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An Overview of Macroprudential Policy and Countercyclical Capital Requirements[1]

The recent severe financial crisis which led to the "Great Recession" represented a serious failure of economic management and financial regulation. Post mortem analysis of the crisis has brought to the fore a set of ideas for the use of "macroprudential" tools to improve regulation. This awkward term refers to an approach to financial regulation that fills the gap between conventional macroeconomic policy and traditional "prudential" (or "safety and soundness") regulation of individual financial institutions. The concept is to manage factors that could endanger the financial system as a whole, even if they would not be obvious as serious threats when viewed in the context of any single institution. Risks that are common to many financial institutions simultaneously, such as excessive exposure to housing credit, can combine with a high degree of interconnections between financial institutions to create systemic risks even when each individual institution appears sound, absent the potential for financial contagion.

As Paul Tucker, Deputy Governor of the Bank of England for Financial Stability, put it, "there is a missing set of instruments. The big question is whether a set can be devised that stack up not only in theory but in practice; instruments that can be used in the real world.[2]" This paper explains that missing set of instruments and how they might work. The first section makes the case for macroprudential policy, with particular emphasis on counter-cyclical capital requirements as the key tool. The remainder of the paper provides an extended primer, in question and answer format, with considerably more detail on the key questions that need to be addressed in regard to macroprudential policy.

The Case for Macroprudential Policy and the use of Counter-cyclical Capital Requirements

The combination of traditional monetary policy and conventional financial regulation signally failed to prevent the near-collapse of the global financial system in 2008. The ensuing crisis demonstrated with great clarity why the stability of the financial system is so important – when finance freezes up, the rest of the economy suffers very badly. The crisis triggered the worst global recession since the Great Depression and led to subsequent massive government responses, the budgetary costs of which we will be paying for many years to come. Nor was this crisis a rare exception; there have been many lesser and

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[2] Paul Tucker speech of October 22, 2009.

more contained financial crises around the world in the modern era which still wreaked considerable havoc even if they did not evoke fears of a worldwide depression as this one did[3].

It is theoretically possible that better execution of both conventional monetary policy and financial regulatory approaches could avoid future severe financial crises. However, there is a growing consensus that macroprudential policy tools are, at the least, better for preserving overall financial stability, and may well be essential.

Conventional monetary policy has arrived at a level of sophistication which makes it quite effective in controlling the average rate of inflation of the prices of goods and services in the aggregate. This sophistication has been achieved through years of theoretical work and by observing the effects of both mistaken and sound decisions over a number of decades. However, it is difficult to use monetary policy additionally to deal with a second target of avoiding asset price bubbles fueled by excessive borrowing in an economy. The run-up to the recent crisis demonstrated once again that serious bubbles can develop alongside the presence of the traditional markers of good monetary policy – low and stable inflation rates for goods and services. Even those theorists and policymakers who believe monetary policy has a significant role to play in taming excessive cyclicality in finance acknowledge that it is a blunt instrument for this purpose and hard to use. Raising interest rates sufficiently to knock the wind out of excessive speculation could require such a sharp rise that it would substantially slow overall economic growth or even induce a recession. A more focused suite of tools might well accomplish the same objectives at substantially lower economic cost.

Similarly, conventional financial regulation is clearly important and can do a good job of ensuring that individual financial institutions have the resilience to withstand their own idiosyncratic mistakes and misfortunes. However, the crisis highlighted the many ways in which systemic risks can render a seemingly strong bank weak. For example, financial institutions around the world had taken on so much exposure to housing risks that the bursting of that bubble caused a spiral downward in the valuations of mortgage-related instruments that went far beyond conventional expectations. Individual institutions and their regulators made assumptions about risk levels that were based on the behavior of housing and financial markets over the preceding half century, not recognizing that systemic exposures to housing were so large that the bursting of the bubble would create unprecedented problems. Similarly, financial institutions had taken on very large levels of exposure to each other, exposures that did not seem frightening when the institutions were all considered strong, but which caused a domino effect of failures and near failures as some of the major institutions became questionable.

At this point, few would argue with the basic concept that traditional financial regulation, now called "microprudential," needs to be supplemented by macroprudential approaches that look at common exposures throughout the system and at interconnections between key institutions that would pose wider risks if such an institution failed. To be truly useful, policymakers will need to do more than just observe those risks; they will also need to use tools to reduce risk levels over time.

[3] See Rogoff and Reinhart (2010), among others, for a detailed listing and analysis of past crises and their effects.

The overall goal of macroprudential policy would be, in the words of the Bank of England (2009), "maintaining a stable provision of financial services to the wider economy – payments services, credit supply, and insurance against risk." In particular, it would be desirable to reduce the size, frequency, and damage created by asset price bubbles linked to excessive credit booms, given that the bursting of such bubbles can severely damage the rest of the economy, as was just demonstrated. The prime way in which the real economy is harmed is through a freezing of the financial system as fears of widespread collapse lead to a sharp reduction in financial activity of all kinds, including lending to all but the safest parties. Modern economies rely heavily on the smooth working of the financial system, which links together almost all economic actors.

The focus is on asset price bubbles because they have a clear capacity to become very large and widespread and to reach deeply into most financial institutions, setting off severe financial crises when the bubbles burst. However, certain asset price bubbles, such as the "Tech Bubble" of a decade ago, are not closely associated with excessive credit expansion and tend to have much less effect on banks and other core financial institutions. These are less dangerous to the larger economy, because they do not threaten a freezing of the financial system. Therefore macroprudential theory emphasizes the risk from asset bubbles associated with credit booms.

The overall macroprudential goal, and the necessary tools, can be broken down into two categories. The first set of approaches focuses on the cyclical element of the problem, with particular emphasis on increasing the financial system's resilience as cyclical risks rise. Ideally, macroprudential policy would go still further, by damping down the cycles in the first place. Unfortunately, many analysts doubt that even the addition of effective macroprudential tools will be enough to enable policymakers to avoid or substantially dampen credit cycles and asset bubbles. Therefore, these analysts urge policymakers to emphasize the need to increase systemic resilience as risks rise, rather than wasting too much energy on attempting to "order back the tide" as King Canute so famously demonstrated that policymakers cannot do. The good news is that most of the tools to increase resilience as cyclical risks rise are also potentially capable of achieving at least some reduction in the cyclicality as well. For example, the idea of "counter-cyclical capital requirements" is to require banks to hold more capital during booms, as underlying aggregate risk levels rise, in order to build up the level of protection available to handle the likely subsequent bust. Since capital is expensive to hold in practice, this also makes lending less attractive and may damp down some of the excessive growth of credit provision that is a hallmark of an unhealthy boom.

The second set of approaches to reducing damage from cycles is to identify those institutions and markets that present substantial systemic risk and to take actions to increase their resilience across the board, not just when cyclical risks seem most pressing. This has the advantage that it can work even if cycles are not identified in a timely manner. For example, the largest and most active financial institutions may be deemed to be "systemically important financial institutions" (SIFIs) and could be required to hold more capital and liquidity or to restrict some of their activities. This would not be directly related to financial cycles, but would be intended to increase overall systemic resilience by

reducing the potential for domino effects as the failure of one major financial institution triggers another during a bust.

This paper will primarily focus on the use of macroprudential policy in a cyclical context and particularly on the use of counter-cyclical bank capital requirements, which is the tool that appears to be most favored for this purpose by regulators and policymakers. It has been endorsed by the coordinating body for global banking regulators, the Basel Committee on Banking Supervision, as well as by many other policymakers and analysts.

Counter-cyclical capital requirements build on an important existing tool of microprudential regulation, the requirement that banks hold at least certain levels of "capital" to back the risks that they take. In simplest form, capital represents the portion of a bank's assets on which no one except the shareholders of the bank has a claim. Since there is normally no public policy reason to protect shareholders, this represents a cushion of protection against losses due to mistakes and misfortune that is available before the damage becomes so large that depositors or other parties that policymakers care about might have to lose money.

Required capital ratios are traditionally static, but macroprudential theory would call for them to increase at times when exuberance is leading to higher aggregate risk-taking during booms, and be allowed to decrease during credit busts. The build-up of capital as aggregate risk levels rise during the "good times" would increase the ability of the banks to withstand the eventual losses during the bust, which hopefully would mean that they would not be obliged to cut back as far on lending when credit contracts. As noted already, there is also the hope that forcing the addition of costly capital during a boom would somewhat diminish the desire of banks to lend excessively, thereby reducing the size of any bubble.

Counter-cyclical capital requirements are favored by many advocates for several reasons:

- They avoid the problems caused by regulators making absolute choices for the banks, such as putting a limit on the volume of their lending or forbidding certain types of loans. Raising capital requirements, like raising taxes, discourages certain activities but will not stop them if they in fact make strong economic sense. This flexibility also somewhat reduces the incentive for banks to game the rules.

- Capital costs are a significant factor in bank lending decisions and therefore do provide a policy lever known to influence credit allocation. Related to this, there is a considerable history with the use of capital requirements which provides guidance to banks and regulators.

- Capital is a direct defense against losses and therefore increases in its level clearly improve the resilience of the system.

- It has the advantage already noted of both directly affecting resilience and directly and indirectly providing incentives to change lending behavior.

There are a number of other macroprudential tools available, including changes in the maximum loan-to-value ratio on mortgages or other secured loans and the imposition of absolute limits on lending volumes. The body of this paper discusses these at considerable length along with how they might be used in conjunction with counter-cyclical capital requirements.

It is still early days in the development of a systematic approach to the use of macroprudential policy. There are many issues still to be worked through, as explained in detail in the body of this paper, including: how to detect when financial conditions warrant macroprudential action; what to do at that point and how strongly to act; what governance structures are likely to work best for the macroprudential policymakers; and how to coordinate within and between countries. These are difficult issues and mistakes will unquestionably be made in the early years, some of which will look quite glaring in hindsight. New capital requirements and other restrictions might prove to be too harsh on average and act as a drag on economic growth; uncertainty introduced by the new macroprudential instruments could also reduce economic activity; lack of coordination within and across countries could reduce the effectiveness and increase the costs of macroprudential policies; and there is the possibility that regulators will systematically err in their use of the tools. Any discussion of macroprudential tools must address both the benefits and the potential costs of the new approach.

However, the risks and costs should not stop policymakers from moving forward. The current approaches expose the financial system and the public to terrible risks, such as a repetition of the recent severe crisis. Improvements can doubtless be made in existing techniques but there are major structural reasons why the policy gap exists that macroprudential approaches are intended to fill. Tweaking conventional monetary and microprudential regulatory policy appears unlikely to eliminate these major problems. Better to make mistakes along the path towards sound macroprudential management than to avoid those mistakes but live with the current unacceptable systemic risks. Mistakes are inevitable in establishing any complicated management system, but it would be a bigger mistake to remain bound to the blunt and inadequate instruments that policymakers have previously used, and which worked so badly in the recent crisis.

The Primer

This paper is intended to provide an overview of macroprudential theory that can be understood by someone who is not an expert in financial regulation. The body is structured as a series of questions and answers in order to make it more accessible and to allow readers to focus on those questions of most interest to them. This report will be followed by a series of papers that address many of the key issues in considerably more detail and more rigor.

The author would like to acknowledge the work of the pioneers in this field, particularly the group associated with the Bank for International Settlements (BIS), spearheaded by Claudio Borio, and those at the Bank of England who have done so much good analysis in recent years. As they would all acknowledge, there remains a great deal of work to be done to bring macroprudential policy into the core of economic management and financial regulation, but at least we can move the analysis forward on a sound base built by these pioneers. In addition to the bibliography attached to this paper, which primarily includes research directly referenced in this paper, there are two other good bibliographical sources. The BIS recently published an excellent and very thorough literature review (Galati 2011) and the International Centre for Financial Regulation has a shorter, but well-annotated, bibliography (ICFR 2011).

The questions are grouped together in the following order:

Background

- Why do credit swings occur?
- Why do they matter?
- How do traditional monetary mechanisms affect credit volumes?
- Why are monetary policy tools no longer fully adequate for financial stability?

Overview of macroprudential theory

- What does “macroprudential” mean?
- What macroprudential tools are available?
- What is capital?
- What are the requirements for bank capital?
- How are capital requirements set?
- How do capital requirements affect the supply of credit?
- How precise an instrument is this?
- Why is countercyclical capital the favored approach of many policymakers?
- Can macroprudential policy eliminate asset price bubbles?

Mechanisms for implementing macroprudential policy

- How would dynamic changes to capital requirements work?
- How can we measure when intervention is necessary?
- Should interventions be done in small steps?
- How could the right counter-cyclical multiples be determined?
- Would the capital surcharges be the same for all banks in a single country, for all products, individually by bank, or some combination?
- Could other macroprudential tools complement capital requirements?
- What alternative tools are available?
- How would the various tools be combined?

Experience to date

- What evidence is there about how changes in capital standards have worked in the past?
- How have alternative tools worked historically?

Coordination issues

- How would credit suppliers other than banks be handled?
- How would cross-border linkages be handled?
- What entities should conduct macroprudential policy?
- Would they be national, regional, global or some of each?
- What entities will conduct macroprudential policy in the US, UK, and the EU more generally?
- How would they coordinate with their counterparts in other countries or regions?
- How would they coordinate with central banks?
- How would the multiplier change if further prudential changes are made in the future, such as through a "Basel IV" agreement?
- How would the authorities deal with any regulatory arbitrage that developed?

Risks

- Will there be a risk of having too little capital for prudential purposes at times?
- Can banks adjust their longer-term commitments to capital ratios that move?
- To what extent would authorities use subjective judgment?
- How would the proper transparency and accountability be achieved?
- How would the authorities counter political pressure not to puncture bubbles?
- What if macroprudential policy is not useful and workable?

Background

Why do credit swings occur?

History shows that credit conditions tend to alternate between "easy" periods, when credit is readily available at lower than average prices, and "hard" periods when it is difficult to borrow and pricing is higher than average. Aikman et. al. (2010) show that there are cyclical fluctuations in inflation-adjusted loan growth that recur in the range of every 8-20 years, whereas business cycles in the wider economy occur every 2-8 years. Not surprisingly, given the disparity in the average length of the cycles, the business cycle fluctuations "were typically not found to account for much of the overall cyclical variation in credit." They conclude that "credit growth exhibits a clear cyclical pattern with a medium-term orientation. The credit cycle appears to be a well-defined empirical regularity. It also appears to have been operating for well over a century."

Why do credit cycles occur? Some of this alternation is due to deliberate monetary policy, because relaxation of credit tends to encourage economic growth and inflation while tightening conditions work in the opposite direction, damping inflation at the expense of slowing growth. For example, the US Federal Reserve Board (Fed) deliberately pushed interest rates up sharply in the late 1970's in order to

slow the economy in order to combat a serious and increasingly dangerous pattern of inflation. However, monetary policy is almost always tied to the business cycle and Aikman showed that credit cycles are largely independent of overall business cycles.

The credit cycle appears to be created by, or considerably exaggerated by, the dynamics of financial institutions and markets. The simplest way to think about this is in terms of Keynes' "animal spirits." There are times when over-optimism is the order of the day and lenders become too willing to lend, followed by times in which there is an over-reaction towards pessimism and only the most creditworthy are able to borrow and then only at excessive prices.

Digging deeper, there are a number of more subtle reasons why these swings occur that are related to incentive problems within financial institutions and markets, combined with flaws in human decision-making.

These problems, described below, include:

- Money illusion
- Risk illusion
- Herding behavior
- Market share orientation
- Compensation incentives
- Fire sales
- Moral hazard
- Accounting and regulatory distortions

Money illusion. This is what economists call a tendency for people to focus on nominal returns on investments or interest rates rather than inflation-adjusted or "real" returns. One way that this manifests itself is the "search for yield" that occurs when overall interest rates decline. Investors may willingly hold a safe investment that returns 6% when inflation rates are 5%, for a 1% real return, and yet be unhappy about receiving a 2% return when inflation is 1%. In line with this, lenders tend to "stretch for yield" by accepting more risk at times when nominal rates are low.

Risk illusion. There is a tendency for humans to ignore or underestimate risks after a long period of "good times," such as we had experienced prior to the recent financial crisis. This is discussed at some length below.

