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ÍNDICE

OPERATIONALISING A MACROPRUDENTIAL REGIME: GOALS, TOOLS AND OPEN ISSUES

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OPERATIONALISING A MACROPRUDENTIAL REGIME: GOALS, TOOLS AND OPEN ISSUES

1 Introduction

Since the early 1970s, the probability of systemic crises appears to have been rising. The costs of systemic crises have risen in parallel. The incidence and scale of systemic crises have risen to levels never previously seen in financial history [Reinhart and Rogoff (2011)]. It has meant that reducing risks to the financial system as a whole – systemic risks – has emerged as a top public policy priority.

The ongoing financial crisis is the most visible manifestation of this trend. Five years on from its inception, the level of real output in each of the major industrialised economies remains significantly below its pre-crisis path (Chart 1). In cumulative terms, crisis-induced output losses have so far reached almost 60 %, over 40 % and over 30 % of annual pre-crisis GDP in the UK, Euro-area and US respectively.[1]

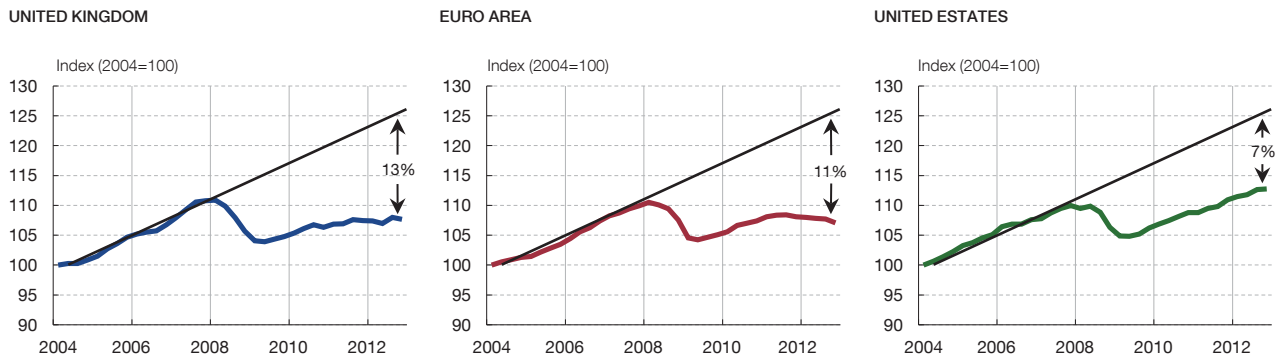
With the benefit of hindsight, the pre-crisis policy framework was ill-equipped to forestall the build-up in systemic risk which generated these huge costs. Monetary policy internationally was aimed at balancing nominal demand in line with the supply capacity of the economy. And microprudential regulation meanwhile focused on the health and conduct of individual financial institutions. This approach appeared to work well for some time – we entered a "Great Moderation".[2] Certainly, demand and inflation were stable and there were few failures of financial institutions.

But at the same time, something dramatic was happening within the financial sector. Global banks' balance sheets doubled between 1990 and 2007. In some countries, such as the UK and Spain, the ballooning of balance sheets was more dramatic still. As financial exuberance took hold, credit became too cheaply priced. Latent financial vulnerabilities began to emerge.

To some extent, these emerging fault-lines reflected fundamental weaknesses in the microprudential regime. In particular, regulatory limits on banks' leverage ratios were set

1 It could plausibly be argued that these output costs are an overstatement of the damage caused by the financial crisis as the pre-crisis level may have been unsustainable.
2 See Blanchard and Simon (2001) and Bernanke (2004).

THE SEVERE AND PERSISTENT REAL COSTS OF FINANCIAL CRISES — CHART 1



SOURCE: Authors' calculations.

A SELECTION OF SYSTEMIC RISK FRAMEWORKS AROUND THE WORLD TABLE 1

	Governance Structure	Mandate	Powers
United Kingdom Financial Policy Committee (FPC)	– Chair: Governor of the Bank of England – 10 voting members (5 from BoE, including head of prudential regulator; head of conduct regulator; 4 external members), one non-voting HM Treasury representative – Meets quarterly	– Protect and enhance the resilience of the UK financial system – Subject to this, support the government's economic objectives including for growth and employment – Cannot take actions that would be detrimental to medium-to-long term growth	– Direction powers over Countercyclical Capital Buffers and Sectoral Capital Requirements – Comply-or-explain Recommendation powers over prudential and conduct regulators – Recommendations (not comply-or-explain) to other bodies (eg on regulatory perimeter) – Measures cannot be directed at individual institutions
United States Financial Stability Oversight Council (FSOC)	– Chair: US Secretary of the Treasury – 10 voting and 5 non-voting members from Federal Reserve and supervisory agencies – Meets at least quarterly	– Identify and respond to emerging threats to financial stability – Promote market discipline, eliminate bailout expectations	– Recommendations to the supervisory authorities on heightened prudential standards – Designation of systemically important non-bank financial institutions and financial market utilities – Reporting to Congress on regulatory gaps
European Union European Systemic Risk Board (ESRB)	– Chair: ECB President – 37 voting members, including central bank governors, and 28 non-voting members from supervisory agencies – Meets quarterly	– Prevent or mitigate systemic risks to the EU financial system – Contribute to smooth functioning of the internal market and sustainable financial sector growth	– Systemic risk warnings and non-binding recommendations to European member states
Germany German Financial Stability Commission (Ausschuss für Finanzstabilität)	– Chair: The Federal Minister of Finance (or deputy) – Three representatives from the Ministry of Finance, three from the Deutsche Bundesbank; and three from the BaFin. Non-voting role for the chairman of the FMSA – Meets quarterly	Tasks of the Commission include: – Consideration of decisive issues for financial stability – Strengthening cooperation in a crisis between institutions represented on the Commission	– Warnings and recommendations to the German government, the BaFin, or any other public sector institution within Germany. Recipients obliged to respond within an appropriate timeframe. – Legal right to request data (forthcoming) both from reporting entities and other public authorities
France Financial Stability Council (Conseil de stabilité financière CSF)	– Chair: Finance Minister – 9 members (Banque de France Governor, the Secretary General and deputy of the prudential supervisor (ACP), the head of the markets regulator, the head of the accounting standards authority and three external independent members)	– Maintain the stability of the financial system and guaranteeing that the financial sector makes a sustainable contribution to economic growth – Ensure co-operation and exchange of information among its members	– Recommendations to institutions represented on the CSF (which may be published) to prevent threats to financial stability. Recipients must inform the CSF of the actions taken in response – At the proposal of the Governor of the BdF, defining capital requirements on exposures in France and outside the EEA – At the proposal of the Governor of the BdF, stipulating criteria or conditions for loans issued by banks
Switzerland	– The Swiss National Bank has the right to submit proposals to the Federal Council, following consultation with the Swiss Financial Market Supervisory Authority (FINMA) – Decision-making power rests with the Federal Council	– Increase the resilience of the banking sector and the overall economy against risks posed by excessive credit growth – Counter excessive credit growth and price rises	– Sector-specific countercyclical capital buffer targeting residential mortgage lending
Sweden Council for cooperation on macroprudential policy	– Chair: Governor of the Riksbank – 6 members (a Deputy Governor of the Riksbank and its Head of Financial Stability, the Director General, Chief Economist and Chief Legal Council of Finansinspektionen, the microprudential supervisor) – Meets at least twice a year	– Discuss both authorities' assessments of systemic risks, appropriate prevention measures and issues relating to development of macroprudential policy in general	Not defined

SOURCES: Bank of England, Financial Stability Oversight Council, European Systemic Risk Board, Bundesbank, Banque de France, Swiss National Bank and Riksbank.

at levels which, with hindsight, were far too low.[3] But there are also limits to what prudential regulation could reasonably achieve as long as it was static and calibrated to institution-specific balance sheets. With this focus, the build-up of leverage and

3 See Wellink (2011) for a summary of weaknesses in the pre-crisis microprudential regime. Consistent with regulatory definitions, this paper defines leverage ratios by dividing the relevant measures of capital by assets (e.g. a leverage ratio of 4%) rather than the reverse (e.g. a leverage ratio of 25 times). But the discussion uses the standard English language interpretation of associating rising levels of leverage with greater indebtedness – under the definition used here, this is equivalent to a falling leverage *ratio*.

maturity mismatch across the financial system, and growing interconnectedness within it, was under-emphasised.

In response, a broad consensus has emerged internationally over the past few years on the need to introduce *macroprudential* regulation.[4] In essence, this new approach seeks to ensure that regulatory rules are attuned to risks arising across the financial system as a whole. Put differently, it aims to plug the gap between macroeconomic policy on the one hand and micro-prudential regulation on the other – a gap through which the largest crisis in a generation fell.

New macroprudential regimes are being put in place around the globe. For example, in the United Kingdom, the Financial Services Act (2012) creates a Financial Policy Committee (FPC) at the Bank of England, with broad powers to make "comply-or-explain" recommendations and control over a set of specific macroprudential tools. In the US, the Financial Stability Oversight Council (FSOC) and in the Euro-area the European Systemic Risk Board (ESRB) have been set up with broadly similar objectives. Macroprudential frameworks are being established in a number of other countries too, including in Switzerland, France and Germany to name but a few. Table 1 summarises a selection of them.[5]

In this paper, we provide an overview of the progress made in making macroprudential regimes operational. Section 2 sets out an analysis of the sources of systemic risk. Section 3 uses this as the basis for a taxonomy of potential macroprudential policy instruments. Section 4 provides a case study of how one such instrument – the countercyclical capital buffer – might be made operational. The material in this section draws heavily on the analysis presented in Bank of England (2013). Section 5 concludes with a discussion of open issues, of which there are many.

2 Fundamental sources of systemic risk

In designing a public policy framework for tackling systemic risk, a natural first step is to identify potential sources of such risk. In this respect, economists have often found it analytically convenient to distinguish two manifestations:[6]

— First, *time-varying or cyclical risks* whose magnitude at any point in time depends on the amount of risk the financial system as a whole takes, relative to its available capital and liquidity resources; and

— Second, *cross-section or structural risks* whose magnitude depends on the network of connections between financial institutions and the distribution of risk across financial market participants.

2.1 TIME-VARYING OR CYCLICAL RISKS

There is a strong collective tendency for financial firms, companies and households to overexpose themselves to risk in the upswing of a credit cycle and to become overly risk-averse in a downswing. This pro-cyclicality has a variety of underlying behavioural causes, including myopia about risk[7] and herding in financial markets.[8] The result is a feast-or-famine problem, with credit plentiful when times are good, but severely rationed when they are bad.

4 See *inter alia* Bank of England (2009, 2011), FSB-IMF-BIS (2011), De Larosière (2009), Van Rompuy (2012), G30 (2010), HM Treasury (2011), CGFS (2010), IMF (2011), Hanson, Kashyap and Stein (2011).

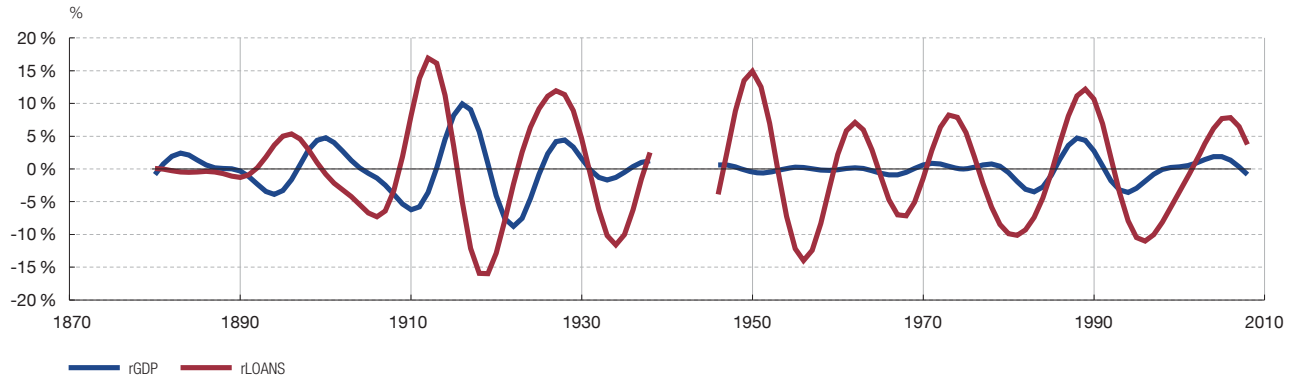
5 Nier *et al.* (2011) set out some of the strengths and weaknesses of alternative institutional frameworks for conducting macroprudential policy.

6 This distinction draws on Borio and Crockett (2000) and is consistent with those adopted by others in the literature, including Bank of England (2009, 2011), CGFS (2010), Group of Thirty (2010), IMF (2011) and FSB/IMF/BIS (2011).

7 See Guttentag and Herring (1986), Herring (1998), Haldane (2009a), Gennaioli, Schleifer and Vishny (2012).

8 On the theory of herding in financial markets, see Avery and Zemsky (1998); Lakonishok *et al.* (1992) test its empirical relevance. Bikhchandani and Sharma (2001) provide an overview of the literature.

MEDIUM-TERM CYCLE IN REAL GDP AND REAL CREDIT FOR THE UNITED KINGDOM CHART 2



SOURCE: Aikman, Haldane and Nelson (2010).

This credit cycle is not just disruptive in its own right. Historically, it has also tended to propagate crises. Credit booms have sown the seeds of subsequent credit crunches for many centuries. The work of Minsky (1986) and Kindleberger (1989) were both attempts to make sense of these regular patterns in the relationship between credit growth and crises, drawing on detailed case studies of past financial crises.

Schularik and Taylor (2012) have recently provided some econometric support for this link between credit and crises. The authors compile a dataset of financial variables from 12 developed economies over almost 140 years. They find credit growth to be the single best predictor of financial instability over this period. For example, according to their estimates, a one standard deviation change in real loan growth raises the probability of a crisis by between two and three percentage points, relative to an in-sample crisis frequency of just under 4 per cent. Dell'Ariccia *et al.* (2012) report similar findings using a dataset of 170 countries back to the 1960s. They find that roughly two-thirds of all credit booms are followed either by a banking crisis or by a period of sub-par economic growth.[9]

Aikman, Haldane and Nelson (2010) use the Schularik and Taylor dataset to document the empirical properties of credit cycles. As Chart 2 illustrates for the UK, bank credit exhibits a remarkably regular pattern of cyclical swings. A broadly similar pattern is evident in most other countries. Relative to the typical business cycle, two features of the credit cycle stand out. First, its average duration is over 10 years, far longer than the typical business cycle. This makes it harder to distinguish structural and cyclical shifts in credit: a lengthy cyclical credit boom may look like a permanent technological shift, as during the run-up to the present crisis.

Second, credit cycles are also distinct from business cycles in their amplitude. The amplitude of credit cycles is roughly five times that of fluctuations in GDP at conventional business cycle frequencies. Cycles in asset prices have higher amplitude still. Drehmann, Borio and Tsatsaronis (2011) report similar findings. This suggests that pro-cyclicality in the financial sector may be an important amplifier of the business cycle.

The recent credit cycle has been particularly severe and synchronised internationally. In 2006, private sector credit across the United Kingdom, United States and Euro-area rose by around 10 %. In some sectors, such as real estate, it was larger still. In the United Kingdom,

9 See also Borio and Lowe (2002), Mendoza and Terrones (2008), Reinhart and Rogoff (2009).

the stock of credit extended to commercial real estate companies doubled between 2002 and 2008; in Spain and Ireland, construction accounted for 20 per cent of the level of GDP in 2007. When the bubble burst, the flow of private credit collapsed.

These credit booms and busts tend, historically, to have been amplified by four factors, all of which were present in the current crisis. First excessive **leverage**, especially in the banking system. When a credit boom is funded by banks operating at low levels of capital, the consequence is a heightened risk of subsequent banking sector distress when imbalances unravel. Leverage was a very important amplifier of both the recent credit boom and bust. A comparison with the late-1990s technology bubble is instructive here. The collapse of dotcom shares led to significant market volatility, but it was the wave of defaults on telecom debt that threatened banking stability.[10]

A second factor that intensifies credit booms and busts is **maturity transformation**. Funding long-term assets with short-term liabilities can be socially efficient and welfare-improving.[11] But taken to excess, this can expose banks to the risk of runs and the possibility that they might need to contract wholesale lending, hoard liquidity or sell assets at depressed market prices to meet actual or prospective withdrawals. Prior to the crisis, many banks reduced their holdings of liquid assets and became increasingly reliant on funding at shorter maturities. This amplified the credit cycle, with the growth of bank balance sheets highly correlated with the proportion of funding sourced from short-term wholesale deposits.[12] When the crisis hit, flighty sources of funding disappeared, putting further pressure on banks' liquidity and solvency.

A third factor is **intra-financial system activity**. Links between financial institutions can help manage risk and distribute funds to where they can be most efficiently deployed. But cyclicality in such interconnectedness can also fuel credit booms. For example, in the pre-crisis period, securitisation was perceived to have dispersed risk around the system. But it reduced incentives for banks to screen and monitor lending, exacerbating over-borrowing.[13] It also lengthened the intermediation chain, masking a significant increase in leverage and maturity transformation across the system.[14]

Fourth, the credit cycle can be amplified by a relaxation of the **terms and conditions** on transactions in financial markets. In the pre-crisis period, lending spreads fell for both the household and corporate sectors, while the share of new mortgages extended at high LTV and LTI ratios rose sharply.[15] This contributed to the bubble in real estate lending in a number of countries, including the US, UK and Spain. Terms in wholesale borrowing markets also became progressively more lax, as did margining requirements on secured financing and derivatives transactions. The reversal of these trends was a major contributory factor to the collapse in interbank markets and the credit crunch.

2.2 CROSS SECTION OR STRUCTURAL RISKS

The systemic consequences of shocks to asset prices and activity also depend importantly on structural features of the financial sector. These include the distribution or concentration

10 See Mishkin (2008).
11 See Diamond and Dybvig (1983).
12 Financial Services Authority (2009).
13 Consistent with this, Keys *et al.* (2010) observe that low documentation subprime mortgage loans with FICO scores just above 620 defaulted 20% more frequently than their counterparts with scores just below 620 – the former category were significantly easier to sell to investors via securitisations than the latter.
14 See Hellwig (1995).
15 For example, in the United States typical LTV ratios rose prior to the crisis, with higher LTV ratios subsequently associated with higher default rates.

of risk across the financial system and the opacity (lack of information) and complexity (difficulty of assessing information) of financial products, institutions and the connections between them. All of these ingredients were important in the run-up to the crisis.

When risk is concentrated in a small number of institutions or markets, or when the provision of financial services is highly concentrated, the system is likely to be more vulnerable than if risks and the provision of services are more evenly distributed. As illustrated by the experiences of AIG and Lehman Brothers in the current crisis and Long-Term Capital Management and Credit Anstalt further back in history, distress or failure of a **systemically important entity** that is "too big to fail" can trigger spillovers to financial institutions or the wider economy which far exceed the contagion generated by the collapse of peripheral players.[16] In other words, there are network externalities associated with the failure of key nodes in the financial system.

These externalities arise because individual institutions or infrastructure providers typically fail to take sufficient account of the effects of their own actions, or failure, on others within the system. This leads to under-insurance against systemic risk. Systemic significance may also give rise to expectations of state support, which further distort perceptions of risk by lowering the cost of funding that such institutions face.[17] This supported rapid balance sheet expansion in the lead-up to the crisis. When such institutions subsequently failed during the crisis, they were provided state support to cushion their contagious consequences. In the UK, US and the Euro-area, state support of various types to financial institutions peaked at over 50 % of GDP.

Systemic risk can also be generated by the **opacity** and **complexity** of institutions, markets and financial instruments. These factors hinder the effective operation of market discipline to limit risk and potentially contribute to perception-driven contagion. Complexity also makes financial institutions more difficult to resolve. Pre-crisis, financial innovation spawned many examples of such complexity. For example, uncertainty over off-balance sheet exposures and banks' widely differing valuations of the same complex structured products led investors to lose faith in published balance sheets and to reduce their appetite for complex financial products and institutions.

Innovation linked to complex trading strategies may also contribute to market stress. For example, high-frequency trading strategies have been highlighted for their role in amplifying the 6 May 2010 US "flash crash". There is evidence that such strategies can drive withdrawals of liquidity, amplifying stress. More generally, algorithmic trading strategies can lead to destabilising feedback loops, which in turn may lead to sharp price falls, possibly across a wide range of market venues.

3 Tools to tackle systemic risk

Given these different sources of systemic risk, a range of different types of macroprudential tools may be needed to tackle them.[18] Prospective macroprudential tools can be roughly categorised three ways:[19]

— Those that operate on financial institutions' balance sheets;

— Those that affect the terms and conditions on financial transactions;

— Those that influence market structures.

16 See Haldane (2009b), Gai *et al.* (2011) and Arinaminpathy *et al.* (2012).
17 Noss and Sowerbutts (2012) quantify the value of this implicit subsidy for UK banks.
18 See also Hanson, Kashyap and Stein (2011) and Berntsson and Molin (2012).
19 See Bank of England (2011).

POTENTIAL MACROPRUDENTIAL INSTRUMENTS

TABLE 2

Key Amplification Channels/ Tools	Time-varying risk			Cross-sectional risk: distribution of risk; opacity; complexity
	Leverage	Intra-financial system activity	Maturity transformation	
Balance-sheet tools	– Countercyclical capital buffers – Maximum leverage ratios – Limits on exposures to particular asset classes		– Time-varying liquidity buffers (e.g. Liquidity Coverage Ratios; Net Stable Funding Ratios; Core Funding Ratios; loan-to-deposit ratios) – Sectoral liquidity buffers – Limits on particular sources of funding or funding instruments	– Capital/liquidity add-ons for systemically important financial institutions (SIFIs) – Large exposure / liability limits – Institutional structure (e.g. ring-fencing)
	– Sectoral capital requirements targeted at real economy lending – Dynamic provisioning – Stress testing	– Sectoral capital requirements targeted at intra-financial system activity – Time-varying or sectoral liquidity buffers		
Terms and conditions of transactions	– Loan-to-value, loan-to-income and debt-to-income restrictions	– Haircut / margin restrictions		
Market structures	– Remuneration practices	– Use of central counterparties		– Use of central counterparties – Design and use of trading venues (including 'circuit breakers')
	– Disclosure requirements			

SOURCE: Bank of England (2011).

The first two of these are primarily designed to tackle cyclical risks. The corresponding tools are likely to be time-varying in nature, ie tightened during periods of exuberance and relaxed when risks have receded or crystallised. The third category of tools is primarily geared towards cross-sectional risks and so would tend to be permanent, or at least durable, in nature. Table 2 lists some frequently discussed tools which fall into these various categories.[20]

Balance sheet tools include maximum leverage ratios, countercyclical capital and liquidity ratios and dynamic provisioning frameworks. These tools influence the aggregate level of leverage and maturity mismatch in the financial system. As such, they might be used to contain generalised risks arising across the financial sector. For example, the counter-cyclical capital buffer (CCB) under Basel III is intended to temper aggregate leverage over the credit cycle. Sectoral capital or liquidity requirements could, by contrast, have a role to play in targeting emerging risks in particular asset or liability classes.

Some balance sheet tools may have a more structural dimension. For example, additional capital and/or liquidity requirements for systemically important institutions might be used to tackle cross-sectional risks, by lowering their probability of failure. Institutional reform, such as the structural separation or ring-fencing of investment and retail banking activities as proposed in the UK [by ICB (2011)], in the EU [by Liikanen (2012)] and in the US [by Volcker (2011)] operate instead by lowering the losses felt across the system in the event of failure, in part by enhancing the "resolvability" of large, complex banks.

Tools that influence the terms and conditions in financial transactions include the ability to restrict the quantity of, or the capital requirements on, lending at high LTVs. These macroprudential tools have been deployed by a number of emerging market countries over the past few years, including China, Hong Kong and Korea. Macroprudential policy could also operate on minimum margining requirements on secured financing or derivative

20 See also CGFS (2010) and Bank of England (2011) for closely related analyses.

transactions within the financial system – the wholesale market equivalent of minimum LTV ratios [CGFS (2009)].

The third category of macroprudential tools – market structure – includes a variety of interventions aimed at altering the topology of the financial network. For example, targeted disclosure requirements can be used to reduce uncertainty about specific exposures or interconnections, which may amplify cyclical or structural risks. The structure of remuneration practices could be used to influence risk-taking incentives by managers of financial firms. And the design and use of organised trading platforms and/or obligations to clear trades through central counterparties could bolster the resilience of markets that are central to the smooth functioning of the financial system.

