**A Survey of Macroprudential Policy Issues**

By

David Longworth

John Weatherall Distinguished Fellow, Queen’s University, January – May, 2011

Adjunct Research Professor, Carleton University

Fellow, C.D. Howe Institute

Version of 24 March 2011

The author would like to thank Pierre Duguay, Frank Milne, and participants in the Weatherall Seminar at Queen’s University for their comments. The author may be reached at:

David\_Longworth@carleton.ca

**A Survey of Macroprudential Policy Issues**

1. **Introduction**

Ten years ago few central bankers could have given a clear description of what “macroprudential” policy meant, even though the term had been around between 15 and 25 years.[[1]](#footnote-1) Indeed, until 2008, there was very little use of it in general economic circles. The financial crisis, which reverberated through the financial systems of the developed world, brought the concept to the fore.

A speech by Andrew Crockett (2000), then General Manager of the Bank for International Settlements, had given the term greater prominence in central banking and regulatory circles. The work by Claudio Borio and William White (e.g., Borio and White, 2004) of the BIS over the last decade in spelling out what kinds of things might be incorporated in macroprudential policy led central bankers to start taking on board more of the ideas.

Macroprudential policy may be seen as prudential policies (policies for “safety and soundness”) that are aimed at mitigating systemic risk, where systemic risk may be defined as “a risk of disruption to financial services that is caused by an impairment of all or parts of the financial system and has the potential to have serious negative consequences for the real economy.” (International Monetary Fund et al., 2009). This can be done both by strengthening the resilience of the overall financial system to shocks and by actively limiting the build-up of risks (CGFS, 2010b). It has been noted that, by the derivation of the term macroprudential, macroprudential policies should have a “macro” or system-wide element and a “prudential” element. In particular, not all financial stability policies are of a macroprudential nature because they may be primarily fiscal or monetary policies and not prudential policies. As well, traditional microprudential policy instruments can be used for macroprudential purposes (indeed, most of the proposed macroprudential policy instruments have been used or proposed for microprudential purposes), but their calibration and potential countercyclical and cross-sectional use are determined by their system-wide purpose.

Work on macroprudential issues has developed rapidly in recent years. The purpose of this survey paper is three-fold:

* To provide an introduction to macroprudential policy and its development (section 2)
* To spell out the market failures that have been discussed in the literature and the macroprudential instruments that have been proposed to deal with them (section 3) These instruments include: capital requirements (including components to deal with both procyclicality and systemic importance), simple leverage requirements in addition to risk-weighted capital requirements, liquidity requirements (both liquidity coverage and stable funding), through-the-cycle margin requirements and haircuts, minimum loan-to-value ratios for mortgages, and reserve requirements on credit (not deposits). Other suggested instruments are touched on very briefly. A typology of proposed macroprudential tools is developed and discussed in detail (section 4). This leads to a discussion of the policy issues of which macroprudential instruments are optimal and how many are needed (section 5).
* To set forth three other key policy issues regarding macroprudential instruments and the governance of macroprudential policy overall (section 6):
	+ How does macroprudential policy and its instruments relate to monetary policy?
	+ How should the non-stationarity of household debt be dealt with?
	+ How should macroprudential policy be governed?
1. **An Introduction to Macroprudential Policy and its Development**

Macroprudential incorporates both a “time series” or procyclical aspect and a “cross-section” aspect which concerns itself with interrelationships and common exposures among financial firms.

 The time series or procyclical aspect relates to the cycle in financial variables, particularly credit. Its antecedents are studies of the credit cycle and the work of Hyman Minsky (1982) on financial crises. Minsky noted, and economic historians like Kindleberger (e.g., Kindleberger and Aliber, 2005) documented how financial crises were typically preceded by rapid growth in credit, and often asset price bubbles as well. Subsequently, the statistical work of Kaminsky and Reinhart (1999), Borio and Lowe (2002), Borio and Drehmann (2009a, 2009b) and others has shown that banking crises can be predicted with the deviation from trend of the credit to GDP ratio, real housing prices, and real stock prices.

At the same time, the nature of the leverage-margin-liquidity cycle in financial markets (and housing markets) (Brunnermeier, 2009; Brunnermeier and Pedersen, 2009; Geanakoplos, 2010) has been examined theoretically and empirically. In this cycle, increased optimism leads to rising prices and financial market liquidity, reductions in margins (haircuts) and increased leverage. (A similar cycle, though typically with less emphasis on liquidity, takes place in housing markets.) As financial markets have risen in importance relative to bank loan markets, the role of the leverage-margin-liquidity cycle has become more important in the behaviour of the financial system as a whole. This has been especially true because of the role of universal banks and the interlinkages between more traditional banks and investment banks and broker/dealers.

On the cross-sectional aspect, researchers have turned to examining models of contagion. Banks are interrelated because: (i) they hold each other’s deposits, bonds, and shares and enter into repo and derivative contracts with one another and (ii) they have common exposures which may in part result from herding behaviour. If they do not hold enough liquid assets, they may be forced to initiate fire sales (Shleifer and Vishny, 2011) which, especially in a world of mark-to-market accounting, lead to reduced valuations of assets for their competitors. Losses experienced in financial markets, especially in fire sales, reduce capital and make it more difficult for banks to make loans at pre-existing terms and conditions. A credit crunch, defined as a sudden tightening of credit conditions or drying up of credit availability, can result.

Credit crunches and the decline in household wealth coming from lower actual and expected earnings in the banking sector and the effects of fire sales on the prices of assets held by households reduces demand and, in new Keynesian models leads to a decline in output and inflation.

These real effects are extremely significant. Reinhart and Reinhart (2010) have documented that median real per capita output growth in advanced economies in the ten years following a financial crisis is about one percentage point lower than the output growth in the ten years prior to the financial crisis. Unemployment rates are significantly higher in the ten years following a crisis than in the ten years before.

The recent financial crisis laid bare the major failures in private sector risk management and in public sector regulatory approaches to the financial system.

In few, if any jurisdictions, had any agency or committee been given the responsibility for regulating the financial system as opposed to regulating firms or markets in the financial system. No one was charged with maintaining financial system stability or reducing the probability of future financial crises. Many central banks were producing Financial Stability Reports, but they could only issue warnings (often vague and qualified), because they typically did not have the power to take action. Warnings that are not backed by the threat of actions typically go unheeded.

In the fallout from the worsening of the crisis in September and October of 2008, central banks, academics, and governments turned to thinking about the fundamental changes that needed to be made in financial regulation. Some concentrated on the individual things that had gone wrong recently, but others were convinced that in the past too much attention had been paid to trying to understand the details and not enough had been paid to the big picture.

One is reminded a little of the policy discussions about inflation in the 1970s. Some focussed on oil prices and labour market behaviour as being the fundamental causes, while others focussed on monetary policy as being the cause and started work to find a monetary policy framework that would lead a lower and more stable inflation rate. Ultimately, taking the “macro” picture and focusing on a policy framework that would achieve it was shown to be the right path.

