

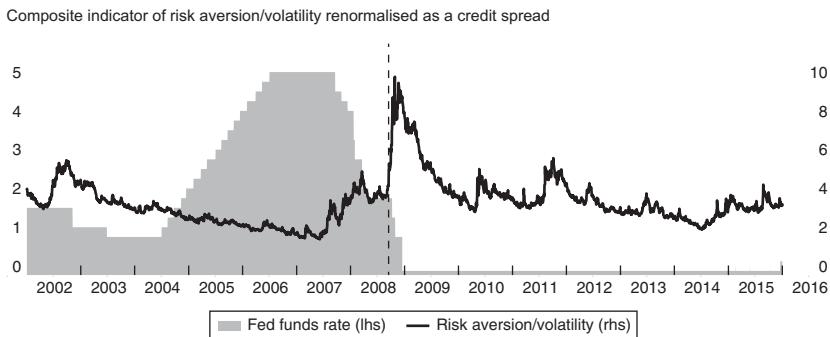
Introduction

Macropredprudential policy is perhaps the most important new development in central bank policymaking circles since the Global Financial Crisis (GFC). This crisis, which showed the limits of conventional monetary policy as a tool to deal with financial stability, forced a wide-ranging rethink of economic policies, their interactions and their repercussions. It has led to new forms of intervention, of regulation and of supervisory practice. As Paul Tucker (2014), Deputy Governor at the Bank of England during the crisis concluded, the central bank – given its pivotal role in the economy's credit system – needs “not merely a monetary constitution, but a money-credit constitution … with macropredprudential policy its instrument of first choice to preserve systemic stability.” He also argued that, given greater awareness of risk and new liquidity rules, the demand for central bank money would remain higher than historically, implying unusually large central bank balance sheets. This view has been echoed by, among others, Friedman (2014), Gagnon and Sack (2014) and King (2016).

Monetary policy – guided by inflation targeting and implemented through changes to the very short-term interest rates – had been able to deliver low and stable inflation, and reasonable economic growth throughout the late 1990s and early 2000s. What it could not do was to contain the expansion of credit, the increased risk-taking and sharp rise in asset prices that occurred at the same time. Despite the sizable increase in the Federal funds rate (from 1 percent in mid-2004 to 5.25 percent by mid-2006), credit spreads continued to narrow and market volatility fell further. Higher policy rates thus failed to stop the build-up in risk-taking in global financial markets that ultimately led to the Great Financial Crisis (Figure I.1). Drawing on UK experience in the 1960s and 1970s, Aikman et al. (2016) reach a similar conclusion that interest rate increases were not very effective in curbing credit expansions.

The failure before the GFC to moderate risk-taking in time was primarily microeconomic (Posen, 2009; Turner, 2017). Those responsible for financial sector supervision did not take enough account of how

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¹ Simple average of standardized scores of EMBI Global spread, US corporate high-yield spread, implied volatility of US equities (VIX index), implied volatility of US Treasury bonds (MOVE index), implied volatility of G10 exchange rates (JPMorgan GVX7 index). Calculations cover the period 1 January 2002–31 December 2015.

Sources: Turner (2012), national data and market data.

Figure I.1. Risk-taking increases despite higher policy rates

externalities, intrinsic to any complex financial system, had become ever more pervasive in the wave of successive financial innovations that took place from the early 1990s (Kenc, 2016). An individual financial firm would typically ignore such externalities, and many took highly leveraged positions that offered opportunities for short-term profits. Normal competitive forces could not be counted upon to produce system-wide risk exposures that were consistent with financial stability (Jeanne and Korinek, 2010b).

The basic features of market failure are well known. Banks made the securitisation of debts ever more complex so that their very opacity would induce buyers to overpay for the resultant products. This proved for a time very profitable. In other words, they deliberately exploited the information asymmetries that lie at the heart of the banking business, not least because other banks were doing exactly the same thing. There was also a classic agency problem: traders took risk positions which earned them handsome bonuses but left banks, and ultimately tax payers, holding large losses. This revealed the underlying moral hazard: because banks were too big to fail, ultimately they had to be bailed out by governments. None of these market failures – information asymmetry, agency problem and moral hazard – is new. Economists have been using these concepts in the study of the banking industry for years. Fixed microprudential ratios (e.g. the higher capital and liquidity requirements on banks under Basel

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III) can in effect counter some of these externalities, and in effect limit financial risk-taking (Korinek, 2011).

