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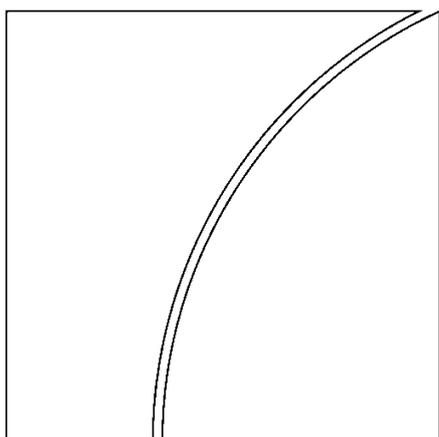
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Rediscovering the macroeconomic roots of financial stability policy: journey, challenges and a way forward

by Claudio Borio

Monetary and Economic Department

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Rediscovering the macroeconomic roots of financial stability policy: journey, challenges and a way forward

Claudio Borio ¹

Abstract

The recent financial crisis has triggered a major rethink of analytical approaches and policy towards financial stability. The crisis has encouraged a sharper focus on systemic risk, the inclusion of a financial sector in macroeconomic models, a shift from a microprudential to a macroprudential orientation in regulation and supervision, and questions about whether price stability is a sufficient criterion to guide monetary policy. In the process, it has led to a rediscovery of the macroeconomic roots of financial instability. This paper argues that this development is welcome but has not gone far enough. To substantiate this conclusion, the paper documents this analytical and policy journey before suggesting a way forward.

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¹ Bank for International Settlements.

Contents

Introduction	6
I. Financial stability policy pre-crisis	6
Prudential policy	6
Monetary policy	8
II. Financial stability policy post-crisis	10
Prudential policy	11
Monetary policy	15
III. A way forward and outstanding challenges	16
Policy	16
Macroprudential frameworks	16
Monetary frameworks	20
Analysis	22
Conclusion	24
References	25

Introduction²

The recent financial crisis in mature economies has been a wake-up call for policymakers and academics alike. The crisis has undermined the widespread conviction that mature economies with sophisticated financial markets are naturally self-equilibrating. It has also highlighted the limitations of the analytical approaches that had guided policy. By construction, macroeconomic models could not incorporate financial instability. And the most influential perspectives on banking distress had become increasingly preoccupied with the failure of *individual* institutions rather than of the financial system as a whole.

The post-crisis response has taken two forms. Policymakers have been strengthening the systemic (or “macroprudential”) orientation of regulatory and supervisory frameworks. And they have begun to question the premise that financial stability can be secured without a more *active* support of macroeconomic policies, not least monetary policy, though little agreement has been reached so far. Analytically, efforts have intensified to improve the measurement and understanding of systemic risk and to include a financial sector in macroeconomic models.

This shift is belated and welcome. Ironically, in some respects it takes us back to the origins of financial stability policy, when its macroeconomic roots were much more prominent. That said, the challenges ahead should not be underestimated.

What follows documents this journey, highlights the challenges ahead and suggests a way forward. The focus is exclusively on crisis prevention. Sections I and II explore, respectively, the pre- and post-crisis approaches to securing financial stability, linking the evolution of policies to that of the analytical frameworks that inspired them. Section III turns to the unfinished business, highlighting the most promising direction for policy and one overarching analytical issue that deserves priority, viz. the need to reconsider further the prevailing paradigm embedded in our understanding of macroeconomics.

I. Financial stability policy pre-crisis

At the risk of some oversimplification, the prevailing pre-crisis policy framework to secure financial stability consisted of two main pillars: (i) prudential regulatory and supervisory arrangements heavily focused on the stability of *individual institutions* (ie with a strong “microprudential” orientation); and (ii) monetary policy arrangements heavily focused on achieving *price stability* over relatively short horizons (around two years). The division of responsibilities was neat and sharp. It drew comfort from the dominant analytical paradigms in academia, which deepened the chasm between banking and macroeconomics. This policy framework was regarded as one key factor behind the Great Moderation – that long period of macroeconomic stability enjoyed by many industrialised countries until the recent financial crisis. Consider each pillar in turn.

Prudential policy

The spirit of the microprudential approach to financial regulation and supervision prevailing prior to the crisis is best captured by the motto “the whole financial system is sound if and only if each institution is sound” (Borio (2003a)). The individual institution is the natural starting point and the equally natural end-point of the approach.

² This paper is forthcoming in the *Annual Review of Financial Economics*. I would like to thank, in particular, Kostas Tsatsaronis for his feedback and help. I am also grateful to Piti Disyatat, Mathias Drehmann, Leonardo Gambacorta, Enisse Kharroubi, David Laidler and Raghuraj Rajan for their helpful comments, and Gert Schnabel for excellent statistical assistance. The views expressed are my own and do not necessarily reflect those of the Bank for International Settlements.

This perspective shaped a number of characteristics of the prudential framework. The approach was bottom-up. In particular, the solvency standard for the system as a whole was purely the residual result of the aggregation of the solvency standards for individual institutions. It was not derived from an assessment, however coarse, of the appropriate degree of solvency for the system as a whole. And prudential tools were calibrated exclusively with respect to the risk profile of individual institutions, *assessed on a stand-alone basis*, regardless of their relationship with other institutions. For example, when Basel II was developed, capital standards were *in principle* set so as to equate the probability of failure across banks (ie the “solvency standard” was the *same* for all banks), independently of their importance for the system.³

Conceptually, the microprudential approach treats risk as *exogenous* with respect to the behaviour of each individual institution and of all institutions taken as a group. Asset prices, credit conditions and the macroeconomy are regarded as *independent* of the collective behaviour of financial firms. This rules out potential fallacies of composition. It is not possible, for instance, for retrenchment at times of stress to actually heighten, rather than lower, aggregate risk, by inducing fire sales or a credit crunch that could make institutions worse off.

Within this overall approach, but logically quite separately, prudential balance-sheet restrictions focused on solvency rather than liquidity. Ensuring the liquidity of institutions was primarily the task of (retail) deposit insurance schemes, aimed at avoiding depositor runs, coupled with central bank emergency liquidity assistance at times of stress.

Against this backdrop, it was left to financial infrastructure policies to address systemic concerns explicitly. Not least, major efforts were made over the years to strengthen payment and settlement arrangements, especially for wholesale transactions. These arrangements were seen as the main channel through which stress at individual institutions could spread to the system as a whole. This concern gave rise to major efforts to secure delivery-versus-payment schemes for the settlement of securities transactions, payment-versus-payment schemes for foreign exchange trades, and to the development of standards for net settlement systems and the promotion of real-time gross settlement.⁴

The microprudential approach to regulation and supervision could draw to various degrees on several strands in the academic literature.⁵

First, and most directly, a growing strand tended to emphasise the depositor protection goal of regulation – the most natural rationalisation of the approach. This strand elaborated on the principal-agent/asymmetric-information distortions that made uninformed depositors vulnerable to the decisions of those that run the banks, as best exemplified by Dewatripont and Tirole (1993). It was supported by evidence that questioned the importance of contagion within the financial sector (Kaufman (1994)).

Second, even when contagion was recognised as important, one view of systemic risk tended to underplay the role of common exposures across financial intermediaries.⁶ This

³ The widespread use of peer group analysis is a typical reflection of a microprudential perspective. As its objective is to identify outliers, by construction this monitoring method cannot tell whether the average institution in the system, and hence the system as a whole, is taking on too much risk.

⁴ See Borio and Van den Bergh (1993), Millard and Saporta (2005) and the many publications by the Committee on Payment and Settlement Systems on the BIS website.

⁵ This paper does not review in depth the relevant academic literature; rather, it highlights the intersecting evolution of policy and academic thinking. For surveys of the literature on banking crises, see Freixas and Rochet (1997) and Gorton and Winton (2003); for surveys on systemic risk, see De Bandt and Hartmann (2000), De Bandt et al (2009) and, on pure theory, Wagner (2010); for a survey on bank capital regulation, see Santos (2001) and for one focused on the measurement of systemic risk specifically, see Borio and Drehmann (2009a).

⁶ Moreover, the common practice of modelling the behaviour of the banking system as a representative bank obscured the distinction between the system and individual institutions within it, arguably encouraging the

literature saw systemic failures as resulting from the knock-on effects triggered by the failure of individual institutions for idiosyncratic reasons (eg Kiyotaki and Moore (1997a), Allen and Gale (2000a)). If so, acting at the source could prevent the domino effects. Moreover, it was natural to associate these knock-on effects with the exposures that arose within payment and settlement systems (Rochet and Tirole (1996a), Freixas and Parigi (1998), McAndrews and Roberds (1995)) or imperfect information about the underlying health of institutions (eg Rochet and Tirole (1996b), Aghion et al (2000)). Thus, in this view, combining a focus on individual institutions with a strong payments infrastructure and appropriate disclosures held out the promise of eliminating systemic risk. Empirical evidence on market discipline, which indicated that markets were rather effective in *discriminating* between healthy and unhealthy institutions, ie at measuring their *relative* riskiness, provided additional comfort (Flannery (1998)).