Those who favoured a focus on the “macro” aspect of regulation formed themselves into groups beginning in the second half of 2008 to suggest how one could build upon the research that been done until that time to extend it and begin to build a macroprudential policy framework. In December2008 and January 2009, Working Group 1 of the G20 was formed with Tiff Macklem of Finance Canada and Rakesh Mohan, the Deputy Governor of the Reserve Bank of India as co-chairs. It was asked to look at what should be done to enhance sound regulation and strengthen transparency. In doing this, it took it upon itself to examine what should be done in the macroprudential area—especially governance and tools—and reported in March/April 2009 to the G20 (G20 Working Group 1, 2009). The G20 (2009) said that they agreed “to reshape our regulatory systems so that our authorities are able to identify and take account of macro-prudential risks.”

The International Center for Monetary and Banking Studies and the Centre for Economic Policy Research asked Markus Brunnermeier, Andrew Crockett, Charles Goodhart, Avinash Persaud and Hyun Shun (2009) to write the eleventh Geneva Report. They presented this at a conference in January 2009 and published it in June 2009. *The Fundamental Principles of Financial Regulation* is an unabashedly macroprudential approach to financial regulation.

The *Reports* section of the *Bank of Canada Financial System Review* began to focus on *Procyclicality in the Financial System* in June 2009 and macroprudential and system-wide issues in December 2009 (Bank of Canada, 2009).

The *Squam Lake Report* (French et al., 2010) from 15 noted U.S. academics was largely researched in 2009 and published in 2010. Although it does not use the term “macroprudential”, it talks about system regulation and its approach is typically macroprudential.

The Bank of England (2009) published “The role of macroprudential policy: A discussion paper’’ in November 2009.

The Warwick Commission on International Financial Reform (2009) published *In Praise of Unlevel Playing Fields* inDecember 2009. The Executive Summary began: “This is not the first international financial crisis the world has seen. This tells us two things. First, in trying to prevent or dampen future crises, we must not focus too heavily on the specific character of the present crisis. We must focus on those factors that are common across financial crises. There will be a different financial innovation or product at the centre of the next crisis. Second, it is unhelpful to think in terms of increasing or decreasing the quantity of regulation. There is good and bad regulation.”

The Committee on the Global Financial System (CGFS), a committee that reports to central bank governors at the Bank for International Settlements, increased its work in the macroprudential area throughout 2009 and early 2010, publishing “The role of valuation and leverage in procyclicality” (CGFS, 2009) in April 2009, “The role of margin requirements and haircuts in procyclicality” (CGFS, 2010b) in March 2010, and “Macroprudential instruments and frameworks: a stocktaking of issues and experiences” (CGFS, 2010a) in May 2010.

The Basel Committee on Banking Supervision was strongly encouraged by many, including central banks, to take a more macroprudential approach to regulation, particularly in the setting of capital requirements and liquidity requirements. As well, cost-benefit analyses of short-run and long-run effects of proposed changes in regulation were undertaken by a Macroeconomic Assessment Group (2010) established by the Financial Stability Board and the Bank for International Settlements, and by the Basel Committee on Banking Supervision (2010a), respectively.

Although the initial round of policy work on capital requirements and liquidity requirements by the BIS has been completed, there are still important issues to be resolved in the policy arena regarding the use of contingent capital, the procyclicality of margin requirements and haircuts, the procyclicality of loan-to-value ratios on mortgages, and the use of Pigovian taxes and subsidies when there is overborrowing.

Academics continue to be involved in the analysis of market failures and in describing practical policy measures to deal with them (see, for example, Hanson et al., 2011).

1. **Market Failure**

Hyun Shin (2010a) has described the overall market failure in financial systems as follows: “Risk is being ‘under-priced’ in the sense that banks take cues from current buoyant market conditions to take on additional exposures now, without taking sufficient account of the fallout to the rest of the economy when the bubble eventually bursts.” This is an externality. “Banks take account of their own short-term objectives without taking account of the spillover effects of their actions on other banks and on the economy as a whole.” As we have seen above, the work of Reinhart and Reinhart (2010) shows that the overall cost of this market failure is substantial. Acharya (2009) notes that, since deposit contracts are not “contingent on bank characteristics,” the costs of bank failure borne by depositors are not internalized by banks and their owners, thus potentially leading to negative externalities.

Brunnermeier et al. (2009) describe five major negative externalities as follows:

* “pure informational contagion” in which the failure of a bank casts doubt on the solvency of a bank that has a similar structure in terms of assets or liabilities (cross-section) **(1)**
* “loss of access to future funding for the failed bank’s customers” associated with the “loss of specific information links between the failed bank and its customers” **(2)**
* “Financial intermediaries trade much more amongst themselves than do other corporates” so “in the immediate aftermath of the failure of an inter-connected bank there is much uncertainty about how much creditors of that bank will get back, and by what date.” (cross-section) **(3)**
* A “bank in difficulty will often be forced to sell assets (fire sales)” and “there is an internal amplifying process (liquidity spirals) whereby a falling asset market leads banks, investment houses, etc., to make more sales (deleveraging), which further drives down asset prices and financial intermediaries’ assessed profit and loss and balance sheet net worth.” (cross-section, procyclicality). **(4)** Acharya (2009) notes that under certain conditions banks will exhibit herding behaviour that gives rise to systemic risk. Segura and Suarez (2010) show that the combination of bank refinancing constraints and the increased competitive price of liquidity in crises lead to the negative externality associated with excessive short-term debt. Other authors[[2]](#footnote-2) have focussed on how this amplification process in the crisis is likely to have been made worse by the extent to which liquidity improved, margin requirements (or required loan-to-value ratios) were loosened, leverage of borrowers increased, and bubble behaviour predominated during the boom period. CGFS (2010) describes the market failure in the setting of margin requirements as relating to the fact that “It is reasonable or even rational from the perspective of the individual financial institution to loosen credit terms during good times, only because the individual institution does not take into account the expansionary impact of its actions on the broader financial system.”
* “To regain liquidity, and to improve capital ratios, a bank, or financial intermediary, may seek to restrict new credit extension.” **(5)**

Brunnermeier et al. (2009) further note that “market failures (in the guise of resource misallocations) also occur during the boom phase, with excessive credit expansion and investment in the ‘bubble’ assets.” **(6)**

1. **Macroprudential Instruments: A Typology**

Macroprudential policy proposals have, in both the policy literature and academic literature, focussed on dealing with the market failures discussed above. Policies have largely fallen into three categories: proposals for capital requirements, proposals for Pigovian taxes (and subsidies), and proposals imposing maximums or minimums on behaviour (either on quantities or on prices and elements of credit conditions).

Policies have been proposed to deal with the following proximate objects of concern (related to market failures): excessive credit creation (including specific categories of collateralized credit), liquidity (including the maturity mismatch between assets and liabilities), and the continuation of a bank whose common equity has fallen below the required minimum. (In addition, some authors view proposals regarding infrastructure, such as central counterparties for OTC derivatives and repo, to be macroprudential in nature.) Many of the proposed policies deal with more than one of the market failures discussed in the previous section.

