



BANCA D'ITALIA  
EUROSISTEMA

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(Occasional Papers)

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conflicts, complementarities and trade-offs

by Paolo Angelini, Sergio Nicoletti-Altimari and Ignazio Visco

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# MACROPRUDENTIAL, MICROPRUDENTIAL AND MONETARY POLICIES: CONFLICTS, COMPLEMENTARITIES AND TRADE-OFFS

by Paolo Angelini, Sergio Nicoletti-Altimari and Ignazio Visco\*

## Abstract

We review the recent literature on macroprudential policy and its interaction with other policies, extracting several points. First, there are externalities in the financial sector, often in the form of excessive credit growth. Second, monetary policy needs to take financial stability into account. Third, macroprudential instruments can moderate the financial cycle. Finally, there are complementarities between monetary and macroprudential policies, but also potential conflict. We then relate these points to recent events in the euro area where, following the sovereign debt crisis, a retrenchment of finance within national borders is taking place, amplifying the divergences across economies. We argue that in principle national authorities would like to adjust macroprudential instruments to compensate for the highly heterogeneous financial conditions, but at present they have little leeway to do so, since in the run-up to the crisis insufficient capital buffers had been accumulated. Various factors may explain low bank capitalization levels worldwide. We discuss the role of risk-weighted assets, which may have inadequately captured actual risks in many jurisdictions; we also document that European and US banks' capital ratios decline monotonically with bank size. This confirms that key features of the microprudential apparatus are crucial for preventing financial instability.

**JEL Classification:** E44, E58, E61.

**Keywords:** macroprudential policy, monetary policy, capital requirements.

## Contents

1. Introduction.....	5
2. Current modelling approaches to macroprudential policy.....	7
3. Macroprudential and monetary policies: lessons from recent experience.....	14
4. Macroprudential and microprudential policies.....	19
5. Conclusions.....	25
References .....	28

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## 1. Introduction

Following the outbreak of the financial crisis in the summer of 2007, the reforms of the regulatory framework aimed to address financial instability and introduced macroprudential authorities in many jurisdictions. As these authorities commence operations, the question of how macroprudential policy will interact with monetary, microprudential and fiscal policies has inevitably come to the fore.

A broad consensus has emerged around the idea that macroprudential policy should address systemic risk – externalities which, if unheeded, could jeopardize financial stability. However, this remains a somewhat elusive concept, hard to measure and identify. Furthermore, we still lack a well defined analytical apparatus and operational definitions of the objectives and instruments of macroprudential policy. Indicators and early warning signals are available, but a coherent framework to interpret them, to assess the need for intervention and to measure the effectiveness of the policies adopted is still lacking. This applies both to the time-series dimension of systemic risk (linked to procyclicality, the accumulation of risk over the business or the financial cycle) and to the cross-sectional dimension (linked to the distribution of risks across intermediaries that may exacerbate vulnerabilities for any given amount of time-varying risk).<sup>1</sup> A related problem is that the set of candidate macroprudential instruments, their effects and interactions – among themselves and with other policies – are in need of more in-depth analysis.<sup>2</sup>

In the next section we review the recent attempts to analyse macroprudential policy and its interaction with other policies, in particular monetary policy. Notwithstanding the advances made, the analytical framework remains far from complete. On the one hand, most of the existing macroeconomic models used to study and simulate macroprudential tools still fail to incorporate operational definitions of systemic risk, the very problem which macroprudential policy should address. On the other hand, models that attempt to incorporate systemic externalities are computationally highly intensive and are

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<sup>1</sup> For a discussion of these two aspects, see Borio and Crockett (2000), Borio, Furfine and Lowe (2001).

<sup>2</sup> See, for example, the Bank of England (2009 and 2011) and Borio (2010).

necessarily formulated at a level of abstraction that makes them unsuitable for policy analysis. Moreover, many of the effects associated with asset price misalignments and financial crises are highly non-linear. This is at odds with the current generation of macro models, which relies heavily on linearization techniques. Such non-linearities may be of a kind that are particularly difficult to deal with, i.e. linked to regime shifts and discontinuities in economic relationships. These difficulties represent a challenge for future research.

Several important points emerge from our reading of the literature. First, the most recent theoretical works have identified sources of externalities in the financial sector, often in the form of potentially excessive credit growth. This finding squares well with recent experience and provides a rationale for macroprudential policy. Second, the conduct of monetary policy needs to take into account financial stability because the latter is a necessary condition for price stability and because, by doing so, it may improve its performance in terms of output and inflation variability. Third, countercyclical macroprudential instruments (time-varying capital requirements or provisioning, loan-to-value ratios, etc.) tend to be effective at moderating economic fluctuations and the financial cycle, although with a number of caveats and uncertainties. Finally, there are complementarities between monetary and macroprudential policies, but also a potential for conflict. This calls for institutional arrangements that favour cooperation and synergies between the two policies.

In sections 3 and 4 we try to relate these key messages to recent events, in particular in the euro area against the backdrop of the unfolding sovereign debt crisis. We argue that in principle national macroprudential authorities would want to adjust countercyclical instruments to compensate for the highly heterogeneous real interest rates that have recently materialised in various euro-area countries. However, at present there is very little room for manoeuvre for such policies: in the run-up to the crisis insufficient capital buffers had been accumulated and, also due to market pressures, it is now difficult for macroprudential authorities, especially in the countries with weak sovereign debt conditions, to credibly call for lowering prudential requirements. It follows that there is not, at present, any issue of conflict between macroprudential and monetary policies; by the same token, neither is there any conflict with microprudential policy.

Why was bank capital so low at the start of the financial crisis? Several factors, linked to the regulatory framework and supervisory practices, may have played a role in preventing the build-up of adequate capital buffers. We discuss the role of risk-weighted assets (RWAs); our evidence suggests that the underlying methodologies may have been unable to adequately capture the actual risks borne



by banks, confirming that the key features of the microprudential apparatus are crucial for preventing financial instability. Can the banking sector as a whole sustain a significantly higher level of capitalization, or would the cost be prohibitively high? We review the debate, pointing out that the new regulation already implies an important move in this direction thanks to changes in both the numerator (higher quality capital) and denominator (increased risk weights) of the capital ratio. Our conclusions are summarized in the final section.

## **2. Current modelling approaches to macroprudential policy**

How should countercyclical macroprudential policy be conducted? To what extent do macroprudential and monetary policies have the capacity to affect the economy independently of each other? May they usefully coexist, or is there a risk of conflict? How should one choose among the multitude of candidate macroprudential instruments? Answering these questions requires the development of a theoretical framework in which these policies can be properly modelled, to be used as a guide for empirical investigation. Ideally, this framework should be simple enough to allow a proper understanding of the underlying mechanisms but also realistic enough to offer guidance to policymakers in this new environment. A very simple framework is unlikely to be adequate. For instance, in a standard AS-AD New Keynesian model, the two policies would be perfectly linearly dependent, as they both end up influencing the only control instrument available to the policymaker, the interest rate – either via open market operations, or via the macroprudential policy measure.<sup>3</sup> A framework for studying macroprudential policies should have another essential characteristic: it should incorporate the particular distortions that macroprudential policy is supposed to address – the externalities associated with systemic risk.

