

Central Bank Evolution: Lessons learnt from the Sub-prime Crisis

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Some Background History

The global financial system that had been developing in the decades up until 1914 was shattered by the two World Wars and the inter-war crisis. The reliance on exchange controls over international capital movements by countries with weak Balance of Payments after WWII further segmented banking systems into separate national silos, especially in Europe. Thus banking in France, West Germany, Spain, etc., was then done primarily, almost solely, by respectively French, German, Spanish, etc., banks. With (almost) all banking done by their own national banks, each country could develop its own national arrangements and traditions of regulation and supervision.

In such a fragmented, nationally-based context, regulation and supervision could, and did, develop separately in each country along lines that depended on the idiosyncrasies of that country's own history, institutional developments and thinking. Thus banking supervision was done within Central Banks in some countries, but in specialised supervisory institutions in others, with a variety of links to the Central Bank. Given the restricted nature of banking, especially in those countries with direct controls on bank lending, there was little need for much direct supervision; in the UK, the Bank of England undertook limited supervision through the Discount Office, staffed by the Principal with a handful of more junior officials, and this sufficed well enough until the Fringe Bank crisis of 1973/74. There were few bank failures and no bank crises between 1945 and the 1970s.

This separate development of national banking systems in Europe led to differing approaches towards the interactions between Central Banks and their respective commercial banks in the provision of liquidity support, and thus in the definition and requirements for holdings of liquid assets. Prior to the 1970s official controls over liquid assets ratios (and cash ratios) were regarded as more important than capital ratios and requirements. But, just as with differing treatment of

liquidity, Central Banks, and separate supervisory institutions, also developed separate definitions, and preferred norms, for the capital funds that they would prefer their own banks to maintain.

The country where the banks had the greatest exposure abroad was the United States. It was then, after WWII, by far the economically most powerful nation, with the largest number of multinational companies. When abroad these companies naturally looked to their own US bank(s) for help with trade finance and other forms of financial support. Having benefited economically from being the arsenal of the West in WWII (and then again with Cold War rearmament and the Korean War), the US felt no need for exchange controls in the post-war period. So large, reputable European companies, faced with financing constraints in their own country, could borrow in dollars from US banks and swap the funds into domestic currency for use at home. Such capital inflows were generally welcomed.

The Cold War had, meanwhile, been a major factor in the genesis of the euro-dollar market. Institutions of various kinds from Communist countries which earned dollars, for example from trade, did not want to place these with US banks, particularly when sited in the US, for fear that they might be blocked, should the Cold War flare up. So they began depositing such dollars with European banks, especially in London, and a market for such euro-dollar deposits sprang up there, encouraged by the Bank of England which was keen to see a revival of London's entrepot trade in foreign currencies. So long as sterling did not flow out, such entrepot trade was free of exchange controls.

The central role of the euro-dollar, or more generally the euro-currency, market was given a strong further impetus by the shock quadrupling of oil prices following the (fourth) Arab-Israeli war in October 1973 and the formation of OPEC. The oil producing countries received huge inflows of dollars, which initially they had no means of using domestically. So they placed these, in dollar form, primarily with the largest banks, and mostly in the euro-dollar market.

In particular, the growth of the Euromarkets, with large volumes of such deposits being channelled through the branches and subsidiaries of foreign banks in host countries (especially, but not only, in London), led directly on to the question of what were the relative responsibilities of the home, and host, authorities respectively for the solvency and liquidity of such foreign banks. This question was deemed sufficiently important to engage the direct interest of politicians, in the guise of a meeting

of G6 Finance Ministers, together with their Central Bank governors, in France in September 1974.

The French Minister, M. Fourcade, then,

‘went somewhat further in his Press Conference than had been anticipated, and gave the impression that the G10 Central Bank Governors *would* be making an announcement at their subsequent Basel meeting, on the following two days, of measures to monitor and support the euro-markets. So, the Governors found themselves under intense pressure to come up with some form of words to that general effect.’ (See Goodhart, 2011, p. 38.)

