, Davis, Karim and Liadze (2010c) look at the drivers of output per person hour in thirteen OECD countries in a panel context, and they include R&D, FDI, and other indicators of technology as well as financial crises. They show that the majority of financial crises since 1980 have had no impact on the equilibrium level of output, although the average impact of crises on output is around –2 to –3 per cent, which is not out of line with the estimate in Cerra and Saxena (2008). Barrell, Davis, Karim and Liadze (2010c) show that it is not possible to impose a common long-run output effect from crises, but some crises do have a significant long-run impact. Systemic crises are different, with three of the four in the sample showing significant and negative effects on productivity. The scale of these significant estimated effects ranges from –4 per cent in the US in the 1980s and Japan in the 1990s to –10 per cent in Finland in the early 1990s. Although Sweden had a systemic crisis at the same time it does not show up in the long-run determinants of productivity, which may reflect changes in the political and institutional structure that increased the scope of the market in the economy. These changes may in turn be the consequence of the crisis.

Barrell, Holland and Liadze (2010) look at a different sample and a longer data period which includes the financial crisis in the UK in the mid 1970s. In a cointegrating regression of the factors affecting productivity that crisis shows up as producing a permanent scar. However, this result disappears when the model is estimated in a panel with common factors as the financial crisis approximately coincides with the oil crisis. This had a similar effect on productivity across all OECD countries, and the step down in the UK is reflected in similar movements in countries that did not have a financial crisis at this time. Hence we would conclude that no financial crisis in the UK since 1900 has had a permanent effect on the sustainable level of output. However, we gauge that the recent crisis is one which has had a permanent effect both in the UK and elsewhere. It is worth seeing if we can act to prevent such crises.

The costs of tighter financial regulation

Policy should be set by balancing the costs of action against the benefits of action. If the average crisis reduces sustainable output by 2½ per cent, then the expected costs of crises are high. The expected benefits from regulation are the reduction in the probability of a crisis multiplied by its costs. The costs of regulation are the net present discounted value of its impact on output or welfare. The short-run impacts may differ from the long-run impacts, and they may be larger on impact than once markets have adjusted. Proposals for regulatory change should be evaluated in the light of their expected benefits evaluated over a long period of time. Regulations need to be chosen to maximise the impact on probabilities whilst minimising the impact on output.

The obvious first step for the regulators would be to raise capital and liquidity standards to get crisis probabilities down to an acceptable level. Barrell, Davis, Karim and Liadze (2010d) calculate that if capital and liquidity standards had been around 4 percentage points of total assets higher over the past fifteen years we might well have avoided the sub-prime crises, although the Spanish and perhaps French banking systems may still have been under stress at present. It is important therefore to ask what impact higher capital standards would have on output. Barrell *et al.* (2009) suggested that an optimal response to the recent crisis would have involved raising capital and liquidity by 3 percentage points, and we look at that proposal below.

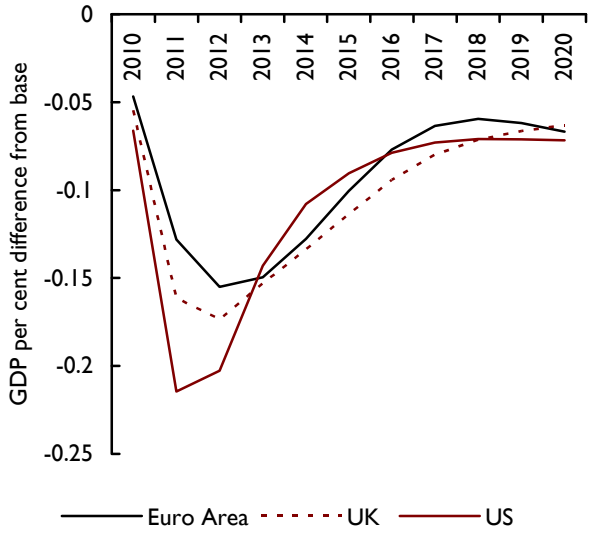
There are a number of approaches to calculating the costs of tighter regulation, varying from a careful study of balance sheets, as in Elliott (2010) to econometric work as in Barrell *et al.* (2009). All involve looking at the effects of increasing the share of liabilities in equity (and assets in liquid form) on the cost structure of banks. In Barrell *et al.* (2009) we suggested that excess cost of equity capital as compared to deposits was about 11 percentage points, and that increases in capital ratios would be reflected in a wider spread between deposit and lending rates in banks. As a result the average cost of loans would rise by 11 basis points for every unit increase in regulatory capital. After calculating an offset for the impact of lower risks on equity costs, Elliot (2010) suggests the increase would be around 8 basis points.