These features are hard to combine in a single model. To our knowledge, none of the existing analytical frameworks feature a comprehensive modelling of systemic risk. This partly reflects its elusive nature: systemic risk can take different forms with respect to market participants (a bank run or the default of an investment firm), markets (stock market crashes or currency crises) and geographical areas (domestic vs. international crises), making it virtually impossible to devise a general modelling approach. Several recent contributions do incorporate systemic externalities, but are too complex and

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<sup>3</sup> Cecchetti and Kohler (2012) adopt a highly-stylized model to investigate the possibility of using capital requirements to reach traditional monetary policy goals such as inflation and output stability and explore whether coordination is desirable when two separate bodies are in charge of the two goals. The authors find that if a policymaker is concerned only with price and output stability, the two instruments are perfect substitute.

stylized for policy use. By contrast, other model classes lend themselves to policy analysis, but fail to incorporate systemic risk. We review these two strands in the next subsections; we then move to the empirical contributions, and present a summary in subsection 2.4. We should acknowledge at the outset that we confine ourselves to some key strands of the literature on macroprudential policy, without any pretence to completeness.<sup>4</sup>

### *2.1 Some models feature systemic risk but are too abstract for policy use ...*

Lorenzoni (2008), Bianchi (2010), Bianchi and Mendoza (2010), Mendoza (2010), Jeanne and Korinek (2010) and Korinek (2011) show that when access to credit is subject to an occasionally binding collateral constraint a credit externality arises, driving a wedge between the competitive equilibrium and the planner's allocation. This approach is rooted in the debt deflation theory developed by Fisher (1933), later introduced in formal models by Kiyotaki and Moore (1997) and Shleifer and Vishny (1997). The key driver is that the price of assets is an increasing function of the aggregate level of debt: when a shock hits the economy, investors must reduce their asset positions in order to fulfil their debt obligations. The contemporaneous ("fire") sale of assets brings their price below its fundamental level and this leads to a tightening of credit conditions and exerts a further depressive effect on asset prices, starting a vicious cycle.<sup>5</sup> As agents do not take into account the effects of their aggregate actions on the price of collateral, in such a set-up this externality induces households to over-borrow. One problem is that it is not yet clear how robust this externality is. Depending on certain features and parameterisations, the models can produce over-borrowing as well as under-borrowing (Benigno et al., 2010), and under reasonable assumptions under-borrowing may even predominate (Benigno et al., 2011). Bianchi and Mendoza (2010) also find that over-borrowing arises in the competitive equilibrium for reasonable values of the key parameters, but not for all values.

Brunnermeier and Sannikov (2011) study a continuous-time, global (non-linearized) model in which certain agents ("experts") have superior skills in selecting profitable projects but possess limited net worth. In normal times the economy is in a steady state with low volatility, but it occasionally lapses into a regime with high volatility induced by strong negative feedback from large losses by the

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<sup>4</sup> See Galati and Moessner (2011) for a recent review of the literature on macroprudential policy, and the papers in Bank for International Settlements (2011) for an overview on systemic risk, financial system procyclicality, early warning indicators, and macroprudential policy implementation.

<sup>5</sup> See Brunnermeier (2009) for the amplification role played by liquidity risk in these circumstances.

“experts”. At the heart of the loop lies an externality, in that individually market participants take prices as given but collectively they affect them. Stein (2011) develops a model where the collateral constraint applies directly to financial intermediaries. In his model banks have a strong incentive to issue “too much” collateralised short-term debt because they fail to fully internalise the fact that in a bad state they will need to liquidate assets to repay their debt, thus inducing a fire sales spiral.

Overall, models of this class provide a micro-founded (albeit specific) definition of systemic risk and a rationale for policy intervention, for example regulatory measures to reduce leverage, or an active role for central banks as lenders (or market makers) of last resort. They also provide insights into the undiversifiable nature of systemic risk and may help explain why asset prices tend to become highly correlated in certain conditions, complicating the task of market operators and regulators alike. However, one common problem is that in order to overcome technical and computational complexities they are extremely simplified. Moreover, they often have an insufficient level of detail in the description of the financial sector or in the monetary policy design, or both, and are accordingly unsuitable for policy analysis.

## *2.2 ... whereas others are suitable for policy use but do not feature systemic risk*

Several recent papers have examined issues of financial stability in more standard macroeconomic models. While not explicitly considering the financial sector, Cúrdia and Woodford (2010), Woodford (2012), and Gilchrist and Zakrajsek (2012) develop a modelling technique that captures financial risk via proxies of credit risk in the economy (typically, a spread between risky and riskless rates). They show that Taylor-type monetary policy rules that also include indicators of financial distress dominate rules of the standard type. One shortcoming of these models is that they fail to incorporate a meaningful modelling of systemic risk, which makes them unsuitable for welfare analysis.

A step in the right direction is made in the literature that develops and uses models with a simplified financial sector, often using DSGE models featuring the “financial accelerator” mechanism originally proposed by Bernanke, Gertler and Gilchrist (1999), or building on the alternative approach pioneered by Kiyotaki and Moore (1997). These models share some of the shortcomings of those of the previous strand. On the other hand, they are well-known, relatively easy-to-use workhorses that can be useful for the purposes of a positive analysis. Specifically, they allow us to study countercyclical macroprudential instruments at the centre of the current policy debate – typically time-varying capital

requirements or provisioning, loan-to-value ratios, etc. – or the interactions between monetary and macroprudential policies.

Kannan, Rabanal and Scott (2009) and Angeloni and Faia (2009) were among the first papers to analyze this interaction, introducing capital ratios as a policy tool into a DSGE model. Kannan et al's paper focuses on housing booms; Angeloni and Faia's on banks prone to runs. Their main finding is that countercyclical capital ratios have beneficial real effects. Moreover, the optimal policy mix would involve a reaction of monetary policy to asset prices, or to credit expansion ("leaning against the wind"). Other papers that focus on various macroprudential instruments and reach encouraging conclusions in terms of the effectiveness of monetary and macroprudential policies and their interaction include: N'Dyaie (2009), Covas and Fujita (2009), Roger and Vlček (2011), Angelini et al. (2011), Lambertini, Mendicino and Punzi (2011), Beau, Clerc and Mojon (2011). Positing that the macroprudential authority can affect mortgage spreads directly, Catte et al. (2010) show that a tighter monetary policy by the Fed between 2002 and 2006 would not have been sufficient to avoid the housing bubble; however, if appropriately combined with macroprudential credit restraints, it could have dampened the housing boom with modest macroeconomic side effects. In many of these papers, however, the extent of the effectiveness of macroprudential instruments depends on various factors, including the way monetary policy is treated. For instance, the benefits of macroprudential policies tend to be smaller if monetary policy rules are optimized to take the effects of the macroprudential instrument into account.