Herding behavior. An executive at a lending or investing institution is much less likely to be fired for losing money following the same mistaken belief as the large majority of their colleagues, but can easily lose his or her job by making a mistake that others do not, notwithstanding an overall track record that is considerably better than average. Keynes put it well many years ago, stating that a "sound banker, alas, is not one who foresees danger and avoids it, but one who, when he is ruined, is ruined in a

conventional and orthodox way with his fellows, so that no one can really blame him.[4]" A fancier version of the same problem is produced by "benchmarking" at investment firms or within banks, whereby performance is judged explicitly relative to peers or the industry as a whole[5]. Statistically, Aikman et. al. (2010) find that reported earnings of banks are grouped more tightly together over time than is the case for non-financial companies, despite the fact that the higher financial leverage of banks would be expected to exaggerate performance differences. They state that this "is consistent with stronger herding instincts in banking" than in other industries. For this and other reasons, there is a strong tendency for lenders to move in a pack, easing credit conditions and lowering prices at the same time that others are doing so.

Market share orientation. This ties into another bias, which is that lending institutions are generally reluctant to lose market share, and therefore often respond to competitive pressures to provide a better deal to borrowers, even when this means charging too little for the risk. The rational aspect of this relates to the tendency of banking relationships to persist for many years, as long as the lender does not offend the customer by pulling back and refusing to meet market terms. Therefore, bankers may be willing to live with under-pricing if they believe that market conditions will return to normal before too long. Unfortunately, too often the under-pricing continues for a long period, over the course of which it may become quite severe, as in the boom leading to the recent crisis.

Compensation incentives. Exacerbating the other problems, the incentives of individual bankers may be distorted by an over-emphasis on shorter-term performance and market shares. This is made worse by up-front fees that often constitute a significant part of the overall return for a bank on a loan to a large corporate borrower. Bonuses that focus too much on volume levels and on initial fee levels can constitute a strong incentive to go along with the herd, rather than lose under-priced business.

Fire sales. Credit crunches and bursting asset bubbles normally force large volumes of asset sales in a compressed period, creating the phenomenon of "fire sales," analogous to the loss of value to a business that must sell everything quickly after a fire. Hanson et. al. (2010) construct a model that focuses on the "fire sales" of assets that become necessary in a credit crunch, as well as the knowledge by financial market participants of the cyclicality that leads to periodic credit crunches. They conclude that "financial institutions have overly strong incentives to both i) shrink assets rather than recapitalize ex post, once a crisis is underway; and ii) operate with too-thin capital buffers ex ante, thereby raising the probability of an eventual crisis and system-wide balance sheet contraction."

Moral hazard. Moral hazard refers to the tendency to act irresponsibly if an insurer or other party will absorb the cost if things go wrong. In theory, one would expect the various market inefficiencies to be ameliorated by actions of the equity and debt investors who supply the funds used by banks to provide credit. In practice, this does occur to a considerable extent, with managements sometimes forced to scale back their plans or correct problems as a result of financial market reactions. However, these

[4] Quote taken from Aikman et. al. (2010).
[5] See Bank of England (2009) for a discussion of this.

investors may be subject to many of the same illusions and institutional constraints as are the banks, such as the search for yield or the instinct to herd together.

In addition, most of the funds employed by banks are supplied by depositors or the debt markets. Unfortunately, these suppliers of funds often assume that, in the event of serious problems, governments will rescue the banks in which they put their funds. This moral hazard problem is both pernicious, because it removes a major constraint on the banks, and difficult to root out, since the underlying assumption is often true. The extreme form of moral hazard exists for bank deposits that are fully covered by insurance funds that effectively have government guarantees. There is little reason for such a depositor to care about the riskiness of a bank's actions. Even non-guaranteed debt exhibited some of the same tendencies in recent years since debtholders often correctly assumed that the largest banks in the world would not be allowed by their home governments to default in a time of crisis. Creditors still paid some attention to the riskiness of banks, because they could not be *certain* their bank would be rescued, but the incentives to be careful were much diminished by the moral hazard.

Accounting and regulatory distortions. Accounting rules and prudential regulations both contribute in various ways to making the financial system more cyclical than it would otherwise be. For example, "mark to market" accounting, which causes some paper gains and losses to show up immediately on the financial statements, increases the perceived ability of banks to take risks during upswings and decreases it during downswings, exacerbating the natural tendency towards credit cycles. On the regulatory side, there is a substantial literature pointing out ways in which the Basel capital rules encourage cyclical swings[6].

In sum, there are strong theoretical reasons for credit cycles, and they certainly recur in practice, sometimes quite strongly. How do they play out? Tucker (2009) gives a nice summary of what happens when an asset price bubble grows with the strong support of excessive liquidity, a concept that overlaps heavily with excessive credit growth:

> "Usually, material rises in asset prices are <u>initially</u> triggered by reasonable perceptions of a favourable shift in fundamentals. In the latest episode, that plausibly included improvements in monetary policy regimes, in the flexibility of the real economy, in the outlook for global costs, and in enriched instruments for hedging and dispersing risks. But it is very hard for anyone to gauge the extent of the warranted revaluation of asset prices. If investors and shareholders extrapolate forward *ex post* windfall gains into forward looking *ex ante* required returns, funds and banks may be incentivized to increase risk in order to deliver.
>
> In an environment of rising asset prices, continuing strong investor demand and high volumes in primary and secondary markets, liquidity is typically abundant. Liquidity premia fall, adding to the upward pressure on asset values. That liquidity may not in fact be resilient, but it can easily look like it to market participants. And with the ability to fund and to manage risk in the markets

[6] See, for example, Tarullo (2008), Gordy and Howells (2004), and Goodhart (2009).

looking straightforward, financial firms feel they can relax the supply of credit – to real economy borrowers and to each other.

When the music stops, almost whatever the trigger, four problems arise – at least. First, some borrowers – households, firms, and financial intermediaries – prove to be over indebted. Second, it can be hard to tell who has fundamental problems and who does not: the so-called Lemon Problem. Third, some of the assumptions on which financial activity has been predicated turn out to be (or to seem to be) invalidated; e.g., in the current crisis the reliability of ratings of ABS. Fourth, the demand for liquidity rises, and its supply falls back. Rising liquidity premia and forced sales depress asset values. Credit supply is reined in. A vicious circle is threatened by the excess leverage and liquidity mismatch that have developed in the financial system during the upswing."

Why do they matter?

Unfortunately, credit swings do not affect just the particular borrowers and lenders; they can have a powerful aggregate effect on the overall "real economy," the portion of the economy that is not primarily financial in nature. The recent financial crisis from which the Western world is still recovering provides vivid examples of this. The housing bubble that was the biggest individual contributor to the crisis was an extreme example of a loosening of credit conditions. In the US, for instance, many borrowers were able to obtain large home loans without providing much documentation of their financial condition, something that usually occurs only when credit is very easy. They were also able to borrow a higher percentage of a house's value than normal and otherwise enjoyed looser lending standards. As the crisis snowballed in 2008, credit conditions rapidly became extremely tight such that even many sound borrowers were shut out of the market temporarily or were forced to pay exorbitantly high rates. The severe credit squeeze was a major cause of the economy's abrupt slowdown that created the worst recession since the Great Depression.

Aikman et. al. (2010) analyze the incidence of serious financial crises from 1880-2008 across 12 countries and find that more than half of them were preceded by a credit boom. For Anglo-Saxon countries such as the US, UK, and Australia, the figure was roughly 75%. As they state, this "is relatively concrete evidence of the credit cycle having real and damaging effects on output," given the high degree of economic damage caused by severe financial crises.

The damage to the overall economy from severe financial crises should not be under-estimated. The US "got off light" in many ways from the recent financial crisis, yet still suffered a loss of output of about 4% from the previous peak, the worst performance since the Great Depression. Studies by Rogoff and Reinhart (2009), among others, show that the cumulative drop in economic activity after severe financial crises averages closer to 9%. Further, the recovery from recessions induced by such crises is much slower on average than from regular "business cycle" recessions, as we are painfully experiencing today. Severe financial crises do terrible harm to the larger economy and it would therefore be worth a great deal to avoid or minimize them.

Easy credit conditions not only increase the vulnerability of the financial system to bursting asset bubbles, but can also contribute directly to creating asset price inflation, as was evidenced in the recent boom. The ability to borrow money cheaply and easily encouraged a great deal of speculation in housing, stocks, bonds, and commodities. This speculation helped feed a classic series of bubbles in which the appreciation in various markets led to even more speculation, often fueled by borrowing, which then pushed prices up even higher, encouraging another round of borrowing and speculation[7]. This particular credit boom was also fueled by "mark to market" accounting practices. The investments held by various banks and other financial institutions saw their market values increase as part of the general boom, which then fed through into a higher accounting value for the net worth of the bank, which made the banks appear safer and therefore able to expand their volume of lending still further. As noted, most financial bubbles combine asset price inflation with substantial spikes in the level of credit in the economy.

A credit crunch generally works in the exact opposite direction to a boom, as it did when the recent bubbles burst. Financial institutions pulled back on their lending and increased their loan pricing, which forced many investors to cut back on their speculation by selling assets[8]. These forced sales depressed market prices further, leading to losses and lower capital levels at banks which marked these assets to market, causing them to retreat from lending still further, triggering another round of fire sales by speculators.

How do traditional monetary mechanisms affect credit volumes?

In the US, as in much of the rest of the world, the central bank conducts monetary policy primarily by taking steps to move a targeted short-term interest rate to a desired level. The interest rate level is chosen to try to optimize the mix of economic growth and inflation, according to the best information and theories available to the central banks at the time. Some central banks focus almost solely on inflation rates, viewing their mission as that of maintaining a stable value of their currency in terms of its power to purchase goods and services. Others, such as the Fed, have an additional mandate related to growth; in the US case it is an explicit mandate to try to minimize the unemployment rate, at least on average over the long run.

In theory, the central bank ensures that the targeted short-term interest rate moves as desired by taking a series of actions, such as buying or selling government securities on the open market in order to influence the money supply. In practice, the demonstrated ability of central banks to effectively determine the actual level of the targeted interest rates through actions such as those has made the signaling effect far more important than the enforcement mechanism that it would otherwise have to use. Barring exceptional circumstances, an announcement by the Fed, for example, that it wants to push

[7] See Elliott and Baily (2009) for more on the various bubbles.

[8] Brunnermeier and Pedersen (2008) found that the ability of traders to fund themselves is closely related to overall market liquidity in the securities in which they trade, which is strongly affected by the funding liquidity of these same traders. Therefore, a liquidity crisis can become self-reinforcing as traders lose some ability to fund themselves, which means they provide less liquidity in security markets, which reduces overall market liquidity and leads to a reduction in their own funding, etc.

up the rate at which banks lend to each other overnight, (the "Fed Funds" rate), by half a percentage point will generally lead to an almost instantaneous move of the rate to that level.

There are a number of ways in which central bank monetary policy actions are transmitted to the wider economy, many of which affect lending volumes. (For ease of presentation, the descriptions will generally focus on US monetary policy, except where noted.) These monetary transmission mechanisms include:

Supply and demand of short-term funds. When central banks intervene directly, rather than relying on signaling effects, they most often do so by buying or selling short-term government securities. This works to influence the targeted rate, such as the Fed Funds rate, because there is normally a fairly close relationship between the rate on short-term government securities and the Fed Funds rate, since banks generally look for a relatively stable "credit spread" on top of Treasury rates to compensate them for the credit risk that a bank might not repay the loan. (Government securities denominated in the local currency, especially short-term ones, are usually viewed as carrying no credit risk.) Higher or lower interest rates will generally be passed along to some degree to borrowers, thereby influencing the volume of new credit.

Intermediate and longer-term interest rates. Short-term rates also influence longer-term interest rates, although theoreticians argue about the extent to which a change in short-term rates induced by monetary policy actions will flow through to changes in longer-term rates. One of the reasons for the uncertainty is that many factors go into forecasting future economic conditions and therefore the future course of interest rates. For example, it is possible that an increase in short-term rates will lead to a slowing in the economy which exerts downward pressure on expectations of future interest rates.

Currency exchange rates. Interest rates in a country will generally also affect exchange rates for that country's currency. Higher interest rates tend to increase the demand for securities denominated in that currency, pushing up exchange rates. Working in the opposite direction, higher interest rates are generally assumed to slow economic growth, decreasing expected future demand for the country's currency. There are also other indirect effects of interest rate movements than can affect the value of the currency. As a result, interest rate movements can have significant impact on exchange rates, but the mechanisms are complex and not always easily predictable. Exchange rates in turn can have many indirect effects on the overall economy and on lending volumes, although the ultimate impact can be hard to predict accurately.

Asset prices in general. Many financial assets are of a long enough maturity that the level of interest rates can have a significant effect on their valuation. In theory, and usually in practice, investors pay close attention to the value in today's dollars of the future cash flows they expect to receive from an investment. This means that the discount rate, the interest rate used to calculate today's value of the future cash flows, is quite important. For example, a safe bond with a 5% coupon will be worth about its stated principal value if the discount rate is also 5%, but will be worth somewhat less if the discount rate is 6%. This effect can be seen most clearly in the bond market, where an increase in general interest

rates will almost always cause a decline in the price of bonds. Moreover, the same logic applies with equities and with other assets, such as real estate. Common stock prices decline when interest rates in the economy rise, all else equal, because the future earnings of a company will be worth less in today's dollars. It is more difficult to be sure how this plays out in the stock market, unfortunately, since so many other factors affect stock prices by changing expectations of future earnings. For example, the same forces that cause interest rates to rise may also cause earnings expectations to rise, counteracting the interest rate effect.

Lending is likely to increase when monetary policy reduces the discount rates used by investors and leads to an increase in asset values. The higher asset values make borrowers more creditworthy by raising the value of their collateral and increasing the resources they have to pay off the loan. Lower interest rates can also lower the operating costs of firms and individuals by reducing their interest expense, further increasing their creditworthiness.

Risk aversion and perceptions of risk levels. As noted earlier, banks and other credit providers tend to become willing to accept greater risk when interest rates are particularly low, sometimes referred to as due to a "search for yield." This tendency should not exist with fully rational decision makers operating without institutional rigidities, but it recurs frequently in the real world, leading Borio and Zhu (2008) to propose that a "risk channel" plays a significant role in monetary policy transmission. One implication is that counter-cyclical capital or other macroprudential tools may be useful in restoring an appropriate focus on risk when markets are either too risk-accepting or too risk-averse.

Ioannidou et. al. (2008) demonstrated that Bolivian banks took more risk and charged lower risk premiums when interest rates were lower. Altunbas et. al. (2010) found a similar result in the US and the EU. They found "evidence that unusually low interest rates over an extended period of time contributed to an increase in banks' risks. This result holds for a wide range of measures of risk, as well as macroeconomic and institutional controls."

Tucker (2009) states that, when bubbles are building, "important contributory factors will typically have included illusions about risk-adjusted returns; underestimating the extent to which buoyant conditions are being driven by falling liquidity premia; and a sense that, if the bubble bursts, the central bank will somehow be able to contain the spillovers. This amounts to 'risk illusion', which should probably be as much debated as 'money illusion' is in monetary economics."

Aikman et. al. (2010) built a model of the financial system in which an analogous process to risk illusion plays a central role[9]. They found that this model produced credit cycles that look broadly similar to what we have experienced in reality over the years, suggesting that misperceptions of risk do have a key role in credit cycles.

[9] Their model assumes banks have incentives to coordinate on high risk strategies to boost their short term profitability, out of a fear that failing to do so will send a negative signal to investors about their ability to produce returns as high as those banks that do take too much risk. This is not strictly "risk illusion" since the banks know what they are doing, but the practical effects are likely to be similar.

Capital levels. As discussed in considerable detail throughout this paper, banks generally charge more for loans and provide fewer of them when capital requirements are high. Decreases in capital requirements produce the opposite effect. Regulators, sometimes including central banks, often intervene directly to influence capital levels. In addition, some of the mechanisms described above, such as the effects on asset prices, indirectly influence capital levels. (A general increase in the value of investments will increase the market value of assets held by banks, raising the net worth of these banks. This can happen immediately for assets that are "marked to market," or over time as other assets are sold at a profit.)

Bank reserves. Decades ago, one of the primary effects of a change in monetary policy was a change in bank lending due to increased or decreased reserves held at the central bank. Banks are generally required to keep a portion of the deposit moneys they receive from customers as reserves at the central bank. In earlier times, such reserve levels were often a key constraint on the total volume of lending, especially when deposits provided the great bulk of funds available for lending. Therefore, if the Fed eased monetary policy by buying Treasuries this would increase the capacity for lending by adding to the reserves banks held at the Fed. Similarly, a sale of Treasuries would lower the reserves held at the Fed, reducing the lending capacity of banks.