The communique that the G10 Govenors then agreed reads as follows:-

‘At their regular meeting in Basle on 9th September, the Central-Bank Governors from the countries of the Group of Ten and Switzerland discussed the working of the international banking system. They took stock of the existing mechanisms for supervision and regulation and noted recent improvements made in these fields in a number of major countries.

They agreed to intensify the exchange of information between central banks on the activities of banks operating in international markets and, where appropriate, to tighten further the regulations governing foreign exchange positions.

The Governors also had an exchange of views on the problem of the lender of last resort in the Euro-markets. They recognized that it would not be practical to lay down in advance detailed rules and procedures for the provision of temporary liquidity. But they were satisfied that means are available for that purpose and will be used if and when necessary.’ (BIS Press Communique, 10 September 1974: Also see Goodhart, *ibid*, 2011, page 39.)

So such national separation broke down in the early 1970s under the influence of:-

- i. the growth of the euro-dollar international wholesale financial market;
- ii. the arrival in Europe, especially in London, of cross-border (primarily US) banks;
- iii. the imbalances resulting from the oil shock; and
- iv. the growing porosity of exchange control barriers.

This led to a shift of financial regulation to the newly (1975) established Basel Committee on Banking Supervision (BCBS). In some ways this title is a misnomer, since the BCBS has remained throughout the main centre for the promulgation of banking regulation, whereas such international supervision

as has been done (as contrasted with national supervision) has been done heretofore by the IMF; though from 2014 onwards the ECB will also be acting as a supervisory body in the Eurozone.

There then, post 1975, followed decades of increasing financial liberalisation, especially in lending to persons, in the shape of credit and loans, mortgages offered to a wider range of potential borrowers (e.g. sub-prime), automobile loans, student loans, etc., etc. As Lord Turner has noted (2010) banks were lending relatively much less to industry, where the bigger firms were now looking more to capital markets for finance, and were now intermediating primarily between borrowing and lending individuals. Meanwhile, this financial liberalisation was causing the growth rate of (bank) credit to be significantly greater than that of bank deposits (Schularick and Taylor, 2009, and Jorda, Schularick and Taylor, 2012). In the previous century before about 1970, indeed as far back as the data enable one to go, bank credit expansion and bank deposit expansion had risen hand in hand. Over the next 35 years they diverged, with bank credit growing considerably faster than bank deposits. This was facilitated both by the process of securitisation and by increasing resort to wholesale funding, plus the associated rapid expansion in shadow banking.

Such developments were partly driven by regulatory arbitrage, and this worried the regulators. In particular, securitisation was intentionally shifting the best private sector assets out of the banks, and leaving such banks with the worst quality private sector assets. Basel I appeared to be having the effect of turning 'good' banks into 'bad' banks, and that was unacceptable. This was the background context in which work on Basel II got under way towards the end of the 1990s.

The other main feature of the time, the mid to late 1990s, was that the analysis of risk (and of potential return), especially by commercial banks, was becoming far more quantitative, i.e. based on mathematical models, and hence supposedly more 'scientific' than before. The key innovation in the field of risk measurement was the development, by Harry Markowitz in 1952, of portfolio analysis that led on to the Value at Risk (VaR) metric. So, when the officials at the BCBS turned to the assessment of Market Risk in the mid-1990s, and circulated a draft paper based on their prior system of separate risk buckets, they were told, correctly, by the banks to whom they had circulated their Working Papers that their analytical procedure was old-hat and deficient. The regulatory officials accepted this criticism, and rushed to catch up on their model-building analytical technique, setting up modelling sub-committees, etc. But the private sector could hire more, better-trained 'quants', and the regulatory community became 'cognitively captured' in the sense that it was not

only prepared, but actually keen, to use techniques and methods for risk assessment developed by the industry for regulatory purposes.

