The Design, Implementation, and Governance of Macroprudential Policy†

Prasanna Gai
University of Auckland
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1. INTRODUCTION

“My law of the cycle lays down that it turns when the last person who can remember what happened last time has retired, or has been made redundant.”

~ Christopher Fildes

By all accounts, the term “macroprudential” was coined in 1979 by the late David Holland, sometime Official at the Bank of England. In keeping with the culture of the Bank at the time, it described a practical way of thinking – a common sense approach to information and analysis – rather than an instrument of policy (Green, 2011). To central bankers of that generation, it was self-evident that a good supervisor should keep a wary eye on broader systemic developments rather than narrowly focusing on the operations of individual entities. The modern day “macroprudentialism” advocated by the Bank of International Settlements (BIS) with its references to capital buffers, credit-to-GDP ratios, variable reserve requirements, and loan-to-income ratios was familiar territory. If anything, central bankers of previous decades would be surprised by the recent trend to limit the business of central banking to price and output stability without proper regard for the condition of the financial system. And they would look askance at efforts to develop “micro-founded theories” of macroprudential policy.

The global financial crisis has reminded policymakers that medium-term price and output stability is not enough to guarantee financial stability, that the absence of financial stability causes substantial and prolonged deviations from inflation targets and full employment, and that monetary policy is not powerful enough to restore stability in the wake of a major financial crisis. Above all, it has reminded them that the financial system is a system and that the regulatory perspective must be holistic. Externalities to the behaviour of financial actors mean that policy measures must be devised to account for the interactions, procyclical tendencies, and spillovers that characterise the market economy.

Macroprudential policy has, thus, been reincarnated in advanced economies. And a great deal of effort has been expended to articulate the key design features of a macroprudential framework, namely:

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1 The following quote from Sir George Blunden, a Deputy Governor of the Bank of England, summarises this thinking well. “A bank may consider a course of action it wishes to take to be acceptable – as it may well be in a limited context. But the same course might, if widely copied by other banks, have unfortunate effects on the banking system as a whole. It is part of the supervisors’ job to take that wider, systemic view and sometimes to curb practices which even prudent banks might, if left to themselves, regard as safe.” (Blunden, 1987).

2 For example, Farhi and Werning (2016).
What are the objectives?
What are the instruments?
What is the appropriate governance and accountability framework?

Resolving these questions properly will take time. The state of knowledge about macroprudential regimes and, more substantively, how financial frictions interact with the macroeconomy is at an early stage – there are a great many issues where the jury remains out. The consensus seems to be that it will be some decades before we are at the stage where a macroprudential framework is both intellectually coherent and operationally practicable. As with monetary policy, it will be a process of trial and error as thinking adapts in the light of experience.

New Zealand has been an early adopter of macroprudential policies. The global financial crisis exposed vulnerabilities in the banking system, especially the reliance on short-term offshore wholesale funding. In response, the Reserve Bank (RBNZ) adopted liquidity rules (implemented in April 2010) to contain banks’ dependency on short-term funding. In 2013, the macroprudential framework was formalised with a Memorandum of Understanding (MOU) between the Governor and the Minister of Finance that enables the Reserve Bank to use macroprudential tools, notably the core funding ratio; the countercyclical capital buffer; sectoral capital requirements; and loan-to-value ratios in the property sector.

The financial system in New Zealand is also very exposed to highly indebted households and farmers, with mortgage lending and agricultural lending accounting for a significant proportion of bank lending. With elevated house prices, there is a risk that even relatively modest shocks could be amplified with far-reaching, and prolonged consequences. Reflecting this potential vulnerability, the Reserve Bank introduced loan-to-value (LTV) ratios following the formalisation of the MOU. Most recently, the Reserve Bank has sought to add loan-to-income ratios to its macroprudential arsenal to complement its LTV policy, but has yet to acquire the tool. As in other jurisdictions (e.g. the UK) deployment of additional instruments must be blessed by the Minister of Finance, given the distributional consequences of macroprudential policy. The MOU also limits macroprudential policy coverage to banks and, again, extensions beyond this perimeter require consultation with the Minister of Finance.

Although the MOU requires that the Reserve Bank inform the Minister when it intends to use the tools, it allows the Reserve Bank the final decision on implementation. This means that the Governor, as sole decision maker, has the final say on macroprudential policy (as well as monetary policy). Unsurprisingly, this concentration of powers in the one
institution and a single individual brings issues of governance and democratic accountability to the fore. While macroprudential regimes in other countries also place the central bank in the driver’s seat (e.g. the UK), they differ in extent to which the central bank’s view is subject to challenge and public scrutiny. Other countries (e.g. France and the US) have opted instead to have a leading role played by the Minister of Finance as part of a more collegiate structure.

This Report takes a “first principles” approach to the issue of macroprudential policy, with a view to stimulating policy debate in New Zealand on the design of a macroprudential framework. The Report brings together the main strands of thinking in academic and policy circles on the key design features of a policy framework. The literature on macroprudential policy has burgeoned since the crisis, spanning orthodox economic ideas in the DSGE-tradition, empirical contributions, as well as new insights from complex systems analysis. In what follows, the Report attempts to distil the essence of these contributions. It therefore does not claim any deep originality for the ideas within, and very much stands on the shoulders of others.

The Report focuses on the role of macroprudential policy in crisis prevention. It is silent on issues of crisis resolution. In part, this reflects the remit given to the author. But it also reflects the fact that the topic of crisis resolution is deserving of a report of its own. Crisis resolution invariably involves losses to taxpayers and thus deservedly falls under the control of the Ministry of Finance. So there is a case for distinguishing between the design and implementation of crisis prevention and management frameworks. Clearly, however, ex post crisis resolution policies do have a profound influence on ex ante incentives and crisis prevention.

The Report also sidesteps issues of efficiency and competition. The RBNZ has responsibility for “promoting the maintenance of a sound and efficient financial system”. Again, the omission partly reflects the nature of the remit and the fact that a short report cannot do proper justice to the large scholarly literature on the tradeoff between financial instability and efficiency. Moreover, an assessment of this topic has also recently been conducted within the official sector in New Zealand (Bloor and Hunt, 2011).

The Report is structured as follows. Chapter 2 defines the problem and presents the rationale for macroprudential policy. It identifies the key externalities at the heart of the problem and distinguishes between micro- and macroprudential policies. Chapter 3 asks what the objectives of macroprudential policy ought to be. It makes the important point that the difficulty of encapsulating financial stability into a simple metric means that the process of policy formation takes on extra importance. It then considers the types of mandate that might be given to a policymaker and asks how policy objectives might be operationalised.
Chapter 4 gathers together the literature on the efficacy of macroprudential instruments. Three types of instruments are considered – asset-based tools (like the LTVs used in New Zealand), capital-based tools, and stress-testing. The Chapter also highlights several operational issues, such as the implications of regulatory arbitrage and whether tools should be deployed in a gradual fashion. The difficult issue of the distributonal consequences of macroprudential policy is also examined, with lessons being drawn from recent work on heterogenous models with incomplete markets and financial frictions.

Chapter 5 considers institutional arrangements for macroprudential policy. As already hinted at, the Chapter observes that the modern-day contract between society and the central bank in which the objective is macroeconomic stability is a relatively new affair. It then explores three perspectives on the extent to which a price-stability oriented framework should take financial stability into account. The Chapter concludes with a brief discussion of the different organisational models adopted by other advanced open economies and some of the accountability challenges now facing central banks.

Chapter 6 draws together the main insights from the analysis, relates them to the MOU, and offers some suggestions for enhancing the financial stability framework in New Zealand. The busy reader who is interested in the gist of the argument may wish to jump to this in the first instance.
2. THE RATIONALE FOR MACROPRUDENTIAL POLICY

“…one should expect that all governance systems will be operating at less than optimal levels, given the immense difficulty of fine-tuning any very complex, multi-tiered system…”

~ Elinor Ostrom

The financial system is a set of institutions and markets that permits economic agents to smooth consumption across time and states of nature. It offers versatile ways of accommodating the widely differing needs of savers and borrowers, and allows agents to reduce or eliminate, at a fair price, the risks that they are unwilling to bear. Financial instability can, thus, be defined as a disruption to the supply of core financial services that has serious negative consequences for the expected path of real economic activity.³

The risk of financial instability – systemic risk – arises from the fact that individual financial agents do not account for the effects that their risk management practices have on the balance sheets of other agents in the financial system. So the term macroprudential refers to policies designed to prevent or temper systemic risk.⁴

These definitions make clear that the ultimate purpose of a policy regime for financial stability is to support the real economy. They suggest a broad, and holistic, perspective on the financial services that support activity. In addition to the banking system, macroprudential policies should acknowledge payment systems, securities markets, shadow banking activity, and financial institutions with a large asset base, namely pension funds and insurance companies. Critically, if stability is to be preserved, the financial system needs to be regulated as a system, not just as a series of notionally independent components.

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³ This notion of financial instability is consistent with the definition adopted by the European Systemic Risk Board (ESRB, 2012). See also Rosengren (2011).
⁴ See footnote 35 for a fuller definition. For related definitions see Nier et al. (2011), Houben et al. (2012), and IMF-FSB-BIS (2016).
2.1 Why regulate?

The costs of financial crises are large. Figure 1 illustrates how real output in the large advanced economies fell following the global financial crisis. In cumulative terms, crisis-induced output losses as a percentage of pre-crisis GDP were around 60% for the UK, over 40% for the Euro area, and over 30% for the US (Aikman et al., 2013).

![Figure 1](source: Aikman et al. (2013).)

The costs of financial system failure thus far exceed the private costs to the managers, creditors, and shareholders of the failing entities. This is a consequence of negative externalities – the private benefits of the socially destructive behaviour exceed the private costs. In financial systems, these externalities take two broad forms. First, the actions of a financial firm can directly influence the choices that other firms make. And second, the actions of a financial firm can influence the constraints facing other firms through their effect on prices. Such “pecuniary” externalities can also arise in efficient markets and are not of themselves distortionary. But when there are other constraints and distortions present, the effect of one agent’s actions on other agents in the system via prices can matter.

Why is it that banks do not voluntarily build capital buffers ahead of time to withstand shocks and avoid either raising capital or reducing assets under duress? Stein (2012) provides an answer. If the Modigliani-Miller theorem is violated so that short-term debt is a cheaper form of finance than equity, banks take on socially excessive levels of debt. His model

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5 Atkinson et al. (2013) suggest that the cost of the 2007-9 crisis in the US may have been around $50,000-120,000 for each household.

6 In the lead-up to the global financial crisis, for instance, many financial intermediaries took on risky leverage to boost equity returns and “keep up with the Goldmans” (Aikman et al., 2015).
illustrates the pecuniary externality. While banks reap the benefits of cheaper debt finance, they do not internalise the costs. Specifically, individual banks do not consider that, when taking on debt, they degrade the collateral value of assets held in common with other banks. In a crisis, and in the presence of collateral constraints, the firesale of assets by one bank lowers the liquidation value that others can realise for the same assets. Ex ante capital buffers are thus insufficient, raising both the probability and expected impact of a system-wide financial crisis.

More fundamentally, financial stability has the key features of a common pool resource and, as such, is vulnerable to the tragedy of the commons (Hardin, 1968). Individual financial agents can – through their (opaque) risk choices – exploit the public resource of financial stability (Haldane, 2012; Tucker, 2016). The derived benefits from such exploitative activity are private to individual firms, while the associated costs are public and imposed on everyone. This is unlike price stability which is a public good. It is non-excludable and non-rivalrous. No one can be excluded from low and stable inflation, and no single agent can readily undermine price stability leaving less for others. The benefits of price stability are received by all.

The standard way into the regulatory debate on resolving the frictions underlying financial stability has been to consider three broad approaches – market-based, taxation, and quantity constraints. We examine each in turn.

A market-based, or Coasian, approach to tackling a negative externality is to create property rights over the socially costly activity and fill the “missing market”. In the classic example of an upstream factory polluting a river and reducing the catch of the downstream fishermen, there is no market for the right to pollute the river. Nobody owns the river, so there is nobody to impose a fee on the factory for its polluting activity. But if courts can adjudicate over property rights and enforce penalties (Coase, 1960), there may be a basis for private transactions to generate efficient levels of production.

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7 The deep friction in this case is the limited enforceability of loans motivating lenders to require collateral from borrowers (Gai et al., 2008; Lorenzoni, 2008). In the event of a decline in collateral values, creditors become reluctant to extend loans. This can intensify the downturn and, in turn, magnify the decline in asset prices. A downward spiral of asset prices and a credit crunch can then ensue.

8 As Hanson et al. (2011) observe, ex post capital buffers will also be inadequate since distressed banks prefer to shrink assets rather than raise new capital. This is because of the debt overhang confronting troubled banks – raising new equity to fund positive NPV projects is unattractive since any value created is siphoned off by senior creditors. The deep friction ex post is a coordination failure – creditors rushing to be in front of a repayment queue.

9 Recent legislation in New Zealand and India giving the Whanganui and Ganges rivers the legal status of a person represents a potentially novel solution to such an issue.
Can the financial system be made safer by creating new markets? Could households and firms be given “stability rights” that could be enforced, in the event of a crisis, via the courts against banks and other entities acting imprudently? Tucker (2016) identifies several difficulties with a Coasian approach. First and critically, notwithstanding problems of demonstrating liability, in the states of the world that characterize financial instability, the banks who must pay compensation may have defaulted and may no longer be there to pay compensation. Secondly, the decline in aggregate incomes following a crisis may be so sharp that society is simply poorer, with the result that would-be “winners” cannot fully compensate the “losers”. Thirdly, since the casualties of crisis are typically dispersed across the economy, large costs impede efficient trade in “stability rights” between agents. And fourthly, even if property rights in stability could be traded, households and firms may not exercise their rights at anything approaching the socially efficient price. Indeed, many agents stand to gain from the imprudence of financial intermediaries and the exuberance that typically precedes episodes of instability.