Finally, the prevailing approaches to systemic risk played down the role of the macroeconomy, typically just a faint shadow in the background. These approaches generally belonged to the “exogenous shock plus amplification” paradigm. In all of them the amplification could have an impact on the real economy – the cause of the welfare loss (eg through the premature liquidation of profitable projects). But only in a subset of them could the macro-economy be regarded as a possible source of the aggregate shock (eg Gorton (1988), Chari and Jagannathan (1988), Rochet and Vives (2004)). This was not the case in the models that portrayed crises as due to self-fulfilling runs (eg Diamond and Dybvig (1983))⁷ or idiosyncratic shocks. Moreover, the approaches within the paradigm did not allow for the possibility of positive feedback effects between the financial system and the real economy in the *build-up* of the crisis. The approaches were essentially static and treated the shock as entirely exogenous.

The emphasis that prudential regulation placed on capital rather than liquidity constraints on banks’ balance sheets was only partially supported by the literature; moreover, the link was rather paradoxical. Most of the literature on systemic risk, beginning with Diamond and Dybvig (1983), stressed liquidity – fundamentally a general equilibrium concept. But one of the proposed remedies – deposit insurance – introduced distortions of its own: unless such insurance was properly priced,⁸ it would weaken the incentives to discipline banks. Minimum capital requirements were generally regarded as a solution (the “skin-in-the-game” argument); eg Koehn and Santomero (1980), Kim and Santomero (1988), Keeley and Furlong (1990), Rochet (1992), Besanko and Kanatas (1996)⁹. Moreover, another strand in the academic literature presented a more benign view of maturity transformation, focusing on the welcome disciplinary role played by short-term liabilities (Diamond (1984), Calomiris and Kahn (1991), Diamond and Rajan (2001)).

Monetary policy

As the microprudential orientation was becoming more entrenched in regulatory and supervisory frameworks, monetary policy was distancing itself from banking and financial

adoption of a microprudential approach. That said, some papers did highlight common exposures arising from holdings of the same asset (eg Allen and Gale (1998) and, later, Cifuentes et al (2005))

⁷ The approach developed by Morris and Shin (1998), by eliminating multiple equilibria, was helpful in tying down crises more closely to fundamentals.

⁸ Moreover, the literature did stress that under asymmetric information fairly priced deposit insurance is generally not feasible; eg Chan et al (1992).

⁹ In Dewatripont and Tirole (1993) minimum capital requirements help to overcome the limited discipline imposed by ineffective monitoring by uninformed depositors, acting as a trigger for the transfer of control to the authorities. In practice, supervisors have tended to place more emphasis on capital not so much as an incentive device but as a pure loss-absorber or as a trigger point for intervention. See, for instance, Hellwig (2009), who stresses this distinction. For general surveys of bank capital regulation in the theory of banking, see Santos (2001).

stability concerns. Central banks had emerged victorious from their drawn-out fight against inflation, with Volcker's courageous efforts in the late 1970s-early 1980s proving to be a decisive turning point worldwide. In the subsequent decades the credibility of central banks' anti-inflation credentials grew and became hard-wired through regimes focused on numerical inflation objectives and underpinned by central bank independence. It was the triumph of inflation targeting (Bernanke et al (1999a), Svensson and Woodford (2005)).

Operationally, the prevailing, albeit not universal, trend was towards monetary frameworks with two key characteristics. First, pursuing numerical inflation objectives over rather *short horizons*, not exceeding two years. The choice of horizon reflected lags in the effects of policy and a desire to keep central banks accountable. Second, an exclusive focus on interest rates, eschewing the previously popular privileged role of monetary or credit aggregates. Interest rates were regarded as sufficient statistics for the stance of policy and quantitative aggregates as uninformative, dispensable guides. In such a framework, it proved increasingly hard to find room for banks other than as invisible cogs in the smooth transmission of interest rate impulses.

In some cases, the spirit of the time was going as far as regarding price stability as sufficient for macroeconomic stability. If central banks succeeded in stabilising near-term inflation, and absent major exogenous "shocks", such as from fiscal policy, the economy would take care of itself. This was the strong version of the view that price stability is the best contribution monetary policy can make to macroeconomic stability. This belief underpinned inflation targeting and drew strength from the Great Moderation. The instances of serious financial instability that did occur against the backdrop of price stability were regarded as reflecting immature financial systems (the Asian financial crisis) or as aberrations due to macroeconomic mismanagement (Japan; eg Ahearne et al (2002)).

Just as in the case of prudential regulation, policy could find plenty of support in the prevailing academic paradigms.

The strong version of the importance of price stability was mirrored in the canonical macroeconomic models of the day, in which the only departure from a *fully equilibrating and well functioning* economy took the form of price rigidities (Woodford (2003) and Walsh (2010)).¹⁰ In turn, these models were rooted in equilibrium representations of the business cycle (Lucas (1987) and Black (1987)), which drew strength from the view that financial markets were "efficient", with asset prices reflecting the fundamentals determined by the model (Fama (1991)). The widespread assumption of model-consistent, or "rational" expectations, once embedded in this paradigm, helped to reinforce its conclusions.

In such a context, it became popular to model monetary policy as operating exclusively through the control of a short-term (often overnight) interest rate that, together with expectations about its future path, fully determined the term structure of interest rates (eg Svensson (2003)). Supporting the practical relevance of this view, it was believed that the probability that central banks would have to drive policy rates to zero in nominal terms was remote (Orphanides and Wieland (1998)).

By construction, this approach ruled out the possibility of financial instability and systemic distress. A fortiori, there was no need to embed a banking sector in the models – a task that, to be sure, had proved quite difficult in the past. And even when financial "frictions" linked to asymmetric information and principal-agent problems were incorporated in the models, they acted only as "persistence-enhancing" devices, helping simply to prolong the impact of the exogenous shocks assumed to drive economic fluctuations (eg Bernanke et al (1999b)).¹¹

¹⁰ To be sure, the models did allow for other frictions, such as real wage rigidities (eg Blanchard and Gali (2010)) and, in some cases, financial ones (eg Bernanke et al (1999b), Dupor (2005)). But as a broad justification for policy, these frictions played a secondary role.

¹¹ Or, as in the influential paper by Kiyotaki and Moore (1997b), actually generate (deterministic) cycles. For another variant of deterministic cycles, see Suarez and Sussman (1999).

During the Great Moderation, this analytical strategy seemed to be strongly justified, representing a reasonable set of abstractions and approximations that appeared to be supported by the data (eg Smets and Wouters (2003), Christiano et al (2005)).

To be sure, central banks did not lose interest in financial stability. Far from it! Partly because of the experience of emerging market economies and, for some, as a result of the loss of supervisory responsibilities, separate financial stability departments mushroomed within central banks. And considerable efforts were made to develop top-down analyses of vulnerabilities in financial systems, not least through macro-stress tests (Sorge (2004), Drehmann (2008)). These sought to trace the effect of serious shocks to real economic activity or asset prices on the financial system. But, not surprisingly, the tools to do this effectively were simply not available (Borio and Drehmann (2009a), Alfaro and Drehmann (2009)). And financial stability assessments hardly ever influenced the stance of monetary policy (Borio (2007)). The two worlds coexisted in the same institution but lived their separate, parallel lives.

II. Financial stability policy post-crisis

The crisis shattered the Great Moderation and, with it, the convictions that had grown behind its protective shield.

First, the crisis was commonly interpreted as the bust of a major financial cycle. In the economies at the origin of the turmoil, the upswing had seen a major expansion in credit and asset prices, especially those of real estate, supported by aggressive risk-taking. Leverage had grown in both overt and hidden forms, overstretching balance sheets. Policymakers and most observers drew the conclusion that these vulnerabilities (or “financial imbalances”), which had slowly developed during the boom, had *caused* the subsequent bust. The self-reinforcing feedback between the financial and real sides of the economy was evident not just in the bust, but also in the preceding boom. And the trust that had been placed on improvements in risk management and in capital requirements had proved unfounded.