This was a mistake. This is not because the techniques and measurements developed by the private sector were consciously biased and self-serving, but because they were developed for different purposes. The objective of the VaR metric was to tell top management how risky its own portfolio was currently. And almost all the time (risk/return) conditions are (log) normal. But financial returns exhibit fat-tails (excess kurtosis) and downwards skew. So VaR, based on an assumption of normality, is a poor measure of extreme risk. This is of less consequence to the bank manager, since in major crises the authorities will have to respond with policy measures, but the effect of such crises should, of course, be central to the concern of the relevant authorities. Historically based measures of VaR are not so subject to this critique so long as a major crisis occurred during the data period. But long periods of crisis-free outcomes, for example 1993-2007 in most of Europe, led to a diminishing appreciation of risk, and in a supposedly 'scientific' manner to boot.

This was then the context from which Basel II emerged. It sought to correct the distortions to the patterns of credit expansion that Basel I had engendered, primarily by adjusting regulatory requirements to align with the risk metrics developed in the private sector for their own (perfectly proper) purposes. While it did do some good work, e.g. in clarifying the relationship between off- and on-balance sheet requirements, it not only increased the complexity of regulation, now a rising complaint, but it also made the whole system much more procyclical and fragile in a way that was difficult, even, perhaps especially, for regulators to observe. This procyclicality was further exacerbated by the generalised adoption of mark-to-market, 'fair value', accounting procedures. While for most purposes this may well be the best possible practice, for regulatory purposes one needs, instead, to know the likely valuations in the event of stressed, panicky markets, i.e. mark-to-crisis, (Doyne Farmer, with Caccioli and Bouchard, 2012).

Anyhow most banking systems seemed highly profitable and on a Basel II RWA basis well capitalised in the early summer of 2007, (including Northern Rock). Some economists, White at the BIS, Ragu Rajan, and several of us at the Financial Markets Group (2001) worried that the inherent fragility of the system was being obscured by the procyclicality of Basel II, but, given the temper of the times, nothing was, or probably could have been, done then.

Lessons from the Sub-Prime Crisis

The years between 1992, when the European Exchange Rate Mechanism (ERM) collapsed, and 2007 were, perhaps, the most successful economic era of all time. In the developed economies, growth was steady, inflation was held low at around the 2% at which most inflation targets were set, unemployment was relatively low, altogether NICE (Non-Inflationary Continuous Expansion, as Governor King christened the period). Although growth in developed economies was slower than in the decades immediately following World War II, during these years growth was much faster in the developing economies, especially in Asia, with more people taken out of poverty during these 15 years than in any other period of history.

It is still extremely difficult to apportion the responsibility for such a good outcome between good luck and good policy, but some of this beneficial outturn will have been due to good policies, especially those arising from the generalised adoption of a combination of inflation targets and independent central banks. The central banking fraternity was at the acme of its reputation, with the central bank governor frequently been regarded as the second most important person in his/her own country. This bred a certain confidence, the unkind might even describe it as complacency, among central banks during the period.

In particular, prior to 2007/8, there were three comfortable myths, which were commonly accepted not only by central bankers, but also by markets and most commentators.

- 1) The first myth was that so long as central banks successfully achieved price stability, interpreted as the achievement of inflation targets, and operationally managed by varying the short-term policy interest rate to that effect, then no generalised macro-economic disturbance could, or would, arise. Of course, during these years there had been quite a number of periods of financial disturbance, coinciding with the continuation of macro-economic stability. These included:
 - a) 1987: stock market crash
 - b) 1991/2: Exchange Rate Mechanism (ERM) collapse
 - c) 1994: US bond market panic
 - d) 1997/8: Asian financial crisis
 - e) 2000/1: NASDAQ Tech equity market crisis

But all of these had been successfully weathered, in most cases and in large part by generating a sharp decline in the official interest rate after the onset of the financial disturbance. Given the difficulty of either observing, or specifically responding to, a particular asset bubble, there appeared to have been a generalised success in cleaning up any such financial disturbances, coexisting with a continuing stable macro-economic context, after the event, otherwise known as the 'Greenspan put'.

So, the general experience had been that it was both easier, better and more effective to 'clean up' after a financial disturbance arises, than to try to 'lean' into the prior asset boom through a generalised increase in interest rates, which would hit the economy more broadly, (rather than just dampening each particular asset boom).