The second way to tackle the problem of externalities is to tax the socially costly part of a financial activity (Pigou, 1920). Imposing a tax equal to the magnitude of the harm caused by the externality should induce efficient behaviour because, under such a scheme, the financial firm bears the full social cost of its behaviour. Some macroprudential regulation does indeed take the form of Pigovian taxation. For example, Shin (2010) and Perotti and Suarez (2011) propose a tax on banks’ non-core liabilities as a tool and such a tax was introduced in Korea in 2010. But quantity-based tools are dominant in the macroprudential toolkit. Of the ten instruments reviewed by Lim et al. (2011), none takes the form of a pure Pigovian tax. In general, macroprudential policy operates via quantity constraints on balance sheet structure.

Weitzman (1974) identifies the circumstances under which quantity regulation may be superior to corrective taxation. Specifically, quantity-based approaches are preferable when the schedule of harm as a function of the (negative) externality is steeper than the marginal private-cost curve of financial firms. The case for Pigovian taxation rests on the converse. Note, however, that quantity restrictions place a burden on the regulator to tailor controls to each firm, making judgments on a case-by-case basis. For example, as well as standard minimum capital requirements applying to all banks, systemic surcharges are applied to some banks whose failure is deemed to be especially disruptive. By contrast, a tax would entail banks adjusting their balance sheets structures endogenously, depending on the private costs entailed.
Why have policymakers not made Pigovian taxes more central to the pursuit of financial stability? One explanation is that quantity controls are regarded as being easier to enforce than taxes because non-compliance is more readily observed. As Glaeser and Shleifer (2001) emphasise, a ban on Sunday trading by shops is easier to monitor and enforce than taxing Sunday trading. A second possible answer lies in the idea that the harm schedule associated with the externalities and the private cost curves are both uncertain. As a result, the policymaker cannot set a tax schedule that is equal to the schedule of harm.10

A final explanation concerns the politics of Pigovian taxation. US environmental taxation provides a useful example. Barthold (1994) observes that although the US government has sought to use the tax code to impose Pigovian taxes on polluters, implementation has been muddled by a confusion of objectives, such as the desire to raise revenue and promote exports, rather than tackling the externality. Jeanne (2013) emphasises that the taxation of the real estate sector and mortgage loans is a politically charged area, and suggests that a Pigovian tax is unlikely to be wielded in anything like an optimal (counter-cyclical) fashion as a result. The trial-and-error process of implementation is also likely to entail substantial reputational costs for the policymaker. As a result, policymakers are more likely to prefer quantified balance sheet restrictions – they offer salient targets and are easier to justify politically.

The economist’s prescription of using policies that counteract distortions in the market to lead the economy back towards something like idealised conditions runs a clear risk of unintended consequences. In the real world, there are often more distortions than tools, and the tools deal only imperfectly with the distortion. Implementation of a policy to mitigate one problem may simply make other problems worse. The unintended consequences can be large and hard to predict. In practice, this has meant that while policymakers have not abstained from intervention, they have advanced cautiously, friction-by-friction, advocating policy tools that are narrowly tailored to deal with each distortion.

But a friction-by-friction approach to financial externalities – while following the spirit of Tinbergen’s rule – makes for a profoundly complex regulatory architecture (Haldane, 2015). The effects of multiple regulatory constraints on the behaviour of financial agents become difficult to disentangle. Indeed, the overall architecture that results may not be the right response to the uncertainties thrown up by financial instability. The greater the layers

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10 Kaplow and Shavell (2002) formally argue, however, that even though the state has imperfect information about the harm caused by an externality, corrective Pigovian taxation is still able to harness a firm’s information about its control costs. As a result, the corrective tax schedule equals the expected harm schedule. They show that this second-best outcome can still be preferable to quantity regulation.
of regulation, moreover, the less favourable macroeconomic outcomes are likely to be (Engel, 2016). An uncomplicated regulatory approach that is founded on simple rules could end up being more robust (Haldane and Madourous, 2012; Hansen and Sargent, 2007; Aikman et al., 2014).

The standard approaches for addressing social costs, thus, do not of themselves provide complete answers to the collective action problems associated with financial stability. It has not been helped by the failure of academic or policy commentary on financial stability to differentiate between the provision of public goods versus the exploitation of an open-access commons. The tendency has been to simply view financial stability as a public good (Crockett, 1997), or to treat public goods and commons scenarios as analogous collective action problems. But this potentially masks important conceptual and policy differences.

Arguably, there are important insights to be gleaned from the literature on common pool resources (e.g. Ostrom, 2009; Ellis, 2001; Sandler and Arce, 2003; Ellis and van den Nouweland, 2006) and moral hazard in teams (Holmstrom, 1982) when thinking about regulating the financial commons. Ostrom (2009) suggests, for example, that a polycentric governance structure may be better suited to regulating a complex system than a hierarchical government agency. Often exploiters of a common resource may be able to come together and self-organise an institutional system of rules and behaviour that can lead to the sustainable exploitation of a commons. She also argues for more careful consideration of policies that induce cooperation in commons problems. Although such issues are beyond the scope of this Report, research in this direction could shed new light on the design and implementation of macroprudential policy.

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11 Regulation thus comes in the form of "kludges" (Ely, 2011). A kludge is a marginal adaptation that compensates for, but does not eliminate, fundamental design inefficiencies. The accumulation of kludges can result in permanently sub-optimal outcomes.

12 The point is not that banks (in New Zealand or elsewhere) should self-organize to create rules, though well they might. Rather it is to suggest that the standard prescriptions of public economics, especially quantity regulation by a single authority, is unlikely to be a panacea that leads to anything like a social optimum. So a proper resolution to financial stability issues may, ultimately, require new perspectives on how macroprudential policy should be designed.
2.2 The key externalities

The conventional wisdom on the design of financial stability policy (e.g. Borio and Crockett, 2000; Bank of England, 2011) holds that risks to financial stability lie along two distinct dimensions:

1. **Time-varying risks**, i.e. the evolution of aggregate risk in the financial system over time. It refers to the tendency of financial agents to assume excessive risk in the upswing and then become overly risk averse in the downswing. Such behaviour reveals itself in cyclical patterns in the leverage and maturity mismatch positions in the financial system – a credit and liquidity cycle; and

2. **Cross-sectional risks**, whose magnitude depends on the network of connections between financial institutions and the distribution of risk across financial market participants or, in other words, the interconnectedness and resilience of the system.

Accordingly, policymakers have begun to develop tools to address potential vulnerabilities based on this analytical distinction (Table 1; IMF-FSB-BIS, 2016).

| Table 1: Vulnerabilities and macroprudential instruments (not exhaustive) |
|---|---|---|
| **Leverage** | **Instrument** | **Objectives** |
| Broad-based | Countercyclical capital buffers (Basel) | Enhance resilience |
| | Dynamic loan loss provisions (Spain) | (may also moderate credit growth) |
| | Countercyclical simple leverage ratio (Bank of England, Europe) | |
| Sectoral | Sectoral capital requirements | |
| | Limits/caps/rules on debt-to-income, loan-to-income and loan-to-value ratios | |
| | Countercyclical change in risk weights | |
| **Funding, liquidity and pricing of risk** | **Instrument** | **Objectives** |
| | Time-varying margin requirements | Reduce liquidity-related systemic risk (can also moderate credit growth) |
| | Time-varying reserve requirements | |
| | Levy on bank non-core funding | |
| **Opacity Interconnectedness Complexity** | **Instrument** | **Objectives** |
| | Deline perimeter of regulation (designation as systemically important— institutions, markets and infrastructure) | Increase resilience of too-important-to-fail institutions |
| | Concentration limits | |
| | Information disclosure | |
| | Systemic capital surcharges (Basel) | Reduce excessive exposures within the financial sector |
| | Systemic leverage ratio surcharges (Bank of England, European Union) | |
| | Systemic liquidity surcharges | |
| | Heightened supervision of systemically important financial institutions, markets and infrastructures | |
| | Changes to market infrastructure (e.g., clearing through central counterparties) | |
But appealing to time-series and cross-sectional vulnerabilities alone is insufficient. Well-intentioned efforts to smooth financial cycles and lower contagion risk may not be desirable – some degree of fragility may be necessary for a properly functioning financial system (Calomiris and Kahn, 1991; Allen and Gale, 1998). The purpose of regulation must be to pin-point and correct key market failures, not tackle vaguely defined “vulnerabilities” to the system. Specifying market failures explicitly has the advantage of being easier to justify politically, and helps identify the most effective instruments for pursuing financial stability objectives.

The academic literature identifies a range of underlying reasons for pro-cyclical behaviour by financial agents. Credit booms can arise because of herd-like behaviour stemming from collective disaster myopia (Gennaioli et al., 2015) or because of the tendency of financial intermediaries to optimize over relative (instead of absolute) returns (Aikman et al., 2015). Risk-taking in the upswing may also be supported by policy interventions themselves. Pre-crisis perceptions of being “too-big-to-fail” or “too many to fail”, and the presence of a moral hazard channel may have encouraged banks to inflate their balance sheets beyond levels that were socially optimal (Acharya and Yorulmazer, 2008; Farhi and Tirole, 2012; Alfonso et al, 2014). Banks also appear to have used their internal models to game risk-weighted capital standards, adjusting risk-weights downwards to lower regulatory hurdles (Haldane and Madurous, 2012). And when financial institutions face risk management constraints such as VaR constraints, they tend to invest more in good times and deleverage in bad times, yielding a pattern of procyclical leverage (Danielsson et al., 2004; Adrian and Shin, 2014). Finally, the limited pledgability of future income prevents borrowers from accessing funding due to lack of collateral. Collateral constraints mean that agents borrow more in good times, when the value of their assets is high, than in bad times, when asset prices tend to be depressed (Kiyotaki and Moore, 1997; Fostel and Geannokoplos, 2014).

Highly interconnected systems are subject to network externalities (Allen and Gale, 2000; Gai and Kapadia, 2010; Gai et al., 2011; Acemoglu et al., 2015). In financial systems, these can arise from default or margin cascades due to counterparty exposures. Even shocks that are modest in size can ripple through the system in an amplifying wave, thus having

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13 Moreover, the two concepts are not independent of each other. The unwinding of financial imbalances poses greater concerns if shocks cause strong spillovers within a highly connected financial network.

14 It is clearly not possible to do full justice to the richness and diversity of the literature on financial stability in a short report. Although the review in this section is partial, it is reasonably representative.
much larger systemic implications. Contagion within a financial system can also arise via \textit{informational channels}. If depositors believe that the failure of bank $x$ is a signal on the health of bank $y$, there can be potential for systemic problems. Chen (1999) shows, for example, that if bank returns are correlated, so observing a run on one bank makes uninformed depositors run on other (correlated) banks, a bank run can quickly turn into a panic (see also Dasgupta, 2004; Anand et al., 2016). Finally, inter-linkage externalities can arise because of financial \textit{complexity} – the growth of dense and opaque chains of exposure. These hinder the potential operation of market discipline to limit risk and potentially contribute to perception-driven contagion.\textsuperscript{16}

The literature also highlights pecuniary (\textit{firesale}) externalities (see Footnote 4 for an example and references). These arise ex post during a crisis because banks and other financial agents do not internalise the impact of their asset sales on the solvency of other banks, with the generalised sell-off of assets amplifying the downturn. Allen and Gale (2004) show that the fundamental market failure behind this effect is market \textit{incompleteness} – if there are not enough contingent securities to efficiently allocate liquidity in each state, liquidity must be found ex post by liquidating assets. Liquidity shocks thus have large effects on market prices.

Shleifer and Vishny (1992) offer a related rationale for firesales – agents investing in an asset need to gather information and become specialists. When a negative shock hits the value of the asset and many specialists liquidate their positions, only less-informed outsiders can buy and ask for a lower price. Critically, the firesale and the premature liquidation imposes a deadweight cost. Finally, asset fire sales can interact with the fact that margin requirements increase when the market becomes less liquid (Brunnermeier and Pedersen, 2009). Losses on one asset induce market participants to reduce their positions. Their sales depress market prices, implying further losses. The reduction in market liquidity prompts financiers to apply higher margin requirements and this reinforces the pressure to sell not just the asset, but also other assets held by the same agents. Firesales can thus take place across asset classes (see also Schnabel and Shin, 2004).

Firesale arguments also have an open economy dimension. Domestic credit booms and busts are typically correlated with capital flows. A boom in capital inflows is associated

\textsuperscript{15} A key insight is that financial networks can be ‘robust yet fragile’: connected networks, in which institutions are connected to each other via credit exposures, are more robust to shocks because of risk-sharing, but are more likely to see all institutions fail conditional on the default of one institution.

\textsuperscript{16} Pre-crisis financial innovation spawned many instances of such complexity. For example, uncertainty over off-balance sheet exposures and widely differing valuations of complex structured products led investors to lose faith in published balance sheets and reduce their appetite for complex financial products.
with a build-up in external debt, a real appreciation of the domestic currency, and a general rise in the price of domestic assets. These developments mutually reinforce each other as the rise in the dollar value of domestic assets increases the “internationally acceptable collateral” of domestic agents looking to borrow overseas. The problem is that booms in capital inflows are often followed by sudden stops (Calvo, 1998) in which the same amplification mechanism works in reverse. The sudden capital outflow is accompanied by a sharp depreciation of the currency and a decline in the foreign-currency price of domestic assets. On this basis, a case can be made for including prudential capital controls in the regulatory toolbox. As Jeanne et al. (2012) note:

The logic behind macroprudential regulation should apply to all financial flows in the economy (including mortgages in the household sector or the choice between debt and equity finance in the corporate sector). In particular, the corporate sector can borrow abroad on its own account without going through domestic banks. The macroeconomic impact of capital controls may be more broad-based and far-reaching than that of banking regulation. (p. 31)

The possibility of prudential capital controls highlights the issue of whether financial stability externalities in the real sector can realistically be addressed solely via the regulation of banks. In general, the answer is no. Limiting macroprudential policy to banks can lead to opportunities for leakage and circumvention, an issue we discuss later in Chapter 4. Clearly, in an environment of global financial integration, borrowers can circumvent domestically regulated banks by relying on foreign banks.

In summary, the academic literature identifies four main types of fundamental market failure that require a regulatory response at the financial system level. These externalities relate to firesales, interconnectedness, coordination failure (or herding), and incentive problems. Table 2 provides some well-known examples of these market failures. As we will discuss in the next section, these externalities cannot be tackled solely by microprudential policies that view institutions in isolation.