But simple monetary policy rules and limited macroprudential policies were not enough to counter the expansion of credit and increased risk-taking, which had wider implications due to a number of very strong macroeconomic/financial feedback loops. Consider the following narrative. A rise in aggregate demand encourages firms and households to borrow more. Higher prices for houses and other assets create expectations of further rises (reinforcing the investment boom) and, in addition, give borrowers extra collateral against which to borrow more. Banks, heartened by a cyclical decline in loan defaults, become more willing to lend. When borrowing conditions in capital markets become more favourable, local firms and households find they can borrow more easily. Lower price volatility of financial assets during upswings leads to reduced haircuts on wholesale funding contracts, facilitating increased leverage. And so the financial cycle provides the conducive environment for increasing levels of borrowing, leverage and risk-taking.

When the cycle turns down, however, these favourable macroeconomic/ financial feedback effects reverse. Asset prices begin to falter and then fall, often far more quickly than they rose, making further investment unattractive. When the interest rate cycle turns, borrowers will find themselves exposed to maturity mismatches. During downswings, haircuts rise and investors are forced to scale back their leverage, implying sharp contraction of their positions. Market volatility rises abruptly. The decline in asset prices that results has further feedback effects on the balance sheets of the banks and other investors.

These developments describe a classic boom-bust cycle. Most recently they were exacerbated by low volatility and low interest rates during the Great Moderation. So-called light-touch regulation permitted increases in leverage and risk-taking. Immediately after the financial crisis, central banks were able to cut short-term interest rates, extend liquidity, widen definitions of eligible collateral and purchase assets to lower long-term yields on government securities and to narrow credit or liquidity risk spreads on non-government paper. Monetary policy needs to be forward-looking and central banks need to be ready to take pre-emptive measures to counter excessive credit expansion. But more targeted measures may help for central banks to better address specific externalities.

An important theme of recent literature is that excessive household leverage is associated with aggregate demand externalities (see Farhi and Werning, 2016; Korinek and Simsek, 2016). In the boom period, households behave rationally at the individual level in borrowing more but their

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leverage is excessive from a social point of view because each household ignores the impact of their decision on aggregate demand. Macropredprudential policies offer the best hope of restricting such debt build-ups. According to these (New Keynesian) models, raising interest rates would be an inefficient policy choice because the income of borrowers falls, and their planned borrowing rises. Barring binding financing constraints, this could have the unintended consequence of actually increasing household leverage and thus exacerbating this aggregate demand externality.

One general difficulty is that the use of macropredprudential policies to influence credit supply conditions (and perhaps moderate asset price increases) will alter monetary policy transmission. This is especially likely in the case of regulatory ratios that are sensitive to macroeconomic variables. Moderating the amplitude of asset price movements, for example, would reduce the potency of interest rates in managing aggregate demand because asset price movements represent an important transmission channel. Much recent research examines how monetary policy affects the transmission mechanism of macropredprudential policy. Gambacorta and Mistrulli (2004), Maddaloni and Peydro (2013), Altunbas et al. (2010), Dell’Ariccia et al. (2013), Jiménez et al. (2014) and Aiyar, Calomiris and Wieladek (2014) show how macropredprudential policy affects the monetary policy transmission mechanism. UK Financial Policy Committee member, Don Kohn, has noted that ‘monetary policy is a blunt tool for addressing financial stability risks’ while ‘macropredprudential policy may be inefficient’ for dealing with cyclical issues (Kohn, 2013). In this context, it is crucial for macropredprudential and monetary policies to take coordinated actions (see, for instance, Angelini et al., 2012; Gelain and Ilbas, 2014; Rubio and Carrasco-Gallego, 2014).

Some believe that policy lags are too long for macropredprudential policies to be used in a countercyclical way. In reality, of course, macropredprudential policy settings are changed through the cycle. The Basel III accord does have a countercyclical capital buffer. Many macropredprudential instruments influence the cycle through their effects on financial intermediation: Jean-Pierre Landau argued in his keynote address for greater reliance for countercyclical tools on liquidity/maturity transformation dimensions, and less on capital. It seems a combination of policies is required where monetary policy deals primarily with pressures contributing to inflation, output and credit-related (cyclical) asset bubbles, while macropredprudential policies primarily address risk-taking and leverage, and requires a substantial cushion of capital against future shocks (which may vary with the economic cycle).