Second, the crisis showed that even in mature economies with sophisticated financial markets funding and market liquidity could easily evaporate under stress, amplifying the dislocations. To be sure, this had been a universal element of crises in emerging market countries (eg Calvo (1998)) and had already been a prominent feature of the near-failure of the hedge fund Long-Term Capital Management in 1998 (eg CGFS (1999) and Borio (2003b)). But the complete seizure of the interbank market and the reach of the gridlock in securitised credit markets, well beyond the banking sector, took observers and policymakers by surprise (Borio (2008 and 2010a), Brunnermeier (2009), Gorton (2009))¹². This prompted huge interventions by central banks, supplying funding and purchasing assets on an unprecedented scale. And despite these widespread dislocations, by and large the payments and settlements infrastructure proved robust.

Finally, the crisis hammered home the message that “cleaning up” the debris left by a financial bust was harder than many had thought. Monetary policy went to extraordinary lengths to keep the system afloat, by cutting policy rates virtually to zero and deploying the central banks’ balance sheets aggressively, through the ample supply of long-term (funding) liquidity and large-scale asset purchases (eg Borio and Disyatat (2010)). While this did help to contain the damage, it proved far less effective than anticipated in triggering a sustainable recovery. Ostensibly, the Japanese experience with such measures following its crisis had been less exceptional than widely believed.

¹² For a recent survey on liquidity, see Tirole (2011) and for a survey of the mechanisms behind distress sales, see Shim and von Peter (2007). See also Brunnermeier and Pedersen (2008).

Thus, in one single sweep, the crisis shook the foundations of existing policy frameworks. Advanced economies with sophisticated financial markets were not necessarily self-correcting. Low and stable inflation was no guarantee of financial and macroeconomic stability. And a prudential framework focused on individual institutions, supported by a sound payment and settlements infrastructure, was not sufficient to ensure financial stability.

This has prompted a major rethink in policy circles and given impetus to new analytical work. It is now agreed that the systemic or “macroprudential” orientation of regulation and supervision should be strengthened and that arrangements should play closer attention to liquidity. In addition, questions are being asked about the adequacy of monetary policy regimes narrowly focused on near-term price stability. Let’s consider each in turn.

Prudential policy

In contrast to its microprudential counterpart, a macroprudential approach to regulation and supervision has a system-wide focus (Table 1). Its goal is to limit the risk of episodes of financial distress with serious consequences for the real economy (“systemic risk”). Because of its general equilibrium nature, the approach treats risk as partly *endogenous* with respect to the collective behaviour of financial institutions. By considering asset prices, credit conditions and the macro-economy as dependent on the behaviour of the financial system, it highlights feedback effects and opens the door for fallacies of composition. The approach focuses on the correlation of exposures across institutions, rather than on their individual risk profiles. And it is fundamentally top-down. For example, it would first establish the solvency standard for the system as a whole and then, from it, derive that of the individual institutions that make it up.

For analytical convenience, it has proved helpful to think of the macroprudential approach as having two dimensions. There is a *time dimension*, dealing with how aggregate risk in the financial system evolves over time. And there is a *cross-sectional* dimension, dealing with how risk is allocated within the financial system at a point in time.

To each dimension corresponds a source of system-wide financial distress. In the time dimension, the source is the *procyclicality* of the financial system, ie those mechanisms that operate within the financial system and between it and the macro-economy and that can generate outside financial cycles and business fluctuations. In the cross-sectional dimension, the source is the *common exposures and interlinkages* in the financial system that can result in joint failures of financial institutions by making them vulnerable to common sources of risk.

Table 1

The macro- and microprudential perspectives compared

	Macroprudential	Microprudential
Proximate objective	limit financial system-wide distress	limit distress of individual institutions
Ultimate objective	avoid output (GDP) costs	consumer (investor/depositor) protection
Characterisation of risk	Seen as dependent on collective behaviour (“endogenous”)	Seen as independent of individual agents’ behaviour (“exogenous”)
Correlations and common exposures across institutions	important	irrelevant
Calibration of prudential controls	in terms of system-wide risk; top-down	in terms of risks of individual institutions; bottom-up

Source: Borio (2003a)

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

Not all the policies implemented in the wake of the crisis have explicitly sought to strengthen the macroprudential orientation of regulation and supervision. In fact, a major part of the efforts falls naturally in the traditional microprudential perspective. For example, the authorities have improved the quality and level of banks' capital requirements, including by improving how risk-weighted assets capture the risks involved in securitisations and the trading book. Moreover, for the first time the international community has agreed on minimum liquidity requirements for banks, calibrated to the liquidity risks incurred by each institution (BCBS (2009)). While both of these steps no doubt make the overall financial system stronger, they could *just as easily* have been taken without *any* reference to a macroprudential perspective.¹³ And, as in the past, these efforts have been complemented by measures to improve the financial infrastructure, in this case by encouraging a shift towards centralised clearing and settlement of over-the-counter derivatives. Here again, while the perspective here is undoubtedly systemic, the measures are a natural continuation of pre-crisis policies and do not require adjustments in the calibration of prudential standards.

That said, policy has taken major strides in the macroprudential direction. The international community has strongly endorsed the need to establish frameworks (FSF (2009), de Larosiere et al (2009), G20 (2009, 2010)), international regulatory bodies have been strengthening the macroprudential orientation of their standards, national and supranational authorities have been setting up new bodies with explicit macroprudential responsibilities, and a lot of work is underway to establish how best to implement the arrangements. Monitoring and limiting systemic risk is now a core policy objective.

The measures adopted by the Basel Committee on Regulation and Supervision illustrate this point very clearly. Taken together, they can be regarded as providing a foundation for fully-fledged macroprudential frameworks, including through the creation of "overlays" to the more traditional microprudential calibration of tools. As explained in the Box, they include: (i) a top-down assessment of the benefits and costs of higher capital (and liquidity) standards; (ii) a countercyclical capital buffer (time dimension); and (iii) higher loss-absorption capacity for systemically important banks (cross-sectional dimension).

In strengthening the macroprudential orientation of regulatory and supervisory frameworks, policymakers have been able to draw on various strands of analytical work.¹⁴ In fact, the contours of a macroprudential approach had already been sketched in the early 2000s, not least in work carried out at the BIS (Crockett (2000), Borio et al (2001), Borio (2003a))¹⁵ and had subsequently been developed further in both policy and academic circles. Post-crisis, this work has gathered momentum.

¹³ For an analysis of the relationship between capital and liquidity standards, including the link to central bank emergency liquidity support, see eg Borio (2010). In general, although higher capital can reduce the probability that liquidity evaporates, the two standards cannot be treated as substitutes; both are needed for a balanced and effective approach.

¹⁴ For a recent review of the literature on the macroprudential approach, see Galati and Moessner (2010); for a recent formalisation, see Hanson et al (2011). See also Brunnermeier et al (2009).

¹⁵ For a history of the term "macroprudential", tracing it back to the late 1970s, see Clement (2010).

Basel III: the foundation for a macroprudential framework

Taken together, three core elements of Basel III can be regarded as laying the foundation for a fully-fledged macroprudential framework.

First, the decision concerning banks' capital (and liquidity) requirements was informed by a top-down assessment of the benefits and costs in terms of overall output (BCBS (2010a)).^① This, in turn, called for estimates of the impact of tougher standards on the probability and cost of banking crises (benefits) and on the cost of financial intermediation (possible cost). The analysis seeks to establish an appropriate solvency (liquidity) standard for the system as a whole rather than one derived purely as the (residual) sum of standards appropriate for individual institutions, considered on a stand-alone basis. Moreover, a similar macroeconomic analysis also informed the length of the implementation period (MAG (2010)).

Second, the Basel Committee has introduced a countercyclical capital buffer, intended to limit the procyclicality of the financial system (BCBS (2010b,c)). Based on criteria set by the supervisors, the capital buffer is accumulated during periods of "excessive" credit expansion, which could signal the build-up of systemic risks, and is released at times of incipient financial stress. The build-up and release can thus limit the amplitude of financial cycles.^② This buffer complements other measures aimed at limiting the procyclicality of minimum requirements, ie reductions in required capital during booms and increases during busts. For example, the Committee has made some risk-weights less sensitive to the financial cycle, by shifting from point-in-time to stressed parameters, ie from parameters that reflect estimates of time-varying probabilities of default over short horizons based on available information at any given point in time to those based on estimates of losses only at times of financial stress or during recessions.^③

Finally, the Committee, together with the Financial Stability Board (FSB), have adopted the general principle that prudential standards should in part reflect the systemic significance of financial institutions (BCBS (2010d)). Institutions whose failure imposes larger costs on the financial system should have tighter standards. Conceptually, this is equivalent to setting a lower probability of failure for them, all else equal. The Committee has developed a set of, admittedly coarse, indicators to establish the systemic significance of institutions, building on previous work by the FSB-IMF-BIS (FSB (2009)). This complements efforts underway to ensure the orderly wind down of systemically significant financial institutions (SIFIs), thereby reducing the costs of their failure and the implicit subsidies associated with the market's expectations of official support ("moral hazard") (FSB (2010)).

