A macroprudential perspective on regulating large financial institutions

Daniel K. Tarullo
Member of the Board of Governors
Federal Reserve System

One of the many lessons to be drawn from the recent financial crisis is that a macroprudential perspective must be brought to bear on the regulation of large financial institutions. This macroprudential perspective suggests two kinds of policy measures, over and above the strengthening of capital and liquidity regulation applicable to all banks. First, the negative externalities that the distress or failure of such institutions can impose on the financial system as a whole should be addressed through progressively stricter regulatory measures to increase the resiliency of the largest firms. Capital surcharges, total loss absorbency requirements, and charges for use of large amounts of short-term funding are examples. Second, the collective impact of changes in the condition of these large institutions on the real economy should be taken into account in regulatory requirements and expectations. Thus, for example, supervisory stress tests should be constructed so as to reflect the potential macroeconomic impact of losses or balance sheet adjustments at large firms as a whole in the face of adverse scenarios. The international community has made a good start in developing regulatory measures motivated by macroprudential considerations. However, there remains considerable work to be done, particularly in addressing the potential for contagion presented by the use of short-term wholesale funding.

Real world crises have a way of shaking up the intellectual foundations of policy disciplines. Elements of received wisdom are undermined, while certain heterodox or less mainstream views are seen as more valid or important than had been widely recognised. The financial crisis of 2007-2009 was no exception. Some ideas, such as the efficient markets hypothesis, have been subject to further challenge and qualification, while others have risen to greater prominence. An example of the latter is the view that financial stability must be an explicit economic policy goal. A corollary of this view is that a "macroprudential" perspective – generally characterised as focused on the financial system as a whole, as opposed to the well-being of individual firms – should be added to traditional prudential regulation.

Macroprudential regulation is still in the early stages of development, in theory as well as in practice. A short essay cannot hope to touch on, much less do justice to, the many relevant issues. After a brief review of what is still a brief history of the concept, I will offer four broad propositions that I believe should guide the evolution of macroprudential policies over the next few years, particularly as they apply to the largest financial institutions. While many of these policies will doubtless evolve gradually, I argue that measures to address the macroprudential vulnerabilities associated with large-scale short-term wholesale funding should be an immediate priority.

1| The emergence of the concept of macroprudential policy

It is worth noting that the term "macroprudential regulation" can be found in Bank for International Settlements (BIS) documents beginning more than 30 years ago. It appears to have originated in specific contrast to traditional banking regulation, which a 1979 background paper at the BIS characterised as focused on "sound banking practice and the protection of depositors at the level of the individual bank."[1]

In fact, in the United States much of the New Deal legislation that would define the financial regulatory structure for more than 40 years was in direct response to what we would today call systemic concerns, including banking panics and excessive leverage in equity markets.[2]

From the late 1970s onward, though, there was indeed reason for the development of an explicitly macroprudential perspective. The use of the term macroprudential – and, it would seem, the influence of the concerns lying behind the term – was somewhat irregular in the three decades after it was coined. In the United States, the New Deal regulatory system was breaking down in the face of profound changes in financial markets, most importantly the progressive integration of capital market and traditional lending activities. The forms of regulation that were evolving as substitutes – principally, though not only, minimum capital requirements – were largely based on what various BIS papers characterised as a microprudential approach to regulation. Although similar changes were taking place in other advanced economies to a lesser extent, local developments also highlighted the need for a macroprudential perspective on financial regulation. In Japan, the asset bubbles in equities and property that contributed to the banking crisis of the 1990s grew to large proportions. In the euro area, and the European Union more generally, the consequences for financial stability of monetary union and financial integration were not addressed with new regulatory policies.

In short, discussion of macroprudential concepts and their implications for regulation was more likely to be found in the papers of a few academics and intrepid BIS researchers than in the pronouncements of senior regulators or other official sector representatives. One important exception is a speech delivered in September 2000 by the late Andrew Crockett, then the General Manager of the BIS.[3] For several reasons, that speech is a good point of reference for us today – as a nod to Sir Andrew's foresight, as an occasion for regret that his words were not more closely heeded by regulators,[4] and as a way of illustrating how the challenge of macroprudential financial regulation has grown in the years since.

1 *See Clement (2010).*
2 *The establishment of federal deposit insurance and the separation of commercial banking from investment banking – two key elements of New Deal financial reforms – were very much directed at what would today be characterised as systemic risks.*
3 *See Crockett (2000), also then the Chairman of the Financial Stability Forum.*
4 *Reading between the lines, one wonders whether Sir Andrew anticipated that his call for action might not be taken up by banking regulators. He styled his remarks as "provocative" and concluded by suggesting they were but "a small awareness-raising step in what, if pursued, is likely to be a long road".*

Sir Andrew's speech contained much that is now familiar and broadly accepted, but was fairly uncommon at the time: he distinguished between the objectives of microprudential regulation – protecting against idiosyncratic risk in a bank – and macroprudential regulation – protecting against systemic risk. He set forth a description of the financial cycle that could be read as a loose paraphrase of Hyrnan Minsky's theory of financial instability.[5] He identified the procyclical and asset correlation concerns regarding large bank activities that have commanded so much attention in the past several years. And, again foreshadowing many recent discussions, he suggested macroprudential tools both to increase resiliency (as through capital regulation with a systemic perspective) and to lean against the wind in an effort to slow or limit the growth of unsustainable asset bubbles (as through maximum loan-to-value ratio requirements).