Macroeconomic/financial feedback loops can take different forms in open economies. A country with an open capital account cannot easily

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insulate itself from conditions in global financial markets. Many emerging economies which grew more strongly than the advanced economies during the 2010–2014 period found that attempts to maintain tighter monetary policy than in the advanced economies led to strong currency appreciation. Such appreciation often stimulated an expansion of credit as banks come to see households and firms as better credit risks and as a lower country risk premium made it easier for local companies to borrow abroad.

The level of development of local financial markets shapes macroeconomic/financial feedback loops, and so will influence the relative efficiency of alternative macropurudential tools. Where financial markets are illiquid or rudimentary, quantity-based tools will often work better than price-based tools. Low-income and developing economies are in general in a process of financial and institutional development that will have implications both for the nature of financial stability risks and for the conduct of macropurudential policies (see IMF, 2014).

Macropurudential policies have both microeconomic and macroeconomic dimensions. An analysis of market failures should be central to the microeconomic dimension. The focus is on how markets and institutions actually function, and on how regulation can better align private interests with the social interest. Macropurudential policies also need to be explored within a macroeconomic framework. Such a framework could just include the analysis of broad macroeconomic aggregates – aggregate demand, total bank credit, asset prices, capital flows and so on. But because the macroeconomic/financial feedback effects that provide much of the rationale for the macropurudential approach, many researchers have tried to incorporate microeconomic financial behaviour in the macroeconomic models. Using a Dynamic Stochastic General Equilibrium (DSGE) model is one way to do this (for early examples, see Borio and Shim, 2007; N'Diaye, 2009; Antipa et al., 2010).

The main problem confronting any model analysis of macropurudential policy is that the objective ‘financial stability’ can mean very different things and is not necessarily amenable to computational modelling. For example, it could mean ensuring the resilience of financial firms that are core in the intermediation process. Or it could mean moderating the amplitude of swings in asset prices or credit growth. Another problem is that these policies are new and there is not yet enough evidence to discriminate between different models empirically. Incorporating concepts such as financial stability or systemic risk into models – and testing them – is therefore difficult. (See Galvão and Owyang, 2013 for a discussion on the topic.) Researchers should, however, take heart from

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progress in developing better, more granular data for financial stability analysis. See Heath and Goksu, 2017 provides an up-to-date review.)

Economists should therefore strive to include those dimensions of macropredprudential policy that can be modelled, as illustrated by some of the chapters in this book. Regardless of their limitations, DSGE models bring important advantages for macropredprudential analysis. First, they can be compared with a benchmark in which there is only monetary policy. Second, they include many sources of shocks that can be used to check for different economic trajectories. Moreover, they rely on general equilibrium analysis and are suitable for simulations to study the impact of new policy instruments. Furthermore, calibrated parameters can be altered to test for alternative policy scenarios. And finally, because DSGE models are microfounded, they can be suitable for the study of welfare issues. We must be aware of the omissions that such approaches are bound to face, and, while macropredprudential policy will increasingly rely on quantified assessment, it will always require an element of judgment.

A specific challenge of analysis in the formulation of macropredprudential policies is to better understand and calibrate their effects. This is particularly difficult when policies have not been implemented, as there is little evidence on which to base the analysis. As Charles Goodhart has noted, ‘The use of macropredprudential instruments is still pretty much in its infancy’ (Goodhart 2014). Nevertheless, central banks have considered how policy effectiveness can be assessed ahead of implementation (‘ex-ante appraisals’). The BIS recently published a report on the best means to judge the risks and vulnerabilities that need to be addressed, on the appropriate instruments that should be deployed and on the timing of and calibration of the intensity of the instruments for the purpose they were designed (BIS, 2016). The IMF through its Financial Sector Assessment Program and its regular Article IV consultations is building up substantial case study-based knowledge on how these policies have worked (IMF, 2014).

The analysis of macropredprudential policy in an open economy (including assessment of any monetary policy alternative) must address several additional questions. A key concern for emerging market central banks is that changes in global financial conditions can lead to large swings in capital flows that almost overwhelm policy-makers in recipient countries. The several case studies in Agénor and Pereira da Silva (2013) illustrate well how monetary policy loses its effectiveness in such circumstances.