**Table 1: Typology of Major Macroprudential Instruments**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object of Concern:****Macroprudential Instrument** | **Credit Creation: General****5** | **Credit Creation:****Specific****5** | **Liquidity** | **Continuation of a Bank** |
|  |  |  |  |  |
| **Capital Requirements** |  |  |  |  |
| *(Base)* | *(X Basel III)* |  |  |  |
| Conservation Buffer | X Basel III |  |  |  |
| Countercyclical Buffer | X Basel III **6**X Geneva 11 **6** |  |  |  |
| Systemic surcharge | X BCBS? |  | X BCBS? **1,3,4** |  |
| Contingent (incl. bail-in debt) |  |  |  | X BCBS?OSFI **2,3** |
| Variable risk weights |  | X BoE **6** |  |  |
| Simple leverage ratio | X Basel IIIX Canada |  |  |  |
| Liquidity mismatch |  |  | X Geneva 11 **1,3** |  |
|  |  |  |  |  |
| **Pigovian taxes** | X Bianchi-Mendoza (overborrowing) **6 (and 4)** | X **6** | X **3,4**X Non-core deposits **1**X capital inflows **4** | X (insurance premiums) **2,3** |
|  |  |  |  |  |
| **Constraints on:** |  |  |  |  |
| Quantities or ratios | X Credit reserve requirements **6** |  | X Basel III LCR **1,4**X Basel III NSFR **1,4** |  |
| Prices or credit conditions |  | X Minimum TTC margins, haircuts (CGFS) **6**X Maximum loan-to-value ratios **6**X Other restrictions on mortgages **6** |  X Minimum TTC margins, haircuts (CGFS) **4**X Maximum loan-to-value ratios **4** |  |

**1** Informational contagion **2** Loss of access **3** Interconnection/failure **4** Fire sales/cycles **5** Restrict new credit expansion (everything in column) **6** Resource misallocations in boom

Table 1 presents a typology of the major macroprudential tools that have been proposed in the academic and policy literatures. On purpose it omits some distortionary monetary policy instruments (such as reserve requirements on deposits) which are clearly far from optimal, some microprudential and accounting changes that would be appropriate to do even without a macroprudential objective, and proposed changes in financial sector infrastructure (such as the use of central counterparties). Although these latter two categories may well reduce systemic risk and even be extremely important in this regard, they have the nature of once-and-for-all changes and thus are not a typical policy “instrument” that can either be occasionally recalibrated or used fairly actively. Moreover, these latter categories of changes are not ones that will eliminate the need for some of the instruments in the table in dealing with the six types of market failure described above.

Before discussing the proposed instruments in detail (and by groups), a short overview of how they related to market failures (indicated by bold numbers both in Table 1 and in the text below) is in order.

The first thing to note is that all of the proposed instruments in the table[[3]](#footnote-3) deal with avoiding the restriction of new credit extension (negative externality **5**) by reducing the probability of a crisis through discouraging credit creation in a boom, raising liquidity levels pre-crisis, and raising the probability that systemically important banks will continue more seamlessly after a crisis.

The major instruments that deal with (**6**), resource misallocations during the boom, are some of those in the two credit creation columns: countercyclical capital requirements, Pigovian taxes on overborrowing or overlending, reserve requirements on credit, variable risk weights in capital requirements or Pigovian taxes that could be used for areas of particularly rapid credit expansion that appeared unwarranted, and regulation of margin requirements and haircuts and of loan-to-value ratios or other conditions for mortgage loans or mortgage insurance.

The proposed macroprudential policy instruments in the liquidity column are designed to deal with one or more of the following market failures: informational contagion (**1**), cycles and fire sales (**4**), and interconnections at the time of failure (**3**). Informational contagion is dealt with by capital requirements that take the form of systemic surcharges or charges for liquidity mismatches and Pigovian taxes on non-core deposits.[[4]](#footnote-4) Cycles and fire sales can be dealt with through systemic surcharges (which can discourage common exposures), Pigovian taxes, minimum requirements for liquidity coverage or stable funding (as in Basel III), and restrictions on margin and haircut requirements and loan-to-value ratios. Pigovian taxes on capital inflows have also been proposed for the particular case of cycles in emerging market economies with weak financial sectors. Interconnections at time of failure can be dealt with through systemic capital surcharges, liquidity mismatch capital charges, and Pigovian taxes (on interconnections or as insurance premiums related to systemic importance), as well as contingent capital.

In addition to helping to deal with interconnections at time of failure, the two policies in the column on continuation of a bank, contingent capital and insurance premiums related to the cost of dealing with failure of a systemically important institution, deal with loss of access (2) by the customers of a large or systemically important institution.

The rest of this section discusses groups of proposed policies in groups: capital requirements to deal with general credit creation; Pigovian taxes and constraints to deal with general credit creation; variable risk weights and Pigovian taxes to deal with specific credit creation; regulation of credit conditions to deal with credit creation in collateralized markets (securities financing, derivatives, mortgage); policies related to liquidity; and policies related to the continuation of a bank.

* 1. **Capital requirements to deal with general credit creation**

An increase in capital requirements helps deal with general credit creation in two ways. First, to the extent that the Modigliani-Miller theorem (Modigliani and Miller, 1958) does not hold,[[5]](#footnote-5) there is an increase in the marginal cost of finance to a bank of increasing the amount of common equity which would be passed on to borrowers through an increase in interest rate spreads and thus constrain the growth of credit. Second, a bigger buffer of capital provides better protection to a bank and to the financial system when the value of assets decreases.

Historically, the justification for the microprudential regulation of capital was to protect the deposit insurer. Deposit insurance was seen to be necessary to prevent bank runs, but there was then the moral hazard that a bank would take excessive risks. A base capital requirement, combined with the type of prompt correction action regime in place in the United States or Canada then greatly reduces the moral hazard, while providing protection to the deposit insurance fund.[[6]](#footnote-6)

Capital requirements set by the Basel Committee on Banking Supervision have been set on the basis of risk-weighted assets since the adoption of Basel I. The argument is that less risky assets require lower amounts of capital.

If there are shocks that affect the financial system as a whole, because risk is endogenous, it will be important that there be more capital in the system than that necessary to deal with the idiosyncratic failure of one bank. This can be seen as the justification for the requirement in Basel III (BCBS, 2010b) for a bank to build up a capital conservation buffer of 2.5 percentage points of risk-weighted assets, beyond the new 4.5 percentage point requirement for common equity tier 1 capital.

The procyclical nature of the financial system means that systemic risks are built up in booms and fall after crises. This is the justification for the countercylical capital buffer of between 0 and 2.5 percentage points which will be in addition to the base component and the capital conservation buffer mentioned above. A countercylical capital buffer had been proposed in Kashyap and Stein (2004) and Brunnermeier et al. (2009) and some details had been discussed in Arjani (2009) and Borio et al. (2010). The basic proposal is to raise the risk-weighted capital requirement when the credit to GDP ratio exceeds its trend.

The Basel Committee on Banking Supervision continues to closely examine two further components of capital requirements. The first is a capital surcharge for systemically important banks, which relates to their interrelationships (deposits, bonds, shares, repos, securities lending, derivatives) with other banks and their common exposures. Interrelationships are a source of continuation and propagation of liquidity cycles, while common exposures exacerbate the effects of fire sales. Adrian and Brunnermeier (2010) have proposed a measure based on CoVaR, which is defined as the “value at risk of the financial system conditional on institutions being under distress.” A bank’s contribution to systemic risk can then be measured by the CoVaR conditional on it being in distress minus the CoVaR in the median state of the institution. It appears that this measure could be useful in *ex ante* stress testing.[[7]](#footnote-7) Gauthier et al. (2010) have shown that a reallocation of total capital among the six largest Canadian banks would significantly reduce the probability of systemic failure; in other words, capital requirements based on systemic importance could more efficiently use total capital to reduce systemic risk. The second further component of capital requirements is contingent capital and bail-in debt, which will be dealt with in the section on policies for the continuation of a bank.