Angelini, Neri and Panetta (2011), Bean et al. (2010), Beau, Clerc and Mojon (2011), Quint and Rabanal (2011), Cecchetti and Kohler (2012) also study the strategic interaction between monetary and macroprudential policy. These papers confirm that macroprudential policy has some potential to stabilise the economy over and above what can be achieved by monetary policy alone, but that this varies depending on the type of shock or setup considered (model parameterisations, etc.). Furthermore, they point to the risk of conflict between the two policies in the absence of coordination. Ueda and Valencia (2012) claim that when a central bank is in charge of price and financial stability a new time-inconsistency problem may arise. Ex ante, the central bank chooses the socially optimal level of inflation. Ex post, the central bank may choose inflation above the social optimum to reduce the real value of private debt. However, this conclusion is based on the assumption that macroprudential policies cannot be adjusted as frequently as monetary policy.

### 2.3 Recent strands of empirical literature

The empirical literature bearing on issues related to macroprudential policy is probably too ample to permit an exhaustive review. Accordingly in this section we confine ourselves to recalling two important recent strands. The first concerns the relationship between monetary policy and risk-taking behaviour, and hence financial stability; the second addresses the issue of macroprudential instruments.

There is by now broad consensus around the view that low interest rates tend to encourage excessive risk-taking. This can occur via various channels.<sup>6</sup> In the presence of an inverse relationship between asset values and interest rates, when rates are low the value of collateral is high, and vice versa. Therefore low rates can drive credit growth above the level compatible with a “normal” value of collateral.<sup>7</sup> Recent evidence confirms this thesis: lower short-term interest rates decrease the probability of default on existing loans but increase it on new loans, so the latter are riskier than average (Jiménez et al., 2008; Ioannidou et al., 2007). Furthermore, periods of low interest rates tend to be accompanied by low volatility and high risk appetite (see, for example, Pericoli and Taboga, 2008; Rudebusch, Swanson and Wu, 2006; Kim and Wright, 2005). Low interest rates may also induce institutional investors to take on excessive risk.<sup>8</sup> Contributions to this strand of literature go under the name of the “risk-taking channel”, after Borio and Zhu (2008), who argue that a loose monetary policy may stimulate excessive risk-taking and leverage, or liquidity transformation, thus increasing systemic fragility and ultimately putting price stability at risk. Altunbas, Gambacorta and Marques-Ibanez (2010), Maddaloni and Peydró (2012), present empirical evidence in line with this hypothesis.

This literature underlines the need for monetary policy to be aware of these potential channels and to monitor a broad range of indicators, like buoyant credit growth, increasing leverage of financial institutions, and in general leading indicators of financial instability. One key implication is that central banks should not confine their action to intervening after a crash; they should also play an active role in limiting the build up of systemic risk during the buoyant phases.

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<sup>6</sup> See the survey by Panetta et al. (2009).

<sup>7</sup> The financial accelerator may be reinforced by banks’ lending policies. Under imperfect information bank managers affected by short-termism have an incentive to adopt an excessively liberal credit policy (Rajan 1994, 2005).

<sup>8</sup> Rajan (2005) describes various possible underlying mechanisms. For instance, insurance companies and pension funds may have a large share of liabilities that are fixed in nominal terms. Therefore, unexpected prolonged periods of exceptionally low rates may put severe strain on their balance sheets and profits and loss accounts, inducing them to seek riskier investments to meet their commitments, since they tend to perceive mainly the upside and to overlook the downside risks.

Another rapidly developing strand of literature draws lessons from the actual implementation of macroprudential instruments, mostly in developing countries. Lim et al. (2011), using data from a group of 49 countries, find that financial system procyclicality may be dampened by several instruments: caps on the loan-to-value (LTV) ratio, on the debt-to-income ratio (DTI), or on credit, or credit growth, reserve requirements, countercyclical capital requirements and provisioning. In addition, limits on net open currency positions and on currency or maturity mismatches may help to reduce common exposures across institutions and markets. Wong, Fong, Li and Choi (2011), Ahuja and Nabar (2011) present evidence that management of LTV and DTI in Hong Kong and in several other countries proved effective, although the effect on household debt and transaction volumes is more evident, whereas that on real estate prices is less direct, or materialises with a delay.

Overall, the evidence suggests that macroprudential policies may effectively achieve their goals, but several caveats apply. In particular, little is known about the costs of resorting to macroprudential instruments, their calibration, and potential unintended effects. Moreover, several factors that policymakers may not have taken into account – for example, a rapid reaction by the financial system to the policy move, or gaps in the regulatory framework – can hinder or completely undo the desired effects. For instance, Jimenez et al. (2012) show that dynamic provisioning sustains credit growth in bad times, but does little to stem it in good times, probably due to the fact that firms find substitute credit from less affected banks and/or other financiers. In a similar vein, Ajar, Calomiris and Wieladek (2012) show that UK-owned banks and resident foreign subsidiaries (the regulated sector) reduce lending in response to tighter capital requirements imposed by the national regulator, but that this effect is largely offset by resident foreign branches (unregulated banks), who respond by increasing it.

More generally, in an integrated financial system possible cross-country spillovers need to be taken into account by macroprudential policymakers, because failure to do so may render policies ineffective. Furthermore, a policy that can be beneficial in one country may have undesired side effects on its neighbours. As argued by Shin (2011), for example, the spectacular rise of gross capital flows through the banking sector in the years preceding the financial crisis provided fertile conditions for excessive credit growth in both Europe and the US. While these issues lie outside the scope of this contribution, in the EU there is an intense debate on the need for cross-border coordination of the actions of national macroprudential authorities.

## 2.4 Summary

We are still far from a satisfactory state of affairs concerning the theoretical underpinnings of macroprudential policy and its relationship with other policies – in particular monetary policy. The empirical literature is also at a very early stage. The main challenge for the future is to develop models that allow the proper handling of externalities associated with systemic risk, and which are at the same time elaborate enough – especially in terms of financial sector modelling – to permit the analysis of policies to counteract this risk. These models will have to handle the strong non-linearities and complexities associated with financial and asset price imbalances, potentially leading to financial crises.