17 Caballero and Simsek (2017) take a more nuanced view. They argue that, from a global perspective, the capital outflow is potentially a beneficial inflow for other countries. So, in an uncoordinated environment, prudential capital controls may well be excessive from a general equilibrium viewpoint. Moreover, capital control policies tend to be strategic complements – the more some countries adopt them, the greater the tendency for others to follow suit.

18 See, for example, the discussion in DeNicolo et al. (2012) and Bank of England (2009). Informational frictions might also reasonably be added to this list.
Table 2: Key externalities and episodes of financial instability

<table>
<thead>
<tr>
<th>Externality</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Coordination failure</td>
<td>Bank runs on Northern Rock (2007), Lehman Brothers (2008), continental Illinois (1984); currency crises in the UK (1992) and parts of Asia (1997); racing for returns ('keeping up with the Goldmans') behaviour in the run-up to the GFC.</td>
</tr>
<tr>
<td>Firesales</td>
<td>LTCM rescue by the New York Fed (1998) prevented a disorderly unwinding spilling over to other institutions; losses by UK life insurers following the Dotcom bubble led UK regulators to relax solvency rules to prevent firesales.</td>
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<tr>
<td>Interconnectedness</td>
<td>Liquidity hoarding that followed the 2008 crisis triggered market freezes in interbank markets.</td>
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<td>Incentive problems</td>
<td>Compensation structures in financial firms pre-crisis rewarding unduly risky practices; the Greenspan 'put'.</td>
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</table>

Tucker (2016) highlights how different professional communities give varying weight to these underlying frictions and the problems that they give rise to. While the academic community has tended to draw attention to firesale dynamics and problems of coordination, regulators have been more focused on interconnectedness externalities. At one level it reflects a tribal struggle for ownership rights to the sphere of macroprudential policy, but on another, it points to differences in emphasis on what needs to be done. On the one hand, researchers focused on firesales suggest responses that are usually centred on Pigovian taxes on short-term debt and leverage, and their concerns are not limited to intermediaries that fund illiquid assets with runnable liabilities. On the other, regulators have focused on the plumbing of the system, and measures to restrict the composition of bank assets as evidenced by the Vickers and Volker propositions to sever retail and investment banking operations and limit proprietary trading.

Strikingly, the core of policy measures implemented thus far (IMF-FSB-BIS, 2016) does not reflect Pigovian taxation. It comprises prescriptive quantity-based measures intended to strengthen intermediaries and simplify the complex financial network. But, as the previous section has already noted, there has been no deep resolution as to which of the three approaches – prices/quantities/property rights – is a more appropriate way of tackling the collective action failings of the financial system. Viewing the financial stability as a commons problem may also suggest alternative emphases and policy prescriptions.
### 2.3 The distinction between microprudential and macroprudential policy

A further drawback of decomposing financial stability risk into time-series and cross-sectional dimensions is that it does not make clear *a priori* what macroprudential policy is able to achieve over and beyond traditional microprudential regulation. Hanson et al. (2011) distinguish between the two forms of regulation as follows:

A microprudential approach is one in which regulation is partial equilibrium in its conception and aimed at preventing the costly failure of individual institutions. By contrast, a ‘macroprudential’ approach recognises the importance of general equilibrium effects, and seeks to safeguard the system as a whole. (p. 3)

Microprudential regulation thus focuses on individual banks’ risk of insolvency *taking the financial environment as given*. It assumes that the risk is given by the market exogenously and does not depend on the decisions made by individual financial intermediaries. In contrast, macroprudential regulation focuses on how the behaviour of financial intermediaries, taken collectively, makes the environment riskier. Aggregate financial system risk is *endogenous*. Table 3 (Borio, 2003) clarifies the distinction between the two approaches.

<table>
<thead>
<tr>
<th></th>
<th>Macroprudential</th>
<th>Microprudential</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ultimate objective</strong></td>
<td>Avoid output costs</td>
<td>Depositor protection</td>
</tr>
<tr>
<td><strong>Proximate objective</strong></td>
<td>Limit system-wide distress</td>
<td>Limit distress of individual firm</td>
</tr>
<tr>
<td><strong>Characterisation of risk</strong></td>
<td>Endogenous; depends on collective behaviour</td>
<td>Exogenous; independent of individual firms’ behaviour</td>
</tr>
<tr>
<td><strong>Correlation and common exposures across institutions</strong></td>
<td>Important</td>
<td>Less important</td>
</tr>
<tr>
<td><strong>Risk management techniques</strong></td>
<td>Top-down credit and liquidity risk review</td>
<td>Bottom-up credit/liquidity risk review</td>
</tr>
</tbody>
</table>

The endogeneity of risk means that macroprudential regulation avoids an important fallacy of composition – the financial system is not made safe by simply making sure that each and every financial balance sheet is sound. What may look stable at the level of an individual institution can be fragile and unstable at the system level due to the interconnections of financial institutions. For example, Beale et al. (2011) demonstrate how, in an inter-linked and procyclical system, the homogeneity of risk management practices can be collectively disastrous. While one bank may appear well diversified, in the context of other banks having similar positions, the financial system is vulnerable to a much wider range of shocks than would otherwise be the case.
The other externalities highlighted above are also critical sources of endogenous risk. Systemic resilience requires heterogeneity of balance sheets, as well as of views and behaviour. Homogeneous behaviour – everyone selling at the same time or buying at the same time – undermines the system. While the financial system may start off as heterogeneous, its dynamic characteristics drive market participants towards homogeneity, as they move through phases of boom and bust and step around static regulatory constraints.\(^{19}\) In this regard, not only is financial system risk endogenous, but regulatory parameters must flexibly adjust in different states of the world to make the system less fragile.

What then should be the role for microprudential regulation? A “commons” perspective might suggest that it has a role in addressing hidden action problems (Tucker, 2016). Institutions who succumb to temptation and engage in excessive risk-taking and regulatory arbitrage are not easily identified. Microprudential supervision thus takes on the essential role of developing deep knowledge of institutions and their activities, and making judgments on (and enforcing) the quality of their risk management systems. Supervisors should ensure that they understand exactly how a bank earns its profits, and are aware of the amount and type of risk being taken to earn those profits. The endogenous risks that undermine the financial system and necessitate macroprudential action can thus be mitigated, to some degree, by a careful application of microprudential regulation.

A crucial aspect of microprudential supervision is enforcing careful credit risk analysis in individual banks. Crean and Milne (2017) point out that certain sectors routinely account for the bulk of bank losses in many crises. Examples include mining and real estate.\(^{20}\) Stress testing these systemic sectors as part of microprudential supervision enables regulators to stipulate downside analysis and embed it in the process of credit risk assessment. This allows estimates of regulatory capital to be considered in the pricing of each credit at the time the credit is authorised. As risks from these systemic sectors escalate, the pricing on new

\(^{19}\) For example, in Acharya (2009), the failure of one bank leads to a lower aggregate level of risky investment, which squeezes surviving banks’ profits. The failed bank thus imposes a negative “recessionary” spillover or externality on other banks. And to minimise this externality banks are incentivised to invest in the same assets to fail or survive together. In Acharya and Yorulmazer (2008), banks take the same risks to maximise the benefits from future bailouts. Bailouts are then optimal only when many banks fail at the same time, so that banks optimally engage in herding.

\(^{20}\) Systemic real sectors share a set of common characteristics. First, the firms are asset intensive – high asset levels are needed to generate their revenues. Secondly, capital expenditure on fixed assets is substantial. Thirdly, assets are financed by a high level of bank borrowing. Fourthly, fixed costs are high and marginal costs are low. Fifthly, competition between firms is intense. Combined, these characteristics render the industry potentially unstable, although problems are slow to build. Cash flows can remain adequate to cover both the high fixed costs and the low marginal costs for a considerable period. But once excess capacity emerges, pricing in the industry can collapse. Competition drives pricing towards marginal cost and, since marginal costs are low, cash flows drop precipitously. Debt service can no longer be covered and firms become bankrupt. With low cash flows, asset values drop to low levels, and banks suffer high losses.
exposures escalates in tandem. Such upward pricing pressure helps curb banks’ incentives to engage in risky lending.
3. THE OBJECTIVES OF MACROPRUDENTIAL POLICY

“At the beginning of my lecture I referred to the frescoes of Good and Bad Government by Lorenzetti. If today you go to the Palazzo Pubblico in Siena to see these wonderful paintings in the Sala della Pace, which I translate as the Room of Stability, you will see the results of allowing daylight to fall on the walls. Yes, greater transparency – more daylight – has damaged the paintings. But if you look carefully, you will see that whereas daylight has caused no harm to the paintings of Good Government, it has indeed damaged Bad Government on the opposite wall. Even today, Lorenzetti’s frescoes tell us about the benefits of transparency and the importance of careful institutional design.”

~ Mervyn King, Speech to the London School of Economics, 2002

A clear objective is a necessary requirement for effective policy. In the period preceding the global financial crisis, the prevailing orthodoxy held that ex ante financial stability could be attained indirectly, via monetary policy and microprudential supervision. By meeting its objective of price stability, monetary policy supported economic growth, ensured efficient resource allocation, and avoided inflationary (or deflationary) shocks to the real value of nominal assets. And microprudential regulation, by ensuring the soundness of individual financial institutions, prevented costly bank runs thereby protecting consumers and depositors. Chapter 2 argues, however, that financial stability can fall between these cracks. The global financial crisis is a dramatic example of how systemic risk can build up without being mitigated, despite the best intentions of monetary policymakers and financial regulators.

Figure 2 (Schoenmaker and Wierts, 2015) shows how macroprudential policy helps fill this void. It lies in the middle of monetary policy and microprudential regulation in the overall policy framework for the monetary and financial system. As depicted, each policy addresses a primary objective (the bold arrows) and has a secondary impact on its neighbouring policies (the dashed arrows). The first two objectives, price and financial stability, can be regarded as equally important fundamental objectives – they affect the whole macroeconomy. The third objective, individually sound institutions, whilst important, is less fundamental. Financial institutions are fragile by design and allowing some possibility of distress is an important check on moral hazard, both at the level of banks and at the level of depositors (Calomiris and Kahn, 1991).
Delegating the task of price stability to an independent central bank is relatively uncontroversial. There is a broad academic and public consensus around the policy objective and, subject to technical issues, the target for price stability can be quantified. The costs and benefits of price stability are also up-front and apparent to most stakeholders. There is an agreed upon analytical framework for monetary policy and a primary policy instrument, the official short-term interest rate, that policymakers can use. Tinbergen’s rule – an instrument for each target – is satisfied and, as international experience with monetary policy over the past 25 years has shown, the public can hold the central bank accountable for its actions.

But it is much less straightforward to do the same for the financial stability objective. There is no uniquely agreed upon measure of the overall stability of the system (or even parts thereof). Indeed, the endogenous nature of systemic risk means that financial instability can take subtly different and evolving forms. The analytical approaches are fledgling, and a variety of instruments from different policy spheres (monetary, fiscal, prudential) contribute to the mitigation of systemic risk. Unlike monetary policy, the performance of macroprudential policy cannot be tied to clear outcomes that can be observed in the short-term.\textsuperscript{21} And the public policy case for financial stability is less obvious, with the perceived benefits tending to recede as financial crises fade into the distance.

The difficulty of encapsulating financial stability into a simple metric means that the process of policy formulation becomes the lynchpin for gauging the success of macroprudential policy. Such a process must be clearly understood by stakeholders and be systematic, so that policy judgments and the use of instruments follow well-articulated procedures. Communication of policy plays a key role in anchoring stakeholder expectations and ensuring accountability. Clear explanations of intentions and the rationale for action (or inaction),

\textsuperscript{21} Regulatory capture can easily arise in such environments (see, for example, Laffont and Tirole, 1991).
public records of deliberations, rigorous and regular public scrutiny by elected representatives, and periodic assessments of the efficacy and side-effects of actions taken, are central to an effective macroprudential policy framework. Critically, building stakeholder support for the financial stability objective and the benefits of macroprudential policy entails articulating a vision of why finance is socially useful and how the conserving the “financial stability commons” serves the public at large.

3.1 Single versus Dual Mandates

In debates on monetary policy, a distinction is typically drawn between a “purist” single mandate for price stability, and a “wider” dual mandate that also weighs output and employment objectives (as is the case in many advanced economies, such as the US and UK). The objectives for macroprudential policy can be similarly categorised as being either about:

• ensuring the resilience of the financial system to the swings and cycles in the real economy.
  The focus would be on the crystallisation of systemic risk and the assessment of its likelihood and potential impact. On this view, macroprudential policy is “purist”, focused solely on financial stability as an objective; or
• ensuring that the real economy is protected from swings and cycles in the financial system.
  On this view, there is a “dual” mandate for macroprudential policy as a vehicle to improve financial resilience and attain macroeconomic ends.

Hellwig (2012) highlights an inherent tension at the heart of the dual mandate. There is a possibility of a clear conflict between the objectives of macroeconomic stability and financial stability. During a downturn, a macroprudential policy that seeks to stabilise the economy might move to loosen banking regulation to enable banks to provide loans so that the real economy does not suffer from a credit crunch. A macroprudential policy that tries to avoid system-wide problems in the financial sector, by contrast, might want to clean up the banks’ books and force them to acknowledge losses and recapitalise, rather than carry hidden losses for an extended period.

The possibility of such tension requires a clear ordering of objectives within the dual mandate. The approach in jurisdictions such as the UK and New Zealand has been to treat financial resilience as the primary objective, and stabilising the real economy as the secondary
objective. As with dual mandates or flexible inflation targeting in monetary policy, this approach reflects a view that exclusive focus on financial stability could stifle real activity. Having regard to, and supporting, the growth objectives of the government guards against the possibility of policymakers being overly averse to financial risk-taking and systemic tail risks.