The emphasis on risk-weighted capital ratios has been criticized from two separate but related directions. First, note the critique of Brunnermeier et al. (2009) that capital should be based on unexpected losses rather than expected losses (which should be built into interest rate spreads with loan loss reserves being built up in periods of low losses). Brunnermeier et al. (2009) argue that unexpected losses (as a percent of assets) may well be higher for highly rated assets than lowly rated assets. Second, risk-weights may be incorrect and there are dangers in highly leveraged banks (the two large Swiss banks had leverage ratios of over 50—i.e. a simple or non-risk-weighted capital ratio of under 2, even though their risk-weighted capital ratios far exceeded the Basel standard). Based on the second critique, and perhaps based on the experience of Canada (and traditional U.S. commercial banks) where there were simple leverage requirements in place prior to the crisis, Basel III incorporates a simple leverage requirement.

The framework that the Basel Committee on Banking Supervision has adopted thus far in Basel III broadly follows the recommendations of academic economists for a good regime of capital requirements. Since banking regulation since the late 1980s has been founded on capital ratios, much of the work on regulation has focussed on improving the risk-weighted capital regime and adding a leverage ratio rather than on the alternatives to be discussed in the next section.

* 1. **Pigovian taxes or constraints to deal with general credit creation**

There are two main alternatives to capital requirements for dealing with general credit creation. The first is a system of Pigovian taxes or subsidies, while the second is a system of reserve requirements on credit.

Bianchi and Mendoza (2010) have proposed a system of Pigovian taxes on borrowing and subsidies on dividends to deal with potential overborrowing.[[8]](#footnote-8) In their model borrowers do not internalize the negative externalities of the fire sales of assets on other agents. As a result, they borrow too much relative to what a constrained social planner would allow them to do. The constrained social plan can be implemented with state-contingent taxes on debt of about one per cent on average and subsidies on dividends of about half a per cent on average.

The other potential way of dealing with credit creation would be to have a system of reserve requirements on credit, rather than deposits. Although historically—and still today in many countries—reserve requirements on deposits have been used in the implementation of monetary policy, they are used in few if any countries today to hit a target for the quantity of deposits (or a monetary aggregate), but rather as a way of achieving the target short-term interest rate of the central bank. In other words, the amount of reserves demanded at the target short-term interest rate is supplied. If reserve requirements on credit were adopted, to be meaningful some interest rate or interest rate spread would have to be free to vary when credit growth differed from the notional target growth for credit. A country could choose to have a credit growth target, just as some countries used to have money growth targets, but then it could not typically achieve its existing monetary target (inflation target, exchange rate target, etc.) Combination targets are possible, but one would have essentially passed from a discussion of macroprudential tools to a discussion of monetary policy and whether monetary policy should have a financial stability objective. This is discussed further in section 6.

One general point that can be made about this sub-section and the last one: if monetary policy is about setting the level of short-term interest rates, macroprudential policy to deal with negative externalities associated with credit growth has to largely be about influencing interest rate spreads and other credit conditions through taxes, subsidies, and the cost of the “tax” imposed through capital requirements or credit reserve requirements. Capital requirements of course have the further effect of protecting the system against failure even in the absence of a significant “tax” element.

* 1. **Variable risk weights in capital requirements and Pigovian taxes to deal with specific credit creation**

Although credit is always, to some degree, fungible, excesses in credit creation prior to crises have often been concentrated in specific sectors such as home mortgages or commercial real estate. Therefore, in response to rapid credit growth (low credit growth) in a particular sector, authorities have to possibility of raising (lowering) risk-weights for assets related to that sector or taxing (subsidizing) lending to that sector. (If taxes are applied when credit growth is high, the revenue would be available to subsidize lending when credit growth is low.) The Bank of England (2009) placed significant attention to sector-specific risk weights in its November 2009 discussion paper.

* 1. **Regulation of credit conditions in collateralized markets**

Collateralized markets are, at one level, just another set of specific markets that could be dealt with as in the section above. There is, however, a particular reason why they should be of particular interest to macroprudential authorities. That is because the credit growth in those markets is often related to the procyclical movements in margin/haircut/downpayment requirements in those markets. These procyclical movements are an important factor affecting the procyclical nature of the margin-liquidity-leverage cycle which, when operating in the bust period can lead to fire sales and financial crises.

The proposals in the literature are for constant minimum through-the-cycle haircuts and initial margin requirements[[9]](#footnote-9) (CGFS 2010b, Longworth 2010, Geanakoplos 2010, and Stein 2010) and constant through-the-cycle maximum loan-to-value ratios. There is also the possibility of countercyclical regulation, which would raise the minimum haircuts and margins (CGFS 2010b, Longworth 2010) and lower the maximum loan-to-value ratios (as has been done in Hong Kong) in boom periods. The large increases in simple leverage ratios in many banks prior to the crisis came about through financing fixed income instruments at lower and lower haircuts. Similarly, there were large increases in typical loan-to-value ratios in U.S. mortgages for new homeowners, which is equivalent to saying that new homeowners were more leveraged than in the past. Geanakoplos (2010) has shown that in models where there is heterogeneity of views about the true value of assets, increases in leverage lead to greater volatility in asset prices. And, when haircuts rise from very low levels in markets, the required decline in leverage (and thus in credit supplied) is much greater than if minimum haircuts had been set on a through-the-cycle basis. This leads to a much greater effect on asset prices, and a greater probability of significant fire sales in some market.

* 1. **Policies related to liquidity**

Policies related to liquidity are primarily to deal with informational contagion (**1**), interconnection/failure (**3**), and fire sales/cycles (**4**).

The BCBS has been examining the possibility of systemic capital surcharges for systemically important institutions. Here, systemic importance would relate to interconnections and common exposures. Common exposures, in turn, raise the probability of informational contagion and fire sales. Work by a number of authors, including Gauthier et al. (2010) have shown that systemically important institutions should have higher capital requirements, and that, for a given amount of capital in a national banking system, the system can be made safer by requiring the systemically most important banks to have higher capital ratios and the systemically least important banks to have lower capital ratios.

The Geneva Report 11 (Brunnermeier et al., 2009) focussed on the mismatch problem in banking, with banks typically having long-term assets funded by short-term liabilities. The greater the maturity mismatch and the less sticky the short-term liabilities (wholesale deposits rather than retail deposits, commercial paper rather than deposits where there are ongoing relationships), the greater the potential liquidity problems for a bank and for the system as a whole during the downturn in a cycle. The Geneva Report thus proposed that there be a capital requirement multiplier based in the degree of mismatch.

Pigovian taxes could also be used to deal with situations of interconnections/failure or fire sales/taxes. Perotti and Suarez (2011) show that, when the lending opportunities available to banks differ, a Pigovian tax on short-term funding will contain systemic risk and preserve the quality of credit. Under the same conditions, a quantitative restriction on liquidity will either be ineffective or will be similar to the tax with a deadweight loss. If, however, banks differ in “gambling incentives,” systemic risk will be better controlled with quantitative ratio restrictions on net funding, and not by Pigovian taxes. Shin (2010a) has focussed on non-core deposits (those non-term, non-retail deposits which can move quickly from one institution to another), and has argued that there are grounds for a levy on their use. (Shin has also noted that there is a strong correlation between the growth in non-core deposits and the cyclical growth in overall credit—in other words, a link between cross-sectional concerns and time-series or procyclical concerns. This feature, as it applies to short-term funding, appears to be captured in the model of Perotti and Suarez.) Others, in an emerging market economy context, have focused on the volatility of portfolio capital inflows and have argued for a levy on them.