4 Case study: operationalising countercyclical capital buffers in the UK

How might macroprudential policy be operated in practice? In this section, we consider the tasks involved in operationalising one particular macroprudential tool: the countercyclical buffer (CCB). [21] The CCB introduces a time-varying capital buffer over and above normal microprudential standards in relation to banks' domestic exposures. It can be raised during periods of exuberance and subsequently reduced.[22] The implementation of this tool requires: a) a risk assessment process; b) a procedure for reaching decisions, explaining those decisions to the public, coordinating with other relevant bodies – including systemic risk authorities in other countries – and enforcing decisions with firms; and c) an assessment of the possible impact of those decisions on financial stability and growth. In what follows, we describe progress in the UK towards developing a framework for carrying out each of these steps. The material in this section draws heavily on the analysis presented in Bank of England (2013).

4.1 RISK ASSESSMENT AND INDICATORS TO GUIDE DECISION-MAKING

There are many different approaches for identifying threats to the financial system. Many authorities use indicator dashboards or cobwebs, including the European Systemic Risk Board, the Office of Financial Research in the United States, the World Bank, the Reserve Bank of New Zealand and the Norges Bank.[23] Stress testing aims to explore the resilience of the financial system under various adverse scenarios.[24] Other modelling approaches include early-warning leading indicator models, composite indicators of systemic risk, and Merton-based models of systemic risk that use contingent claims analysis.[25]

Given the complexity and state-contingency of signals from indicators and models, it would not make sense to tie movements in the CCB mechanically to any specific set of indicators or models. At the same time, the Bank of England's new Financial Policy Committee (FPC) has identified a relatively short list of core financial and economic indicators that it will routinely review to help guide decisions to adjust the CCB. These are intended to help anchor policy actions, provide some consistency to decision-making and give a basis for explaining actions to an external audience. They help enhance the predictability of the regime and reinforce the signalling channel of macroprudential policy.

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21 See Juks and Melander (2012) for a similar analysis for the case of Sweden.

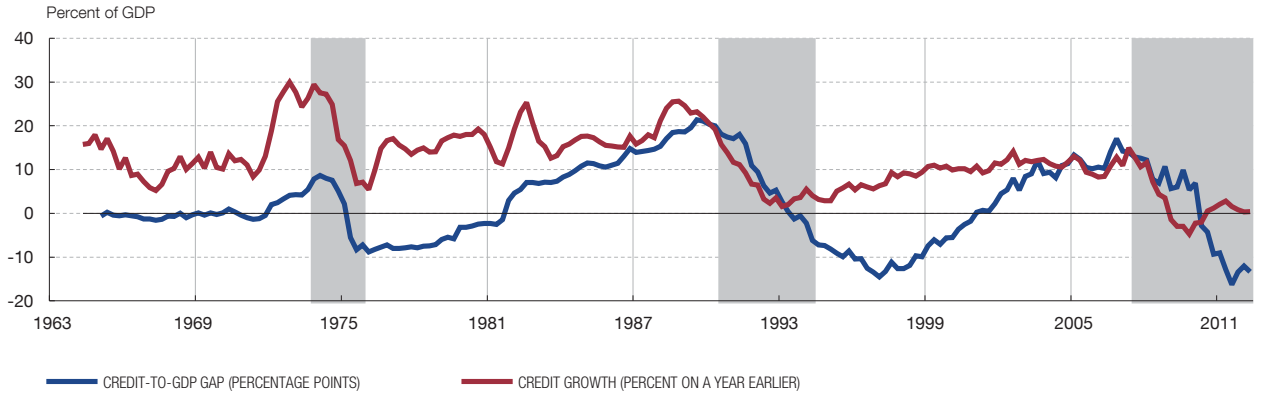
22 The design features of the CCB are prescribed in some detail in Basel III and, in Europe, the forthcoming CRDIV/CRR. For further details on the specification of this tool in the United Kingdom, see Bank of England (2013).

23 For the US, see section 3 of the OFR Annual Report (2012). The ESRB's Risk Dashboard' is published on the web (see http://www.esrb.europa.eu/pub/rd/html/index.en.html). On the cobweb approach used in New Zealand and Norway, see Bedford and Bloor (2009) and Dahl *et al.* (2011), respectively.

24 See Aikman *et al.* (2009), Burrows *et al.* (2012) and Kapadia *et al.* (2013) for a discussion of the Bank of England's approach to stress testing and its "RAMSI" model.

25 On early warning indicator models, see Kaminsky and Reinhart (1999), Drehmann *et al.* (2011), Borio and Lowe (2002, 2004) and Barrell *et al.* (2010). On composite indicator models, see Illing and Liu (2006) and Holló *et al.* (2012). On contingent claims models, see Gray *et al.* (2008) and Gray and Jobst (2011).

UK CREDIT GAP AND CREDIT GROWTH (a) (b) (c) CHART 3



SOURCES: ONS, Bank of England and Bank calculations.

a Credit is defined here as debt claims on the UK private non-financial sector. This includes all liabilities of the household and not-for-profit sector and private non-financial corporations' loans and debt securities excluding derivatives, direct investment loans and loans secured on dwellings. ONS data are not available before 1990. Before then, stable relationships between the ONS household and private non-financial corporation debt data and Bank of England household and private non-financial corporation lending data are assumed and the ONS household and private non-financial corporation debt series is assumed to grow at the same rate as the Bank of England household and private non-financial corporation lending series.
b The credit-to-GDP gap is calculated as the percentage point difference between the credit-to-GDP ratio and its long-term trend, where the trend is based on a one-sided HP filter with a smoothing parameter of 400,000.
c Twelve-month growth rate of nominal credit.

The full set of indicators is discussed in detail in Bank of England (2013); a brief overview is given below. Particular emphasis is placed on simple, high-level indicators rather than more complex metrics. As well as being important for transparency and accountability reasons, some empirical evidence and case studies suggest that simple indicators can often out-perform more complex alternatives in their predictive power due to their greater robustness in the face of uncertainty.[26]

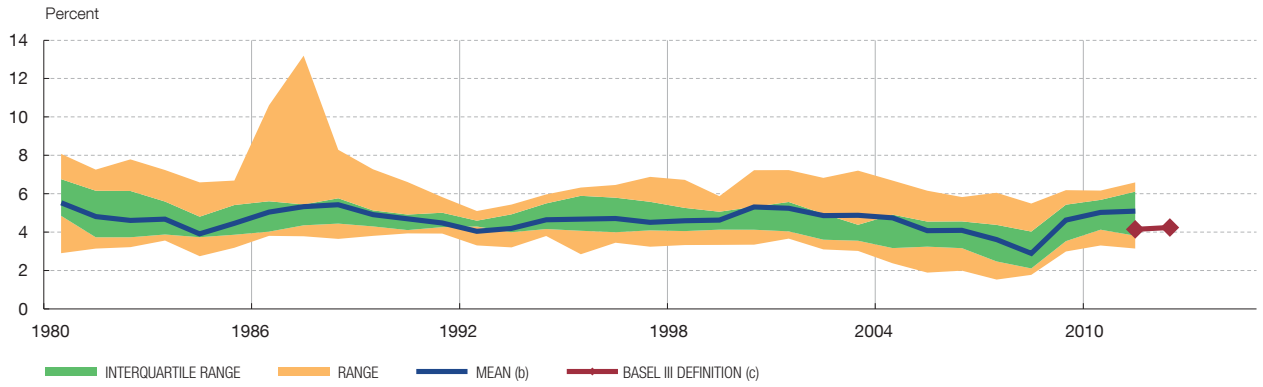
A natural starting point is the so-called **"credit-to-GDP gap"**, defined as the deviation of the ratio of household and corporate indebtedness to GDP from its long term trend. This is given particular prominence in Basel III. It has been found to be a useful leading indicator of past crises in many countries within sample.[27] In the United Kingdom, it performed well in signalling emerging vulnerabilities in advance of each of the last three major episodes of financial distress (Chart 3). Prior to the current crisis, it would have suggested activating the CCB as early as 2002. It also would have suggested activating the CCB ahead of the UK secondary banking crisis in the 1970s and the small banks' crisis in the early 1990s.[28]

As discussed by Bank of England (2013, Box 2) and Giese *et al.* (2013), however, it is important to augment the information in the credit-to-GDP gap with a range of complementary indicators. This partly reflects its poorer ability to signal the possible need to reduce the CCB in the face of deteriorating credit conditions (Chart 3). The indicator also fails to account for the absolute level of credit and is agnostic on the sources or quality of credit.

To meet these concerns, it is helpful to monitor a wider set of indicators reflecting bank and non-bank balance sheet stretch. **Aggregate risk-based capital ratios** and **leverage ratios** reflect the amount of capital that the financial sector has available to absorb losses on its

26 See Haldane and Madouros (2012) and Aikman *et al.* (2013).
27 See Borio and Lowe (2002), Alessi and Detken (2009) and Drehmann, Borio and Tsatsaronis (2011). Barrell and Karim (2012), however, find little evidence that the indicator signals crises in OECD countries, although they find some role in emerging market economies. Repullo and Saurina (2012) also criticise this indicator on the grounds of its negative correlation with GDP growth in many countries.
28 See Giese *et al.* (2013).

UK BANKS LEVERAGE RATIOS (a) CHART 4



SOURCES: Published accounts, FSA supervisory data and Bank calculations.

a The mean and ranges shown are based on the simple leverage ratio defined as the ratio of shareholders' claims to total assets based on banks' published accounts (note a discontinuity due to introduction of IFRS accounting standards in 2005, which tends to reduce leverage ratios thereafter). Data exclude Northern Rock from 2008.
b Weighted by total assets.
c The 'Basel III leverage ratio', from end-2011 onwards, is calculated as aggregate peer group Tier 1 capital over aggregate leverage ratio exposure, according to the proposed Basel III definition. However, Tier 1 capital includes some 'grandfathered' instruments which will no longer be eligible after the full transition in 2019. The Basel III sample includes Barclays, HSBC, Lloyds Banking Group, RBS, Nationwide, Santander UK and Co-operative bank. Last data point is October 2012.

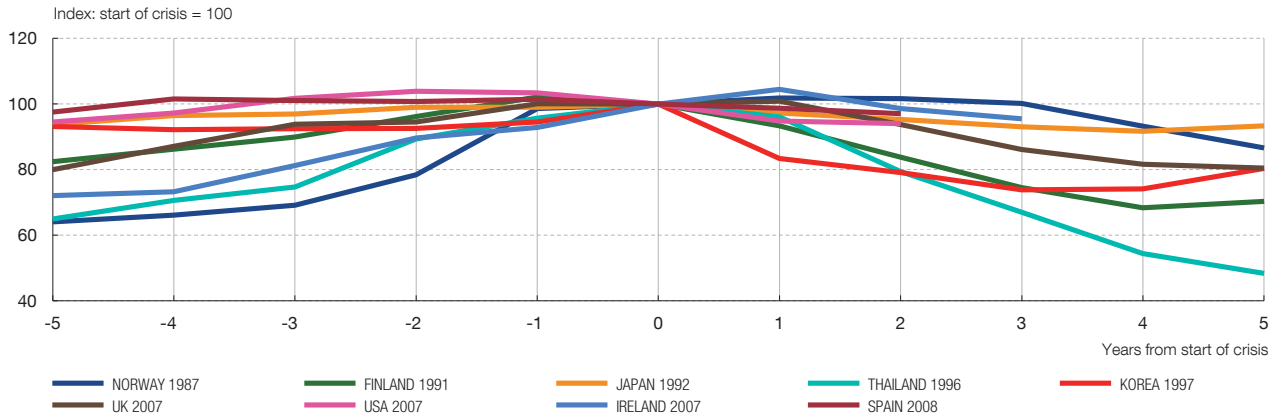
assets, on a risk-weighted and unweighted basis respectively. A rapid build-up in leverage (i.e. a fall in leverage ratios) in the major UK banks was an important driver of the current financial crisis (Chart 4). Risk-based capital ratios tended to provide poorer signals before this crisis, particularly for larger banks[29] ; their failure to signal impending problems reflected a secular decline in **average risk weights**. Some studies from earlier episodes, however, have tended to find a more positive role for risk-based standards in predicting bank failure.[30] Going forward, there is likely to be value in monitoring both metrics in determining whether banks have sufficient buffers to absorb future losses during periods of stress. And since profits are the first line of defence against losses, simple measures of the core profitability of the banking system, such as the **pre-tax return on assets**, are also likely to be useful in such circumstances.

Another helpful indicator of banks' balance sheet stretch is the **loan-to-deposit ratio**, which provides a signal of whether the provision of credit has become too reliant on unstable funding sources. Rising loan-to-deposit ratios were evident in many countries prior to this crisis. This indicator also performed well in signalling impending distress in East Asia in 1997-98 (Chart 5).

Market-based metrics can provide corroborative evidence on perceptions of banking sector health. Spreads on bank debt, such as **subordinated debt spreads** and **CDS on senior unsecured debt**, indicate financial market participants' assessment of the likelihood of bank failure. The views of equity market investors, meanwhile, can be gauged by considering **banks' price to book ratios** and **market-based leverage ratios**. But these indicators need to be interpreted with caution. In periods of exuberance, they may be subject to significant mispricing or indeed even a "volatility paradox": times of low volatility may be associated with a build up of leverage, which increases systemic risk.

29 Haldane and Madouros (2012).
30 See Avery and Berger (1991 and Estrella, Park and Peristiani (2000).

LOAN-TO-DEPOSIT RATIO BEFORE AND AFTER MAJOR CRISES (a) (b) CHART 5



SOURCES: World Bank, published accounts and Bank calculations.

a The years beside the country names give the dates of the first year of a banking crisis, based on Reinhart and Rogoff (2009).
b The UK measure is major UK banks' customer lending as a percentage of customer funding, where customer refers to all non-bank borrowers and depositors. Where disclosed, repurchase agreements are excluded from loans and deposits. The measure for all other countries is the 'Bank credit to bank deposits' series from the World Bank Global Financial Development database. In their measure of credit, the World Bank include the financial resources provided to the private sector by domestic money banks.

Moving beyond banks, movements in national balance sheet indicators such as the **current account** provide a natural indicator of balance sheet stretch in the wider economy. Large and persistent current account deficits and high and rising external indebtedness have tended to precede past crises. For example, these factors were observed prior to the Latin American debt crisis of the 1980s, the East Asian crisis of 1997-98, and the more recent crises in the United States and some euro area economies.

These balance sheet metrics can be complemented by monitoring indicators of terms and conditions in financial markets. For example, conditions in global capital markets can be indicative of overall levels of risk appetite, as reflected in metrics relating to equity markets (such as the **VIX** which captures expectations of stock market volatility) and debt markets (such as **global spreads** over risk-free rates, for example on corporate bonds or on collateralised and securitised debt). Signals of strong risk appetite, combined with low or falling **long term real interest rates**, may indicate a "search for yield".

4.2 DECISION-MAKING, COORDINATION AND IMPLEMENTATION

The UK's FPC meets quarterly to assess the information in the core indicators, alongside a wider set of information including from stress testing and other models, and from market and supervisory intelligence. Having reached a decision on whether to alter the CCB, the rationale for the FPC's decisions is communicated externally through some combination of a press release, a Record of the meeting (published approximately two weeks afterwards) and the Bank of England's twice-yearly *Financial Stability Report.*

For the CCB, international coordination is ensured by the reciprocity arrangements enshrined in Basel III. In particular, overseas regulators are expected to apply the CCB rate chosen by the FPC for their banks' UK exposures and vice versa. This should help to enhance the effectiveness of macroprudential policy by reducing the likelihood of international leakages. Such leakages are likely to be substantial if policies are uncoordinated – for example, Aiyar *et al.* (2012) find that one third of the impact of higher Pillar 2 capital requirements on UK banks may be offset by increased lending by foreign branches.

For other macroprudential actions, it will also be important to consider possible cross-country spillovers when reaching macroprudential decisions. The forthcoming Capital Requirements Directive and Regulation will institutionalise a coordination process within the EU to assess such spillovers, including the potentially negative spillovers from *failing* to act in a timely fashion to mitigate domestic systemic risks – it is important to balance policy coordination with a need to avoid inaction bias.

Once policy action on the CCB has been agreed, banks will typically have twelve months to meet any increase in the CCB – although a shorter implementation period may be recommended to the regulators in exceptional circumstances. Banks that fail to meet the buffer level in the required time, or breach it subsequently, will be subject to automatic restrictions on dividends and discretionary bonuses and will be required to prepare a plan explaining how they will meet the buffer level within an appropriate timeframe.[31] It will be the responsibility of the microprudential authority to monitor compliance and to impose further supervisory measures if needed. A decision to *decrease* the CCB can take effect immediately.

4.3 IMPACT ANALYSIS

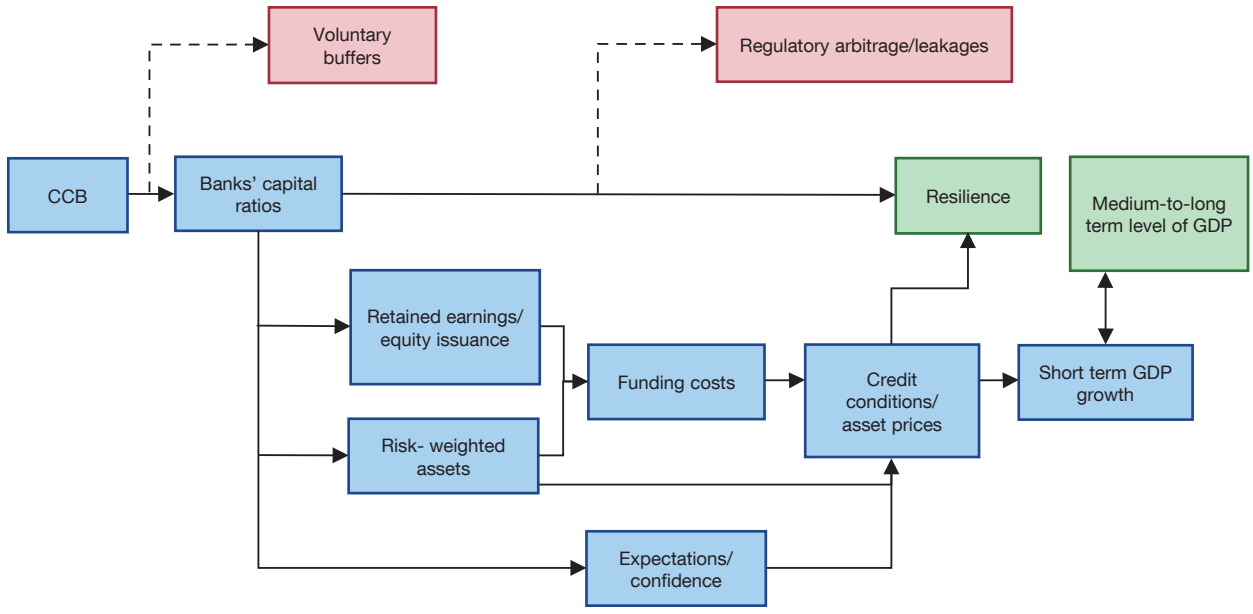
The objectives of the FPC in setting the CCB are to ensure resilience of the UK financial system and, subject to that, to support the government's objectives for employment and output. To understand whether policy actions are consistent with these objectives requires a view on how CCB decisions are likely to affect financial stability and growth. The key links in the transmission mechanism are illustrated in Figure 1.

A decision to apply the CCB when threats to resilience are increasing will enhance financial stability in two ways. First, capital provides a cushion to absorb losses. So, holding fixed

31 Under the forthcoming CRD4/CRR, banks whose capital ratio falls within the upper quartile of the combined conservation buffer and CCB will be required to retain 40% of their profits. Banks then face a sliding scale of restrictions, whereby as a bank's capital ratio falls further from the target, it is required to conserve capital by paying out smaller dividends and bonuses to shareholders and employees. Specifically, these distribution restrictions increase to 60%, 80% and 100% as banks' capital ratios fall to the third, second and first quartiles respectively.

THE IMPACT OF THE COUNTERCYCLICAL CAPITAL BUTTER ON RESILIENCE AND GROWTH

FIGURE 1



SOURCE: Bank of England (2013).

banks' asset and liability positions, a change in the CCB will have the direct effect of increasing the loss absorbing capacity of the banking system, reducing the likelihood and severity of financial crises. This effect is shown in Figure 1 by the central arrows linking capital ratios to resilience and medium-to-long term GDP. While the precise magnitude of this channel is uncertain, there are strong *a priori* grounds for expecting the sign to be positive – greater capital reduces the likelihood of crisis.[32]

Second, the CCB will also affect financial stability through its impact on credit conditions. This size of this channel will depend on various factors including the sensitivity of risk premia on bank debt and equity to banks' leverage,[33] the ease with which banks are able to raise fresh equity in capital markets or adjust retained earnings, the stickiness of loan interest rates and the degree of competition in the banking sector.

For example, if capital buffers are increased in the midst of a credit boom, then the tighter credit conditions that follow may boost financial stability by helping to arrest the build-up of vulnerabilities created by the over-extension of credit. Similarly, if previously accumulated capital buffers are reduced in the midst of a contraction, then that may help to loosen credit conditions, so boosting the economy and thereby helping to reduce borrower defaults. This channel is shown by the arrow in Figure 1, linking credit conditions to short-term GDP growth. Of course, the strength of these effects may vary depending on whether policy is being tightened or loosened – we come on to discuss such asymmetries in the transmission mechanism in Section 5.1.

The effect of these tools on risk-taking behaviour is likely to be more powerful if financial markets anticipate that the policy change will be reinforced by further policy changes in these measures. As in other areas of public policy, there could be an important role for expectations in shaping this collective behaviour. This "signalling channel" of macroprudential policy is depicted in Figure 1 by the arrows running from capital ratios through to credit conditions, via the box marked "expectations", and then on to resilience.

There are as yet no published estimates of the likely impact of changes in the CCB on credit conditions. But some recent studies have analysed the quantitative impact of an increase in capital requirements on banks' lending behaviour (Table 3). While the results differ according to the methodologies employed, and whether permanent or temporary shocks are being analysed, most find that an increase in regulatory capital requirements generates only a modest tightening in credit conditions. For example, based on existing studies, a 1 percentage point increase in capital requirements is estimated to lead to an increase in the interest rate on bank loans of between 4.5 and 25 basis points and a decline in the quantity of lending of between 0 % and 3.6 % relative to baseline. These effects also operate with long and variable lags, often of a couple of years.

A study by the Financial Stability Board and the Basel Committee on Banking Supervision used a similar methodology to estimate the impact of a change in capital requirements on

32 A deeper justification for capital to enhance banks' survival probability is provided by incentive-based theories like Holmstrom and Tirole (1997), where capital strengthens banks' incentives to monitor borrowers. Gale (2010) sounds a note of caution however in his review of the theoretical literature on bank capital and risk taking: general equilibrium effects in these models can sometimes lead to the relationship flipping sign.

33 This is the Modigliani-Miller effect. Banks' cost of equity tends to exceed the rate at which they can borrow. This reflects the preferential treatment of debt in the tax system, market perceptions that the debt-holders of large banks are unlikely to suffer losses because such banks will not be allowed to fail (the so-called "too-big-to-fail" problem), and greater uncertainty over the future earnings that will accrue to shareholders compared to debt-holders who have more certainty over interest payments. These frictions may also make the cost of debt insensitive to banks" leverage and hence their solvency risk.