The lesson that Hy Minsky (1982, 1992) had described and taught, that the very success of stabilising actions would lead to a reduction in volatility and to financial intermediaries reaching for yield, for example via much enhanced leverage, was forgotten; not that Minsky ever became part of the mainstream of economic analysis. Indeed such mainstream economic analysis, in the modern guise of Dynamic Stochastic General Equilibrium (DSGE) models, continued to treat money and finance as a pure veil, with all the action occurring in the real sector of the economy. In such models, default and financial failure was simply assumed away, as were all possible shocks emanating from the financial sector, which was assumed to be perfectly behaved; an assumption which was carried through into the Efficient Market Hypothesis.

So, the main function of central banks was to vary interest rates to offset the (real) shocks affecting the real economy. Financial stability could be left largely to look after itself.

- 2) Central bankers on the whole never fully bought this argument that financial stability could be largely disregarded, and left to the efficient workings of the financial system. While some, particularly in the USA, tended in this direction, most others, notably in Europe, always thought that various market inefficiencies and externalities could lead to financial instability, even when the macro economy was behaving itself. But the general view was that any resulting financial disturbances could be absorbed within the system, notably within the central, crucial and potentially fragile banking system, by ensuring that all banks maintained sufficient capital to meet unexpected losses. There had been, as noted earlier,

concerns that Basel I was leading to the securitisation of banks' better assets, with the worse ones left on banks' balance sheets. But it was thought that, absent generalised macro-disturbances, the Basel II Capital Accord, which had been recently negotiated, would guarantee bank solvency. While, with the benefit of hind-sight, this appreciation now looks wildly misplaced, it must be realised that markets, and most commentators, accepted exactly this same optimistic view. Thus, CDS spreads for banks in developed economies, which measure, subject to certain qualifications, the market's view of their probability of failure, were at an all-time low in the early summer of 2007, shortly before the balloon went up.

As noted earlier, the generalised adoption of mark-to-market, 'fair value', accounting practices led to asset price increases, at least in the trading book, feeding directly into banks' accounting profits, and, to the extent retained, to their accounting capital base. But, in so far as such profits and higher capital were due to higher asset prices, they were of course subject to sharp reversal as and when the underlying asset markets reversed.

Moreover, there was little appreciation how little potentially loss-absorbing equity was actually held by banks in their Tier 1 capital base. Particularly in Europe, where there was no underlying simple leverage ratio to act as a constraint, the ratio of overall assets to equity rose in this decade to over 40 or even 50:1. It only required a significant down-turn in the valuations of a major asset class held by the banks to wipe them out. Such underlying fragility was not perceived at the time by regulators, supervisors, monetary authorities, most economic commentators, nor indeed by the bankers themselves. A discussion of why this was so will follow shortly.

- 3) Prior to the development of wholesale funding markets, with the euro-dollar being the first in the late 1960s, bank liquidity had mostly taken the form of asset liquidity. In particular banks in most countries, partly as a result of the aftermath of World War II, held a sizeable proportion of their assets in the form of their own government public sector treasury bills and bonds. Prior to the 1970s, the British banks held over 30% of their portfolio in such liquid assets. These were, of course, relatively low yielding, and, as access to the more flexible wholesale funding markets developed, banks tended to substitute their funding liquidity, i.e. the ability to borrow from such markets as and when needed, in place of asset

market liquidity. In the late 1980s, the Basel Committee on Banking Supervision had sought to check this trend by agreeing an Accord on Liquidity to accompany the Accord on Capital. But they failed to do for several reasons, partly that liquidity management differed from country to country and no important central bank was keen to give up its own operational system in pursuit of a more generalised harmony. In any case it was thought that access to funding liquidity could, indeed, largely replace market liquidity, so long as the banks were perceived as safe, which it was thought that adherence to the Basel II Capital Adequacy Requirement would ensure.