This monetary transmission channel has become considerably less important as banks have developed other sources of funds besides deposits and as some types of deposits have ceased to carry reserve requirements. In addition, banks in the US currently have very large excess reserves that they are holding at the Fed, reflective of their caution about lending in the present environment as well as a somewhat lower demand from potential borrowers. Thus, the creation of additional reserves at the banks might lead to little change in lending behavior at the moment. Despite its much reduced importance, this reserve mechanism remains one of the key drivers in many theoretical models of monetary policy transmission, as the models have not always kept up with changes in the actual financial system.

Why are monetary policy tools no longer fully adequate for financial stability?

In recent decades monetary policy in the major advanced economies has tended to focus principally on maintaining a low and stable rate of inflation in the prices of goods and services. In some countries, such as the Euro area and the UK, this has been the sole explicit mandate for their central banks. In other countries, such as the US, there is an additional mandate related to employment or overall economic growth. Even in those countries, the long period of the "Great Moderation," when business cycle movements were quite gentle, minimized the emphasis on economic variables besides inflation.

Unfortunately, the recent crisis has demonstrated quite clearly that it is possible to experience a long period of moderate inflation in the prices of goods and services while at the same time asset price bubbles develop, in combination with excessive growth in credit across the economy. (In fact, the very stability of inflation and monetary policy in such a period can help feed an overconfidence among investors and lenders that leads them to take too much risk and place too high a value on their

investments.) Aikman et. al. (2010) point out that between 2000 and 2007, "UK nominal GDP growth exhibited no signs of exuberance, with GDP at trend and inflation at target. Over the same period, UK banks' balance sheets trebled." A similar, although less dramatic, divergence occurred in the US around the same time. Thus, the run-up to the recent crisis is consistent with the finding of an IMF study that "[i]nflation and output do not typically display unusual behavior ahead of asset price busts.[10]"

Asset price bubbles and excessive credit growth can lead to inflation in the prices of goods and services, but these indirect effects can be too muted to lead central banks to step on the brakes in a significant way. For example, asset price bubbles in the US in the 2000's encouraged housing construction, pushed up rents (and rent-equivalents for homeowners), and increased commodity prices that fed through to other measures of inflation. However, overall measures of inflation for goods and services remained relatively tame and central banks were largely unwilling to use overall monetary policy to attack the asset bubbles by slowing down the entire economy. Many central bankers, including Alan Greenspan, held the view that it was either too hard to identify asset price bubbles or that there were too many negative side-effects to using the blunt instrument of interest rates to attack them. Therefore, they held that central bankers must be prepared to clean up after a bubble bursts, if it does, but that there was little to be done in advance of that bleak day, as long as inflation in goods and service prices remained well-behaved.

Supporting this view, Aikman et. al. (2010) show two interesting charts in which they "plot credit cycles in the UK and US from 1880, together with the different monetary policy regimes which have operated over this period. Strikingly, credit cycle dynamics appear to be largely invariant to the monetary policy regime – fixed or floating, rules or discretion, lax or tight. This, too, is indicative evidence that monetary policy may not be the most effective tool for moderating credit fluctuations." In terms of the recent bubble and its painful bursting, they comment that using "monetary policy to tame credit growth over this period would have come at the expense of a destabilization of non-financial activity", since the economy as a whole was not experiencing unusual growth or inflation.

This is clearly not, however, a settled area in economic theory. There are many analysts on the other side of the argument who believe that central banks can and should take credit booms and asset price bubbles into account when determining overall monetary policy. Fortunately for the purposes of this paper, there is wide agreement that monetary policy is a quite blunt instrument for dealing with these kinds of problems and that therefore it would be desirable to find other, more targeted, means for achieving greater financial stability.

A review of the monetary transmission mechanisms described above helps to explain why movements in interest rates tend to be blunt instruments for dealing with potential bubbles (or asset and credit busts, for that matter.) Many of the transmission mechanisms affect credit volumes and asset prices only relatively indirectly. Unfortunately, the effects on the overall economy can be significantly larger than the effects on the bubbles that are being targeted. Slowing the economy down sharply enough will

[10] IMF World Economic Outlook (2009).

generally deflate any bubble, but achieving this goal can require a severe contraction. Naturally, central bankers and politicians are loath to force the economy to absorb this level of pain, which is why there has been a search for better targeted tools for dealing with asset price and credit bubbles.

It may have been that standard monetary policy was more capable of stopping asset and credit bubbles in earlier decades when the financial system was less complex, although Aikman's findings suggest caution about this view. When banks dominated the financial sector and their products and operations were simpler, there may have been a more direct connection between interest rate movements spurred by monetary policy changes and the volume of credit in the economy as a whole. However, such innovations as the advent of widespread securitization of mortgage and other loans considerably reduced the importance of bank balance sheets and therefore the ability of central banks to influence lending decisions by affecting those balance sheets through such steps as increasing the level of bank reserves by buying Treasuries[11].

Overview of macroprudential theory

What does "macroprudential" mean?

There is a range of definitions of macroprudential. All of them are based on the idea that there is a need for a policy approach that falls between macroeconomic management and traditional prudential regulation of financial institutions. However, various definitions are broader or narrower or focus on different aspects of regulation and economic management.

Claudio Borio, one of the earliest and most persistent advocates of macroprudential approaches, has described it as follows[12]:

> "As originally defined, macroprudential is an orientation or perspective of regulatory and supervisory arrangements. It means calibrating them from a system-wide or systemic perspective, rather than from that of the safety and soundness of individual institutions on a stand-alone basis. It means following a top-down approach, working out the desirable safety standards *for the system as a whole* and, from there, deriving that of the individual institutions within it. It means taking explicitly into account the fact that drivers of risk depend on the collective behavior of financial institutions (are "*endogenous*"), and are not something outside their influence ("*exogenous*")."

The very length of this definition, plus the need to take up several further pages in his paper to distinguish this definition from others, is a clear indication that there are not solid dividing lines between macroprudential and other policy actions or tools.

[11] Altunbas et. al. (2007) summarize their findings by stating that "[u]sing a large sample of European banks, we find that the use of securitization appears to shelter banks' loan supply from the effects of monetary policy."
[12] See Borio (2010), "Implementing a macroprudential framework: Blending boldness and realism".

Borio goes on to argue that macroprudential policy has both a "time dimension" related to cyclicality in the system and a "cross-sectional" dimension dealing with how risk is allocated within the financial system at a point in time. As he puts it[13]:

> "To each source of financial distress corresponds a policy principle. To address procyclicality, the principle is to build up buffers in good times, as aggregate risk grows, so that they can be drawn down in bad times, as it materialises. Such countercyclical buffers can help to stabilise the system. To address common exposures and interlinkages, the principle is to calibrate prudential tools with respect to the contribution of each institution to systemic risk, once a given level of acceptable risk for the system as a whole is selected. This calibration can help ensure that each institution pays for the externality it imposes on the system."

A question that is still under debate is whether macroprudential policies should aim only at stabilizing the financial system so that it can continue to serve the real economy even under stress, or whether policy should go further and attempt to eliminate or substantially reduce the frequency and severity of asset price bubbles linked to excessive credit provision. To the extent there is a consensus, it seems to be that the prime goal must be to stabilize the financial system, but that it ought to be possible to make some progress in fighting bubbles while remaining consistent with this core mission.

What macroprudential tools are available?

The prime focus of macroprudential policy is to attempt to avoid or minimize the effects of asset price bubbles supported by credit booms. Although the boom period generally increases economic growth and short-term prosperity, the inevitable bust that follows more than wipes out these benefits. Macroprudential policy can assist in two ways. First, it can focus on better preparing the financial system to survive the busts, such as by requiring higher levels of capital as the system enters the danger zone. Second, it can attempt to keep credit busts from becoming more severe than necessary, in order to reduce the damage to the real economy when credit and other financial services are withdrawn. This may well involve damping down the preceding credit boom in order to minimize the repercussions of its demise.

There are a number of ways that regulators could moderate swings in the volume of credit in the economy. In earlier decades, some regulators in advanced economies would directly attempt to limit the total amount of credit provided by the banks. Since banks dominated the financial sector at that time, this could be reasonably effective for the economy as a whole, although even then other financial sector participants were able to circumvent these constraints and provide some of the additional credit desired by the real economy. The increased diversity and sophistication of the financial sector, combined with globalization, renders this impractical now in most advanced economies. However, some emerging market economies still use this quite direct form of macroprudential tool.

[13] Ibid.

Another approach to credit constraints is to control the amount of leverage that can be employed in asset purchases. For instance, the Fed still retains the ability to use "margin" requirements to limit the amount of borrowing against common stock. Securities brokers in the US may lend only a certain specified percentage of the value of a stock and if the stock declines too far in value then they have to make a "margin call" asking for additional collateral. Apparently the Fed considered increasing the required margin during the Tech Bubble as a way of signaling its concern with the level of the stock market, but concluded that it would have been so easy for the borrowing to occur in other ways that the move would have been seen as toothless. Similar effective levels of leverage could also be obtained through the purchase of options on stock prices without the need for direct financial leverage, reducing the effect of margin requirements still further.

However, there is an area where such controls can be substantially more effective, which is in the mortgage sector. Financial regulators often have the ability to enforce a maximum loan to value (LTV) ratio for mortgages. At one time in the US the common maximum LTV ratio was 80% for most private loans, (equivalent to a 20% down payment), although the government's Federal Housing Administration would lend to qualified borrowers while requiring only a 3% down payment. In recent decades, the maximum LTV ratio offered by private financial institutions tended to be in the 95-97% range, although many borrowers put down more in order to obtain a better rate. Residential mortgages are somewhat more susceptible to control by regulators because individuals often have no other way to borrow large sums of money cost-effectively. Further, in the US, most mortgages are securitized with the backing of Fannie Mae or Freddie Mac, which can therefore impose their own LTV requirements, with the penalty being a higher borrowing rate in the market if the loan cannot have the benefit of their backing. Nonetheless, not all mortgages are securitized, some that are securitized are done outside of Fannie and Freddie, and there is a large financial sector that provides second mortgages and home equity lines that effectively allow homeowners to increase their leverage after taking the original mortgage.

For many years, US regulators had some indirect control over both the cost and volume of borrowing through limits on the interest rate that banks and other depository institutions could pay on their deposits. Since banks at the time largely funded themselves through deposits, it became difficult for them to expand their lending activity if deposit rate ceilings were unattractively low. This approach had to be abandoned in large part because of the invention of "money market" mutual funds. These funds pooled together investor dollars to buy short-term securities from major corporations, disintermediating banks by taking away chunks of both their deposit and lending businesses. The threat from this and other forms of disintermediation became so severe that the deposit rate ceilings were eliminated and banks were allowed to choose how much to pay for deposits.

This is an illustration of the general problem with direct volume controls in advanced economies. Their openness and diversity makes it too easy for entities that are lightly regulated to provide the credit volume that more regulated institutions are forbidden to provide.

Under some definitions of "macroprudential" policy, there are non-cyclical tools available, including those intended to reduce the risk from "systemically important financial institutions" (SIFIs)[14]. These are the financial institutions that are deemed to be so important to the system as a whole that they might require rescue in the event of a severe financial crisis. Steps taken to lower this risk, such as capital or liquidity surcharges to increase the safety of SIFIs or operational constraints on SIFIs, could reduce the impact, and perhaps frequency, of financial crises, even though these policies would not vary with the cycle. As noted by the Bank of England (2009) such surcharges "would lower the probability of those institutions failing and so provide some extra systemic insurance." In addition they "would also provide incentives for those firms to alter their balance sheet structure to lower the systemic impact of their failure." The fact that these policies are focused on risks to the system as a whole and that the surcharges are calibrated based on that risk, rather than simply the particular situation of the individual SIFI, arguably make them macroprudential in nature rather than conventional safety and soundness measures. (There are various debates in progress on whether and how to regulate SIFIs differently from other financial institutions, but these lie outside the scope of this paper.)

Other policies fall in a middle ground between prudential policies focused on individual institutions and macroprudential policies focused on the system as a whole. For example, tying compensation packages for bankers more closely to long term performance is another non-cyclical change that might reduce systemic risks[15], although it has more of a conventional regulatory flavor than a macroprudential one. Approaches could also be designed whereby macroprudential policies that respond to swings in the credit cycle are tailored to have particular impact on SIFIs.

The macroprudential tool on which regulators in advanced economies are placing the most emphasis for damping the effect of credit cycles is "counter-cyclical" bank capital requirements. Minimum capital requirements set by regulators are strong factors in determining the economic attraction of credit provision by a bank. Currently they are set statically, with occasional adjustments that are usually based on revised risk analyses rather than macroeconomic conditions. Dynamically-adjusted bank capital requirements could provide a particularly powerful tool to influence banks' credit behavior, which in turn heavily affects the behavior of other credit providers. (Many non-bank financial institutions rely substantially on direct or indirect liquidity provision by banks.) It could be useful to give authorities the ability, underpinned by the necessary theoretical framework, to adjust capital ratios up to reduce the incentives to provide credit during booms that threaten to become bubbles and to adjust them down to counter excessive tightness in credit conditions.

A somewhat related tool described in more detail below, is "dynamic provisioning" for loan loss reserves. The idea, which has been used in Spain for some years, is to require banks to set aside higher levels of reserves for future loan losses during an upswing, both because banks traditionally underestimate the risk they are taking on during a boom and because higher reserving requirements

[14] See Aikman et. al. (2010) for example, where footnote 2 makes this point, as well as Borio's definition of "macroprudential" discussed earlier.
[15] See Aikman et. al. (2010), for example.

would provide a disincentive to making loans during periods of over-exuberance. This approach would also counter the current accounting limits on recognizing potential future losses that cannot be solidly established based on recent history.

The Basel Committee on Banking Supervision (Basel Committee), the club of bank regulators around the globe who attempt to agree on common approaches to key regulatory issues such as capital requirements, has endorsed counter-cyclical capital requirements. They put forth a method for creating counter-cyclical capital buffers in July 2010, (see Basel Committee (2010).) This leaves the decisions in the hands of national regulators, but suggests common approaches to encourage consistency across countries. The committee notes that buffers may be needed as infrequently as once every 10 or 20 years, depending on developments in the credit cycle in each country.

The Basel Committee states the objectives of its proposal as:

> "The primary aim of the proposal is to use a buffer of capital to achieve the broader macroprudential goal of protecting the banking system from periods of excess aggregate credit growth that have often been associated with the build-up of system-wide risk. Protecting the banking sector in this context is not simply ensuring that individual banks remain solvent through a period of stress, as the minimum capital requirement and capital conservation buffer are together designed to fulfill this objective. Rather, the aim is to ensure that the banking sector in aggregate has the capital on hand to help maintain the flow of credit in the economy without its solvency being questioned, when the broader financial system experiences stress after a period of excess credit growth. This should help reduce the risk of the supply of credit being constrained by regulatory capital requirements that could undermine the performance of the real economy and result in additional credit losses in the banking system.
>
> In addressing the aim of protecting the banking sector from the credit cycle the proposal may also help to lean against the build-up phase of the cycle in the first place. This would occur through the capital buffer acting to raise the cost of credit, and therefore dampen its demand, when there is evidence that the stock of credit has grown to excessive levels relative to the benchmarks of past experience. This potential moderating effect on the build-up phase of the credit cycle should be viewed as a positive side benefit, rather than the primary aim of the proposal."

What is capital?

In its simplest form, capital represents the portion of a bank's assets which have no associated contractual commitment for repayment. It is, therefore, available as a cushion in case the value of the bank's assets declines or its liabilities rise. For example, if a bank has $100 of loans outstanding, funded by $92 of deposits and $8 of common stock invested by the bank's owners, then this capital of $8 is available to protect the depositors against losses. If $7 worth of the loans were not repaid, there would still be more than enough money to pay back the depositors. The shareholders would suffer a nearly

complete loss, but this is a considered a private matter, whereas there are strong public policy reasons to protect depositors.

If bank balance sheets were always accurate and banks always made profits, there would be no need for capital. Unfortunately, that is not the case in the real world, so a cushion of capital is necessary. Banks attempt to hold the minimum level of capital that supplies adequate protection, since capital is expensive, but all parties recognize the need for such a cushion even when they debate the right amount or form.

The issues surrounding bank capital can be very complex and extend well outside the scope of this paper, (see "Bank Capital: A Primer[16]" for more detailed explanations of bank capital, how it works, and the regulations covering it.)