Barrell *et al.* (2009) also look for a role for liquidity holdings in the margin between borrowing and lending rates in banks. They find that marginal increases in liquidity holdings in US banks could raise costs by up to 500 basis points for every 1 percentage point increase in liquid asset ratios. Hence a 1 point increase in required liquidity would raise the lending margin by 5 basis points in the US. The marginal cost would be noticeably lower in the UK and Europe as banks there generally hold much less liquidity, and hence have to shed less high yielding assets to hold more liquidity. We would

judge that a 1 percentage point increase in required liquid asset holding would raise the spread betweeen borrowing and lending rates by 1.5 basis points in Europe. The impact of these increases in borrowing costs depends upon how investment is financed and upon the impact of lower equilibrium investment (and higher saving) on the risk-free real interest rate.

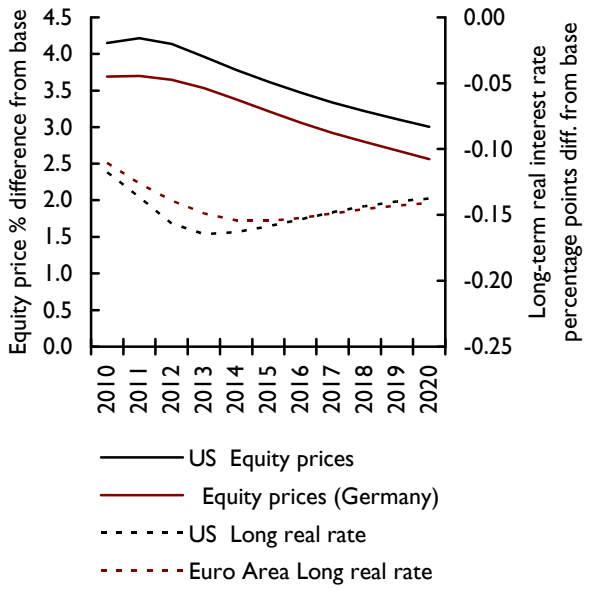
It is possible to assess the impact of a 3 percentage point increase in capital and liquidity in Europe and North America using our global macro model NiGEM. We have models of 24 members of the EU as well as the US, Canada, Mexico, Japan, China and a number of other countries. In the fifteen largest EU countries as well as in North America (and elsewhere) we have a fully spelled out supply side of the economy where the equilibrium capital stock depends upon the user cost of capital. This in turn depends on the shares of finance from equities and from borrowing, and these differ across countries. An increase in bank borrowing costs will be reflected in the user cost both directly and through its effects on bond market borrowing costs. Barrell *et al.* (2009) show that in normal times the spreads in these two markets move together. This is in part because firms will arbitrage between these markets until the marginal (shadow) cost of borrowing is equalised. The spread between borrowing and lending rates facing consumers is also modelled on NiGEM, and an increase in this spread will reduce consumption in all countries, whether or not the personal sector is a net debtor or net creditor, as is discussed in Barrell and Holland (2007).