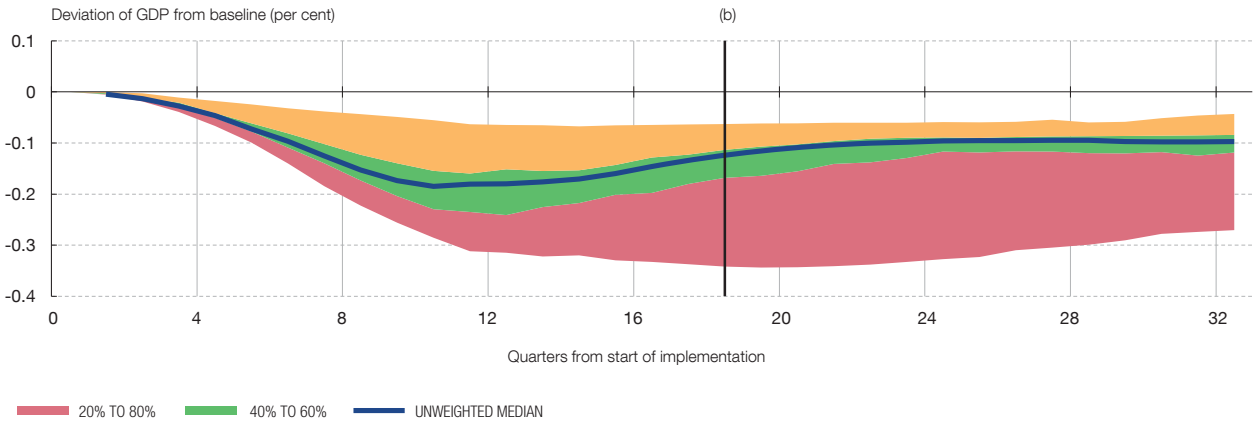
ILLUSTRATIVE ESTIMATES OF THE IMPACT OF A 100 BASIS POINT INCREASE IN BANKS HEADLINE CAPITAL TABLE 3

	Loan rates (basis points)	Loan volumes (per cent)
Permanent change in required capital		
MAG (2010) (a)	17.3 [5.1, 25.0]	-1.4 [-0.7, -3.6]
Elliot (2009) (b)	[4.5, 19.0]	—
Temporary change in required capital		
Aiyar *et al.* (2012) c)	—	[-6.8, -9.0]
Francis and Osborne (2012) (d)	—	0.0

SOURCE: Bank of England (2013).

a The Macroeconomic Assessment Group (MAG) analysed the impact of the transition to Basel III across a range of alternative models, calibrated across a wide variety of jurisdictions (including the UK). The reported figures in the table refer to the median impact across a range of estimated models (see Annex 2.2 in MAG (2010)), with the maximum and minimum reported in square brackets. Estimation assumes implementation of permanently higher capital requirements over two years. Results are for the 18th quarter of the simulation. Monetary policy is held constant.
b Results based on a loan pricing equation calibrated for US banks linking capital requirements to lending rates. The maximum effect refers to the case where banks are able to pass through in full the costs of higher capital requirements on to their customers. The minimum effect assumes a modest decline in banks' funding and administrative costs. Results are calculated from Tables 1 and 2 in Elliott (2009). The exercise assumes no response of monetary policy to the shock
c Results based on an econometric analysis of the impact of the UK Financial Services Authority's microprudential Pillar 2 requirements over the period 1998-2007. Reported results show the cumulative impact, excluding the potential for leakages via the foreign branch lending.Monetary policy is held constant.
d Taken from Francis and Osborne (2012), Table 5. Results based on an econometric analysis of the impact of microprudential Pillar 2 requirements imposed by the UK Financial Services Authority over the period 1996-2007. Results assume a 44 per cent pass-through from regulatory capital requirements to banks' capital ratios. Monetary policy is held constant.

ESTIMATED IMPACT ON GDP OF DATA A 100 BASIS POINT CREASE IN CAPITAL REQUIREMENTS IMPLEMENTED OVER TWO YEARS (a) CHART 6



SOURCE: Macroeconomic Assessment Group (2010).

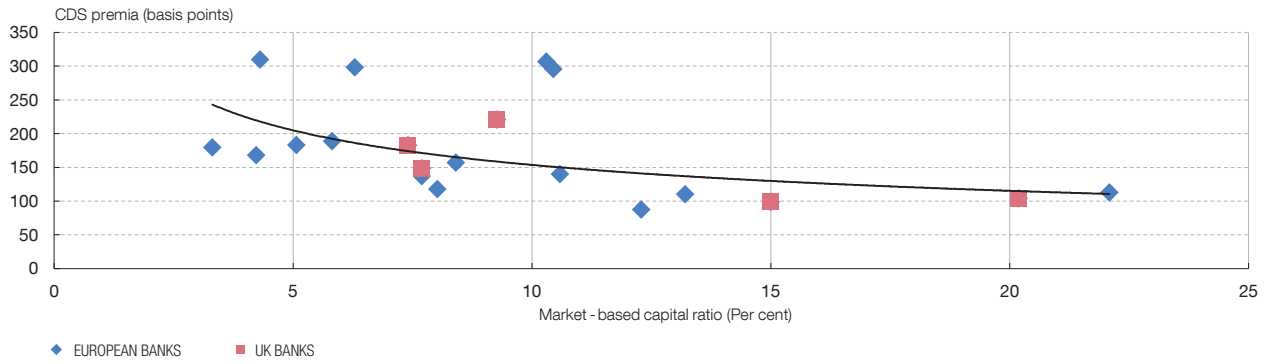
a The shaded areas indicate the 20-80th percentile and 40-60th percentile ranges respectively. The yellow line shows the unweighted median. The distribution of outcomes is computed across 89 models, discussed in MAG (2010). The results do not include the impact of international spillovers.
b The vertical line indicates the 18th quarter.

economic growth.[34] It estimated that GDP will contract by between 0.05 % and 0.35 % relative to baseline in the short run following a 100 basis point increase in headline capital requirements. The largest average impact on GDP across these models was around -0.2 % relative to baseline, occurring after around ten quarters (Chart 6).

These are the best quantitative estimates currently available to guide the setting of the CCB. But the uncertainty is sufficiently large that they need to be treated with caution. One reason for this is that the results in both Table 3 and Chart 6 pertain to a change in headline capital requirements, whereas the CCB will apply only to banks' domestic exposures. Also, some of the studies assume a permanent increase in capital requirements rather than a cyclical regime.

34 See Macroeconomic Assessment Group (2010).

RELATIONSHIP BETWEEN MARKET-BASED CAPITAL RATIOS AND FUNDING COST IN NOVEMBER 2012 (a) (b) (c) (d) CHART 7



SOURCES: Capital IQ, Markit Group Limited, published accounts, Bank of England and Bank calculations.

a Market-based capital ratios are banks' market capitalisation as a percentage of published risk-weighted assets.
b The sample shown is the largest 20 European banks by assets.
c Funding costs are proxied by 5-year senior CDS premia. The 'line of best fit' shown above illustrates their relationship with market-based capital ratios.
d Where possible, Capital IQ data has been used to calculate the market-based capital ratio, but for some banks it was necessary to use published accounts data.

More fundamentally, all such estimates reflect average relationships between banks' capital ratios and credit conditions in the past. It is well known that past relationships can be a poor guide to the future, particularly when there are large structural changes in the economy. The creation of a macroprudential regime might be one such structural change. For example, if financial markets come to expect the CCB to be raised in a sequence of steps when exuberant lending threatens financial stability, then the initial impact of policy actions might be larger than past relationships would suggest.

The relationship between capital requirements and credit conditions is also likely to vary in important ways depending on economic circumstances. For example, in a situation of acute uncertainty about banks' solvency, their borrowing costs may be highly sensitive to their capital adequacy (Chart 7). In these circumstances, a decision to increase capital adequacy may improve confidence to such an extent that overall funding costs fall. That, in turn, might be expected to relax credit conditions. The recapitalisation of UK banks in 2008 and the US stress tests and consequent capital raising of 2009 may have had precisely such an effect.

5 Open issues

While considerable progress has been made in making macroprudential regimes operational over the past few years, a large number of practical challenges remain. From a potentially long list, we discuss three such open issues: how to improve macroprudential policy effectiveness in a downturn; how to make macroprudential decisions when there is uncertainty about the impact of decisions and magnitude of threats; and how to foster policy coordination between macroprudential, microprudential and monetary policies.

5.1 MACROPRUDENTIAL POLICY IN A DOWNTURN

Macroprudential regimes will be at their most effective when policies are set in a broadly symmetric fashion. In practice, that means tightening macroprudential policy tools when lending practices are exuberant but, just as importantly, loosening those tools either when risks recede or when credit conditions need a boost. Achieving this balance will be a major policy challenge.

It is often felt that, in situations of stress, many of the arms of macroeconomic policy are constrained – that policy risks "pushing on a string". Macroprudential policy is no exception. For example, the market might demand higher (than regulatory) capital

requirements in a downswing because they fear the risk of insolvency. That would potentially reduce the potency of a macroprudential loosening of policy, for example in stimulating credit and growth.

But recent empirical research by Jiménez *et al.* (2012) has reached a more optimistic conclusion on the effects of macroprudential policy loosening. The authors analyse the economic impact of the Bank of Spain's dynamic provisioning framework – a close cousin of the Basel III countercyclical capital buffer. In particular, they ask whether its impact differed in good times (when buffers were being built up) from the downswing (when the buffers were being released).

In the upswing, they find that the banks that had to provision more cut their credit supply by most, as might be expected. But, crucially, this macroprudential policy tightening had relatively little effect on overall credit conditions or the macroeconomy. The reason was that other lenders stepped in and picked up the slack created by constrained banks exiting. In other words, credit was highly substitutable during the boom.

By contrast, the release of buffers in 2008 Q4 was found to have had a large positive incremental effect on lending, employment and firm survival in 2009 and 2010, albeit relative to a baseline in which credit conditions were tightening substantially. The reason is that, in a bust, credit supply is not very substitutable, with fewer alternative suppliers of credit to households and customers. So, while the overall level of provisioning turned out to be too small to save Spain from a severe macroeconomic downturn, these results do suggest that macroprudential policy could in fact be more potent in a downswing, not less.

The design of macroprudential tools can also help to foster a symmetric regime. For instance, it may make sense to distinguish between stocks and flows of lending in the application of such tools. Capital requirements are traditionally applied uniformly to both the stock of banks' existing assets and to any new loans created. But suppose capital requirements on *new* loans could be flexed without affecting those applied to the back-book of existing assets. Such an approach could be particularly useful in the downswing as it could stimulate credit supply while reducing the risks associated with release of the buffers. Banks would only benefit from capital relief to the extent they continued to lend, thus stimulating credit supply; while their resilience against legacy assets would still be protected. In the UK, such an approach has recently been put into practice with a lower effective capital charge placed on new loans relative to old to stimulate credit supply.[35]

5.2 MACROPRUDENTIAL POLICY UNDER UNCERTAINTY

Another major challenge in designing macroprudential policies is how to deal with high degrees of (Knightian) uncertainty. This can take many forms: uncertainty over the severity of the threats to financial stability and how these have changed; uncertainty about the structure of the economy and the financial system; uncertainty about the impact of alternative policy tools; and uncertainty about the impact of policy actions on market participants' expectations.

While there is no clear guide from the academic literature on what optimal policy should be in such an environment,[36] some general policy design lessons can be drawn. For example, it is clear that policymakers should not worsen this uncertainty problem through their own actions

35 For details, see http://www.fsa.gov.uk/static/pubs/other/adjustments-capital-planning-buffers.pdf.
36 See Brainard (1969) and Hansen and Sargent (2003, 2004).

and reactions. Among other things, this calls for as clear and transparent a macroprudential decision-making process as possible.

There are several potential dimensions to such a transparent regime. One is having as clear as possible a set of inputs to the policy decision-making process. As discussed in Section 4, the Bank of England's FPC has recently published a list of the core indicators it intends using to set macroprudential policy, for just this reason. The credit-to-GDP ratio guideline path specified as part of Basel III is also intended to serve an indicator role.

A more sophisticated step would be to produce, and potentially publish, information on stress-tests for key macroprudential measures such as liquidity, capital, lending and output. For example, in the United States an annual round of such top-down stress-testing has been in place since 2009, with a high degree of transparency about both inputs and outputs. This is generally felt to have reduced market participants' uncertainty about the true state of health of US banks' balance sheets and thereby supported financial stability.

A third layer of transparency concerns the deliberations of the macroprudential policy committee itself. In the UK, a Record of the meeting of the FPC is published, broadly in line with the practices of the Bank's Monetary Policy Committee. This is intended to make transparent the nature of the FPC's discussion and the reasoning behind its policy stance. Over time, this will help external participants understand the shape and nature of the FPC's "reaction function". Inevitably, this will be a two-way process, as the FPC learn more about how its actions affect the macro-financial environment and market participants learn more about how the FPC intends operating its tools.

One key policy lesson, which is well-illustrated in a wide range of other policy environments, is the need to avoid fine-tuning macroprudential responses when uncertainty is great and past historical evidence limited. Simplicity, both in approach and in action, can be of considerable value in such uncertain environments in avoiding the large errors that otherwise might arise if policy is over-fitted, over-complicated or hyper-active.[37]

5.3 MACROPRUDENTIAL POLICY CO-ORDINATION

A third challenge relates to the co-ordination of macroprudential policies with other policy levers, in particular micro-prudential and monetary policies. In general, these three arms of policy would be expected to be complementary and mutually-supportive. For example, during the pre-crisis credit boom, a macroprudential policy tightening would have helped alleviate strains on micro-prudential regulation of individual firms. It would also potentially have helped reduce the costs of the crisis, thereby alleviating some of the burden subsequently placed on monetary policy.

Nonetheless, because these three arms of policy are, at least to some extent, overlapping in their impact, they do raise new and important issues of co-ordination. Attaching all three arms of policy to a single body – in the UK, the Bank of England – can help in this co-ordination process, as it internalises any policy spillovers, or externalities, which might otherwise arise between them.

Nonetheless, this framework still requires that the three decision-makers consider the impact of each others' actions when making their own policy decisions.[38] For example, monetary policy forecasts for inflation and output will need to include an assumption about

37 Haldane and Madouros (2012); Aikman *et al.* (2013).

38 For a recent discussion, see Stein (2013).

the stance of macroprudential policy. And macroprudential stress-testing will in turn need to make assumptions about the course of monetary policy and the macro-economy.

Co-ordination issues also arise when co-ordinating macroprudential and microprudential policies. By and large, macroprudential tools involve using microprudential tools to address risks to the stability of the financial system as a whole. At some points in the cycle, there may be tensions between the instrument settings appropriate for macro and microprudential purposes. These problems are perhaps most acute during the downswing, when a macroprudential release of buffers could sit awkwardly with a microprudential approach of seeking to bolster firms' resilience.

Potential trade-offs and tensions between policy settings are part and parcel of public policy. The benefits of having a clearly defined policy framework, including for macroprudential policy, is that these trade-offs can be discussed and, ideally, resolved openly. Having distinct policy committees, with distinct statutory remits, ought to make that policy process of openness and resolution no more difficult, and potentially somewhat easier. It certainly ought to make it more transparent and understandable to the wider world.

There is an urgent need for more research on all of these important macroprudential questions – and more besides. If macroprudential policy reduces somewhat the chances or severity of another systemic crisis, the gains to society are potentially enormous.

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BANKING UNION

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BANKING UNION

Banking union is the cornerstone of a broader policy framework[1] that aims to break the link between sovereigns and banks, so that:

— neither the euro nor Member States are at risk from banks; and

— banks are not at risk from sovereigns.

If successful, banking union will also deepen integration within the Euro zone in what is arguably the key sector of the economy. This should promote both stability and growth.

What will it take for banking union to be successful? That depends above all on whether the new regime is rigorous or lax. Over the long term, only a rigorous approach will work. But that requires an appropriate institutional framework. Starting with supervision runs the risk that banking union will remain partial. Indeed, if banking union stops at supervision, that will make things worse, not better.[2] The Single Supervisory Mechanism (SSM) should be integrated with the framework for provision of liquidity from the central bank and broadened out – as the Council and Commission have proposed – to include reform of resolution regimes and deposit guarantee schemes.

1 Banking union

Banking union consists of five elements:

— Regulation.

— Supervision.

— Provision of liquidity from the central bank.

— Resolution.

— Deposit guarantee schemes.

Banking union will be an exercise in 'variable geometry'. Although regulation will continue to apply at the EU level, full banking union will only apply within the Euro zone. Member States outside the Euro zone will not be required to join the SSM (but may 'opt-in' via so-called close cooperation agreements). Banking union will effectively be embedded within the single market and measures will be taken to assure that banking union is consistent with the single market.

Even though the European Council (2013) has set a tight timeframe for its enactment into legislation and implementation into practice, banking union will remain a 'work in progress' for some time. Not only will the SSM require extensive preparation, but legislative action will be required to reform both resolution regimes and deposit guarantee schemes in the

1 As Hermann van Rompuy (2012) President of the European Council noted banking union is part of a much broader programme to create a 'genuine' economic and monetary union. This programme includes measures to coordinate fiscal and economic policy as well as measures to create banking union. See European Council (2012).

2 As Elliott (2012, p. 14) comments, "practically all policy analysts argue that there are serious problems and dangers in designing bank supervision before knowing how resolution and guarantees will work." See also Huertas and Nieto (2012), IMF (2013, p. 4) and Wyplosz (2012, p. 12).

EU. The ECB is already working with national supervisory authorities (NSAs) to establish the SSM, so that it can become operational as scheduled in March 2014. The Council has set June 2013 as a target for agreement on the Bank Recovery and Resolution (BRR) Directive as well as for agreement on the Deposit Guarantee Scheme (DGS) Directive – after allowing time for transposition into national legislation, these measures to harmonise national approaches to resolution and deposit guarantees would also become effective in 2014. Finally, the Council has endorsed the Commission's intent to introduce by the summer of 2013 a Single Resolution Mechanism (SRM) for countries participating in the SRM. It may therefore be two or more years before the Euro zone has a fully operational SSM and SRM and quite a bit longer before the Euro zone has a single deposit guarantee scheme. This extended transition may pose significant risks.

2 Regulation remains at EU level

Regulation sets the rules to which banks must adhere and the framework within which supervisors conduct supervision. This will – possibly with one very important exception – remain at EU level. Legislation approved by the Council and Parliament would continue to set the overall foundation for regulation. The European Banking Authority (EBA) would fill in the details through the development of binding technical standards.[3]

However, the introduction of banking union within the Euro zone requires an adjustment in the voting procedures at the EBA. Under banking union it is envisaged that the ECB would 'coordinate and express' the views of the Member States within the banking union [EC (2012c)]. This effectively grants the ECB a veto over any decision that the EBA might wish to take: the EBA cannot enact any measures without the concurrence of the seventeen Euro zone Member States that will – via the coordination that the ECB will provide – vote as a bloc. To assure that the ECB could not simply impose its views on the EBA, approval of binding technical standards will require a 'double majority' of Member States within the banking union and of Member States outside the banking union.[4]

The exception to keeping regulation at the EU level is likely to be the regulation of bank structure. Although the Liikanen (2012) report recommended measures to ring fence trading activities be taken at EU level, the Commission has not as yet introduced legislation. That has created scope for individual Member States to go their own way. The UK has elected to put the ring fence around retail and commercial banking [HMT (2013)], whilst France and Germany have each elected to introduce variants of Liikanen. Even if the Commission does introduce legislation, it may be difficult to override national legislation, especially if banks have already taken significant steps toward implementation. So single market will have a single regulator (the EBA) but it may not have a single structure.

3 The Single Supervisory Mechanism is the core of banking union

Under the Single Supervisory Mechanism (SSM) the European Central Bank (ECB) will together with the national supervisory authorities constitute a single supervisory system responsible for supervision of all banks in the Euro zone [Constâncio (2013)]. As the European Council (2012) decision states:

> The SSM will be composed of the ECB and national competent authorities. The ECB will be responsible for the overall functioning of the SSM. Under the proposals, the ECB will have direct oversight of Euro zone banks, although in a differentiated way and in close cooperation with national supervisory authorities.

3 Such standards require the concurrence of the Commission (and are actually issued by the Commission) and are subject to review by the European Parliament.

4 This provision will remain in effect as long as there are at least four Member States outside the Single Supervisory Mechanism.

The ECB will take 'direct' responsibility for the supervision of all banks headquartered in a Euro zone Member State that have a certain size (assets in excess of €30 billion or above 20% of the Member State's GDP). Banks below this threshold will remain the supervisory responsibility of the Member State in which the bank is headquartered. Based on this division of labour, the ECB will directly supervise all (approximately 140) systemically important Euro zone banks, accounting for approximately 80% of the aggregate assets of the Euro zone banking system. NSAs will supervise the remaining banks. But all supervision will be done in accordance with policies and procedures set by the ECB and the ECB "can decide to transfer to direct supervision any bank or group of banks that may be considered relevant or the origin of systemic risk" [Constâncio (2013)].

In taking up these new responsibilities, the ECB will, together with national supervisors and the Member States themselves, have to resolve a number of practical issues. These include (i) organisational issues, (ii) any entry conditions on banks that the ECB will impose, and, most importantly (iii) the approach that the ECB will take to supervision: will it be rigorous or lax?

3.1 ORGANISATIONAL ISSUES

The main organisational issues concern how to govern the relationship of the SSM to (a) the national supervisory authorities, (b) the Governing Council of the ECB and (c) Member States who elect to "opt-in" to the SSM by concluding close cooperation agreements.

The SSM will not replace national supervisory authorities (NSAs). NSAs will continue to exist and will retain responsibility for consumer protection, payment systems and citizens' access to bank accounts and services and other aspects of conduct supervision as well as for the supervision of smaller institutions not subject to the SSM. The question is what role, if any, the NSAs should continue to play with respect to the supervision of institutions that will be 'directly' supervised by the ECB.

Although the ECB can execute many supervisory tasks (e.g. peer analysis) centrally, and although the ECB can centrally set the methods that supervisors should follow, much of the interaction with banks will – if supervision is to be fully effective – have to take place locally, where the banks are headquartered, rather than centrally from the headquarters of the ECB in Frankfurt. That would require the ECB to build up a local presence throughout the Euro zone, either directly (e.g. via transfer of supervisory staff from the NSAs to the ECB) or indirectly via building multinational supervision teams and/or concluding cooperation or agency agreements with NSAs. Under such a cooperation or agency agreement, the ECB would give direction to the NSA and take final supervisory decisions with respect to the bank(s) concerned, possibly (but not exclusively) upon the recommendation of the NSA. Although the former direct approach is likely to be more effective over time, the latter agency approach may be more feasible both from a timing perspective (given the tight timetable for implementation of the SSM) as well as from a political perspective (the cooperation or agency approach preserves a greater role for the NSAs. This may be relevant, given that the adoption of the SSM requires unanimous approval from the Member States.)[5]

However, the cooperation or agency approach carries risks, particularly if the NSAs retain either implicitly or explicitly (a) the power of initiation (the NSAs indicate the issues the ECB should consider), (b) the right of recommendation (the ECB can only take decisions

5 Note that the preservation of existing roles is not the only way to accord ongoing influence to the NSAs. It would also be possible to assign individual NSAs with the lead responsibility for certain functional areas and/or certain types of risk (e.g. the NSA in one Member State would become the centre of expertise for the SSM with respect to operational risk; a second NSA for credit risk, etc.).

on recommendations from a NSA[6]) and/or the right to participate in any supervisory decision that the ECB may make (e.g. via subjecting such decisions to a vote by the proposed Supervisory Board of the ECB). The more power the NSAs retain, the less direct the supervision of the ECB will be and the greater will be the risk that the ECB is captured by the NSAs (and by extension policymakers in Member States as well as the banks themselves).

Much will depend on how policy-makers are able to reconcile two different precepts, namely, (i) the need to separate the conduct of supervision from the conduct of monetary policy and (ii) the provisions of the Treaty that prohibit the Governing Council of the ECB from delegating to anyone else its responsibility to take decisions for the ECB (ultimately, therefore, the Governing Council has responsibility for both supervision and monetary policy). To assure that supervision is 'independent,' it is proposed that the ECB set up a supervisory board consisting of representatives from national NSAs and from the ECB[7] to take supervisory decisions subject to ratification by the Governing Council. However, discussion continues as to whether the Chair of such a supervisory board or a Member of the Governing Council should take executive responsibility for the SSM.

That decision will help determine whether member States outside the Euro zone elect to conclude cooperation agreements with the ECB to 'opt-in' to the SSM. For a number of Member States outside the Euro zone, the domestic banking system is dominated by subsidiaries or branches of banks headquartered in a Euro zone Member State.[8] As a result, financial stability in such a non-Euro zone Member State can be heavily influenced by supervision of the parent enterprises in the home (Euro zone) Member State. Opting-in to the SSM therefore presents such non-Euro zone Member States with the opportunity to influence the stance that the supervisor of the parent bank may take – provided such Member States have a vote in the SSM supervisory board and provided this board, rather than the Governing Council, exercises the executive authority within the SSM. If real power rests with the Governing Council (on which non-Euro zone Member States cannot vote), it is unlikely (even though the SSM may provide 'better' supervision) that non-Euro zone Member States will elect to opt in to the SSM.

3.2 ENTRY CONDITIONS

A second practical consideration concerns the condition of the banks for which the SSM assumes supervisory responsibility. Should the transfer of authority occur on an "as-is" basis, or should banks be required to undergo an "entrance exam" to demonstrate that they are in good condition before the ECB assumes responsibility?[9] The answer depends on how banks that failed such an entrance exam would be treated. Would they be recapitalised, and, if so, by whom, national authorities or the ESM (see comments on resolution, below).

3.3 THE ECB'S APPROACH TO SUPERVISION

Finally, and most importantly, the ECB must decide upon the approach that it will take to supervision. Will the SSM merely be a scaled–up version of the current national approach,

6 This is an unlikely outcome as it would effectively amount to co-determination or sharing of authority between the ECB and the NSA.

7 The ECB representatives on the supervisory board would not be involved in monetary policy decisions.

8 To a lesser extent, there are also Euro zone Member States (e.g. Estonia, Finland) whose systemically important banks are headquartered in a Member State outside the Euro zone. These Euro zone Member States also have a strong interest in cooperation with the 'headquarters' Member States.