Although the crisis and its aftermath have created a broader consensus for the proposition that financial stability should be a more explicit objective of economic policy, there is considerably less convergence around theories of, metrics for, and policy prescriptions to promote financial stability. Policy and academic writing generally limits the term "macroprudential" to measures directed specifically at countering risks in the financial system that, if realised, can severely impact real activity.[6] But adoption of consistent terminology does not itself resolve questions of whether, for example, increases in systemic risk are endogenous to the financial system and thus follow a somewhat regular cyclical pattern, or are instead somewhat randomised – albeit recurring – phenomena.[7]

Differences in views of the origins of systemic risk obviously affect views of the best ways to measure it and, of course, the best policies to contain it. One example, of particular interest to central bankers, is the ongoing debate about the circumstances under which monetary policy should be adjusted to take account of financial stability concerns. Lying behind the various positions in this debate are differing views on how systemic risk propagates, and thus on the relative efficacy of monetary versus macroprudential policies.

Progress in these debates is complicated by the fact that, by definition, financial stability policies are directed toward preventing or mitigating rare events, rather than outcomes such as inflation and unemployment that are continuously observable. This focus on tail risks raises important issues of accountability in the institutional design of macroprudential policies and also complicates the task of testing financial stability theories and proposed policies.

Yet even against the backdrop of what is still a comparatively underdeveloped understanding of financial stability,[8] commentators and policymakers have compiled and, in some cases, developed so-called "toolkits" of possible macroprudential measures. These measures are thought available for use against one or both of two frequently identified dimensions of systemic risk – procyclicality and interconnectedness.[9] Of course, the attractiveness of many of these tools will depend on one's views of a variety of theoretical, institutional, and practical questions.

5 *Sir Andrew summarised the financial cycle as follows:* "A review of the instances of financial instability would reveal some shared stylised elements. There is first an over-extension phase during which financial imbalances build up, accompanied by benign economic conditions. In this phase, asset prices are buoyant and their surge tends to feed, and be fed by, rapid credit expansion, domestically or internationally. Leverage, in overt or hidden forms, accumulates in balance sheets, masked in part by the favourable asset price developments. The trigger for a reversal is essentially unpredictable. It can originate either in the financial sphere (e.g. an asset price correction) or in the real economy (e.g. a spontaneous unwinding of an investment boom). The process then moves into reverse. Ex post, a financial cycle is evident."
Compare Minsky's conclusion to his essay "The financial instability hypothesis", http://www.levyinstitute.org/pubs/wp74.pdf: "In particular, over a protracted period of good times, capitalist economies tend to move from a financial structure dominated by hedge finance units to a structure in which there is large weight to units engaged in speculative and Ponzi finance. Furthermore, if an economy with a sizeable body of speculative financial units is in an inflationary state, and the authorities attempt to exorcise inflation by monetary constraint, then speculative units will become Ponzi units and the net worth of previously Ponzi units will quickly evaporate. Consequently, units with cash flow shortfalls will be forced to try to make position by selling out position. This is likely to lead to a collapse of asset values."

6 *Thus, for example, fiscal or tax policies would not be generally characterised as macroprudential tools, even though they could have implications for systemic risk in some circumstances. For useful overviews of macroprudential policy issues and debates, see International Monetary Fund (2011); Galati and Moessner (2011).*

7 *For a recent study finding a correlation between the growth of credit aggregates and financial crises, and also suggesting a secular trend making such crises more of a risk, see Schularick and Taylor (2012).*

8 *There is actually quite a rich history of policy measures in the United States that we would today call "macroprudential". See Elliott* et al. *(2013). It is notable that the enactment and use of a number of tools waned as the integration of capital markets with traditional lending functions accelerated in the last quarter of the 20th century, though even if there is a causal relationship between these two phenomenon, it is not clear which way the causality runs (perhaps in both directions).*

9 *The terminology may differ among commentators. For example, "cross-sectional" is sometimes used in place of interconnectedness, a term that may have some appeal to the extent it moves away from the traditional domino image of one failing firm knocking down another, and also embraces dynamics such as contagion across the financial system arising from correlated asset holdings and sources of funding.*

The tools identified can be variously categorised. One useful distinction is between measures designed to prevent systemic risk from building – often termed "lean-against-the-wind" measures – and those designed to increase the resiliency of the financial system should systemic risk nonetheless build sufficiently that broad-based stress ensues. Another distinction is between time-varying and time invariant measures, with the former based on a response – either discretionary or in accordance with a rule – to some measured increase in risk.

With this context, I offer these four propositions for taking the macroprudential regulatory project forward, with attention both to overall risks to financial stability and to the concentrated risks posed by the largest financial intermediaries.

2| A macroprudential perspective should dominate the regulation and supervision of large financial institutions

Sir Andrew entitled his speech "Marrying the micro- and macroprudential dimensions of financial stability", suggesting an equal partnership between the two regulatory dimensions, as he called them. My own sense is that at both the national and international levels we need to concentrate our post-crisis efforts to reshape the regulation and supervision of large financial institutions on measures reflecting the macroprudential dimension, at least for a time.