^① For a critical analysis arguing that, as estimated, the costs of higher capital requirements are greatly overstated, see Admati et al (2011). ^② See Caruana (2010b) for a quantitative assessment of how the buffer would have operated in the context of the recent crisis. ^③ In addition, the CGFS has proposed a set of measures to reduce the procyclicality of margining practices, such as by encouraging the use of through-the-cycle margins, ie margins whose value remains broadly constant over a financial cycle (eg if based on long-term averages); see CGFS (2010b).

An obvious antecedent of the macroprudential approach is the work that highlights how by focusing on individual institutions one can badly misread systemic risk, owing to the relationships that exist between them, well beyond the knock-on effects of individual failures (eg Hellwig (1995), Acharya (2009)).¹⁶ But probably the most influential strand has been the work on the procyclicality of the financial system. Initially, that work focused exclusively on the amplifying mechanisms induced by regulatory constraints becoming binding *during episodes of financial distress* (eg Blum and Hellwig (1995) and Goodhart (1995)). Later on, however, as bank regulation became more risk-sensitive, the analysis also began to examine the implications of the decline in risk-weights, and hence in regulatory minima, *during booms* as well (eg Danielsson et al (2004), Kashyap and Stein (2004), Gordy and Howells (2006),

¹⁶ Tellingly, Acharya's work dates back to 2001, but it was not published until 2009, partly as a result of lack of interest in the academic community.

Repullo and Suarez (2008)). More importantly, it started to highlight the disruptive procyclicality that could arise *even in the absence of regulation* (eg Borio et al (2001)).¹⁷

In considering the forces driving procyclicality even in the absence of regulation, the analysis drew closer to an older tradition, which saw financial instability as an inherent property of an economy reflecting the close link between the financial and business cycles. This strand was best exemplified in the post-war period by the narratives of Kindleberger (1996) and Minsky (1982), but was also more common in the study of emerging market economies¹⁸. The analysis also drew closer to the vast literature on “asset price bubbles”, which had gained in appeal as the belief in the efficiency of financial markets had waned.¹⁹ And, especially since the crisis, it has found additional theoretical backing in, or rediscovered, two related strands of analysis. One highlights the existence of “credit externalities”, which lead to over-borrowing (“excessive credit booms”) as agents do not internalise the costs of the fire sales induced by negative shocks to the economy (Lorenzoni (2008), Korinek (2011), Bianchi and Mendoza (2010)).²⁰ Another formalises disruptive cycles in leverage (collateral constraints) given irreducible heterogeneity in the willingness of agents to purchase the assets that can act as collateral, reflecting eg differences in opinion, risk preferences or the utility derived from the assets (Geanakoplos (2003), (2010)).²¹

The work on procyclicality, in particular, was rooted in economic mechanisms that were almost entirely absent in the mainstream macroeconomic literature. One was limitations in *perceptions* of risks and valuations – in effect, eschewing model-consistent expectations. For example, a voluminous literature started to document how measures of risk commonly used by financial institutions moved heavily procyclically, falling during booms and rising only during busts, *even as risks were building up in the financial system*. Examples of such measures included value-at-risk (VaR),²² probabilities of default and loss given default (Borio et al (2001), Allen and Saunders (2003), Altman et al (2005), Segoviano and Lowe (2002)). Measures tended to behave more like extrapolative expectations and did not exhibit sufficient (conditional) mean reversion.²³ Another mechanism was limitations in *incentives*, which meant that individually rational actions could result in undesirable aggregate outcomes. Well-

¹⁷ See Borio and Zhu (2008) and Taylor and Goodhart (2006) for surveys of the procyclicality of capital standards.

¹⁸ See, in particular, the role assigned to credit booms, as stressed by Honohan (1997), Gavin and Hausmann (1996), Sachs et al (1996), Corsetti et al (1999). Views differed, however, concerning the role of bad policies and inherent features of the economy and some took, on balance, a more benign view of such booms and their consequences (eg Gourinchas et al (2001)). For some empirical evidence quoted in that literature confirming the predictive content of credit growth for banking crises, see eg Demirgüç-Kunt and Detragiache (1998).

¹⁹ The literature on bubbles is vast. See Allen and Gale (2000b) for a model that highlights the role of credit in that context. For an overview, see Brunnermeier (2001). See also Shiller (2008) for an emphasis on the role of bubbles behind episodes of financial distress.

²⁰ Again, the literature on emerging market economies had already explored aspects of this issue, focusing on the relationship between external borrowing constraints and the real exchange rate; eg Caballero and Krishnamurthy (2001) and Mendoza (2002).

²¹ More recently, Gersbach and Rochet (2011) have proposed a complementary rationale, in which credit externalities arise from the conjunction of moral hazard between banks and those financing them, banks' exposures to systematic shocks and their ability to reallocate capital among borrowers.

²² For example, it is well known that short-term volatility is directional, being lower in bull markets than in bear markets, and that return correlations spike in periods of stress; for the equity market, see Schwert (1989) and Ang and Joe (2002). This inevitably has first-order implications for measures of risk based on market prices, such as VaRs or probabilities of default, along the lines suggested by Merton (1974), including for system-wide measures (eg Gray et al (2006)).

²³ Even credit ratings, while in principle insensitive to the cycle (through-the-cycle measures), exhibit some procyclicality (Amato and Furfine (2004), Altman and Rijken (2005), Bangia et al (2002)).

known notions included coordination failures and herding²⁴ (eg Froot et al (1992), Rajan (1994), Denevow and Welch (1996)). Arguably, underpinning both mechanisms are *short horizons* of economic agents (Borio (2003a), Shleifer and Vishny (1997), Frankel and Froot (1990)). And in turn, these short horizons can be a response to the asymmetric information problems between the suppliers and users of funds inherent in all financial transactions.

As discussed further below, this literature went hand-in-hand with efforts to measure systemic risk more precisely. One line of work, relevant for the time dimension, sought to measure the build-up of vulnerabilities in the financial system. In addition to macro-stress tests, efforts focused on developing real-time *leading* indicators of system-wide financial distress. Some of these were explicitly informed by the notion of the financial cycle, trying to remedy the lack of mean-reversion in market measures of risk (eg Borio and Lowe (2002a,b),²⁵ Alessi and Detken (2009)). For example, unusually strong cumulative expansions in credit and asset prices were taken as signals of future financial distress. A complementary, subsequent line of work, more relevant for the cross-sectional dimension, sought to develop measures of systemic risk that could be then used to estimate individual institutions' contribution to it (eg Segoviano and Goodhart (2009), Adrian and Brunnermeier (2009), Acharya and Richardson (2009), Huang et al (2009 and 2010), Tarashev et al (2009 and 2010), Drehmann and Tarashev (2011)). These measures could in turn help to calibrate prudential tools with respect to the institutions' relative systemic significance.

Monetary policy

In contrast to the broad consensus over the direction of prudential policy post-crisis, no such agreement as yet exists concerning whether, and if so how, monetary policy frameworks should be adjusted to better support financial and macroeconomic stability. The crisis has generated much soul-searching, but as yet no clear answers.

To start with, there is no agreement on the role that monetary policy has played in the *build-up* of the crisis: did it contribute significantly to the financial boom that preceded the bust? Some accounts answer this question positively (eg Borio and White (2003), Rajan (2005), Borio (2007), Taylor (2008), Issing (2011)), others negatively (eg Bean (2009), Bernanke (2009), Svensson (2010)).

Partly as a result, there is no agreement on whether or how far monetary policy regimes should be adjusted to lean against the build-up of risks in the financial system during the upswing of a potentially disruptive financial cycle. One view is that monetary policy regimes should continue to focus on price stability, much as they did before the crisis. Financial stability is best ensured through the newly established macroprudential frameworks (eg Bean (2009), Bernanke (2009)). To do otherwise would risk overburdening monetary policy and compromising its credibility. An alternative view, which is gaining ground, is that implementing a macroprudential framework can help but is not sufficient. The role of monetary policy is simply too important (eg Trichet (2009), Shirakawa (2010), Bloxham et al (2010)).²⁶

²⁴ Herding may also result from informational asymmetries, as with information cascades (eg Banerjee (1992), Bickchandani et al (1996)).