What are the requirements for bank capital?

Banks, and other financial institutions, generally hold capital equal to at least the minimum required by each of the main parties that they care about. Regulators directly impose minimum requirements, but most banks also target some minimum rating from the credit rating agencies, all of whom have their own idea of the right minimum capital levels[17]. In addition, the more sophisticated banks that tend to dominate the financial system each have their own economic models that attempt to determine the minimum capital necessary to avoid, with some high level of probability, a future insolvency. Looking ahead, it appears that the newly toughened regulatory capital requirements will be the most binding measure for most banks, therefore the bulk of the discussion will focus on those. Naturally, banks will not generally run themselves right at those minimums, but rather will wish to keep an additional cushion to avoid running into regulatory constraints should their plans miss by a modest amount.

The key countries in the world financial system model their capital requirements after the global agreements that have been reached at the Basel Committee. The original capital agreement, now known as "Basel I" was reached in 1988. It was amended quite considerably in 2004 to a version that became known as "Basel II." This accord is in force in most countries, with the important exception of the US. However, the recent financial crisis revealed a number of glaring flaws which the Basel Committee has just agreed to attempt to fix through a series of additional modifications to the Basel Accord. The amended version is known, not surprisingly, as "Basel III" and takes effect on a phased-in basis starting 2013.

All of the Basel accords are based on the concept of "tiers" of capital. Tier 1 is intended to represent the strongest form of capital, which is then supplemented by Tier 2 capital which includes instruments that

[16] Available at http://www.brookings.edu/~/media/Files/rc/papers/2010/0129_capital_elliott/0129_capital_primer_elliott.pdf

[17] At times, debt or equity investors may push for still higher capital levels, but this generally only occurs in the heart of a crisis. The rest of the time, the rating agencies generally act as the proxy for market requirements.

are less pure forms of capital. The purest form of capital is common stock, since it has the key attributes of capital:

- It does not have to be repaid.
- There is no legal requirement for periodic dividend or interest payments.
- It has the very lowest priority of repayment in a bankruptcy or insolvency proceeding.

Other forms of capital do not have all of these attributes to the same extent as common stock, but share enough of them to provide real protection to depositors, counterparties, bank customers, and others whom the banking regulators wish to protect. For example, a perpetual, non-cumulative preferred security comes close to providing the full level of protection that common stock does. It never has to be repaid (hence the term "perpetual"), the planned dividends can be skipped without giving the security holders the ability to take action against the bank, and it has the lowest bankruptcy priority except for common stock, thereby providing a cushion for all other bankruptcy claimants.

At the other end of the capital spectrum, the Basel Committee has decided that subordinated debt securities should no longer be counted as capital for most purposes. They *do* have to be repaid at maturity, they *are* entitled to periodic interest payments, and holders *may* put a bank into insolvency if the payments are not made. The one element of capital that they do have is that their claim in insolvency is below almost all other claimants, although ahead of common and preferred stock. The recent financial crisis showed that this was less useful to regulators than was originally hoped, since it became critical in practice to keep the major financial institutions out of insolvency proceedings, negating the key capital benefit of subordinated debt. In addition, subordinated debt prices largely failed to provide early warning signals of distress, which had been a second perceived benefit of allowing their issuance as capital instruments.

The Basel calculations include a number of deductions from the stated balance sheet figures for capital. First, and probably most importantly, the Basel agreements require the deduction of goodwill, effectively treating it as worthless for these purposes[18]. Second, Basel III will limit the portion of deferred tax assets that may be counted in capital, because the value of those assets would be realized only if a bank makes future taxable profits, which might not occur if it ran into the kind of trouble that makes capital important. Several other items are similarly limited or eliminated from the calculation because they are viewed as not being sufficiently reliable loss-absorbers in a crisis.

[18] Goodwill is the accounting term for an intangible asset that represents the difference between what was paid for an acquisition (usually of a company) and the accounting value of the acquisitions assets minus liabilities at the time of the acquisition. The presumption is that the arms-length transaction price is an accurate measure of the value of the purchase and that therefore there must be additional value beyond what is shown on the books of the acquired firm. (It may be easier to envision this with a different type of intangible asset, such as the value of Coca Cola's brand name.) The problem in a banking context is that it can be extremely hard to turn "goodwill" into cash in a crisis, even if it does represent true longer-term value.

The principal measurement of capital adequacy under Basel rules is the ratio of Tier 1 capital to "risk-weighted assets," (RWA.) RWA is the risk-weighted total amount of assets held by the bank. That is, the total value of each asset is multiplied by a percentage reflecting its risk level, and this adjusted amount is added across all assets to produce a total risk-weighted asset figure. The percentage weighting for each category ranges from 0%, for extremely safe investments such as cash and US government securities, to 100% for riskier classes of assets. In a few cases, the levels exceed 100% for certain very risky assets, such as loans in default or imminent danger of default and the riskiest tranches of securitizations. Commitments to lend that are not carried on the balance sheet are converted to an asset amount using weightings that depend on the type of commitment, with those that are certain to be drawn down receiving 100% weightings. These asset-equivalent amounts are then treated as if they were already on the balance sheet, with their effect on total RWA depending on the riskiness of their type of credit.

Under Basel III, once it has taken full effect, Tier 1 capital must be equal to at least 7% of RWA, of which 4.5% must be in the form of Tier 1 common equity. On top of this, there is a capital conservation buffer of 2.5% of RWA that is required to be in the form of additional Tier 1 common. Failure to maintain the full buffer will lead to limitations on the ability to pay dividends, repurchase stock, pay the desired levels of compensation, or take certain other actions. The idea is that banks should be strongly encouraged not to eat into their buffer, but that if they do, the consequences should not be drastic, and that they be given time to rebuild the buffer. In contrast, falling below the minimum Tier 1 level would have quite drastic consequences, including the possible seizure of the bank by regulators. Arguably, the ability to eat into this buffer without drastic consequences gives the policy some of the characteristics of a counter-cyclical capital buffer.

Banks can also be required to maintain an additional "counter-cyclical buffer" of up to 2.5% of RWA in periods of credit booms. This buffer, and how it would operate, is still being defined, as is discussed in greater length below.

In addition to Tier 1 capital, banks will also be required to keep an additional 2% of RWA in the form of Tier 2 capital and excess Tier 1 capital. Serious consideration is being given to adding yet another form of capital, so-called contingent capital, on top of this. Contingent capital would be a debt instrument containing contract terms that would cause it to convert into an instrument qualifying as Tier 1 capital if the bank becomes stressed in a defined manner. This remains a quite ill-defined concept that is subject to intense debate. Regulators and many others, including the author, find it an attractive concept. However, it is quite hard to design it to have a cost not too far above normal debt instruments while still having the locked-in ability to become Tier 1 capital when regulators need it to do so. Put another way, if the cost is close to that of raising equity capital, then firms may simply opt to issue additional equity, making the requirement for contingent capital, or a stronger form of capital, equivalent to simply requiring a higher equity capital ratio.

In general, the Basel rules discussed above all fall under the so-called "Pillar 1" mechanisms, which are those that the signatories agreed would be applied essentially uniformly by all countries, with some

modest adjustments for national differences in legal and financial systems. The Basel accords also contain "Pillar 2" agreements, laying out principles to guide national regulators in making decisions that apply solely to their own jurisdictions. For example, regulators are allowed to set capital or other requirements higher than the Pillar 1 minimums, if they feel these are necessary in their jurisdictions. This would, in fact, be one mechanism by which counter-cyclical capital requirements, or certain other macroprudential tools, might be implemented. There is also a set of "Pillar 3" guidelines to encourage or require appropriate reporting transparency by the financial institutions themselves in order to aid market discipline, which is recognized as an essential complement to regulatory actions.

How are capital requirements set?

Governments and regulators in each country set their own capital requirements as part of their national bank regulation. The great bulk of the global financial system is in countries that have voluntarily agreed to coordinate their capital requirements through the Basel Committee. However, there is no global enforcement mechanism and few countries have implemented Basel II in exactly the form that most outsiders would agree is precisely consistent with the Basel rules. In the case of the US, Basel II was never implemented for its commercial banks, although it was eventually put into place for its investment banks. All of the countries represented on the Basel Committee are likely to implement Basel III, including the US, but there may be some considerable differences in implementation around the world.

Those countries in the European Union (EU) will have a second level of obligation to implement Basel III, as was also the case with Basel II, because the EU will incorporate the Basel rules into a new Capital Requirements Directive, which individual nations would then have a treaty obligation to incorporate into their national laws and regulations. That said, not every EU directive is implemented by every country in the full form intended in the directive. There are EU enforcement mechanisms, but they do not work well enough to ensure full compliance.

In the US case, the various regulators have the authority to implement the Basel III rules without further legislation.

How do capital requirements affect the supply of credit?

Financial institutions determine the volume and price of their credit activities in large measure based on the cost of capital, which in turn depends on the amount of capital that they must hold. For example, loan pricing is significantly influenced by a calculation along the following lines:

> The price of a loan must be at least equal to: the sum of the cost of the allocated capital, plus the cost of other funds used to make the loan, plus any administrative costs, plus expected credit losses, minus the profits from any ancillary business for the bank made possible by agreeing to make the loan.

This formula is not an absolute determinant, because other factors must be taken into account, such as the longer-term bank relationship with the client or market share considerations, either of which might

encourage a bank to accept under-pricing in order to "stay in the game" for future business. There may also be either a glut or a deficit of capital from non-lending activities which may cause the bank to relax or tighten its credit terms in order to employ or free up the additional capital. In theory, the bank would simply adjust its capital size, but practical considerations often cause management to be reluctant to raise or release a large amount of capital in one period.

An increase in the regulatory capital requirement would generally both raise the price of credit and reduce the volume. At first glance, the increase in price might seem simply to fall out of the formula, since it would mean an increase in the cost of capital which, in the first instance, would simply feed through to price. However, as I have analyzed at length in previous papers[19], the other variables in the equation are not fixed and can be moved either by the bank or the markets. For example, the banking industry is likely to cut expenses, including compensation expenses, in reaction to pressure placed on it by significantly higher capital requirements. Looking at another dimension, higher capital requirements translate into reduced volatility and greater safety, which should cause equity investors over time to lower their required returns at least modestly, thereby reducing the required loan price[20]. Directionally, it is clear that loan pricing would rise, but it could be by a significantly smaller amount than would be implied by leaving all the non-capital parts of the equation fixed.

Loan volumes should decline with higher capital requirements, for multiple, related reasons. First, higher prices resulting from increased capital costs would likely reduce the demand for loans. Second, banks may tighten their credit underwriting requirements to reduce expected loan losses, which may eliminate some loans from consideration. Third, some banks may be unwilling to increase their capital quickly to the substantially higher levels that might be necessary to undertake the full volume of lending that would otherwise be indicated. There are disadvantages in going to the capital markets to raise more equity, particularly the fact that new issuance tends to depress stock prices for a period of time. (This is a larger factor when individual firms raise capital at a time when others in their industry are not, since it may create a "signaling effect" suggesting that management considers its stock over-priced or at least not under- priced. Capital raisings resulting from broad trends in an industry do not carry the same stigma.) In general, managements prefer a "glide path" that allows them to raise any needed capital internally through earnings, rather than by accessing external markets.

Of course, banks are not the only providers of credit. Competitive sources may constrain banks from taking some of the actions they would otherwise take, such as raising loan prices to the full extent necessary to recoup increased capital costs. This also means that macroprudential tools, such as counter-cyclical capital requirements, are less effective if they affect only banks. This is discussed further below in the section on coordination issues.

[19] See Elliott (2009) and Elliott (2010b).

[20] See Miles (2011) for an extensive analysis of the changes in required equity returns demanded by the financial markets as a result of changes in bank capital levels. This is an area of some controversy. Virtually every analyst agrees on the direction of changes, but there are major arguments about the degree of change.

How precise an instrument is this?

Macroprudential tools, including counter-cyclical capital, are unavoidably blunt tools, although less blunt for these purposes than ordinary monetary policy. They attempt to impose simple aggregate limits of one kind or another in order to influence overall credit conditions. A more precise intervention would require considerably more detailed constraints and a substantial amount of regulatory judgment. However, that degree of regulatory intervention could quickly subvert the market mechanisms that work so well in general for generating prosperity for our societies. The economic costs of an excessive level of interference in the economy could be very high.

There are a number of ways in which an increase in capital requirements could fail to produce the desired decrease in credit volumes across the economy, including:

Failure to change the actual capital ratios. Minimum regulatory capital requirements are only one determinant of actual capital ratios. Banks could choose to eat into the buffer of capital they maintain above the minimum, which would be particularly likely if they set their capital levels based on rating agency requirements or their own economic models and these factors have been more binding.

Banks might raise more capital. The apparent attractions of lending during a credit boom might cause more capital to be deployed in order to continue the desired volume of lending, such as by issuing more common stock. This is one way in which macroprudential regulation differs from traditional prudential regulation. The increase in capital would meet traditional regulatory objectives by lowering the risk per dollar of capital in the financial system, however it would fail to meet the macroprudential goal of slowing the credit boom.

Less-regulated financial institutions or markets might pick up the lending volumes. If capital requirements are increased only for part of the financial system, such as banks, other parts may expand to replace the foregone lending. This is a constant problem with financial regulation, sometimes referred to as the issue of the "perimeter of regulation." It is discussed further below.

Banks might find a way to work around the regulatory constraints. The minimum capital requirements might prove to be ineffective. For example, the Basel II rules proved less effective than intended in part because banks found ways to move assets off of their own balance sheets while still retaining most of the profit and, as it turns out, much of the risk. If the requirements are not fully binding in practice, then toughened capital requirements will not decrease lending to the extent expected.

Foreign banks might fill the gap in lending. They might increase their activities within the country's borders or by lending to that nation's corporations or citizens outside of the country. Methods of coordinating across borders are discussed below.

Aggregate lending might decline, but not in the worrisome sectors. The response to higher capital requirements may include decreased lending, but the sectors producing a bubble may continue to

receive the same volume of lending due to their apparent attractiveness. It may be the safer, but seemingly less profitable, business that is cut back.

All of this is not to say that macroprudential tools will not work, but to indicate (1) that they will necessarily be blunt instruments and (2) that additional measures will have to be taken to ensure their full effectiveness, given that the most straightforward methods face these various difficulties.

Why is countercyclical capital the favored approach of many policymakers?

The macroprudential tool for dealing with cycles that appears to have the most support among regulators in the world's financial centers is clearly counter-cyclical capital. The Basel Committee, for example, has included it among the measures that it encourages national banking regulators to implement and is in the process of refining specific advice as to how to implement a capital buffer for counter-cyclical purposes. The Bank of England, among others, has also shown considerable enthusiasm for adding this tool to its toolbox.

Why is counter-cyclical capital favored over other potential tools? Answering this requires a certain amount of conjecture, since little has been written comparing the desirability of the different macroprudential tools. The major comparative advantages of counter-cyclical capital appear to be:

- **Ease of implementation**. Banks are already subject to complex capital requirements. Adding a buffer on top of the other requirements would be very easy.

- **Ability to use either broadly or narrowly**. Capital requirements are a fairly flexible tool, in that they can be increased or decreased for all regulated financial institutions or a subset and for all credit products or a subset.

- **Existing theoretical and empirical analyses of capital requirements and their effects**. Capital requirements have been in existence for many years in the major financial centers and there is considerable theoretical and historical evidence concerning their effectiveness. There is a great deal that remains unknown, but this is even more the case for many of the other potential tools.

- **Power of the tool**. Regulators know that capital requirements have substantial effects on lending activity.

- **Compatibility with market forces**. Some potential macroprudential tools transfer significant control from markets to national regulators, such as by setting a limit on the total credit issued by the banks. Capital, like taxes, is less intrusive. It provides incentives and disincentives, but allows the market to choose how it responds.

Can macroprudential policy eliminate asset price bubbles?

Few, if any, supporters of macroprudential policy believe that it can eliminate all asset price bubbles. For example, Bank of England (2009) supports macroprudential policy, but notes that there are "clear limitations to the extent to which prudential policy can moderate the credit cycle" and that the "limitations of macroprudential policy would be even more acute if the goal were instead to moderate asset price bubbles or financial imbalances more broadly. To the extent that fluctuations in credit supply contribute to – or indeed finance – bubbles and imbalances, macroprudential policies may help moderate them. Exuberance would, to a degree, be choked off at source. But sometimes bubbles and imbalances are not associated strongly with shifts in (bank) credit supply. Macroprudential tools are likely to be ineffective in these circumstances." They go on to note that the Tech Bubble is an example of a bubble that was not financed principally by bank credit and that consequently did less damage when it burst. Others acknowledge limitations in the ability to attack asset price bubbles, but are somewhat more ambitious in their goals for macroprudential policy than the Bank of England.