9 Constâncio (2013) notes that the launch of the SSM "will be associated with a comprehensive review of participating banks' balance sheets. The objective of this review is to identify legacy problems and start with a system that avoids reputational risks for the SSM down the line. This process may have financial implications if impaired assets have to be written down".

or will the European approach be rigorous enough to break the link between banks and sovereigns?[10]

The answers to a few simple questions should indicate the direction the SSM will take. How will the SSM ask banks under its supervision to treat Euro zone government bonds? Will it continue to allow banks to hold such bonds in the banking book, to hold such bonds at historic cost, to accord such bonds a zero risk weight and to exempt such bonds from large exposure limits? Or will the SSM require banks to hold such bonds in the trading book (so that they are marked to market and subject to capital requirements for interest rate risk)? If the SSM allows banks to continue to hold Euro-government bonds in the banking book, will it force banks to value such bonds at the lower of cost or market and/or set limits on the amount of such bonds from a single issuer that a bank may hold?[11]

To break the link between banks and sovereigns, limits must be set on the amount of bonds from a single issuer that a bank may hold. With such a limit, the default or rescheduling of a sovereign's debt need not necessarily bring down immediately the banks incorporated in that jurisdiction. Without such a limit the tendency of banks to amass vast quantities of bonds issued by the sovereign of the jurisdiction in which they are incorporated could continue unabated. The link between banks and sovereigns would remain intact.

A second litmus test for the SSM is: how proactive will the ECB be as a prudential supervisor? Will it judge the effectiveness of banks' business models, assess the ability of management to execute its selected strategy, take a forward look at the risks that banks assume and act to intervene when one or more of these areas pose a significant threat to the soundness of the bank and the safety of deposits? Or will the ECB be reactive, as many NSAs have been, or even prone to forbearance?

Much will depend on whether the Euro zone creates a robust resolution regime to which the ECB can hand over a bank that fails to meet threshold conditions. If such a regime is created (see section on resolution below), the ECB can be a much more proactive supervisor, as sending a bank into resolution becomes a credible threat. This in turn will incentivise investors to monitor and control management more closely and induce banks' management to weigh risks more carefully.

4 Monetary policy, macro-prudential supervision and the provision of liquidity to the banking system and economy at large

Formally, there will be a degree of separation between supervisory decisions regarding individual institutions and decisions concerning monetary policy (see organisational issues above).

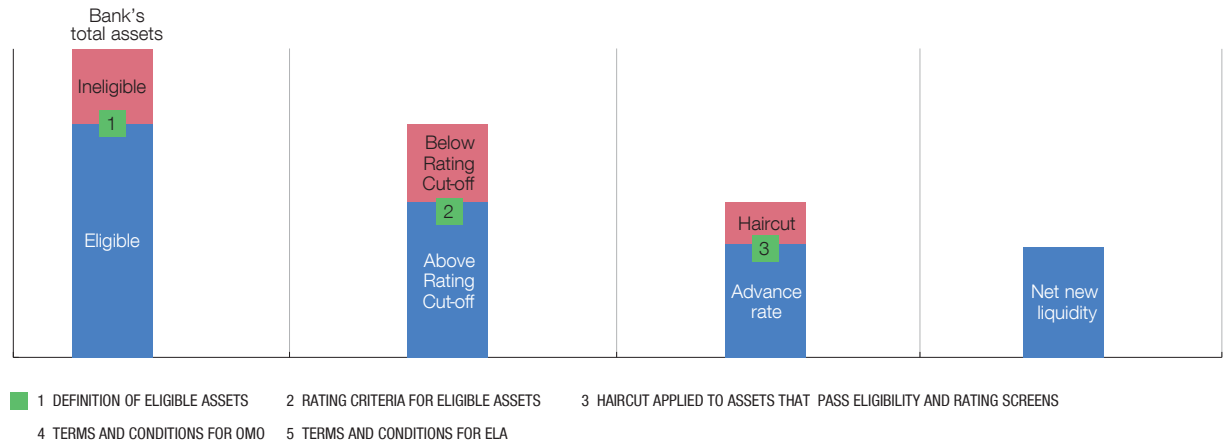
However, the ECB implements monetary policy largely through lending to banks on a collateralised basis via an auction process [ECB (2011)]. Setting the policy rate is but one component of monetary policy. The terms on which the ECB extends credit to the banking system matter as well, for they affect the transmission mechanism by which banks and other financial intermediaries convey the central bank's policy impulses to the real economy.

10 The EBA may also have a role to play here, since it is charged with the development of a single supervisory handbook for the EU as a whole.

11 A rigorous ECB would be more aggressive than national supervisors in forcing banks to take provisions against real estate lending. And, a rigorous ECB would also be stricter than national supervisors in limiting the forbearance that banks provide to SMEs and other borrowers. In addition, the ECB could potentially consider using Pillar 2 to implement CRD IV in a manner that is fully consistent with Basel III rather than deficient [Basel Committee on Banking Supervision (2012)] to the internationally agreed standard.

CENTRAL BANK LIQUIDITY: ECB HAS MULTIPLE LEVERS TO PULL
Can these be the basis for macro-prudential supervision?

CHART 1



SOURCE: Author´s elaboration.

Essentially, these terms constitute a set of policy levers that the central bank can pull to promote financial stability, exercise macro-prudential supervision and conduct monetary policy. At various stages in the crisis the ECB and/or the national central banks have pulled each of these levers. Banking union should set the stage for bringing these levers into a more consistent and comprehensive framework for macro-prudential supervision that takes the transmission mechanism more explicitly into account.[12]

The ECB has five principal levers at its disposal (see chart 1):

1 *It can define what assets are eligible for inclusion as collateral with respect to ordinary liquidity operations.* During the crisis the ECB broadened the definition of eligible collateral. This eased credit conditions.

2 *It can limit eligible assets to those that also meet a minimum credit standard.* During the crisis, the ECB has lowered the minimum credit rating that eligible assets must have in order to serve as collateral for open market operations. This also eased credit conditions.

3 *It can set the haircut or advance rate on the actual assets presented for discount at the central bank.* Reducing the haircut (or increasing the advance rate) eases credit conditions.

4 *It can set the terms and conditions for open market operations.* During the crisis the ECB has at various times adjusted the terms on which it meets the bids of banks for funds. It has allowed unlimited borrowing (subject only to provision of qualified collateral), extended the term for which banks could borrow to as long as three years and allowed banks to pre-pay outstanding credit without penalty.

5 *It can set the terms and conditions for emergency liquidity assistance* (CELA). Central banking doctrine holds that ELA should only be provided on the basis of sound collateral to institutions that are viable (solvent) but temporarily illiquid. Currently, the national central banks are the entities that evaluate the collateral banks provide in connection with ELA. National central banks also make the viability determination and national central banks

12 Central banks' macro-economic models generally do not take the transmission mechanism explicitly into account, a defect that may have contributed to the severity of the financial crisis [Huertas (2011), pp. 103-114, 196-197]. See also Pereira (2013).

extend ELA for their own account, subject to approval of the quantity of the credit (but not the quality) from the ECB. Any losses incurred as a result of extending ELA are the responsibility of the national central bank and ultimately, the Member State concerned.

Logically, this allocation of responsibilities should change under banking union. The ECB should assume direct responsibility for the provision of ELA, at least for the institutions for which it exercises direct supervisory responsibility. This would unify decision-making with respect to putting a bank into resolution. Not only would the ECB make the supervisory decision regarding whether or not the bank is meeting threshold conditions, but it would also make the determination as to whether and when the bank's access to liquidity should be cut off. That should limit the possibility of forbearance; particularly if there is a robust resolution regime into which the ECB can put a failed bank (see below).

Decisions on these five variables have important implications for the overall conditions that banks face and the decisions that banks make with respect to credit contraction or expansion. That has certainly been true during the crisis. It would now be beneficial for the ECB to incorporate these elements more formally into a macro-prudential tool kit. That will promote financial stability and increase the effectiveness of monetary policy.

5 Resolution

The failure to link supervision to a credible resolution regime would force the Euro zone at large and the ECB in particular to choose among three unappealing outcomes:

1 Disruption of financial markets and the economy at large (if the ECB were to put a bank into resolution). This could result, if national resolution regimes could not – possibly due to a lack of coordination – resolve a bank in a manner that assured continuity of critical economic functions without taxpayer support.

2 Imposition of significant cost on the European taxpayer. This could result, if a decision were made that the ESM should simply recapitalise failing banks without reform of the resolution regime. That would create very large actual and contingent liabilities for Euro zone taxpayers.

3 Forbearance. Reluctance to countenance either of the first two results dictates that the authorities exercise forbearance. They refrain from putting into resolution banks that fail to meet threshold conditions and provide emergency liquidity assistance to keep them in operation. Under current arrangements this raises the exposure of national central banks and ultimately Member States to the failing bank, strengthening the link between sovereigns and the bank and increasing either the disruption to markets or the cost to the ESM if the bank is ultimately put into resolution.

To remedy this situation, the authorities must reform resolution. The proposed Bank Recovery and Resolution (BRR) Directive makes a start in line with the recommendations of the Financial Stability Board (2011) with respect to key attributes for resolution regimes. When implemented, the BRR would harmonise resolution tools across all EU Member States. This would over time assure that

— Each Member State has the same resolution tools for banks and a designated resolution authority empowered to take rapid decisions with respect to how a bank should be resolved. This is an essential precondition, if resolution is to achieve the objective of assuring continuity of critical economic functions.

— Such resolution tools allow the resolution authority to bail-in various bank liabilities so as to assure that investors and creditors of the bank bear loss before taxpayers. This provides a statutory basis for bail-in that banks can and should complement with contractual provisions.

— Such resolution authorities cooperate with one another. The Directive envisions the formation of bank-specific resolution groups consisting of the resolution authorities of each Member State in which the banking institution has a presence. This group would take a collective decision with respect to the resolution of a banking enterprise headquartered in an EU Member State. However, it is extremely unlikely that such a resolution group could reach an agreement within the time frame required to implement the resolution of a systemically important financial institution while limiting total losses to taxpayers.

For Member States in the banking union, it makes sense to go a step further and create a single resolution mechanism (SRM) that would pick up where the SSM leaves off. This is exactly what the European authorities propose to do [Van Rompuy (2012)]. The SRM would effectively take the hand-off from the SSM as and when the ECB took the decision to put a bank under its supervision into resolution.

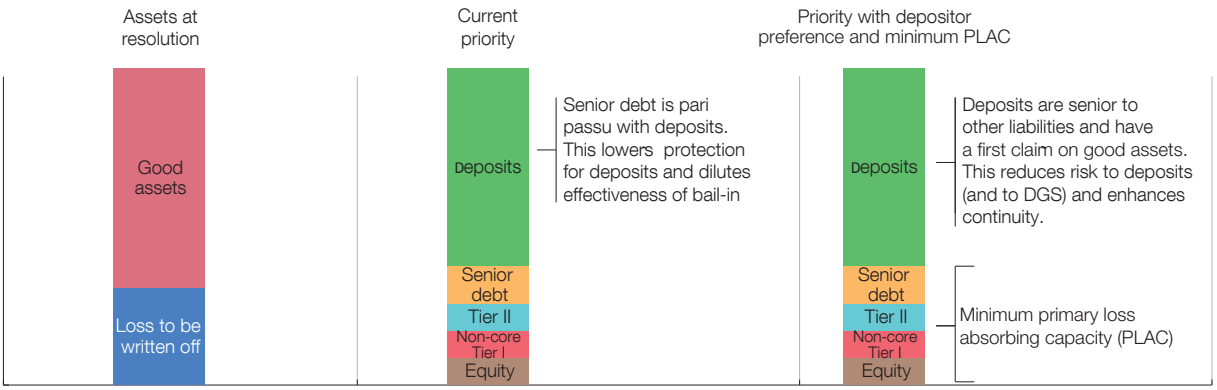
To administer the SRM the Commission proposes to create a European Resolution Authority (ERA) that would implement a single resolution process across the Euro zone Member States. This will streamline if not fully centralise the operation of resolution groups (in that the ERA will act for all Member States in the banking union), but some further adjustment may be required to assure that the ERA can effect resolution within the very tight (generally no longer than 48 hours) timeframe required in order to assure continuity of critical banking services.

Perhaps the key question is the risk to which depositors should be exposed – particularly after the agreement of the Euro zone finance ministers [Eurogroup (2013)] to bail-in uninsured deposits at two large banks in Cyprus. Deposits are the quintessential customer obligation, allowing the depositor to make and receive payments and providing the customer with liquidity. Access to deposits is one of the critical economic functions whose continuity resolution procedures should seek to assure.

The current priority ranking of deposits does not promote this result (see chart 2). At present deposits rank pari passu with senior debt. Although losses will go through a so-called waterfall, with equity taking first loss, then non-core Tier I capital and then Tier II capital, the waterfall stops when it comes to the next level. If losses exceed the total of the bank's outstanding capital instruments (equity, non-core Tier I capital, Tier II capital), this excess loss should be shared pro rata among the senior unsecured creditors of the bank, i.e. the depositors and the holders of the bank's senior debt.

In contrast, if deposits have preference, the waterfall contains an additional level. If losses exceed the total of the bank's capital instruments (equity, non-core Tier I and Tier II capital), loss is then allocated to the holders of the bank's senior debt before any loss is attributed to the bank's deposits. Depositor preference lowers the risk of deposits (and the risk to the deposit guarantee scheme), particularly if there is also a requirement that the bank maintain outstanding a minimum amount of primary loss absorbing capacity (equity, non-core Tier I capital, Tier II capital and senior debt subject to bail-in). However, the proposed bank recovery and resolution (BRR) Directive leaves the priority of deposits unchanged and fails to require banks to issue a minimum amount of bail-in-able debt.

RESOLUTION: THE IMPORTANCE OF DEPOSITOR PREFERENCE CHART 2



SOURCE: Author´s elaboration.

Accordingly, the ECB may wish to consider introducing a supervisory requirement that banks under its direct supervision maintain a minimum amount of primary loss absorbing capacity. This would lower the risk of deposits and reduce risk to the deposit guarantee funds, even if depositor preference is not formally introduced. To the extent that a bank elected to meet this requirement with senior debt, such debt should be subject to bail-in (as both a statutory and contractual matter) and subordinated to deposits.

Attention also needs to be paid to arrangements for the resolution process. This starts with the decision to pull the trigger. Will this require a formal decision of the entire supervisory board, or will such a decision be taken by a smaller executive group? How will the supervisory decision to withdraw authorisation be coordinated with the decision of the ECB with respect to refusing or discontinuing ELA? Measures will have to be taken to assure rapid decision-making and maintenance of confidentiality.

The resolution process also needs attention. What role will the ESM play, once the SSM comes into operation, and how might this change if the European Resolution Authority (ERA) is created?

As outlined above, the ESM should be available to directly capitalise banks once the SSM comes into operation. Until the point where the SSM commences operation, the ESM will continue to provide funds to the Member State seeking restructuring assistance (which may in turn utilise some or all of those funds to recapitalise failing banks). To effect the transition from the old ESM regime (lending to Member States only) to the new (direct recapitalisation of banks as a permissible use of ESM funds), it is proposed that banks undergo an 'entrance exam' to identify any legacy losses. These would be the responsibility of Member States under current resolution approaches, and any recapitalisation required would come from investors or from Member States, not the ESM. This was the approach adopted in the case of Cyprus, and the presumption is that a similar approach would be followed in other Member States, should resolution of failing banks be required as part of an overall restructuring programme.

Upon commencement of the SSM, the ESM would be able to recapitalise banks directly. But the terms and conditions on which it would do so remain open to debate. Does tapping the ESM to recapitalise a failing bank require the Member State in which the bank is headquartered to agree to a more general restructuring and monitoring programme? In other words, does recourse to the ESM carry conditionality for the Member State seeking assistance? Secondly, where would the ESM stand in the queue of capital providers to the failing bank? First in line, or last, only after investors have been bailed in? Would 'investors' include uninsured depositors?

Under a rigorous regime, there should be no presumption that the ESM would simply replenish the capital of any bank that fails to meet threshold conditions. Recourse to the ESM should be a last resort, only after investors (but not necessarily uninsured depositors) have been fully bailed in, and the terms on which the ESM injects new money (if at all) should be 'last-in, first out' basis with the same type of conditions that a private equity investor would insist upon. As a new investor the ESM should primarily be responsible for assuring that the bank has sufficient funds for a fresh start, not for bearing losses arising from the failed bank's past mistakes. Such losses should belong to investors, not taxpayers. To assure that this would be the case, the ESM should have a strong interest in the supervisor's taking prompt corrective action. If the bank goes into resolution as soon as it fails to meet threshold conditions, this will minimise losses to investors as well as to the ESM (as an investor of last resort).

Finally, consideration needs to be given to how a European Resolution Authority would improve the resolution process. It should certainly streamline decision making, but this may require changes to the BRR, particularly with respect to resolution groups. It may also receive authorisation to build up a resolution fund to bear any losses that it may incur in connection with resolving failed banks. If so, this fund should be tapped before there is any recourse to the ESM.

Such a resolution fund should also in my view be distinct from any fund that may be built to back the promises of the deposit guarantee scheme. The resolution regime should make clear for which losses such a resolution fund might be responsible. These losses might include compensation to investors whom the resolution regime made worse off than they would have fared under liquidation, but such 'losses' should not necessarily include a provision to recapitalise failed banks, unless this were done as an "investor of last resort" on the last-in, first out private equity terms outlined above.

6 Deposit guarantee schemes

The final question is whether banking union requires a single deposit guarantee scheme, over and above the improvements to national schemes that the enactment of the Deposit Guarantee Schemes (DGS) Directive [EC (2010)] would bring about. The European Council (2013) thinks not. Although the Council endorsed the Commission's intent to introduce a Single Resolution Mechanism (SRM) and a European Resolution Authority, it refrained from calling for a single deposit guarantee scheme at this time.

Is this correct? On the surface, a single European deposit guarantee scheme would assure the man or woman in the street that a euro in a bank deposit in one banking union Member State is just as good as a euro in a bank deposit in another banking union Member State. With such a guarantee there would be no reason to withdraw one's funds from a bank in a Member State whose sovereign was experiencing difficulties in raising debt in private capital markets.

But could such a guarantee be plausibly given? If commercial risk were the only risk facing the deposit guarantee scheme, a single deposit guarantee scheme would be feasible. The commercial risk to the DGS is the risk that the DGS will suffer a loss as a result of a bank's being placed into resolution. The way to address commercial risk is to give deposits preference and require banks to keep outstanding a minimum amount of primary loss absorbing capacity. That will facilitate bail-in and lower the risk to deposits (and to the DGS).[13]

13 It would also facilitate resolution and lower the size of any deposit guarantee fund that might be required. And, if banks subject to the European DGS were exempt from contributions to national deposit guarantee funds, smaller banks would in all likelihood over time seek to become supervised directly by the ECB and become members of the larger European DGS.

But banks also face sovereign risk – the risk that the sovereign will default, the risk that the sovereign will impose one-off levies on deposits [as the Eurogroup (2013) proposed Cyprus do] and the risk that the sovereign will decide to re-denominate its currency (although under the terms of the Treaty, it would have to leave the EU in order to do so). This sovereign risk aggravates the commercial risk – indeed, borrowing costs for firms and households continue to be correlated with the borrowing cost of the sovereign, as are funding costs for banks. A weak sovereign generally means a weak economy, poorer bank asset quality and lower bank income.

Although geographic diversification can help mitigate sovereign risk, it cannot eliminate this risk entirely. In particular, banks (and therefore the single deposit guarantee scheme) would remain exposed to the risk that the sovereign could impose one-off levies on deposits and/or the sovereign could re-denominate the currency (even if this meant leaving the EU).

This poses significant moral hazard issues. If the single deposit guarantee scheme were to cover such risks, the European guarantee would effectively offset much of the economic cost that the levy or re-denomination could cause and thereby make it more likely that a sovereign would adopt such a course of action. That would raise the risk to the single European deposit guarantee scheme, require a larger fund to be accumulated and pose greater contingent risk to whatever backstop the Member States established to assure that the single deposit guarantee scheme could fulfil its obligations. So a single deposit guarantee scheme must very likely await full political union – a state of affairs that is a long way off and may never occur.

Does that mean that banking union must await full political union? No. Banking union requires a single resolution mechanism to complement the single supervisory mechanism, but it does not require a single deposit guarantee scheme. Strengthening the national schemes – as the DGS Directive proposes to do – should be adequate, particularly if deposits are given preference and banks are required to issue a minimum amount of bail-in-able instruments subordinated to deposits.

7 Conclusion

In sum, if banking union is done well, it is very much worth doing. It can break the "bank-sovereign loop," promote financial stability and foster economic growth. But for banking union to be done well, the ECB must in fact as well as in name exercise direct supervision over Euro zone banks. Furthermore, the ECB must be rigorous not lax. That requires national supervisory authorities to cede real authority to the ECB. It also requires that the creation of an effective single resolution mechanism so that banks become 'safe to fail', so that a European Resolution Authority can resolve a failed bank without cost to the European taxpayer and without disruption to the financial system or the economy at large. In short, the SSM is the right first step, but the journey shouldn't stop there. The SRM needs to follow in short order.

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REQUERIMIENTOS PRUDENCIALES Y AJUSTES VALORATIVOS POR RIESGO DE CONTRAPARTIDA EN DERIVADOS OTC: SITUACIÓN ACTUAL Y PERSPECTIVAS

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Desde la caída de Lehman Brothers, son muchos los cambios producidos en el sector financiero, siendo uno de ellos el abandono de la idea de contrapartes libres de riesgo. Ello ha tenido como consecuencia una revisión profunda, tanto por parte del sector como de los reguladores prudenciales, del concepto de riesgo de contrapartida, que surge principalmente en la operativa con derivados contratados en mercados no regulados. En este artículo se describen los conceptos más importantes asociados a este riesgo, incluyendo el *credit valuation adjustment* (CVA) y el *debt valuation adjustment* (DVA), y se presentan los criterios que podrían garantizar una adecuada gestión del riesgo de contraparte.

1 Introducción: concepto e importancia del riesgo de contrapartida

La crisis financiera ha hecho cobrar importancia al riesgo de contrapartida. El hecho de que el mercado haya presenciado desde 2007 situaciones de crisis tan sonadas y con pérdidas cuantiosas como las de Bear Stearns, Lehman Brothers o Wachovia ha motivado que las entidades hayan tomado conciencia de la importancia que tiene la correcta identificación, medición y gestión de este riesgo.

El riesgo de contraparte es una modalidad del riesgo de crédito y tiene como característica definitoria el que la exposición es esencialmente aleatoria y depende de factores de mercado. Es un riesgo derivado de contratos financieros, que, según evolucionen las variables de mercado subyacentes, cobrará un valor positivo, negativo o nulo.

Por ello, cuando el contrato es de naturaleza bilateral, acaba importando la calidad crediticia de ambas partes, puesto que, en muchas ocasiones, cualquiera de las dos puede llegar a ser deudora. Así, por ejemplo, si «A» acuerda una permuta financiera con «B» en la que «B» paga unos intereses fijos y recibe variables, «A» corre riesgo con «B» y «B» con «A». Además, solo se aprecia en estos contratos (permutas, derivados OTC y operaciones de financiación de valores[1]) cuando son negociados privadamente entre las partes, despreciándose en aquellos instrumentos contratados a través de cámaras de compensación *(central counterparties),* en los que está comúnmente aceptada la inexistencia de este riesgo[2].

Al igual que para el riesgo de crédito tradicional, se ha de diferenciar entre pérdidas esperadas e inesperadas. Las primeras habrían de ser reconocidas contablemente como coste e incluidas en el valor razonable *(mark to market* o MtM) registrado del contrato. La diferencia entre una valoración libre de riesgo y otra que incluya entre sus parámetros el riesgo de crédito existente[3] es lo que habitualmente se denomina «ajuste de valoración por riesgo de crédito» o *credit valuation adjustment* (CVA).

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1 «Operaciones de financiamiento de las garantías», en terminología de la Circular 3/2008 del Banco de España.

2 No obstante, es importante no confundir el menor riesgo existente con su inexistencia. En este sentido, merecen destacarse las recomendaciones del Banco de Pagos Internacionales (BIS) sobre la gestión de los riesgos asumidos por las cámaras de contrapartida central (Recomendaciones para entidades de contrapartida central, http://www.bis.org/publ/cpss64es.pdf), así como los mayores requerimientos de capital para las entidades sujetas a estos en relación con la operativa con dichas entidades (Requerimientos de capital para las exposiciones bancarias frente a entidades de contrapartida centrales, http://www.bis.org/publ/bcbs227_es.pdf).