To be sure, idiosyncratic problems such as certain operational risks may threaten large institutions, and traditional regulation and supervision surely have an important ongoing role to play. But the dynamics observed during the financial crisis of highly correlated asset holdings, shared risks, and contagion among the largest firms suggest that the well-being of any one of these firms cannot be considered in isolation from the well-being of the global financial system as a whole. Severe problems at such institutions are far more likely to arise from vulnerabilities to common stresses, and severe problems at such firms are far more likely to exacerbate systemic weaknesses. Since the health of any one of these large institutions is tied to the health of these firms as a group, good microprudential regulation may itself require a macroprudential dimension.

The reorientation of the Federal Reserve's supervision of large, complex financial firms is reflected organisationally in the Large Institution Supervision Coordinating Committee (LISCC). The LISCC was created three years ago to facilitate the execution of horizontal, cross-firm analysis of the largest firms and to centralise supervision of these firms so as to promote an integrated and consistent supervisory approach. The LISCC includes senior staff both from the supervisory staffs of the Board and Reserve Banks, and from the Board's Office of Financial Stability, Division of Monetary Affairs, Division of Research and Statistics, and other relevant divisions. This "interdisciplinary" approach to large bank supervision not only fosters more rigorous microprudential regulation. It also facilitates and formalises a broader look at systemic risks by using quantitative methods to evaluate macroeconomic and financial risks, and how they could affect individual firms and the firms collectively. A comparable – though somewhat differently organised – horizontal, interdisciplinary supervisory approach was adopted by the Bank of England when it reacquired prudential regulatory responsibilities in 2013. The assumption by the European Central Bank of supervisory oversight of large euro area banks offers the opportunity for similar innovations.

3| Building greater resiliency is central to the macroprudential regulation of large financial institutions

In early 2009 there was widespread doubt about the solvency of the US financial system as a whole, given that so many large firms had directly or indirectly been deeply involved in mortgage markets and associated securitisations. When the Federal Reserve created the first supervisory stress test in the midst of the crisis, our aim was to stabilise, and restore confidence, in the financial system as a whole by ensuring that the nineteen largest bank holding companies were sufficiently capitalised that they could continue serving as viable financial intermediaries. Thus the focus on resiliency was initially a matter of necessity.

But there is also logic to making the resiliency of the largest firms the most important part of an ongoing macroprudential regulatory agenda. Just as a microprudential approach to regulation has come

to emphasise building up capital because it makes the individual firm better able to absorb losses from any source, including unpredictable ones, so an appropriately refocused set of macroprudential capital requirements can help make the financial system better able to withstand shocks from unanticipated, as well as familiar, sources. As mentioned by Andrew Crockett, a macroprudential perspective suggests two ways in which resiliency should be strengthened. One is to treat the financial system as a whole as the "portfolio" of assets subject to safety and soundness oversight, and the second is to apply stricter regulations on firms of systemic importance whose failure would carry a good chance of endangering the entire system. In the last five years, we have been developing measures to advance both forms of resiliency.

Following our use of stress tests of the nation's nineteen largest bank holding companies in the midst of the crisis, Congress included in the Dodd-Frank Act a requirement of annual supervisory stress tests for a larger group of firms – all those with greater than USD 50 billion in assets. These stress tests, and an associated supervisory review of the capital processes and practices of the covered firms, have in just a few years become a core part of the oversight of large firms.

Stress testing provides a good example of how sound microprudential regulation of the largest banking firms can incorporate a significant macroprudential orientation. Conventional capital requirements are by their nature somewhat backward-looking, reflecting loss expectations based on past experience and loss recognition that often occurs well after the likelihood of loss has become clear. Rigorous stress testing helps compensate for these shortcomings through a forward-looking assessment of the losses that would be suffered under stipulated adverse economic scenarios, so that capital can be built and maintained at levels high enough for the firms to withstand such losses and still remain viable financial intermediaries. This forward looking aspect of stress testing automatically builds capital – and boosts resilience – in the face of weakening loan-underwriting standards, because for any given adverse scenario weaker underwriting standards will imply higher losses.

Also, because the firms are stressed simultaneously, in setting loss parameters supervisors are able to identify and take account of correlated exposures and other common risks.[10] The group of firms covered by the Dodd-Frank Act supervisory stress tests account for more than 70% of US banking sector assets, thus approaching Sir Andrew's standard of a supervisory perspective that examines the assets of the financial system as a whole.

The effectiveness of stress testing as a macroprudential tool depends, of course, on how the tests are constructed. A macroprudential perspective must inform the construction of the scenarios against which the assets and revenues of the banks are stressed. Such a perspective argues for incorporating particular risks to the financial system even when there is some uncertainty regarding the probability of a particular risk being realised. For example, the scenario might include a sharp drop in house prices if analysis suggested – but did not confirm – that there might be overheating in the housing market, and if supervisors judged that large banks had correlated exposures to the housing sector. That is, the stress tests provide for resiliency in the event the risk comes to pass, without necessarily requiring other measures to restrict directly the lending or other activity lying behind the risk.

A macroprudential perspective also counsels against injecting more procyclicality into the financial system by, for example, simply assuming a standard deterioration in economic conditions from whatever the baseline projections might be. Such an approach would overlook the tendency of systemic risk to build during strong, prolonged expansions, when underwriting standards decline, rising asset prices make secured lending seem safer, and defaults wane. The approach we are instead taking is that, under such conditions, our severely adverse scenario would assume a level of unemployment during the stress period comparable to that observed in past severe recessions, not simply an increase in unemployment comparable to the increase observed during those recessions.[11] Thus, the scenario's unemployment rate would feature a larger and sharper rise in the unemployment rate as economic expansions proceed.