So, absent any concerns about bank solvency, liquidity, it was thought, would always be available via deep, efficient wholesale markets. So, banks in most countries did, indeed, turn to wholesale markets for funding and liquidity, largely running off their liquid assets. By 2007 the main British banks held virtually zero British Government Securities. This same process allowed for a systematic shift in loan/deposit ratios, with lending, especially to the private sector, growing much faster than deposits in most economies. As Schularick and Taylor (2009) have demonstrated, the trend increase in bank loans began to diverge from, and grow faster than, the trend growth of deposits in most developed countries from 1970 onwards. Whereas loans in almost all countries over all prior documented banking history had grown at almost exactly the same rate as deposits, from 1970s onwards they grew much faster. Moreover, the wholesale market financing, whether via repos, commercial CDs, commercial paper, or whatever, was generally uninsured and came from relatively well-informed investors. While most private-sector deposit holders were either insured, uninformed, and/or generally trusting in the safety of their banks, this new trend towards a larger proportion of bank funding being done through wholesale markets left the banks very much at an elevated risk of what Gary Gorton (e.g. 2012 and with Metrik, 2012) has described as 'the run on the repo', though this could, and should, be generalised, to a run by informed institutional investors, including the banks themselves, on any bank which was perceived as fragile.

Indeed the commercial banks themselves, who appreciated, better than the regulators, how fragile they were themselves, were amongst the first to withdraw their interbank lending to their banking counterparts. The interbank market was one of the first casualties of the Great Financial Crisis (GFC).

These various sources of financial instability were not well perceived in advance by the authorities, markets, commentators, or by the banks themselves, though financial markets, and to some extent bankers, reacted when the sub-prime crisis first hit in the summer of 2007 rather quicker than several of the regulators. In particular, there are quotes from both Bernanke and King at the time indicating that they did not believe that the initial sharp asset market downturn, focussed on the sub-prime US market, could have a generalised effect in bringing about a near-collapse of financial markets either in the US or more widely in other developed countries. Initially, the scale of asset value declines in the sub-prime market appeared to be relatively low compared to the prior profitability and capital strength of the banking systems, with regulators partly failing to see how the latter had been blown up by fair value accounting.

As everyone knows, the trigger for the Great Financial Crisis was the bubble in the housing market, primarily in the USA, but also in some, but not all, countries in Europe, such as Spain, Ireland and the UK. Responsibility for the development and continuation of the housing bubble is widespread among the various agents of the economy. In some large part, government policies, especially in the USA, helped to stoke the rise in housing prices. In particular in the USA the government mandated Fannie Mae and Freddie Mac to provide guarantees for lower quality mortgages, which they had not been prepared to do beforehand, in order to encourage conditions which would allow the less-advantaged in the USA to get onto the housing ladder. In most countries encouragement of wider house ownership was an objective of official policy, and was supported by a range of such policies, both fiscal and otherwise.

Although the credit rating agencies are now accused of conflicts of interest, and being too keen to curry business from the banks involved in securitisation, the actual main failing was over-reliance on formal econometric models. There were excellent monthly data on virtually all aspects of mortgage finance in the USA starting from the 1950s. By the 2000s such data provided over 50 years (600 plus observations) of all aspects of US mortgage finance. During this period, there had only been a very few months in which the value of houses, and mortgages related to them, of a regionally diversified portfolio of housing assets over the US as a whole had faced a loss, and then only a very small one. While there had been sharp declines in housing valuations in certain specific regions, i.e. the North East in 1991/2, the oil producing states in the mid-1980s, etc., etc., a regionally diversified portfolio virtually never showed a loss, and then only a minor one, over these 50 years. Put those data into a regression analysis, and then what you will get out at the far end is an estimate that any loss of value, in a regionally diversified portfolio, of greater than about three or four percent, would be a

two standard deviation event, in other words highly improbable. Of course, such econometric regressions are based on the implicit assumption that the future will be like the past, and a better appreciation either of US history, or of experience with housing markets outside the USA, could have led sceptics to realise that these 50 years, from which these data were taken, were unusually favourable.