The BCBS (2010c) has chosen not to go the capital-regulation or Pigovian-tax route for regulating liquidity. Rather, they are implementing over a period of years the implementation of two minimum liquidity standards: a Liquidity Coverage Ratio (LCR) and a Net Stable Funding Ratio (NSFR). The first ratio is designed to ensure that each bank has enough high quality liquid assets to survive a significant stress scenario of net cash outflows over 30 days. The second ratio, which focuses on a time horizon of one year, emphasizes ongoing stable sources of funding. One difficulty with the BCBS requirements is that they do not state what will happen in a systemic event. In such an event, it is imperative that required liquidity ratios not be enforced. Liquidity is only useful if it can be used in difficult times (Northcott and Zelmer, 2009). If it cannot be used freely, the requirement is just acting as a tax—and that tax is not achieving a desirable social objective.

One final remark in relation to liquidity is that minimum haircuts and margins and maximum loan-to-value ratios, policies which were discussed in the above sub-section, also tend to reduce the probability of pronounced margin-liquidity-price cycles and thus the probability of fire sales.

* 1. **Policies related to the continuation of a bank**

The BCBS in general, and OSFI (supported by the Bank of Canada) (D’Souza et al., 2010) in particular, have been examining policies for contingent capital and the like. These policies are aimed at increasing the likelihood of a continuation of a bank when that bank is no longer viable in the view of the supervisor (or when common equity falls short of some minimum standard), without the injection of government money. They have the valuable by-product of doing away with the moral hazard of the too-big-to-fail problem by allowing the shareholders to be wiped out (or greatly diluted, as the case may be) and management to be replaced, while allowing the institution itself to continue. Contingent capital is essentially a subordinated security, whether a preferred share or a subordinated debenture, that is converted to common equity under conditions laid out by contract. Bail-in debt consists of senior debt securities that, under conditions laid out by contract, are converted to common equity. If the sum of required contingent capital, bail-in debt, and excess common equity (i.e. common equity above required levels) equals or exceeds the base requirement for common equity, then the bank would have the minimum amount of common equity to continue operating, even if all its original common equity (base plus buffer plus countercyclical buffer) had been wiped out.

It has also been proposed that an insurance fund be built up through payments by systemically important institutions. This fund could then be used by the government to recapitalize systemically important institutions that fall below their required capital levels. The difficulty of implementing such a proposal is knowing at what rate to set the insurance premiums.

1. **Which macroprudential instruments and how many? What are the issues?**

The above section has basically laid out a typology of what has been proposed in the academic and policy literature to improve financial regulation. If one accepts that there are market failures of the six types laid out earlier in the paper, which macroprudential instruments should be chosen to deal with them?

This question can first be asked in a theoretical world without constraints. But it can also be asked about a world in which state-contingent Pigovian taxes and subsidies would have to be approved by legislatures or governments—which would be somewhat problematic in most countries—and a world which already begins with risk-weighted capital regulation. Brunnermeier et al. (2009) appear to be implicitly asking the second question, as they focus on the ways one could build on Basel II, adding a countercylical capital multiplier to deal with the time-series dimension and a maturity-mismatch multiplier to deal with the cross-section dimension (differences in liquidity across institutions).

My reading of the literature is that policymakers have generally decided to focus on the time-series dimension through capital, but that there is still a lot of difference on the approach to the cross-section dimension as it applies to liquidity. In part, that is because there are a number of different dimensions to liquidity (short-run, stable funding, liquidity in the repo market).

As noted above, there is a strain of the literature in which the connection between the growth in the asset side of the balance sheet and the growth in the liabilities side are essential to the results. This is especially true when the acceleration in credit is financed by the acceleration in short-term or “non-core” liabilities. If this is a general feature of the financial cycle, then the dimensionality of the policy problem may be much reduced (in other words, the negative externalities are potentially not independent of one another.) **This argues for a closer study across time and across countries of the association of accelerations in credit with the acceleration in various types of liabilities.**

The focus on the health of lenders which permeates much of the literature suggests an examination of how the health of specific types of borrowers might feed back on the health of those lenders that rely heavily on collateral. Thus, one can consider the importance of the health of households with residential mortgages (and commercial enterprises with commercial mortgages) for the behaviour of housing prices and the health of non-bank investment firms (as well as banks) using the repo market for the behaviour of prices in the fixed income market. Both of these argue for **a close examination of whether separate regulation is needed for loan-to-value ratios and haircuts**, as opposed to relying on capital to cover overall credit risks. Housing price bubbles have been associated with a number of financial crises and there has not yet been enough study of whether dealing with negative externalities associated with the behaviour of total credit would be sufficient to deal with externalities specific to the mortgage market.

Overall, capital regulation is in place to deal with credit growth and its procyclicality. The work on contingent capital and bail-in debt is well on its way to deal with the continuation of banks (while getting rid of moral hazard). The work on the regulation of liquidity, both theoretically and in practice, is much less compelling. In part, this is because of the multi-dimensional nature of liquidity dealt with above. In part, it is because of the multi-dimensional nature of the negative externalities that are present. Most academic work treats these externalities one at a time, and understandably so. This, however, makes the results more difficult to use directly in policy.

1. **Other issues: macroprudential policy and monetary policy; non-stationarity in the behaviour of the household indebtedness ratio; governance**
	1. **Macroprudential policy and monetary policy**

There is obviously a close relationship between macroprudential policy and monetary policy. In normal times, monetary policy works through affecting the current and expected future short-term interest rates. Macroprudential policy, on the other hand, works through affecting interest-rate spreads, the terms and conditions of credit, and the availability of credit. Current and expected future short-term interest rates will affect both credit demand and credit supply—and thus influence the degree of future financial stability; interest-rate spreads, the terms and conditions of credit, and the availability of credit will affect the real economy and thus the rate of inflation—the things that monetary policy is concerned with.

At one level, the relationship between monetary policy and macroprudential policy is no different than the relationship between monetary policy and fiscal policy: there is no real difficulty if the objectives of both policies are known to both the monetary policy authorities and the fiscal policy authorities,[[10]](#footnote-10) and it is clear that the monetary authorities will make interest-rate decisions far more often than fiscal authorities make budgetary decisions. Similarly, there will be no difficulty if the objectives of both monetary policy and macroprudential policy are known both the authorities responsible for each, and it is clear that the monetary authorities will make interest-rate decisions far more often than macroprudential authorities will change the policy tools at their disposal. Moreover, **if the macroprudential tools are found to deal appropriately with all the relevant negative externalities, then there would be no need for monetary policy to focus on issues of systemic risk and financial stability.**

At another level, however, it is not yet clear that we know enough for the type of macroprudential tools described in the earlier part of the paper to sufficiently reduce the probability of financial instability (or a financial crisis) to its socially optimum level. The short-term interest rate is a powerful tool; it is not yet clear whether the combination of all the macroprudential tools described above would sufficiently reduce the probability of financial instability. Furthermore, if political constraints mean that some of the macroprudential tools cannot be employed, there may be stronger reasons for monetary policy to have financial stability as an objective, even if it is a secondary one.