10 *It is important to emphasise here, as we do in our annual capital reviews of large banking organisations, that our supervisory stress testing of all covered firms simultaneously does not supplant the need for firms to develop, and make capital decisions dependent upon, their own stress scenarios that incorporate risks more specific to the activities and portfolios of each firm. That is, the necessary emphasis on macroprudential measures at the present time does not obviate the need for solid microprudentially inspired measures.*

11 *For a full explanation of the Board's approach to scenario design, see Federal Reserve System (2012). See also Liang (2013).*

Finally, stress tests must be modified so as to avoid incentivising firms to correlate their asset holdings or adopt correlated hedging strategies. This potential problem can be illustrated by reference to the market shocks we have applied to the trading books of the six largest financial firms in recent stress tests. The shocks, designed to be severe, consisted of instantaneous, hypothetical jumps in asset prices based on those observed over the entire second half of 2008. The resulting trading losses are – as one would expect – quite large. Even so, had we simply used the same shocks that we used in the 2009 exercise, unchanged from the historical experience, we would have underestimated the potential losses associated with subsequent developments. For that reason, we modified the market shock scenario in 2011 to take account of euro area stress and then further modified the hypothesised stress in 2012 and 2013 to include sharp moves in interest rates. We will continue to modify the market shock regularly to incorporate salient risks that were not necessarily present in 2008 and to ensure that firms cannot artificially improve their performance on the test through holding significant amounts of certain assets that happened to perform well in that period.

The second aim of a macroprudential approach to resiliency is to reduce the chances of distress or failure for financial companies of systemic importance to a greater degree than for other firms. A microprudential requirement is informed by asking what level of capital would be necessary to allow the firm to remain a viable financial intermediary even after absorbing losses that, within a fairly high level of confidence, might be encountered over some relevant timeframe. A macroprudential capital requirement should take account of the fact that there would be very large negative externalities associated with the disorderly failure of any systemically important financial institution, distinct from the costs incurred by the firm, its stakeholders, and the federal deposit insurance fund.

The failure of such a firm, especially in a period of stress, significantly increases the chances that other financial firms will themselves experience great stress, for two reasons. First, direct counterparty impacts can lead to a classic domino effect. Second, because losses in a tail event are much more likely to be correlated for firms deeply engaged in trading, structured products, and other capital market instruments, all such firms are vulnerable to accelerating losses as troubled firms sell their assets into a declining market. Enhanced capital requirements should take into account these costs. Thus, the aim of financial stability capital standards is to reduce further the probability that the firm might fail under stress through holding additional capital. These additional capital requirements can also help offset any funding advantage derived from the perceived status of such institutions as too-big-to-fail.

For all its important contribution in strengthening capital positions for all internationally active banks, Basel III was primarily motivated by microprudential considerations. A macroprudentially motivated capital rule is the set of surcharges on more than two dozen banks of global systemic importance (G-SIBs) that was agreed in 2011 by the Basel Committee on Banking Supervision.[12] In discussions preceding that agreement, it became clear that the task of determining how much additional capital is needed to reduce the probability of a systemically important firm's failure to more acceptable levels is not a straightforward one. In calibrating the surcharge, the Basel Committee began with what has been termed the "expected impact" approach, which calls for additional capital to reduce the probability of the firm's failure sufficiently to equalise the expected impact on the financial system of the failure of a systemically important firm and the failure of a banking firm just outside systemic status.[13] But implementing this concept was complicated by the fact that, despite some very useful metrics that have been developed in the past few years for measuring the systemic risk associated with a particular firm, there is certainly no generally accepted approach.[14] Indeed, differences among reasonable assumptions in applying the expected

12 *The methodology originally announced has been updated, and can be found at Basel Committee on Banking Supervision (2013).*
13 *For example, if the loss to the financial system from the failure of a systemically important firm would be five times that resulting from failure of the non-systemic firm, then the firm would have to hold additional capital sufficient to make the expected probability of failure one-fifth that of the non-systemic institution.*
14 *Among the useful efforts along these lines are a measure of conditional value-at-risk (CoVaR), see Adrian and Brunnermeier (2011) and a measure of systemic risk based on each firm's contribution to the expected capital shortfall of the entire financial system in a crisis, see Brownlees and Engle (2011). The concept behind the latter measure is also described in Acharya* et al. *(2011). Updated systemic risk rankings are maintained by the authors at* http://vlab.stem.ny.edu. *A helpful review of the efforts to measure systemic risk is Billio* et al. *(2010).*

impact approach led to a fairly broad range of potential surcharges. The 1 percent to 2.5 percent amounts negotiated within the Basel Committee are at the low end of that range, reflecting a good deal of caution – frankly, more caution than I think would have been desirable, even given the uncertainties. Regardless of one's views on calibration, though, the motivation and methodology for what have become known as "systemically important financial institutions (SIFI) surcharges" are clearly macroprudential.

The establishment of the G-SIB surcharge was an innovation in international financial regulatory cooperation, which had generally made agreements applicable to "internationally active" banks. This project has raised the question of the extent to which similar macroprudential motivations should inform development of other agreements or frameworks applicable only to systemically important firms. In the United States, the Dodd-Frank Act requires such special regulations in a variety of other areas, including stress testing, single counterparty credit limits, risk-management, and resolution planning. Internationally, the Financial Stability Board (FSB) and the Basel Committee have begun initiatives in the areas of resolution planning[15] and supervisory practices[16] applicable to G-SIBs.