Notwithstanding these limitations, the literature reviewed above does highlight some important points. First, externalities may induce excessive credit growth followed by sudden busts, providing a rationale for macroprudential policies designed to curb excessive credit volatility. Second, monetary policies that also take into account measures of financial tensions tend to improve upon standard Taylor-type reaction functions in terms of macroeconomic stabilisation. Moreover, there is some theoretical – and empirical – support for the view that a loose monetary policy may lead to excessive risk taking. These conclusions support the view that monetary policy has a role to play in leaning against the development of financial imbalances, and should not just be confined to “cleaning up” after the bursting of financial bubbles. The observation that theoretical developments appear to have followed, rather than anticipated, economic events, does not take away from the fact that these works have contributed to our understanding of the way policies ought to react to unexpected events. This lesson should be heeded as soon as the world economy exits the current crisis. Third, countercyclical macroprudential policies (time-varying management of capital requirements or provisioning, loan-to-value ratios, etc.) can be effective at moderating economic fluctuations and the financial cycle, although with a number of uncertainties (potential unintended effects, offsetting forces which may undo the impact of the policies, etc.). Finally, there are both complementarities and trade-offs between monetary and macroprudential policies, with a potential for conflict; this calls for institutional arrangements that favour cooperation and synergies between the two policies.

### **3. Macroprudential and monetary policies: lessons from recent experience**

The main conclusions emerging from the previous paragraph have a clear bearing on the current situation. There is no doubt that excessive credit growth, causing high levels of leverage in the financial and nonfinancial sectors, and fuelling a real estate boom in several countries, was among the determinants of the current crisis. Moreover, central banks have been very active in contrasting financial distress, as prescribed by several of the models surveyed above. Although rigorous empirical evidence in support of this thesis is still not available, it seems likely that the exceptionally loose monetary policy stance currently prevailing in most advanced economies cannot be fully rationalized in terms of inflation and output dynamics. This is confirmed by a simple Taylor rule that we computed using the expected inflation and output gap: since 2010 the actual short-term rate in the euro area has been well below the rate suggested by the rule.

Could countercyclical macroprudential policies be adopted to moderate the current negative economic and financial cycle? Is there a material risk of conflict between monetary and macroprudential policies? Restricting the focus to the euro area at the present juncture, we argue that a selective use of macroprudential instruments at the national level could bring great benefits to the weaker countries, where they are most needed, but that unfortunately there is not much room for manoeuvre for these actions. In this context, monetary policy can cooperate with macroprudential policy, “lending a hand” for financial stability purposes.

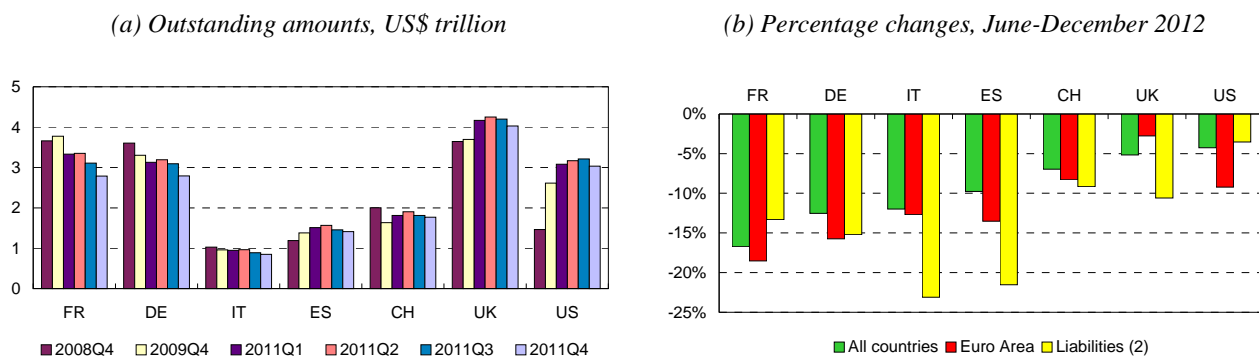
Let us see why the selective use of macroprudential instruments at the national level could deliver great benefits at this point in time. In principle monetary policy implements a single short-term, risk-free interest rate in the euro area, and lets market forces determine the appropriate cost of funds for the various economic actors – firms and households – as a function of several idiosyncratic factors, first and foremost, their creditworthiness. However, this mechanism has been malfunctioning since the onset of the current crisis, as confirmed by several indicators.

Figure 1 reports the outstanding foreign claims of the banking systems of selected industrialised countries. Panel (a) shows that the four main euro area economies are financially very open: at the end of 2008 foreign claims held by their banks jointly amounted to over US\$9 trillion, a value roughly equal to the sum of these countries’ nominal GDP. The UK banking system displayed a similar degree of openness, whereas the values for the US were much smaller (about US\$1.5 trillion, or 10 per cent of



GDP).<sup>9</sup> In the last three years banks' foreign claims have rapidly declined on average in the euro-area countries, whereas they have grown in the US and UK.

**Figure 1 – Bank foreign claims by nationality of reporting banks (1)**



Source: BIS

(1) Immediate borrower basis. – (2) Computed as foreign claims by euro area banks towards the countries in the figure.

Panel (b) of the figure focuses on percentage changes in the second half of 2011, which marked the aggravation of the euro area sovereign crisis. Over this period banks' retrenchment within national borders is somewhat generalised, but it is more intense among the euro area countries. The panel also reports a measure of foreign liabilities: the sharpest drop is recorded in Italy and Spain, countries that have been heavily affected by the crisis. It vividly illustrates the unwillingness of euro area banks to lend to each other, which led to the corresponding dramatic increase in refinancing from the ECB over the same period.

Overall, there is clear evidence of malfunctioning in the interbank market, the initial stage of the transmission mechanism. Does this have any effect on the final stage of the mechanism, i.e. on the conditions faced by the nonfinancial sector in the markets for bank products? Figure 2 looks at the behaviour of interest rates on loans to firms and on households' deposits over three key sub-periods: the period prior to the Lehman default, in September 2008; the July 2010-June 2011 period; the period starting in July 2011, characterized by an escalation of the sovereign crisis in Europe. Both panels display a dramatic increase in the cross-country dispersion of deposits and lending rates in the second and third sub-periods. The greatest changes tend to be concentrated in the program countries (Greece,

<sup>9</sup> The high degree of openness for the EU countries clearly reflects intra-EU interconnections.

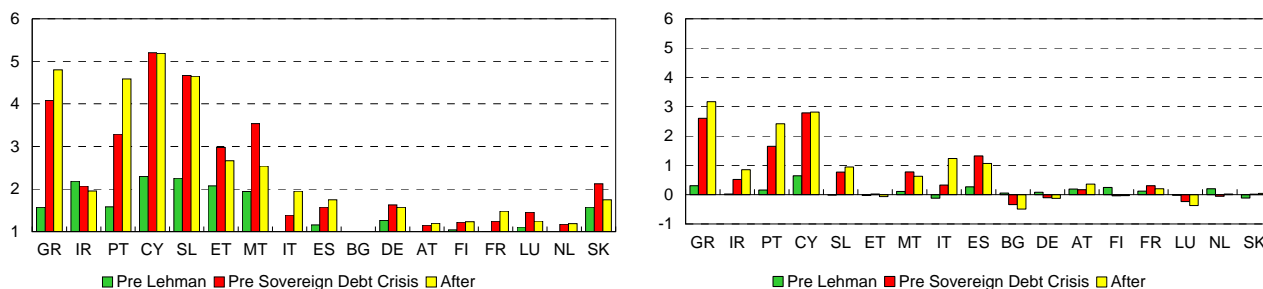
Portugal and, to a lesser extent, Ireland), Cyprus, Malta and Slovenia; relatively strong variations can also be seen for Spain and Italy.

