



BANCA D'ITALIA
EUROSISTEMA

Questioni di Economia e Finanza

(Occasional Papers)

Lessons learned from the financial crisis for
financial stability and banking supervision

by Alessio De Vincenzo, Maria Alessandra Freni, Andrea Generale,
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LESSONS LEARNED FROM THE FINANCIAL CRISIS FOR FINANCIAL STABILITY AND BANKING SUPERVISION

by Alessio De Vincenzo^{*}, Maria Alessandra Freni^{*}, Andrea Generale^{*},
Sergio Nicoletti Altimari^{**} and Mario Quagliariello^{*}

Abstract

The financial crisis that began in 2007 has revealed a need for a new supervisory and regulatory approach aimed at strengthening the system and containing the risk of future financial and economic disruptions. Three ingredients are needed to ensure financial stability: robust analysis, better regulation, and international cooperation.

First, financial stability analysis must be improved to take full account of the different sources of systemic risk. Data coverage of the balance sheets of both non-bank financial institutions and the non-financial sectors should be increased. Moreover, to address the problems raised by the interconnections among financial institutions more granular and timely information on their exposures is needed. There must be further integration of macro- and micro-information and an upgrading of financial stability models.

The second ingredient is the design of robust regulatory measures. Under the auspices of the G20 and the Financial Stability Board, the Basel Committee on Banking Supervision recently put forward substantial proposals on capital and liquidity. They will result in more robust capital base, lower leverage, less cyclical capital rules and better control of liquidity risk.

Finally, the third ingredient is strong international cooperation. Ensuring more effective exchanges of information among supervisors in different jurisdictions and successful common actions is key in preserving financial integration, while avoiding negative cross-border spill-overs. Better resolution regimes are part of the efforts to ensure that the crisis of one institution does not impair the ability of the financial markets to provide essential services to the economy.

JEL Classification: G01, G18, G28.

Keywords: financial crisis, international cooperation, macroprudential analysis, procyclicality, prudential regulation, stress tests.

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1. Introduction

The financial crisis that began in 2007 has revealed a need for a new supervisory and regulatory approach designed to strengthen the system and contain the risk of future financial and economic disruptions. The approach needs to be of a macroprudential nature, since recent events have shown that even rational choices at the individual level can lead to negative systemic consequences. Regulation and supervision should aim at containing the procyclical nature of financial intermediation, its tendency to experience phases of boom and bust.

The roots of the crisis lie in the build-up of excessive leverage and unsustainable maturity mismatches, the latter largely concentrated in unregulated or insufficiently regulated financial intermediaries (the so-called shadow banking system). Financial innovation spurred the growth of opaque and complex financial products, whose fundamental value was difficult to assess. Excessive risk-taking was coupled with a relaxation of credit standards and buoyant credit expansion. The increased cross-border reach of financial institutions led to a high level of interconnection between different economies, further enhanced by common exposure to certain risk factors.

Three ingredients are needed to ensure financial stability: thorough analysis, better regulation, and international cooperation.

First, financial stability analysis must be enhanced to include the study of the different sources of systemic risk. Data coverage of the balance sheets of both non-bank financial institutions and the non-financial sectors should be increased. Moreover, to address the problems raised by the interconnections between financial institutions, more granular and more timely information on their exposures is needed. There must be greater integration of macro- and micro-information. However, since data collection and dissemination may be extremely burdensome, the benefits of new data should be carefully set-off against the costs. Financial stability analysis models – early-warning systems and stress-tests – are very important tools for the assessment of financial risks. However, models also need upgrading in various ways, for example through a better understanding of the interactions between the financial and the real sector of the economy and the design of more complete adverse scenarios against which to assess the resilience of the financial system. A fuller integration of the macro- and micro-perspectives is key for performing reliable simulations. Progress in communicating the results is also necessary.

The second ingredient for financial stability is the design of robust regulatory measures. Under the auspices of the G20 and the Financial Stability Board, the Basel Committee on Banking Supervision recently put forward proposals on capital and liquidity aimed at ensuring a more stable system in the future. They will result in more robust capital base, lower financial leverage, and better control of liquidity risk. Special attention is given to the debate on the various measures to reduce the procyclicality of financial intermediation:

banks should build up resources in advance of a crisis in order to withstand its impact and ensure that they are able to finance the economy adequately even during a recession. Even if there is consensus about the need for these measures, several technical questions still have to be resolved to ensure that their implementation does not disrupt the level-playing field among different institutions. This set of reforms requires maximum international convergence. Policy measures aimed at tackling the problems posed by systemically relevant financial institutions should also be adopted in each jurisdiction; however, differences in the financial systems call for minimum harmonization of these options with a peer review.

The third and last ingredient is international cooperation. Ensuring more effective exchanges of information among supervisors in different jurisdictions and more successful common actions is key in preserving financial integration while avoiding negative cross-border spill-overs. Better resolution regimes are part of the efforts to ensure that the crisis of one institution does not impair the ability of the financial markets to provide essential services to the economy.

2. The financial crisis: some stylized facts

The financial crisis that began in 2007 has revealed that significant vulnerabilities have been created by the profound structural changes that have taken place in the financial sector over the past decades. While observers did occasionally point out the risks that were accumulating, the actual financial system's exposure to various sources of risks was severely underestimated by financial institutions and public authorities alike. A number of different factors, acting both at the macro and at the micro level, contributed to this collective failure.

Structural changes in the financial sector preceding the crisis

In the two decades preceding the financial crisis, the volume and number of financial transactions in the world economy increased significantly. On the supply side, deregulation, ICT, financial innovation and continuous integration of markets at the global level greatly increased the range of products and widened the spectrum of risk-yield combinations, reduced transaction costs, created new markets and unified previously segmented ones. On the demand side, population ageing increased the share of savings invested in pension funds and insurance products, while easier access to credit boosted mortgages and consumer credit. With respect to the traditional model in which banks played a dominant role in financial intermediation, the weight of markets and non-bank institutions such as hedge funds, private equity funds and sovereign funds has increased considerably.

Banks underwent a profound transformation and reacted to the challenges posed by the development of markets by expanding their functions well beyond the traditional model of intermediation. They fragmented the activity of credit supply by selling outstanding loans to other financial operators through securitization. The transfer of securitized assets and their

short-term financing to off-balance-sheet vehicles (SIVs and conduits, in particular) made it possible to expand activities and leverage by diversifying (only apparently, as the crisis later showed) credit and liquidity risks and circumventing regulatory limits. The growth of derivative instruments was rapid. The CDS market, which went from zero to 44 trillion dollars in notional amounts in the space of ten years, created an entirely new definition of counterparty risk that was much more difficult to assess, evaluate and collateralize. On the liability side, banks diversified the sources of financing, resorting to wholesale markets and reducing the weight of traditional deposits. The distinction between different intermediaries vanished: banks became institutions supplying liquidity as well as a large range of highly complex products and services. Although the banks' share of total activity decreased they retained a central role in the economy while becoming more interconnected with the markets and among themselves.