Although financial resilience is often stated to be the primary aim of macroprudential policy, policy debate in practice has often tended to focus on leaning against financial cycles. Table 4 (CGFS, 2016) shows that although authorities in many jurisdictions aim to build the resilience of financial institutions, the desire to lean against financial imbalances looms large on the horizon. The underlying concern is typically with the effects of financial conditions on new lending and, through new lending, on the real economy and possibly back from the real economy on the financial system. Policymakers have resorted to a range of instruments – countercyclical capital buffers, increases in loan-to-value ratios and margins and haircuts – to slow the build-up of credit risks by restraining lending sprees. On this view, reversing these policies when the financial cycle turns also provides some leeway to temper the adverse consequences for real activity. Discussions then shift to the conditions under which to use such instruments, and the indicators which might be used for their imposition and subsequent reversal.

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22 For example, in New Zealand, the memorandum of understanding between the government and the central bank describes the objectives of macroprudential policy as follows: "The objective of the Bank’s macroprudential policy is to increase the resilience of the domestic financial system and counter instability in the domestic financial system arising from credit, asset price or liquidity shocks. The instruments of macroprudential policy are designed to provide additional buffers to the financial system (e.g. through changes in capital, lending and liquidity requirements) that vary with the macro-credit cycle. They may also help dampen extremes in the credit cycle and capital market flows. As such, these instruments can play a useful secondary role in stabilising the macro economy. As a result, the Reserve Bank will consider any interaction with monetary policy settings when implementing macroprudential policy and will explain the implications, if any, for monetary policy." (emphasis added).

23 King (1997) cautions against a narrow focus on a single mandate, caricaturing monetary policymakers who target inflation with no concern for the stability of the real economy as “inflation nutters”.
Table 4: Interpretation of the financial stability objective

<table>
<thead>
<tr>
<th>Country</th>
<th>FS Objective</th>
<th>Emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia (CB; Supervisor)</td>
<td>Reduce realistically the risk of a financial system disruption so that the real economy is not harmed; low incidence of FI failure</td>
<td>Building resilience</td>
</tr>
<tr>
<td>Canada (CB; supervisor; MoF)</td>
<td>No explicit overall mandate, but FS considerations present in agency mandates</td>
<td>Building resilience</td>
</tr>
<tr>
<td>Netherlands (CB; Supervisor)</td>
<td>Enhance overall resilience of financial system and counteract financial excesses to reduce probability and impact of crises</td>
<td>Building resilience</td>
</tr>
<tr>
<td>Switzerland</td>
<td>The preservation of financial system stability</td>
<td>Building resilience/leaning against the cycle</td>
</tr>
<tr>
<td>Sweden (Supervisor)</td>
<td>To ensure that the financial system is stable and meets the need for key financial services. To counteract financial imbalances with a view to stabilising credit markets</td>
<td>Building resilience/leaning against the cycle</td>
</tr>
<tr>
<td>UK (CB; supervisor)</td>
<td>To protect and enhance financial stability</td>
<td>Building resilience (primary); leaning against wind (secondary)</td>
</tr>
<tr>
<td>US (CB; other agencies)</td>
<td>Reduce risk of financial disruptions that damage the broader economy</td>
<td>Building resilience/leaning against the cycle</td>
</tr>
</tbody>
</table>

Fine-tuning the credit cycle is ambitious. The causes of financial imbalances may well be outside the control of macroprudential policy, particularly if the source of the problem originates overseas or from other domestic policy decisions. As Chapter 4 indicates below, the empirical evidence supporting the effectiveness of macroprudential instruments in reining in the financial cycle is also limited. There are few reliable indicators that can help guide the policymaker. While the credit-GDP gap is often highlighted as a useful device to trigger the use of macroprudential tools such as counter-cyclical capital buffers (Giese et al., 2014; Gersbach and Rochet, 2014), no one indicator is likely to be the best in all situations. Policymakers must, thus, rely upon a range of indicators and an element of judgment – an assessment of ‘the story’ underlying current developments – in using their instruments (Hellwig, 2012).

A more fundamental criticism of attempts to fine-tune credit cycle dynamics is offered by Tucker (2016). He points out that it is hard to know ex ante whether a temporary increase in capital requirements for banks would tighten or relax the supply of short-run credit. A tightening of capital requirements potentially signals something about the state of the financial system. In contrast to monetary policy, where economic data is largely in the public domain, financial system information about linkages amongst institutions and vulnerabilities in their balance sheets is private information, that is typically available only to the
microprudential authority. Thus, if market participants view a tightening of capital requirements as reflecting news about financial stability concerns, then credit conditions might tighten. On the other hand, if the policy action confirms something that the market already suspected, then credit conditions could conceivably loosen reflecting confidence in the policymaker’s willingness to act.

Given the limited state of knowledge about the frictions underlying financial stability and the empirical relevance of risk indicators, Hellwig (2012) argues for clearly articulating the “story” underlying current developments. He suggests proceeding as in competition analysis:

Gather observations on what seems to be going on. Try to understand the ‘story’ that underlies new developments. Think as to which animals in our zoo of propagation effects and macro shocks might be relevant. Possibly also what mutations of the species we have studied might best be adapted to what we observe. All this must be done from a system perspective and going back and forth between the available data and the potential stories behind the data. This procedure involves a certain element of ad-hockery and is anything but foolproof. However, given the way in which the economy is constantly coming up with new patterns of interaction between the different participants, it seems like the best we can do. If we do not follow this approach and instead settle on single macro model and a single mechanism for systemic risk propagation, which we then estimate and calibrate, we can be pretty sure that the next big crisis will again be a big surprise. (p. 62)

There is a tradeoff between the need for discretion to deal with imperfect indicators of systemic risk and the need for commitment. Legislators typically favour rule-based regulation to guard against the exercise of arbitrary power by unelected officials. But a static rulebook invites regulatory arbitrage – indeed, the tighter and more permanent are macroprudential measures, the stronger will be the incentive to engage in arbitrage. A policy framework – be it for a dual or single mandate – must allow policymakers sufficient flexibility to respond to mutations, but nevertheless, constrain the scope for discretion by subjecting risk assessment analysis of the policymaker to proper scrutiny.

3.2 Intermediate and Operational Objectives

Operationalising the ultimate objective of financial stability requires identification of intermediate policy objectives. A natural starting point is to focus on the market failures –
namely interconnectedness, fire sales, herding, and misaligned incentives – that macroprudential policy seeks to address. The European Systemic Risk Board has attempted to take precisely such an approach to operationalising the policy objective (see Table 5 below). The intermediate objectives are explained at the outset, and in relation to the key externalities, as part of the policy framework.

Table 5: An externality-based approach to intermediate objectives

<table>
<thead>
<tr>
<th>Intermediate objective: to prevent/mitigate systemic risk in the banking sector arising from...</th>
<th>ESRB intermediate objectives, indicators and policy instruments</th>
<th>Table A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive credit growth and leverage</td>
<td>Excessive maturity mismatch and illiquidity</td>
<td>Exposure concentration</td>
</tr>
<tr>
<td>Relevant indicators of risk</td>
<td>Credit-to-GDP gap</td>
<td>Structural funding ratio (eg net stable funding ratio)</td>
</tr>
<tr>
<td>Housing credit and prices</td>
<td>Short-term liquidity stress indicators</td>
<td>Relevant instruments</td>
</tr>
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Describing ex ante the circumstances under which certain policy actions will, or can be, acts as a mechanism to incentivise the policymaker to either take key actions when a risk is identified or be compelled to explain why no action is needed. This reduces the inaction bias inherent in financial stability policy (Goodhart, 2011). A policy strategy based on ex ante intermediate objectives serves as a natural linking pin to instrument use and can help guide the expectations of market participants.

While this approach helps shield policymaking from political interference, it suffers from a reliance on imperfect indicators of risk. Moreover, the link between intermediate objectives and the ultimate objective of financial stability can break down. This may be
because financial risk-taking takes on new forms, or because statistical relationships no longer hold once fine-tuning based on specific indicators becomes systematic. Reflecting this, the ESRB recommends regular reviews of the intermediate objectives.

An alternative approach to operationalisation and intermediate objectives is to articulate these at the time when specific instruments are being implemented. At this stage, the policymaker makes clear what the success criteria are, along with the review process for evaluating achievement. While this approach has the benefit of not confining itself to specific risk indicators or ex ante intermediate objectives that may wane in relevance, it suffers from a lack of accountability. It is also a very ad hoc and partial approach that fails to adequately address system stability in a holistic fashion. Table 6 (CGFS, 2016) summarises the ex post approach to intermediate objectives taken by some advanced economies.

Table 6: Intermediate FS objectives in small open economies

<table>
<thead>
<tr>
<th>Intermediate objectives</th>
<th>How Achieved</th>
<th>Review Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Robust lending standards in the mortgage market</td>
<td>Set of indicators, including growth in share of investor housing loans and interest rate buffers when assessing ability to service debt</td>
</tr>
<tr>
<td>Sweden</td>
<td>Key vulnerabilities correspond to identified market failures (these include interconnectedness, household debt, bank reliance on wholesale funds)</td>
<td>Set of indicators indicating development of vulnerabilities; expert judgement</td>
</tr>
<tr>
<td>UK</td>
<td>For LTI: limit risks to financial and economic stability from household indebtedness; For CCB: ensure ability of banking system to withstand disruption without breakdown of core services</td>
<td>Achievement to be measured by suite of guiding indicators; expert judgement</td>
</tr>
<tr>
<td>Switzerland</td>
<td>For CCB: strengthen resilience of banking system from excessive credit and lean against excesses.</td>
<td>Not specified</td>
</tr>
</tbody>
</table>

As Table 6 makes clear, the way in which intermediate objectives, success criteria, and review procedures are specified varies significantly from country to country – there is no coherent pattern. For example, while the Swedish and UK approaches to intermediate objectives are broadly based around the notion of market failures, the same cannot be said of Australia or Switzerland. The choice of indicators around which to measure achievement are loosely specified in each country. And the process of revising intermediate objectives ranges
across the entire spectrum. The Swedish macroprudential authority (Finansinspektionen) reassesses the intermediate objectives of financial stability twice a year. By contrast, there is no process for review in Switzerland, and the Australian review process is vague, relying on a once-in-15 year overhaul of the regulatory architecture. If objectives provide context for wielding macroprudential policy, then there is little in Table 6 to suggest meaningful constraints on the powers, scope, or accountability of the policymaker.

Figure 3 illustrates the macroprudential decision-making process in New Zealand. It suggests that the operational approach of the RBNZ is closer to that followed in countries such as the UK and Sweden, than the ESRB approach (in which all externalities and instruments are identified ex ante and up-front). The focus of systemic risk assessment is more centred on notions of excessive indebtedness and asset price over-valuation than market failures per se. And the case for intervention rests on a suite of indicators, judgement, and a cost-benefit analysis. The intermediate objective is an ex post one, defined after an instrument is identified. As with the UK and Sweden, the success criteria are discretionary – based on the set of guiding indicators intermeshed with expert judgement. The review process is periodic, with policy impact statements and communication to stakeholders based around the Financial Stability Report.

Figure 3: The current RBNZ approach

The macro-prudential decision framework

Source: RBNZ.
The multi-faceted objectives of financial stability place significant challenges for policymaker accountability and communications. The analysis of this chapter suggests that a coherent framework for macroprudential policy would benefit from far greater emphasis on communication to create a constituency for financial stability, both amongst the public as well as market participants. Reliance on Financial Stability Reports and bland policy communiques alone to convey ex post intermediate objectives, and the success (or otherwise) of attaining them, is insufficient. At this, relatively early stage in macroprudential policy development, discretion and expert judgement needs to be open to vigorous debate and challenge by stakeholders, and policymakers need to be explicitly held accountable for their actions by legislators.24

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24 Balls et al. (2016) go even further, arguing that high-level government involvement is essential to secure legitimacy and accountability for macroprudential policy. They recommend setting up a government-led body to establish and review high-level financial stability objectives and an operationally independent technocratic group to deliver on the implementation (see Chapter 5).
4. POLICY INSTRUMENTS

“It doesn’t matter if the cat is white or black, so long as it catches mice.”

~ Deng Xiaoping

During an interview in 2012, Mervyn King was asked what he thought of the macroprudential instruments available to the newly formed Financial Policy Committee of the Bank of England. The response was succinct: “I want to stress that this is an experiment. We know absolutely nothing about how these instruments are going to work.”25 In the five years since King’s observation, our understanding of macroprudential policy tools, and their impact on both the financial system and the real economy, remains extremely incomplete. Academic scholarship in this area is very sparse, with almost all empirical contributions coming from researchers in policy institutions such as central banks and the IMF. The lack of definitive answers to many questions has forced regulators into a learning-by-doing approach – experimenting with tools, observing the consequences, and re-calibrating methods where necessary.

Exhaustive lists of potential macroprudential tools have been drawn up by many regulators. In brief, these fall into three categories: (i) capital-based tools; (ii) asset-based tools and loan restrictions; and (iii) liquidity-based tools (IMF-FBS-BIS, 2016). Capital tools include broad-based instruments such as the counter-cyclical capital buffer (CCB), capital surcharges for (domestically and/or globally) systemic banks, and sectoral capital requirements. Asset-based tools include caps on exposures to specific sectors and restrictions on borrowers, notably loan-to-value ratios (LTVs), loan-to-income ratios (LTIs), or debt service-income ratios (DSIs). And examples of liquidity-based measures are core-funding ratios and the Basel III liquidity coverage ratio.

Two other macroprudential instruments warrant mention. These are stress-testing and communications. Stress-testing can be viewed as a tool that addresses the “cross-sectional” dimension of systemic risk, enabling measurement of systemic risk as well as an individual bank’s contribution to systemic risk. Tucker (2016) argues that stress tests are a powerful tool for safeguarding the resilience of the financial system, enabling – by choice of scenarios – the policymaker to maintain a standard of resilience. Articulating financial stability

risks and resilience standards via stress test outputs may, in time, be akin to inflation fan charts in central bank Inflation Reports. Transparency of this kind would be an instrument in itself—improving private sector decision-making by making clear the likelihood and impact of system-wide risks.

4.1 Operational issues

Before turning to the empirical evidence on the efficacy of some prominent macroprudential tools, several operational issues deserve to be highlighted. These are (a) the scope of application and the implications of leakage/circumvention; (b) the speed and size with which policy tools should be adjusted; and (c) whether macroprudential tools work symmetrically during good and bad times. We consider each in turn.