3 Los modelos de valoración de derivados empleados por la industria en general no consideran la presencia de riesgo de crédito, como, por ejemplo, en el modelo de Black-Scholes. No obstante, como consecuencia de los episodios descritos en el presente artículo, es cada vez más habitual encontrar modelos donde explícitamente se halla incorporado aquel.

Por el contrario, las pérdidas inesperadas se han de cubrir con capital, a semejanza de las surgidas del posible *default* tradicional. Pero, dada la renovada importancia de este riesgo, tanto el Banco de Pagos Internacionales (BIS) como la Comisión Europea y los distintos reguladores están revisando el marco de requerimientos de capital, de manera que se introducirá una nueva carga adicional que cubrirá las pérdidas surgidas en el CVA por posibles migraciones en las calidades crediticias, el denominado «capital por CVA».

En cuanto a la importancia de esta carga extra de capital, el BIS publicó en abril de 2012 los resultados de un ejercicio de seguimiento del impacto que tendría el nuevo acuerdo de capital sobre los requerimientos prudenciales de algunas entidades. En él se estimó que supondrá un incremento en los activos ponderados por riesgo de un 19,4 % para los bancos internacionalmente activos y de un 6,3 % para los de ámbito local; de esos incrementos, más de un tercio en ambos casos se debe a la nueva carga de capital por CVA.

El presente artículo tiene la siguiente estructura: en primer lugar, se profundizará en el concepto de exposición al riesgo de contrapartida, para enumerar a continuación las lagunas existentes en el tratamiento de este riesgo dentro del marco actualmente existente y cómo la introducción de un ajuste CVA es una respuesta a aquellas. En el tercer apartado se describirá cómo lo anterior ha sido recogido en el nuevo marco regulatorio prudencial del riesgo de contrapartida, dedicándose el último apartado a la exposición de las conclusiones.

2 Componententes del riesgo de contrapartida

Como ya se ha comentado, el riesgo de contrapartida se diferencia del riesgo de crédito habitual en la complejidad que entraña la correcta valoración de la exposición crediticia. En un contrato *over the counter* (OTC) típico, la relación entre los intervinientes en el contrato podría generar obligaciones potenciales de entregar distintas cantidades de efectivo a lo largo de la vida del contrato. Así pues, no hay certeza de cuánto nos debe la contraparte, que puede ser incluso permantentemente nuestro acreedor y no nuestro deudor. Si, además, las relaciones entre esas partes son múltiples y existe un convenio de compensación de posiciones *(netting)* válido y en vigor, habrá que atender al valor neto de dichas relaciones.

Algebraicamente, a efectos de calcular el capital por riesgo de contraparte necesario para absorber las pérdidas que se pudieran llegar a presentar, se podría establecer una medida igual al producto de una exposición, que a su vez depende de múltiples variables subyacentes de mercado, por una función de pérdidas crediticias:

$$\text{Riesgo de Contrapartida} = \text{Exposición} \times f(PD, LGD, M, \rho) \qquad [1]$$

En esta expresión, PD es la probabilidad de que una contraparte incumpla sus obligaciones en un horizonte temporal considerado, LGD es la severidad de las pérdidas afrontadas en caso de producirse dicho impago, M es el vencimiento de las exposiciones consideradas y ρ es un factor de ajuste por correlación.

Por su peculiaridad en lo referido al riesgo de contrapartida, se abordará a continuación el concepto de exposición, toda vez que la función de pérdidas asociada no presenta, en general, especificidades con respecto a la del riesgo de crédito general.

Para ilustrar la problemática asociada al concepto de exposición, considérese una entidad de crédito que estuviera cotizando una permuta financiera con un nocional y vencimiento determinados, en la que la contraparte pagaría un tipo fijo y recibiría un variable. La pregunta que

se ha de responder será, desde el punto de vista de la gestión del riesgo de crédito: ¿qué exposición se estaría asumiendo? Obsérvese que tanto la entidad como la contraparte podrían resultar deudores o acreedores, indistintamente, en función de cómo evolucione una variable aleatoria que en este caso serán los tipos de interés. No obstante, solo incorporarán riesgo de crédito las posiciones deudoras y se definirá, en una primera aproximación, la exposición crediticia a partir de los valores positivos de la valoración del instrumento financiero de que se trate.

Alcanzado este punto, se puede definir algebraicamente la exposición como:

$$\text{Exposición} = \text{Max}\,(\text{MtM},0) = \text{MtM}^{+} \qquad [2]$$

La adecuada medición de la exposición en este ámbito requiere de especial cuidado, toda vez que para muchos instrumentos el acreditado no tiene en riesgo el pleno del nocional, sino solo el coste de reemplazamiento en caso de producirse el impago, que sería aquel coste que habría de satisfacer a un tercero para que aceptara entrar en ese contrato.

Ha de resaltarse, además, que la exposición crediticia tampoco ha de coincidir con el valor de mercado actual del instrumento (MtM). La determinación de por cuánto podría ser enajenado un activo financiero en estos momentos no tiene por qué coincidir con el importe no percibido del activo financiero en algún momento futuro indeterminado.

Cualquier medida de esa exposición habrá de considerar, necesariamente, tanto la exposición actual como la posible exposición futura que se pudiera llegar a presentar, no existiendo una única definición de esta, por lo que según los distintos objetivos perseguidos se habrá de emplear una u otra.

Las de mayor relevancia son las siguientes:

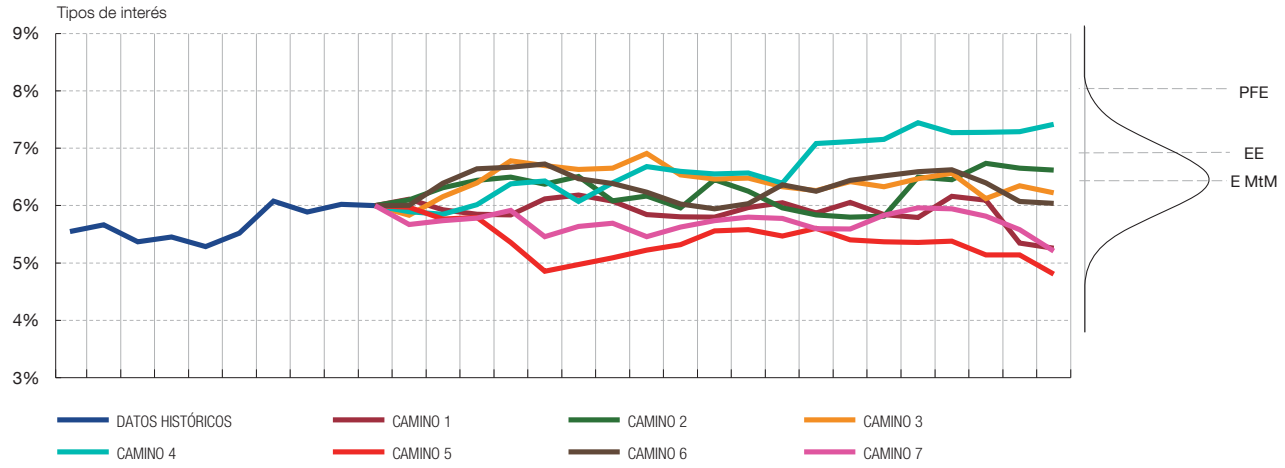
— MtM esperado (E MtM), que representa el valor razonable esperado en algún punto futuro para una transacción o conjunto compensable de ellas.

— Exposición esperada (EE), que será la media de la distribución de las exposiciones de una operación o conjunto compensable de las exposiciones en cualquier fecha futura con anterioridad a su vencimiento. Dada la asimetría reflejada implícitamente en la ecuación [2], las entidades solo se preocuparán, desde la óptica de gestión del riesgo de crédito, por los MtM positivos. Así, la EE será superior al MtM esperado toda vez que esta será el promedio de los MtM positivos. De hecho, puede haber instrumentos cuyo valor de mercado sea nulo o negativo y conlleven una exposición esperada positiva, en atención a la potencialidad implícita en el contrato.

— Exposición potencial futura *(Potential Future Exposure, PFE)*, que se obtiene de un percentil normalmente elevado de la distribución de la exposición en cualquier fecha futura con anterioridad a su vencimiento para una transacción o conjunto compensable de ellas. Vendría a responder a la siguiente pregunta: ¿cuál es la máxima exposición que se podría llegar a tener en un horizonte determinado con un 99 % de probabilidad, por ejemplo? Este concepto es muy parecido al más conocido *value at risk* (VaR), si bien con dos diferencias: se empleará un plazo mayor que el habitual de un año y está referido a beneficios o valores positivos del instrumento en lugar de a pérdidas.

TIPOS DE EXPOSICIÓN

GRÁFICO 1



FUENTE: Banco de España.

En el gráfico 1 se representan algunas de las métricas expuestas tomando como base los distintos caminos que, en el futuro y de forma aleatoria, pueden ser tomados por la exposición.

Existen otras definiciones derivadas de las anteriores y con relevancia prudencial:

— Exposición positiva esperada (EPE), promedio de las EE en el horizonte temporal considerado.

— EE efectiva, que será la EE condicionada a no poder decrecer durante el primer año. Una vez transcurrido ese primer período, esta y la definición anterior coincidirán. La importancia de esta definición surge de ser la base de la utilizada por el marco regulatorio de capital definido en Basilea.

— EPE efectiva, que es el promedio de la métrica anterior y es directamente empleada en el método regulatorio avanzado de determinación de la exposición por riesgo de contrapartida según Basilea.

3 Gestión del riesgo de contrapartida en derivados OTC

Una vez dotados de dicho instrumental conceptual, para gestionar este riesgo de contraparte en derivados OTC procede seguir los mismos pasos que con los demás riesgos que gestionan las entidades de crédito: identificarlo, medirlo, decidir si se acepta o no y, en su caso, mitigarlo o incluso transferirlo a un tercero.

La gestión realizada de este riesgo ha sido claramente insuficiente hasta tiempos recientes. No ha sido hasta en el inicio de la actual crisis financiera cuando su presencia ha comenzado a suponer problemas para algunas entidades, ya que el grueso de la contratación de productos OTC se realizaba con contrapartes mayoristas, principalmente bancarias, con un riesgo de crédito percibido reducido; por otro lado, el volumen total de dichas operaciones no ha alcanzado volúmenes significativos hasta hace relativamente poco tiempo. Además, cada vez ha ido siendo mayor la contratación de productos con contrapartes minoristas, con un perfil de riesgo distinto al de las mayoristas, y a pesar de ello en la gestión de estas exposiciones, y en su valoración y registro, en un primer momento, se continuaron empleando aquellos métodos iniciales, dando lugar a una serie de anomalías e incoherencias en su aplicación.

Uno de los principales motivos que seguramente han incentivado la contratación de productos OTC con clientela minorista, además de ofrecer un nuevo producto a estos clientes, ha sido la existencia de unos mayores diferenciales aplicados, que permitían registrar beneficios inmediatos basados en la creencia de que los diferenciales persistirían durante toda la vida de la operación y que eran en su totalidad fruto de la capacidad negociadora de las entidades. Las dudas acerca de lo adecuado del reconocimiento de estos resultados se pueden resumir del siguiente modo: ¿hasta qué punto las entidades eran —y son— capaces de separar la parte de los resultados atribuibles a la capacidad negociadora de aquella otra atribuible al puro y simple riesgo de crédito? Un primer paso dado por el regulador bancario español fue la obligación de que las entidades de crédito que participaran en esta operativa minorista tuvieran la obligación de posponer el reconocimiento de ese beneficio del primer día. Así, esa diferencia queda fijada inicialmente y es periodificada linealmente a lo largo de la vida de la operación. No obstante, esta medida solo supone una mejora parcial, toda vez que el riesgo de crédito no se asume solo con contrapartes minoristas, y no incentivaría una gestión consciente y eficaz de este riesgo. Además, únicamente se bloquea el reconocimiento de beneficios del contrato en un momento inicial. Esto quiere decir que oscilaciones en las variables de mercado que dan valor a los contratos sí son reconocidas, como podría ser el caso de una variación en los tipos de interés.

Por ello, las entidades activas y los supervisores han evolucionado hacia una mejor gestión de este riesgo, que permita aprovechar oportunidades de negocio a las primeras, y que dé las garantías derivadas de una gestión y reconocimientos prudentes a los segundos. Un segundo paso en este sentido es el reconocimiento de lo conocido internacionalmente como «CVA». Según se verá posteriormente, en la valoración de los derivados OTC y del riesgo de crédito implícito en ellos existe un triple plano de valoración: para conceder la operación, conociendo qué riesgo se está asumiendo con la contraparte, para valorarlos contablemente y para agregarlos, con el resto de activos y riesgos, a los activos ponderados por el riesgo (APR).

3.1 NUEVOS ENFOQUES EN LA INCORPORACIÓN DEL RIESGO DE CRÉDITO EN ÁREAS DE MERCADO: AJUSTE CVA

Empecemos por su valoración como instrumento financiero y contable. Con la extensión de la negociación de derivados OTC a contrapartidas minoristas, o simplemente no bancarias, surge, en primer lugar, la acuciante necesidad de asignar un precio adecuado al riesgo asumido con ellas y, en segundo lugar, de atender a la exigencia de la normativa contable de reflejar por su valor razonable los derechos de cobro y obligaciones surgidas en la contratación de estos productos, exigiéndose que en dicha valoración se incorporen todos los factores de riesgo relevantes, incluido el riesgo de crédito (norma 14.ª 4.c de la Circular 4/2004 de Banco de España, por ejemplo).

Esto da lugar al ajuste CVA, que es una aproximación que trata de recoger el impacto sobre el valor de mercado que tendría la probabilidad marginal de *default* en cada punto temporal del contrato.

$$\text{Ajuste}^{CVA} = \sum_{i=1}^{N} [(\text{Prob. Supervivencia}_{i-1}^{\text{contrapartida}} - \text{Prob. Supervivencia}_{i}^{\text{contrapartida}}) \times \text{LGD contrapartida} \times EE_i \times \text{Factor descuento}_i] \quad [3]$$

En la fórmula [3], i es cada uno de los puntos temporales relevantes que se han de considerar, EE_i es la exposición esperada en cada uno de ellos; la diferencia de probabilidades de supervivencia da como resultado la probabilidad de que la contraparte incumpla en el período temporal considerado y, por último, se incorpora un factor de descuento temporal.

Esta aproximación presupone la independencia de las distintas variables[4], se descuenta del valor de mercado libre de riesgo del derivado y da lugar al valor de mercado ajustado:

$$MtM^{Ajustado} = MtM^{Sin\ riesgo} - Ajuste^{CVA} \quad [4]$$

Tomando como base la exposición, una vez reducida por los posibles acuerdos de *netting* y de reposición de colateral, el ajuste propuesto incorporará una prima de riesgo en la valoración, teniendo como *input* crítico la PD de la contrapartida.

Esta PD puede ser estimada a partir de la observación de los registros históricos de impagos, o bien con variables de mercado. En el primero de los casos, el procedimiento sería similar al seguido en los modelos internos de capital, extrapolando posteriormente los resultados a los años de vida del derivado de acuerdo con una matriz de transiciones de *ratings* como las publicadas por las agencias de calificación crediticia[5].

En un ajuste realizado por una entidad de este modo, no se incorporarían parámetros de mercado, a pesar de que la cartera de derivados OTC es una cartera valorada a valor razonable.

Frente a esta opción, se contrapone la obtención de las PD a partir de *spreads* crediticios de mercado (bonos y CDS, principalmente). Estos *spreads,* que son pérdidas esperadas, permiten obtener indirectamente las PD implícitas. Al fin y a la postre, lo que se está concediendo a las contrapartes es un crédito, eso sí, por un importe que se ha de determinar.

La diferencia entre el empleo de esas PD históricas y las PD de mercado en estos momentos, y aún más en el pasado reciente, es muy acusada, debido a distintos motivos:

— Las PD históricas son promedios extraídos de bases de datos con una antigüedad limitada, que no recogen situaciones de estrés en los mercados como las actuales.

— Las hipótesis históricas de severidad constante de los métodos históricos no tienen por qué haber incorporando los cambios en la percepción de los inversores.

— Las PD de mercado incorporan primas de liquidez, aversión al riesgo y otros factores que no son contemplados en las históricas.

En todo caso, unas incorporan la historia de lo ya sucedido y las otras la anticipación realizada a día de hoy por los distintos agentes económicos de aquello por suceder. Las primeras, por su carácter objetivo y TTC *(through the cycle),* parecerían las adecuadas para la estimación de las cargas de capital; las segundas, por reflejar la situación de los mercados y su carácter PIT *(point in time)*, serían las utilizadas en procesos valorativos y de fijación de precios, con alguna consideración adicional, que será expuesta más adelante.

4 La fórmula [3] se encuentra entre las más habituales usadas a estos efectos, pero no deja de ser una aproximación, toda vez que incorpora múltiples supuestos acerca de la independencia entre las distintas variables aleatorias, fundamentalmente las distintas PD, LGD y exposiciones. Además, aquella se simplificaría notablemente si se dispusiera de factores de descuento con primas incluidas para cada uno de los puntos temporales considerados. Esta fórmula es la adaptación a tiempo discreto y exposiciones esperadas puntuales de la fórmula del artículo 373 del borrador de Reglamento del Parlamento Europeo y del Consejo sobre los requisitos prudenciales de las entidades de crédito y las empresas de inversión. Igualmente, es una formulación coincidente con la establecida por Alavian y Ding (2010) y Gregory (2010).

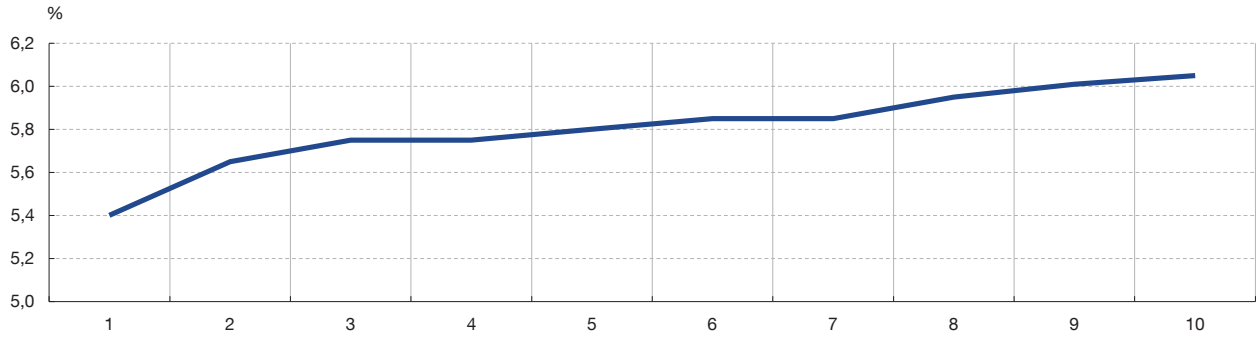
5 Un ejemplo de matriz de transiciones para riesgos soberanos es la mostrada por Standard and Poors en su página web: http://www.standardandpoors.com/ratings/articles/en/us/?assetID=1245302231824.

3.1.1 Ejemplo de cálculo del CVA con *spreads* de mercado

Para ilustrar el efecto del ajuste valorativo, tomemos el caso de un *swap* de tipos de interés a diez años con un nocional de 100 millones de euros, donde la entidad recibiera fijo al 6 % y pagara como tipo variable el euríbor a un año. Los datos de la curva de tipos cupón cero, compatible con los tipos euríbor a un año anticipados, y que hace que el valor del contrato sea nulo, son los siguientes:

EJEMPLO CVA
Datos de partida

GRÁFICO 2



FUENTE: Banco de España.

Si la contraparte de la operación fuera alguien con riesgo de crédito mínimo, la valoración del *swap* contratado sería cero, toda vez que hemos solicitado para entrar en el contrato un tipo de interés fijo del 6 % en contraprestación por el tipo variable del euríbor que se va a pagar a partir de ese momento.

$$V_{swap} = \frac{6}{(1 + 5{,}40\,\%)^{10}} + \cdots + \frac{106}{(1 + 6{,}05\,\%)^{10}} - 100 = 0 \qquad [5]$$

Son varias las situaciones posibles a partir del momento de la firma del contrato. Si los tipos de interés disminuyeran, la entidad resultaría beneficiada, puesto que seguiría cobrando un tipo de interés fijo, adquiriendo el contrato un valor positivo sujeto a riesgo de impago. Toda vez que es un *swap*, que se liquida por diferencias y donde por tanto no existe riesgo de crédito tradicional, sino de contraparte, la pérdida experimentada en caso de impago sería igual al pago que se ha de efectuar a un tercero que entrara en el contrato en las mismas condiciones que teníamos firmadas anteriormente. Por el contrario, si los tipos de interés subieran, la entidad resultaría perjudicada y tendría que pagar el diferencial, resultando deudor de su cliente.

En general, la forma de estimar el riesgo de crédito asociado a la contraparte del contrato es la siguiente:

— Se simulan los posibles valores que puede seguir la variable subyacente en cada uno de los períodos de liquidación y obtenemos la media de estos valores.

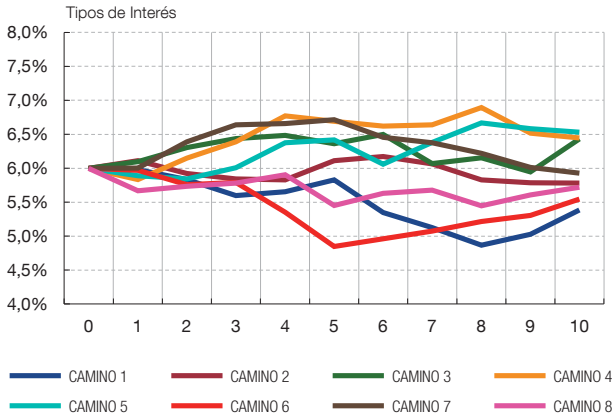
— Se obtienen las valoraciones del contrato asociadas a cada uno de esos valores.

— Como consecuencia de lo anterior, se calcula un valor razonable positivo esperado (EE). Es igualmente posible obtener un valor razonable negativo esperado (NEE), que será explicado posteriormente.

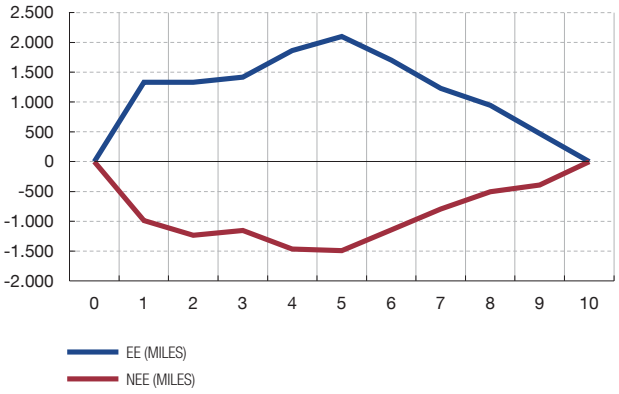
EJEMPLO CVA

GRÁFICO 3

CAMINOS SIMULACIÓN TIPOS DE INTERÉS



CAMINOS SIMULACIÓN TIPOS DE INTERÉS



FUENTE: Banco de España.

EXPOSICIÓN ESPERADA GENERADA, CVA RESULTANTE, Y CDS Y LGD UTILIZADOS

CUADRO 1

Años	EE+	AAA	A+	BBB–	BB–
0	0	0,0	0,0	0,0	0,0
1	1.330,54	5,5	18,7	63,8	123,4
2	1.331,90	5,2	17,7	60,4	116,8
3	1.418,19	5,2	17,8	60,7	117,4
4	1.860,54	6,5	22,0	75,3	145,6
5	2.095,99	6,9	23,4	80,0	154,7
6	1.700,25	5,3	17,9	61,3	118,5
7	1.230,10	3,6	12,2	41,8	80,8
8	942,51	2,6	8,7	29,8	57,7
9	470,62	1,2	4,1	14,0	27,1
10	0,00	0,0	0,0	0,0	0,0
CVA		**41,9**	**142,6**	**487,0**	**942,1**
PRO MEMORIA					
CDS		44	148	505	978
PD implícita (%)		1,1	3,7	12,6	24,4
LGD mkt (%)		40	40	40	40

FUENTE: Banco de España.

— Sobre el valor razonable positivo esperado en cada punto se deduce el efecto de un posible impago, mediante la aplicación de la tabla de probabilidades de impago marginales para cada uno de los distintos puntos temporales.

— Se actualiza lo anterior a un tipo de interés libre de riesgo, ya que se ha eliminado el riesgo crediticio en cada uno de los puntos temporales.

El resultado de la simulación, empleando el método de Montecarlo y adoptando hipótesis de reversión a la media en la evolución de la estructura de los tipos de interés, se presenta en el gráfico 3, junto con la EE y la EE negativa (NEE) asociados (en miles de euros).