The underestimation of risk

Under-pricing of risk. – At the macro level, risk premia in equity, real estate, government bonds and corporate debt markets reached historical minimums at different times during the ten years prior to the crisis. They declined continuously from the mid-eighties. There are structural reasons behind this trend: the deepening and broadening of global financial markets and more stable policy regimes, in particular for monetary policy, leading to lower macroeconomic volatility – and therefore risk (the Great Moderation).¹ But there were also transient, and thus less comforting, factors at work: lower volatility in the economy was partly due to 'good luck', i.e. a historically unprecedented decline in exogenous shocks. Coupled with the progress in financial intermediation, these developments generated benign conditions. However, the perception of safety was clearly exaggerated. Indeed, an optimistic view overestimated the true degree of risk dispersion and the benefits of diversification in credit markets, creating excessive confidence in the system's ability to absorb shocks. Moreover, protracted low interest rates may have fed an exaggerated appetite for risk, reinforcing the flawed incentives in risk management that played a pivotal role in the crisis. Indeed, the existence of a 'risk taking' channel – an impact of monetary policy on either risk perception or risk tolerance – appears to have some grounds in both theoretical and empirical research.² From a historical perspective, accommodating monetary policy has been found to be a key factor in many credit boom-bust cycles ending in crises.³ Protracted low interest rates associated with asset price booms – especially in housing – very low risk premia and buoyant credit growth should ring a bell to policy makers.

The expansion of leverage. – Low perceived risks and interest rates fostered a credit boom in the early 2000s in almost all the advanced economies.⁴ This trend was accompanied by an

¹ See Trichet (2008).

² See, among others, Jimenez et al. (2008).

³ See Calomiris (2008) and Bordo (2007).

⁴ See Hume and Sentence (2009).

exceptional increase in leverage in the international banking sector, facilitated by an overly favourable calibration of risk weights to calculate capital requirements on certain assets, particularly those included in banks' trading books. However, to look merely at the expansion of bank lending would be to underestimate the broader financial expansion that took place. A very important, if not the most important, feature of this broader trend was the fast development in some jurisdictions of the "shadow banking system" – largely unregulated financial institutions such as investment banks, hedge funds, SIVs, conduits and monolines – which increased the availability of non-bank credit to households and firms. This phenomenon was particularly strong in the US, where the credit granted by the shadow banking system reached nearly 120 per cent of GDP (elsewhere in the OECD it amounted to about 60 per cent). The SEC's relaxation in 2004 of pre-existing limits on leverage for investment banks contributed to these developments. Many of the shadow banking institutions were actually sponsored by banks and/or linked to them by the granting of explicit or implicit credit lines so that, as the crisis later revealed, overall risk was much more concentrated in the banking system than actually perceived by regulators, supervisors, and investors.

As experience has repeatedly shown, excess leverage makes the real economy more fragile in the face of adverse shocks by acting as an amplifying mechanism, magnifying the effects of liquidity and solvency shocks on the wider economy.⁵

Excessive risk-taking and relaxation of credit standards. – Financial institutions increased their risk exposure to potentially illiquid positions in many different national and international markets, sowing the seeds for a number of possible adverse developments. The deterioration of credit standards reached elevated levels in the market for subprime mortgages in the US, but by no means only there. Indeed, the underlying reason why problems in US subprime loans led to the broad-based macrofinancial crisis was the global nature of exposures to increasing risk aversion and deleveraging. When problems emerged in the specific US subprime market, this set in motion a process that ultimately led to a re-pricing of risk across all asset classes.

Among the factors that contributed the most to excessive risk-taking by financial intermediaries, observers have underscored:

- *Longer intermediation chain:* the increased distance between the borrower and the final holder of the loan under the OTD model of intermediation may have decreased the issuer's incentive to assess creditworthiness and monitor the loan.
- *Flawed incentives:* remuneration practices across the financial industry favoured strategies directed at short-term profits, disregarding the longer-term risks, and encouraged herd behaviour among financial traders. Due diligence by investors was insufficient and their reliance on rating agencies excessive. The latter have been involved

⁵ See Adrian and Shin (2008).

in severe conflicts of interest in their dual role as evaluators and advisors for issuers and investors.

- *Complexity and opacity of financial products:* securitization spurred the creation of complex structured products, such as CDOs, involving the pooling and tranching of risk. Pricing models for such products were poorly understood by investors and did not generally factor in tail events (such as a nationwide decrease in house prices in the US).

Excessive risk-taking was also facilitated by the regulatory framework. There were clear limits in the new financial context, allowing an apparent transferral of risk outside the banking sector and the growth of the shadow banking system. Moreover, arbitrage between different activities was possible in terms of capital absorption, with capital ratios not reflecting real leverage levels. The system of supervision was also clearly inadequate in some countries. The crisis started and propagated in sectors where there was little or no supervision.

Maturity mismatch and liquidity risk. – The structural changes in the banking industry contributed, in the years prior to the financial crisis, to boost liquidity in financial markets. Banks markedly increased the share of funding on wholesale markets relative to the share of traditional retail deposits, fostering “funding liquidity” (the ability to fund maturity transformation) with the creation of large and deep money markets. On the asset side, “market liquidity” (the ability to exchange assets for cash) also increased with the boom in securitization activity that had made banks’ investment portfolios (apparently, as the crisis has shown) more liquid by creating new markets for previously illiquid loans.

However, liquidity risk increased in tandem. Within wholesale market funding, the very short-term component (in particular overnight repos) was boosted, increasing the banking system’s reliance on shorter-term and more unstable sources of financing (compared with deposits that are insured) and the maturity mismatch between assets and liabilities. Moreover, as banks continued to be linked to off-balance-sheet vehicles by explicit or implicit back-up liquidity commitments and credit lines, the diversification of liquidity and credit risk away from the banking system was largely an illusion.

The fragility of liquidity markets played a crucial role in transmitting and amplifying the original shocks in credit markets. Following the first credit losses in the subprime mortgage markets in early 2007, market liquidity was drastically reduced as asset backed securities lost value and became illiquid. SIVs and conduits were unable to roll-over their debt and banks were forced to reabsorb impaired structured products on their balance sheets. Two different types of liquidity spirals set in: a loss spiral, as capital losses forced leveraged investors to sell their assets (in order to maintain their leverage ratio) while the amount that they could borrow suddenly declined; a margin spiral, as haircuts and margins rose and investors reduced their leverage and sold assets further reinforcing the loss spiral. Asset prices declined, further igniting panic and reinforcing the negative spirals (“fire sale

externality”).⁶ In addition, faced with increasing uncertainty about their own future liquidity needs, banks became increasingly unwilling to lend to each other and engaged in massive liquidity hoarding to the detriment of the interbank market.⁷ As a result, funding liquidity evaporated as well. Rising inter-bank rates and deleveraging of financial institutions exerted a strong spill-over on bank lending rates and credit supply to the rest of the economy. The liquidity externality becomes stronger and systemic the more institutions are interconnected. This systemic component of liquidity risk is neither internalized by individual institutions nor priced in markets.