Mechanisms for implementing macroprudential policy

How would dynamic changes to capital requirements work?

Effective use of countercyclical capital rules require several pre-conditions, each of which is discussed in considerably greater detail in later sub-sections:

Clear roles for the use of macroprudential authority at one or a set of institutions. Just as with monetary or fiscal policy, there must be clarity about who has the responsibility and authority to make the decisions. Most advocates of macroprudential policy favor a major or sole role for the central banks, but this is not an absolute necessity provided there is an appropriate coordination with monetary policy and other financial regulatory actions. In the US, a council of regulators, the Financial Stability Oversight Council (FSOC), will have the ultimate macroprudential authority. In the UK, a new Financial Policy Committee is being constructed under the aegis of the Bank of England, but with some participation by non-central bank parties. At the EU level, there is now a European Systemic Risk Board which has some macroprudential responsibilities.

A framework to judge credit conditions and asset price levels. Macroprudential policy is intended to "lean against the wind" when economic forces are feeding bubble conditions. Therefore, there must be a framework to evaluate wind speed and direction, as well as likely near-term changes in both. Most analysts agree that there will have to be a measure of subjective judgment on top of the various proposed quantitative analyses, given the current state of forecasting.

A process to determine which tools to use when action is required. If the authorities are vested with multiple macroprudential powers, and not just counter-cyclical capital, then there must be a way to decide which tools are used, and to what degree, when action is needed. This is an area which has not

been studied much to date, given the analysis that is still necessary to determine how to use any individual tool.

A framework for imposing counter-cyclical capital requirements. The most straightforward approach is probably that suggested by the Basel Committee -- adding a counter-cyclical capital buffer on top of the minimum capital requirements resulting from the rest of the Basel rules. This can be thought of either as a number of percentage points tacked on top of the otherwise required ratios of capital to risk-weighted assets or as a multiple of those ratios. For example, capital requirements could be increased by 10% simply by multiplying all existing ratio requirements by 1.1 or the total requirements could be increased by, say, one percentage point. In theory, a separate set of calculations could be used to determine the total level of capital needed, but there are compelling reasons to retain the Basel structure rather than creating a competing set of rules. An alternative regime could lead to confusion and to odd decision-making processes if the new set of rules appeared to be about to bind on the banks due to overall financial conditions that might lead to macroprudential action.

A way of deciding how much to move the requirements and on what timeframe. As with the analysis to determine whether a move is necessary, there will need to be quantitative measurements, supplemented by subjective judgment, to indicate the new level of capital requirements.

Clear means of communicating the decisions and their rationales. It will be difficult, but critically important, to ensure that macroprudential decisions are understood by politicians, regulators, banks, financial markets, and other key constituencies. Lack of clarity could lead to confused reactions and market volatility as well as undermining the prospects for achieving the necessary public and political support.

Sound governance structures. A corollary of the points on clear macroprudential roles and good communications is that the authorities with macroprudential powers must also be structured on sound governance principles. Conflicts of interest, unmanageable organizational complexities, capture by political or commercial forces, and other such flaws must be avoided. There will be temptations to let each of these problems creep in as a result of pressure to compromise and satisfy all parties with an interest in how the authorities are structured. For example, if every group with an interest in the outcome is given representation on a macroprudential board, there would be great potential for crippling complexity and conflicts of interest. At the same time, there must be ultimate accountability and a structure that ensures that the authorities do not operate with an excessively narrow view.

How could the right counter-cyclical multiples be determined?

This is one of the more difficult questions which will be answered only through a combination of more research, actual experience over a period of years, and subjective judgment that takes into account the particular circumstances of the times in the relevant country or countries. In this respect, it is akin to the state of monetary policy many years ago. Unsatisfying as the situation is, it is hard to imagine moving to the point where the authorities can make more accurate decisions without enduring the trials of an initial phase where there is considerable uncertainty.

Finding the right answer involves several steps:

Determining the need to act. This is discussed elsewhere.

Deciding how large an effect on credit pricing and volumes is desired. This is equivalent to the monetary policy question of what interest rate level to target. Over the years, theory and experience has built up on that question and there are now such tools as various versions of the "Taylor Rule" that provide significant guidance, as well as the advent of formal or informal inflation targets as the objective of choice in most advanced countries. There are no clear answers yet in macroprudential policy, which means that considerable research is needed to examine how credit volumes and prices create and affect the unhealthy booms that become bubbles or otherwise affect financial stability.

Judging the response function to changes in capital requirements. Authorities need a sense of how large a change in capital requirements is necessary in order to induce the needed movement in credit conditions and/or the resilience of financial institutions. Although understanding of this remains inadequate, there is guidance to be found on both the theoretical and empirical level. Banking theorists have for many years put forth models of the role of capital in lending decisions. At this point they tend to remain quite theoretical, meaning that they make a number of simplifying assumptions that are not valid in the real world, or the models produce only quite limited outputs that are not sufficient for the necessary decisions. However, this theoretical base can be expanded. There are also analyses that are on the border between theory and empiricism that examine some version of a "loan pricing" equation and place some bounds on the response of loan prices and volumes to a given change in capital requirements[21]. An added complication is that a true macroprudential approach would be new in the advanced economies and would thereby itself alter the way in which banks make key decisions. This would add particular uncertainty in the early days before both regulators and the financial industry develop an understanding of how each side is likely to act.

In addition, there are empirical investigations that have looked at the responses of banking systems around the world to the changes in national banking regulation that have occurred from time to time. These are complemented by studies of the differential behavior of banks where their individual capital requirements vary based on regulatory judgment. The various empirical investigations are helpful[22], and will likely be more so as they are refined; however, they are inevitably bound by the constraints of dealing with the circumstances in a particular place and time, which may render them less relevant to current circumstances. They also suffer from the fact that there were always other important things happening in parallel in the economy and financial system and the effects of these can be hard to disentangle from the effects of bank regulation.

[21] See for example the author's own analyses, Elliott (2009) and Elliott (2010b). These are based on a formalization of the loan pricing equation described earlier in this paper, which says that the price of a loan must be sufficient to pay for the allocated cost of capital, the cost of other funds, and all other relevant costs to the loan business.
[22] See, for example, Berrospide and Edge (2010), Francis and Osborne (2009), Gambacorta and Mistrulli (2004), and Bernanke and Lown (1991).

Determining whether and how to phase in any changes. As discussed below, banks may have to charge more for loans if they must absorb an appreciable risk of an increase in capital requirements over the life of the loan. Some sort of phase-in may be useful to reduce this problem and may also be necessary to minimize the political pushback on changes. This may not be a major problem, because bubbles tend to build up over time rather than emerge suddenly. On the other side of the credit cycle, Borio and others have pointed out the desirability of reducing capital requirements rapidly once a credit bust starts, since the negative effects can occur quite quickly. Fortunately, there is likely to be little resistance from banks, politicians, or the public to such a loosening of credit conditions during a bust, although there could be resistance from micro-prudential regulators concerned about keeping as much capital in the system as possible to cushion losses from the credit and asset bust.

How can we measure when intervention is necessary?

Macroprudential regulation is intended to minimize the damage from excessive swings in credit conditions that lead to bubbles and subsequent busts that feed through to the wider economy. As such, there needs to be a way of measuring when the financial system faces a high risk that a bubble fed by a credit boom is developing. Research in this area is at the point where there are promising ideas and there is reason to believe that models can be built that would be useful in practice. However, there is considerable disagreement about the best modeling techniques and none of the models yet produced can provide a strong sense of comfort about their accuracy. That said, even relatively imprecise models could be of significant value compared with the earlier practice of choosing not to forecast potential bubbles, or to do so on a more subjective basis.

Assessments of existing models

A number of papers have been written in the last two years assessing the predictive power of various models aimed at signaling the emergence of bubbles. They generally find some significant predictive power in both a statistical and a practical sense, but exhibit considerably less accuracy than one would ideally like to see.

Borgy et. al. (2009) examined the previous attempts to produce predictive models of bubbles and busts. They concluded that "the identification of an asset-price boom or bust remains challenging ex ante and ex post despite the fact that the methodologies implemented in the literature differ sometimes only marginally. There remain critical choices regarding the determination of key parameters [that affect the performance of the models.]" They found that models including house price data produced consistent signals, as measured using their methodology, 53-75% of the time, while ones using stock prices were consistent 45-63% of the time. Fortunately for the usefulness of the models, they also concluded that house price booms, which are a little easier to predict, are more likely to be associated with a later costly recession than is the case with stock price booms. At the time of writing their paper, they were in the early stages of expanding their analyses to include bank balance sheet data, which they were finding to be helpful in increasing the predictive power of the models.

A slightly earlier paper by Borio and Drehmann (2009) re-examines a model they had published some years earlier to see how its performance looked in light of the passage of additional time and the data provided by the recent major financial crisis. They conclude that their analysis:

> "suggests that it is possible to build relatively simple indicators that can help inform assessments of the build-up of risks of future banking distress in an economy. These indicators are based on the coexistence of unusually strong and protracted increases in credit and asset prices. We find that they perform reasonably well also out of sample, as indicated by their ability to point to potential banking distress ahead of the current crisis.
>
> At the same time, a number of caveats should be borne in mind. First, the analysis confirms the critical role of judgment. And for some, this role may be uncomfortably large. The out-of-sample performance is not an unqualified success. The indicators would have failed in recent years had they been based exclusively on equity prices, which perform so well in sample. The extension to property prices is essential for the current episode. Similarly, we caution against deciding on 'optimal' performance in sample purely based on strict statistical criteria, without acknowledging the 'fuzzy' nature of the exercise. This, too, could have failed to identify the risks correctly. For policy purposes, we support the use of ranges rather than point thresholds. Second, a full assessment of the indicators' performance will require more time, as the current financial strains are still unfolding."

They go on to describe some potential ways of improving the models, such as developing better data sources, including more cross-border data, and finding a better way of capturing all leverage in the system.

Drehmann and Borio et. al. (2010) builds on Borio and Drehmann (2009) by fleshing out their statistical analyses further. They conclude:

> "For a top-down approach, the analysis shows that the best variables as signals for the pace and size of the accumulation of the buffers are not necessarily the best for the timing and intensity of the release. Credit seems to be preferable for the build-up phase. In particular when measured by the deviation of the credit-to-GDP ratio from its trend, it has proven leading indicator properties for financial distress. The corresponding data are also available in all jurisdictions, in contrast to other variables, such as CDS spreads. An additional benefit of using this conditioning variable would be that a time-varying target on credit expansion in good times could also restrain the credit boom and hence risk-taking to some extent.
>
> Some measure of aggregate losses, possibly combined with indicators of credit conditions, seems best for signaling the beginning of the release phase. Whether and how to guide the pace and intensity of the release is less clear. In general, a prompt and sizeable release of the buffer is highly desirable as a gradual release could reduce the buffer's effectiveness.

> At this stage, the conclusions of this paper should be seen as providing some initial suggestions rather than the final answer to how countercyclical capital requirements should be implemented. Many questions remain. For example, it could be possible to construct rules based on a range of conditioning variables rather than just one. However, it is hard to envision how this could be done in a simple, robust and transparent fashion. But our analysis indicates more generally that any fully rule-based mechanism may not be possible at this stage. As a result, some degree of judgement, both for the build-up as well as the release phase, seems inevitable."

They also note that countercyclical capital buffers will work better and more effectively the less cyclicality there is in the underlying base minimum capital requirements. This matters, since it is known that the Basel II rules introduced significant elements of cyclicality which the Basel III reforms are trying to reduce. The authors also find that system-wide variables work better than trying to tailor individual countercyclical capital requirements for each bank.

Borio and Drehmann's 2009 and 2010 papers are of particular interest because they, and related work by the authors and their colleagues at the BIS, have considerably influenced the recent Basel Committee proposals on counter-cyclical capital requirements.

An IMF analysis in 2009[23] concluded that "credit, the share of investment in GDP, current account deficits, and asset prices typically rise [during a boom], providing useful leading indicators of asset price busts." The IMF analysts created models based on these insights, looking at 47 house price busts and 98 stock price busts from 1970 to 2008 occurring in 21 advanced economies. They found that "[s]imulations suggest that using a macroprudential instrument designed specifically to dampen credit market cycles would help counter accelerator mechanisms that inflate credit growth and asset prices." They go on to caution, "[h]owever, expectations should be realistic. It is difficult to discern whether credit and asset price booms or surging current account deficits are driven by benign or malign developments. Even the best leading indicators of financial vulnerability are noisy, sometimes sending false signals and raising the risk of policy errors."

They summarize their model results as follows:

> "In summary, large booms in credit and investment, as well as deteriorating current account balances, substantially increase the probability of a bust occurring in the near future. When these indicators raise an alarm, the probability of a bust is more than twice the unconditional probability. Nonetheless, even the best indicator failed to raise an alarm one to three years ahead of roughly one-half of all busts since 1985. Thus asset price busts are difficult to predict."

It should also be noted that, with the exception of the Borio and Drehmann analysis, all of the conclusions from the various studies are based on "back testing" by designing models today and running

[23] IMF World Economic Outlook (2009).

them on data from the past. There is always a risk that the particular historical circumstances have led the modelers unconsciously to design models excessively tailored to those previous circumstances, or that the world will operate somewhat differently in the future so that the models do not work as well in the future as they did with hindsight.

Core concepts in the predictive models

Some aspects of the various models are based on quite straightforward approaches. For example, a boom in credit can be measured by comparing credit volumes with historical averages and analyzing the rate of growth. It is made somewhat more complicated by the fact that ideally it should include calculations of the effective amount of credit that is being provided through off-balance instruments, including options or other derivatives that produce the economic effect of leverage without an actual loan taking place. (Investors can choose between increasing their exposure to an investment by borrowing to buy more of it, or taking the same exposure by buying a call option which costs much less but has value only if the investment goes up by a significant amount. Either approach produces a "leveraged" effect and there is a strong similarity between them.) Similarly, lines of credit that are available but not yet drawn down can help fuel credit booms, since the assurance that funds would be available if needed can inspire activity similar to that which takes place with an actual loan.

The second key measurement issue is determining whether an asset market is seriously overvalued, since the models are generally looking for a combination of a credit boom and an asset price bubble. There is a long history of researchers looking for formulas to determine when markets have strongly overshot. Most of the models being proposed for macroprudential purposes are relatively simple and look for large deviations in valuation ratios from their longer-term averages or rapid spikes even if the deviations are not as large.

The next key measurement issue is to choose the threshold values beyond which credit volume or asset valuations must go in order to count as a significant deviation from the norm. This requires appropriately balancing the benefits of positively identifying boom periods with the costs of a "false positive" that identifies a boom that did not in fact occur. Generally, the lower the thresholds the more often the formulas identify both real and false booms. In many cases, a low cut-off will also include more booms that have relatively small effects on the wider economy. It is difficult to set the appropriate level of sensitivity, because this requires a fairly subjective judgment about the costs of being fooled by false positives or reacting to minor increases in credit activity.

One potential stance is that, the task being to identify potential dangers, it is acceptable to over-react in a conservative direction. However, this could mean frequently putting an unnecessary drag on the economy from excessive capital requirements, which could also undermine public support for the macroprudential regime. At the same time, insisting on no false positives effectively means giving up on identifying all but the most egregious bubbles, for there is unlikely to be a tool that is nearly perfect in identifying dangerous bubbles.

Yet another complication is that not all credit booms are destructive "bubbles". For one thing, a "boom" may in fact be the reversal of a previous bust which brings the level of credit to more normal levels. Or a credit boom may be justifiably supporting a spurt in real economic activity associated with positive developments in the economy, such as the advent of superior new technology or a rise in world trade.

Moreover, not every asset price boom is associated with a credit boom. The prime example is the Tech Bubble around the turn of the millennium in the US. The prices of many technology stocks jumped beyond all reasonable valuations, but the investments were virtually all in the form of common stock and relatively little of the funding came from borrowed money. As a result, the destruction of market values that occurred afterwards did not have nearly the same impact on the economy as it would have done if it had been funded via financial institutions that would have been endangered by the crash.