Nor were most economists much better. It was argued that the remarkably low level of both nominal and real interest rates in the run-up to 2007 would be consistent with asset prices, including housing, rising relative to income. Moreover, with housing prices increasing, the value of assets held by persons was rising faster than their liabilities. Again there was a failure to appreciate that the assets were in illiquid, equity form, whereas the liabilities were in nominal, fixed interest form. So if one marked to crisis, the resulting effect on the private sector could be relatively devastating. Furthermore, it was argued that any wealth effects from the housing price increases were small, or even in some cases negative, so there was no cause to worry about rising house prices having any major effect on conditions in the real economy.

Perhaps not surprisingly, this confidence in the continuation of high, or even further rising, housing prices, fed through onto bankers as well. Lehman Brothers failed not because of proprietary gambling bets on exotic financial instruments. Indeed, their derivative book remained profitable throughout, but because their CEO, Fuld, was confident that he would make money by taking a larger and larger position on Mortgage-Backed Securities (MBS). Whereas there have been several occasions of 'rogue traders', only with AIG, which can be regarded as a failure to control concentrated lending, (a standard banking problem), and earlier with Barings, did such trading imperil the financial institution involved, (and with AIG the system as a whole). Instead, the major banking problem, both in the GFC, and with previous crises, had involved excessive credit extension based on property-related loans, either mortgages, or especially, commercial real estate. Northern Rock, HBOS, Anglo-Irish, the Cajas in Spain, and now the Co-op in the UK, are all examples.

Indeed, virtually everyone was sucked into the general conventional wisdom that housing prices were almost sure to continue trending generally upwards. In this context, of course, sub-prime made perfect sense both to borrowers and lenders. With housing prices increasing, sub-prime borrowers could re-finance after a few years even more easily because their own equity in the house would have increased; they could move from one low teaser rate context to another, without ever having to reset onto the much higher rate which they would have found difficult to repay. But even

in those cases when they could not repay, and the lenders had to foreclose, the lenders would not have lost money, again because the housing prices would have gone up, and they could resell at a profit. So, in 2005/6 almost everyone was happy with sub-prime, politicians, rating agencies, economists, lending banks and borrowers. Indeed, it was then frequently considered one of the best examples of great financial innovation ever discovered.

Of course, a few people did see that the market trends were likely to be unsustainable, and some made a lot of money from that perception. Michael Lewis (2011) has written about those who did foresee this in his book, *The Big Short*. What is remarkable about that book is that most of the characters who did foresee the downturn were non-socialable loners, who did not buy into the conventional wisdom.

What I find remarkable is that this narrative has been submerged by a totally different narrative, which is that bankers, almost single-handedly, brought about the collapse of the financial system by consciously taking excessive risk, especially in exotic financial instruments in their investment banking arms, in the expectation of bail-out by the taxpayers. As several articles by Stulz, (e.g. with Fahlenbrach, 2009, also see Foote, et al., 2012), has revealed, the real problem was that bankers did not realise that they were taking risks with their banks, nor, perhaps, until the very end, was there any expectation that they would either need to be, or would be, bailed out by the taxpayer. They thought that their positions were relatively safe. The high profits and enhanced capital generated by the application of 'fair value' accounting helped to blind both bankers and regulators to the underlying fragility of the system. The basic problem was not that the 'casino banks' were putting the 'utility banks' at risk, but that the 'utility banks' themselves were doing what they have always done, which is to get caught up in a real estate bubble, with excessive credit extension and far too much leverage.

Implications

Prior to 2007, there was widespread agreement that the best contribution that monetary policy could make to medium and longer term growth would be to maintain price stability. The medium and long-term Phillips curve was believed to be vertical. Once inflation diverged from a low and stable level resources would be utilised, unnecessarily, to try to offset its deleterious effects. Real growth should be enhanced by real supply-side reforms. So, there was a dichotomy, with the

government responsible for growth-enhancing supply-side reforms, and monetary policy responsible for maintaining a context of (price) stability.