3. Macroprudential analysis

The crisis has shown with dramatic clarity the need to strengthen the analytical tools used to gauge the build-up of systemic risks. The following two issues are now at the forefront of international attention. First, for a robust analysis, more timely and complete data are needed. The analysis should cover a wider array of intermediaries and economic sectors whose behaviour might potentially have systemic implications for financial stability. The crisis has shown that even in countries where banks have the lion’s share of financial intermediation, systemic contagion might come from other sectors of the financial industry (the case of the shadow banking system that played a key role in the unfolding of the recent crisis). The second issue concerns the need for better models in order to understand the interlinkages between different intermediaries (interconnection) and the relation between the financial and the real sector. These questions are on the agenda of policy makers at the international level and some initiatives are already at an advanced stage.

Both efforts to improve data availability and the models used should aim to take into account the interconnections between each financial institution and the system as a whole. In this respect, macroprudential analysis is justified by the observation that focusing on the stability of individual institutions is by no means sufficient for the stability of the financial system and the real economy.

More timely and complete data

The crisis has revealed the presence of important data gaps, in particular for largely unregulated sectors, that were at the core of the crisis. At the international level, under the coordination of the FSB and the IMF, work has rapidly begun to establish a clearer picture of the activity of other financial intermediaries and specific transactions, such as credit derivatives, that entail counterparty risk. The IMF/FSB recommendations presented in the Report to the G20 Finance Ministers and Central Bank Governors refer to the need to: i) better capture the build-up of risks in the financial sector by strengthening the international

⁶ See Brunnermeier (2009).

⁷ See Acharya and Merrouche (2009).

reporting of indicators on financial health, developing measures of leverage and maturity mismatches, and improving the coverage on risk transfer instruments; ii) improve data on international financial network connections for systemically relevant financial institutions, and increase information on cross-border flows, in particular with a view to better coverage of non-bank financial institutions; iii) monitor the vulnerability of domestic economies to shocks by strengthening the coverage of balance-sheet information in national economies, improve cross-country comparability of public sector statistics, and increase information on real estate prices; iv) improve the communication and dissemination of official statistics, thereby increasing the ability to monitor at the international level.⁸

Financial stability analysis uses a wide array of sources. Data based on publicly available information (market data) – such as spreads on credit default swaps (CDS) – are used as a proxy of the risk the market perceives for a given institution. These data incorporate the divergent views of investors and are available in a timely fashion. However, they may reflect phenomena other than risk, being influenced by the liquidity conditions in a particular market segment. Moreover, they could not reflect all the information, if some of it is not available to the market, for example owing to the complexity or opacity of the activity of a certain institution or market. Finally, market data are often available only for a subset of institutions (e.g. listed banks) and are biased by market expectations, for example giving a too optimistic picture in periods of buoyant activity. The IMF noted that market indicators such as equity volatilities and CDS spreads provided coincident, rather than forward-looking, indicators of the stresses in the system⁹ and that further analysis was needed in order to ascertain the predictive power of certain indicators.

Financial stability analysis should then be complemented by supervisory information. This is information collected at the micro-level. Supervisory activity also envisages the use of micro early-warning exercises, such as those available for the analysis of a bank's different risk profiles (liquidity, credit risk, organizational structure, etc.). Given these considerations, the use of both market and supervisory information clearly helps in building a more robust assessment.

Cross-fertilization between supervisory and macroprudential analysis is a promising avenue. In the words of Bernanke: “*We must combine a system-wide, or macroprudential, perspective with firm-specific risk analysis to better anticipate problems that may arise from the interactions of firms and markets.*” Recently, in some countries (e.g. the US and Italy) the use of thematic on-site inspections has proved to be a powerful instrument for assessing the relevance of common sources of risk and has allowed for a homogeneous assessment of risk across banks.¹⁰ Supervisory information has the notable advantage of being very

⁸ FSB-IMF (2009).

⁹ IMF (2009).

¹⁰ According to Bernanke (2009): “*For example, drawing on our experience with the recent capital assessment program, we have increased our emphasis on horizontal reviews, which focus on particular risks or activities across a group of banking organizations.*”

detailed and complete. However, in some cases it might be difficult to aggregate in order to obtain a systemic view of the build-up of risks. Moreover, accuracy comes at the cost of timeliness.

The ongoing reform of the European financial supervisory architecture provides for the enhancement of both macroprudential oversight and microprudential supervision. Moreover, it creates the institutional basis for the two functions to be carried out in an integrated fashion, exploiting synergies and achieving a better understanding of the build-up of risks for the financial sector.

The reform is based on two pillars: the first encompasses the scope of macroprudential supervision that will be entrusted to the European Systemic Risk Board (ESRB), a body closely linked to the European Central Bank; the second pillar includes the microprudential functions that will be allocated to three new European Supervisory Authorities (ESAs) – with sectorial competences – and to the National Supervisory Authorities, which will maintain responsibility for the day-to-day supervision of financial institutions.

The ESRB will conduct analyses of the European financial system, issue risk warnings and, if necessary, make recommendations for corrective interventions at European or national level. The ESAs will contribute to establishing common rules and consistent supervisory practices at European level (single rulebook), ensure uniform application of European legislation, promote consistent supervisory college operating procedures, and ensure a coordinated response by the authorities in emergencies. The ESAs will also manage shared databases by gathering the microprudential information needed for evaluation of the risks of the financial system, in cooperation with the ESRB. The proposed framework provides that the ESAs will have specific responsibilities and tasks in the monitoring and assessment of systemic risk; in coordination with the ESRB, the ESAs will develop a set of quantitative and qualitative indicators to measure systemic risk and an adequate stress test regime to help identify those institutions that may pose a systemic risk.

Analytical framework

What is in the toolkit of the financial stability analyst? The first point to make is that, looking at the various financial stability reviews – the ECB being a notable example¹¹ – a variety of tools are available. An incomplete list includes the results of stress tests, indicators of financial soundness, evidence collected from market intelligence and market data, the analysis of the balance sheets of the financial and non-financial sector, and qualitative information gathered through specific interviews or surveys on the topics that are deemed to be relevant at a particular juncture.

Financial soundness indicators (FSIs) are a set of indicators defined in a comparable way at the international level and currently disseminated by the IMF for financial stability

¹¹See ECB, Financial Stability Review, various issues. <http://www.ecb.int/pub/fsr/html/index.en.html>

analysis.¹² Work is already under way to improve and enrich the set of indicators. They are, however, a very important part of the macroprudential analysis and their availability at the country level increases the transparency and effectiveness of the oversight process.

Financial Stability Reviews are an important means of highlighting, for the financial community and the general public, the assessment of risks to the financial system. They contain more than a collection of information and analyses on the financial system and a very important section usually concerns the financial conditions of households and non-financial firms, whose behaviour impacts on financial intermediaries. Clearly, when a shock hits the financial system, the prospects for financial system stability will depend largely on the financial conditions of the non-financial sector, the ability of households to repay their debts, the profitability of non-financial firms, and the leverage of the non-financial sectors. For example, after a crisis has impaired the capital position of banks, it is likely that where the balance sheets of the non-financial sector are in a better shape – e.g. non-financial firms have an adequate amount of internal financial resources because they are profitable – the impact on the economy of deleveraging by banks facing capital pressure will be less severe than in countries where firms’ conditions are more fragile. Consequently, the negative feedback loop between the financial and the real sector will be less acute.