One last point on macroprudential resiliency measures is that they can have secondary effects that serve the lean-against-the-wind aim of macroprudential policies. For example, a supervisory stress test can assign a higher loss rate to a certain class of assets in a hypothesised adverse scenario because they are particularly vulnerable to potential shocks and thus susceptible to particularly sharp declines in a serious recession. To the extent that firms learn over time that such assets will be treated that way, there is at least a mild disincentive to hold them. As I will discuss in a moment with respect to countercyclical capital requirements, we should not overstate this lean-against-the-wind effect, but perhaps not dismiss it out of hand either.

4| Time-varying measures will play a more limited role

Some discussions of macroprudential policy appear to contemplate a somewhat regular adjustment – up and down – of both resiliency and lean-against-the-wind measures. The idea is to proceed in an intentionally countercyclical fashion by attempting to restrain rapid, unsustainable increases in credit extension or asset prices and to relax those restraints as economic conditions deteriorate. This is a conceptually appealing approach, but, as various commentators on macroprudential policy options have noted, one that raises a fair number of significant issues: the reliability of measures of excess or systemic risk, the appropriate officials to be making macroprudential decisions, the speed with which measures might realistically be implemented and take effect, and the right calibration of measures that will be effective in damping excesses while not unnecessarily reducing well-underwritten credit flows in the economy. Because of the significant variations that can exist in both local economic conditions and in domestic legal and constitutional arrangements of jurisdictions represented on the Basel Committee and the FSB, time-varying measures are much harder to coordinate internationally than ex ante structural measures to increase resiliency or mitigate the build-up of systemic risk.

If the measures are designed to be targeted, questions of efficacy may be raised by those who believe that suppression of excess credit or asset price increases in one sector will likely result only in the redirection of credit and speculation to other sectors until underlying macroeconomic and financial conditions have ceased enabling such activities. If, on the other hand, the measures are designed to be fairly broad-based, the more basic question of the appropriate role of monetary policy may be raised by those who are focused on reactive policies that "get in all the cracks" of the financial system, not just the heavily regulated portion occupied by large financial firms.

15 *See Financial Stability Board (2013).*
16 *See Financial Stability Board (2010).*

Finally, we should probably be skeptical as to how effective a macroprudential relaxation of regulatory requirements can be on the downside of economic cycles. Market discipline, which may have been lax in boom years, tends to become very strict when conditions deteriorate rapidly. Even if supervisors were to announce a relaxation in regulatory requirements, in stressed economic conditions investors and counterparties may well look unfavorably on reductions in capital levels (even from higher levels) or relaxation of underwriting standards at any one firm, notwithstanding the potential benefits for the economy as a whole were all large firms to follow suit. Anticipating such a reaction, senior management of banks may thus have strong non-regulatory incentives to act as if microprudential regulation continued to dominate.

In short, the task of buffering the financial system against a tail event seems more tractable than that of moderating the financial cycle. But all these questions of economic knowledge and institutional capacities should be grounds for proceeding cautiously, not for eschewing time-varying measures entirely. It is true that the state of the art of financial stability risk assessment is still in a relatively early stage. But it is reasonable to think that the amount of effort being put into these efforts in governments, central banks, international organisations, and universities will produce some well-conceived and well-tested metrics over time. Certain deviations from historical patterns are, even under existing states of knowledge, surely clear enough to justify some action.

Moreover, in the absence of time-varying macroprudential tools, the burden of systemic risk containment will rest entirely elsewhere. For time invariant measures to bear this burden, it might be necessary to have through-the-cycle constraints that strengthen financial stability at significant cost to beneficial economic activity. For those who are reluctant to use monetary policy in pursuit of financial stability goals at the expense of more immediate employment and price stability goals, the burden on time invariant measures would be large indeed. Even for those who believe financial stability objectives should and can be effectively incorporated into monetary policy, monetary tightening will surely not be the correct response to all instances of increasing leverage or asset prices that raise macroprudential concerns. Those adhering to this second school of thought might regard targeted time-varying measures as effective in slowing the increase in systemic risk to give monetary policymakers more time to evaluate the need for a monetary policy response.

There are two obvious places to begin a considered development of time-varying tools. One is in the traditional supervisory oversight of practices at regulated institutions, as enhanced by the increasingly horizontal and interdisciplinary features of large bank supervision. Good supervision is always time-varying, in that it should respond to potential and growing problems in a directed fashion.[17] The coordination engendered by the LISCC at the Federal Reserve and parallel efforts at other central banks can facilitate the identification of potentially risky trends in, for example, underwriting certain forms of lending. The greater use of data, both for the regulated sector as collected by supervisors and for the economy as a whole as analysed by our Office of Financial Stability, further increases the prospects of timely supervisory responses.

I do not want to overstate the significance of this evolution in supervisory practice, however. For one thing, as was shown by the US experience with commercial real estate lending guidance issued before the crisis, supervisory guidance is an imperfect tool. In addition to the issues surrounding real-time interventions mentioned earlier, that episode revealed the potential for substantial political resistance to supervisory actions directed at specific sectors. Still, with ongoing improvements in relevant analytic capacities, there is room to develop this tool further.