In sum, the models are designed to identify an asset price bubble which has combined with substantially excessive leverage in the banking system in a pattern that suggests that a dangerous bubble has developed, which in turn is likely to lead to a recession or substantial reduction in economic growth when it bursts. Before moving on, however, it should be noted that Barrell et. al. (2010) concluded that the level of credit in the system was not one of the remaining variables when stepwise regression was used to systematically determine which of a large set of variables contributed to the best predictions from an equation using a core group of variables. So, there is not unanimity even in the generally-agreed view that aggregate levels of credit are key predictors of dangerous bubbles.

Indicator variables

As noted, there are a few core variables generally agreed upon by modelers. However, there are a wider number of indicators that could be useful, particularly as contributors to subjective decision-making. The Bank of England (November 2009) provides a summary in their Table 4.1, reproduced below.

Table 4.1 Indicator variables for capital surcharge

- Credit flows, stocks and spreads.*
- Income and capital gearing of households, corporates and other financial companies (OFCs).*
- Unemployment rate.*
- House price to earnings ratio, house price inflation.*
- Maximum loan to income and value ratios of first-time buyers.*
- Commercial property prices and rents.*
- Property pipelines and vacancy rates.*
- Credit conditions surveys.*
- Volumes/spreads data on LBO (leveraged buyout) and private equity deals.*
- Volumes/spreads data on syndicated loan activity.*
- Growth in assets under management at hedge funds and OFCs.*
- Contribution to growth in mortgage market from other specialist lenders.*
- Reliable data on leverage ratios of hedge funds/other OFCs.
- A granular geographical breakdown of banks' loan books.
- Richer data on the quality of institutions' loan portfolios — such as the loan to value breakdown of their mortgage and commercial real estate lending; a breakdown of their mortgage book between prime, adverse credit, self-certified and buy-to-let.
- A consistent breakdown of trading assets by class and quality.

Note: An asterisk (*) denotes that the data source is currently available to us.

Stress tests

There is another quantitative approach to judging the stability of the financial system, which is to perform a "stress" test. The idea is to specify one or more scenarios that could potentially cause severe distress in the financial system and to test the banks and the system as a whole to see whether it has enough capital and liquidity to handle the problems induced by that scenario. The scenario would specify the values of certain key economic and financial variables, such as the change in GDP, level of unemployment rates, levels of long-term and short-term interest rates, fall in house prices, etc. Each important financial institution would be required to show the effects it would experience from such a scenario and how it would react to counteract any problems. The regulator would then need to look at the combined actions to see if there would be additional systemic stress beyond simply the sum of the individual effects. For example, if all the banks were planning on cutting back on credit provision or selling financial assets, then there could easily be additional problems as a result of a spiral whereby the economy and financial markets suffer from the banks' actions which in turn cause the banks to suffer further losses and perhaps take further actions that would hurt the economy[24].

Should interventions be done in small steps?

There is a considerable degree of consensus that macroprudential interventions should not occur most of the time, during the "normal" parts of the credit cycle. Instead, they should occur during periods of over-exuberance and in the immediate period of the busts that follow. However, there has been little discussion, and no consensus, on the question of whether interventions should be fine-tuned when they are indeed needed. That is, should a macroprudential authority try to constrain or respond to over-exuberance in one or two large moves or make a series of smaller adjustments, in part responding to information gained from the reactions to the initial moves?

There is a parallel here with monetary policy. When the economy appears to be over-heating, central banks will often try to respond with a series of quarter-point moves in key interest rates, knowing this may force them to move every couple of months until the situation alters, but accepting this as the price for minimizing political pressure and gaining the advantage of the information gleaned from the market reactions to the initial moves. On the other hand, sometimes central banks will go for a large initial move in order to try to head off the problem and to show that they are very serious and will not let the boom turn into a period of truly excessive exuberance.

Macroprudential authorities will face much the same trade-offs, but with less history to guide them.

Would the capital surcharges be the same for all banks in a single country, for all products, individually by bank, or some combination?

Although the need for coordination is clear, it appears unlikely for both practical and theoretical reasons that counter-cyclical capital buffers would be set at the same level around the world, as is discussed further below. The key question then becomes whether the national buffer levels should be constant

[24] For more on macro stress tests, see ECB (2010b) pp. 117-124.

throughout the regulated financial system or based on particular products. There are pros and cons of both approaches.

Arguments for focused changes in capital requirements

Direct impact on the area of greatest concern. If the problem is a bubble in housing, then reducing the volume of housing loans is likely to have a more appropriate impact than simply reducing lending across the board. More expensive or harder to obtain mortgage loans may help deflate an asset price bubble that could otherwise grow more dangerous over time, while also reducing the banking system's direct exposure to the bursting of that bubble. One way to achieve this could be selectively and temporarily increasing Basel III risk weightings for the specific categories of assets of concern.

Signaling effect. As with monetary policy, the first step towards damping a bubble could have a multiplicative effect. It could cause market participants to reassess both the underlying rationale for their actions and the possibility that further capital requirement increases may follow, reducing the economic viability of their investments. (It might also have knock-on signaling effects related to monetary policy if it is assumed that overall monetary policy may be tightened if the macroprudential approach fails to damp the excessive growth.)

Reduction of the potential negative impact on the wider economy. One potential problem with raising capital requirements across the board is that safer and more socially useful lending may be curtailed to allow the capital to be redeployed to the booming sector. Higher capital requirements in that sector would likely reduce lending in that area from what it would otherwise be, although the effect might be muted by the high demand from borrowers and the desire of lenders to participate in the sector.

Arguments for across the board capital changes

Avoidance of specific credit allocation. The use of macroprudential tools is already a significant new intervention in credit markets; many regulators may be reluctant to risk the further step of "allocating" credit by using dynamic capital requirements to increase or decrease the attractiveness of different types of loans. Of course they already do this on a static basis under the Basel rules, but this is based on an analysis of the relative risk of the loans and does not change over time. Countering this, it could be argued that the reason to intervene in a housing bubble, for example, is that mortgage lending has become more dangerous as the result of cyclical factors, and that an increase in capital requirements therefore would be appropriate for both macroprudential and traditional safety and soundness reasons.

Harder for the industry to work around. Focused changes in capital requirements may be subject to technical enforcement difficulties. For example, the housing risk might be taken in another manner, perhaps through lending to a different corporate form, such as a mutual fund or real estate investment trust, or through undertaking some form of derivative transaction. Or the funds might shift to a closely related area, perhaps commercial real estate loans for apartment buildings instead of residential mortgages.

Better at catching wide problems. It may be that a housing bubble is just one manifestation of a wider set of financial and economic circumstances that are encouraging excessive risk-taking, as was true to some extent in the recent bubble. In that case, focusing specifically on housing may move the risk-taking without particularly diminishing it. A wider capital increase could be more effective in this case.

Could other macroprudential tools complement capital requirements?

Counter-cyclical capital requirements are by no means the only possible macroprudential tools. As noted earlier, some alternative tools are already in use, particularly in emerging markets. It would certainly be possible, and sometimes desirable, to complement counter-cyclical capital requirements with these other tools. For example, one important way of combating a housing bubble might be the imposition of maximum loan-to-value ratios on residential mortgages, so that a minimum down payment of, say, 10% is necessary (equivalent to a loan to value ratio of 90%.) This would have no direct effect on bank capital requirements, but would make it harder to grant credit in this area and would reduce the attractiveness of the sector for speculators by requiring them to risk more of their own money.

In certain economies, it may be effective to impose some aggregate limits on lending, although this can be difficult to achieve without quite significant intervention in how banks operate, which is one reason that most advanced economies do not attempt to use such limits. The caps are also much harder to employ if banks do not dominate the financial system, since it then requires some way to divvy up the aggregate lending limits across financial sectors in addition to effectively dividing them among the banks.

What alternative tools are available?

There are many other potential macroprudential tools, including:

Loan-to-value (LTV) ratios. As noted earlier, these limit the amount of leverage a borrower can take on when purchasing a specific type of asset. They are most commonly applied to real estate, since the value of the collateral is a major influence on the likelihood of a mortgage default and the losses resulting from it. LTV's can also be applied in other circumstances where collateral is a critical part of the lending decision. However, the conservatism introduced by LTV ratios can easily be undermined if there are lenders willing to make second mortgages or other supplemental loans based on the same collateral, or if the purchaser can easily obtain general credit unrelated to the collateral. LTV's are particularly useful with mortgages because they usually apply to borrowers who would have difficulty raising large amounts of credit without putting up real estate as collateral. Individuals often have a large portion of their wealth tied up in housing and small businesses are sometimes in a fairly similar position in regard to their office or shop space.

Administrative caps on aggregate lending. Regulators can put a limit on total lending by financial institutions as a class and/or on individual financial institutions. As noted, this is more common in less advanced economies where there is more state intervention and banks dominate the financial sector.

The tool allows quite direct control of total credit volumes, but at the expense of substituting government decisions for market signals. In addition, the more complicated the financial sector, and the instruments through which credit is provided, the harder it is to make the cap stick. Doing so may involve increasingly interventionist policies that can fail under the sheer weight of the required regulations.

Dynamic loan loss provisioning. As noted above, this idea is somewhat similar to counter-cyclical capital requirements in that banks would be forced to reserve for a higher level of loan losses during a boom than they would otherwise. This can be implemented in one of two ways. First, the rules can attempt to counteract a procyclical aspect of conventional loan loss reserving, which tends to fall during booms even though it is the loans made during periods of over-optimism that tend to be the most dangerous. Most loan loss provisioning methodologies require or encourage banks to estimate their losses based on relatively recent experience. During a boom, that recent experience will show unusually low loss levels, leading to diminished provisions. Dynamic loan loss provisioning applied in this manner essentially tries to keep loan loss provisions at a level sufficient for an average downturn. Second, the rules could go beyond that to try to build up quasi-capital reserves above the true best estimate of future loan losses during booms, either by focusing on losses under a stress case or by adding a margin of error in some other manner. The latter approach adds an element that is very similar to counter-cyclical capital requirements.

Spain employed dynamic loan loss provisioning for most of its banks, but not for its "cajas" or savings banks[25]. The consensus is that this approach probably reduced the damage to its mainstream banks, even though Spain still ended up with a major financial crisis, partly due to the cajas and partly to crucial underlying aspects of its economic and financial systems.

Minimum margins/haircuts[26] on secured lending. In recent years, a large proportion of financial transactions among big institutions has been undertaken through various forms of secured lending, such as repurchase agreements (repos). This has been particularly the case in the so-called "shadow banking" sector that has gained market share from banks in recent years but which has neither the same level of prudential regulation nor access to insured deposits or other more stable sources of funds. The Bank of England (2009), the CGFS, and others, have suggested that the margins and haircuts that are used might be made subject to regulatory minimums that would vary over time.

Counter-cyclical liquidity requirements. Banks are increasingly being required by their regulators to hold certain levels of safe, shorter-term or highly liquid assets to cover the possibility of their needing cash quickly to stop a bank run or to handle a freeze in credit markets that makes it difficult to raise funds. The Basel III rules will impose some form of liquidity requirements over time, although the details are still being worked out. Some countries already have formal liquidity requirements in place and all

[25] See Jimenez and Saurina for the theoretical underpinnings of the Spanish approach.

[26] "Haircut" is the industry term used for the difference between the value of an asset used to secure a loan and the amount of the secured loan that will be made. The haircut covers the lenders' risk that a failure by the borrower will force them to sell the collateral, which may have fallen in price in the interim.

regulators pay attention to liquidity issues on at least a judgmental basis. Increasing liquidity requirements in a boom would have an effect somewhat similar to increasing capital requirements, in that it would raise both the cost to the banking system of making loans and the safety of the individual institutions and of the system as a whole. Regulators generally believe that capital requirements are a more effective way to handle cyclical pressures, but there could be room for dynamic liquidity requirements as a complement. As with counter-cyclical capital requirements, and indeed most of the potential macroprudential instruments, regulators will need to keep in mind the trade-off between increased systemic safety and the cost burden of higher liquidity requirements and its effects on the financial system and the larger economy.

Constraints on currency mismatches. In many countries a considerable portion of credit activity takes place in currencies other than the country's own. This became a problem in parts of Central Europe and some other parts of the world during the recent crisis and, in general, these exposures represent a risk factor that becomes more important during boom times. Limits could be tightened during booms and released again during busts or in more normal times.

Many other potential tools exist, such as those listed in Committee on the Global Financial System (CGFS) (2010) in Table 1 of that report. However, those listed above are likely to be the most relevant in the near term.

Moreno (2011) discusses a number of potential benefits in the short-run of using many of these alternative tools in the emerging market economies. However, he adds some interesting caveats:

> "Over the medium term, the use of supplementary and macroprudential tools raises issues of financial development and efficiency. On the one hand, many supplementary tools discussed here have been abandoned in advanced economies because of the heavy costs imposed on the financial system and distortions in resource allocation. On the other hand, recent experience showed clearly that market discipline is not enough to guarantee financial stability. The crisis has prompted a reassessment of how these two competing considerations should be balanced.
>
> Another concern is that the focus on supplementary tools, including capital controls, could draw attention away from the need for sound macroeconomic policies. A number of central banks take the view that there is no substitute for conservative fiscal, monetary and regulatory policies in order to prevent fluctuations in global capital flows from causing severe disruptions in [e]merging market economies."

How would the various tools be combined?

This is a particularly difficult question. The state of understanding of macroprudential tools is still somewhat primitive even when examining such tools one at a time. There has been little work analyzing how they might be combined most effectively, especially in combination with counter-cyclical capital, the main topic of this paper.

As a common-sense matter, it is probably logical to consider first the application of specific tools that are aimed at the particular sector where a bubble is being created, if there is indeed a clear focus, such as housing. Maximum loan-to-value ratios are likely to be fairly effective in taking some of the air out of a housing bubble while also decreasing the risk banks take on with each loan. Of course, the concern may be great enough to merit combining this with higher capital requirements, especially as the uncertainty with regard to the effectiveness of each tool argues for trying more than one approach.

On the other hand, some of the tools, such as aggregate lending caps, are fairly direct substitutes for counter-cyclical capital requirements. Their use ought to be considered in those economies where they are most likely to be effective, which largely rules out most advanced economies, and where capital requirements are deemed to be less useful. This may still leave some circumstances in which either approach could be used. Unfortunately, there is not yet clear guidance as to how to choose between such competing tools.

One area that has been studied more than others in this regard is the trade-off between a price-like mechanism (for example, a tax or a minimum capital or liquidity ratio that adds costs to credit provision) and a quantity limitation, such as a limit on total lending by an institution or sector. Weitzman (1974) was a seminal work in this regard as he established a set of principles that apply in many areas of regulation, such as pollution control, where there is a choice between price and quantity mechanisms. One of his conclusions was that the choice of instrument depends to a significant extent on the relative degree of uncertainty of the social costs of allowing too much pollution or other "bad" versus the uncertainty about the cost to the private sector of being too tough in setting the rules. More recently, Perotti and Suarez (2009) and Jeanne and Korinek (2010) have built on these insights with specific applications for taxes versus capital/liquidity ratios. Perotti and Suarez, for example, argue that taxation might be superior to liquidity ratios for inducing the socially appropriate behavior in regard to systemic liquidity.

Experience to date

What evidence is there about how changes in capital standards have worked in the past?

It has been relatively rare for regulators to move capital requirements specifically to affect credit conditions in the short- or medium-term and therefore there is little direct evidence about the effectiveness of these tools. As noted above, there *is* a considerable body of research on capital requirements, including their effects on lending, which can provide useful guidance. However, only a small fraction of this has focused specifically on *counter-cyclical* capital requirements.

How have alternative tools worked historically?

Prior to the last couple of decades, it was much more frequent for governments and regulators to intervene directly to affect credit volumes. This was made considerably easier than it would be today by

the greater simplicity of national financial systems and the lesser degree of linkages across borders. Even so, these efforts often failed to achieve their overall goals.

The Bank of England put together a one page listing of some previous efforts in this regard and their outcomes. The following chart is taken from Bank of England (November 2009), Box

7.

Box 7
Leakages in past regulations

The problem of disintermediation is endemic to financial regulation.(1) Recent financial history provides a number of instructive examples of the powerful incentives that exist to circumvent regulation. In the United Kingdom, these include direct credit ceilings in the 1960s and the supplementary special deposit scheme, also known as the 'Corset', in the 1970s. International examples include federal margin and deposit interest rate regulation after the Great Depression in the United States and the introduction of Basel I. Most of the examples were not primarily directed at prudential regulation — many were seen as monetary policy instruments. But without exception, they all resulted in financial activity leaking to the unregulated sector. This box draws lessons from past episodes of financial disintermediation.