**Figure 2 – Interest rate spreads (1)**

(percentage points)

(a) Loans to nonfinancial corporations

(b) Deposits



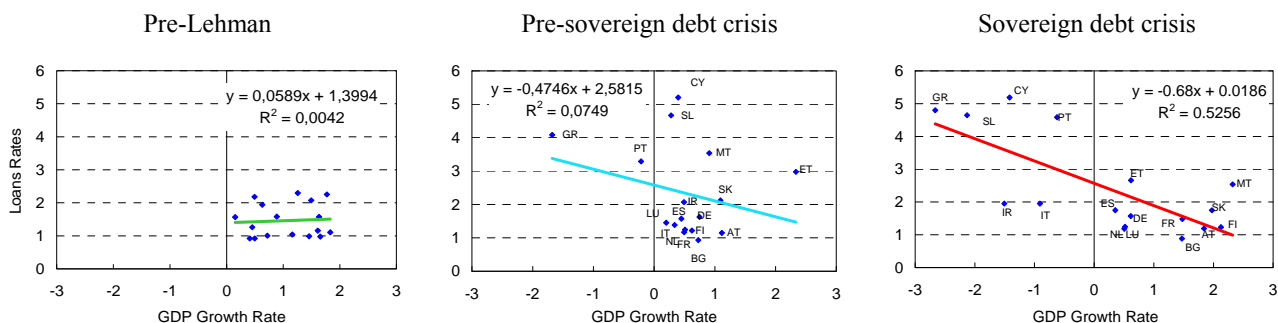
Source: ECB

(1) Spreads are calculated as the difference between the interest rate on new loans – in panel (a) – or the interest rate on new deposits – in panel (b) – and the interest rate on the main refinancing operations of the ECB. Specifically, the former interest rates are on loans other than revolving loans and overdrafts, denominated in euro with maturity up to 1 year, to nonfinancial corporations; the latter are on deposits denominated in euro with agreed maturity up to 1 year, held by households and nonfinancial firms. Averages over the relevant sub-period. “Pre-Lehman”, “Pre-sovereign crisis” and “Sovereign crisis” indicate, in order, the following sub-periods: January 2007-August 2008, July 2010-June 2011 and July 2011-March 2012.

The increased dispersion in lending rates could be due to the fact that firms in countries that are more exposed to the sovereign crisis have become riskier, given the poor performance of the respective economies. The evidence in Figure 3 is consistent with this hypothesis: the relationship between a country’s real GDP growth and average loan prices, apparently nonexistent prior to the Lehman default (panel (a)), becomes negative in the July 2010-June 2011 period, and strongly significant afterwards (panel (c)). This seems reasonable, to the extent that nationwide averages can be used to proxy for micro relationships and since low growth is associated with a higher probability of default.

**Figure 3 – Interest rate spreads and GDP growth in the EU (1)**

(percentage points)



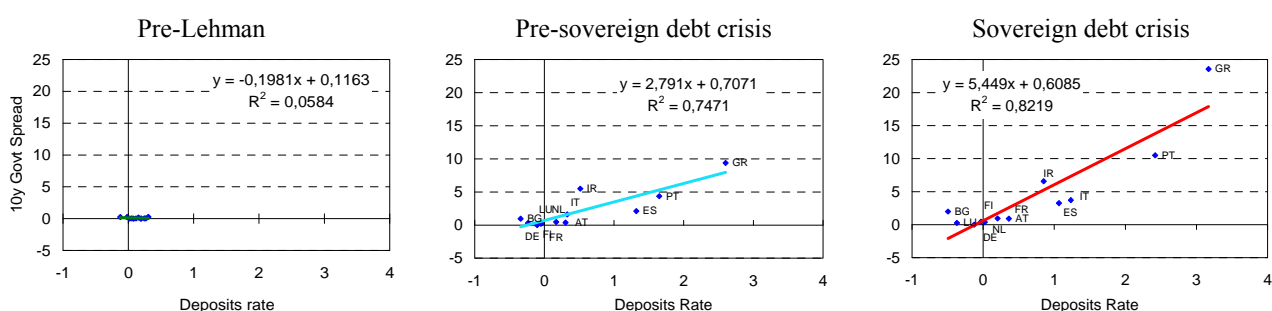
Source: ECB

(1) See the footnote to figure 2 for the definition of the loan rates and of the sub-periods.

However, strong simultaneity might be at work here: the decline in growth rates may have been to some extent caused by the increase in lending rates, which in turn were triggered by the sovereign crisis. Indeed, there are several direct and indirect channels through which sovereign risk affects the cost and availability of banks' funding (Committee on the Global Financial System, 2011). Figure 4 lends some support to this thesis: it shows that the relationship between sovereign spreads and deposit rates, nil before the Lehman collapse, became increasingly positive and significant in the two sub-periods that followed.

**Figure 4 – Sovereign spreads and deposit rates in the EU (1)**

(percentage points)



Source: ECB

(1) See the footnote to figure 2 for the definition of the loan rates and of the sub-periods.



firms is not exclusively driven by their fundamentals: it also reflects difficulties faced by the local banks, which are affected by the perceived health of their sovereign, and are forced to transfer their higher cost of funds on to borrowers, independently of the latter's creditworthiness.

The medium to long-term consequences of these developments relate to level playing field concerns. The immediate ones are even more worrisome: the economies of the countries with weak sovereign debt conditions and growth problems would require lower real rates, whereas those of the strong countries would in principle require relatively higher real rates; however, the opposite occurs. Among the weaker countries this situation can fuel a vicious circle between economic slowdown, high sovereign debt, and banking system fragility, a distinguishing feature of the latest stage of the current crisis; among the strong countries, it can engender overheating, leading to pressures on both consumer and asset prices.

This situation would be an ideal testing ground for macroprudential policies at the country level. In principle, these policies should act countercyclically in the weak countries, and stand ready to prevent the emergence of asset price imbalances in stronger countries that are experiencing large capital inflows. Unfortunately, as we argue below, there is at present little room for manoeuvre for macroprudential countercyclical policies in the countries most affected by the crisis. There is no problem of a potential conflict between monetary and macroprudential policies; rather, the two policies can cooperate, helping to achieve financial stability.

#### **4. Macroprudential and microprudential policies**

##### *4.1 Interactions and potential conflicts between micro- and macroprudential policies*

Why has the scope for countercyclical macroprudential policy been so limited in the follow-up to the crisis? Answering this question leads us to consider the interactions between macro- and microprudential policies.