Analysis of the non-financial sectors, such as housing and commercial real estate, needs to be upgraded continuously, including with distributional data. Indeed, distributional aspects are one of the priorities for closing the data gaps that the crisis has revealed. When analysing the various indicators of financial conditions, taking account of their dispersion is a necessary step to properly assess stability. For example, we all know that an excessive leverage is a signal of stress in the economy. But the same average level of leverage can mask a different degree of heterogeneity; if the distribution has fat tails, even a “normal” average level of indebtedness of a specific sector can imply that there are important pockets of fragility in the economy. A robust financial stability assessment calls for the analysis of dispersion and this, in turn, implies the need to analyse data at the micro (individual or group) level.¹³

Better early-warning models

The aim of early-warning exercises such as those performed by the IMF and the FSB is to have a forward-looking perspective. Data and models able to anticipate the build-up of risks are needed. A variety of indicators and models should be used to form a clear picture of the outlook for the risks to financial stability. Early-warning exercises are part of this

¹²Johnston et al. (2009) provide a clear illustration and discuss the limits that these variables have shown in highlighting the build-up of risks in the last financial crisis, such as the limited predictive power of capital ratios for the future evolution of a banking system’s soundness.

¹³ See Hernando and Martínez-Carrascal (2003).

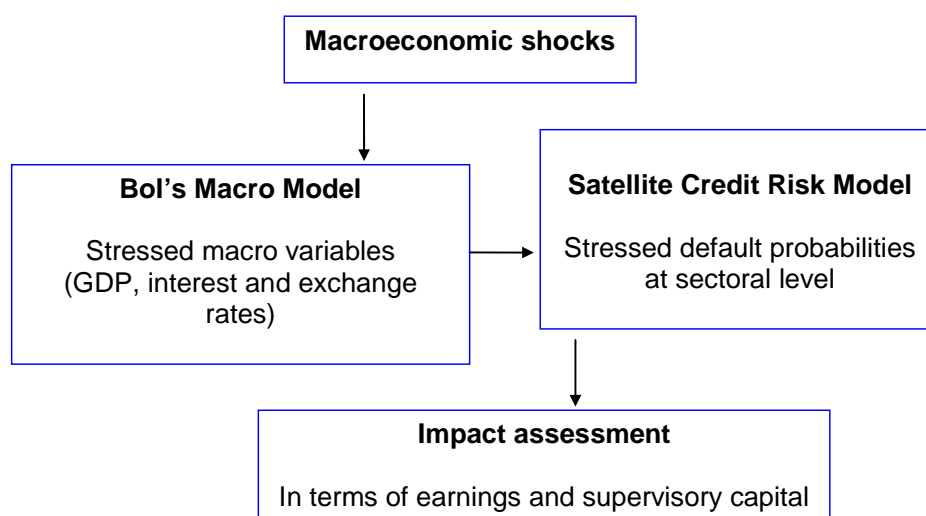
framework,¹⁴ together with the informed judgement of the policy maker. For example, monitoring delays in payments by borrowers or loans that are considered difficult to recover can shed light on the outlook for banks' balance sheets.

Stress tests have become a very important instrument for a forward-looking approach to financial stability analysis and are part of early-warning-like exercises. Stress tests are a way to gauge the resilience of the system, i.e. its ability to absorb potential exogenous shocks or shocks that stem directly from imbalances in the financial system itself.

In addition to being applied at the level of individual financial institutions' portfolios (micro level), as part of risk analysis, stress testing techniques have taken on an increasing role in the toolkit available to public authorities in financial stability analysis (macro level). The main goal of macroeconomic stress tests is to identify structural vulnerabilities in the financial system and to assess its resilience to shocks. In this respect, aggregate stress tests can usefully enrich the financial stability toolbox, mostly because they provide forward-looking information on the impact of possible extreme events. Furthermore, this kind of simulation allows the interconnections across economic sectors to be examined, capturing major risk sources for intermediaries and disentangling interactions across different risks (Quagliariello, 2009).

One example of stress tests is that performed at the Bank of Italy on credit risk with a top-down methodology (see chart below). A severe but plausible scenario for credit risk is imposed on the banking system and probabilities of default are quantified using econometric techniques. Macroeconomic projections on relevant variables that affect credit risk – such as real GDP growth – are fed through a satellite model that groups probabilities of default at the industry level. A very valuable input is the use of data on credit relationships available in supervisory records and in the Central Credit Register. An impact assessment in terms of loan losses is then derived by making hypotheses on the evolution of exposures and taking conservative measures of the losses that banks incur in case of default (LGD, loss-given-default). Coherent (with the stressed scenario) hypotheses on the evolution of banks' operating profits allow the part of losses covered by banks' internally-generated resources to be estimated and capital adequacy to be measured.

¹⁴ The International Monetary Fund (IMF) describes these exercises as follows: “*The Exercise draws on a broad range of analytical work as well as market information and expert opinions. These include a large empirical toolkit, market and country-specific insights gained through the IMF’s regular surveillance and crisis work, as well as consultations with market participants, academics, and country authorities.*” <http://www.imf.org/external/np/exr/facts/ewe.htm>



In another approach, often used as a complement to the top-down method, supervisory authorities define the macroeconomic shock (or a set of shocks), let the intermediaries evaluate its impact on their balance sheets, and then aggregate the bank-level outcomes in order to get the overall effect. This approach to stress testing is usually called bottom-up and has the advantage of permitting a richer set of information to be deployed – i.e. more granular on each bank’s exposure. However, aggregation of the results for macro financial stability purposes is often an issue.

In performing stress tests the macrofinancial analyst is confronted with a variety of complex problems; moreover, modelling techniques are still somewhat lacking as regards, for example, the inclusion of feedback effects in an increase in credit risk, lending supply and the macroeconomy.¹⁵ Macro stress tests performed before the last financial crisis had their own shortcomings, in particular as regards the insufficient severity of the scenario, the inability to appropriately model endogenous sources of risks – such as common exposures to a certain risky asset – or the presence of structural breaks.¹⁶ In the end, a vast majority of these models is linear and not able to take into account the materialization of extreme events. This suggests caution in interpreting the results and makes it advisable to use all available information (e.g. from market intelligence or gathered through micro level supervision) to form a clearer picture of the risks ahead. One relevant issue concerns the publication of stress test results. Financial stability reviews usually report the outcome of these exercises at the aggregate (banking or financial system) level, in order to give a macroprudential assessment of the system’s resilience to shocks. The recent experience with the capital assessment programme in the United States and the EU has shown that transparency to the public of individual stress test results is beneficial in reducing the uncertainty regarding the

¹⁵ For a survey of stress testing techniques, see Foglia (2009). For a comprehensive overview of stress testing methods and practical applications, see Quagliariello (2009).

¹⁶ See Alfaro and Drehmann (2009).

conditions of financial institutions. In order to have robust and comparable results, close interaction between the banks and supervisors is needed.