The second place to work on time-varying tools is found in another element of the new capital regime, the countercyclical buffer provision of Basel III, an explicitly macroprudential element of what was generally a microprudentially-oriented

17 *One should note that "time-varying" supervision should not mean excessively procyclical supervision.*

capital framework. This provision envisions an increase in the applicable risk-weighted capital requirements of financial companies by up to two and half percentage points when "credit growth is excessive and is leading to the buildup of system-wide risk."[18] While stress testing has a built-in degree of time-variance (since macroeconomic scenarios must be constructed annually), the countercyclical buffer is intended to be purely time variant, in that it is to be activated when, and only when, there is "excess aggregated credit growth", a condition that the Basel Committee anticipates will occur only infrequently.[19]

The principal macroprudential rationale of the countercyclical buffer is one of increasing the resiliency of the banking system as a whole by ensuring that it will have enough capital to continue effective intermediation, even if a period of stress follows what turned out to be a period of unsustainable, rapid credit growth that leads to unusually high losses as asset prices plummet thereafter.[20] The Basel Committee also noted that there could be a secondary, lean-against-the-wind effect if the higher capital requirements raise the cost of, and thus dampen, credit extension.

It is probably not surprising that the regulators represented on the Basel Committee have chosen capital requirements as a time-varying macroprudential tool. Capital regulation is central to prudential regulation and, as already noted, is being used in service of macroprudential objectives. Both regulators and financial institutions are accustomed to capital regimes (although the post-crisis changes have altered that regime quite significantly).

Still, it is uncertain just how useful this tool will be.[21] In addition to some of the limitations affecting use of all time-varying instruments, such as judging when leverage or asset prices have become excessive, it is quite blunt. If "turned on", it would apply to all large banks in all parts of a jurisdiction. So it would not be useful to deploy in response to asset bubbles or leverage in particular regions or sectors, since the additional capital required for lending in those sectors would be no greater than in less frothy parts of the economy. Indeed, it could in some circumstances have the unintended effect of encouraging banks to do *more* lending in the booming areas of concern, at the expense of lending in more stable areas. The precise impact on bank lending behaviour is further muddied by the one year period given to build the additional capital cushion.

These potential shortcomings notwithstanding, the tool is now available to jurisdictions represented on the Basel Committee. It could, in fact, serve as a complement to the more targeted actions available through the supervisory process. Fortunately, when those of us around the world do contemplate use of the countercyclical capital buffer (CCB), we should have the benefit of a good deal of thinking and experience at the Bank of England. The setting of CCBs is now committed to the Financial Policy Committee (FPC) under the reorganisation of regulatory functions effected in the United Kingdom on April 1, 2013. The FPC is required to set forth a general statement of its policy and to make quarterly determinations of whether to impose or change a CCB.[22] I should note that Parliament extended the countercyclical power beyond the broad measure in Basel III and also granted the FPC authority to direct increases in the risk-weights applicable to specific sectors judged to pose a risk to the financial system.

18 *See Basel Committee on Banking Supervision (2011). Basel III introduced the concept of a capital "buffer" to supplement the long-established concept of minimum capital requirements. In brief, the idea is that a bank's distribution of capital to shareholders or employees will be progressively more restricted as capital levels fall below required buffers, but – unlike the case where capital levels fall below minimum requirements – a bank need not bring its capital levels above the buffer by shedding assets or raising new capital. Basel III introduced a "fixed" capital buffer of 2.5% of common equity on top of the 4.5% minimum capital requirement. The countercyclical capital buffer (CCB) would be placed on top of the fixed buffer. If applied at its maximum 2.5% amount, the CCB would thus require that a bank maintain equity capital of at least 9.5 % of risk-weighted assets in order to remain unencumbered by restrictions on capital distributions. There is a view held by some that large banks would be under considerable market pressure to maintain their capital levels above the 7% total minimum requirement and fixed buffer (as well as the added systemic surcharge for those banks subject to it), even in stressed periods.*

19 Idem.

20 *See Basel Committee on Banking Supervision (BCBS) (2010).*

21 *For a useful discussion of the pros and cons of variants on CCBs, see Elliott (2011).*

22 *A draft policy statement was published even before the April 1 effective date of the new FPC authority. See Bank of England (2013).*

5| High priority to developing measures to control the structural vulnerability presented by short-term wholesale funding

The shared vulnerabilities of large banking organisations as a whole are underscored by something omitted from Sir Andrew's otherwise prescient speech – the potential for damaging fire sales, itself exacerbated by the prevalence of short-term funding. The use of short-term wholesale funding was hardly unknown among major financial firms in the 1990s, but broadened significantly thereafter, both within large firms and in sponsored entities such as the now infamous structured investment vehicles (SIVs) used to fund asset-backed securities. This trend was a dramatic example of the ways in which traditional lending and capital market activities had become increasingly integrated and another example of how prudential regulation had not quickly enough adjusted to that trend.

Last fall, as we observed the five-year anniversary of Lehman Brothers' failure, numerous retrospectives on the crisis reminded us of its multiple causes. But the practice of many firms, including all those with sizeable broker-dealers, of funding large amounts of assets with short-term wholesale funding was an accelerant of the problems that had grown within the financial system. When questions arose about the quality of some of the assets on which short-term funding had been provided, investors who had regarded short-term secured lending as essentially risk-free suddenly became unwilling to lend against a wide range of assets. Then ensued the classic adverse feedback loop, as liquidity-strained institutions found themselves forced to sell positions, which placed additional downward pressure on asset prices, thereby accelerating margin calls on leveraged actors and amplifying mark-to-market losses for all holders of the assets.