It has been long recognised that the distinction between micro- and macroprudential policies is best thought of in terms of the objectives, rather than in terms of the instruments used in the pursuit of those objectives (Crockett, 2000). Indeed, much of the discussion following the recent financial crisis has been on how to re-orient typical microprudential tools (such as capital and liquidity requirements, loan-to-value ratios, etc.) to serve the macroprudential goal of limiting systemic risk. If the tools are broadly the same but must serve two purposes and be used by two different authorities, the potential for conflict

arises, just as in the case of the interaction between macroprudential and monetary policies, reviewed above. It is worth noting that the potential for conflict seems asymmetric: it is likely to materialise mainly (or exclusively) during downturns, when the macroprudential regulator may want to run down equity buffers in order to avoid a credit crunch, whereas the microprudential regulator may be reluctant to let that happen owing to the need to preserve the safety and soundness of individual institutions. Is this a cause for concern under the present macroeconomic conditions?

As in the case of the interaction of macroprudential and monetary policy, we believe that the answer is no. In a downturn it may be very difficult for the macroprudential authority to lower the capital requirement, because markets themselves may put pressure on banks to recapitalize (Diamond and Rajan, 2009). This problem should be addressed by raising the requirement in normal times by a sufficient amount, so as to make the reduction dictated by countercyclical policies in bad times credible and acceptable to markets. But the current crisis caught banks in most advanced economies off their guard. In practice, it has been impossible for macroprudential authorities to implement countercyclical policies, because good times had not been used to build sufficient buffers. In loose terms, we could say that countercyclical macroprudential policies are at their lower bound.<sup>11</sup>

Figure 6, which extends to Europe the evidence highlighted by Hanson, Kashyap and Stein (2011) for the US, supports this narrative: large banks in the US and in Europe increased their capitalization levels after the Lehman default. Market pressure was probably an important driver of this effect: at a global level, there was no specific regulatory provision to increase capitalization levels until the first version of the Basel 3 package appeared in 2010. Another interesting insight we can glean from the figure is that the capital ratio for small banks declined over the same period (2008-2009), effectively playing the countercyclical role that a macroprudential authority would have liked to implement at the aggregate level. This effect was clearly insufficient to offset the opposite trend prevailing among all other size classes, but it suggests that, provided bank capital levels are large enough, capital ratios could be effectively manoeuvred in a countercyclical fashion.<sup>12</sup>

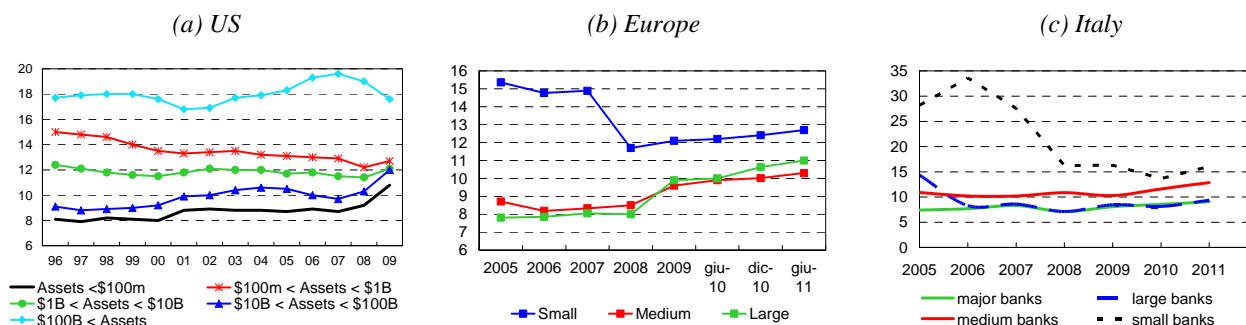
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<sup>11</sup> In principle, the macroprudential regulator could force banks to raise new capital (increasing the numerator of the capital ratio), via retained earnings or by raising equity on the market. In practice, this is hard to do in a crisis situation, as bank profits tend to be low and shareholders are reluctant to accept the strong dilution effect that new capital issuance entails in an environment of high risk aversion and low share prices.

<sup>12</sup> Indeed, the move observed among small banks was arguably spontaneous, suggesting that a macroprudential authority might not even be needed to implement a countercyclical mechanism. The evidence surveyed in Panetta et al. (2009) indicates that the capital buffers that banks hold over and above the regulatory minimum can significantly mitigate the procyclicality induced by capital requirements, but that they are unlikely to fully eliminate it. On this issue see also Repullo and Suarez (2008).

**Figure 6 – Tier 1 risk-based capital ratios of commercial banks, by bank size (1)**

(percentage points)



Sources: panel (a): Hanson, Kashyap and Stein (2011); panel (b): ECB; panel (c): Bank of Italy.

(1) In panel (c) size classes are derived from quartiles of total assets, computed for each year on a sample of about 100 consolidated bank balance sheets.

The Tier 1 ratios are subject to notable differences in the way they are computed over time and across countries. A degree of caution should therefore be exercised when interpreting and comparing the results presented in Figure 6. Despite the common international standards set up by the Basel Committee on Banking Supervision, national rules and practices for determining Tier 1 ratios still differ substantially across countries. The main differences can be referred to both the numerator of the ratio, Tier 1 capital, and the denominator, risk-weighted assets (RWAs). As for the numerator, some jurisdictions allowed a relatively broad definition of Tier 1 capital, including instruments that during the crisis showed little loss absorption capacity. These differences are bound to be gradually reduced with the implementation of the new Basel 3 framework, which excludes most of the weaker components of capital and gives a strong preference to equity as the prevailing element of regulatory capital. As for the denominator, concerns have been raised recently about the ability of RWAs to capture risk correctly. We discuss this issue in the next section.

#### 4.2 Risk-weighted assets and leverage

Besides the general disregard of systemic risk, other factors, linked to the regulatory framework and supervisory practices, may have played a role in preventing the build-up of adequate capital buffers in the run-up to the current crisis.

Under the Basel framework the amount of minimum required capital of banks is proportional to the level of risk-weighted assets (RWAs), which aim to measure the actual exposure of individual

institutions to risk, or the true amount of risk per euro of exposure. The methodology for computing RWAs has become a cornerstone of supervisory activity since the Basel 1 accord in 1988. It has been refined over time, in particular with the Basel 2 accord (2004). Various factors have contributed to amplify cross-country heterogeneity in RWAs, making comparisons difficult. First of all, not all countries adopted Basel 2 at the same time and to the same extent. In addition, the Basel 2 framework gave banks the option to compute capital requirements based on their own internal models, validated by the supervisor. As a result the computation of RWAs has become increasingly dependent on banks' discretionary choices. Further changes have recently been introduced by Basel 2.5, as it is known, which has radically revised the RWA computation for trading-book items. The phasing-in of Basel 3 will bring about further changes.