The discussion so far has shown that there is no “silver bullet” for macroprudential analysis. This, however, does not mean that modelling techniques should not be upgraded in order to create a robust analytical framework for early-warning and prevention of the build-up of financial imbalances. However, the crisis has clearly underlined the need to reinforce the regulatory system and to adopt a macroprudential approach in designing the new rules.

4. Macroprudential regulation

The rapid increase in credit growth and in asset prices observed in recent years points to the need to contain the procyclical behaviour of financial intermediation. This comes together with the need to mitigate the possible procyclical impact of Basel II capital regulation. This paragraph reviews the debate that eventually led to the proposals – expected to be finalized by the end of 2010 – to review the regulatory framework in order to mitigate procyclicality.

The procyclicality issue

During expansionary phases, banks may underestimate their exposure to risks, relaxing borrowers’ selection criteria and reducing the amount of provisions for future losses.¹⁷ After the peak of the cyclical upturn, customers’ profitability worsens, borrowers’ creditworthiness deteriorates, and non-performing assets are revealed, causing losses in banks’ balance sheets. This pattern is often coupled with a fall in asset prices that, in turn, further affects customers’ financial wealth and depresses the value of collateral. Consequently, banks tighten lending conditions and a reduction in credit supply occurs. External financing for non-financial firms and households becomes more difficult to obtain, leading to a contraction in spending that exacerbates the recession.

Prudential rules to ensure that banks hold a minimum amount of capital can exacerbate this tendency and reinforce cyclical effects. In a recession, the number of borrowers that are not able to honour their financial obligations increases, reducing banks’ revenue and calling for higher levels of loan-loss provisions, which should be aligned with the increasing default rates. If banks’ profits are not sufficient to cover the extra credit losses due to the downturn, banks need to deplete capital.

Basel II makes minimum capital requirements more sensitive to the risk of banks’ portfolios. This is obtained by using risk parameters (i.e. probability of default, loss-given-default, and exposure at default, which measure the expected loss and, via the supervisory formula, determine the unexpected loss) that may be affected by the economic conditions. In

¹⁷ See Borio, Furfine and Lowe (2001).

such a framework, the cyclical effect is not transmitted merely through the absolute level of capital, but also via the change in the risk of the assets held in banks' portfolios, measured by the migration of customers across rating buckets, thereby increasing capital needs at the very moment when losses due to the recession are reducing capital. This, in turn, exacerbates the negative effect on a bank's ability to finance the economy.

*The debate after the crisis*¹⁸

In April 2009, the G20 leaders agreed on the need for a financial system with better quantity and quality of capital, and less procyclicality. Against this background, considerable effort has gone into giving operational content to the principle that banks must build up buffers in good time and release them in a recession. Various policy options have been considered to meet this goal. In what follows, we report the main proposals – with their pros and cons – that helped the Basel Committee to define its present package of measures.

Binding rules on the estimation of probabilities of default (PDs). – In most rating systems, the PDs are assigned in a two-stage process. First, an individual PD is assigned to a counterparty (PD assignment); next, counterparties are assigned to rating grades and a PD is estimated for each rating grade (PD quantification). The latter is used to calculate the minimum required capital for each exposure. Procyclicality can result from (i) migrations (i.e. individual counterparties are assigned better or worse PDs as the cycle improves or deteriorates), and from (ii) recalibration of rating grade PDs (i.e. rating grade PDs are updated as the cycle reverses), or from a combination of the two. In Point in Time (PiT) rating systems, banks seek to estimate default risk explicitly over a limited future period, typically one year, looking at current conditions. In such systems, the role of factor (ii) above as a driver of procyclicality will typically be negligible, whereas factor (i) will be important: in a downturn, a large number of borrowers will migrate to worse grades, resulting in higher IRB capital requirements (and vice versa in an expansion). By contrast, in Through the Cycle (TTC) rating systems, debtors are assigned to rating grades based on evaluations of their ability to remain solvent at the trough of a business cycle or during stress events. Thus, migrations to different rating grades are rare and their role as a driver of procyclicality tends to be negligible. In TTC systems, some volatility of capital requirements might derive from factor (ii), as actual defaults do vary throughout the cycle. The table below summarizes the impact of different rating systems on the cyclicity of the minimum capital requirement.

¹⁸ This section draws also on Angelini, Enria, Neri, Quagliariello and Panetta (2010).

Degree of minimum capital requirement volatility	Statistical PD attached to individual borrowers is PiT	Statistical PD attached to individual borrowers is TTC
Grade-PD based on short-term average of default rates (not allowed by the EU Capital Requirement Directive)	+++	++
Grade-PD based on long-term average of default rates	+++	+

Basel II favours TTC rating systems, but it does not force banks to adopt them. In Europe, for instance, most banks have implemented hybrid solutions, including both point-in-time and through-the-cycle components. Therefore, requiring banks to adopt TTC systems seems a straightforward way to reduce procyclicality induced by capital regulation.

Strengthening stress tests. Another option, which can be combined with more TTC ratings, is to strengthen Pillar 2 provisions, particularly stress tests. In fact, bank supervisors already have the duty to assess capital adequacy in the light of analyses of the economic cycle and of macroprudential concerns. In particular, Pillar 2 gives supervisors the discretion to require banks to increase capital resources above the Pillar 1 minimum. While not limited to this purpose, Pillar 2 rules have also been designed for reducing cyclicality (this is the reason why stress tests should consider, at the least, the impact of a recession on capital adequacy). Banks can be required, for instance, to run stress tests based on common recessionary scenarios set by supervisors and adjust their capital buffers according to the results.

Time-varying capital functions. – Basel II prudential discipline aims to ensure that the probability of default of a single bank stays below a given threshold, regardless of economic conditions.¹⁹ The time invariance of the rule implies that in a recession the objective of reducing a bank’s probability of default is over-weighted and that of keeping sufficient credit flows to the economy under-weighted (and vice versa during expansions). It has been suggested that a policy maker who cares about both objectives could adopt confidence intervals that change over the business cycle.²⁰ Another option is the adjustment of the asset correlation parameter: the correlation would be adjusted downwards in bad times and upwards in booms.

Smoothing the output of the capital function. A way to reduce the procyclicality of regulation while preserving the informative value of PiT rating systems would be to smooth the output of the capital requirement formula,²¹ either through an autoregressive time-series

¹⁹ For example, if banks are required to hold enough capital to absorb losses that may emerge in a one-year horizon at a 99.93 per cent confidence level, the result is a probability of default over the same time-horizon equal to 0.07 per cent.

²⁰ See Kashyap and Stein (2004).

²¹ See Gordy and Howells (2006).

filter that smoothes capital requirements at the individual bank level²² or by applying a non-bank-specific, time-varying multiplier (higher than one in good times and smaller than one in bad times) to the output of the regulatory formulae; this multiplier could be linked, for example, to equity values or to credit growth and should be announced in each period by the national regulators and applied to all banks within their jurisdiction.²³

An alternative approach for dealing with cyclicity is to rely directly on risk-sensitive variables, which are able to maintain the beneficial incentives to better risk management offered by Basel II. The Committee of European Banking Supervisors – CEBS – for instance proposes a simple mechanism for measuring the gap between banks’ capital needs in recession and in normal times.²⁴ Since the probabilities of default are the greatest source of cyclicity in banks’ rating models, the CEBS proposes using mechanisms that rescale PDs estimated by the intermediaries in order to incorporate recessionary conditions. In practice, the methodology would be based on the application of an adjustment which reflects the gap between current PDs and PDs corresponding to recessions. By construction, the size of the adjustment decreases in a recession and increases in expansionary phases. Capital needs commensurate to adjusted PDs would serve as a benchmark for supervisors when assessing the adequacy of Pillar 2 buffers.