A related question is the impact on the exchange rate. This matters because there is increasing evidence of risk-taking channel of currency appreciation, which Philip Turner described in his keynote address (drawing on Hofmann et al., 2016). One implication is that lifting

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interest rates to limit exuberant domestic credit may aggravate some risk-taking by driving the exchange rate up. This produces an ‘easy’ reduction in inflation (tradable goods fall in price) but may increase the demand for non-tradables and especially property. Increased borrowing for real estate can itself create risks. Macropredprudential policies designed to curb such credit expansion (reducing reliance on interest rate increases) can limit the risks of unwarranted currency appreciation. Bruno et al. (2015) found that twelve Asia-Pacific economies, faced with strong growth and inflation pressures in the mid-2000s, responded by raising interest rates – even in the face of a sharp real exchange rate appreciation. But a renewed rise in their exchange rates as growth strengthened after 2009, led them to rely much more on macropredprudential measures. The IMF has carried out a similar major study, but covering more countries. They cover 353 episodes of policy tightening and 125 episodes of policy loosening in forty-six countries: see Zhang and Zoli (2014).

Another question is the nature of the shock macropredprudential policies are meant to address, a point that has been emphasised by both the BIS and the International Monetary Fund (IMF) in their discussions about the choice between alternative policy instruments. One important dimension is demand versus supply shocks. Kannan et al. (2012) find that using a macropredprudential instrument specifically designed to dampen credit market cycles would also provide stabilization benefits when an economy faces financial sector or housing demand shocks. In this model, the optimal macropredprudential rule under productivity shocks is to not intervene. Broader and more aggressive policy regimes can improve stability in the face of financial shocks, and can also help in the face of housing demand shocks, but they raise the possibility of policy mistakes in the face of productivity shocks. Historically, however, productivity shocks have frequently stimulated speculative borrowing in new, uncertain areas. All too often, the extrapolation of a temporary jump in productivity engenders unwarranted optimism about the future. Financial risks would therefore increase, which macropredprudential policy might need to counter (Turner, 2012). If the productivity shock at the same time drives down unit costs and prices, monetary policy might need to ease for the central bank to meet its inflation target. In such circumstances, monetary and macropredprudential policies might need to move in opposite directions.

Another dimension is external versus internal. Blanchard et al. (2017) and Jeanne and Korinek (2010a) have argued that macropredprudential policies are better than capital controls when the problem is that a credit boom has made all borrowing risky: there is no need to discriminate between domestic and foreign lenders. But on other occasions, it is

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external borrowing that is the source of the distortions (especially bank foreign liabilities) so the authorities should discriminate against resident/non-resident transactions. A similar argument applies when the problem is one of increased currency mismatches: policies to limit foreign currency debt may be preferred to raising domestic interest rates (which often have the unintended consequence of encouraging firms and households to borrow in low-interest foreign currencies – aggravating financial stability risks).

In some countries these policies have been rapidly applied with only partial analytical support – and just as for a time inflation targeting policies were ahead of theory (King, 2005) – so macroprudential policy has so far been implemented without the theoretical structure that would help central banks understand its full effects. In other countries, the implementation of such policies has been cautious due to the absence of analytical studies to support an over-arching framework. No theoretical modelling approach has emerged as pre-eminent. Perhaps no single theoretical structure will ever emerge, and we will need to use different models to answer different questions. The articles of this book therefore explore various theoretical perspectives with some analytical rigour. This book is the first serious research source book for macroprudential policymakers, offering an evaluation of alternative policies in a consistent modelling framework.

Some chapters explicitly use *DSGE models* to impose some discipline on our thinking and avoid the kind of ad hoc discussion of systemic risk, the design of instruments and rules for implementation that tends to occur when a new policy regime is in its infancy. Nevertheless, DSGE models still face formidable challenges. Representative agent models built on microeconomic foundations can be misleading when it is heterogeneity which drives financial intermediation. Researchers need to find ways of introducing heterogeneity – different types of forms of household, different lending contracts (e.g. foreign versus domestic currency) and different types of financial intermediation. Another challenge is the need to model defaults.

There is also an important role for *reduced-form macroeconomic models*. This is especially true empirically when, for example, we need to find a variable (with a long run of data) which is closely related to the macroprudential instrument under consideration. Reduced-form macrofinancial models can be useful in working out how the P&L and balance sheets of a large number of banks would respond to macroeconomic or financial market shocks. Such models could help to identify feedback effects coming from common exposures, for instance. One ambitious attempt is the large-scale financial macroeconomic model developed by the Bank

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of Japan (Ishikawa et al., 2012). This model, which covers more than 350 banks and regional financial co-operatives, relies on estimated behavioural equations for the banks included. Bank supervisors are increasingly conducting stress tests which use such models: see Goldstein (2016) and Kitamura et al. (2014).