En el panel izquierdo del gráfico 3 se observan los distintos caminos que pueden seguir los tipos de interés, y en el de la derecha, la evolución tanto de la exposición positiva esperada como de la negativa.

A partir de los *spreads* asociados a los distintos *ratings* de las hipotéticas contrapartes, y aplicando la fórmula [3], se obtiene el ajuste por CVA que se recoge en el cuadro 1, donde se puede comprobar cómo a medida que se deteriora la calidad crediticia se incrementa el importe del ajuste CVA.

El resultado final es que, tras la incorporación del ajuste por CVA, de una valoración inicial del derivado nula pasaríamos a otra tanto más negativa cuanto menor sea la calidad crediticia de la contraparte. Esta corrección de valor se habría de aplicar a todas las posiciones en derivados OTC, con independencia de su valor positivo, negativo o nulo.

3.2 CVA BILATERAL

Las cargas por CVA han sido aplicadas tradicionalmente a empresas no financieras, en ningún caso al sector bancario, toda vez que el riesgo percibido en él era escaso. Por este mismo motivo, una contrapartida corporativa difícilmente podría haber discutido con una entidad de crédito lo adecuado de dicha carga, debido a la diferencia entre sus riesgos asociados. El sugerir antes del colapso de Lehman Brothers en 2008 que un banco podría llegar a una situación de ese tipo se consideraba simplemente fuera de lugar. Como consecuencia de dicho suceso, se ha puesto cada vez más en cuestión la existencia de contrapartidas auténticamente libres de riesgo, ampliándose los *spreads* de las instituciones financieras y haciendo necesaria la consideración de los ajustes CVA en un sentido bilateral. Dejando al margen las probabilidades asociadas a que las dos partes del contrato hagan *default*, se podría emplear la siguiente fórmula, tal y como propone Gregory (2010):

$$\begin{aligned}\text{Ajuste Bilateral}^{CVA} = \Sigma_{i=1}^{N} [&(\text{Prob. Supervivencia}_{i-1}^{\text{contrapartida}} - \text{Prob. Supervivencia}_{i}^{\text{contrapartida}}) \\ &\times \text{LGD contrapartida} \times EE_i \times \text{Factor descuento}_i - \Sigma_{i=1}^{N} [(\text{Prob. Supervivencia}_{i-1}^{\text{entidad}} \\ &- \text{Prob. Supervivencia}_{i}^{\text{entidad}}) \times {}_{\text{LGD entidad}} \times NEE_i \times \text{Factor descuento}_i]\end{aligned} \quad [6]$$

Siendo esta fórmula muy parecida a [3], hay que resaltar la inclusión de un segundo término. En este, las probabilidades de supervivencia, la LGD y el factor de descuento operan exactamente igual que antes. La NEE_i, por su parte, es la exposición esperada negativa para cada uno de los puntos temporales contemplados. La suma de este término da lugar al llamado *debt valuation adjustment* (DVA). El concepto de DVA es problemático en sí mismo, toda vez que se corresponde con la ganancia que una entidad podría obtener con su propio *default*.

Entre otras, la primera consideración que se debe realizar será que el ajuste bilateral por CVA (BCVA) podría llegar a ser negativo, lo cual implicaría que el valor del derivado ajustado sea mayor que el valor sin riesgo. Igualmente, una paradoja en la consideración de un ajuste en su forma bilateral es que la firma de acuerdos de *netting* podría no siempre conducir a una mejora en los resultados para una entidad, ya que es posible que reduzca un BCVA con signo positivo por predominar el DVA sobre el CVA.

Por último, es opinión de los autores que la consideración de ajustes bilaterales por los participantes en los mercados financieros mayoristas puede alterar tanto la tipología de las operaciones realizadas como su propia realización. En este sentido, podrían existir dos

formas que harían coincidir el importe del ajuste y el precio, facilitando las transacciones. La primera de ellas sería a través del uso compartido de métricas CVA, según las cuales una entidad tendrá un saldo de BCVA positivo o negativo y la otra acumulará una posición simétrica, respectivamente. Un segundo camino, que parece ser el elegido por la legislación comunitaria en discusión[6], consistiría en la adopción, en mercados OTC, de requerimientos de colateralización, empleo de cámaras de contrapartida central y uso generalizado de técnicas de *netting*. Todos estos elementos mencionados tienen como denominador común la reducción del riesgo crediticio de las transacciones y, por lo tanto, la reducción de los ajustes por CVA y por DVA que han de considerar.

3.3 IMPLICACIONES PARA LA GESTIÓN

Una estrategia básica de gestión del riesgo de contrapartida se fundamentará en una sólida definición de exposición crediticia y en la elección de unas PD y severidad adecuadas.

La consideración de estos tres factores conjuntamente podría producir todo tipo de situaciones: preferencia por reducidas exposiciones pero con elevadas PD, frente a situaciones donde se acumulen elevadas exposiciones con PD reducidas; preferencia por situaciones de elevada PD pero elevada colateralización (y, por lo tanto, reducida LGD), frente a exposiciones con reducida PD pero sin colateralizar.

Desde un enfoque tradicional, en el que la decisión que se ha de adoptar es la de aprobar o denegar operaciones, se ha intentado evolucionar a uno de gestión de riesgos, fijación de precios y cobertura de los riesgos asumidos, lo cual ha introducido la necesidad de considerar nuevas técnicas como límites de crédito, acuerdos de *netting*, acuerdos de reposición de colateral, etc.

Como consecuencia de todo lo anterior, las entidades tendrán que adoptar dos decisiones clave en la gestión del riesgo de contrapartida esperado: si para la determinación del CVA emplean PD y LGD históricas o, por el contrario, de mercado; y, por otro lado, si procederán a la realización del ajuste en su forma bilateral (BCVA).

Por ejemplo, considérese un bono emitido por una contrapartida para la cual se estima que la probabilidad de impago a un año extraída de los datos facilitados por las agencias de calificación es del 4 %, que sin embargo cotizara al 95 % y para el cual el coste de cubrirse en el mercado a través de la contratación de un CDS específico fuera del 6 %. Aquella es la conocida como «PD real» y esta última es la conocida como «PD neutral al riesgo». Si bien teóricamente la posibilidad de llevar a cabo un arbitraje empujaría el precio hasta el 94 % mediante la toma de posiciones cortas en el bono y largas en el activo libre de riesgo, ¿qué PD y, por lo tanto, qué precio debemos asignar contablemente a estas posiciones? Idealmente, dado que se ha de obtener una valoración a precios de mercado, todo parece indicar que el empleo de métricas derivadas de estos ha de ser obligatoria. No obstante, resulta necesario considerar que puede no disponerse de los precios cotizados de CDS y productos similares necesarios, o que, al tratarse de carteras minoristas, una entidad decidiera que el empleo de métricas directamente obtenidas de mercado no fuera adecuado. En estos casos, resultará necesario complementar las métricas objetivas disponibles. Según se esté ante un CVA con base real o de mercado, hablaremos de un CVA actuarial o de un CVA neutral al riesgo.

El riesgo de contrapartida podría ser medido y evaluado de una manera similar a como se haría con un bono o un crédito ordinarios. En esta línea, se podría calcular el CVA que se ha

6 Véase propuesta de reglamento del Parlamento Europeo y del Consejo relativa a los mercados de instrumentos financieros y por la que se modifica el reglamento [EMIR] relativo a los derivados OTC, las entidades de contrapartida central y los registros de operaciones.

de aplicar partiendo de la estimación de unas PD y LGD reales u objetivas. No obstante, estos parámetros son valores esperados según la información pasada disponible, pero una adecuada gestión de los riesgos asumidos hace necesaria la consideración de pérdidas inesperadas, cuya cuantificación puede resultar altamente subjetiva. Si resultara excesiva, se perderán oportunidades de negocio y, si pecara por defecto, se podrían sufrir pérdidas importantes. Por otra parte, nada nuevo en el mundo del riesgo de crédito. Son dos los aspectos que se deben considerar en la determinación de las pérdidas inesperadas que se han de incluir: el horizonte temporal y el nivel de confianza. Aumentando el horizonte temporal considerado y el nivel de confianza, se ganaría en prudencia, pero se podría obtener una cifra muy elevada.

Siguiendo lo propuesto por Gregory (2010) a este respecto, si bien en el cálculo de un CVA con base actuarial se ha de considerar toda la vida de la operación, la PD real utilizada podría ser, por ejemplo, aquella a un año pero que considerara las posibles migraciones de *rating* y variaciones en la EE además del hipotético *default*, puesto que ambas son fuentes de generación adicional de pérdidas.

Otra alternativa en sentido contrario, propuesta por el mismo autor, sería obtener un CVA neutral al riesgo a partir del hecho económico subyacente y de su hipotética cobertura. La asunción de riesgo de contrapartida tiene una exposición de mercado detrás, que es la probabilidad de acumular valores razonables positivos que implícitamente hacen surgir ese riesgo y su correspondiente CVA. A través de una descomposición pormenorizada de la EE según sus factores de riesgo, se puede presumir la posibilidad de cubrirla en el mercado y de obtener un coste asociado a este proceso. Bajo este enfoque, no habría que considerar pérdidas inesperadas, ya que, al estar cubierta la exposición, lo único que habría de preocuparnos sería la eficacia de la cobertura durante su vida. El CVA neutral al riesgo ofrece el coste que supondría cubrir esta posición complementado con una cuantificación del riesgo residual no cubierto debido a la incertidumbre y a los costes de transacción.

En términos prácticos, un punto intermedio entre ambos enfoques podría ser alcanzado. Por ejemplo, suponiendo que las principales exposiciones pudieran ser cubiertas mientras que otros riesgos (ya fuera por ser menos importantes o por la ausencia de un mercado que permitiera su cobertura) fueran tratados como riesgos con base actuarial. De este modo, sobre los primeros se podrían incorporar las métricas de mercado, mientras que sobre los segundos se tendrían en cuenta métricas reales, alejadas de las de mercado, toda vez que este no existe.

En este dilema de qué PD elegir, se ha consultado lo publicado por algunas entidades importantes. Según sus memorias, algunos de los bancos más activos en los mercados financieros internacionales (Citibank, BNP Paribas, Deutsche Bank, Bank of America) se estarían inclinando por la opción del CVA neutral al riesgo, ya que medirían el riesgo de crédito implícito en los productos OTC con modelos basados en variables observadas en los mercados, principalmente cotizaciones de CDS. Así, por ejemplo, se puede leer en la memoria de BNP Paribas: «*… the CVA varies according to changes in the existing exposure and in the prices quoted for the counterparty's credit risk, which may be reflected in particular in the credit default swap spread variations used to calculate the probability of default».*

El otro punto crítico en este ajuste es si resulta conveniente proceder al ajuste DVA. No siempre será fácil determinar si se ha de emplear el DVA o si, bien al contrario, se ha de considerar un CVA aislado. A favor de la primera opción, en un mundo con riesgo de crédito bidireccional, resulta difícil obviar el hecho de que para alcanzar un precio al que cerrar una transacción entra en juego la consideración de ambos riesgos. La realización del beneficio

latente en los pasivos propios emitidos a consecuencia del deterioro de la propia calidad crediticia es conseguida a través de su recompra, pero esto no siempre es posible en los mercados OTC. Siguiendo la literatura al respecto, fundamentalmente Gregory (2010), es necesario ser cautos en las formas en las que un DVA podría ser monetizado[7]:

— A través de la quiebra, pero se podría dar la paradoja de que en este punto el DVA fuera lo suficientemente positivo como para hacer que la entidad no estuviera en tal situación.

— Muy cerca de la quiebra, una entidad podría monetizar este componente a través de ciertas cláusulas en los contratos financieros que provocarían la retrocesión de una operación al valor de mercado de ese momento ante el deterioro crediticio de la contrapartida, permitiendo la realización de ganancias por este concepto.

— En determinadas situaciones, una contrapartida con MtM positivo acumulado, y con acuerdo de reposición de colateral mediante el cual se le garantizara su exposición, podría efectuar una remuneración sobre ese colateral extra superior al realizado en el mercado, a fin de incentivar la sobrecolateralización y de este modo reducir su exposición al riesgo de crédito. Quien ha colocado el colateral obtendría de esta manera un medio de monetizar el DVA.

— La cobertura, que es el medio habitual de monetizar posiciones, encuentra sin embargo trabas importantes, dado que una entidad no puede vender CDS sobre sí misma.

— Del mismo modo que la EPE representa un derecho de cobro a largo plazo, la NEE representaría una fuente de financiación con un coste asociado no pagado.

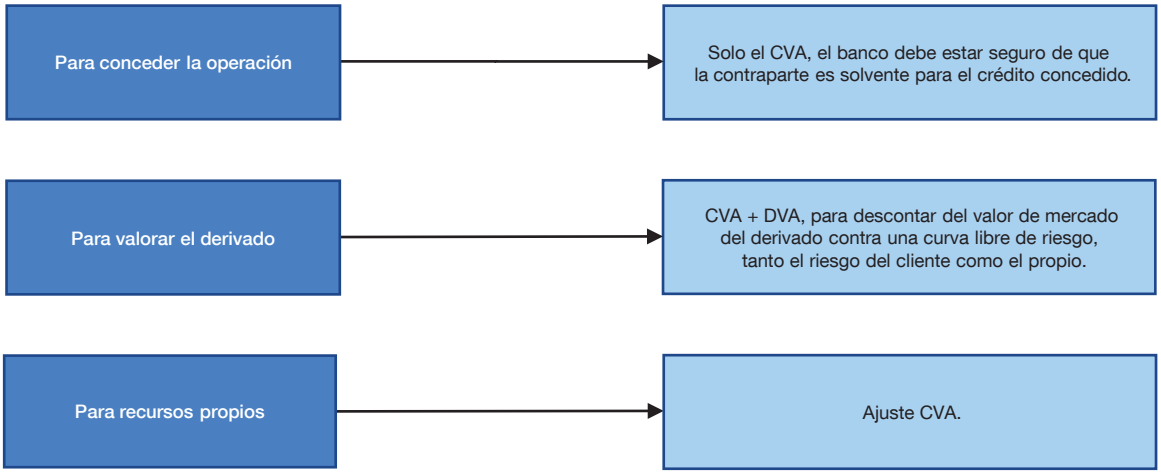
Además, en nuestra opinión, si bien las dudas sobre el DVA para pasivos en balance son muy razonables, en el caso de los derivados dicho ajuste tendría otra naturaleza, porque aquí el problema que se intenta resolver es el siguiente: considérese una entidad que concede un *swap* a un cliente BBB y acuerda, en atención a su mayor riesgo, cargarle un 3,5 % fijo, cuando acordaría cobrar un 3 % a un acreditado libre de riesgo; de este modo, se genera un valor positivo que se podría querer abonar a resultados y que es en parte puro riesgo de crédito, por lo que debería hacerse un ajuste de valoración, el CVA, para no adelantar resultados. Ahora bien, si el *swap* se contemplara desde el punto de vista del acreditado, este, si actúa con lógica económica, también habría consentido pagar más (piénsese en un 4 %) a un banco más solvente y habría negociado un menor tipo con una entidad menos solvente. En definitiva, el precio pactado resulta del cruce de ambos riesgos de crédito. Por ello, puede ser admisible contemplar en el cálculo los dos *ratings* crediticios. Esta opinión es compartida por los supervisores americanos, en la *Interagency Supervisory Guidance on Counterparty Credit Risk Management* de 9 de junio de 2011:

> «CVA may include only the adjustment to reflect the counterparty's credit quality (a one-sided CVA or just CVA), or it may include an adjustment to reflect the banking organization's own credit quality. The latter is a two-sided CVA, or CVA plus a debt valuation adjustment (DVA). For the evaluation of the credit risk due to probability of default of counterparties, a one sided CVA is typically used. For the evaluation of the value of derivatives transactions with acounterparty or the market risk of derivatives transactions, a two-sided CVA should be used.»

7 No obstante, a menudo asistimos a compras de pasivos propios por parte de las entidades, realizadas por debajo del valor contable y con el consiguiente registro de beneficios, por lo que beneficiarse del riesgo de crédito propio no es un ejercicio tan exótico como podría pensarse.

ÁMBITO DE APLICACIÓN DE AJUSTE POR CVA

ESQUEMA 1



FUENTE: Banco de España.

En definitiva, para estos derivados OTC habría que aplicar tres métodos de valoración para tres finalidades distintas, como se explica en el esquema 1.

Puede sonar complejo, pero también lo es el producto subyacente.

4 Requerimientos regulatorios de capital para el riesgo de contrapartida

Hasta la entrada en vigor de Basilea III, los requerimientos prudenciales existentes en este ámbito quedan limitados a una carga de capital cuya finalidad es la cobertura de las posibles pérdidas inesperadas y que se ha mostrado claramente insuficiente desde el inicio de las tensiones en los mercados financieros.

Por ello, en el nuevo marco de solvencia bancaria, junto con la reforma de los niveles y calidad del capital, uno de los puntos donde más esfuerzos se han invertido ha sido en la reforma del marco prudencial de las carteras de *trading* y derivados OTC, y más en particular, en lo referido a su riesgo de crédito. Ello ha dado lugar a la introducción de nuevas cargas de capital y, por consiguiente, se han introducido en la legislación nuevos conceptos, como IRC *(incremental risk charge), Stressed VaR* y capital por CVA. Este último, como se ha expuesto al principio del presente artículo, habría de producir en su redacción original[8] los mayores incrementos en los requerimientos prudenciales exigidos a las entidades bajo el nuevo acuerdo de capital, lo que, en todo caso, impactará en la rentabilidad asociada a las actividades desarrolladas en los mercados y, por tanto, en última instancia, en la misma actividad.

4.1 REQUERIMIENTOS DE CAPITAL POR RIESGO DE CONTRAPARTIDA

El primer punto es determinar el ámbito objetivo de estos requerimientos, que incluiría los derivados OTC, *repos* y operaciones de financiación de las garantías, principalmente.

Los requerimientos de recursos propios para cubrir el riesgo de contrapartida estricto anticipan las eventuales pérdidas inesperadas derivadas de impagos en la cartera definida y se

8 No obstante, este impacto sobre las entidades comunitarias quedará reducido. En el nuevo Reglamento de Capital, pendiente a la fecha de redacción de este artículo solo de su aprobación definitiva, se exceptuará de los requerimientos de capital por CVA la operativa con entidades no financieras que no supere un cierto umbral (artículo 372.3a).

basan, por ello, en el tratamiento del riesgo de crédito para la inversión crediticia, que tiene como base para su cálculo la fórmula [1]. En el enfoque IRB avanzado[9], se supone que:

$$f(PD, LGD, M, \rho) = \left[LGD \times \Phi\left(\frac{\Phi^{-1}(PD) + \sqrt{\rho}\Phi^{-1}(0{,}999)}{\sqrt{1-\rho}}\right) - PD \times LGD\right] \times M(PD, M) \qquad [7]$$

A través de aquel, en su forma más avanzada, los bancos calculan sus ponderaciones de riesgo (f(.)) a través del cálculo de los factores de riesgo, como son la PD, LGD, M y ρ, siendo Φ y Φ^{-1}, respectivamente, las funciones de distribución acumulada y de distribución acumulada inversa de una variable normal estándar.

Esta forma de calcular las ponderaciones es compartida por el riesgo de crédito y por el riesgo de contrapartida, encontrándose la diferencia en cómo se calcula la exposición *(exposure at default,* EAD). Para su cálculo, el acuerdo de capital propone tres métodos, que son —de más sencillo a más complejo— el método de la exposición actual o real, el método estándar y el método de los modelos internos (IMM).

La primera peculiaridad que cabe mencionar es que la EAD ha de ser calculada tras realizar el *netting*, que desde el punto de vista de Basilea es un conjunto de operaciones con una única contrapartida que están sujetas a un acuerdo de compensación bilateral exigible legalmente.

El método de la exposición actual consiste en añadir al MtM actual un recargo para recoger la potencial evolución de aquel, que es fijado según una tabla proporcionada por el regulador.

El método estándar, por su parte, está dirigido a aquellas entidades que no son capaces de proceder al cálculo interno de su exposición, pero tratan de adoptar un enfoque más sensible al riesgo.

La última de las alternativas es el uso del *internal model method* (IMM) en la determinación de la exposición. Es el método reservado para aquellas entidades lo suficientemente competentes en la determinación de los requerimientos por riesgo de mercado según sus propios modelos y que deseen ascender a un nivel superior en cuanto a su empleo. Este enfoque es el más sensible al riesgo y, entre otras ventajas, no solo permite un tratamiento realista de importantes mitigantes del riesgo como los acuerdos de *netting* y colateralización, sino que también puede llegar a permitir un neteo completo entre operaciones de distinto tipo, como, por ejemplo, derivados OTC y operaciones de financiación de garantías. La fórmula sería la siguiente:

$$EAD = \alpha \times EPEE \qquad [8]$$

La exposición positiva esperada efectiva (EEPE) ya fue explicada, siendo α el factor destinado a corregir la situación de insuficiente granularidad de las carteras, la presencia de potenciales correlaciones entre acreditados y la presencia de los riesgos de correlación adversa. El nivel estándar de este parámetro es del 140 %, pudiendo ser rebajado hasta el 120 %, previa autorización. Según diversos estudios empíricos, estas métricas podrían ser

9 Aquellas entidades que hayan optado por el método estándar proceden al cálculo de sus ponderaciones por riesgo según *ratings* emitidos por agencias de calificación o aplicando las ponderaciones preestablecidas a tal efecto.

excesivamente cautas, si bien tienen como rasgo común el haber sido construidas de acuerdo con datos previos al evento Lehman[10].

En este ámbito, y además de la introducción de una nueva carga prudencial por el posible impacto de cambios en el importe del ajuste por CVA, comentada en el epígrafe siguiente, son varias las modificaciones de Basilea III. En primer lugar, en la determinación de la exposición base de los requerimientos por riesgo de contrapartida a través de la opción IMM, la EPEE habrá de ser calculada utilizando parámetros actuales y estresados, empleándose la mayor de ellas. Ello tendrá como objetivo que los requerimientos de capital no se reduzcan en épocas de escasa volatilidad. En segundo lugar, se habrán de reforzar las normas de gestión del colateral y, en el cálculo del capital regulatorio, la modelización del efecto sobre aquel de los márgenes de garantía iniciales constituidos se reviste de elementos adicionales de prudencia. De hecho, es este un camino iniciado por el Comité de Basilea que no parece haber concluido. En tercer lugar, la preocupación por el riesgo sistémico surgido de la excesiva interconexión entre entidades de crédito, entre otras vías a través de los mercados de derivados, ha conducido, en el terreno de la regulación específicamente aplicable a las entidades de crédito, a un endurecimiento de las ponderaciones relacionadas con posiciones mantenidas con otras entidades financieras, así como con cámaras de contrapartida central, aun a pesar de la preferencia mostrada por el empleo de esta vía en la liquidación de aquellas. Por último, el Comité de Basilea se ha mostrado especialmente preocupado, igualmente, por la presencia de los riesgos de correlación adversa, que se producen cuando existe una relación desfavorable para una entidad entre su exposición crediticia y la calidad crediticia de la contrapartida. Sus implicaciones son importantes para los requerimientos mínimos de capital, ya que el simple producto en su cálculo no resultaría adecuado y habría de considerarse la existencia de algún tipo de relación entre la exposición y la PD o similar. El nuevo acuerdo de capital incorpora una serie de indicaciones para la correcta identificación de la presencia de este riesgo en la operativa de las entidades.

En definitiva, la reforma del marco de requerimientos por riesgo de contrapartida ha sido profunda y ha tratado de subsanar aquellos aspectos que los acontecimientos han demostrado que eran excesivamente permisivos. No obstante, el camino elegido para esta reforma (y, en particular, en lo referido al tratamiento de los riesgos surgidos por la presencia del riesgo de correlación adversa) ha sido el más práctico de entre los posibles, introduciendo cautelas en los multiplicadores empleados y reforzando la gestión llevada a cabo en la identificación cualitativa de aquellos, frente a alternativas de resolución incierta, como la introducción de relaciones entre exposición y PD o similares.

4.2 CAPITAL POR CVA

Como ya se ha comentado, de entre todas las modificaciones incluidas inicialmente, la que mayor impacto cuantitativo habría producido será la introducción de una nueva carga de capital por CVA, según el ejercicio de calibración de resultados hecho público por el Comité de Basilea. Dicha carga tratará de cubrir las potenciales pérdidas por valoración como consecuencia del deterioro de la solvencia de las contrapartidas, las cuales no están incluidas en los requerimientos por riesgo de contrapartida estricto y que durante el episodio post-Lehman generaron mayores pérdidas que los impagos mismos.