Figure 1. Impacts on GDP of a 3 percentage point increase in capital and liquidity standards



Source: NiGEM simulation

Figure 2.Impacts on real interest rates and equity pries of a 3 percentage point increase in capital and liquidity standards



In order to evaluate the effects of a 3 percentage point rise in capital and liquidity standards, we raise these spreads by 400 basis points in Europe and 500 basis points in the US (to reflect the higher marginal cost of liquidity there). We assume financial markets are forward looking, and firms invest in relation to expected output levels and the user cost of capital. Consumers react to their incomes and their housing and financial wealth, and governments change taxes to achieve their deficit targets in the long run. The long-run real (equilibrium) interest rate is determined by the global savings and investment balance and the long-run equilibrium affects long real rates now with forward looking financial markets. The monetary authorities are assumed to target inflation using the short-term interest rate. Long rates are the forward convolution of expected future short rates.

In Barrell *et al.* (2009) we undertook an analysis of a 3 percentage point increase in capital and liquidity in the UK alone, and showed that for every one point increase sustainable output would fall by 0.1 per cent. As we can see from figure 1, the same regulatory change

introduced in a number of countries together has much less impact on sustainable output. The UK is a small open economy, and when it acts alone the change in regulation does not change the global saving and investment balance. When all OECD countries act together the initial impact is to lower investment and raise saving. Real interest rates fall as a result. As equity markets reflect the discounted value of future profits and the discount rate has fallen, equity prices rise and the cost of equity finance falls. These two effects offset about two thirds of the output costs we identified when the UK acted alone. Figure 2 plots the paths for long-term interest rates and real equity prices in this scenario. As we operate with a model with no restrictions on capital movements, the changes in real interest rates and in equity prices are approximately the same in all locations.

It would appear that the costs of tighter regulation are in the long run small, and as the costs of crises are potentially high tighter regulation would be wise. There are caveats to make. Moving too rapidly to a tighter standard would be inadvisable, as it could induce a major slowdown in activity, only some of which is visible in figure 1. Barrell *et al*. (2009) show that UK banks react progressively more to falls in their headroom, the excess amount of capital they hold above their regulatory floor. As headroom gets close to zero lending margins facing firms rise sharply to ration credit. A rapid increase in regulatory capital would reduce headroom noticeably and could induce a new banking crisis. The Bank of England (2010) shows that capital ratios have risen noticeably since the crisis in 2007, but that increase has been more marked in the UK than in continental Europe. Hence over-rapid regulatory changes could worsen the situation of an already fragile banking system, and start a second (or third) financial crisis in these countries.

Countercyclical capital buffers

The BIS has recently advocated the introduction of credit related countercyclical buffers. As we show above, these will have costs. It is not apparent that they will have benefits. In the sequence of papers by Barrell, Davis, Karim and Liadze (2010; 2010a, b) cited above on the causes of crises, we show that financial crises are driven by property market bubbles, current account deficits and the growth of off-balance sheet activity. In no case is there a role for credit growth directly. Of course this could be a driver of the house price bubbles that Rheinhart and Rogoff (2009) also identify as precursors of crises, but evidence has to be presented to show this is the case.

It is widely believed that excessive lending leads to excessive house price growth, but it is not clear that this is the case, as table 1 suggests. We have undertaken simple Granger causality tests of the relationship between real house price growth and real credit growth in a number of countries, and it appears that in some cases house price growth 'causes' credit growth, whilst in others credit growth 'causes' real house prices. In Germany and Sweden there is clear evidence that credit growth causes house price growth. The former has not however experienced a housing market bubble, whilst the Swedish correlation reflects events in the 1980s and 1990s. There is also evidence that credit growth 'causes' house price growth, albeit with a two-year or more lag in France and the US.

In countries with liberalised financial markets and forward looking asset markets we might expect house prices to cause credit growth. If perceptions of future incomes change, for instance because politicians tell people income growth will be stronger in future, then house prices may rise. Given transactions continue all the time, the increased price will require increased credit to finance purchases. House prices then cause credit. Only when individuals are constrained in the amount they can borrow would we expect to see credit cause house prices, especially when the credit constraints are relaxed. This is indeed the pattern we observe in table 1. This would suggest that countercyclical buffers will have little impact on housing market bubbles and hence will not reduce the probability of financial crises.