Since 2007, however, growth has continued to be extremely disappointing, with only a very sluggish recovery from the sharp downturn in 2008/9. Moreover, fiscal policy has been constrained by the extraordinarily high (for peacetime) levels of both deficits and debts, which has put their long-term sustainability into question. Meanwhile, supply-side reforms are politically difficult to introduce, and usually slow in effect. So, it seemed that the use of monetary policy for improving the growth rate of the economy might be increasingly necessary. These years have, in practice, been ones of generalised deflation, with continuing high unemployment. Nevertheless, even in those cases and in those countries where inflation was seen as a potential danger, there were significant calls for a temporary overshoot of inflation, beyond the target, to be entertained and allowed; indeed some influential commentators sought to bring about conditions in which central banks would commit to allowing a temporary blip of inflation in the future, in order to balance the prior deflationary pressures.

This became a contentious issue. In such conditions should central banks be prepared to put their inflation target at some risk, in order to encourage a faster recovery? Some of the best academic economists, e.g. Woodford and Svensson, advocated that central banks should do just this. On the whole, central bankers themselves were both wary and chary about the virtues of a (temporary) burst of future inflation, as a means of exiting from the present sluggish and reluctant recovery. Perhaps the most important example of the view that expansionary monetary policy should accompany other growth policies is to be found currently in Japan, where the 'three arrows' of Abenomics are being used to try to extricate Japan from two decades of stagnation.

It was always the case that inflation targeting should be applied in a 'flexible' manner, because in the shorter run there was always seen to be a trade-off between inflation and output growth; thus in short periods the Phillips curve is downwards sloping. But now, following the GFC, there are more questions about the medium-term objectives of monetary policy; in particular whether there should be some kind of 'dual mandate'. Should monetary policy aim to promote growth, even if that should put the price stability objective in the medium term at some risk? Whereas some commentators now believe that such a risk is worth taking, on the whole central bankers continue to hold to the maintenance of price stability as being their primary, main objective.

But the GFC has shown that central banks must also consider a secondary objective, in the form of the maintenance of financial stability. If there are to be two objectives, then, according to the Tinbergen principal, there should be at least two sets of instruments, if both objectives are to be hit exactly. This consideration had led to the search for another set of instruments, for the achievement of financial stability. Such instruments have been described, and characterised, as 'macro-prudential instruments'. Effectively their main function is to operate counter-cyclically against booms and busts in asset markets, in particular the property market, both in residential housing and in commercial real estate. This can either be achieved by measures to influence bank loans to such asset markets, in the form of required variations in officially set capital or liquidity ratios held against such specific lending, or in the form of more direct measures to affect such asset markets, whether by margin limitations, for example loan-to-value or loan-to-income controls, or alternatively in the form of fiscal measures, i.e. changing taxes on transactions in such markets.

There are several problems relating to the application of such controls by central banks, even for macro-prudential purposes. As already indicated, it is frequently difficult to observe when a boom is occurring. If people perceive such a boom as unsustainable, then ordinary market processes would bring it to an end. So the fact that a boom is continuing implies that many, possibly most, observers in the system do not believe that it is unsustainable. If so, it is politically difficult, and generally highly unpopular, for a central bank to step in and make housing purchases during a house price boom more expensive. In any case the distinction between a direct quantitative margin control, and a fiscal measure, is quite thin. If the authorities are to be operating directly in the housing or real estate markets more generally, it is arguable that such intervention should be done by the government, rather than by the central bank.

The central bank is on rather firmer grounds, when it intervenes to try to check, during booms, credit expansion by the banks in particular fields, or alternatively to encourage them during busts. Even then, however, the central bank, in trying to use such macro-prudential instruments, will be operating against the momentum and grain of the market. This is quite difficult to do, even during booms. Then it will be unpopular, and since the constraint will, perforce, be granular, it may be relatively easy to avoid by disintermediation either to banks abroad, to shadow banks, or even to lending for non-control purposes which then gets shunted back into the controlled sector. Given the difficulties and unpopularity of measures to try to check a credit boom, the danger is that it would be done too gently to have much effect. For example, the Spanish Dynamic Provisioning Scheme was a successfully designed counter-cyclical macro-prudential measure; and it worked! But it was

not sufficiently sizeable, by itself, to prevent the Spanish banking system from running into massive difficulties during the course of the GFC. The problem will be to strengthen the backbone of central bankers in order to impose sufficiently strong macro-prudential measures during the upturn, always realising that it is impossible to foresee when a generalised good outcome is in practice an unsustainable boom.