²⁵ This work, in particular, builds on the approach put forward by Kaminsky and Reinhart (1999) by developing *real-time* indicators, by paying attention to cumulative processes and the interaction among variables, and by lengthening the policy horizon, so as to distinguish sustainable from unsustainable financial booms in time to take remedial action. For reviews of the literature on leading indicators of financial crises, see Bell and Pain (2000) and Davis and Karim (2008)..

²⁶ On the former view, see, for instance, also Bernanke and Gertler (1999) and Blanchard et al (2010); on the latter, see eg Cecchetti et al (2000), BIS (2010) and Borio (2009). Borio and Lowe (2004), Borio (2007) and Papademos and Stark (2010), Chapter 6, contain references to the large literature on this topic.

Finally, there is no agreement on the proper role of monetary policy, be it interest-rate or balance-sheet policy, in the *aftermath* of a financial crisis. To be sure, there is a consensus that monetary policy should be used aggressively *in crisis management*, so as to prevent the implosion of the financial system. But what to do thereafter is more controversial. One view stresses the risks of failing to be as accommodative as possible, by failing to drive policy rates close to zero, to commit to keep them there for as long as it takes and to deploy the central bank's balance sheet aggressively. Another view highlights the collateral damage of such a response, seen as potentially delaying the deleveraging and broader adjustments necessary for a self-sustained economic recovery and as repeating some of the mistakes that caused the crisis in the first place.

Not surprisingly perhaps, against this backdrop there has been no wholesale rethink of the analytical frameworks underlying policy. To be sure, the work on the real-time identification of the build-up of systemic risks has been relevant here too, especially when extended to analyse the information content of the leading indicators for output and inflation (eg Borio and Lowe (2004)).²⁷ And some work has also analysed both theoretically and empirically the impact of policy interest rates on perceptions and attitudes towards risk (the so-called "risk-taking channel"; Borio and Zhu (2008), Adrian and Shin (2010)). But the main response so far has been simply to add a financial sector to mainstream macroeconomic models (eg Angeloni and Faia (2009), Christensen et al (2010), Christiano et al (2010), Cúrdia and Woodford (2009), Gerali et al (2010), Gertler and Kiyotaki (2010))²⁸. Given their strong equilibrium properties, however, these models cannot quite capture financial crises. At best, as discussed further below, they can replicate variations in the (normal) volatility around steady state and provide some, albeit limited, insight into the impact of simple changes in prudential requirements (eg Angelini et al (2011)).

III. A way forward and outstanding challenges

The previous analysis indicates that, post-crisis, policy has been moving in the right direction. But what more should be done? What principles should guide further measures? And what are the critical analytical areas that should command priority? What follows addresses these questions, based on a personal assessment of the balance of the arguments and of the available evidence. It considers, sequentially, the outstanding policy and analytical challenges, and points to a way forward.

Policy

In discussing the way forward for policy, it is best to consider macroprudential frameworks and monetary policy frameworks in turn.

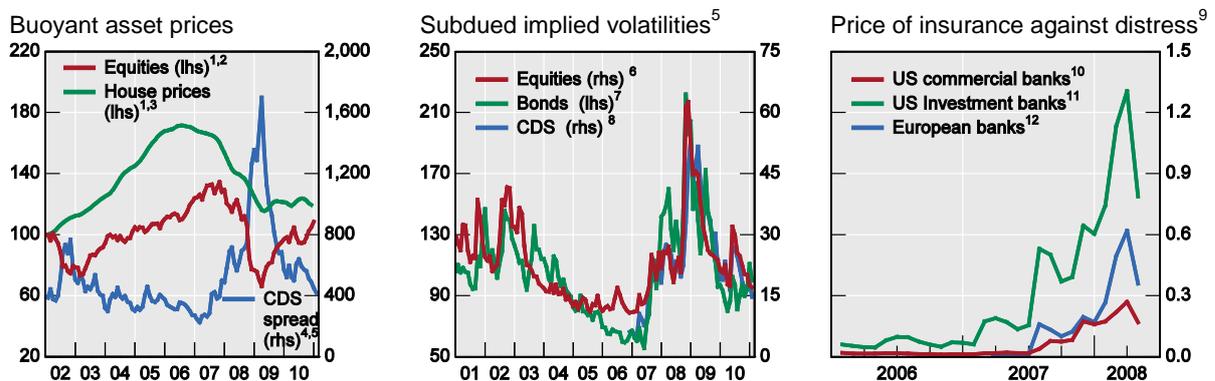
Macroprudential frameworks

The crisis has created the opportunity to put in place fully-fledged macroprudential frameworks to support financial stability. That opportunity should not be missed. Doing so requires providing answers to several questions. These relate to a number of issues: the criterion of success; how best to measure systemic risk and the associated data requirements; how close instruments should track systemic risk; the range of instruments to be used; the balance between rules and discretion; and governance arrangements.

²⁷ For a sceptical view on this information content, although based on somewhat different indicators and approach, see Assenmacher-Wesche and Gerlach (2010).

²⁸ Gertler and Kiyotaki (2011) also review part of the literature. For a less mainstream variant of such models, see eg Goodfriend and McCallum (2007).

Graph 1
Footprints of the paradox of financial instability
 The US example



¹ End 2001 = 100. ² S&P 500. ³ S&P Case Shiller index, 20 cities. ⁴ 5-year on-the-run CDX.NA.HY 100 spread. ⁵ in basis points. ⁶ VIX index (implied volatility on S&P 500). ⁷ MOVE index (implied volatility on treasury options). ⁸ Implied volatility on the 5-year-on-the-run CDX.NA.HY 100 spread. ⁹ In per cent, based on CDS spreads. Risk neutral expectation of credit losses that equal or exceed 15% of the corresponding segments' combined liabilities in 2006 (per unit of exposure to these liabilities); risk neutral expectations comprise expectations of actual losses and attitudes towards risk. Taken from Tarashev and Zhu (2008). ¹⁰ 10 banks headquartered in the United States. ¹¹ 8 banks headquartered in the United States. ¹² 16 universal banks headquartered in Europe.

Sources: Bankscope, Bloomberg, Datastream; JPMorgan, Markit; Tarashev and Zhu (2008), author's calculations

The criterion of success should be realistic. The main risk is promising too much, setting the framework up for failure. Financial crises will not disappear, but their frequency and severity can be reduced. Ideally, the framework should mitigate the financial cycle. But on this the evidence so far is mixed. It suggests that while making the system more robust should lessen the severity of crises, thereby mitigating the intensity of the *bust*, mitigating the intensity of the *upswing* (ie acting as an effective “speed-limit”) may be harder (eg Borio and Shim (2007), BIS (2010), Caruana (2010a), CGFS (2010a)).²⁹ If so, at least at the beginning and until more evidence is gathered, it would be prudent to set as criterion of success increasing the resilience of the financial system³⁰ rather than also taming the upswing of the cycle *per se*.

The best measure of systemic risk depends on the purpose for which it is used. It is essential to make a distinction between the time and cross-sectional dimensions. The reason reflects what might be called the “paradox of financial instability” (Borio and Drehmann (2009a)): the system looks strongest precisely when it is most vulnerable. Credit growth and asset prices are unusually strong, leverage measured at market prices artificially low, and risk premia and volatilities unusually low precisely when risk is highest. What looks like low risk is, in fact, a sign of aggressive risk-taking. The experience of the recent crisis has confirmed this once again, as illustrated in Graph 1 for the United States.

In the time-dimension, the best leading indicators of financial distress seek to turn the paradox to the policymakers' advantage. This is one reason why indicators such as those

²⁹ For example, statistical (“through-the-cycle”) loan provisioning has no doubt made banks in Spain more resilient, but seems to have had little effect on the credit boom (Borio and Shim (2007), Caruana (2010a)). The increase in capital requirements during the boom may need to be quite large before it has a restraining effect: it is very cheap to raise capital in good times and the impact of higher capital on loan spreads appears to be relatively small (eg Elliott (2009); Hanson et al (2010), King (2010)). Maximum loan-to-value ratios may be more effective (Gerlach and Peng (2005)). In general, however, the ability to circumvent all of these restrictions should not be underestimated.