Scope of application: Should policymakers favour broad or targeted instruments? Some tools, such as counter-cyclical capital buffers, or liquidity and reserve requirements, endow the financial system with loss-absorbing capacity and tackle generalised financial imbalances. But they are blunt weapons—common sense suggests that, if problems arise in a specific sector, then tightening a system-wide instrument in response is likely to be excessive, cost-ineffective, and risk undesired side effects. Broad measures are also prone to leakage effects. Leakage effects arise when the implementation of measures propel imbalances elsewhere in the financial system. For instance, use of capital tools can lead to the provision of credit services by non-bank players or shadow banks. Leakages can also occur across borders if foreign banks are established as branches and not as subsidiaries (which entails being subject to home country regulation). Aiyar et al. (2014) document how, in the UK, resident branches of foreign banks increased lending in response to tighter capital requirements on domestic banks, thereby offsetting almost one-third of the tightening.

Targeted measures, by contrast, allow specific concerns in individual sectors to be addressed more efficiently. But they are also more vulnerable to circumvention. Circumvention occurs when the agents at whom the measure is directed actively seek to

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26 This idea was the basis for development of the Bank of England’s top-down stress-test model (RAMSI). Central bank stress-test models use granular balance sheet data on financial institutions to measure the probability and impact of extreme, but plausible, scenarios. Other examples include MFRAF (Bank of Canada), and STAMPE (ECB). Market-based measures of systemic risk include CoVaR (Adrian and Brunnermeier, 2016) and SRISK (Acharya et al., 2012). Goldstein and Sapra (2013) discuss the benefits and costs of publicly disclosing stress test results, and conclude that disclosure of aggregate stress test results can be beneficial.

27 CGFS (2016) provides an inconclusive (and frankly underwhelming) assessment of communication as a macroprudential instrument in its own right.
neutralize or mitigate the possible effects. For example, faced with LTV limits on mortgages, a bank might use alternative products to expand real estate exposure beyond admissible limits. And borrowers may attempt to evade LTI ratio limits by tapping multiple lenders, who have no way of preventing such behaviour without a central credit registry. Acts of circumvention are also much more likely to occur during the upturn, when optimism prevails and risk is misperceived – precisely the time when tightening measures are needed most.

The possibility of circumvention highlights the importance of effective microprudential supervision. Rigorous supervision would go a long way in mitigating evasive behaviour. It can also provide early warning of leakage effects and spur policymakers into taking corrective actions. The use of multiple tools in concert (e.g. LTV and LTI) could also limit circumvention – while the former limits loan exposure relative to collateral value, the latter constrains the overall level of lending to each customer based on income.

**Speed and size of policy adjustments.** When faced with instrument uncertainty, policymakers proceed cautiously. This wisdom has been a part of monetary policymaking since the seminal contribution of Brainard (1967). To a large extent, macroprudential policy has followed in the same vein (IMF-FSB-BIS, 2016). For example, in the UK, the Financial Policy Committee is explicit in seeking gradual movements in the CCB because of uncertainty about the effects of the instrument and uncertainty about the complex nature of the financial system (Bank of England, 2016). Similarly, in Ireland, policymakers have sought to ensure that LTV and LTI limits do not exclude all borrowers. Allowances ensure that LTV and LTI constraints are not immediately binding on some cohorts, but can be calibrated to become effective once a build-up of imbalances materialises (Lane, 2016). The desire to avoid adverse side-effects has also meant that with gradualism comes a preference for less-intrusive (or smaller) measures.

But overly cautious macroprudential policy can risk creating an environment for inaction bias. It can be all too easy for a policymaker to sit on one’s hands when there are no rules to trigger action and when threshold indicators are imprecise. Bahaj and Foulis (2016) emphasise that the Brainard result holds only when the policymaker has a symmetric loss function – i.e. weights the good and bad times equally when choosing an optimal action. But in the case of financial stability, policymakers are much more likely to have an asymmetric loss function – the downsides of crisis far outweigh the outcomes in normal times. Policy activism may well be more the more appropriate response. But the size of such an intervention is a matter of fine judgement. Too sharp a rise in, for example, the CCB, could
create a dearth of capital at the system-level as banks scramble to simultaneously acquire fresh funds.

Finally, it is worth noting that, during booms, it is not uncommon for real credit growth to be of the order of 25% (CGFS, 2012). Asset prices are also typically inflated. This suggests that the size of asset-side or capital based interventions may need to be quite large to bring financial imbalances to heel.

**Efficacy of instruments over the cycle:** A priori, one might expect a degree of asymmetry in macroprudential tools over the financial cycle. During the upswing, market participants are optimistic and banks tend to hold smaller capital and liquidity buffers. Macroprudential instruments should be at their most effective in such circumstances since they are tighter than the constraints imposed on intermediaries by market discipline alone. By contrast, in a downswing, market pressures may see banks voluntarily adopting measures that are well above regulatory thresholds. Relaxing macroprudential measures (such as releasing capital constraints via the counter-cyclical capital buffer) during these times might be expected to have much less impact.

As already noted, the possibility of circumvention means that effectiveness of macroprudential instruments, particularly during the upswing, is dimmed. And for an effective relaxation of macroprudential instruments during downturns, there must have been an adequate tightening during the preceding boom. The recent crisis has suggested that the large banks in Europe and the US reacted by increasing capital procyclically (Hanson et al, 2011). Overall, the empirical evidence on the extent of asymmetric effect appears inconclusive (see, for example, Nier et al., 2012).

### 4.2 Empirical evidence

The empirical literature on the efficacy of macroprudential instruments is relatively small. The lack of firm insights reflects both data issues and a lack of consensus on models of the interaction between the financial system and the macroeconomy. Data availability particularly affects cross-country panel studies, and limits the scope for reliable international comparisons. And while analyses based on micro-level data are informative, their country- and institution-specific nature makes it difficult to draw general conclusions.

The literature can be broadly categorised in terms of studies of (a) asset-side instruments aimed at borrowers; and (b) the efficacy of capital-based instruments to both lean
against the cycle and build resilience. Since some of the main studies have already helped inform assessment of macroprudential policy in New Zealand (e.g. Rogers, 2013; Thornley, 2016), the treatment here is relatively brief.

**Asset-side tools.** The cross-country evidence suggests that LTV and LTI limits are relatively effective in curbing credit growth, while the link between these measures and house prices is more tentative. Lim et al. (2011) provide an early cross-country panel study of asset-based instruments. They find evidence suggesting that LTVs and LTIs dampen procyclicality. Kuttner and Shim (2016) use data spanning three decades for 57 countries and show that housing credit growth is significantly influenced by changes in the LTV ratio and LTI ratio. Their analysis suggests that housing-related taxes are the only instrument with a discernible impact on house price appreciation. Crowe et al. (2013), however, point to evidence that LTVs and LTIs can be effective at decelerating property price growth. More recent studies (Cerrutti et al. 2015; Akinci and Olmstead-Rumsey, 2015) continue to confirm the finding that LTVs and LTIs are effective at curbing credit growth. Finally, Claessens et al. (2013) find that LTVs and LTIs can reduce a bank’s leverage, assets, and non-core to core liabilities growth during the upturn of the financial cycle.

A limitation of cross-country studies is that they potentially miss the richness and complexity that characterises the interaction between borrow behaviour and LTV and LTI limits. Micro-data studies shed more light in this regard. Using a combination of Canadian micro- and macro-data, Allen et al. (2016) study macroprudential tightening and loosening episodes during the period 2005-10. Although the study does not explicitly address growth in mortgage credit, it finds that housing related macroprudential tools stimulate or dampen demand through their influence on the wealth constraints of households. These demand changes are likely to translate into changes in credit growth.

Kelly et al. (2017) use loan-level data on Irish mortgages between 2003-2010 to explore the effect of asset-based tools on house prices. Their findings suggest that macroprudential limits potentially have a significant impact on house prices, with the levels at which the limits are set playing an important role. In their model, the introduction of an

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28 The empirical literature on liquidity tools is very limited and therefore not reviewed here. BCBS (2010) estimates that the introduction of a net stable funding ratio (NSFR) lowers the probability of a systemic event by 10-20 percent. Simulations based on stress-test models also suggest that liquidity tools should mitigate negative feedback spirals. So, the overall impact on resilience of such tools is likely to be positive. The empirical implications of liquidity-based tools for the financial cycle do not appear to have been well-studied.

29 The analysis of Cerrutti et al. (2015), which covers 119 countries over the period 2000-2013, further suggests that macroprudential policies have asymmetric impacts, with some measures working better during the boom phase of the cycle.
LTV-LTI combination of 70 and 2.8 leads to a house price fall two and a half times as large as a combination of 95 and 4.5. Their results indicate that the timing of the policy is a crucial determinant of the impact on house prices – the measures have a smaller impact when credit conditions are tight. The policy implication is that it may be beneficial to introduce policies early, away from the peak of the housing cycle to avoid large shocks to housing markets. If introduced during a relatively quiescent period, a macroprudential regime may bolster borrower and lender resilience, without sharp impacts on house prices.

Although these studies suggest that sector-specific asset-based tools may influence credit growth and asset prices, they do not assess if these tools successfully address the underlying externalities contributing to financial instability. Arguably, measures such as LTVs and LTIs can usefully influence externalities due to herding (strategic complementarities) behaviour by borrowers and lenders in the housing market. And they may also limit borrower and lender exposure to potentially damaging firesale effects triggered by a rise in defaults. Policymakers have also been relatively silent about the externalities that asset-based tools are meant to address. Making their reasoning transparent, and articulating the intermediate objectives that speak to such externalities, would allow for a more thorough assessment of the efficacy of LTVs and LTIs.

Figure 4 illustrates a generic transmission mechanism by which tighter LTVs and LTIs might achieve the twin objectives of increased resilience and leaning against the financial cycle (CGFS, 2012).

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30 The imbalances that sow the risk of firesales are typically built up during the preceding boom. Private agents may overborrow, leading to excessive leverage and inflated asset prices, because they do not internalize the effects that a generalized firesale has on the ex-post borrowing capacity of other agents (Lorenzoni, 2008; Stein, 2012).
**Capital tools:** A range of official studies suggest that building capital buffers builds resilience in financial systems. The Long Term Economic Impact Group (LTEIG) which meets under the auspices of the Basel Committee on Banking Supervision (BCBS) estimates that a 1 percentage point increase in capital requirements leads to as much as a 20-50% reduction in the likelihood of systemic crises (BCBS, 2010). Similarly, the IMF (IMF 2015) observes that the level of loss-absorbancy implied by a 15-20 percent risk-weighted capital ratio would have avoided at least 80% of the financial crises experienced by advanced countries since 1970. Laeven et al. (2014) also suggest that capital surcharges are the most effective bank-level instrument for reducing systemic risk. Basten and Koch (2015) analyse Switzerland’s sectoral (mortgage) CCB and find that it achieved its objective of raising resilience by shifting mortgage lending away from capital-constrained banks. Following this change in the

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31 The models used for the basis of this study includes the Bank of Canada’s MFRAF stress-testing model, which explicitly models firesales, network effects and herd-behaviour.
composition of credit supply, the capital buffers of banks engaged in mortgage lending increased as banks with low capital levels reduced their activities in the real estate sector.

Unlike LTVs and LTIs, capital tools are more obviously targeted at the key externalities identified in Chapter 2. Capital tools provide buffers that reduce the risk of firesales. They weaken the incentives of banks to become systemic, and induce banks to internalise more of the costs of engaging in risky lending. But, as already highlighted, an important caveat is the possibility of leakages and circumvention. The tightening of broad-based capital measures can shift lending away towards capital-constrained institutions outside the regulatory perimeter, undermining resilience in the process. Banks can also potentially game risk-weights to circumvent tighter capital requirements. But regulators can put in place complementary measures that mitigate these adverse effects.

In addition to resilience, capital tools have also been used to lean against financial cycles. The empirical evidence on this score is rather mixed. Aiyar et al. (2014) draw on a micro-level dataset for the period 1998-2007 to suggest that tighter capital requirements in the UK succeeded in reducing credit growth. Jimenez et al. (2015) examine Spain’s experience with counter-cyclical dynamic provisioning using micro-level data. Their results suggest that while dynamic provisioning failed to prevent the credit boom during good times, it was effective in supporting firms’ activities and financing in the subsequent bust. And while Basten and Koch (2015) find in favour of capital requirements increasing resilience, their findings do not point to any slowdown in credit growth.

The implications of increased bank capital requirements for economic growth has long been the subject of debate. Studies that find sizable costs in terms of reduced loan supply due to higher capital requirements typically start from the perspective that equity is expensive, in line with the pecking order theory of finance (Myers and Majluf, 1984). Papers suggesting that higher capital requirements imply sizable costs through higher lending rates and so compress loan growth include Gambacorta and Mistrulli (2004) and Van Den Heuvel (2008). Carlson et al. (2013) also suggest that the effect of capital ratios on bank lending may be non-linear as well as asymmetric. They find that the elasticity of bank lending with respect to capital ratios is higher when capital ratios are relatively low. And the relationship between loan growth and bank capital is stronger during episodes of loan contraction than during expansionary episodes.

Research that concludes that the cost of higher capital requirements is relatively small include Elliott (2009), Berrospide and Edge (2010), Admati et al. (2011), Kupiec et al. (2014), and Gambacorta and Shin (2016). These papers argue that the overall funding costs will be lower (or not materially increase) in response to higher capital requirements due to the
reduced probability of default for banks individually and collectively. The corresponding downward pressure on the cost of equity and debt weighs strongly enough to prevent significant downward pressure for loan volume growth.

Arguably, the benefits from lower crisis probabilities and an associated lower long-run cost in terms of lost output outweigh any possible losses from any short-run restricted loan supply. The scale of short-term macro-economic costs from capital tools, moreover, depend on exactly how banks move to higher capital ratios. If banks react to higher capital requirements by asset-side deleveraging, then the benefits of activating capital-based macroprudential tools may be limited. But if banks react to higher capital requirements by raising and investing equity capital, increased resilience and a fall in banking crisis probabilities become more likely.