There is some evidence that lower-than-normal interest rates, particularly if they are expected to last, can have significant effects on risk-taking and on interest rate spreads. This might have the effect of increasing systemic risk. Borio and Zhu (2008) have examined this risk-taking channel of monetary policy.

There are some things that monetary policy can do to increase the probability of financial stability through the design of the monetary policy framework, even in the absence of a specific change in the monetary policy objective (from a focus on price stability, perhaps combined with the real economy). Two of these are including housing prices in the household basket that is targeted or monitored and emphasizing the uncertainty of the future interest rate path (whether or not the expected path is made public).

It is important to note that the inclusion of credit growth (or asset price growth) in the monetary policy reaction function does not indicate that monetary policy is ‘’targeting’’ credit growth (or asset price growth) or financial stability. That may merely be a more efficient way of minimizing a loss function that is solely a function of the deviation of inflation from target and the deviation of output from potential output given linkages between financial activity and real activity.

Prior to the most recent financial crisis, few of the primary macroeconometric models used in central banks contained more than a rudimentary financial sector (which was typically represented by short-term and long-term interest rates). Secondary models were beginning to incorporate bank credit, financial accelerator and bank capital channels related to the work in the literature by Bernanke and Gertler (1995), Bernanke, Gertler and Gilchrist (1996), and Meh and Moran (2010). Transmission of monetary policy through wealth, collateral, and bank capital effects is one thing; capturing rising probability of a downward spiral in liquidity and asset valuations (fire sales) leading to credit crunches—a distinctly non-linear effect—is another. For monetary policy aimed at inflation, one needs the former. To discuss role of monetary policy in financial stability, one needs the latter.

Overall, it seems premature to make a decision as to whether monetary policy should have a financial stability objective, even a formal one that is secondary to its price stability. Informally, as is the case almost everywhere, monetary policy can play a supporting role when it does not significantly reduce the probability of the achievement of its primary objective. One reason that weighs against making a decision now is that it would greatly complicate the governance and transparency of both monetary policy and financial stability policy.

* 1. **Non-stationarity in household debt-to-disposable-income ratio**

In many countries, the aggregate household debt-to-disposable-income ratio has continued to rise to levels above 145 per cent (Sweden,[[11]](#footnote-11) New Zealand, and Canada). When interest rates return to normal levels, debt service ratios in these countries will be much above normal and may well be at historic peaks. If the typical distribution of debt service ratios across households continues to hold, there could well be a much larger-than-normal proportion of households that are vulnerable to shocks to their employment situation or income. DSGE models that deal with average households and ratios relative to trends cannot capture these effects.

Since household credit represents the greatest proportion of lending in many banking systems, the picture painted in the above paragraph likely has significance for the financial stability of those systems. It also raises the role of particular macroprudential tools in dealing with the situation. Tools are already in use in some countries (including many Asian countries, some continental European countries, and Canada) in dealing with mortgage indebtedness: maximum loan-to-value ratios, maximum debt-service-to-income ratios, etc. The question that needs to be answered is whether there need to be tools to deal with credit card and automobile loans as well: higher minimum monthly payments and larger downpayments. There seems to be some evidence that some households (perhaps implicitly encouraged by financial institutions and automobile companies) limit their downpayments and monthly payments to minimum levels—taking them as recommended levels rather than as minimums (and failing to consider alternative payments)—thus raising their vulnerability at every point in their repayment period. When a huge proportion of the population does the same thing, the overall system is more vulnerable.

Although this area has received some treatment in Financial Stability Reports (including the Bank of Canada’s *Financial System Review*), there has been little written on it from a theoretical and macroprudential policy point of view.

* 1. **Governance**

In both monetary policy and regulatory areas, there has been significant emphasis put on governance for achieving desired results. Governance issues can be generally divided into two: a framework for achieving a desired objective, and specific governance practices (legitimacy, relationships, structure of the decision-making body, integrity, independence, transparency, accountability, “will to act,” and human resource management) to aid in the effectiveness of the framework.

A generic framework for a macroprudential authority is set out below in Figure 1. A legislature grants powers to an authority which allows it to carry out certain activities and use a number of policy instruments to achieve certain goals which will allow it to meet its overall objective. If the overall objective is to avoid significant financial instability, then the plain-language version of reducing systemic risk or mitigating negative externalities would be dampening procyclicality and reducing the potential effects of contagion. The key policy instruments would be the macroprudential instruments discussed above, but they could also include advice on policies to governments, and warnings to private sector firms and households about underappreciated risks. To exercise these instruments, the macroprudential authority will need to undertake data collection (both of important aggregate data and important subaggregates), engage in surveillance of what is happening in the financial system, undertake analysis and stress testing of the system, and assess the degree of risk present in the system.

One of the key questions is whether the macroprudential authority should itself be able to determine the settings of the macroprudential instruments or just be able to recommend them to microprudential authorities on a “comply or explain” basis. This is, of course, not independent of the question as to who the macroprudential authority should be the Treasury, the central bank, an integrated micro- and macro-prudential regulator, or a committee bringing together most of these parties.

Figure 1. (Source: Longworth, 2011, and text)

As I have pointed out elsewhere (Longworth, 2011), there is a relationship among a number of important governance practices in the macroprudential area: the committee or organization responsible, legitimacy, and relationships. Committees of the relevant parties (Treasury, central bank, regulators of various financial sectors, and the deposit insurer) have two distinct advantages. First, they have the legitimacy that comes from a variety of expertise about the structure of the financial institution, from the details that are necessary in understanding financial innovations to the big picture of understanding how the system fits together. This expertise is real and, if properly incorporated into decision-making, can be of great benefit.[[12]](#footnote-12) Second, in G20 members, committee members are likely to have significant ties to important international bodies: the G20 itself, the Financial Stability Board, the Basel Committee on Banking Supervision, IOSCO, the Committee on Payments and Settlement Systems, the Committee on the Global Financial System, and the BIS Governors. Thus, they will be well aware of important international trends, as well as to developments in international policy standards. Moreover, Blinder and Morgan (2005) in their work on governance which focused on monetary policy committees, also suggests the value of committees: “Group decisions are on average better than individual decisions.” [[13]](#footnote-13)

Both the European Union and the United States have adopted structures with inter-departmental committees. The United Kingdom, in comparison, has given the responsibility to the Bank of England, but with a governance structure which explicitly includes members from outside the Bank. It remains to be seen which type of structure will be more effective. Both can be effective if the adopted framework, the leadership, and the motivation of committee members are all appropriate. The policy question is, given the market failures that need to be dealt with, which are the frameworks and governance structures and practices that are more likely to achieve the financial stability objective in a given country.

Figure 2. (Source: Longworth, 2011)

1. **Conclusion**

“Macroprudential policy,” particularly as it applies to the design and use of macroprudential instruments, is a new field. Policymakers’ understanding in the macroprudential area builds on a wide variety of types of literature and analysis. These include the study of:

* Systemic risk
* Procyclicality in financial systems, as apparent in historical episodes, studies of the credit cycle, and in studies of prediction of banking and financial crises
* Automatic stabilizers
* Negative externalities
* Networks and contagion
* Traditional microprudential instruments
* Behavioural finance
* Macroeconomics of financial frictions
* Bank runs

Much progress has been made in the last four years in terms of the study of negative externalities and policy frameworks. Academics have contributed greatly to our understanding of fire sales, margin/leverage/liquidity spirals and the dangers of short-term or “non-core” banking liabilities. But there is much work left to be done, both theoretically and in translating the existing literature into workable policy.