Perhaps one of the newest analytical approaches is the use of *network models* to capture contagion risks. One of the lessons from the GFC was that contagion channels could amplify shocks which directly affect only a small sector (e.g. sub-prime mortgages). An early contribution was the analysis by Brunnermeier and Pedersen (2009) of collateralized debt in interbank markets. Gourieroux et al. (2012) developed a network model for the banking system. Gabrieli et al. (2015) use a network model to analyse cross-border contagion risk in the European banking system. Such collateral effects extend far beyond the banking industry. Whenever any debt is collateralised by any marketable asset (including property), fire-sale effects can create powerful feedback loops. Davila and Korinek (2016) review fire-sale externalities. The recent analysis of Korinek and Simsek (2016) show how such feedbacks can exacerbate aggregate demand externalities as asset fire sales reduce aggregate demand by tightening borrowing constraints.

The coverage of the chapters places emphasis on the global perspective, the open economy angles, the actual policies that have been pursued and the question of systemic risk and the practice of policies to date. On an institutional level, the final chapter highlights the importance of the design and governance of macroprudential policy in comparison to the design and governance of monetary policy.

Our contributions are drawn from central bankers, practitioners and academics in many countries ensuring that the insights apply to more than one country or financial system summarising work streams that have been undertaken at the European Central Bank, the Bank of England and the Federal Reserve, as well as the International Monetary Fund and the Bank for International Settlements.

We turn now to a summary of the main contributions. The first chapter, titled ‘The Macroeconomics of Macroprudential Policies’ (Philip Turner), touches upon a topic that has again become core to central banking. “Again” because the Bank of England became a central bank in the early nineteenth century with what we would now call a macroprudential mandate (Allen, 2014). It was not responsible for price stability – because the restoration of convertibility of Bank of England notes into gold in 1821 after the Napoleonic Wars had taken care of that. The Bank’s task was to avoid financial crises and, when crises did threaten, to limit the systemic impact of any bank failure. Many other

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central banks also saw their job in such terms; for instance, Rotemberg (2014) has pointed out that the goal of Federal Reserve monetary policy from the 1920s was to limit speculative lending. The word “macropurudential” itself seems to have been coined in 1979 by a Bank of England official, the late David Holland. It surfaces in Basel Committee documents at about this time (Green, 2011) and was prominent in policy discussions at the BIS from the early 1980s.

The starting point of his analysis is the Bernanke–Blinder model of the bank lending channel: shifts in the willingness of banks to lend (as ‘the perceived riskiness of loans’ changes) have an impact on aggregate demand. In this model, the interest rate is not the policy rate but that on domestic bonds, and is therefore endogenous. This model has the advantage of allowing interest rates to react to financial system shocks. Extension in a simple Mundell–Fleming framework then links this interest rate to the exchange rate. Macropurudential prudential policies can be viewed as acting directly on the bank lending channel. Hence he argues that the endogenous responses of the interest rate on domestic bonds and the exchange rate should be taken into account in any analysis of macropurudential policies.

The chapter titled ‘The New Art of Central Banking’ (Jagjit S. Chadha) notes that some difficult lessons have been learned over this crisis. First, inflation targeting alone cannot prevent boom and bust and therefore needs to be augmented with more instruments and better judgement. Second, while the financial sector amplifies the impact of economic shocks and properly designed MPIs ought to minimise the effects, through sensible application of liquidity and capital targets via macropurudential policy. But, third, while interactions between fiscal, financial and monetary policy provide support to fragile financial institutions, coordination could be a difficult task and one that needs further research.

The chapter titled ‘A Liquidity-Based Approach to Macropurudential Policy’ (Jean-Pierre Landau) argues that a cyclical approach to macropurudential policy presents major challenges for central banks and supervisors as it necessitates a comprehensive and operational view of the interactions between the financial system and monetary policy.

This challenge had been neglected in recent decades, when inflation targeting was the dominant monetary policy framework in advanced and emerging economies, New Keynesian models were dominant and monetary policy acted mostly through interest rates with no role for the financial sector. We know that financial institutions play a more important role in the transmission mechanism in a realistic description of the economy. The behaviour of the financial system involves a constant