Esta es una carga complementaria a aquella por riego de contrapartida que tiene como objetivo cubrir el riesgo de incurrir en pérdidas por la valoración a precios de mercado del riesgo de contraparte esperado (pérdidas por ajustes por CVA) para derivados OTC. Existen dos

10 Wilde (2005), por ejemplo, sitúa el nivel de este parámetro en un 1,21, pero Canabarro (2003) lo reduce hasta el 1,09. Céspedes (2010) lo mantiene por debajo del 1,2 aun en situaciones de fuerte correlación.

formas de proceder a su cálculo: una estándar y otra avanzada, quedando fuera del cálculo las operaciones con cámaras de contrapartida central y las operaciones de financiación de las garantías que se pudieran haber realizado, aunque estas solo con carácter general.

En su forma avanzada, esta nueva carga de capital modelizará, a través del modelo VaR aprobado para bonos, el impacto que las variaciones en los *spreads* de las contrapartes tendrían en la valoración de la cartera de derivados OTC, tras la aplicación de las coberturas admisibles. Este modelo VaR se limita a variaciones en los *spreads*, ignorando los cambios en el ajuste CVA por cambios en la EE. Basilea III, siendo quizá consciente de la etapa inicial en la que se encuentran muchas entidades en cuanto al reconocimiento contable de este ajuste, separa la metodología prudencial que se ha de aplicar en su determinación de la aplicada con aquellos fines.

La fórmula reconocida de ajuste CVA coincide básicamente con la expuesta anteriormente en este artículo:

$$CVA = (LGD_{mkt}) \times \sum_{i=1}^{T} \text{máx}\left(0; \exp\left(-\frac{s_{i-1} \times t_{i-1}}{LGD_{mkt}}\right) - \exp\left(-\frac{s_i \times t_i}{LGD_{mkt}}\right)\right) \times \left(\frac{EE_{i-1} \times FDto_{i-1} + EE_i \times FDto_i}{2}\right) \quad [9]$$

donde s_i es el diferencial de crédito de la contraparte en cada uno de los plazos t_i. Ante la disyuntiva de optar por *spreads* históricos o de mercado, explícitamente, a estos fines, el nuevo acuerdo de capital lo deja claro:

> «deberá utilizarse el diferencial del CDS de la contraparte; cuando no lo esté [disponible], el banco utilizará un diferencial comparable al de la contraparte por calificación, sector y región.»

Por su parte, en lo relativo a la severidad que se debe emplear, será la pérdida en caso de incumplimiento de la contraparte y será diferente de la LGD determinada para el capital exigido por riesgo de crédito, ya que en nuestro caso se tratará de una valoración del mercado más que una estimación interna. Por último, $FDto_i$ es el factor de descuento libre de riesgo que se ha de aplicar sobre cada punto temporal.

No obstante, sobre esta nueva carga de capital son varios los puntos que cabe destacar. En primer lugar, en lo referido a si un DVA contablemente admitido se podría considerar entre los recursos propios computables, principalmente como *Common Equity Tier 1*, que será el capital de máxima calidad cuyo objetivo declarado será el de absorber pérdidas en condiciones de funcionamiento, el regulador prudencial no se muestra dispuesto a ello. Si bien es cierto que se trata de unas plusvalías latentes que se materializarían, de hacerlo, en una situación que es precisamente la que se trata de evitar con este tipo de regulación, es igualmente cierto que tanto el CVA como el DVA son más relevantes cuanto mayor es la distancia a un posible *default*[11]. Así, el nuevo acuerdo de capital, refiriéndose a los pasivos en general, afirma que todas las ganancias y las pérdidas latentes resultantes de cambios en el valor razonable de aquellos por variaciones en el riesgo de crédito propio habrán

11 En una contrapartida con una calidad crediticia reducida, el riesgo relevante de hecho es el de que se produzca el *default,* ya que este es el evento más severo y el que determinaría el percentil de pérdida máxima. No obstante, para una contrapartida con una buena calidad crediticia, el evento de *default* es despreciable, estando el percentil de pérdida máxima determinado por el riesgo de migración.

de ser eliminadas. Esta referencia generalizada a pasivos obligó con posterioridad al Comité de Basilea a aclarar si dentro de ellos se habrían de incluir los surgidos por derivados[12], optando finalmente por la alternativa más severa de entre todas las posibles: la completa deducción del DVA, tanto el inicial como los cambios sobre aquel. La justificación para ello hemos de encontrarla en que todos los métodos propuestos para aislar el DVA inicial de sus variaciones eran, o muy complejos, o faltos de conservadurismo, o descansaban fuertemente en supuestos. Ello tiene como consecuencia que las entidades tendrán que proceder a la valoración de sus derivados, solo a efectos del cálculo del *Common Equity Tier 1*, como si fueran contrapartidas sin riesgo de crédito y deducir todos los beneficios latentes tanto en la firma de los contratos de derivados como posteriormente, cuando su solvencia se deteriore. El Comité de Basilea asegura que la opción elegida es la más simple y evita que deterioros de la calidad crediticia tengan como consecuencia no deseada la mejora de la ratio de solvencia.

En segundo lugar, puede plantear dudas el hecho de que las cargas de capital por contrapartida y por CVA sean simplemente aditivas, cuando presentan una naturaleza hasta cierto punto complementaria. Esto es así porque, si una contrapartida se encuentra lejos de hacer *default*, nos preocupará su posible migración crediticia, y al revés. Si una contraparte hiciera *default* o estuviera cerca de hacerlo, esa es la principal fuente de pérdidas que se ha de afrontar. Desde este punto de vista, el enfoque regulador elegido podría ser catalogado como conservador, si bien en línea con el tratamiento simplemente aditivo otorgado a otros riesgos en el marco de regulación de capital.

En último lugar, un aspecto que ha preocupado en la introducción de esta nueva carga es la posible prociclicidad derivada de la no consideración del DVA. En un entorno volátil como el actual, con *spreads* elevados, el efecto valorativo de esta situación quedaría parcialmente compensado entre el CVA y el DVA. Pero, dado que esta compensación no se produciría a efectos prudenciales, habría un incremento en los requerimientos cuando se ampliaran los *spreads,* lo que puede llegar a ser muy procíclico. Este efecto, sin duda, deberá ser objeto de análisis y seguimientos futuros.

5 Conclusiones

Las recientes modificaciones en la regulación del riesgo de contrapartida han venido a cubrir un vacío que las tensiones sufridas han puesto de manifiesto: el riesgo de crédito existe en la operativa mayorista entre entidades, incluida, especialmente, la contraída a través de la contratación de derivados OTC. Estos instrumentos han sido señalados como un vehículo de transmisión de dificultades en épocas de crisis de unas entidades a otras; resulta necesaria, por tanto, la anticipación a aquellas a través de la mejora del reflejo contable y prudencial de esas operaciones.

Igualmente, ese riesgo de crédito se intensifica cuando las contrapartes de estos derivados OTC no son mayoristas, sino empresas no financieras o minoristas.

Este riesgo de crédito ha de ser valorado desde una triple perspectiva: para medir la idoneidad de la contraparte para asumir con ella dicho riesgo; para valorar contablemente el instrumento en el balance, vigilando no registrar como resultados lo que corresponde a

12 Es interesante hacer notar que en la emisión de todo pasivo existe un beneficio por el riesgo de crédito propio y que el nuevo acuerdo de capital solo exige la eliminación de los cambios sobre aquel. Así, por ejemplo, en la emisión de un bono a su par, el banco estaría valorando el bono usando un tipo de descuento que reflejara su riesgo de crédito propio en el momento de su emisión y que los inversores recibirían pagos en cupones acordes con él. Para mayor conocimiento al respecto, véase *Application of own credit risk adjustments to derivatives,* http://www.bis.org/publ/bcbs214.htm.

pérdidas futuras esperadas por el riesgo asumido; y, a efectos de requerimientos prudenciales, agregando a los activos ponderados por riesgo el importe que por estas operaciones corresponda.

Es opinión de los autores que, en todo caso, el reconocimiento contable del riesgo de contrapartida asumido y su cobertura prudencial han de ser el reflejo de una operativa prudente y explícita al respecto. La medición y la cobertura son importantes, porque todo riesgo no reconocido es normalmente un riesgo no controlado.

En este sentido, las normas contables vigentes exigen desde hace tiempo que se realice el ajuste que proceda por este riesgo, correspondiendo a las entidades dotarse de métodos adecuados para llevarlo a cabo de acuerdo con una metodología solvente y en línea con su operativa. Una vez realizada la valoración contable de los riesgos contraídos, el siguiente paso dado por los reguladores ha sido tender a asegurar que los impactos patrimoniales sufridos por oscilaciones en el riesgo de contrapartida asumido no pongan en peligro la solvencia de las entidades de crédito. Sin duda, Basilea III es un paso decisivo en esa dirección.

Los autores consideran que, aun quedando mucho por avanzar en este camino, se ha de revestir todo el proceso de gestión del riesgo de contrapartida con las suficientes cautelas. Por ello, es imprescindible la realización de un ajuste contable CVA en todas las entidades que operen en aquellas actividades con riesgo de contrapartida, resultando vital su realización para las entidades más activas en este campo, pero también para aquellas otras con una operativa dirigida fundamentalmente a empresas y particulares.

Dicho ajuste, siguiendo la práctica de los pares internacionales, habrá de basarse principalmente en *spreads* extraídos de mercado. Aun siendo conscientes de las limitaciones que en muchos casos pudieran existir, dado que el mercado de CDS y otros similares son mercados muy estrechos en cuanto a las contrapartes cotizadas, se podrá realizar una aproximación a aquellos a través de la observación de *spreads* geográficos y sectoriales. El uso de *spreads* históricos, revestidos con la necesaria prudencia descrita en este artículo, podría ser considerado en situaciones residuales como una alternativa posible, acercando estos a los observados en los mercados.

Es opinión de los autores que, en línea con la normativa contable internacional, se debería permitir el reconocimiento contable del DVA en la operativa con derivados OTC, lo cual mitigará en gran medida el posible impacto en resultados del ajuste por CVA. El hecho económico subyacente es que existe un precio pactado entre contrapartes y que es consecuencia, entre otras cosas, del riesgo de crédito bilateral percibido. Por tanto, si se ha de reflejar el adecuado valor de lo contratado, un componente tan importante como el riesgo de crédito propio en una cartera valorada a valor razonable ha de ser reconocido. No obstante, resultará adecuado y deseable que las entidades dispongan de un plan de contingencia para, llegado el caso, monetizar este DVA.

Por último, en la determinación de los recursos propios computables, y siendo los autores conscientes del tratamiento más severo que supone a efectos prudenciales el otorgado al DVA surgido en derivados OTC con respecto al de bonos y similares[13], la dificultad existente

13 Bajo las IFRS y las US GAAP, para determinados pasivos no registrados en *trading book* se permite lo conocido como *fair value option* (FVO). Su activación permite el registro de una cartera de activos y pasivos por su valor razonable con cambios en pérdidas y ganancias, siempre y cuando existan derivados implícitos, o lo mismo resultara en una mayor información relevante, debido a que se eliminan de este modo incoherencias contables o a que grupos de activos y pasivos son gestionados de forma conjunta y evaluados sobre una base de valor razonable.

para separar la parte aparecida originariamente de aquella surgida con posterioridad por cambios en el riesgo de crédito propio hace que, dado el carácter nuclear que tiene el concepto de capital en la normativa de solvencia, aquel haya de ser rodeado de las debidas cautelas. Esto justifica el tratamiento dado de eliminar como recursos propios computables el DVA que, por este motivo, se pueda haber reconocido en contabilidad. La incorporación de este tipo de filtros prudenciales no resulta novedoso, tal y como ya sucede, por ejemplo, con los fondos de comercio surgidos en las combinaciones de negocios.

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COVERED BONDS: THE RENAISSANCE OF AN OLD ACQUAINTANCE

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1 Introduction

Mortgage finance activity entails long term risks for financial institutions. Thus, it is not surprising that financial institutions have developed several ways to back their mortgage activities either by transferring the risk (securitizations), by means of public government guarantees (Government sponsored enterprises) or by creating long-term and low risk liabilities backed by these assets (covered bonds). This article focuses on the third model, whose presence is rapidly increasing at the global level. Covered bonds have been a traditional funding instrument whose double recourse (against the bank and a specific pool of assets) makes them particularly safe and really attractive among a stable and conservative group of investors.

Several European countries had an old dated legislation for covered bonds as an instrument to fund both mortgages and public sector credit. These legislations contain several peculiarities due to legal and cultural differences, something that was compatible with a very fragmented and home-biased market. The creation of the monetary union eased the possibility to broad internationally the investor base, moreover authorities introduced several changes to develop secondary markets.

The global financial crisis induced a new wave of changes for covered bond markets exerting higher pressure towards an increased harmonization among countries. Covered bonds became more attractive as investors realized the complexity of alternative instruments like securitizations. Nevertheless, covered bonds were not completely immune to the financial crisis, although their movements were more linked to collateral valuations. In particular, covered bond spreads rose with higher intensity during this period in those countries more affected by housing price overvaluation problems (like Spain or United Kingdom). Later on, covered bonds became affected by the European sovereign debt crisis as concerns arose about the relationship between sovereign and banking risk, although this market showed higher resilience than, for example, the unsecured debt market.

Under this environment several important structural changes are reshaping covered bond markets. Firstly, several jurisdictions introduced new legislative frameworks to facilitate diversification of the funding sources for their banks. At the same time, investors became more aware of issues like transparency of covered pools or the situation of covered bond holders in resolution processes. This is resulting in a harmonization trend not only among new legislations, but also through amendments of the existing ones. Finally, financial regulators are introducing several changes at the international level (i.e. Basel III capital or liquidity requirements) that contain incentives that foster covered bond demand.

This article reviews with some detail all of these issues. Section 2 describes the main characteristics that define a covered bond; Section 3 reviews the main market trends identified in covered bond markets previous and along the financial and sovereign debt crisis; Section 4 focuses on the regulatory environment, describing the main characteristics of older and new legislations, and the consequences for covered bonds of some of the financial regulatory changes in the pipeline. Finally, Section 5 concludes identifying the main milestones for this market in the future.

2 Understanding covered bonds

There is no common definition for covered bonds at the international level, although there are some basic characteristics that a debt security must satisfy to be considered as such:

— *Double recourse:* Investors in covered bonds have two different claims that secure their investment; they have a claim over the originator, who must satisfy the payment of principal and interest; and, in case of issuer's default, bondholders have a preference claim over the pool of assets that serve as collateral.

— Cover-pool assets remain *on the balance sheet* of the issuer, so credit risk is retained by the originator which aligns incentives with those of investors (and avoids some of the problems related with the originate-to-distribute model, (Bernanke 2009)). However, it is important to note that in general these assets are usually placed aside from the rest of assets, thus clearly identifying them and assuring that covered bond holders have a priority claim over them compared to the rest of creditors.

— Covered bonds are *"over-collateralized",* that is, assets in the cover-pool exceed the notional value of the bond thus assuring the timely payments of interests and principal even if the originator fails.

— Moreover, the cover-pool is *dynamic,* that is, the quality of the cover-pool must be maintained over time (in case some assets deteriorate or pre-paid, then they must be replaced by assets of the same quality as the ones initially posed). Obviously, in case of bankruptcy of the originator these dynamics are broken and the cover pool becomes static.

Thus covered bonds are a form of secured debt that also shares some characteristics of securitized products, so in some sense they could be interpreted as a mixed instrument between both classes of debt securities (see Table 1 for a comparison among covered bonds, ordinary debt bonds and mortgage backed bonds). In fact, covered bonds have been described as a form of "on-balance sheet securitization" [Mastroeni (2001)].

There are two main types of covered bonds: legislative and structured covered bonds. First, in some countries these instruments are issued under a specific legislative framework (legislative covered bonds) thus their characteristics are established by statutory law (presenting multiple idiosyncrasies among different countries, Section 4). Secondly, covered bonds might be issued through private contractual agreements (structured covered bonds). The development of this market segment has been motivated mainly by an attempt to access to this type of funding in those jurisdictions lacking covered bond legislation (i.e. UK, Canada, Netherlands, US, etc.), or as a way to obtain higher flexibility in countries where a legislative framework is already in place. For example, most national legislations establish certain criteria regarding assets eligible for the cover pool (type, loan-to-value, etc.). Some issuers might use private agreements in order to include other assets non-eligible under these legislations. One recent example is the small and medium-sized enterprises (SMEs) structured covered bond issued by Commerzbank on February 2013, which replicates exactly the structure of German legislative covered bonds with loans to SMEs used as collateral assets (non eligible under German covered bond legislation).

Given their characteristics, the next obvious question is why issuers have incentives to choose covered bonds instead of other ways of funding. One of the main advantages of these securities compared to unsecured debt is that they provide relatively cheaper long-term funding as the double recourse nature partly delinks the credit quality of the bond to the one of the issuer. Thus, the ratings of covered bonds tend to be high (most of them are

COVERED BONDS VERSUS ORDINARY SECURED BONDS AND SECURITIZATIONS TABLE 1

	Covered Bonds	Ordinary Secured Bonds	Asset Backed Securities
Issuer	Regulated credit institution, subject to prudential oversight.	Regulated credit institution, subject to prudential oversight.	Special Purpose Vehicle.
Balance sheet treatment	On-balance-sheet funding, though cover pool assets are segregated for exclusive benefit of covered bond investors.	On-balance-sheet funding with no segregation of collateral assets.	Assets packaged and sold to investors for purposes of off-balance-sheet sale treatment, risk and capital reduction.
Investor recourse in event of default	"Dual recourse". Investors have sole right to proceeds of cover pool assets and, if cover pool collateral is insufficient, an unsecured claim against the issuing bank.	Recourse to the issuer in case of collateral deficiency.	If collateral in pool is insufficient, bondholders suffer the loss, with no recourse to issuing bank.
Payment source and schedule	Typically, principal and interests are paid from bank cash flows, with cover pool serving only as collateral. Principal is returned in a "bullet" installment at maturity of bonds. No prepayment risk.	Typically, principal and interests are paid from bank cash flows, with cover pool serving only as collateral. Principal is returned in a "bullet" installment at maturity of bonds.	Principal and interest are paid solely from the proceeds of asset in pool. Principal is returned as individual assets mature, with prepayments passed through to investors.
Asset pool management and structure	Dynamic collateral management, with substitution allowed and required for non-eligible assets. Single class of bonds, generally overcollateralized.	Static pool, so if overcollateralization exists it might not be maintained.	Static pool, with investors bearing risk of any asset-quality deterioration. Multiple tranches, with senior and subordinate classes having varying degrees of credit enhancement.

SOURCES: Moody's (2010), Schwarcz (2011).

rated Aaa or Aa[1]). Moreover, covered bonds have performed relatively better during stress periods, or at least they have recovered earlier in case of collapse.[2] Part of this evolution is related to the fact that, given their safeness, these bonds attract investors that traditionally were focused on ultra safe debt as they offer relatively higher yields at reduced credit risk. The access to this stable investor base by the issuer constitutes an advantage as it improves conditions for future issuances and refinancing activity. The comparison with secured funding is slightly different since issuers look mainly for capital relief and not for liquidity management (as it is the case with covered bonds) when they use secured instruments like residential mortgage back securities [Carbo et al. (2011)].

From the investor's side, the attractiveness of this type of bonds relies mostly on their high credit quality that is accompanied by higher yields compared to those offered by government or state-guaranteed bonds. Second, their exclusion from bail-in resolution tools make them more attractive compared to unsecured debt. Third, liquidity[3] and capital regulation[4] give them a favourable treatment. Finally, covered bonds are also accepted under relatively good terms under repo transactions by some central banks such as the European Central Bank or the Bank of England, which increases it attractiveness as it facilitates the access to

1 Moody's (2010).
2 ECBC (2012) highlights that this form of funding was one of the first in recover access in capital markets among those debt securities without state guarantees after the Lehman collapse.
3 Covered bonds are eligible as liquid assets under Basel III.
4 For example, UCITS (European Commission directive that regulates investments of retail investment funds) allows investors to have a higher exposure than other investments because of their high credit quality. Moreover, Solvency II establishes a spread risk factor of 0.6% to covered bonds AAA-rated compared to 0.9% for senior unsecured and corporate AAA-rated bond.

LCS (a) FOR THE GLOBAL COVERED BONDS INDEX BY COUNTRY (OCTOBER 2012) TABLE 2

	Covered bonds		Credit bonds
France	0.602		0.825
Germany	0.416		0.755
Spain	1.775		0.579
United Kingdom	0.52		0.892
Sweden	0.42		0.542
Denmark	0.661		0.731
Italy	1.199		0.86
Netherlands	0.385		0.58
Annex	Global Covered Bonds Index	Pan-Euro Treasury Index	Pan-Euro Credit Index
October 2012	0.773	0.193	0.745

SOURCE: Barclays.

a LCS = (Ask price-Bid price) / Bid price.

central bank's liquidity facilities and funding programs (a characteristic that becomes especially important during stress periods).

Given all these features it is not surprising that demand for covered bonds is highly concentrated on long term investors with hold-to-maturity strategies. Under these circumstances, the development of a deep secondary market that serves as reference for investors might be challenging. The enhancement of liquidity on covered bond markets started with the introduction of the euro and the possibility to broad internationally the investor base. Under this environment, authorities created the Jumbo Pfandbrief market in 1995. This model has become the foundation for other benchmark-covered bond models in other European countries (such as Austria, France, Ireland, Italy, Luxembourg, Spain and United Kingdom). Basically, the Jumbo model contains a set of rules that mainly refer to size, format, issuance and buybacks practices. The key feature of this model relies on the commitment of market makers for a limited amount of cash orders, a feature that increases transparency and guaranties investors a minimum amount of bond trading. Liquidity is also complemented with the activity on repo operations with covered bonds. In this case, an additional agreement was created in 1998 among 17 banks through the Financial Markets Association to establish market making commitments in the repo market. As it is the case in other financial markets, repo activity is highly interconnected with cash transactions and liquidity (or the lack of it) goes in parallel among them (something that became evident during some episodes of the recent crisis[5]). The liquidity framework was completed with the acceptance of covered bonds by electronic trading platforms.[6] However, the importance of electronic trading is limited and nowadays almost half of the transactions are still executed through voice agreements.[7]

In order to assess the level of liquidity on this market, Table 2 presents a measure based on differences between ask and bid transactions on secondary markets in relation to the ask level. Covered bonds present similar liquidity levels than other private fixed income products but significantly lower than public debt. Meanwhile liquidity differs among jurisdictions and this heterogeneity is higher than the one observed for other credit instruments.

5 Engelhard et al. (2012)

6 Covered bonds could be traded in multidealer platforms (Euro MTS and Eurex), Customer platforms (Tradeweb, Bondvision of Bloomberg) and individual client platforms.

7 SIFMA (2009).

3 Market trends

Covered bonds noticeably increased their importance in the years preceding the financial crisis (2003-2007), establishing themselves as a key stable funding source for financial institutions, and, more specifically, for European banks. In general, covered bond issuance increased during these years in parallel to the growth of European mortgage lending to households. The foundations for this growth had been already laid a decade before with the launch of the first Jumbo covered bonds in 1995 out of Germany and the development of a favourable European legislation for covered bonds (Directive 85/611/EEC on undertakings for collective investments in transferable securities, UCITS, and, afterwards, the Capital Requirements Directive, CRD). In parallel to the growing liquidity of these instruments and the adoption of the euro, covered bonds started to attract global investors. Furthermore, the geographical range of these instruments also expanded amid the enactment or revision of national covered bonds legislations in several European countries (Section 4.1). In this context, the amount outstanding of covered bonds increased by a 35% since 2003 to a total of over EUR 2 trillion in 2007 [ECBC (2012)]. Gross issuance of covered bonds increased until 2007 as well, when USD 374 bln covered bonds were placed in the global markets (unless otherwise indicated, retained issuance is excluded from all the figures of gross issuance in the text[8]) and, if Germany is excluded from the sample, issuance almost three-folded (Chart 1, panel A). In this period, issuance took off in countries such as Ireland and Italy, and structured covered bonds (those not backed by a dedicated legislation) were first launched in the UK (Morgan Stanley, 2011). Meanwhile, gross issuance from Germany steadily decreased since 2003.[9]

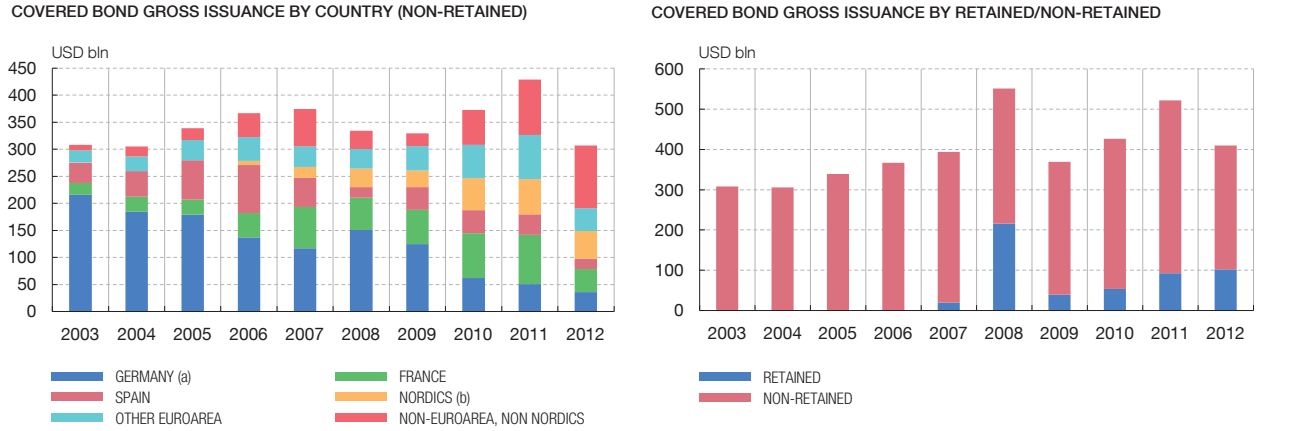
During the first phase of the financial crisis (august 2007-september 2008), amid a higher risk aversion, issuance of securitizations slumped worldwide (from USD 1,3 trillion in 2007 to USD 171 bln in 2008) and unsecured bonds' activity (excluding government guaranteed debt) decreased by a 22%, whereas covered bonds issuance decreased less and mostly in certain countries such as the UK and Spain. In consequence, covered bond issuance, whilst certainly affected, showed however a higher resilience to the financial turmoil than

8 Retained covered bonds are those placed in a bank's own book usually in order to create collateral for its central bank operations [LBBW (2011)].