It is not surprising, therefore, that RWA measures have recently attracted increasing attention (Bair, 2011; Le Lesle and Avramova, 2012). One argument is that heterogeneities in the methodologies to compute RWAs may not only hinder comparability across institutions and jurisdictions, but also fail to reflect risk properly (see, among others, Hellwig, 2010; Carmassi and Micossi, 2012), with potentially negative consequences on the level playing field in financial markets, and most importantly, on financial stability. One main problem is that separating the correct drivers of divergences in banks' RWAs (mainly risk profiles, possibly also differences in business models) from undesired drivers (regulatory arbitrage, differences in supervisory and accounting rules, and supervisory practices) is rather difficult.<sup>13</sup>

Irrespective of the source of the divergences in RWAs, it is interesting to look at the relationship between RWAs across jurisdictions and the actual risk borne by the respective banking sectors, as proxied by public funds used to rescue banks. In panel (a) of Figure 7 we plot for a sample of European countries and the US the RWA/total asset ratios in 2008 against the maximum amount of government

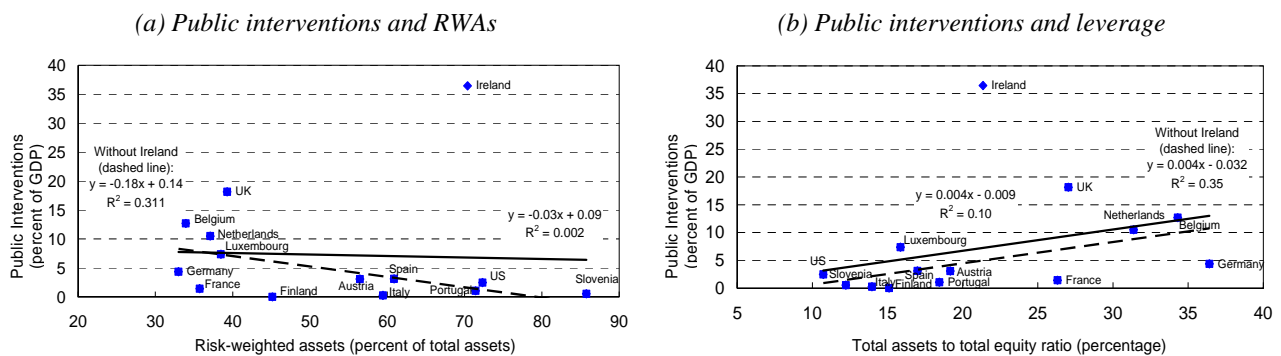
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<sup>13</sup> As an example of the correct drivers, consider a bank holding only short-term debt securities, and another one holding only a similar nominal value of stocks by the same issuer. Clearly the RWAs of the former will be lower than those of the latter, correctly reflecting each bank's different exposures to risk. As an example of the incorrect drivers, consider the differences in consolidation rules between the US GAAP and the European IAS-IFRS. According to Deutsche Bank (2006), total assets for the group at the end of 2006 were €1.126 trillion based on the former accounting standard, and €1.572 trillion according to the latter. Our point here is not to single out any particular accounting standard for criticism, but to show that different standards may substantially alter the accounting representation of the same balance sheet and make cross-country comparisons very difficult. Cannata, Casellina and Guidi (2012) show that a significant portion of divergences in RWAs across a sample of large European financial institutions is explained by the different asset allocations across regulatory portfolios (business models) and the different proportion in which the Internal Ratings-Based and the Standardised approaches (both introduced by Basel 2) are used by banks. Partly due to data limitations, they fail to provide an estimate of the extent to which differences in RWA may reflect undesired drivers.



capital injections and asset relief measures in subsequent years. In theory, if RWAs were adequately reflecting the actual risk faced by the different banking sectors we should expect no correlation between the two variables: the materialisation of risk should have been contrasted with adequate bank capital. On the contrary, a negative relationship emerges from the figure: in jurisdictions where RWAs were small relative to total assets the need for government interventions has been greater.<sup>14</sup> This evidence suggests that, at least in these cases, RWAs may have been unable to adequately capture risks, due to potential problems in the rules, or in supervisory practices, or in both.

**Figure 7 – Public interventions in the banking sector and banks’ risk indicators (1)**  
(percentages)



Sources: Based on ECB, EU Commission and OECD data.

(1) Public interventions include governments’ capital injections and asset relief measures, i.e. the amount of assets acquired or guaranteed by the State to improve banks’ balance sheets either via a national scheme or via an ad hoc individual rescue operation. The value equals the acquisition value plus the guaranteed value. Risk-weighted assets (RWA) and leverage measures refer to domestic banks.

In Figure 7, panel (b), we replicate the previous exercise by replacing the RWA/total asset ratio with a measure of banks’ leverage, given by the ratio of total assets to total equity. The panel provides complementary information with respect to panel (a): while in fact RWAs establish the minimum capital requirements, banks may decide to hold more capital, or may be asked to do so by the supervisors. The figure shows that the higher the leverage ratio the greater the need for public interventions during a crisis. In particular, leverage ratios higher than 25 are often associated with

<sup>14</sup> The exercise was replicated using the value of public support measures as of end 2011, instead of their maximum value, or using only capital injections (excluding asset relief measures), or constructing these measure as a percentage of banks’ total assets instead of GDP. The results are practically unchanged. We also considered the whole banking sector in the computation of RWAs and leverage. In this case as well, the results are not radically different, with the exception of Ireland: its aggregate RWAs over total asset ratio falls (to about 40 per cent), whereas its leverage ratio grows (to about 30 per cent), strengthening the correlations portrayed in Figure 7.

significant public costs for banking rescue purposes. This suggests that the ceiling value of 33 for the leverage ratio set forth in the Basel 3 package may still be quite high.

Overall, while certainly not conclusive, the evidence presented above prompts two considerations. First, sound microprudential supervision is a pillar of financial stability, and so are key features of the microprudential regulatory apparatus. In particular, the methods for measuring the risks borne by banks tend to be prone to weaknesses, partly due to the strong incentives for financial intermediaries to “optimize capital”; therefore, following a risk diversification approach, the regulator should avoid overreliance on a single risk containment measure. The new Basel 2.5 and 3 accords have tried to tackle these problems by moving in two directions: revising the methodology to compute RWAs, with the objective of ensuring more comprehensive risk capture, especially with reference to complex financial products; and introducing a ceiling on the leverage ratio, which relies on total assets rather than RWAs and is a cruder indicator of risk taking, but also simpler, more transparent and harder to manipulate (although some of the caveats for RWAs also apply to total assets, and hence to leverage; see footnote 13). Both amendments to the rules should be closely monitored and refined over time. Second, while there might be short-term conflicts between macro- and microprudential policies, particularly in downturns, complementarities are probably dominant. It is hard to imagine the success of one policy without the success of the other. Regardless of the institutional arrangements, it is therefore crucial to ensure a continuous exchange of information while setting up well-defined mechanisms to resolve possible conflicts between the two functions, should they emerge.