Figure 5 illustrates a generic transmission mechanism by which tighter capital requirements achieve the twin objectives of increased resilience and leaning against the financial cycle (CGFS, 2012).
4.3 Stress testing

Since the global financial crisis, the stress-testing of banking systems has gradually emerged as a potent, and systematic, instrument of financial stability policy. The inputs and outputs of a stress-test – the scenarios and their system impact – are highly public, the exercise can be done annually or bi-annually, and the method and results can be subject to public scrutiny in much the way as in monetary policy. As Goodhart (2016) observes,

…stress tests should provide the authorities with an early warning signal of which banks were flirting perilously close to the danger area, should a severe adverse shock occur. Put another way, if a bank collapsed in year t having sailed easily through the prior stress test in year t-1, there would have been something amiss with that test. Of course, the chosen scenario for the stress test in any year may diverge considerably from the shock that actually occurs to weaken the bank, but doing a new stress test each year, with changing parameters, should give the authorities an increasingly rounded picture of each bank’s strengths and weaknesses. (p. 148-149)
Central banks have made major investments in developing top-down stress-testing models since the crisis. In a top-down stress test, the policymaker sets the scenario and conditions under which the test is run, and calculates the results without the involvement of the banks themselves. The focus can be on the system as a whole, as well as the soundness of individual institutions. By applying the same scenario on the same model with the same assumptions at the same time, top-down tests allow for direct comparisons across banks, as well as a transparent framework for articulating weaknesses in the banking system as a whole. Crucially, a stress-test can capture the impact that the actions of one bank has on the risk of the rest of the system. These individual risk contributions provide a basis for capital or liquidity requirements or surcharges.32

One weakness of top-down stress-testing models is that they lack the fine balance sheet detail on banks’ trading portfolios and overall exposures. Bottom-up stress tests, typically run by banks themselves using internally developed models, can provide more detailed insights into how an individual institution might be affected by a specific macroeconomic scenario. But these, unlike top-down tests, do not take the externalities of a bank’s actions or second-round/amplifying effects into account. But careful analysis of both kinds of test to the same scenarios can allow a proper picture of banking system vulnerabilities to be built. As Goodhart (2016) again notes,

…the conduct of annual stress tests gives the regulatory authorities their best available chance of dealing with fragile banks while there is still enough time to avert a, potentially contagious, failure. The key requirement is to have ready-made plans on the shelf in advance about how best to back-stop the weakest banks. This could be by some combination of forced retained earnings, forced raising of additional external equity, injection of public sector funding…How this might be done needs to be considered and reviewed before the exercise is completed. (p. 149)

Cecchetti (2015) also echoes Tucker (2016) in suggesting that stress-testing may be the most effective and transparent way to ensure (a) the resilience of the financial system; and (b) articulate the standard of resilience as a policy objective. He suggests that:

32 Gauthier et al. (2012) make the important point that, once a bank’s capital (or liquidity) levels are changed, bank’s default probabilities, default correlations, and overall system risk change as well. They advocate an iterative algorithm, in which each bank’s risk contribution is first calculated, the bank’s capital surcharge is then levied, and then systemic risk and each bank’s risk contribution is then re-calculated. The procedure is repeated until there is convergence. Gauthier et al., thus, define macroprudential capital (liquidity) requirements as a fixed point where each bank’s capital (liquidity) equals its risk contribution under that level of capital (liquidity).
Stress tests may be the most powerful prudential tool we have at our disposal for safeguarding the resilience of the financial system. They take seriously the fact that, when a large common shock hits, there is no one to sell assets to or raise capital from. By ensuring that each individual institution can withstand significant stress, we ensure the system can, too. And, importantly, by adjusting the stress scenarios, prudential authorities can maintain resilience. At least in principle, they can both account for changes in the distribution of the shocks and ensure that the amplification potential of the propagation mechanism does not increase...

...By changing the stress scenarios, prudential authorities are changing the level of capital that banks are required to hold. Passing tests with higher stresses necessarily requires more capital. And, the target is a given level of systemic resilience – resilience that requires both being able to withstand larger shocks and being able to mitigate the extent to which a given shock is transmitted to the economic and financial system more broadly.

I should note that some people would view this as simply a way of implementing a countercyclical buffer. That is, rather than rely mechanically on an indicator like credit growth, authorities would instead use stress testing as a way to calibrate the required amount of capital. There is clearly a sense in which the objectives are the same – maintaining systemic resilience – just the method of getting there is different. My sense is that stress testing is more flexible, faster, and less politically contentious than Basel III’s countercyclical capital buffer. (p. 167-168)

Transparency of stress-testing is, however, essential if it is to be truly effective. The policymaker can choose any scenario for the stress test that they think fit, apply undisclosed modelling and proprietary data to assess the outcome, and use the results to impose capital and liquidity requirements. Goodhart (2016) emphasises that, since stress testing is likely to be a very powerful tool in the policymaker’s armoury, its constitutional and legal setting deserves further thought. He suggests that policymakers be required to report the conduct and outcome of each stress test to a Select Committee of the legislature, and be prepared to justify their actions resulting from such testing to that same Committee. This process could be public or private depending on the commercial sensitivity involved when testing specific institutions.33

33 A process such as this would go some way in countering major critics of stress-testing (notably Dowd, 2015) who worry that public stress-tests by central banks are liable to manipulation by the policymaker so as prevent “confidence” in the system becoming undermined.
4.4 Distributional issues

Although monetary policy has distributional consequences, it is not particularly granular. Central banks cannot, within the same currency area, set different interest rates for different economic regions, or for different economic agents. By contrast, some macroprudential policies are overtly distributional in their impact. Sectoral tools, such as LTVs and LTIs, can (in principle) be targeted at specific loan types or regions. While such pin-point intervention can be beneficial in ameliorating distortions and minimising economic inefficiency, it comes at a political-economy cost – some agents visibly gain at the expense of others. This poses some important questions about accountability and governance that are analysed in Chapter 5.

Assessing the distributional and welfare consequences of macroprudential policy is extremely difficult. A policy may improve aggregate social welfare but heighten inequality between agents. It is also not straightforward to identify the gainers and the losers from a policy intervention. Some insight on the issues involved can be gleaned from recent work in macroeconomics on heterogeneous agent models with incomplete markets and financial frictions. Although the focus of this literature has largely been on explaining the link between household financial distress and the Great Recession in the US, the analysis has broader relevance and speaks to the distributional implications of tighter macroprudential policy.34

Guerrieri and Lorenzoni (2016) is a seminal study of the distributional impact of tighter household borrowing constraints on the macroeconomy. In their model, the tighter borrowing constraint induces poorer households to increase their work effort and their savings. The incentives to save are smaller for rich households who are further away from their borrowing constraints. The interest rate drops to clear the bond market and the overall effect is for households to delay gratification, with the rich working less and consuming more. Output declines because of the reduction in labour of the high-skilled workers. Thus, the increased difficulty of accessing credit translates into a lower ability to obtain consumption by poor households and a slowdown in economic activity.

A key lesson from such models is that, depending on their asset position, the reaction of households to financial shocks can vary quite a bit. But other real-economy frictions can also matter greatly. For example, Huo and Rios-Rull (2015) develop a model that highlights the role of search friction in consumption markets and where demand contributes to

34 In the New Zealand context, some recent work by Schroter and Yao (2016) uses this approach to compare the distributional consequences of LTVs and LTIs. Their results suggest that the LTV is the welfare superior instrument but, by impacting relatively poor households more, heightens the inequality of home ownership.
productivity. Following an unexpected financial shock, some households reduce consumption to meet tighter borrowing constraints. The fall in consumption that ensues means that households spend less time searching for certain consumption goods (“services”), leading to a decline in the price and quantity purchased of service goods. As a result, there is a direct impact of greater savings on productivity and output arising from reductions in search. But there is also an indirect effect. Consumption is tilted towards the rich households because they exert less search effort per unit of consumption than do poor households. The indirect effect, thus, moderates the overall fall in output.

In a related paper, Huo and Rios-Rull (2016) study the distributional consequences of an unexpected tightening of the loan-to-value ratio in a model that is calibrated to US data and where all household borrowing is collateralised by housing. The difficulty accessing credit translates into a decline in housing demand and, with it, house prices. The fall in house prices has two separate but related effects on households: first, it further tightens the collateral constraint and forces more households to reduce their debt involuntarily; second, it weakens the balance sheets of all homeowners, which is followed by a reduction of consumption (and output) through wealth effects. These forces reinforce each other and form a vicious cycle.

In their calibrations, Huo and Rios-Rull find that while the change in the loan-to-value ratio accounts for much of the fall in output, the increased markup in mortgages has more permanent effects via its impact on the user cost of ownership of housing for the poorest households. They also find that households whose consumption falls the most are those whose wealth drops the most. These households are highly leveraged, have a large share of housing in their total net worth, and are concentrated in the middle of the wealth distribution (30%-80%). Since the poorest households do not own houses, their consumption increases slightly (because of lower nontradable prices). But most households own some housing and so suffer from a weakened balance sheet. Overall, consumption inequality falls following the financial shock.

Empirical research also suggests a heterogenous response of consumption to adverse financial shocks. For example, Mian et al. (2013), Mian and Sufi (2014), and Parker and Vissing-Jorgensen (2009) document that the households that lose the most are the ones that cut their consumption the most. Mian et al. (2013) and Mian and Sufi (2014) also show, using spatial data, that regions that experience a larger house price drop are where consumption falls the most. Leveraged and underwater households also tend to cut their consumption more aggressively. Parker and Vissing-Jorgensen (2009) provide evidence to suggest that
medium to rich households (in terms of both income and wealth) reduce consumption the most.
5. MACROPRUDENTIAL POLICY AND INSTITUTIONAL ARRANGEMENTS

“Trust is the lifeblood of all things monetary and financial, including central banks. And incredulity is Kryptonite for central banking Supermen (and the odd Supergirl), rendering ineffective their policies and unaccountable their actions. Building trust and legitimacy is among the most pressing issues facing central banks today.”

~ Andy Haldane

“The final challenge for macroprudential policy is a longer-term one, going beyond the immediate issues of setting up the apparatus. That is to maintain over long periods of time the independence and legitimacy that macroprudential policy needs to do its job effectively. That means winning the battle of hearts and minds.”

~ Mervyn King

The global financial crisis has demonstrated that price stability was not a sufficient condition for financial stability, that financial conditions mattered greatly for the transmission of monetary policy, and that the unconventional tools used by central banks to meet their objectives had fiscal implications. It has highlighted the need for central banks to coordinate closely with the government and other regulatory institutions to stabilize the macroeconomy. The pre-crisis consensus of an ideal central bank, independent from government, pursuing price stability having regard to the government’s growth and employment objective, appears to be giving way to a much wider brief that risks straying into politically charged areas such as housing policy. To some, central banks are now too independent and insufficiently accountable to the public. To others, the embrace of macroprudentialism is a slippery slope that blurs the central bank’s focus on price stability and jeopardises hard-won credibility.

It is worth remembering, however, that financial stability and politics both lie at the heart of central banking. Financial instability was the primary motivation for the founding of the Federal Reserve. And the Banque de France was established to finance Napoleon’s Treasury, in exchange for which he was willing to grant the new institution exclusive rights to issue bank notes in Paris. As a result, central banks have acquired the central position in the financial system, including as the bank for other banks. Jeanne (2011, p. 3) refers to the tight-knit relationship between bankers, the central banks, and the sovereign as the “dirty roots of central banking”, and argues that these deep roots from the origins of central banking have been exposed by the latest crisis. The modern-day contract between independent
central banks and society, in which the central bank has a macroeconomic objective is relatively new. Ever since the fall of the Gold Standard, the focus has shifted away from the behaviour of the central bank as a business in the centre of the financial system and towards the role of monetary policy as a tool for macroeconomic stabilization. But monetary policy is not the same thing as central banking. And the mandate for the macroeconomic objectives of central banking ultimately depends on the perception that it is delivering good outcomes for society.

The impact of macroeconomics on central banking has been profound. Price stability and full employment have been codified in, for example, the Humphrey Hawkins Act in the United States, and an exclusive focus on price stability is enshrined in the Bundesbank Act and in the Maastricht Treaty. The ultimate policy objective is far removed from the microeconomics of what the central bank does, and financial stability is not explicitly mentioned in the legal mandates of many central banks. Although financial stability is recognised in the RBNZ Act, most policy debate in New Zealand has tended to focus around the macroeconomic mandate specified in a formal social contract (the Policy Targets Agreement) between the Governor and the Minister of Finance. By contrast, financial stability considerations and macroprudential policy are relegated to a memorandum of understanding.

Hellwig (2014) highlights that, regardless of whether the central bank’s macroeconomic mandate is formulated in terms of price stability or in other terms, subsuming financial stability is potentially problematic because in some situations the two mandates can be in conflict. Actions that endanger financial stability might be justified with a view to the central bank’s macroeconomic mandate. A central bank that sees its macroeconomic mandate endangered because private banks are very cautious could, for example, be tempted to induce the private banks to take more risks. A dual mandate for price stability and financial stability brings potential conflicts into the open and makes explicit the need for coordination.

Goodhart (2011) points out that policy coordination between monetary and financial stability is made less severe given the nature of the central bank’s balance sheet. The central bank is monopoly issuer of ‘high-powered’ money to the financial system and monetary policy, through the choice of the official interest rate, controls the overall size of the central bank’s liabilities. The counterpart assets take the form of claims on the public sector, claims on the rest of the world (reserves), and claims on the private sector. In the presence of financial frictions, asymmetric information and externalities, financial stability policy, in the form of liquidity or market interventions, can be conducted by affecting the composition of the central bank’s claims on the private sector (including loans to banks). The ability to buy and sell claims on the private sector and alter the composition of central bank assets for liquidity and
market interventions is, thus, “the first instrument” in the macroprudential policymaker’s arsenal. Such transactions can provide reassurance during panics, or to signal disapproval of risky commercial paper during booms. Although actions in the monetary and financial spheres can affect each other, they need be no more severe than the coordination issues between fiscal and monetary policy (see also Bean, 2014).

5.1 Financial stability and monetary policy – three views

To what extent should a price stability-oriented framework take financial stability objectives into account? Drawing on Smets (2013), we can caricature academic scholarship as belonging to three main perspectives which can be dubbed (a) the modified consensus; (b) leaning against the wind; and (c) the inseparability hypothesis. Table 7 summarise the three views.