³⁰ This seems to be the objective set in the United Kingdom, see Tucker (2011).

based on *joint* positive deviations (“gaps”) of the ratio of (private sector) credit to GDP and asset prices from historical norms provide reasonably reliable signals of systemic financial distress over horizons that vary between two-to-four years ahead, including out of sample (eg Borio and Drehmann (2009b), Alessi and Detken (2009)). It is also one reason why macro-stress tests have so far failed to identify risks: the starting point is simply too demanding, especially given their inability to capture the highly non-linear behaviour during crises owing to the deficiencies of existing macro models. There is a real danger that they may lull policymakers into a false sense of security.³¹

While the paradox of financial instability rules out using raw market prices in the time dimension, it does not prevent their use in the cross-sectional dimension. Here what is at stake is the ability of market prices to measure *relative* risk, so as to calibrate prudential tools with respect to the systemic significance of financial institutions. This is something that market prices, by and large, do better, as suggested by the extant empirical literature (eg Flannery (1998)). In fact, the various measures of systemic risk used for calibration in the cross-section discussed above rely quite heavily on market prices. True, some of these inputs, such as probabilities of default, could also come from supervisors. But for others, such as correlations or other measures of interdependence, it will probably be very difficult to dispense with market price information altogether.³²

In contrast to what is often argued, *the data requirements to implement a macroprudential approach are not that demanding* (Borio (2010c)). For a start, the widespread failure to anticipate the recent financial crisis did not reflect mainly inadequate data, but the inadequate lens through which available data were interpreted. For instance, the leading indicators of financial distress already discussed did provide warning signals (Borio and Drehmann (2009b)). And there is a serious risk of overestimating the value of detailed and costly data on bilateral exposures, so popular in network analysis. In fact, they can cast only very dim light on contagion. Common (similar) exposures of institutions, on both their asset and liability sides, together with indiscriminating responses by investors and counterparties, are the main drivers of the dynamics of financial distress. A financial crisis is more like a tsunami that sweeps away all that gets in its way than a force knocking down one domino after the other along a specific path.³³ Information about bilateral exposures can be of value to supervisors in crisis management, but in that case it needs to be very granular and up-to-date.

Priorities for data collection are different. First, there is a need to improve very long-term series to help calibrate leading indicators of financial distress. Following improvements in housing price statistics, there is still a major gap concerning commercial property prices. In fact, historically it is commercial property prices that have typically been a source of banking distress; the role of residential property prices in the current crisis is rather exceptional. Second, there is a surprising need for readily available and comprehensive statistics on the consolidated balance sheets of banks’ global operations, ideally complemented with information of the balance sheets in individual locations (residency-based). Publicly available

³¹ This is quite different from the much more helpful role that very tough macro stress tests can play in putting pressure on banks to clean up their balance sheets after episodes of stress; see, eg Borio et al (2010). Brunnermeier et al (2010) propose bottom-up aggregation of individual stress tests based on estimates of reaction functions of institutions. The information requirements of such an aggregation, however, are exceedingly demanding; similar methodologies had already been examined a few years back in policy circles (CGFS (2000)).

³² That said, in calibrating the prudential tools it is critical to avoid interfering with the time dimension, and inadvertently introducing procyclicality. This can be done by relying on parameters sets as long-term averages or drawn from stressed conditions only. See Borio (2010a) for a further discussion.

³³ See Elsinger et al (2006) for empirical evidence on this point; see Upper (2010) for a critical survey of contagion analysis based on networks.

data are badly incomplete and not very reliable.³⁴ These data would provide a solid basis for the assessment of the risk profile of the sector, which is inevitably involved in any crisis of systemic significance. They could, over time, be extended to cover other sectors too (Cecchetti et al (2010)). At the same time, any collection system should remain flexible, able to adjust to the rapidly changing financial environment.

Because any measure of systemic risk is inevitably quite fuzzy, it would be a mistake to expect prudential tools to track it closely. It is clearly better to be approximately right than precisely wrong. The objective is to choose calibrations that are as robust as possible. The need to keep things simple further supports this conclusion. A concern with robustness and simplicity is what has motivated the Basel Committee to use the credit-to-GDP ratio as guide for the build-up of the countercyclical capital buffer, as this variable has proved to be the best *single* leading indicator of future financial distress. And since this variable fails to decline as distress emerges, and may even continue to rise, better contemporaneous indicators of incipient distress – such as aggregate losses and signs of a tightening in credit terms – are used for the release phase ((Drehmann et al (2010), BCBS (2010b,c)).³⁵ ³⁶ Moreover, even simple fixed (non-state-contingent) calibrations can be quite effective. Examples include standards based on long-term averages (“through-the-cycle”) or stressed parameters or conservative maximum loan-to-value ratios.

The range of prudential instruments should be as wide as possible. So far, the most concrete steps have relied on capital standards, loan-to-value ratios and adjustments to accounting standards (eg dynamic provisioning; Fernández de Lis et al (2001), Jiménez and Saurina (2006)).³⁷ Work is underway on the merits of margin requirements (CGFS (2010b)) and resolution regimes. An omission so far relates to liquidity standards (Borio (2010a)).³⁸ Those proposed for banks can help limit risk-taking during expansions, but do not include specific macroprudential overlays: so far, they have been calibrated exclusively with respect to the risk profile of individual institutions assessed on a stand-alone basis and are set as minima, rather than buffers that can be drawn down. This reduces their effectiveness in dealing with procyclicality during busts (time dimension). Absent such a calibration, the standards put greater pressure on discretionary adjustments and official sources of liquidity support at times of stress. There is also scope to explore further additional instruments, such as insurance schemes based on aggregate conditions (eg Kashyap et al (2008)). And the very line between what is a prudential and non-prudential instrument can be blurred: addressing systemic risk should rely on as many instruments as possible, based on their effectiveness.³⁹

³⁴ The BIS international banking statistics are probably the best data in this area, but they cover only the international operations of banks. These statistics helped to cast light on one of the biggest puzzles of the crisis, namely the extraordinarily large US dollar funding needs of European banks (McGuire and von Peter (2009)). See also Fender and McGuire (2010) for an illustration of how rich the analysis based on the combination of *consolidated* and *residency-based* data can be when exploring funding risk in the global banking system.

³⁵ For what could be considered a complementary way of limiting procyclicality, in this case by smoothing the minimum capital requirement with reference to GDP, see Repullo et al (2010); for a critique of the current approach, see Repullo and Saurina (2011).

³⁶ The same principles apply to the cross-sectional dimension, where the objective is to find simple variables that can approximate more complex measures; see FSB (2009).

³⁷ For a more in-depth analysis of the accounting issues and for further references, see Borio and Tsatsaronis (2004) and Taylor and Goodhart (2006)).

³⁸ The crisis has given impetus to academic work that highlights the incentives to take illiquid positions and that considers ways of addressing the corresponding externality; see Acharya and Viswanathan (2011), Brunnermeier and Oehmke (2010), Martin et al (2010), Perotti and Suarez (2010) and Shin (2010).

³⁹ There is a semantic issue here. In this paper “macroprudential” is defined as an orientation of regulatory and supervisory frameworks, and as such covers the tools under the control of the corresponding authorities. Once specific macroprudential frameworks are put in place, the range of tools could be extended to cover those under the control of such authorities, including targeted levies (eg Shin (2010), Jeanne and Korinek (2010),

The framework should be as rules based as possible, but no more than that. Room for discretion is inevitable, especially as one seeks to be more ambitious in tracking systemic risk or to tailor the response to the specific features of the financial cycle or if one is highly uncertain about the effectiveness of specific rules. For example, in Basle III supervisors have retained considerable discretion in the application of the macroprudential overlays based on their judgement, with respect to both the time dimension (eg the reliance on the credit-to-GDP guide) and in the cross-sectional dimension (the quantitative indicators for the capital surcharge for SIFIs). That said, rules, if well structured, can act as automatic stabilisers and can be especially effective as pre-commitment devices. Above all, the political economy pressures to refrain from taking action can be overwhelming: in the cross-sectional dimension, on fair competition grounds; in the time dimension, to keep enjoying an apparently endless boom. And the temptation to believe that “this time things are different” can be very powerful for everyone, including the authorities themselves (eg Reinhart and Rogoff (2009), Borio (2008)).

Governance structures should ensure an alignment of goals, instruments and know-how as well as operational autonomy from government. Mandates should be realistic and avoid a false sense of precision. Control over instruments should be commensurate with those mandates. Given their comparative advantage in understanding the functioning of financial markets and the macro-economy, central banks should play a leading role in any macroprudential framework. And given the especially long lag between the build-up of systemic risk and its materialisation and the political economy of economic booms, the rationale for operational autonomy from government is even stronger than in the case of monetary policy. While there is a constituency against inflation, there is none against the inebriating feeling of getting richer.⁴⁰

Monetary frameworks

The reasoning so far makes it clear that, in our view, it would be imprudent to rely exclusively on a macroprudential framework to ensure financial stability: monetary policy has to play its part as well. There are a number of reasons for this.