Countercyclical provisioning. In order to restrict the possibility for managers to use provisioning as a profit-smoothing tool, current accounting standards allow banks to provision only at the very moment when losses are actually incurred. This can have a procyclical effect, as losses do materialize in bad times and the induced increase in provisions would constrain banks’ ability to lend.

So far, though, the only practical example of countercyclical provisions in the EU is the Spanish system of dynamic (or “statistical”) provisioning. The Spanish approach links provisions to banks’ historical loan loss experience. Another possible mechanism for correcting this rules-driven procyclical effect would be to align provisions to expected losses. This proposal has been sketched by the International Accounting Standards Board (IASB). In particular, provisions should reflect losses that banks estimate will be produced by a portfolio of loans, to be recognized in the income statement on an accrual basis or at origination. Such provisions would then be changed through time to reflect updated estimates of expected losses. The model would require the calculation of the net present value of expected cash flows (contractual cash flows less expected credit losses).

²² This way shocks are absorbed into the regulatory minimum over several years rather than all at once.

²³ More specifically, Gordy and Howells (2006) mention a multiplier tied to a moving average of the aggregate default rate for commercial bank borrowers. Repullo et al. (2009) propose a multiplier based on the deviation of GDP growth from trend. Brunnermeier et al. (2009) propose to use credit growth. Himino (2009) proposes equity prices.

²⁴ See CEBS (2009).

Discussion of the policy options

All the approaches presented above have pros and cons. For instance, requiring banks to use TTC rating systems does not seem either feasible or desirable. Indeed, TTC ratings would impair the comparability across time of the capital requirement and would make it difficult to infer changes in portfolio risk from changes in banks' capital ratios;²⁵ moreover, they are poorly suited for internal pricing and risk management purposes and may fail the “use test” provided for by the Basel II framework, which envisages that risk estimates used for the calculation of capital requirements are effectively employed for internal risk management purposes.

Attempts to modify some elements of capital functions – for instance introducing time-varying confidence levels – would imply new and lengthy calibration analyses.

Establishing a link between capital requirements and forward-looking measures of economic conditions, such as equity prices, could have useful countercyclical properties, but would also make capital requirements heavily dependent on the volatility of stock prices.²⁶ Furthermore, market variables such as stock prices or spreads on credit default swaps are not necessarily robust indicators of credit cycles for jurisdictions where banks are mainly involved in retail segments and loans to small and medium enterprises and relevant markets are less liquid. Using macroeconomic indicators (GDP growth) may have drawbacks due to publication delays and revisions.

Smoothing the output through autoregressive mechanisms may create perverse incentives for intermediaries. In fact, a weak bank may be encouraged to increase portfolio risk rapidly (gambling for resurrection) because required capital would adjust only slowly. Moreover, the calibration of the speed of adjustment would pose practical challenges. In fact, the timing of capital restoration after a crisis would largely depend on the choice of this parameter, which may be difficult to estimate.

More importantly, in our view, the variants discussed so far share a main drawback: as they define aggregate, system-wide adjustments, they are unable to capture the specific features of individual banks. For instance, the proposed adjustments would fail to discriminate between banks with more TTC or PiT approaches. Reliance on TTC estimates would thus be discouraged as, although capital requirements calculated on the basis of TTC PDs would not be sensitive to cyclical conditions, the bank would in any case be required to build up buffers in the same amount as banks using more procyclical measures of credit risk.

The proposal put forward by the CEBS is bank-specific, so that the adjustment is consistent with the riskiness of the portfolio; it is based on risk-sensitive conditioning variables and therefore meets the incentive structure provided for by Basel II – banks adopting TTC rating systems would be required to hold lower buffers than those adopting

²⁵ See Gordy and Howells (2006).

²⁶ Other financial variables (such as spreads on credit default swaps) are likely to suffer from similar problems.

PiT systems, which would face more sizeable adjustments, consistently with the more pronounced fluctuations of minimum capital requirements over the cycle. More generally, the approach does not require any calibration of the buffer; in fact, each bank would be required to hold buffers consistently with the cyclicity of its capital requirements: if cyclicity is a small problem, the solution will be small and vice versa. There are also some shortcomings. First, this approach addresses the procyclicality of capital regulation, but does not lead to truly countercyclical capital buffers. In fact, the buffers will move through the cycle to compensate for the fluctuations of risk-sensitive capital requirements, bringing the Basel II framework close to Basel I: the sum of capital requirements and capital buffers will turn out to be flat throughout the cycle. If countercyclicality were deemed desirable, other tools would have to be introduced, ones that allow capital to be freed in recessions. Second, the proposal might lead to wrong outcomes for banks that experience significant structural changes in portfolio composition – e.g. through M&As – and would face requirements based on past measures of risk that were no longer significant.

Countercyclical provisioning does not directly amend the procyclicality of capital requirements, but could contribute to the building up of resources in good times, to be used to shelter loan losses during recessions. Attention needs to be paid to the technical specification of the instrument, though. For instance, the proposal put forward by the IASB would be based on the banks' internal estimates of expected losses. Such specification would risk being procyclical, as it would generate more frequent changes in provisioning for banks relying on PiT estimates of credit risk: for those banks, provisions would indeed continue rising during downturns, thus restricting banks' lending capacity, while their low levels during upswings would contribute to sustained profits and lending booms. In the case of TTC estimates, the mechanism would work better, but would nonetheless limit the procyclicality of provisioning, without really contributing to the build-up of countercyclical buffers.

The proposals of the Basel Committee

Since, as described above, no single tool is able to address adequately all the aspects of procyclicality, the Basel Committee has opted for a set of tools which should ideally complement each other. More specifically, the proposal aims at: i) dampening any excess cyclicity of the minimum capital requirement; ii) promoting more forward-looking provisions against losses; iii) inducing banks to conserve capital to build buffers that can be used in stress; iv) achieving the macroprudential goal of protecting the banking sector from periods of excess credit growth.

Instruments to achieve the objective under i) could include following the CEBS's approach of adjusting for the compression of probability of default (PD) estimates in internal ratings-based (IRB) capital requirements during periods of benign credit conditions by using the PD estimated for a bank's portfolios in downturn conditions. Addressing the same issue, the UK Financial Services Authority (FSA) has proposed an approach aimed at providing

non-cyclical PDs in IRB requirements through the application of a scalar that converts the outputs of a bank’s underlying PD models into through-the-cycle estimates.

Stronger provisioning practices (objective ii) would result from revised accounting rules that allow an expected-loss approach to be followed and that are not limited – as now under current accounting rules – to incurred losses.