Although the amounts of short-term wholesale funding have come down from their pre-crisis peaks,[23] this structural vulnerability remains, particularly in funding channels that can be grouped under the heading of securities financing transactions (SFTs).[24] The use of such funding surely has the potential to increase again during periods of rapid asset appreciation and ready access to leverage. While SFTs are an important and useful part of securities markets, without effective regulation they can create a large run risk, and can thus increase systemic problems in various asset and lending markets.

As emphasised by Jean Tirole in his important analysis of the role of illiquidity in the recent crisis,[25] the risks associated with short-term funding are as much or more macroprudential as they are firm-specific. From a microprudential perspective, SFTs are low risk, because the borrowing is short-dated, overcollateralised, marked-to-market daily, and subject to remargining requirements. Capital charges are low because credit risk is low. The liquidity coverage ratio (LCR) recently adopted by the Basel Committee is an important step forward for financial regulation, since it will be the first broadly applicable quantitative liquidity requirement for banking firms. But it, too, has a principally microprudential focus, since it rests on the implicit premise that maturity-matched books at individual firms present relatively low risks.

While maturity mismatch by core intermediaries is a key financial stability risk in wholesale funding markets, it is not the only one. Even if an intermediary's book of securities financing transactions is perfectly matched, a reduction in the intermediary's access to funding can force the firm to engage in asset fire sales or to abruptly withdraw credit from customers. The intermediary's customers are likely to be highly leveraged and maturity transforming financial firms as well, and, therefore, may then have to engage in fire sales themselves. The direct and indirect contagion risks are high.

23 *In 2006, just before the onset of the stresses that eventually led to the financial crisis, the largest US financial firms relied on short-term wholesale funding for about half their total funding needs, and deposits for just over a third. Today (or, more precisely, as of the end of the second quarter of 2013) those proportions are almost exactly reversed. Some of the change is likely due to changes in risk assessment and supervisory expectations. But it is also true that deposits were a safe haven for many households and non-household investors during the crisis. It may be that, as financial and economic conditions continue to normalise, households and other investors will move more deposits into other investment vehicles.*

24 *Included in this grouping are repo, reverse repo, securities lending and borrowing, and securities margin lending.*

25 *See Tirole (2011). See also Farhi and Tirole (2012).*

The dangers thus arise in the tail and apply to the entire financial market when normally safe, short-term lending contracts dramatically in the face of sudden and significant uncertainty about asset values and the condition of counterparties. Macroprudential regulatory measures should force some internalisation by market actors of the systemic costs of this intermediation.

There are two kinds of policy options that can be considered, individually or together, in responding to the financial stability vulnerabilities inherent in firms with large amounts of short-term wholesale funding, whether loaned, borrowed, or both. The first would impose a regulatory charge calculated by reference to reliance on SFTs and other forms of short-term wholesale funding, whether the firm uses that funding to finance inventory or an SFT matched book. The second would directly increase the very low charges under current and pending regulatory standards applicable to SFT matched books.

Among the first set of options, the idea that seems most promising is to tie capital and liquidity standards together by requiring higher levels of capital for large firms that substantially rely on short-term wholesale funding. The rationale behind this policy option is that, while there is need for solid requirements for both capital and liquidity, the relationship between the two also matters. For example, a firm with little reliance on short-term funding is less susceptible to runs, and thus to the need for engaging in fire sales that can depress capital levels. A capital surcharge based on short-term wholesale funding usage would add an incentive to use more stable funding and, where a firm concluded that higher levels of such funding were nonetheless economically sensible, the surcharge would increase the loss absorbency of the firm.

The second kind of policy option is to address head-on the macroprudential concerns arising from large matched books of securities financing transactions. A capital surcharge is in some respects an indirect response to the problem of short-term wholesale funding runs and, as earlier noted, current versions of capital and liquidity standards do not deal with the matched book issues discussed earlier. One might choose either to increase capital charges applicable to SFT assets or to modify liquidity standards so as to require firms with large amounts of these assets to hold larger liquidity buffers or to maintain more stable funding structures.

It is important to note that requirements building on any of the foregoing options would by definition be directly applicable only to firms already within the perimeter of prudential regulation. The obvious questions are whether these firms at present occupy enough of the market that standards applicable only to them would be reasonably effective in addressing systemic risk and, even if that question is answered affirmatively, whether the imposition of such standards would lead to a significant arbitrage through increased participation by those outside the regulatory perimeter. It does not seem farfetched to think that, with time and sufficient economic incentive, the financial, technological, and regulatory barriers to the disintermediation of prudentially regulated dealers could be overcome.

For this reason, there is a need to supplement prudential bank regulation with a third set of policy options in the form of regulatory tools that can be applied on a market-wide basis. That is, regulation would focus on particular kinds of transactions, rather than just the nature of the business model of a firm engaging in the transaction. To date, over-the-counter derivatives reform is the primary example of a post-crisis effort at market-wide regulation. Given that the 2007-2008 financial crisis was driven more by disruptions in the SFT markets than by disruptions in the over-the-counter derivative markets, comparable attention to SFT markets is surely needed. Over the past two years, the FSB has been evaluating proposals for a system of haircuts and margin requirements for SFTs. In its broadest form, a system of numerical floors for SFT haircuts would require any entity that wants to borrow against any security to post a minimum amount of excess margin that would vary depending on the asset class of the collateral.