Among the issues that I have surveyed in this paper are the following:

* What is the relationship historically in various countries between accelerations in credit and accelerations in short-term or “non-core” funding? What does this say about the number of macroprudential instruments that are needed? More generally, if there are six or so major negative externalities in the financial system, how many macroprudential instruments are needed to deal with them?
* Is the growth of collateralized credit in the mortgage market and repo market just like any other credit (which can be dealt with tools focussed on aggregate credit) or is it so important that one needs to contemplate regulation of loan-to-value ratios and haircuts?
* Traditionally, if one has a set of negative externalities, one can find a set of Pigovian taxes or quantitative restrictions to deal with them. What is different about the negative externalities in financial systems that make some suggest that monetary policy, quite a blunt tool, be used in addition to macroprudential instruments to deal with potential financial instability arising from these externalities? What is the appropriate role for monetary policy in financial stability?
* Have we focussed enough on the financial health (in a trend sense) of the major clients in many banking sectors: the household sector? Are there negative externalities associated with the behaviour of this sector? Is some of the behaviour of this sector irrational (see Shiller, 2008)?
* How should macroprudential policy be governed? What are the appropriate weightings on the diversity of experiences that a committee of agencies can bring and on the system-wide perspective of a central bank?

**References**

Acharya, Viral A. 2009. “A theory of systemic risk and design of prudential bank regulation,” *Journal of Financial Stability* V.5, 224-255.

Adrian, Tobias and Hyun Song Shin. 2008. “Financial intermediary leverage and value at risk,” Federal Reserve Bank of New York Staff Reports No. 338.

Adrian, Tobias and Markus K. Brunnermeier. 2010. “CoVaR,” Federal Reserve Bank of New York Staff Report no. 348 (revised), November.

Arjani, Neville. 2009. “Procyclicality and Bank Capital,” *Bank of Canada Financial System Review*, June, 33-39.

Bank for International Settlements. 2010. *BIS 80th Annual Report.*

Bank of Canada. 2009. *Financial System Review.* June and December.

Bank of England. 2009. “The Role of Macroprudential Policy,” A Discussion Paper, November.

Basel Committee on Banking Supervision. 2010a. “An assessment of the long-term economic impact of stronger capital and liquidity requirements,” August.

Basel Committee on Banking Supervision. 2010b. “Basel III: A global regulatory framework for more resilient banks and banking systems,” December.

Basel Committee on Banking Supervision. 2010c. “Basel III: International framework for liquidity risk measurement standards and monitoring,” December.

Bernanke, Ben and Mark Gertler. 1995. “Inside the Black Box: The Credit Channel of Monetary Policy Transmission,” *Journal of Economic Perspectives,* V. 9, no. 4, 27-48.

Bernanke, Ben, Mark Gertler and Simon Gilchrist. 1996. “The Financial Accelerator and the Flight to Quality,” *The Review of Economics and Statistics,* V. 78, no. 1, February, 1-15.

Bianchi, Javier and Enrique Mendoza. 2011. “Overborrowing, Financial Crises and ‘Macroprudential’ Policy,” IMF Working Paper WP/11/24.

Blinder, Allan and John Morgan.2005. “Are Two Heads Better than One? Monetary Policy by Committee,” *Journal of Money, Credit, and Banking,”* October, V. 37, no. 5, 789-812.

Borio, Claudio. 2009. “Implementing the macroprudential approach to financial regulation and supervision. *Banque de France Financial Stability Review*, no. 13, September, 31-41.

Borio, Claudio. 2010. “Implementing a macroprudential framework: Blending boldness and realism,” BIS mimeo, 22 July.

Borio, Claudio and Mathias Drehmann. 2009a. “Towards an operational framework for financial stability: ‘fuzzy’ measurements and its consequences,” BIS Working Paper no 284, June.

Borio, Claudio and Matthias Drehmann. 2009b. “Assessing the risk of banking crises—revisited,” *BIS Quarterly Review*, March, 29-46.

Borio, Claudio, Craig Furfine and Philip Lowe. 2001. “Procyclicality of the financial system and financial stability: issues and policy options,” in “Marrying the macro- and micro-prudential dimensions of financial stability,” BIS Working Paper no 1, March, 1-57.

Borio, Claudio and Philip Lowe. 2002. “Asset prices, financial and monetary stability: exploring the nexus,” BIS Working Papers No 114, July.

Borio, Claudio and William White. 2004. “Whither monetary and financial stability? The implications of evolving policy regimes,” BIS Working Papers No 147, February.

Borio, Claudio and Haibin Zhu. 2008. “Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism,” BIS Working Papers No 268, December.

Brunnermeier, Markus K. 2009. “Deciphering the Liquidity and Credit Crunch 2007-2008,” *Journal of Economic Perspectives,* V.23, No. 1, Winter, 77-100.

Brunnermeier, Markus K., Andrew Crockett, Charles Goodhart, Avinash Persaud and Hyun Shun. 2009. *The Fundamental Principles of Financial Regulation.* Geneva Reports on the World Economy 11, International Center for Monetary and Banking Studies, Geneva, and Centre for Economic Policy Research, June.

Brunnermeier, Markus K. and Lasse Heje Pedersen. 2009. “Market Liquidity and Funding Liquidity,” *Review of Financial Studies* 22(6): 2201-2238.

Clement, Piet. 2010. “The term ‘macroprudential’: origin and evolution,” *BIS Quarterly Review,* March.

Committee on the Global Financial System. 2009. “The role of valuation and leverage in procyclicality,” CGFS Papers No 34.

Committee on the Global Financial System. 2010a. “The role of margin requirements and haircuts in procyclicality,” CGFS Papers No 36.

Committee on the Global Financial System. 2010b. “Macroprudential instruments and frameworks: A stocktaking of issues and experiences,” CGFS Papers No 39.

Crockett, Andrew. 2000. “Marrying the micro- and macro-prudential dimensions of financial stability,” Speech before the Eleventh International Conference of Banking Supervisors, Basel, 20-21 September.

Diamond, Douglas and P. Dybvig. 1983. “Bank runs, deposit insurance, and liquidity,” *Journal of Political Economy*, V. 91, 401-19.

Domanski, Dietrich and Tim Ng. 2011. “Getting effective macroprudential policy on the road: Eight propositions,” BIS mimeo, 11 January.

D’Souza, Chris; Walter Engert, Toni Gravelle and Liane Orsi. 2010. “Contingent Capital and Bail-In Debt: Tools for Bank Resolution,” *Bank of Canada Financial System Review,* December, 51-56.

Engert, Walter. 2005. “On the Evolution of the Financial Safety Net,” *Bank of Canada Financial System Review*, June, 67-73.

Financial Stability Board, International Monetary Fund, and Bank for International Settlements. 2011. “Macroprudential policy tools and frameworks,” Update to G20 Finance Ministers and Central Bank Governors, 14 February.

French, Kenneth R., Martin N. Bailey et al. 2010. *The Squam Lake Report: Fixing the Financial System*, Princeton University Press.

G20. 2009. “The Global Plan for Recovery and Reform,” Final communiqué of meeting of G20 Leaders in London, 2 April.

G20 Working Group 1. 2009. “Enhancing Sound Regulation and Strengthening Transparency,” Final Report, March 25.