The capital conservation buffer proposal (objective iii) is based on the idea of constraining dividend distribution or bonus payments to bank managers in order to meet a predefined solvency target. The farther the actual solvency level is from the target, the tougher will be the limits to payout ratios.

Objective iv) is explicitly macroprudential. The Basel Committee has developed a mechanism which would adjust the capital buffer range when there are signs that the economy is overheating, for example when credit has grown to excessive levels with respect to the long-term trend. This will ensure that banks build up countercyclical capital buffers in times of euphoria, increasing their ability to absorb losses in a downturn. The debate on the mechanism for building up/reducing the buffer echoes that on rules versus discretion in monetary policy. The main issue concerns whether the identification of bad and good macroeconomic times should be based on the dynamics of predefined indicators or left to the judgment of public authorities. In conditions of uncertainty, discretion is needed to allow for the right amount of flexibility. However, this can lead to opacity in the decisions made by regulators, raise level-playing-field issues and reinforce political pressure, thereby inducing forbearance. Also, discretion-based policy responses may provide wrong signals and trigger self-fulfilling prophecies. Under rule-based frameworks, any policy reaction would be left to predefined automatic mechanisms and triggers. This would avoid time-inconsistency, but the design of the set of rules may be extremely difficult, particularly for a brand new policy, which should be applied world-wide.²⁷

All the proposals were agreed by the Governors and Heads of Supervision (GHoS) of the BIS in September 2010, along with the calibration of the minimum requirements and buffer. The table below summarizes the new requirements: the capital conservation buffer will be set, after a phasing-in period, at 2.5 per cent of risk-weighted assets; the countercyclical buffer will also be required to reach 2.5 per cent at the peak of the credit cycle. While the former is expected to be met with common equity capital, the GHoS press release seems to leave some room for other instruments – such as contingent capital – for the latter. Tools for smoothing the cyclicalities of the minimum requirements will be implemented under Pillar 2.

	Common equity	Tier 1 capital	Total capital
Minimum Capital Requirements	4.5%	6%	8%
Capital Conservation buffer	2.5%		
Countercyclical buffer		2.5%	

²⁷ See Libertucci and Quagliariello (2010).

5. The international dimension

The crisis has shown that even economic systems with relatively well capitalized banks can be adversely affected by the externalities created by the failure of large cross-border institutions. This opens two issues: i) what policy measures could be set in place to reduce the negative externalities for the system of such a failure? ii) how can we induce a more consistent enforcement of the existing rules, to avoid weak supervision in one country negatively affecting stability in other countries and in this way reduce ex-ante the possibility that risks are built up?

An adequate resolution framework, accepted by public authorities, market participants and stakeholders, should reduce the negative spill-over effects from the crisis of large financial intermediaries (issue i). A proper resolution plan should ensure that the firm is able to provide the authorities with all relevant data – even under conditions of stress – in order to allow the best resolution option to minimize social costs, provide better depositor protection, and ensure market integrity; clearly describe all legal inter-linkages between different entities within the group in order to allow a prompt and effective dismantlement of single business units, shielding the sound from the problematic; provide a clear and detailed list of all market/infrastructures with which the firm is (heavily) interconnected so as to allow for an orderly disconnection. The consequence of better resolution mechanisms would be to reduce the systemic relevance of these institutions and the associated moral hazard. In this way, the social costs of the failure itself would also be minimized.

In order to limit the systemic impact of large financial institutions, resolution regimes should be able to prevent failure from producing system-wide disruption; they should allow the continuity of essential services and orderly reduction or transfer of critical functions performed by the institutions. To this end, the authorities should have the power to apply different types of resolution options to different components of the firm and initiate a wind-down for operations not of a critical nature. Legal and operational frameworks should include both “going concern” resolution options, which may consist in a restructuring of a firm’s capital and/or liabilities, and “gone concern” resolution options, which end a firm’s legal existence while ensuring continuity of all or part of its operations or winding them down in an orderly fashion. National authorities should be empowered to restructure the firm by either applying haircuts or forcing partial debt-to-equity conversion for uninsured creditors. Should it prove impossible to restore the viability of the groups (or some of their vital components) through the above option, the authorities would also have the power to remove the management and appoint special administrators. Special administrators should be in a position to actively manage the firm and take the necessary action to keep the bank as a going concern (e.g. by arranging mergers with solvent institutions or establishing a bridge bank). To make these options workable in a cross-border context, cooperation and mutual trust between authorities from different jurisdictions are crucial; moreover, increased harmonization of national supervisory powers, intervention tools and resolution procedures deserves proper consideration.

The global nature and scale of the financial crisis has emphasized the need for internationally-coordinated action to address the problems and weaknesses at its root, in particular those relating to financial regulation and supervision (issue ii above). Against this background, the G20 has decided to provide the Financial Stability Forum – now the Financial Stability Board – with an institutional basis and broaden both its membership and its mandate. Such measures are designed to strengthen the effectiveness of the FSB as a mechanism for national authorities, standard-setting bodies (SSBs) and international financial institutions to address vulnerabilities as well as to develop and implement strong regulatory and supervisory standards and other policies in the interest of financial stability.²⁸

The FSB membership has been enlarged to include all G20 countries, plus Spain and the European Commission. This enlarged composition reflects the growing importance of financial markets and intermediation in emerging economies and the need to give these countries the opportunity to contribute to the shaping of international policies and regulation.

The FSB's mandate encompasses new activities, such as a) monitoring market developments and their implications for regulatory policy; b) advising on best practices in meeting regulatory standards; c) carrying out joint strategic reviews of the policy development work of the international standard-setting bodies; d) developing guidelines to support the establishment of supervisory colleges; e) managing contingency planning for cross-border crisis management, especially with respect to systemically-important firms; and f) carrying out Early Warning Exercises in collaboration with the IMF.²⁹

To respond to a call by the G20 Leaders at the April 2009 London Summit the FSB recently launched an initiative aimed at promoting global observance of international financial standards, in particular the BCBS, IOSCO and IAIS core principles. The programme includes the identification of non-cooperative jurisdictions which will be assisted in improving their level of compliance with international standards. The global nature of financial markets requires strong and smooth cooperation between supervisors, while the supervisory experience shows that there are many countries and territories which are still unable or unwilling to cooperate.³⁰

The FSB also agreed on a toolbox of measures including both positive (e.g. capacity-building measures) and negative incentives. In particular, if a jurisdiction is unwilling to cooperate with the FSB process, the toolbox provides for its disclosure from the end of 2010. The FSB may also call upon its members to take stronger measures against non-cooperative jurisdictions, including sanctions such as restrictions to market access and cross-border transactions.

²⁸ G20 Leaders' Statement - The Pittsburgh Summit, September 24–25 2009.

²⁹ See FSB Charter (2009).

³⁰ As the FSB (2010) points out, “weaknesses in cooperation and information exchange can undermine the efforts of regulatory and supervisory authorities to ensure that laws and regulations are followed and that the global operations of the financial institutions for which they have responsibility are adequately supervised”.