#### *4.3 Are much higher capital levels sustainable for the banking sector?*

Are levels of capitalization close to 20 per cent, such as those suggested by the evidence in Figure 6, sensible and feasible? The starting point to address this question is the Modigliani-Miller equivalence result: in the absence of frictions, debt and equity are equivalent sources of funds, as the value of the firm does not depend on the composition of its liabilities. Thus, the debate revolves around the empirical importance of the deviations from the frictionless world hypothesized by the theorem. This debate, which dates back at least to Myers and Majluf (1984), has been reopened by the current crisis.

Several commentators, mainly from the side of the banking industry, have argued that forcing banks to abide by higher capital ratios may hamper their ability to finance viable investment projects, with large negative effects on economic growth (see, for example, the Institute for International

Finance, 2010). Admati et al. (2010), and Miles, Yang and Marcheggiano (2011) have taken the opposite view, arguing that capital requirements for banks should be raised to values of 20-30 per cent.

While there is broad agreement on the view that the Modigliani-Miller paradigm does not apply to banks, significant uncertainty remains about the practical importance of the various sources of deviations from the paradigm, making it difficult to obtain reliable estimates of the cost of capital for banks. For instance, the debate often overlooks the role of fiscal wedges, which provide strong incentives to use debt to the disadvantage of equity (see the IMF, 2009). Moreover, higher costs or efficiency losses from regulatory reforms should always be confronted with the social losses deriving from banking crises which, as shown by recent experience, may be very large.

The increase of minimum capital requirements recently adopted by the regulator (Basel 3), relying on original estimates of the economic costs and benefits of the reform (see BCBS, 2010; MAG, 2010), has taken a pragmatic middle ground between the extreme positions referred to above. The new regulations are designed to increase capital requirements gradually to the new levels in 2019, in order to avoid the procyclical consequences of a rapid drive to these levels when economic conditions are still weak. Overall, it implies significantly higher capitalization, due to changes in the numerator (higher quality capital) and in the denominator (tighter risk weights) of the capital ratio. Moreover, the recent special provisions regarding global SIFIs move in the direction of further increasing capital requirements over and above the Basel 3 levels (the Swiss regulator has already significantly increased the requirements for its two largest banks, following capital injections by the government in one of the two). Finally, individual countries may also choose to impose higher standards. In the EU, following an ongoing debate, national macroprudential authorities are likely to be granted leeway to impose tougher requirements in their jurisdictions, if properly motivated. In perspective, this may help build precautionary buffers in those countries where they are most needed. It is not surprising that many of the countries advocating for themselves the right to impose higher prudential standards are characterized by financial systems whose total assets are a large multiple of their GDP.

## **5. Conclusions**

In this paper we review recent attempts to analyse macroprudential policy and its interaction with other policies, in particular monetary policy. Through the prism of theoretical literature, we then examine the conditions in the euro area as the sovereign debt crisis evolves. We argue that there is not,

at present, any issue of conflict between monetary and macroprudential policies. Because of the sovereign debt crisis, a retrenchment of capital and intermediaries within national borders seems to be taking place, jeopardizing the uniform transmission of monetary policy impulses in the area and amplifying the divergences across its economies. The policy action of the ECB, aimed at contrasting these tendencies, has played an important role in preserving financial stability, but by its very nature it has limits in tackling cross-country heterogeneities: in theory, the economies of countries with weak sovereign debt conditions and growth problems would require lower real rates, whereas those of the strong countries would need relatively higher real rates; however, the opposite occurs. Ideally, in this situation national macroprudential policies would act countercyclically in the countries most affected by the crisis and stand ready to prevent the emergence of asset price imbalances in the economies that are experiencing massive capital inflows. Unfortunately, there is very little room for manoeuvre for countercyclical macroprudential policies, especially in the weaker countries. As a consequence monetary policy is left to shoulder most of the burden (a situation not unique to the euro area).

Why has the scope for countercyclical macroprudential policy been so limited since the onset of the crisis? Answering this question brings us to that of the interactions between macro- and microprudential policies, and those microprudential tools (capital and liquidity requirements, loan-to-value ratios, etc.) which may be appropriately calibrated to serve macroprudential goals. In the run-up to the crisis insufficient capital buffers had been accumulated, and market pressures prevented macroprudential authorities from credibly pushing for a countercyclical relaxation of capital requirements to avoid a credit crunch.

Banks' behaviour in the US and in Europe during the financial crisis confirms that capital levels were indeed too low to allow for countercyclical policies. We show that in the initial years of the crisis large commercial banks, whose capital was very close to the minimum Basel requirement, increased their capital ratios, mainly because of market pressure. Smaller banks instead reduced their ratios, effectively playing a countercyclical role. They could do this because at the onset of the crisis they had accumulated significantly higher capital buffers.

Several factors, linked to the regulatory framework and supervisory practices, may have played a role in preventing the build-up of adequate buffers. While there is no doubt that the regulation had failed to adequately take systemic risk into account, other pitfalls have also emerged, linked to rules and supervisory practices. A key determinant of banks' capital requirements under the Basel regulatory framework is risk-weighted assets (RWAs), the denominator of the capital ratio, which have recently

come under close scrutiny by market analysts, banks and supervisory authorities. Observers have pointed out that RWAs may not be comparable across jurisdictions and may not properly reflect actual risk, calling into question the role of rules and supervisory practices in determining banks' capital requirements. We find that RWAs failed to reflect the effective risk borne by the different banking sectors, as proxied by the public funds used to rescue banks in the aftermath of the financial crisis: in jurisdictions where RWAs were small relative to total assets, governments' interventions to shore up national banking systems have been larger. In a similar vein, measures of leverage seem to perform well in predicting the cost of public interventions.

This evidence shows that the key features of the microprudential apparatus are crucial for preventing financial instability. In particular, the methods for measuring the risks borne by banks tend to be prone to weaknesses. The new Basel 3 accord tackles some of these problems by revising the methodology to compute RWAs and introducing a ceiling on the leverage ratio, an indicator that is cruder but also simpler, more transparent, and harder to manipulate. Both amendments to the rules should be closely monitored and refined over time, bearing in mind that financial intermediaries tend to react to the new regulations quickly, reducing their effectiveness.

Can the banking sector as a whole sustain a significantly higher level of capitalization, or would the cost be prohibitively high? The debate on this issue is still open. Certainly, the recent crisis has been a strong reminder that the social losses associated with financial and banking crises may be very high. As a consequence, the regulatory reform has moved in the direction of imposing significantly higher requirements, in terms of both the levels and quality of capital. The possibility for national macroprudential authorities to impose tougher requirements in their jurisdictions may help build precautionary buffers in those countries where they are most needed.

Overall, we stress complementarities over trade-offs in the interaction of macroprudential policies with other policies. Macroprudential policy should be concerned with the setting of the structural features of the financial system, with a view to limiting risk, reducing procyclicality and increasing resilience by building up adequate buffers in good times for use in bad times. Only if these structural parameters are properly set will there be room left for discretionary and countercyclical macroprudential policy.

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