House price bubbles may be related to changes in lending standards, and hence it may be wise to introduce quantitative controls on the loan to value ratio (LTV). These may be hard to enforce unless one can deal with second mortgage markets by removing recourse from second loans. Upper limits can be made self reinforcing, as in Germany where mortgages cannot be securitised (a very mature market) if they exceed an LTV of 90 per cent. This may be one of the reasons why in 2006 the average LTV in Germany was 72 per cent as against 80 per cent in the UK and typically 78 per cent in the US. The former did not have a housing bubble whilst the latter two did. However, it is hard to find a role for LTV ratios in econometric models of house prices because of the paucity of data, and hence relying on this alone for regulation may not be good evidence-based policy.

Table 1 Granger Causality tests on growth in real house prices and personal sector real borrowing

	Personal debt →Property prices: null hypothesis: no Granger Causality F-stat (probability)				Property prices→Personal debt: null hypothesis: no Granger Causality F-stat (probability)			
	1lag	2 lags	3 lags	4 lags	1lag	2 lags	3 lags	4 lags
Belgium	0	0.73	0.68	0.87	0.07	2.15	1.29	1.02
	(0.99)	(0.49)	(0.57)	(0.49)	(0.8)	(0.13)	(0.3)	(0.41)
Canada	1.61	1.65	1.39	0.79	**4.35**	3.32	2.54	**3.88**
	(0.21)	(0.21)	(0.27)	(0.54)	**(0.04)**	(0.05)	(0.08)	**(0.01)**
Denmark	**6.97**	3.4	2.3	2.0	0.19	0.17	1.19	0.57
	(0.01)	(0.05)	(0.1)	(0.13)	(0.67)	(0.84)	(0.33)	(0.69)
Finland	1.03	0.21	0.65	1.08	0.2	1.87	2.53	**3.29**
	(0.32)	(0.81)	(0.59)	(0.4)	(0.66)	(0.18)	(0.09)	**(0.04)**
France	2.55	1.81	**3.99**	**3.04**	1.08	1.81	1.3	0.47
	(0.12)	(0.18)	**(0.02)**	**(0.04)**	(0.31)	(0.18)	(0.29)	(0.76)
Germany	**8.53**	**8.79**	**4.59**	**3.24**	0.4	0.16	0.08	0.66
	(0.01)	**(0.0)**	**(0.01)**	**(0.03)**	(0.53)	(0.85)	(0.97)	(0.62)
Italy	0.0	1.38	0.88	1.02	**11.51**	**7.43**	1.79	0.89
	(0.97)	(0.27)	(0.46)	(0.42)	**(0.0)**	**(0.0)**	(0.18)	(0.48)
Japan	3.7	2.89	0.93	1.07	0.71	**5.12**	1.0	**3.03**
	(0.06)	(0.07)	(0.44)	(0.39)	(0.41)	**(0.01)**	(0.41)	**(0.04)**
Netherlands	0.3	0.33	0.53	0.56	0.28	0.62	1.6	1.45
	(0.59)	(0.72)	(0.67)	(0.7)	(0.6)	(0.55)	(0.21)	(0.25)
Sweden	**14.38**	**8.5**	**5.35**	**4.03**	0.48	0.51	0.4	0.12
	(0.0)	**(0.0)**	**(0.0)**	**(0.01)**	(0.49)	(0.6)	(0.75)	(0.97)
Spain	0.31	2.2	1.56	1.31	1.49	2.36	1.41	0.99
	(0.58)	(0.13)	(0.22)	(0.29)	(0.23)	(0.11)	(0.26)	(0.43)
UK	0.32	0.76	0.37	0.38	0.07	0.28	0.5	0.77
	(0.58)	(0.47)	(0.78)	(0.82)	(0.8)	(0.76)	(0.68)	(0.55)
USA	1.72	2.96	**4.26**	2.89	0.0	1.14	1.66	1.32
	(0.2)	(0.07)	**(0.02)**	(0.05)	(0.99)	(0.33)	(0.2)	(0.3)

Note: 95% significance effects in bold type.