The initiative on non-cooperative jurisdictions is part of a wider FSB framework for the promotion of global adherence to international standards. Within this framework FSB members are called on to “lead by example”. This means that FSB countries should be strongly committed to implementing financial standards and participating in international assessments – especially in the IMF’s Financial Sector Assessment Program (FSAP). Furthermore, members will be involved in periodic peer reviews focusing on the implementation and effectiveness of international financial standards and policies agreed within the FSB.

The FSB initiatives aim to bring a “race to the top” into the regulation and supervision of financial institutions. Regulatory arbitrage allowed financial institutions to expand their business across jurisdictions, hampering supervisors’ ability to oversee banks’ worldwide business. Differences and inconsistencies in the implementation of regulatory standards also affect the international level playing field as they give competitive advantage to institutions and market places that are less regulated. During the financial crisis well-regulated and soundly-supervised institutions proved more resilient to systemic turmoil and in some cases survived without public support.

Cooperation between supervisors may help to strengthen the observance of prudential standards also by spreading the application of best supervisory practices across jurisdictions. Colleges of cross-border financial groups are seen as a fundamental means to serve these goals, and in accordance with the G20 and FSB recommendations such structures have now been set up for the main international institutions. As the Basel Committee points out in a document recently issued for consultation,³¹ colleges are primarily meant to help supervisors develop a better understanding of the risk profile of international groups. Indeed, information exchange and cooperation between supervisors are not only necessary to strengthen consolidated controls, they may also prove of assistance to host authorities in performing their duties with respect to local components of international groups, i.e. by widening the scope of analysis and providing additional tools based on the practices developed by other supervisors.

Supervisory colleges build on the experience gained through cooperation in the implementation of Basel II, in particular in model validation. They are now expected to evolve into stable fora for discussion of broader issues and to develop supervisory approaches based on cooperative work. According to international principles, the colleges should have flexible structures reflecting the complexity of the group and the needs of individual supervisors. As pointed out at the G20 level, the membership of colleges should ensure a proper representation of the host countries, including – where appropriate – those of emerging economies. Supervisors that are not core members in the colleges of a specific institution should be placed in a position to have the information needed for the performance

³¹ Basel Committee on Banking Supervision (2010).

of their duties.³² Confidentiality arrangements are necessary to assist the members of a college in improving the quantity and quality of information sharing; to this end, more convergence of national legislations as regards secrecy and gateways would help supervisors to build mutual trust and would make it easier for them to reach confidentiality arrangements.

There is broad consensus at the international level on the benefits of cooperative work within the supervisory colleges, especially in core activities such as risk assessment, stress testing and model validation. These benefits pertain in particular to the efficiency of supervisory processes; collaborative work reduces the burden on supervisors and regulated entities by avoiding duplication of efforts, enhances the quality of oversight through the allocation of skills and expertise, and contributes to the improvement of supervisory approaches.

More recently, international policy makers have started to consider a possible key role for the colleges in crisis management and macroprudential analysis. Colleges cannot work as substitutes for other, more specific structures tailored for crisis management, i.e. cross-border resolution groups that also gather ministries of finance and central banks. Nonetheless, colleges could play a complementary role, for instance by facilitating information sharing and the development of contingency plans. Finally, colleges of supervisors may play a crucial role in identifying the risks arising from large, systemic international institutions because they bring together supervisors on a global basis; they may also serve as a mechanism for collecting information for macroprudential analysis. Currently, risk assessments are conducted according to a bottom-up approach, which combines analyses of individual risks with controls and oversight of risk management processes in order to obtain an overall risk assessment for credit, liquidity, market, operational, and legal risk. Going forward, risk assessments are expected to include a top-down macroprudential perspective that would enable systemic issues to be identified.

The EU experience of supervisory colleges has reached an advanced stage; amendments to the European directive on capital adequacy (CRD) have now made it compulsory to establish colleges for all the European banking groups by the end of 2010. EU legislation and the CEBS implementing guidelines provide details on the information to be exchanged within the college and on joint decision-making in the field of model validation and Pillar 2 assessment. Furthermore, the ongoing reform of the financial architecture in Europe envisages an important role for supervisory colleges within the European System of Financial Supervision. In particular, they will be asked to contribute, together with the new European supervisory authorities and national supervisors, to the definition of a more harmonized framework, in particular by developing convergent high quality supervisory practices to be further transposed into European legislation.

³² See G20 (2009).

6. Conclusions and open issues

Intense efforts are underway at the international level to reform the framework of financial regulation, in particular for capital and liquidity measures. This paper has discussed how the reforms should be complemented by macroprudential analysis, in particular as regards better data coverage on the financial system and robust models.

Some indications on how operational content could be given to the concept of macroprudential supervision and regulation are also provided. It should be clear from the discussion that progress has been made on both fronts, but that there are still open issues for which international cooperation is needed.

A first issue concerns data availability for macroprudential analysis. This is particularly urgent for unregulated financial intermediaries, which have been at the centre of the financial crisis. The G20 recommendations to close the data gaps give emphasis to the need for more timely and granular information on this part of the financial sector, its leverage, and maturity mismatches. How can these recommendations be made operational? How will different jurisdictions cope with the need for better monitoring of non-bank financial institutions?

Stress tests are a very important tool for assessing the financial system's resilience to shocks. The main issues here concern the frequency of these exercises; the severity of the scenarios and their plausibility; the discussion of the results with banks' management; the need to ensure that the stress scenarios are applied in a consistent way by different institutions when the bottom-up approach is used (an area in which there is clear scope to better integrate the micro- and the macro-approach to financial supervision); and communication of the results to the public.

A common international framework for financial regulation has been discussed. General rules regarding capital, liquidity and leverage require maximum harmonization at the international level. For other measures, such as those concerning systemically relevant banks, national specificities will remain due to differences in the structure of the banking and financial markets. What is the best way to take into account these heterogeneities without compromising the international consistency of rules and the level playing field?

The presence of systemic institutions that are internationally interconnected reinforces the need for cooperation at the international level. This issue is of particular importance in economies with a large presence of foreign banks. Some of these institutions might not be systemic at the international level, but could represent a source of systemic risk in some of the economies where they operate. The question concerns the ways in which national supervisors could contain the negative impact of the failure of one of these institutions.

The measures that are being discussed for systemically relevant financial institutions range from stricter supervision to the introduction of capital surcharges, to tax levies and to the use of contingent capital and restrictions on the breadth of banking activities. The effectiveness and the economic impact of these measures will also depend on the structure of

the financial system in each jurisdiction. How should the assessment of the optimal mix of these measures be performed?

Banking crises impair the ability of households and non-financial firms to access external finance. The reforms to contain procyclicality discussed in the paper aim to reduce the likelihood that banks cut their lending sharply in a recession. However, the question is whether these regulatory reforms are sufficient. Or are more structural reforms to further develop market-based finance needed in order to reduce the impact of a banking crisis?

Since some macroprudential tools are likely to be discretionary, it is crucial that national authorities adopt homogeneous approaches in the exercise of discretion and ensure a credible and consistent implementation of the new rules. Accordingly, countercyclical tools to be implemented under Pillar 2 will also require greater harmonization in order to avoid an uneven playing field across jurisdictions.

Peer reviews, supervisory colleges, more binding international standards are key elements of future regulation; they deserve our attention and increasing efforts in the future.

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