Galati, Gabriele and Richhild Moessner. 2011, “Macroprudential policy—a literature review,” BIS Working Papers No 337, February.

Gauthier, Céline, Alfred Lehar and Moez Souissi. 2010. “Macroprudential Regulation and Systemic Capital Requirements,” Bank of Canada Working Paper 2010-4.

Gauthier, Céline, Zhongfung He and Moez Souissi, “Understanding Systemic Risk: The Trade-Offs between Capital, Short-Term Funding and Liquid Asset Holdings.” Bank of Canada Working Paper 2010-21.

Gârleanu, Nicolae and Lasse Heje Pedersen. 2009. “Margin-based asset pricing and deviations from the law of one price,” mimeo.

Geanakoplos, John. 2010. “The Leverage Cycle.” Cowles Foundation Discussion Paper 1715R, January.

Hanson, Samuel; Anil K. Kashyap and Jeremy C. Stein. 2011. “A Macroprudential Approach to Financial Regulation,” *Journal of Economic Perspectives*, V. 25, No. 1, Winter.

Hellwig, Martin. 2010. “Capital Regulation after the Crisis: Business as Usual,” Preprints of the Max Planck Institute for Research on Collective Goods, 2010/13.

Ingves, Stefan. 2011. “Challenges for the design and conduct of macroprudential policy,” Speech to the Bank of Korea – BIS Conference, Seoul, Korea, 18 January.

International Monetary Fund, Bank for International Settlements, and Financial Stability Board. 2009. “Guidance to Assess the Systemic Importance of Financial Institutions, Markets, and Instruments: Initial Considerations,” October.

Kamhi, Nadja. 2009. “Procyclicality and Margin Requirements,” *Bank of Canada Financial System Review*, June, 55-57.

Kaminsky, Grace and Carmen Reinhart. 1999. “The twin crises: the causes of banking and balance of payments problems,” *American Economic Review* V. 89, no. 3, 473-500.

Kashyap, Anil and Jeremy Stein. 2004. “Cyclical Implications of Basel-II Capital Standards,” *Federal Reserve Bank of Chicago Economic Perspectives,* V. 28, 18-31.

Kashyap, Anil, Raghuram Rajan, and Jeremy Stein. 2008. “Rethinking Capital Regulation,” *Maintaining Stability in a Changing Financial System,* Federal Reserve Bank of Kansas City.

Kindleberger, Charles P. and Robert Z. Aliber. 2005. *Manias, Panics and Crashes: A History of Financial Crises.* Fifth Edition. Palgrave MacMillan.

Longworth, David. 2010. “Warding Off Financial Market Failure: How to Avoid Squeezed Margins and Bad Haircuts,” C.D. Howe Institute Backgrounder 135, December.

Longworth, David. 2011. “Remarks on Macroprudential Policy Frameworks,” Forthcoming in BIS Papers, “Macroprudential regulation and policy,” Proceedings of a joint conference organized by the BIS and the Bank of Korea in Seoul on 17-18 January 2011, Monetary and Economic Department, BIS.

Meh, Césaire and Kevin Moran. 2010. “The role of bank capital in the propagation of shocks*,” Journal of Economic Dynamics and Control,* V. 34, no. 3, March, 555-576.

Macroeconomic Assessment Group. 2010. “Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements, Final Report,” Bank for International Settlements, December.

Minsky, Hyman. 1982. *Can “It” Happen Again? Essays on Instability and Finance.* Armonk, N.Y.: M.E. Sharpe.

Modigliani, Franco and Merton Miller. 1958. “The Cost of Capital, Corporation Finance and the Theory of Investment,” *American Economic Review*, V. 48, no. 3, 261-297.

Morris, Stephen and Hyun Shin. 2008. “Financial Regulation in a System Context,” *Brookings Papers on Economic Activity*, Fall.

Northcott, Carol Ann and Mark Zelmer. 2009. “Liquidity Standards in a Macroprudential Context,” *Bank of Canada Financial System Review*, December, 35-40.

Reinhart, Carmen M. and Vincent R. Reinhart. 2010. “After the Fall,” forthcoming in *Macroeconomic Challenges: The Decade Ahead*, Federal Reserve Bank of Kansas City.

Segura, Anatoli and Javier Suarez. 2010. “Liquidity shocks, roll-over risk and debt maturity.” Mimeo, CEMFI, November.

Shiller, Robert. 2008. *The Subprime Solution: How Today’s Global Financial Crisis Happened, and What to Do about it.* Princeton University Press.

Shin, Hyun Song. 2010. “Macroprudential Policies Beyond Basel III,” Policy Memo, 22 November.

Shin, Hyun Song. 2009. “Discussion of ‘The Leverage Cycle’ by John Geanakoplos,” Princeton University mimeo, June.

Shleifer, Andrei and Robert Vishny. 2011. “Fire Sales in Finance and Macroeconomics,” *Journal of Economic Perspectives*, V. 25, No. 1, Winter, 29-48.

Stein, Jeremy C. 2010. “Securitization, Shadow Banking, and Financial Fragility,” *Daedalus,* Vol. 139, no. 4: 41-51, Fall.

Warwick Commission on International Financial Reform. 2010. *In Praise of Unlevel Playing Fields.* December.

1. See Clement (2010) for a history of the evolution of the term “macroprudential.” [↑](#footnote-ref-1)
2. See, *inter alia*, Brunnermeier (2009), Brunnermeier and Pederson (2009), Geanakoplos (2010), and Stein (2010). [↑](#footnote-ref-2)
3. The base capital requirement (common equity tier 1 requirement) is not truly a macroprudential instrument and is included (in italics in the Table) only for the sake of completeness. [↑](#footnote-ref-3)
4. Core deposits are those which have a longer maturity or where there is a close relationship between the bank and depositor (as for many retail deposits). [↑](#footnote-ref-4)
5. See the discussion of the reasons why Modigliani-Miller might not hold, and the potential increases in the cost of capital from its failure to hold in Hanson et al. (2011). See also Macroeconomic Assessment Group (2010). Most authors seem to agree that Modigliani-Miller does not hold exactly, but that the cost of raising an additional percentage point of capital is not too large. [↑](#footnote-ref-5)
6. See Hanson et al. (2011) and Engert (2005). [↑](#footnote-ref-6)
7. However, Rodriguez-Moreno and Rena (2011) show that CoVaR measures were the least effective measure of systemic risk in predicting systemic events in 2004-2009. [↑](#footnote-ref-7)
8. This paper is an illustrative one in the recent literature on overborrowing. [↑](#footnote-ref-8)
9. In the most recent financial crisis, there were also market practices that exacerbated the procyclicality of behaviour in repo markets, securities lending markets, and over-the-counter derivatives markets. CGFS (2010b) also deals with how these might be regulated to reduce the change in credit supply between boom and bust periods. [↑](#footnote-ref-9)
10. As well, fiscal policy must be on a sustainable track. [↑](#footnote-ref-10)
11. See Ingves (2011) for concerns in Sweden in this area. [↑](#footnote-ref-11)
12. Furthermore, warnings or actions of a committee that includes all authorities responsible carry more weight than warnings from a committee that can only recommend. [↑](#footnote-ref-12)
13. The authors noted that this result was true whether the groups made decisions based on majority rule or unanimity. [↑](#footnote-ref-13)