The difficulties of applying counter-cyclical policies are, however, far greater than busts. During booms, both the micro-prudential and the macro-prudential objectives of strengthening banks go together hand in hand. During busts, however, the micro-prudential authority is even more strongly determined to try to strengthen banks' capital and liquidity ratios. By the very fact that a bust has occurred, it has been demonstrated that, before then, banks must have had insufficient capital and liquidity to survive the bust. So the immediate response is 'that must never happen again'. Capital and liquidity ratios are raised. In that context, how can it be possible to bring about some counter-cyclical macro-prudential easing?

The question of how to undertake macro-prudential counter-cyclical easing during a bust has become acute, of course, during the course of the current GFC. It is clear that banks would have done far better had they had much more loss-absorbent equity capital in the recent crisis. But, if one just asks banks to raise the equity ratio now, then the likely response will be that they will seek to do so by deleveraging, i.e. to reduce their total assets, rather than to increase the amount of equity they have on their books, because the latter would lead to considerable dilution of equity and to a lowering of the Return on Equity (RoE). A partial answer to this quandary is to introduce incentives on bankers to raise equity directly, rather than ask them to raise equity ratios. This latter has been done much more successfully in the United States than in Europe.

There are, perhaps, rather fewer problems in trying to adjust liquidity ratios in a counter-cyclical fashion. Liquidity and reserve ratios could be increased, fairly dramatically, during significant upturns in asset booms; and again such required ratios could be lowered, at least somewhat, in the aftermath of severe downturns. After all, in downturns, the central bank is usually striving to inject masses of liquidity; so requiring banks to hold a larger reserve of liquidity themselves at such junctures is, perhaps, less, rather than more, necessary.

Again, more thought needs to be given to separating marginal from average control mechanisms. Thus the UK's Funding for Lending Scheme (FLS) relaxes both liquidity and equity conditions on new

lending, at the same time as the required ratios on existing loans is raised. Similarly, during downturns, the payment, by central banks, of a high average return on banks' deposits held with themselves helps to maintain such banks' profitability. But, if the rate of return on such marginal deposits, held by banks with the central bank, was lowered as far as possible, even perhaps made negative, then at the margin the banks would have an inducement to use such marginal reserves to go out and make additional loans and buy additional assets. More thought and innovation about separating the marginal from the average, or divorcing requirements on new lending from those on old lending, could help to facilitate the utilisation of successful counter-cyclical macro-prudential measures in a severe downturn. More thought needs to be given to this difficult issue.

Anyhow, central banks have now been given additional responsibilities, in the field of achieving financial stability through macro-prudential measures, as well as their price stability objective. This raises the question of whether central banks have now been given an overload, and whether this overload might even imperil their independence. Especially if macro-prudential measures should spill over from controls over banks to controls over the asset markets themselves, there will be questions whether the central banks are not infringing into areas which should be the responsibility of the government, rather than for an unelected, but independent, authority. Will the pressures and responsibility on the central bank (governor) simply become too much?

Another potential threat to central bank independence could be that the massive increase in their balance sheet, resulting from unconventional expansionary measures, such as Quantitative Easing (QE), could lead in future to very large losses, as and when interest rates return towards normal. With the central bank being part of the public sector, such losses on Central Bank holdings would actually be internalised within the public sector, with no net economic effect whatsoever. Nevertheless the political and presentational effect of such losses could be made to appear damaging to the continued independence of such central banks.

Finally, the advent of the GFC made it abundantly clear that neither central banks nor economists fully understood the working of the economic system. We, central bankers and economists, no doubt have learnt many lessons as a result of the GFC. But, do we yet really understand enough about the workings of the financial system as a whole? Probably not! The very fact, as outlined above, that there are several narratives about the main causes of the GFC, indicate that there remain many uncertainties about the way our system works. We cannot be sure that we have learnt the right lessons; uncertainty remains endemic.

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