Table 7: Three views

<table>
<thead>
<tr>
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<th>Modified Consensus</th>
<th>Leaning Against the Wind</th>
<th>Inseparable</th>
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</thead>
<tbody>
<tr>
<td><strong>Monetary policy</strong></td>
<td>Framework largely unchanged; Limited effects on risk-taking and credit; Blunt instrument to deal with financial imbalances</td>
<td>Financial stability is a secondary objective; Impact on risk-taking and credit; ”gets in all the cracks”</td>
<td>Twin objectives on an equal footing; unblocks balance sheet impairment; avoids financial imbalances in upturns</td>
</tr>
<tr>
<td><strong>Macroprudential policy</strong></td>
<td>Granular and effective</td>
<td>Cannot fully address financial cycles; vulnerable to regulatory arbitrage</td>
<td>Inseparable from monetary policy</td>
</tr>
<tr>
<td><strong>Interaction</strong></td>
<td>Easy to separate objectives and instruments</td>
<td>Financial conditions affect monetary transmission and price stability</td>
<td>Financial stability and price stability are intimately connected</td>
</tr>
<tr>
<td><strong>Issues</strong></td>
<td>Coordination of policy</td>
<td>Coordination of policy; over-burdening of monetary policy</td>
<td>Time inconsistency problems</td>
</tr>
<tr>
<td><strong>Main (Academic) Proponents</strong></td>
<td>Svensson</td>
<td>Woodford</td>
<td>Brunnermeier</td>
</tr>
</tbody>
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35 Macroprudential policy can, thus, be summarised as the process of correcting systemic risk externalities by influencing the process of financial intermediation through (a) changes in the composition of central bank assets; (b) the adjustment of margins (e.g. LTVs, capital/liquidity ratios); and (c) alterations to the structure of the financial system (including limits to the size and function of intermediaries).

36 Relatedly, King (2016) has suggested that the central bank be a “pawnbroker” for all seasons, ready to lend to banks against their illiquid and risky assets.
**Modified consensus**: On this “reductionist” view, monetary policy should be reserved solely for the narrow task of fulfilling its macroeconomic objective and financial stability would be pursued by a (ideally separate) macroprudential authority, with each authority having their own instruments. Jeanne (2011) and Smets (2013) describe this as a modification of the popular “Jackson Hole consensus” that prevailed before the crisis, namely the monetary authority should only take financial stability considerations into account to the extent that they affect the outlook for price stability and economic activity.

The consensus view argues that the challenge, post-crisis, is to create an effective and credible macroprudential framework. Once this is in place, monetary policy can continue to focus on price stability. Financial stability considerations will influence monetary policy decisions to the extent that assessments of systemic tail risks change the expected outlook for inflation or real activity. So there is a role for financial stability monitoring and information exchange. But the objectives, the instruments, and the transmission mechanisms of monetary and macroprudential policy are separable. Moreover, the interaction between monetary policy and macroprudential instruments is limited and, in contrast to macroprudential policy, the official interest rate is viewed as being an ineffective tool for tackling financial imbalances.

**Leaning against the wind**: This view, often associated with the Bank for International Settlements, contends that the narrow focus of many central banks on the inflation outlook during the Great Moderation prevented monetary policy from being used as insurance to curb growing financial imbalances. This perspective suggests that the financial cycle cannot be fully addressed by macroprudential policy, due to regulatory arbitrage, and that the endogeneity of risk can lead to potentially non-linear outcomes. It argues that the stance of monetary policy affects risk-taking by the financial intermediation sector and, conversely, that the fragility of the intermediation sector affects the transmission process and the outlook for price stability.

In a policy framework that allows monetary policy to lean against the wind, financial stability concerns become a secondary objective of monetary policy strategy. Since the typical financial cycle is much longer than the business cycle, a secondary objective of financial stability implies a longer policy horizon for the monetary policymaker. Woodford (2012) develops a model illustrating the implications of allowing financial stability objectives into the central bank loss function. The main finding is that the optimal targeting rule involves not only the output gap, but an additional financial stability term reflecting the marginal risk of a financial crisis. The implications for policy framework is that although financial stability concerns are accounted for in the adjustment path, the overall primacy of maintaining a price
stability objective over the medium-term is unaffected. The model also suggests that it may be appropriate to use monetary policy to “lean against” a credit boom, even if this requires both inflation and the output gap to be below their medium-run target values for some time.

**Inseparability hypothesis.** The third view proposes a more radical change in the objectives of monetary policy. In the I(ntermediation)-theory of money, Brunnermeier and Sannikov (2016) argue that the presence of financial frictions means that price stability and financial stability are so intimately intertwined that it is impossible to make a distinction. The close connection arises because the health of the financial intermediation sector determines the degree of inside money creation and the price of risk in the economy. Monetary policy redistributes wealth in ways that dampen the amplification effects coming from balance sheet constraints. For example, cutting the short-term interest rate can increase the value of long-term bonds and stabilise banks’ balance sheets.

The I-theory perspective suggests that optimal monetary policy involves more than narrow inflation targeting. Brunnermeier and Sannikov note that, during downturns, ex post crisis management is tantamount to a “bottleneck” monetary policy – central banks must establish where the bottleneck (i.e. productive sectors with impaired balance sheets) lies and use monetary policy to act against deflationary forces and liquidity spirals that redistribute wealth away from such sectors. They suggest that monetary-policy tools be employed to reduce long-run moral hazard. During upturns, ex ante crisis prevention is essential to avoid being forced into ex post redistributive monetary policy. Central banks must, thus, be acutely aware of aggregate and sector-specific credit growth and other monetary aggregates, since a narrow focus on current interest rates can be misleading.  

Each of those different perspectives recognizes the important interaction between financial stability and monetary policy in pursuit of price stability. But opinions differ on the nature of the interaction, the effectiveness of independent macroprudential policies, the extent to which monetary policy contributes to financial instability, and whether monetary policy should be the last line of defence during crises. The case for housing both monetary policy and macroprudential policy under the same roof in the central bank arises if (a) there are coordination benefits (because the interaction between policies is intense); (b) monetary policy is needed to supplement fledgling and ineffective macroprudential instruments to achieve

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37 For a similar view, see also Tucker (2007) and Friedman (2014).
financial stability; (c) the central bank is drawn into using either non-standard tools or the interest rate as a last line of defence in a crisis.\textsuperscript{38}

5.2 Organisational models

Since the functions of macroprudential policy covers ground between monetary policy, the business of central banking, and microprudential supervision, it is natural to consider how a macroprudential authority might be organised. Different countries have taken quite different approaches to the problem. But several general questions come to the fore:

- Should there be integration of the central bank and supervisory agencies?
- Who should “own” the macroprudential policy mandate – the central bank, an independent committee, or multiple agencies? What is the role of politicians?
- How passive (or active) should the Ministry of Finance be?

Table 8 illustrates some of the main organisational models used.

\textsuperscript{38} Information loss and loss of institutional memory are two other very important reasons for keeping everything under one roof. The separation of monetary and supervisory responsibilities at the Bank of England in 1997 weakened the UK's financial stability architecture considerably. Against these arguments runs the possibility that, by engaging in first-order distributional policies, the central bank’s involvement undermines the pursuit of price stability. There may also be time inconsistency problems for the central bank if fundamental financial reforms do not get undertaken, trapping it into providing looser monetary conditions than required for the pursuit of price stability.
<table>
<thead>
<tr>
<th>Model</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration of CB and supervisor</td>
<td>Full</td>
<td>Full</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Ownership of mandate</td>
<td>CB</td>
<td>Independent committee of experts, individually accountable to parliament</td>
<td>Independent committee of regulators and independent experts accountable to parliament, chaired by Minister of Finance</td>
<td>Multiple agencies</td>
<td>Supervisor</td>
</tr>
<tr>
<td>Role of MoF and Politicians</td>
<td>Passive</td>
<td>Passive</td>
<td>Active</td>
<td>Passive</td>
<td>Passive</td>
</tr>
<tr>
<td>Separate body coordinating across policies</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes (check)</td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td>New Zealand</td>
<td>United Kingdom</td>
<td>France</td>
<td>Australia</td>
<td>Sweden</td>
</tr>
</tbody>
</table>

As Table 8 illustrates, New Zealand, Australia, the UK, France, and Sweden have all adopted quite different approaches to the design of the financial stability regime. In New Zealand, the Reserve Bank has responsibility for both macroprudential and microprudential policy and the Governor has sole responsibility for financial stability mandate. In the other countries, however, decision-making is more open to challenge and scrutiny, involving independent outside technical experts with parliamentary mandates and leaders of other regulatory agencies.39

The UK and France offer two quite different examples of how collegiate structures operate. In the UK, the Financial Policy Committee, whose members are each accountable to Parliament for their actions, has a statutory responsibility to keep the financial system under review. The FPC is an independent committee of the central bank. In addition to the internal members from the Bank of England, who also sit on the Monetary Policy Committee, the FPC comprises outside technical experts (appointed by the Chancellor) to challenge the “in house” perspective. Critically, the overlapping committee structure in the UK is designed to

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39 In New Zealand, cross-agency collaboration is achieved via the Council of Financial Regulators, a body comprising the Reserve Bank, the Ministry of Finance, the Financial Markets Authority and, unusually, the Ministry of Business, Innovation and Employment (MBIE). It is an information sharing body only, and explicitly keeps its discussions confidential. The Council meets quarterly and the chair rotates between the RBNZ and FMA.
ensure that most members in either committee are solely dedicated to the specific mandate in question.40

Given the first-order distributional implications of macroprudential policy, a strong argument can be made in favour of a role for elected Ministers as Chairs of a Financial Stability Committee. This is the approach adopted in France, where the High Council for Financial Stability (HCFS) is chaired by the Minister of Finance. The HCFS membership comprises the Governor of the Central Bank, the Chair of the Financial Market Authority, the Head of the Supervisory and Resolution Authority, and three outside technical experts. The technical experts are all distinguished academics, and are each appointed by the Lower House of parliament, the Senate, and the Minister of Finance respectively.41 The direct and indirect involvement of elected representatives in this fashion gives considerable legitimacy to the macroprudential actions of the HCFS. The Governor is the sole member, however, with the right to propose (or withdraw) the activation of a macroprudential instrument, ensuring that the central bank remains at the heart of the framework. The HCFS is external to the central bank, and the logistical support for systemic risk monitoring is provided by both the Banque de France and the Ministry of Finance.

In Sweden, the central bank has a much less dominant role in macroprudential policy. The Swedish FSA holds the mandate for the delivery of the financial stability objective, and is supported in its endeavours by a Financial Stability Council that comprises the Minister of Finance, the Governor of the Riksbank, the Head of the Debt Office, and the Head of the FSA. The FSC is a forum for discussion, and does not make decisions or formal recommendations. The Australian approach relies heavily on “better supervision” rather than the explicit pursuit of macroprudential policy per se. The financial stability regime is based on very close cooperation between APRA and the Reserve Bank, who both answer to the Australian parliament. Issues of accountability and legitimacy have not yet arisen largely because the Australian financial system has avoided mishap in recent years.

Balls et al. (2016) and Tucker (2016) both observe that agencies typically struggle to deliver more than one function well. There is a tendency, highlighted by Holmstrom and

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40 Even then, there is a risk that this leads to two classes of members: external members that only sit on one committee may be marginalised, undermining their ability to avoid group think on the committee. Such problems can be minimised by having regular joint-meetings of both committees to resolve cross-cutting issues. 41 In the UK, the technical experts or outside committee members have typically been academics, ex-central bankers, and former financiers. The key point is that these individuals (a) bring technical expertise to the table; (b) do not represent vested interests; and (c) collectively embody a diverse set of skills. Tucker (2016) and Crean and Milne (2016) emphasise that the skill-set required for financial stability is very distinct – it requires an analytical cast of mind spanning macroeconomics and microeconomics, including international finance, corporate finance and banking, and the economics of information and incentives. Institutional knowledge, particularly of banking and markets is also invaluable.
Milgrom (1991), to focus attention on the job that is more salient and visible. In the case of a central bank pursuing price stability alongside a fuzzy financial stability objective, one might expect a much stronger emphasis on the more measurable task of the attaining the inflation target. The overlapping committee structure of the Bank of England is an attempt to mitigate this problem somewhat – external committee members are incentivised to deliver their committee’s particular contribution to stability. In France, Australia, and Sweden, on the other hand, the task of achieving financial stability has been assigned to committees or agencies outside the central bank, with its influence varying in each case.

5.3 Accountability

Ultimately, the choice of organisational model depends on history, institutions, and the culture of a jurisdiction. But the authority to use macroprudential tools needs to be balanced with clear accountability arrangements. An accountable policy process arguably requires a mix of parliamentary and government oversight, clear procedures to implement instruments, and public understanding of the financial stability mandate. In other words, the policy process must be transparent, legitimate, and open to scrutiny.

As Chapter 3 has already noted, the difficulty of quantifying the impact of macroprudential policy on financial stability, means that accountability cannot be based on the policy outcome (like price stability). Strong accountability therefore requires the macroprudential authority to be transparent ex ante on the policy strategy it has adopted, and transparent ex post on how the strategy has been applied. As Haldane (2017) observes, most thinking has focussed on ex ante transparency – whether openness and information provision fosters public understanding. Far less effort has been given to thinking about ex post transparency, i.e. whether communication by the policymaker engenders trust. As Blinder et al. (2008, p. 941) note, “…It may be time to pay some attention to communication with the general public…In the end, it is the general public that gives the central banks their democratic legitimacy, and hence their independence.”

Haldane observes that, despite the huge efforts of central banks to embrace openness in recent years, the transparency dividend – in terms of both understanding and trust – has been negligible. In large part, this has reflected the changing nature of trust. In the past, trust was anonymous, centralized, and institutional. Even though the actions or purpose of

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42 In an early contribution to this debate, Gai and Shin (2003) emphasise the importance of the format of communications in shaping financial stability outcomes.
institutions like the Bank of England and the Bundesbank were not understood by the public, they were viewed as a trusted third-party capable of overseeing financial affairs. But, as evidenced by the advent of innovations like Blockchain and Uber, and the changing nature of media as well as language, trust has become personal, distributed, and social. Peer-to-peer interactions are increasingly becoming the norm, the need for central institutions as “verifiers” is diminishing, and the complex language of “experts” breeds mistrust.