One reason I place a high priority on measures to address the vulnerability created by short-term wholesale funding is that the development of these measures does not depend so heavily on identifying when credit growth or asset prices in one or more sectors of the economy have become unsustainable. Instead, an externality analysis can help identify the points of vulnerability and guide the fashioning of appropriate regulations. Indeed, time invariant policies may be better suited to containing certain kinds of risks than would policies requiring regular adjustment. Obviously, judgment will still be needed to determine the degree of

constraint to be imposed on relevant activities of large banking organisations. But unlike real-time measures – where quick but not precipitous action will be of the essence if those measures are to be useful – the adoption of structural constraints can proceed with the full opportunity for debate and public notice-and-comment that attends rulemaking processes.

6| Conclusion

The four propositions I have presented here are generally intended to outline the contours of a macroprudential approach to the regulation and supervision of large financial institutions, not to identify or elaborate specific policies. But I will close by saying that specific policies to counteract the structural vulnerabilities created by short-term wholesale funding are a priority, not just for the stability of our large prudentially regulated institutions, but for the financial system as a whole. A macroprudential reorientation of our bank regulatory policies will require a range of continuing work on resiliency, on other structural measures, and on the effective blending of macroprudential with traditional microprudential regulatory and supervisory policies. Even as we make more progress in these areas, our efforts will not be adequate or complete without measures addressing what I have termed an accelerant of systemic problems.

References

Acharya (V. V.), Brownlees (C.), Farazmand (F.) and Richardson (M.) (2011)
"Measuring systemic risk", in *Regulating Wall Street: The Dodd-Frank Act and the new architecture of global finance*, *Wiley Publishers*, pp. 87-119.

Adrian (T.) and Brunnermeier (M.) (2011)
"CoVaR", Federal Reserve Bank of New York, *Staff Reports*, No. 348, September.

Bank of England (2013)
"The financial policy committee's powers to supplement capital requirements", January.

Basel Committee on Banking Supervision (2010)
"Guidance for national authorities operating the countercyclical capital buffer", p. 1.

Basel Committee on Banking Supervision (2011)
"Basel III: a global regulatory framework for more resilient banks and banking systems", p. 57, June.

Basel Committee on Banking Supervision (2013)
"Global systemically important banks: updated assessment methodology and the higher loss absorbency requirement", July, *http://www.bis.org/publ/bcbs255.htm*

Billio (M.), Getmansky (M.), Lo (A. W.) and Pelizzon (L.) (2010)
"Measuring systemic risk in the finance and insurance sectors", MIT Sloan School, *Working Paper*, No. 4774, Cambridge, MIT Sloan School of Management, March.

Brownlees (C. T.) and Engle (R. F.) (2011)
"Volatility, correlation and tails for systemic risk measurement", New York University, *Working Paper*, June.

Clement (P.) (2010)
"The term 'macroprudential': origins and evolution", BIS, *Quarterly Review*, pp. 2-3, March.

Crockett (A. D.) (2000)
"Marrying the micro- and macroprudential dimensions of financial stability", remarks before the 11th international conference of banking supervisors, Basel, September 20.

Elliott (D. J.) (2011)
"An overview of macroprudential policy and countercyclical capital requirements", *http://www.brookings.edu/research/papers/2011/03/11-capital-elliott.aspx*

Elliott (D. J.), Feldberg (G.) and Lehnert (A.) (2013)
"The history of cyclical macroprudential policy in the United States", Federal Reserve Board, *Finance and Economics Discussion Series*, No. 29, May.

Farhi (E.) and Tirole (J.) (2012)
"Collective moral hazard, maturity mismatch and systemic bailouts", *American Economic Review*, 102(1), pp. 60-93.

Federal Reserve System (2012)
"Policy statement on the scenario design framework for stress testing", November 15, *http://www.federalreserve.gov/bankinforeg/bcreg20121115a4.pdf*

Financial Stability Board (2010)
"Intensity and effectiveness of SIFI supervision: recommendations for enhanced supervision", November 2, *http://www.financialstabilityboard.org/publications/r_101101.pdf*

Financial Stability Board (2013)
"Recovery and resolution planning for systemically important financial institutions: guidance on developing effective resolution strategies", July 16, *http://www.financialstabilityboard.org/publications/r_130716b.pdf*

Galati (G.) and Moessner (R.) (2011)
"Macroprudential policy: a literature review", BIS, *Working Paper*, No. 337, February.

International Monetary Fund (2011)
"Macroprudential policy: an organising framework", March 14.

Liang (N.) (2013)
"Implementing macroprudential policies", conference on financial stability analysis", Federal Reserve Bank of Cleveland and Office of Financial Research, May 31, *http://www.clevelandfed.org/events/2013/financial_stability/pdf/Implementing_Macroprudential_Policies_May31-2013_final.pdf*

Minsky (H. P.) (1992)
"The financial instability hypothesis", *http://www.levyinstitute.org/pubs/wp74.pdf*

Schularick (M.) and Taylor (A. M.) (2012)
"Credit booms gone bust: monetary policy, leverage cycles and financial crises, 1870-2008", *American Economic Review*, 102(2), pp. 1029-1061.

Tirole (J.) (2011)
"Illiquidity and all its friends", *Journal of Economic Literature*, 49(2), pp. 287-325.