First, the effectiveness of macroprudential policy in restricting the upswing of the financial cycle, for normal ranges of variation in the calibration of the tools, is open to doubt. By contrast, the influence of monetary policy on credit conditions, asset prices and yields is hardly in doubt. This is precisely how changes in interest rates are supposed to affect aggregate demand. Moreover, there is growing evidence that monetary policy can also affect risk-taking (Altunbas et al (2009), Ioannidou et al (2009), Jiménez et al (2009), Gambacorta (2009), López et al (2010), Maddaloni and Peydró (2010)). Risk measures and risk tolerance move closely with asset prices, cash flows and profits (eg. Borio et al (2001), Borio and Zhu (2008)). Nominal interest rates that are low compared to historical norms can induce search-for-yield behaviour (Rajan (2005)). And a monetary policy strategy that is expected to behave asymmetrically, not constraining the upswing in the financial cycle but easing aggressively in its aftermath, can add fuel to the fire (Fahri and Tirole (2009), Diamond and Rajan (2009)). Indeed, looking back it is hard to imagine that the prolonged period of negative real policy rates in the 2000s did not contribute to the boom in credit and asset prices that preceded the crisis, although it did prove consistent with low inflation in prices of goods and services. Moreover, monetary policy cannot be arbitrated away as easily as regulatory restrictions as

Bianchi (2010)). From a policy perspective, to avoid misuse of the tools, it is critical that they be designed and deployed with the *sole purpose* of limiting systemic risk and be supported by *appropriate governance arrangements*, so as to ensure their disciplined use. As the term has become popular, there is now a certain unhelpful tendency to regard as “macroprudential” tools that are not primarily intended to achieve that objective and may not be effective in doing so either (eg capital controls). For a further discussion of these issues, see Borio (2010b).

⁴⁰ For a recent in-depth discussion of the governance issues raised by central bank financial stability functions, see BIS (2011).

it sets the universal price of leverage in a given currency, regardless of the instruments and the institutions involved. It affects both market and intermediated financing flows. And it influences the opportunity cost of internally-financed investments and intertemporal consumption choices. Its reach goes well beyond that of regulation and supervision.

Second, the bust of outside financial cycles may be quite costly in terms of output even if banks are robust enough to withstand it. The recent experiences in Greece, Portugal and, to a lesser extent, Spain are cases in point. Moreover, the relatively speedy recoveries in Switzerland and Germany suggest that, if the domestic economy does not experience a major financial cycle and the strains incurred by banks reflect exposures elsewhere, the macroeconomic costs are more manageable. The need for deleveraging in non-financial sectors can weigh very heavily on the economy.

Finally, while calibration is not straightforward, the difficulties can be overstated. The traditional guideposts that inform monetary policy, such as economic slack or output gaps, natural rates of unemployment and natural rates of interest, are all unobservable and measured with a large degree of uncertainty. By comparison, the information content of real-time leading indicators of financial distress based on measures of the financial cycle should not be underestimated.

What is needed is a way to allow monetary policy to tighten even if near-term inflation is under control, whenever there are signs that credit and asset price booms threaten financial stability. At a minimum, this would require a lengthening of the policy horizon, beyond the roughly two years commonly used in current frameworks. The build-up of systemic risk takes considerably longer. And given the uncertainties surrounding its path and the timing of the materialisation of distress and macroeconomic costs, a longer horizon would support a more comprehensive assessment of the balance of risks facing the economy.

Moreover, it is worth reconsidering the role of monetary policy in dealing with the bust of the financial cycle. There is considerable evidence that subsequent recoveries tend to be slow and protracted (eg Reinhart and Rogoff (2009), Reinhart and Reinhart (2010)), and the output losses long-lasting or even permanent, especially if the bust goes hand-in-hand with a banking crisis (BCBS (2010a)). In all probability this reflects a mixture of an overestimation of potential output and growth during the boom, the corresponding misallocation of resources, notably capital, the headwinds of the subsequent debt and real capital overhangs, and disruptions to financial intermediation. Fiscal expansions in the wake of the crises can add to these problems, by piling government debt on top of private debt and sometimes threatening a sovereign crisis (Reinhart and Rogoff (2009))⁴¹.

All this reduces the effectiveness of monetary policy and exacerbates its unwelcome side-effects. These become apparent once the easing is taken too far after averting the implosion of the financial system. The economy needs balance-sheet repair, but very low interest rates together with ample central bank funding and asset purchases delay the recognition of losses and the repayment of debt⁴². Too much capital has been accumulated in the wrong sectors, but the easing tends to favour investment in the very long-lived assets in excess supply. The bloated financial sector needs to shrink, but the easing numbs the incentives to do so and may even encourage punting. The financial sector needs to generate healthy earnings, but as short-term interest rates approach zero they compress banks' interest margins unless banks take on more interest-rate and, possibly, sovereign risk; and as long-

⁴¹ Moreover, the unsustainable credit and asset price booms that precede the crisis flatter the fiscal accounts, by artificially boosting revenues and leading to an overestimation of potential growth; see eg. Eschenbach and Schuknecht (2004).

⁴² For example, given the low cost of forbearance, very low interest rates may disguise underlying credit quality weaknesses; encouraging banks to "extend and pretend" that loans of low-quality borrowers will become good. See Caballero et al (2008) on the Japanese experience in the 1990s and Albertazzi and Marchetti (2010) on the Italian case during the recent credit crisis.

term rates decline, too, they can generate strains in the insurance and pension fund sectors. Thus, as the easing continues, it raises the risk of perpetuating the very conditions that make eventual exit harder. A vicious circle can develop.⁴³

Analysis

Better policy calls for better analytics. The crisis has not just challenged policymakers; it has also been a major wake-up call for the economic profession in general. This big-picture overview suggests that much has been done in recent years to strengthen the analytical basis for policy. In particular, major steps have been taken to measure systemic risk and to explain the dynamics of financial distress. And the profession is beginning to investigate more systematically the relative merits of different tools to address systemic risk. These efforts are very helpful and will, in due time, support better policy.

Looking ahead, the greatest payoff can come from drawing the lessons of the crisis for our understanding of the strengths and weaknesses of the prevailing macroeconomic paradigms. The processes that underlie financial instability have macroeconomic roots. That episodes of systemic financial distress are rare does not imply that we can live with two types of model, a fair-weather and stormy-weather one. That might be acceptable if the stormy weather was the result of outside exogenous shocks. It is not, however, if, as argued here, the stormy weather is generated during fair-weather conditions; if, in other words, the boom does not just *precede*, but *causes* the bust. Financial instability is a symptom of deep-seated forces that drive the economy *at all times*, although financial distress emerges only infrequently.

Ironically, taking macroeconomics in this direction would take it closer to its historical roots. Back in the nineteenth century and under the gold standard, financial crises were seen as a phase naturally linked to the business cycle⁴⁴. Moreover, most classical economists saw business cycles as disequilibrium phenomena, with expansions leading to subsequent contractions, and not as tracing out a sequence of equilibrium outcomes based on optimising behaviour by individual agents subject to a sequence of exogenous shocks. And the role of monetary factors, in the form of credit or monetary expansion and contraction, played a key role (eg Wicksell (1898), Fisher (1932), von Mises (1912) and Hayek (1933)).⁴⁵ There was never any question that financial instability had macroeconomic causes and was deeply rooted in business fluctuations. At least in terms of its emphasis on monetary and macroeconomic factors, the monetarist perspective, too, falls in the same tradition, although many of its proponents have tended to see price stability as sufficient for macroeconomic and financial stability (Schwartz (1995), Bordo et al (2000)). Clearly, the prevailing paradigm, embodied in the mainstream dynamic stochastic general equilibrium (DSGE) models, is a radical departure from this line of inquiry.

In which direction should current models be modified? The key is to allow scope for those cross-sectional and inter-temporal coordination failures that lie at the heart of business fluctuations and financial instability. For those who wish to micro-found macroeconomics, this

⁴³ In addition, aggressive and prolonged balance-sheet policies can, over time, undermine central bank independence; see Borio and Disyatat (2010).

⁴⁴ See, for instance, Lord Overstone's (1857) view of the business cycle, in which the "convulsion" phase was in effect synonymous with financial distress. Similar perspectives can be traced back to Adam Smith (1776) and Marshall and Marshall (1879). It may not be a coincidence that the term "crisis" was typically used to denote the turn of the business cycle (eg Juglar (1862)). On these issues, see Zarnowitz (1992), Laidler (1999) and Besomi (2006 and 2011). On the link between financial crises and the business cycle, see also, eg Calomiris and Gorton (1991).