Stresses in Europe

In its April 2010 *Financial Stability Report* the IMF reduced its estimate of losses in the global banking system to $2.3 trillion, and suggested that about one third of those losses were yet to be made public, with the majority of the unexposed bad assets being held in European banks. Losses on this scale could remove a good proportion of the equity base of those banks, and they are therefore likely to result in higher lending margins. It was clear in April that those losses would need to be taken on board by central banks and governments if they wished to remove the credit rationing and margin increases that would be necessary to produce the required reserve rebuilding by banks. Since the April Report the focus of the regulators has shifted to problems with sovereign debt in Europe.

The stress test undertaken in July by the Committee of European Bank Supervisors (CEBS) of 91 banks revealed some of the problems this may have caused. Twenty-seven Spanish, six Greek and four Portuguese banks were included. However there are also major stresses in French and German banks, not all of which have become apparent. However, the stress test probably revealed the majority of the hidden losses referred to by the IMF. It was also able to make clear that capital issues and government recapitalisations had made good most of these losses in bank equity.

In recent years banks in the Euro Area have built up large holdings of Euro Area governments debts. These assets were liquid and had no apparent currency risk, and for a long period after 2002 they attracted similar interest rates whichever sovereign they were issued by. They seemed good substitutes for each other, but recent movements in sovereign spreads over German government long rates have shown they are not. Bank of England calculations suggest that the German banking system holds up to three times its equity base in Euro

Area government debt with about a tenth of that in Greek, Spanish, Irish and Portuguese governments' debt (Bank of England, *Financial Stability Report*, June 2010). Exposure to Greece alone represents 10 per cent of bank equity capital in that country. The French banking system's exposure is only marginally lower at more than two and a half times its equity base held in Euro Area sovereign debt, with the amount held in debt from the same four countries being as large as a quarter of its equity base. The UK, Italian and Spanish banking system are less exposed to sovereign debt, and especially less to foreign sovereign debt. The stress test included relatively stringent potential losses on these sovereign debts. The chance of an Argentinian-style default, even in Greece, is extremely low. A rescheduling that involves a 23 per cent write-down in the value of Greek debt is the worst it is wise to assume. Putting a potential write-down of 10 per cent in German government debt was stringent.

The recently produced stress test on European banks has gone some way to allaying fears about solvency risks. Of the 91 banks tested seven failed, with five savings banks in Spain and one bank each in Germany and Greece. Another twelve were marginal, again with six in Spain and two in Germany. Most of Spain's problems were in the savings bank system. The core commercial banking system was sound and this is more important for long-term economic health. Parts of the stress test were stringent, and others were not, but at least they may have identified where some of the problems may exist. The probability of the stress scenario, at a one in twenty event probability, was more stringent than that in the US in 2009, which had a one in fifteen event probability. However, the application by domestic supervisors may have been patchy.

Conclusion

The financial crisis that overtook the World Economy in 2007 and 2008 made it clear that banks were holding too little equity for the risks they were taking, and that some countries such as the UK had allowed liquid asset holdings to drop to unsafe levels. There is a strong case for raising required equity and liquidity ratios by 3 per cent of the unweighted assets of the OECD banking system. This would reduce the probability of crisis and would have a limited effect on growth. However, there is more that could be done. House price bubbles are commonly associated with crises and it would be wise to flatten these bubbles with different regulations on lending and on transactions. However, there is limited evidence that reducing credit growth will impact on house price bubbles. Indeed it is probably more common for housing market bubbles to cause lending growth than the other way round. European banks have been raising equity in the past two years, either from the state or from the market, and this might be why the majority passed the recent stress tests. US banks have also raised equity and hence an increase in requirement may have less impact on lending costs than we currently project as the equity that will be needed is already in place.

NOTE

[1] An earlier write-up appeared in Barrell *et al.* (2009).

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