But the sheer volume of communication has also contributed to the breakdown of understanding and trust (and hence accountability). Shannon (1948) emphasises that understanding of a message depends, in large part, on whether uncertainty is reduced. Adding more verbiage in the form of central bank reports, speeches, and minutes, thus, does not necessarily add to accountability. As Figure 6 and Figure 7 show, despite the staggering increase in communication since Mervyn King's revolutionary emphasis on central bank transparency, trust in economists, bureaucrats, and politicians in the UK is extremely low.

**Figure 6 and 7: Bank of England speeches over time, Trust in professions in the UK**
Ex ante and ex post transparency certainly requires a greater element of “peer-to-peer” communication by central banks than has hitherto been the case. But newer initiatives such as “blogs”, “twittering”, and “town hall meetings” may not be a panacea.43 Properly rigorous and open parliamentary scrutiny by lawmakers seems, at present, to be the most practical way forward. As the recent experiences of the Bank of England at the Treasury Select Committee hearings for Charlotte Hogg showed, they offer a very public “scratch and sniff” test. In the end, humility, integrity, and empathy are what lie at the heart of accountability.

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43 Hannah (2017) describes the Reserve Bank of New Zealand’s approach to stakeholder dialogue following a 2014 survey of stakeholder engagement. As with the UK, the level of general public trust in the central bank is relatively low.
6. SUMMING UP AND IMPLICATIONS FOR NEW ZEALAND

“In many respects, we’re coming to the last seconds of central bankers’ 15 minutes of fame, to use the Warhol line, which is a good thing.”

~ Mark Carney

In this Report, I have attempted to shed light on the main issues confronting the design and governance of a financial stability regime. The Report highlights the main externalities that give rise to stability problems, considers the efficacy of the main instruments, and stresses the political economy of constrained discretion and the constraints on legitimate delegation to an independent regulator. In summing up, I first highlight some of the key messages that emerge from this general discussion. I then consider what implications – if any – these may have for the shape of the MOU. A final section concludes with some recommendations for enhancing the financial stability framework in New Zealand.

6.1 Some lessons

Financial stability is a commons problem.

Price stability is a public good – much like a lighthouse or clean air. By contrast, financial stability is a common pool resource. It is non-excludable, since no one can be prevented from benefiting. But it is not non-rivalrous – individual firms can privately take risks that erode system resilience.

This perspective is quite different from the conventional treatment of financial stability. It suggests, for example, that standard approaches to the regulatory debate may, in the final analysis, not be the right tools to address the underlying market failures. This does not mean that we jettison quantity-based instruments or Pigovian taxes as potential solutions in the meantime. Rather, it means that we should not expect too much from current quantity-based regulation. Policymakers should also be alert to the complex nature of the financial system and be willing to adjust these tools flexibly. In other words, a regime for financial stability should be based around constrained discretion.
Regulation should be justified by ex ante externalities as far as possible.

A policy framework that specifies up-front the key externalities and is clear about how regulations are intended to address them is likely to be more compelling to stakeholders. It motivates the policymaker to take key actions when a risk is identified, or otherwise explain the reasons for inaction. It also provides a better shield from politics. Specifying ex ante intermediate objectives makes instrument use more convincing and accountable, and better guides the expectations of agents in the economy. Identifying externalities ex ante and linking them to intermediate objectives and triggers is not without its difficulties, however. Systematic attempts to exploit relationships opens the possibility that the relationships can breakdown (i.e. the Lucas critique). Regular reviews of the intermediate objectives will thus be needed.

A regime for financial stability should emphasize the resilience of the financial system.

Given how little we know about the efficacy of macroprudential instruments, their unintended consequences, or the innovative shapes which finance might take to benefit from regulatory arbitrage, time-varying macroprudential policy that seeks to fine-tune credit cycle dynamics is overly ambitious. The purpose of the framework should be to emphasize resilience, i.e. the maintenance of core financial services in the face of significant disruption to financial intermediation. Put differently, the aim should be to reduce the probability and impact of financial crises, rather than trying to temper the misallocation of resources that credit booms bring about.

Politicians must own the standard of financial resilience.

Even in a properly functioning financial stability regime, some risks of instability are tolerable. There is a point at which the costs of making the system more robust exceed the benefits. With macroprudential policy, moreover, winners and losers are more obvious. The issues of how much instability and redistribution are acceptable are matters for society. Politicians must therefore endorse the standard of resilience that the regulator is seeking to maintain and be actively engaged in the process. Indeed, in many jurisdictions (France, Canada, USA), the Minister of Finance is directly involved in the conduct of macroprudential policy.44

44 Somewhat ironically, this poses a potential dilemma for central banks. The more independence the central bank seeks to pursue financial stability, the more politicized it risks becoming, especially given the distributional nature of macroprudential policy and the politics of crisis management. Allowing other stakeholders, including
Microprudential regulation focuses on banks’ riskiness, taking the financial environment as given. By contrast, macroprudential policy treats the financial environment as endogenous.

First-rate microprudential policy, whilst desirable, is not a sufficient defence against endogenous systemic risk. What appears resilient at the level of individual institution may turn out to be illusory once amplification mechanisms based on key externalities take hold. But while macroprudential policy involves setting core regulatory parameters to maintain the resilience of the financial system, micro- and macroprudential supervision is about developing a deep knowledge of firms’ risk management practices, forming judgements about whether the firms in question can meet the ex ante standard of systemic resilience, and enforcing constraints on its risk-taking. Stress-testing emerges as a useful tool to monitor and debate both supervision and standards of resilience.

The fuzzy nature of financial stability means that monitoring the delivery of objectives requires a focus on the process of policy formulation, rather than the targeting of specific variables.

Since the performance of macroprudential policy cannot easily be tied to outcomes that can be observed in the short term, evaluation of the framework requires a much greater focus on processes. Ways to achieve this include the publication of an overall strategy and records of deliberations leading to specific decisions, rigorous scrutiny by parliament or the public, and regular periodic external assessments of the effectiveness (and costs) of actions taken.

Monetary policy has an important, supportive, role in sustaining financial stability.

In the view of the limited efficacy of the instruments involved, monetary policy needs to operate in concert with macroprudential policy to achieve financial stability objectives. At the very least, monetary policy will need to serve as a “last line of defence”. A sharp separation of functions (à la Sweden) seems unnecessary, especially considering the role of the central bank’s balance sheet in the conduct of monetary and financial policy and the role of the central bank at the heart of the financial system. The institutional expertise and memory of the

the Minister of Finance, to have greater voice in financial stability policy may in fact better preserve the central bank’s independence and reputation, particularly with respect to monetary policy.
central bank are also powerful reasons for keeping the operational aspects of macroprudential policy within the central bank.

6.2 Financial stability policy in New Zealand

As noted in the introduction, New Zealand adopted macroprudential policy in the wake of the global financial crisis. The responsibility for, and approach to, financial stability is enshrined in the Reserve Bank Act (1989, Section 1A (1b)), and the more recent Memorandum of Understanding between the RBNZ and the Minister of Finance (2013).

Although financial resilience is the primary aim of policy, dampening excessive credit growth and asset prices is another stated aim. There is an impression of wanting to lean against the credit cycle in NZ financial stability policy and this is reflected in the fact that the MOU applies to time-varying tools only. Moreover, the MOU confines the perimeter for policy to the banking sector (though this may be extended after consultation with the Minister), and limits the time-varying toolkit to four instruments.

As currently written, the MOU seems limited. Given that resilience should be at the core of financial stability policy, and given the propensity for policy discourse to “drift” away from resilience towards “fine-tuning” credit cycles, the MOU should be broadened to make very clear what instruments the central bank is using to ensure resilience as states of the world change, how it intends to wield them, and how performance will be judged. Limiting the MOU to only time-varying instruments invites excessive focus on the secondary dimension of financial stability at the expense of the primary dimension.

In its recent FSAP exercise for New Zealand, the IMF (2017, p29) also notes the limited nature of the MOU, albeit from a different perspective. The IMF suggests that a limited time-varying toolkit potentially constrains the RBNZ’s actions in the face of emerging financial stability risks. The limited perimeter of policy is also identified as another – unnecessarily narrow – feature of the MOU. Although the MOU allows for amendments following consultation with the Minister, there is a risk that policy may not be implemented in a timely (or, indeed, time consistent) fashion to deal appropriately with financial stability problems.

As noted in Chapter 3, the framework for deploying macroprudential instruments in New Zealand more closely resembles the approach used in the UK and Sweden. In other words, key vulnerabilities (loosely corresponding to important externalities) are highlighted as they emerge, and a process for employing a selected instrument is then activated. This is quite different to articulating the externalities and an associated (wide) set of instruments
upfront in the MOU. There seems scope to revise the MOU to better explain the case for regulatory intervention. Doing so would greatly improve public understanding of financial stability policy.

The communication and accountability framework might also be sharpened in the MOU. At present, the MOU relies on the Financial Stability Report as the primary method of communicating risks to financial stability. In practice (as in other countries), the Reserve Bank attempts to reinforce dialogue via stakeholder consultations, senior management speeches, and parliamentary hearings. But the impact of this effort is unclear and seems limited. There are relatively few respondents (typically between 13–40) to stakeholder consultations about macroprudential instruments (and these are usually the banks). As noted by the IMF FSAP, the procedures for consultation with the Minister are not particularly transparent. There have been very few major speeches setting out the thinking on financial stability and macroprudential policy in recent years. And parliamentary oversight of financial stability policy could be much more engaged and robust, akin to the Treasury Select Committees operating in the UK and US.

The MOU should be explicit about the governance architecture for financial stability policy. Under the current regime, the Governor is the sole decision-maker when it comes to macroprudential policy, there is an opaque consultation process with the Treasury (effectively on a “as threats arise” basis), and an opaque Council of Financial Regulators (involving government departments with a questionable locus on financial stability, e.g. MBIE) operates without a clear mandate.

To the extent that politicians “own” the standards of resilience (much as they have ultimate ownership of the inflation target), there is a case for the Minister of Finance (or the Treasury) to become more visibly engaged with macroprudential policy. While this might be minimally achieved by making the consultation process with the Treasury more transparent, a more substantive reform – in keeping with international practice – would be for the Minister of Finance (or the Treasury) to be involved as part of a formal committee structure, perhaps alongside other financial regulators and external experts. As discussed in Chapter 5, the HCSF in France and the FPC in the UK are exemplars in this regard. The key is that individual committee members be accountable to parliament for their voting record. Broadening the decision-making structure may very well enhance the integrity, legitimacy,
and accountability of macroprudential policy, while at the same time strengthening the independence of monetary policy.

The MOU could also better reflect the role of macroprudential supervision in achieving the financial stability objective. In so doing, it could more clearly set out the roles and expectations of prudential policy, and how this can be evaluated (e.g. via stress tests). The IMF FSAP (Appendix 5 and Technical Note on Stress Testing) provides a detailed assessment of prudential supervision in New Zealand. It highlights significant room for improvement in developing stress-test models, in the intensity of prudential supervision, and in the partnership with Australian supervisors. Serious credit risk analysis and risk management techniques are not easy to develop “in-house”, and state-of-the-art system-stress test models will need to be built if systemic risk is to be properly measured and evaluated. Considerable investments need to be made if “macro” prudential supervision of the kind suggested in this Report is to be undertaken.

6.3 Recommendations

In 2013, New Zealand took an innovative approach to financial stability and, in many respects, was at the forefront of the international debate on macroprudential policy. The 2018 Review of the MOU and the recent IMF FSAP now provide an opportunity for a fundamental appraisal of the financial stability regime in the light of developments in policy debate, academic thinking, and experience. I put forward several recommendations below. These suggestions are offered in a constructive spirit and should not, in any way, be construed as criticism of the Reserve Bank, other regulators, or the macroprudential actions taken so far.

Recommendation 1: Financial stability should sit on an equal footing with monetary policy and the social contract with the central bank should reflect this. The MOU should be elevated to a status that is akin to the PTA.

46 Specifically, the IMF observes that “…Overall, the lack of first-hand independent verification of prudential returns and assessment of banks’ risk management practices prevents the RBNZ from having a thorough understanding of the banks.” (IMF FSAP, p62, emphasis mine). Enforcement is also difficult. It requires the consent of the Treasury and as the IMF notes, “Demonstrating imprudent behaviour based on, for example, inadequate risk management,…is made difficult by the lack of supervisory standards.” The IMF further recommends that the RBNZ “expand its modelling capabilities to enhance credit risk assessment of CRE/SME and corporate exposures as well as step up their analytical work to explore systemic interactions among financial institutions” in the next 1-3.5 years. These are precisely the sort of issues touched upon in Chapters 2 and 4.
**Recommendation 2:** The current MOU should emphasise resilience over time-varying policy. It should be broadened in scope – in terms of the tools that can be deployed and the perimeter of operation. The MOU should also explicitly identify ex ante the key market failures or vulnerabilities along which policy will act and make clear the tools that will be used to address these frictions.

**Recommendation 3:** The role and expectations of prudential supervision (both micro- and macro-) should be clearly articulated in the MOU. With an eye to future developments, stress-testing should be emphasised as a means of evaluating the performance of supervision and debating the standards of resilience chosen by society.

**Recommendation 4:** The governance arrangements in the MOU should be revisited. There is a strong case for the Minister and parliament to be more involved and have greater ownership of financial stability policy. While views may differ on the exact format, there is merit in moving away from the single decision-maker model to a committee model involving insiders and outsiders. Records of deliberations should be published after a reasonable interval, with due regard to commercial confidences. Members of the committee should be individually accountable for their actions and subject to a parliamentary scrutiny.

**Recommendation 5:** Macroprudential and prudential policy should remain in the central bank. They are part of its core business and separation of its functions should be resisted. While a Norwegian model (combining monetary and financial stability into a single decision-making committee) seems tempting in view of New Zealand’s small size, the presence of separate committees can bring key issues/potential conflicts out into the open and makes the need for cooperation explicit.
REFERENCES