Direct credit ceilings (1961–71)

In the United Kingdom, direct ceilings on the growth in lending to the private sector were enforced on clearing banks in the 1960s through to the introduction of Competition and Credit Control in 1971. Although these appeared to be effective in limiting credit creation by the firms they covered, financial activity migrated to the less regulated secondary banks. These fringe institutions developed large exposures to the commercial property sector, financed through the wholesale market, including from the clearing banks. The emergence of this highly vulnerable 'shadow' banking system culminated in the Secondary Banking Crisis in the mid-1970s, forcing the Bank of England to intervene for fear of a loss of depositor confidence in the core banking sector.(2)

Supplementary special deposit scheme — 'the Corset' (1973–80)

The implementation of the 'Corset' at different phases between 1973 and 1980 aimed to limit the rapid growth in credit that had occurred following the introduction of Competition and Credit Control in 1971.(3) Banks were required to hold a share of their assets as non-interest bearing reserves if growth in certain sterling interest-bearing (retail and wholesale) deposits grew beyond a specified limit.

These rules were quickly circumvented. Instead of borrowing directly from banks, large companies financed themselves by issuing bills that were guaranteed (accepted) by banks. The growing 'bill mountain' had to be factored into monetary policy decisions at the time. Non-bank financial institutions were willing to buy these bills in the knowledge that they were guaranteed by the major banks. Financial activity also diverted to building societies which were not covered by the scheme. During the Corset period, building societies' share of personal sector deposits grew substantially and was used to finance rapid growth in mortgage lending. Following the abolition of the Corset, there was large-scale re-intermediation and a marked increase in conventional measures of broad money and bank lending growth.

Margin and Deposit Interest Rate Regulation (1933–34)

US Federal regulations governing minimum initial margin requirements have been in place since 1934, but there has been no change in their level since the early 1970s because of doubts about their effectiveness given the development of derivatives and other financial innovation. Regulation Q — which imposed ceilings on the interest rates that financial institutions in the United States could pay on deposits — spurred the development of the Eurodollar market in London, especially after it was tightened in 1963.(4)

The Basel Capital Accord (1992–2007)

At an international level, the incentive structure underlying the original 1988 Basel Capital Accord contributed to the rapid growth in securitisation over the past two decades. Banks responded to the imposition of risk-weighted capital requirements by engaging in regulatory arbitrage. Exposures with high regulatory capital relative to economic capital were shifted off balance sheet. The problem, as witnessed during the current crisis, is that many of the vehicles used to securitise these assets remained reliant on banks, actually or implicitly through reputational effects. So when liquidity risks materialised they were borne, to a significant extent, by the regulated institutions.

This historical experience with international leakages from regulatory frameworks underscores the importance of international co-ordination in implementing a robust macroprudential regime.

(1) As Goodhart (2008) states, 'effective regulation, one that actually bites, is likely to penalise those within the regulated sector, relative to those just outside, causing substitution flows towards the unregulated'.
(2) Bank of England (1978).
(3) Bank of England (1982).
(4) Milton (1971).

The Committee on the Global Financial System (CGFS), an international coordinating body for central banks to discuss broad issues concerning the financial system, issued a report in May of 2010 addressing macroprudential issues. It reports on a survey the CGFS conducted on experience with macroprudential tools to which 33 central banks responded. The report indicated:

> "In most economies, macroprudential policy frameworks are at an early stage of development. They have been implemented using existing microprudential monetary policy and liquidity management mandates and institutions. And, macroprudential interventions have taken the form of adjustments or add-ons to instruments already used for microprudential or liquidity management purposes.
>
> To date, most experience with macroprudential policy has focused on judgmental, rather than rules-based, use of instruments. The aims have mostly been to enhance financial system resilience rather than to moderate aggregate financial cycles, though there are examples where instruments have been used with a flavour of both.
>
> The evidence for effectiveness is tentative. The independent effect of macroprudential instruments is hard to isolate, given that they have come into use only recently in most cases, and often in conjunction with other stabilisation measures such as monetary policy responses. Authorities that have used them generally report that they helped to protect the financial system from downturns, but made a lesser contribution to moderating the financial cycle.
>
> To date, macroprudential instruments have been used mainly to limit the amount of credit supplied to specific sectors seen as prone to excessive credit growth, especially property investment and development. In addition, some emerging market economies have used reserve requirements to prevent the build-up of domestic imbalances arising from volatile cross-border capital flows. Measures targeting the size and structure of financial institution balance sheets for macroprudential purposes have been less common, with the exception of Spain's dynamic provisioning system, which has now been in place for a number of years."

The report is of particular value because, so far as the author is aware, it is the only wide survey of macroprudential activity around the world[27]. However, the high degree of subjectivity in the responses and the difficulty of independently analyzing the actions and their effects renders the results unavoidably quite tentative. The report itself acknowledges that "most respondents had a broad concept of what constitutes a macroprudential instrument" and that "responses indicated that conceptions of macroprudential policy aims and objectives are fuzzy."

[27] As noted earlier, Moreno (2011) recently reviewed macroprudential policy in emerging markets. This provides a deeper analysis of the situation in the emerging markets, as well as some examples of central bank and regulatory actions and their consequences.

Coordination issues

How would credit suppliers other than banks be handled?

It may do relatively little good, from a macroprudential point of view, to increase capital requirements at the banks if this means simply that non-banks will pick up the slack. Financial regulation has always faced this issue of determining which institutions should be treated as special and therefore regulated more strongly than normal businesses. Banks and insurers are virtually always regulated under special sets of rules because they are viewed as providing unique and economically critical functions. One of the main ones for banks is to provide a safe place for people and businesses to deposit funds that they may need on short notice, but are likely to leave for longer periods in practice. Banks are able to perform "time intermediation" by treating the bulk of the deposits as relatively permanent, allowing them to lend funds out for longer periods. This provides a major economic benefit in normal times by allowing the cash to be invested in medium and longer-term projects, where the core of the investment needs are. If all those funds stayed invested on a very short-term basis, there would be a real inefficiency.

However, time intermediation opens up the possibility of bank runs, where depositors become spooked, for good reason or bad, and all demand their funds simultaneously, a demand that cannot be accommodated given how much is tied up in longer-term loans and investments. As a result, almost all advanced economies have a government-backed insurer to protect bank deposits and also have a large number of prudential rules to ensure that banks do not take undue risks that might endanger the deposit insurance fund.

Insurers, for their part, provide protection for people and businesses against risks that are too large for them to handle on their own, such as having their house burn down or the breadwinner in the family die young. Hence, they too are regulated in great detail, given their critical economic role and the need for certainty for their policyholders.

However, there are other credit providers which are largely unregulated in regards to their capital and investments. Many of these participate through the capital markets by buying corporate bonds. This group includes individuals, non-financial corporations, charitable foundations, mutual funds, and hedge funds. Pension funds are similar to these participants in many ways, but generally are severely limited in their ability to borrow in order to fund investments.

If counter-cyclical capital requirements, or other macroprudential tools, are made too binding, then credit activity might simply shift to other providers who are not bound by these rules. The risk of this occurring depends on the relative competitive strength of the banks and other financial institutions that are bound by the macroprudential requirements. For example, I have analyzed the competitive constraints facing US banks in their response to higher capital requirements on their loan books, see Elliott (2010b). My conclusion, over-simplifying considerably, was that US banks had considerable room to react without running into competitive problems from other financial sectors. The credit business that they could easily lose to capital markets was lost years ago and their position with individuals and

small businesses is quite strong. In theory there was a danger that finance companies or other bank-like financial institutions with weaker regulation could take the credit business away, but the recent financial crisis and ensuing regulation largely destroyed the viability of the business model of such entities.

However, the competitive situation in Europe, for example, could be quite different. This is particularly true on the Continent, where capital markets are likely to become significantly tougher competitors for the banks over time since currently those markets are under-developed. There has also not previously been a large role for non-bank financial institutions other than insurance companies. Regulation is likely to prevent such non-banks from becoming major competitors, but it is always possible that this could change.

In any event, if banks are hamstrung in responding to macroprudential tools due to competition from other sectors, then it will be necessary either to expand the tools to include some of those other sectors or to accept a more limited role for macroprudential policy. As discussed below, the US's Financial Stability Oversight Council will have the ability to impose stronger or more bank-like regulation, including capital requirements, on systemically important non-bank financial institutions.

How should cross-border linkages be handled?

Regulators in a given country may determine that their credit markets are starting to boom to a dangerous extent and that it is time to raise capital requirements and/or deploy other macroprudential tools. However, there is a risk that lenders in other countries might step in to fill the gap. They might be able to do this by lending through branches operating in that country or the total capital in the group might be sufficient for them to comfortably redeploy some of it to the booming country. They also have the alternative in some cases of lending to companies that are based in the booming nation, but which can borrow outside their home country either directly or through foreign subsidiaries.

It therefore becomes important that there be global coordination of macroprudential activities. At the extreme, this could in theory mean treating the globe as one large market and having all relevant countries move in tandem. However, such global coordination would not only be too difficult, but would also almost certainly be counterproductive, given that national economies and financial systems remain different enough that the right medicine for one country can be poisonous to another. The task becomes one of ensuring that the differences in macroprudential choices across borders do not cause excessive damage to the policies each nation needs to employ for its own purposes.

One method that has been proposed is for other countries to honor the macroprudential choices of host countries. Thus, if the UK, for example, were to raise capital requirements on its domestic loans, then other countries should also raise capital requirements on UK loans being made by their own banks. A global bank would thereby find that its total capital requirements were based on a weighted average of the requirements relevant to its business in the various countries in which it operates. Unfortunately, there would remain considerable potential for "gaming" the different capital standards across countries, such as, in this example, by finding ways to reclassify what is essentially a UK domestic loan as a loan in a country with lower capital requirements.

The Basel III agreement endorsed by the G-20 leaders calls for national regulators to honor each other's macroprudential decisions, at least within the range of the counter-cyclical capital buffer of up to 2.5% of risk-weighted assets.

What entities should conduct macroprudential policy?

There is probably no single, uniquely right, answer to the question of what authority or authorities should conduct macroprudential policy. The central bank of a given country is most likely to be the sole or main authority in this regard, but there are arguments for an independent authority or for a committee arrangement in those countries which split regulatory authority for finance between multiple bodies.

There is a strong argument for central banks to control policy in this area because it is fairly closely related to overall macroeconomic policy and there are powerful reasons for the macroprudential authority to reside in a body with considerable independence from politicians. The authority will have to be prepared to step in to damp down credit/asset price booms in the face of strong opposition from those who are enjoying the short-term benefits of such a boom. The arguments for giving this role to the central bank are even stronger in those countries where the central bank also has a substantial role in prudential regulation of financial institutions, since macroprudential policy falls between macroeconomic and prudential regulation and needs to be coordinated with both those areas.

On the other hand, adding this further power to an already strong central bank could arguably produce an excessive concentration of power in one entity that has a relatively indirect accountability to the public. Just as with monetary policy, macroprudential decisions will require considerable subjective judgment and will produce winners and losers in the economy, although, presumably, more winners over time than losers. There is at least a theoretical danger of empowering an elite who might consciously or unconsciously serve the interests of themselves and their allies at the expense of the broader public. Even the appearance of this would present a danger to the critical and hard-won independence that most central banks enjoy on monetary policy. Enforcing tough decisions about macroprudential policy could create enemies who would look to weaken the central bank in order to exert more control over it. This would be particularly likely in the early years, before there has been a chance to prove that the macroprudential approach has long-term value and in a time when lack of experience is most likely to produce mistakes.

There is also an interaction between the macroprudential instruments to be used and the question of who should use them. As a general matter, it will be easier to coordinate when the instrument to be used is controlled by only one authority, which may use it for either macroprudential or other purposes. That said, this is more of a tie-breaker than a determining factor, especially as there are counter-arguments that having one authority try to use a single variable for multiple purposes can create ambiguities and confusions.

Would the authorities be national, regional, global or some of each?

It is most natural to think of macroprudential authority residing at the national level and this also appears most politically feasible. There does not appear to be a sound reason to go down to even smaller geographical divisions. Moving in the other direction, there are certainly theoretical arguments of some force for vesting the authority in regional groupings such as the EU or even in a global authority, given the increasingly global nature of finance, the intertwining of national economies, and the resulting importance of coordination. However, it appears unlikely that the political will exists to do this and it is not even clear that it would make good theoretical sense. Different nations still have fairly different economic and financial systems and circumstances which means they might suffer from the tendency of a wider authority to use a "one size fits all" approach.

If there is an area in the world today where a regional approach might make sense and have a chance of being implemented, it would be the EU. There is already a single central bank for the bulk of the EU's economy – those nations that use the euro accept the monetary authority of the European Central Bank (ECB). There is also considerable policy coordination across the EU, and the economies of the individual nations are linked to a substantial degree, certainly more so than is the case with most nations.

Nonetheless, there remain major differences between the economies and financial systems of different parts of the EU, as has been observed again recently with the crises surrounding Greece, Ireland, and some of the other economies of the periphery. In sum, there could well be major political and economic obstacles to vesting macroprudential power in an EU-wide authority. On the other hand, there would almost certainly be a strong push to coordinate *national* policies across the EU, at a minimum. Thus, the capital standards might differ across EU countries, due to different levels of counter-cyclical buffers, but should, at a minimum, be determined by each country using commonly agreed overall approaches.

What entities will conduct macroprudential policy in the US, UK, and the EU more generally?

The US, the UK, and the EU have each set up bodies to conduct or coordinate macroprudential policies going forward. In the case of the US, the Financial Stability Oversight Council (FSOC) will have the power to make most macroprudential decisions, with the implementation often left to the Fed or, to a lesser extent, other regulators. The FSOC is composed of 15 members, primarily the heads of the major national regulatory bodies, but with some representation, generally non-voting, of state regulators, insurance regulators, and financial experts. The Secretary of Treasury serves as the Chairman of the FSOC and has greater power than just running the meetings. (For example, no non-bank financial institution can be designated as systemically significant without the Chairman's assent.) The Dodd-Frank Act also created an Office of Financial Research (OFR) within the Treasury Department to provide technical expertise to the FSOC, especially in regard to data gathering and analysis and overall analyses of financial stability. Despite being within Treasury, Congress clearly intended the OFR to have a somewhat independent role, since the Director is protected by a six-year term and shielded from pressure to revise Congressional testimony to reflect Administration views.

The FSOC has a wide-ranging grant of power to deal with large banks and with systemically important non-bank financial institutions and it is mandated to preserve financial stability. It is therefore in a

position to actively conduct macroprudential policy, including by leaning against the wind. Currently, however, there appears to be more emphasis in the US on the reduction of systemic risk generally, with less focus on the cyclical aspects of macroprudential policy, although this could change.

The UK has chosen to concentrate macroprudential authority, and financial regulatory authority more generally, at the Bank of England. Consistent with this, legislation is being pursued to create a Financial Policy Committee (FPC) at the Bank with a clear macroprudential objective of leaning against the wind, in addition to the reduction of systemic risk more generally. There is already an interim FPC that will provide guidance to the Bank while awaiting final legislation. As noted earlier, one aspect of the legislation is that Parliament will very likely specifically authorize the Bank to use certain tools and not others as part of its policy.

The EU has created a European Systemic Risk Board (ESRB) that is intended to encourage appropriate macroprudential actions by the national regulators. It describes its mission, in part, as being "responsible for the macro-prudential oversight of the financial system within the Union in order to contribute to the prevention or mitigation of systemic risks to financial stability in the Union that arise from developments within the financial system and taking into account macro-economic developments, so as to avoid periods of widespread financial distress.[28]" At this initial stage of its development – it is just a few months old – its powers are purely advisory, including the authority to make its advice public. If it follows the path of many other EU-wide institutions, it is likely to accrete decision-making power over time.

The ESRB is a large body with 37 voting members (27 heads of national central banks, plus 10 others) and almost another 30 non-voting members. Many outside observers assume that the smaller Steering Committee, of 14 members and weighted more towards heads of EU-wide institutions, will end up dominating decisions. The ESRB will rely considerably on the European Central Bank for technical assistance and is located in Frankfurt with the ECB.

How would the authorities coordinate with their counterparts in other countries or regions?