⁴⁵ The macroeconomic origins are also evident in the strand of literature that stresses the role of the lender of last resort (Thornton (1802) and Bagehot (1873)), although the boom phase is not prominent in these accounts.

necessarily implies moving away from the still common assumption of the omniscient⁴⁶ representative agent. And if the objective is to incorporate financial distress in a meaningful way, it is hard to see how this could be done without treating credit risk and default more thoroughly (eg Goodhart (2004), Goodhart et al (2004 and 2006)). The more recent academic developments are edging in this direction, while using shortcuts to retain tractability (eg Jeanne and Korinek (2010), Bianchi and Mendoza (2010)).⁴⁷

Going one step further, one could conjecture that an important, and so far neglected, line of inquiry is to treat our monetary economies more seriously (Borio and Disyatat (2011)). Whether extended to include a banking system or not, current models are “real” models disguised as “monetary” ones.⁴⁸ Financial contracts are set in real, not in nominal, terms. And when the models incorporate money, they treat it as a friction, not as the necessary ingredient that improves over barter. Above all, the banking system simply *transfers* real resources from one sector to another; it never *generates* (nominal) purchasing power. And yet, it is loans that create deposits, not the other way round. While the generation of purchasing power acts as oil for the economic machine, it can, *in the process*, open the door to instability. Working with better representations of monetary economies should help cast further light on the aggregate and sectoral distortions that arise in the real economy when credit creation becomes unanchored, poorly pinned down by loose perceptions of value and risks. Only then will it be possible to fully understand the role that monetary policy plays in the macro-economy. And in all probability, this will require us to move away from the heavy focus on equilibrium concepts and methods to analyse business fluctuations and to rediscover the merits of disequilibrium analysis, such as that stressed by Wicksell (Borio and Disyatat (2011)).⁴⁹

This theoretical agenda needs to be supported by a focused empirical strategy. The priority here is to better document the financial cycle and its relationship with the business cycle. Work in this area has already started, in the process of either developing leading indicators of financial distress or describing stylised features of the relationship between the key variables, most notably credit⁵⁰. We know, for instance, that financial cycles can have a much longer duration than business cycles, as normally measured, which helps to explain why financial instability is such a rare event. This is illustrated in Graph 2, which shows, in particular, how credit and property prices continued to boom despite the 2000-2001

⁴⁶ There is, of course, a large literature that goes beyond fully model consistent expectations. Particularly interesting are the approaches that allow for the rational coexistence of differences of opinion despite common knowledge (Kurz (1994 and 2011)) and the imperfect knowledge economics approach put forward by Frydman and Goldberg (2011). The latter dovetails nicely with the empirical work on the possibility of identifying financial imbalances in real time based on deviations from historical norms, or gaps (eg Borio and Lowe (2002a,b)). See also De Grauwe (2010), who generates endogenous boom-bust cycles in a DSGE model modified to allow for simple (heuristic) expectation formation mechanisms and learning, which ensures that, in the long run, expectations are unbiased.

⁴⁷ For example, these authors use non-linear solution techniques to allow for only occasionally binding borrowing constraints, therefore replicating forms of “financial distress” among economic agents short of modelling widespread failures. See also Woodford (2010), who in a DSGE model with credit makes the transition probability to a bad (crisis) state a function of the amount of leverage in the system. This is seen as a simple way of modifying current DSGE models with financial frictions so as to formalise the desirability of a monetary policy that leans against the build-up of financial imbalances.

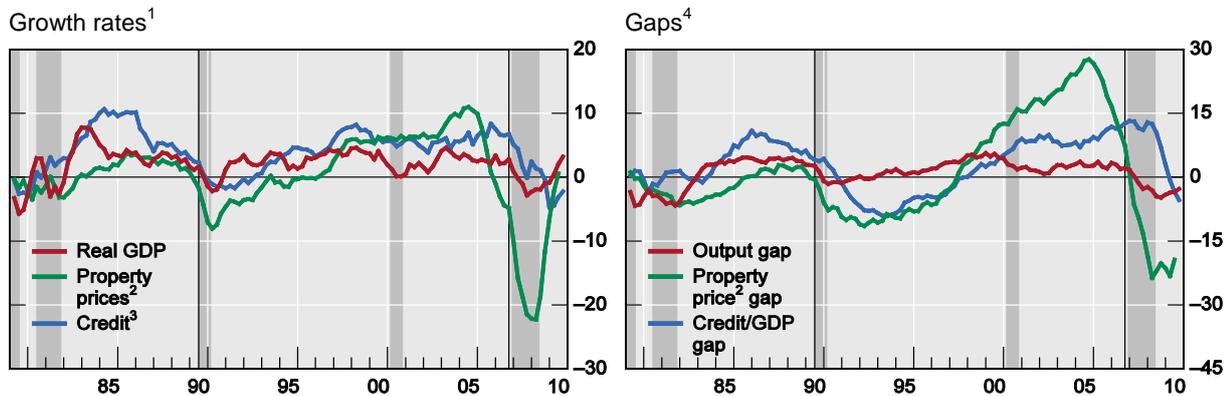
⁴⁸ On the difference between “real” and “nominal” analysis, see Schumpeter (1954) and Kohn (1986).

⁴⁹ Some analyses do consider contracts set in nominal terms (eg Diamond and Rajan (2006)). Moreover, there is a growing literature that treats money as essential, improving over barter; see Williamson and Wright (2011) for a non-technical survey. That said, these approaches do not develop the implications of the generation of purchasing power associated with credit creation and the distortions that this can generate in disequilibrium.

⁵⁰ See, for instance, Borio and Lowe (2002a,b), Reinhart and Rogoff (2009), Schularick and Taylor (2009), Aikman et al (2010), Claessens et al (2010). See also the findings by Geanakoplos (2010) on the evolution of collateral constraints (margins and loan-to-value ratios) over the financial cycle. It is high time to write a credit, as opposed to monetary, history of the world economy, with the emphasis on credit rather than on the money stock.

recession in the United States. But much more needs to be done in this area, including casting light on how different monetary and financial regimes affect the relationship between financial and business cycles. This work should prove an indispensable guide to the more theoretical analysis.

Graph 2
The financial cycle can be longer than the business cycle
 The US example



The vertical lines indicate periods of systemic banking distress; the shaded areas represent dates of business cycles (peak to trough) as identified by NBER.

¹ Annual changes, in per cent. ² Aggregated residential and commercial property prices, in real terms. ³ Domestic credit to the private sector; in real terms. ⁴ Deviation from a long-term trend (Hodrick-Prescott filter; $\lambda = 400000$); in percentage points (per cent for property prices).

Sources: National data; author's calculations.

Conclusion

The financial crisis has triggered a major reassessment of policies towards financial stability. The framework of regulation and supervision of financial intermediaries has been shifting from a micro- to a macro-prudential (or “systemic”) orientation. Correspondingly, attention has shifted from the stability of individual institutions to that of the system as a whole and from partial to general equilibrium analysis. This has brought into sharper relief the nexus between the financial system and the real economy. At the same time, the view that a monetary policy exclusively focused on short-term price stability is fully adequate to support financial stability has increasingly been questioned. In the process, financial stability policy has embarked on a journey back to its historical origin, in which its macroeconomic roots were more apparent.

This paper has reviewed the policy shifts underway and the evolving analytical backdrop supporting them. It has argued that they are welcome and should be taken further, sketching how this could be done. Proceeding along this road raises a number of analytical challenges. The overriding one, in my view, is to reconsider the prevailing paradigm embedded in macroeconomics. That paradigm is very ill-suited to capture financial instability in a meaningful way and, by implication, also the deeper forces behind all business fluctuations. Significant steps are being made in this direction. But more needs to be done. Theoretically, this ultimately calls for a rediscovery of the monetary nature of our economies, in which (inside) credit creation, and hence the creation of purchasing power, plays a key role. Empirically, it calls for a better understanding of the relationship between business cycles and the longer financial cycles that reinforce them.

It is commonly said that macroprudential policy is at the same stage as monetary policy was in the 1970s: the contours of an effective policy response are being worked out as a stronger

analytical framework is being developed. This may be a reasonable characterisation if successful monetary policy is defined as stopping runaway inflation. It is not, however, if success is defined as delivering satisfactory macroeconomic performance. For, the analytics of financial and macroeconomic stability are two sides of the same coin. And monetary policy plays a critical role in both. The task ahead is to fully recognise this.

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