It would be about as difficult theoretically to coordinate macroprudential policies as it already is to coordinate monetary policies. It would probably be even more difficult in the beginning, given the uncertainties and different views that would exist initially about the policy framework. The broad idea would be to respond in a similar manner across the globe to similar financial circumstances. If there were a global bubble in commodities fueled in part by excessive credit, then it would be in the interests of most countries to deflate that burgeoning bubble and to increase the effectiveness of the response through coordination of policies.

The task would not be easy, however. There might well be a difference of opinion between those countries that primarily produce commodities and those that primarily consume them about whether a bubble is forming or not. Or, there might be a set of countries which were experiencing a housing

[28] Quoted from the ESRB website, http://www.esrb.europa.eu/about/tasks/html/index.en.html

bubble while other nations were not. Even within those where a bubble had formed or was forming, they could well be at different stages or experiencing it to different degrees and the danger in each case might vary considerably, depending on the local housing and financial systems. These various differences could make coordination difficult[29].

That said, there are certain aspects of coordination that would virtually always be useful and important. Regulators should share information about the state of the financial system in their countries, especially as regards any potential dangers. Major financial institutions with substantial cross-border activities must be observed from the multiple viewpoints of the different national regulators, in order to assure that there is a combined picture available for macroprudential decision-making. (There is already a mechanism of "colleges" of supervisors for each of the most critical global institutions. These operate on a somewhat informal and consensual basis.) It would also be useful for any major macroprudential steps to be communicated in advance of implementation to regulatory colleagues in other countries, in case there should turn out to be implications that are not obvious to a given national regulator.

How would they coordinate with central banks?

If regulatory authorities other than central banks play a significant role in macroprudential policy, then it will be important to ensure that they coordinate appropriately. As an obvious example, it would be unfortunate if tough new macroprudential policies were put into place to stop a potential bubble at the same time as the central bank slammed on the brakes for the economy as a whole, unless the situation were truly so troublesome as to merit action on both fronts.

As described above, conventional monetary policy actions do have considerable effects on credit activity and asset prices through a variety of transmission channels. The most effective overall policy would require coordination with macroprudential actions that also affect credit provision in significant ways. Similarly, the information necessary to understand the necessary macroprudential actions overlap to a considerable extent with that needed for monetary policy, making it highly desirable that all authorities share their information and thought processes.

Finally, macroprudential regulators and monetary authorities both need politicians and the public to accept their actions, lest they eventually lose the independence to make these decisions. If one group is pushing the economy in a particular direction that appears to be at odds with the other group, it could do harm to both. Of course, the risk for macroprudential regulators is probably greater, because they will have a quite new mandate yet little history to show that this approach is useful.

Coordination must involve appropriate exchanges of information about the state of the financial system and of systemically important institutions, with particular emphasis on those aspects that represent the greatest dangers. Ideally there would also be an open exchange of views about the economy and the financial system. There should be frequent communication at the staff level between the various

[29] There are parallels with the theoretical discussions in monetary policy concerning Optimal Currency Areas. See Lafrance and St-Amant (1999) and Benigno (2004), for example.

authorities, complemented by more formal discussions perhaps once a quarter or more frequently if danger looms.

How would the multiplier change if further prudential changes are made in the future, such as through a Basel IV?

It is more than likely that capital requirements, or other tools that overlap with those used for macroprudential purposes, will be changed over time. For instance, it is easy to imagine a "Basel IV" accord that substantially revised the latest round of rules. In general, such changes should lead to offsetting changes in macroprudential regulation. If authorities were already comfortable with the level of capital being held as a result of the combination of prudential regulation and counter-cyclical capital requirements, then the instinct should be to keep the same level of total capital in the system, even if this means decreasing the counter-cyclical capital buffer. The logic is that the buffer was chosen in order to ensure that the total capital cost sent the right signals to the market about the desired tightness of credit conditions. If individual institutions need to hold more capital for prudential reasons on average over the cycle, this may need to be counteracted at this particular point in the cycle.

However, this logic could be overcome if the reasons underlying the change in prudential standards also had implications for macroprudential policy, such as by indicating that banks had learned how to avoid holding capital in regard to certain assets by taking them off balance sheet. It could also be the case that the higher prudential requirements meant that the current level of capital would imply a negative counter-cyclical buffer, which would not be consistent with the overall logic of the macroprudential approach. If other macroprudential tools were in use, these might have to be used to undo some of the credit tightening that would otherwise occur in that case.

How would the authorities deal with any regulatory arbitrage that developed?

This could be a particularly difficult question in practice and the answer would depend a considerably on the specific circumstances and legal authorities. One type of regulatory arbitrage would be the development of major non-bank financial institutions that lie outside the macroprudential framework. The best response might either be to begin regulating these as banks, both for "safety and soundness" and macroprudential reasons, or to adapt the macroprudential responses to encompass these other institutions as well. If neither of these actions makes sense, then the arbitrage would create constraints within which macroprudential policy would have to operate, yielding "second best" solutions at times.

Another potential difficulty would cross borders, with one nation using macroprudential policy very different from another and affecting cross-border lending behavior. As noted, it probably makes sense to defer to the macroprudential decisions of other countries, so that if, for example, mortgage lending in the UK were deemed by the British to need restraining then other countries whose banks lend into the UK should be placed under similar restraints. However, there might be more complicated interlinkages that are harder to unravel. These would likely matter only if macroprudential policy varied a great deal across borders -- which argues for a bias towards broadly similar policies in today's globally inter-linked world.

Nonetheless, for both good and bad reasons, there will be differences in macroprudential policy among major trading partners. It will be necessary for lines of communication to be open and for the authorities in different countries to be willing to listen to the concerns of their peers. Of course, virtually the same points could be made in regard to the desirability of monetary policy to be broadly consistent across borders and for there to be good communications. Yet, differing national approaches remain an area of serious concern and there are sometimes suspicions that one country is engaging in "beggar they neighbor" policies by influencing exchange rates or other economic variables that lead it to benefit at the expense of others. So, there is no reason to expect easy answers that will always work on such cross-border issues. All that can be done is to design a system to minimize the damage from these divergences.

Risks

Won't there be a risk of having too little capital for prudential purposes at times?

It is theoretically possible that decreases in counter-cyclical capital intended to fight credit busts would be so large as to encourage excessive risk at the financial institutions. This would be the case, however, only if the core capital levels, excluding counter-cyclical capital, were set too low to provide adequate protection in those circumstances. Rather, the intent of regulators is generally to have core capital levels that are strong enough in all cases and to have counter-cyclical capital always be either zero or an additional amount that adds to the system's safety both through the suppression of credit booms and by providing an extra buffer of protection to the individual financial institutions.

Can banks adjust their longer-term commitments to capital ratios that move?

If counter-cyclical buffers were changed too frequently or in too extreme a manner, it could make it difficult for banks to make medium and long-term loan decisions. Capital requirements are an important input into pricing decisions and indirectly into decisions about making a loan in the first place. It would be difficult to know what to charge if the average capital ratio over the life of the loan might be quite different depending on the path of capital requirements over time.

This can be countered in three broad ways. First, over time, authorities can act in consistent and predictable ways that allow banks to anticipate future changes, or at least the circumstances in which those changes would occur. Second, regulators can provide assurances that such changes will be made in a reasonable manner or even that existing loans would be exempted from the capital requirement increases or that the changes would be phased in. Third, market mechanisms could be developed whereby changes in capital requirements would be reflected in changes to the pricing of the loan. This would, though, pass the risk and reward from macroprudential capital changes onto borrowers, which might discourage some useful borrowing or put certain borrowers into a bad position if capital ratios were pushed up too quickly or dramatically. It might also be hard to determine how the change in requirements should translate into pricing, especially as the right adjustment would be dependent on decisions by the banks involved, as well as being affected by larger market conditions.

To what extent would authorities use subjective judgment?

It is hard at this point in the development of macroprudential theory to imagine a set of formulas good enough to eliminate the need for the authorities to make judgment calls, even though this clearly has its own drawbacks. The use of judgment has the great advantage of allowing the authorities to take into account information which is not contained in the models, including the possibility that an asset price boom is driven by a genuine economic development and not an investment fad. Or the authorities may be aware that other factors, such as world economic conditions, are likely to damp down the boom without the need for macroprudential actions.

Kannan et. al. (2009) conclude from their simulation analyses that "using a macroprudential instrument designed specifically to dampen credit market cycles would also be useful. But expectations should be realistic about what can be achieved with such an approach. In particular, it is often difficult to accurately identify the source of the shock driving house price booms. Invariant and rigid policy responses raise the risk of policy errors that could lower, not raise, macroeconomic stability. Hence, discretion would need to be applied."

Tucker (2009) states that he is "doubtful that macroprudential instruments could be operated as a rule. To steer the banking system towards increasing its resilience to incipient problems in a stretched sector, a whole series of judgments would have to be made. Whether the rate of credit growth seemed excessive; whether terms were overly lax; or whether the 'bubble bursting' would materially damage banks."

The IMF comes to the same conclusion, stating "[t]hese results suggest that policy reactions to indicators of potential financial vulnerability should be neither automatic nor rigid – policymakers need room for discretion.[30]"

However, subjective judgments can be wrong, they can be biased, and they can be harder to explain and defend. There is a fair chance that subjective judgment would raise the predictive ability of the authorities compared with using only a formula, but there would also be a danger of the authorities falling into the very human trap of buying into the same prevailing fallacies about the causes of an asset price bubble as did the rest of society. Worse, political pressure might be harder to resist when applying subjective judgment. This is not just a question of defending a decision but also of the human trait of convincing ourselves of those beliefs that will minimize conflict with others. Certainly, however, there would also be the issue of convincing politicians and the public that the authorities were acting appropriately. In the beginning, this could go either way. A formula provides an objectivity that might be helpful, but a formula that has not yet proven itself might be less convincing than the arguments of experts.

[30] IMF WEO (2009).

The Basel Committee (2010) acknowledges that national regulators will need to use subjective judgment. In order to increase the consistency and effectiveness of actions across the world, the committee proposes five principles to guide decisions:

"Principle 1: Buffer decisions should be guided by the objectives to be achieved by the buffer, namely to protect the banking system against potential future losses when excess credit growth is associated with an increase in system-wide risk."

The committee notes that the buffer, as such, "is not meant to be used as an instrument to manage economic cycles or asset prices." This does not mean that there would be no effects on these, but that the core purpose is to achieve stability in the financial system.

"Principle 2: The credit/GDP guide [a particular analytical measurement suggested in the report to measure excessive credit growth] is a useful common reference point in taking buffer decisions. It does not need to play a dominant role in the information used by authorities to take and explain buffer decisions. Authorities should explain the information used, and how it is taken into account in formulating buffer decisions.

Principle 3: Assessments of the information contained in the credit/GDP guide and any other guides should be mindful of the behaviour of the factors that can lead them to give misleading signals.

Principle 4: Promptly releasing the buffers in times of stress can help to reduce the risk of the supply of credit being constrained by regulatory capital requirements.

Principle 5: The buffer is an important instrument in a suite of macroprudential tools at the disposal of the authorities."

How would the proper transparency and accountability be achieved?

There is also a question of the degree of transparency surrounding macroprudential decisions. If the authorities were able to reduce the process to a set of formulas, then there would be a strong argument for making those formulas public. It might make sense to release those formulas and their current values even if they were just a portion of the items considered by the authorities. In addition, the subjective elements of the decision-making processes should be disclosed as well, within reason. In this regard, it is similar to the information releases from the Fed or the European Central Bank when monetary policy decisions are made.

Macroprudential authorities must also be accountable for their decisions, just as monetary policy officials are. The right approach is probably similar in both cases. The authorities must make clear decisions which they then communicate along with their reasons for making them. It may also be desirable for them to make periodic reports to their governments, as the Fed does in its appearances before Congressional committees to explain their monetary policy stance. In the end, the body politic has the ability to rescind or limit the independence and authority of these bodies and could legitimately

choose to do so if the authorities appeared to be making too many wrong decisions when viewed with the benefit of hindsight.

In the UK, Parliament will decide what macroprudential tools may be employed by the Bank of England and its Financial Policy Committee. This initial decision could, of course, be altered by Parliament later and there would be a real chance of that happening if the macroprudential authorities fail to make a clear and convincing case for the actions they take. At the EU level, the ESRB's sole powers are advisory, which makes it all the more critical that its analyses be convincing. The FSOC in the US is potentially more powerful than either of these bodies, having been given a very wide grant of authority, but it appears likely to operate with a much narrower approach, except, perhaps, in financial crises.

Of course, establishing credibility by sound analyses and decisions will be harder than achieving the same result with monetary policy, because credit cycles are longer than business cycles. This means that the correctness of a macroprudential decision may not be clear for several years, whereas the consequences of monetary policy decisions tend to manifest themselves somewhat faster.

How would the authorities counter political pressure not to puncture bubbles?

Political pressure will doubtless be brought to bear whenever macroprudential authorities attempt to damp down the development of credit booms. Boom periods create a host of winners, some of whom are true winners, such as brokers who pocket commissions based on asset prices and volumes, and some of whom are winning only temporarily, because their profits exist only if they were to sell while the bubble remained in place. Politicians will almost inevitably respond to the protests of these constituencies, especially as there tend to be few groups that are seen as being hurt by the boom. The arguments will usually not be in the guise of naked claims of self-interest, but will be wrapped in economic theories, such as the alleged productivity gains that came from the Tech Bubble or the benefits that purportedly arose from expanding the base of homeowners substantially.

Central bankers already face this sort of political pressure whenever they start to raise interest rates, since that action usually slows down the overall economy, creating many more losers than winners in the short run, even though it may be necessary for the common good in the longer run. However, they start with stronger economic theories to guide them and can point to years of experience that show why the temporary sacrifices are necessary. They also benefit from relative political independence that has been gained from historical experiences that have shown that lack of independence can lead to major economic problems.

Macroprudential authorities will need to make the best arguments they can, but it will take courage to withstand the onslaught. Over time, a consensus should develop, as it has with monetary policy, that the overall approach is right and that political independence is necessary to gain the benefits and minimize the pain.

On the other hand, the situation without the use of macroprudential tools is virtually the same as giving in to political pressure and never using them. Therefore, if they are used even partially and hesitantly, the economic results may well be significantly better than if the authority did not exist at all.

On the bright side, there is little likelihood in practice of the theoretical possibility that macroprudential authorities will overshoot by being too tough. The political pressures are almost certain to ensure that any errors are on the side of too little action.

What happens if we're wrong about this being useful and workable?

There are several ways in which the use of macroprudential tools could go wrong, including:

Excessive timidity. As noted, political pressures might keep the tools from being used to any great extent. This does not appear likely to create any more problems than are faced today, although it would mean that the benefits would largely fail to materialize.

Excessive aggressiveness. As again was noted, this is very unlikely to occur given the political pressures not to act to deflate potential bubbles. A greater risk in this area would be that counter-cyclical buffers would be brought back down to zero too fast or too frequently. Again, however, the present system operates in a system implicitly with buffers that are effectively at zero anyway, so while this would be an opportunity cost compared with ideal policy, it might still be better than today's situation.

Policy confusion. There is certainly a risk, especially in the early days, that policymakers send confused signals or change their methods too frequently. This could add volatility to financial conditions and thereby the overall economy. It would also likely raise the cost of capital and debt funding for financial institutions, costs which would be passed through in higher loan costs and reduced availability of credit.

Inappropriate credit allocation. If macroprudential tools are used not just to set overall credit conditions, but also to make certain sectors more or less attractive, there would be a danger of getting these allocations wrong and encouraging an inefficient allocation of societal resources. The misallocation could simply be due to mistakes or, more perniciously, it could result from political pressures to favor one sector or another.

Excessive interference in business decisions. Some of the potential macroprudential tools could be used to allow regulators to micromanage the financial system. For example, if counter-cyclical capital requirements were set on a sectoral level, authorities could be tempted to substitute their own judgment for that of the markets on exactly what kinds of loans are sensible. Some of the other tools are potentially even more heavy-handed, such as the setting of total limits on credit provision by banks. Setting the limits and dividing them among the different institutions would give scope for authorities to play favorites among institutions or among uses of the credit capacity.

Excessively high average capital requirements. The addition of counter-cyclical capital buffers, which are always positive or zero, will raise the regulatory capital requirements on average over time.

Directionally, this is almost certain to make credit more expensive and less available, on average. If none of the intended benefits of “leaning against the wind” are achieved, then this could lead to slower economic growth. On the other hand, if capital ratios are still too low after Basel III, as some have suggested, then the buffers may have an unintended positive benefit of bringing average levels closer to the optimal ones.

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