9 This declining trend, which continues up till now was partially related to the gradual reduction of public-sector Pfandbriefe's issuance, especially since 2005.

GLOBAL COVERED BOND ISSUANCE BY COUNTRY AND RETAINED/NON-RETAINED

CHART 1



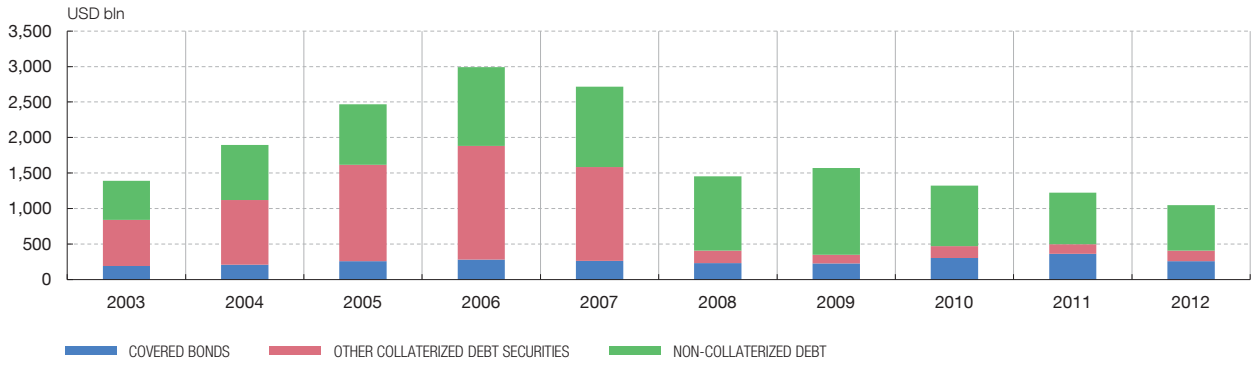
SOURCE: Dealogic.

a Registered German covered bonds are not included in Dealogic.

b Finland is not included in this category, it is included in the "Other Euroarea" group. Nordic coverage of covered bond issuance by Dealogic is not representative of the total issuance in these countries, especially for the period before 2010. For specific data related to these markets, please refer to ECBC Statistical database.

GROSS ISSUANCE OF PRIVATE BANK DEBT

CHART 2

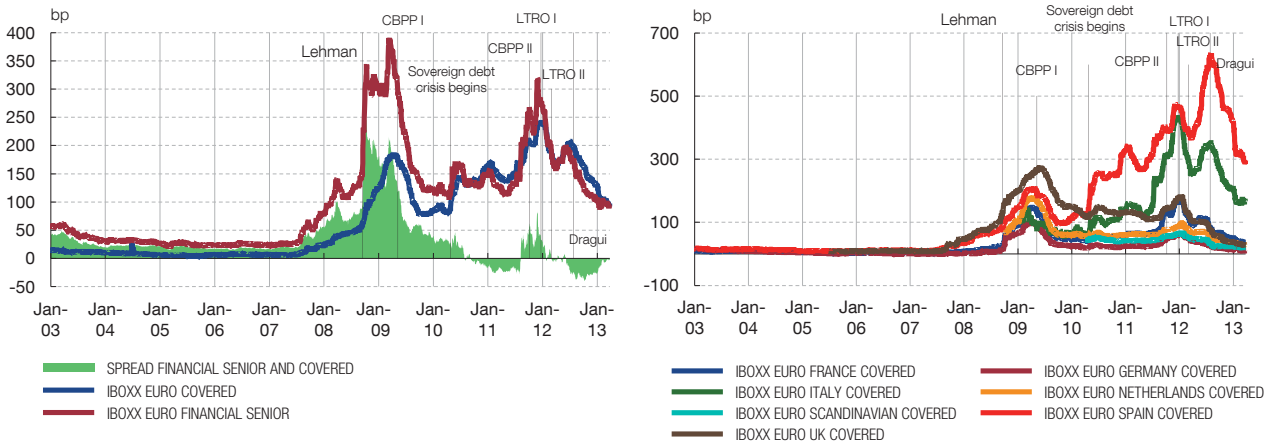


SOURCE: Dealogic.

a We only consider non-retained issuance with maturity above or equal to 1,5 years and from private bank parent issuers. As such we consider Hypo Real Estate Holding and ING Groep, too. Only banks of those countries that have issued at least one covered bond since 2003, according to Dealogic, are included in the sample.

SENIOR DEBT AND COVERED BOND SPREADS FOR DIFFERENT EUROPEAN COUNTRIES (a)

CHART 3



SOURCES: Iboxx, Barclays.

a "Lehman": Lehman Brothers files for Bankruptcy; "Sovereign debt crisis begins": Greece seeks financial support; "Dragui": Whatever it takes speech.

other debt securities (Chart 2).[10] In fact, even though secondary spreads of euro covered bonds started to deteriorate,[11] they widened less than senior euro financial debt spreads (Chart 3, panel A) [ECB (2008)]. On the other hand, although retained covered bonds increased significantly in 2008, to a large extent they were originated by British issuers in the context of the Special Liquidity Scheme launched by the Bank of England in April 2008.

With the intensification of the crisis in September 2008, covered bond markets also came under pressure. In the primary markets, issuance in 2008 Q4 and 2009 Q1 fell to its lowest levels since 2004. Furthermore, average spreads in the primary and secondary markets increased significantly as well[12] – also for French and German covered bonds, which had been relatively immune to the turmoil so far, with only a slight widening of their spreads

10 When comparisons between secured and unsecured instruments are done, we only consider non-retained issuance with maturity above or equal to 1,5 years and from private bank parent issuers. As such we consider Hypo Real Estate Holding and ING Groep, too.

11 Covered bond spreads had been up until 2007 quite homogeneous between European countries. This trend reverted when the financial crisis began and UK and Spanish spreads widened more than for other countries.

12 Many deals in Dealogic do not show this information, so the average is done on a smaller sample than the one used for total issuance.

(Chart 3, panel B) and liquidity in secondary markets deteriorated. In this context, the ECB announced on May 2009 the first Covered Bond Purchase Program (CBPP1) with the aim of encouraging the recovery of this market through the outright purchases of these instruments. Indeed, this program (in a context of general better financial conditions) led to the reactivation of covered bond issuance activity and to the tightening of secondary market and bid-offer spreads. However, the reactivation of covered bond markets could have been at the expense of the uncovered bank bonds: The program might have not been able to increase the outstanding amounts of bank debt [ECB (2011)] in a context where senior debt funding was more expensive than covered bonds or the senior market was closed for certain issuers. As such in the first half of 2010, the share of covered bonds issued to uncollaterized debt (excluding government guaranteed debt) in the euro area jumped from 47% to 83%, when compared with the same period of 2009.

In 2010, in a context of declining housing prices and higher mortgage loan defaults in some countries, the first wave of the European sovereign debt crisis hit global markets. The increase in sovereign debt risk affected covered bonds trough several channels, being one of them the reduction of the public sector's ability to bail out banks ("implicit subsidy"). As a result, the euro area covered bond primary and secondary market split roughly in two: Peripheral[13] and non-peripheral. By the end of 2010 covered bond markets were almost closed for Irish and Portuguese issuers, while Italian and Spanish issuance weakened significantly after 2011 Q1 (Chart 1, panel A). In parallel to this, peripheral banks turned to retained covered bonds as an alternative source of funding and were the main issuers of these instruments from 2009 onwards (Chart 1, panel B). On the other hand, issuance of covered bonds from France, Switzerland or the Netherlands was buoyant in both 2010 and 2011[14] since non-peripheral countries covered bonds were overall considered as very safe investments in a context of high risk aversion. In the secondary markets, the spreads between peripheral and non-peripheral covered bonds' significantly drifted apart.[15] Thus, in this period covered bonds were probably more strongly affected by the performance of their respective sovereign bonds than by their own idiosyncrasies. The intensifying market turmoil led to the introduction by the ECB of a new Covered Bond Purchase Program (CBPP2) by the end of 2011. However, covered bond secondary spreads tightened mainly as a consequence of the 3-year Long-Term Refinancing Operations (LTROs) carried out by the ECB in December 2011 and February 2012, only to widen again as the effects of this LTROs started to wear off [Engelhard, F. M. Seimen and J. Harju (2012)]. European covered bond secondary market spreads have been steadily drifting lower since the ECB´s strong commitment to the euro made in the summer 2012. However, these spreads are overall wider than before the financial crisis and peripheral covered bonds are still significantly higher than the spreads of non-peripheral countries' covered bonds.

Despite the negative impact of the financial and sovereign crises on covered bond markets, non-retained issuance remarkably recovered from its post-crisis lows in 2009, reaching the highest amount ever in 2011 and subsequently falling in 2012. What's more, the share of covered bonds in global bank debt issuance[16] increased in 2010 and 2011 (in parallel to the reduction of government guaranteed bonds) as both issuers and investors started to favour them over unsecured bonds.

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13 In this section we consider as euro area peripheral countries to Italy, Ireland, Greece, Portugal and Spain.

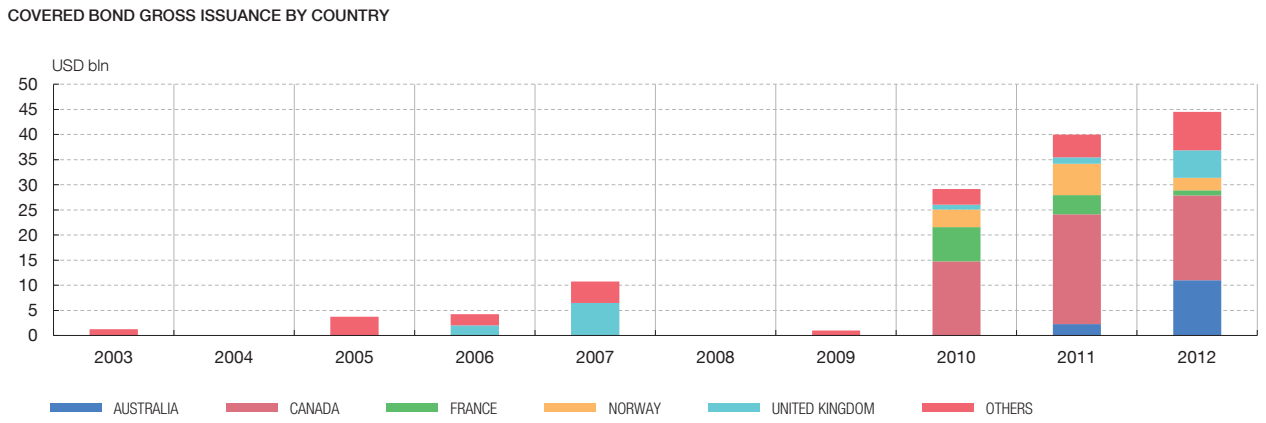
14 German issuance's decline was probably linked to the structural contraction of this market. In fact, German Pfandbriefe have traditionally benefited significantly from a wide national investor base in covered bonds.

15 In the second half of 2011, the spread between French and German covered bonds significantly widened as well.

16 Only banks of those countries that have issued at least one covered bond since 2003, according to Dealogic, are included in the sample.

GROSS ISSUANCE OF US MARKETED COVERED BONDS IN USD

CHART 4



SOURCE: Dealogic.

Additionally, the proportion of covered bonds issued in the euro area has fallen to 45% in 2012 (80% in 2008). In fact, global decline of issuance in 2012 was largely explained by reduced activity in the euro area;[17] on the contrary, activity outside the euro area and Nordic countries reached the highest yearly amount ever. Indeed, despite the crisis (or perhaps because of it) covered bonds have expanded worldwide in parallel to the creation of legislative frameworks for these debt instruments around the world. For instance, Australian banks were the most important issuers globally in 2012, following the approval of their special legislation in 2011. The UK and, afterwards, Canada became important originators of these instruments even before their specific national legislations for covered bonds were endorsed. Both Australian and Canadian covered bonds attracted investors' demand that looked for safe covered bonds not affected by the sovereign debt crisis. Moreover, Canada, followed by Australia and the UK, were the most important issuers of US marketed covered bonds in 2012. Although there is still no covered bond legislation in the US, foreign issuers have been taking advantage of the growing attention from US investors for these instruments. In consequence, this market has increased significantly since 2009 (Chart 4).

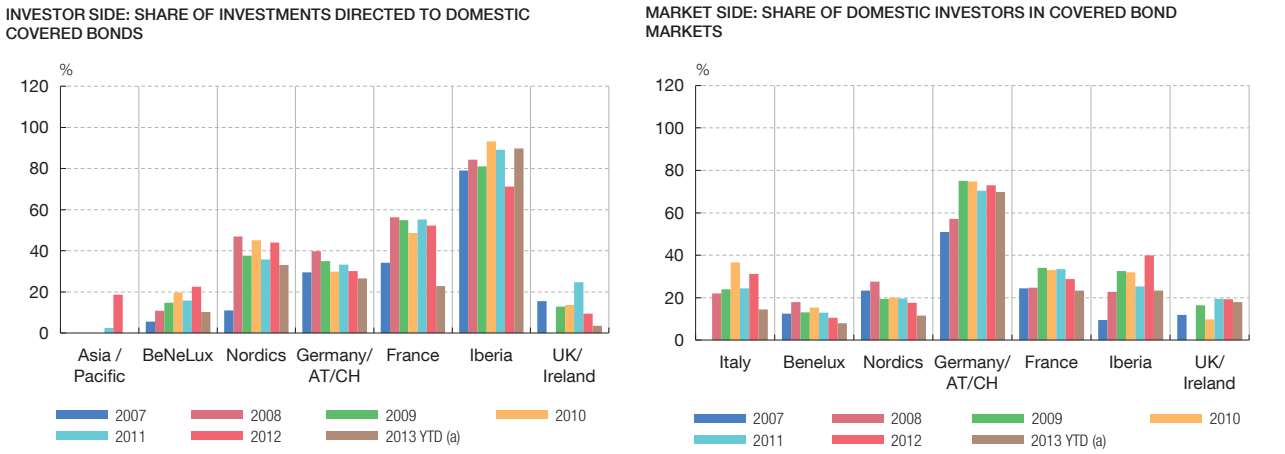
Other characteristics of covered bonds have also changed remarkably during the crisis. Euro area covered bonds ratings' landscape has changed significantly between 2011 and 2012,[18] as a result of the many downgrades of European sovereigns and banks in a period when rating methodologies have also been revised. Euro area AAA covered bonds' issuance share fell to the lowest since at least 2003 (72% in 2012). In contrast, AAA issuance of non-euro area covered bonds still represented 92% of total issuance. Although it seems that investors in euro covered bonds do not rely on ratings so much as in the past, ratings are still very relevant when they reach a threshold that could affect, for instance, capital charges for banks or their inclusion in certain indices. Regarding maturities,[19] average maturity for non-euro area countries reached in 2012 its second highest since 2007; especially noteworthy was the increase in total issuance of covered bonds above the 10 year maturity range. For European peripheral countries', average maturity has been steadily decreasing since 2009, recording an important increase of the share of issuances with a maturity scope between 1 and 3 years. The average maturity is higher for other euro

17 An underlying factor of this development was the massive European bank's participation in the two 3-year LTROs, which might have reduced their immediate funding needs and allowed them to access the markets only when funding costs were lower.

18 Data not available for the whole sample of covered bonds.

19 Data regarding maturities until end of 2012.

HOME BIAS IN COVERED BOND MARKETS CHART 5



SOURCE: RBS based on public sources.

a Data until February 21st.

area countries and, in this case, covered bonds below 3 years were in 2012 in their lowest proportion since at least 2003.

The investor base in covered bonds is wide and heterogeneous. Main investors in euro covered bonds are banks, investment funds, pension funds and insurance companies, central banks and residually, hedge funds or corporates. These investors follow different rules when valuing covered bonds and focus on different maturities (for instance, insurance companies and pension funds prefer longer maturities than banks or central banks) which benefits covered bond issuers: In fact, during 2012 new issues were on average oversubscribed. Funds and banks continued to be the most important buyers in 2012, although pension funds and insurance companies are steadily increasing their share.

Most investors in euro denominated covered bonds are based in Europe, being the German the most important buyers followed by French investors [Barclays (2013)]. Furthermore, home bias is very relevant for traditional covered bonds issuers, such as Germany, France or Iberia (Chart 5). However, this home bias is not so relevant for some non-traditional jurisdictions such as the Netherlands, UK and Ireland. Overall, covered bonds with bigger domestic bases are considered to be more stable and to withstand better than others market volatility [ECBC (2012)].

4 Regulatory context for covered bond markets

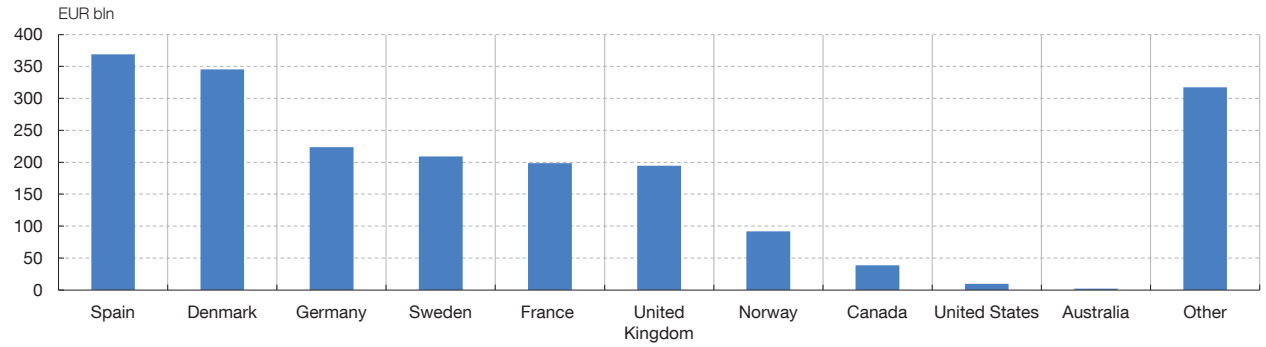
The increasing importance of this funding source at the global level highlighted in the previous section has been driven both by cyclical and structural factors. On one hand, investors risk aversion is the main driving force in their day-to-day decisions. However, there are some structural factors, in particular those related to legal and regulatory changes that help to understand these trends in the medium to long term.

4.1 NATIONAL LEGISLATIONS: FROM HETEROGENEITY TO SOME CONVERGENCE

There are some countries which have traditionally promoted this type of debt as a way of providing some incentives to the development of alternative sources of mortgage funding compared to the traditional models based on securitization (such as the US Government Sponsored Entities model, Netherlands or the UK). There are no two identical legislations, but they have some important points in common as it is explained below.

Importantly, in this section an exhaustive revision of national legislations is not presented but only those jurisdictions with the biggest mortgage covered bond markets are described

MORTGAGE COVERED BONDS OUTSTANDING BY NATIONALITY OF THE ISSUER 2011 CHART 6



SOURCE: ECBC (2012).

attending to their main characteristics (Chart 6). In particular, we will consider Spain, Denmark, Germany, Sweden, France and Norway. This group of countries have the first legislations in this area and, recently, some transformations have been adopted (especially regarding transparency) as a way of enhancing the credibility and the quality of this debt instrument.

These amendments of traditional legislations, together with the approval of new covered bond frameworks in other countries (such as Australia, Canada and the UK) that are reviewed on the second part of this section; conform a trend towards the standardization and convergence of national legislative models. However, there are still some important differences between national models which are neither trivial nor swiftly to deal with, which represent a challenge for the development of a real international covered bond market.

a) Covered bonds as an alternative funding tool for the mortgage market

Spain, Germany, Denmark, France, Sweden and Norway have the major mortgage covered bonds markets globally. Some of them have the oldest covered bonds legislations which draw a quite heterogeneous picture (Table 3). In general, these countries tended to use a specialized banking model, where the activities in which the issuer could engage were restricted (thus, in some cases, the issuer and the originator differed). Some countries, such as Denmark, Germany and Sweden, have abandoned this specialist banking principle and now universal credit institutions (with/without a special license) can issue covered bonds. There are other jurisdictions that still keep that model. For example, in France, commercial banks can only issue covered bonds through the creation of a subsidiary independent of the rest of the group (Societes de Credit Foncier and, since 2010, also Sociètes de Financement de l'Habitat) dedicated exclusively to the issuance of covered bonds named obligations foncières (issuer differs from the originator). The same case applies in Norway, where commercial or savings banks are only able to issue covered bonds through a mortgage credit institution established as a subsidiary. As an exception, Spain is the only jurisdiction where from the very beginning all credit institutions that participated in the mortgage market (commercial, cooperative and savings banks) can issue covered bonds.

These legal frameworks were established without direct issuance limits in general. Instead, they provided by minimum legal levels of overcollateralization with the aim of protecting covered bondholders: 102% in France, Germany and

COVERED BONDS AS AN ALTERNATIVE TOOL TO FINANCE THE MORTGAGE MARKET

TABLE 3

	Date	Issuer	Issuance limit	Cover pool characteristic					Issuer supervisor
				Ring-fence of assets	Eligible assets	Over-collateralization limits	Cover pool monitoring	Transparency	
Denmark	2007 (a).	Commercial (SDOs) and mortgage banks (SDROs).	-	Held in issuer's balance sheet and assigned to capital centers in mortgage banks and registers in commercial banks. In case of bankruptcy, a trustee is appointed by the bankruptcy court in mortgage banks and, in commercial banks, the administrator will be in charge of the assets.	Loans secured by real property (80% or 75% max LTV); exposures to public authorities (SDROs also include exposures to credit institutions (15%) and collateral in ships).	108% minimum coverage ratio (mandatory for mortgage banks and not for commercial banks).	The issuer monitors the cover pool continuously. Mortgage banks - internal auditor. Commercial banks - report directly and quarterly to the FSA (verified by an external auditor). Issuers must prepare quarterly reports on asset-liability management for the FSA.	Investor reports, trading venues and investor relations websites. Danish national transparency template (complements the ECBC label).	Danish Financial Supervisory Authority.
France	Obligations foncières - OF (1999) & Obligations the Financement de l'Habitat - OH(2010/11).	Specialist credit institution - Sociètes de crédit foncier (SCF) and Sociètes de Financement de l'Habitat (SFH).	-	Held in the issuer's balance sheet. SCFs and SFHs are totally bankruptcy remote.	OF - First-rank residential and commercial mortgages (max LTV 80%); state and third party guaranteed real-estate loans; public sector exposures; securitization of the above. OH - Residential mortgages and securitization of them.	102% minimum coverage ratio.	Specific Controller appointed by the SCF/SFH and agreed by the supervisory authority. Duties: control eligibility, composition and valuation of assets; compliance with minimum coverage ratio (quarterly report); control management of risks on assets (liquidity, interest rate, currency and maturity mismatch risks).	SCFs/SFHs should issue periodic financial information (quarterly asset report, semi-annual report on coverage ratio and other legislative limits, anual reports on assets and methods of valuation and a report on risk management).	French banking supervisory authority.
Germany	2005.	Universal credit institution with an special license.	-	Held in the issuer's balance sheet. Cover assets (recorded in the cover register) are excluded from the insolvency state (cover administrator, proposed by BaFin and appointed by court).	Mortgages, public sector loans, ship, aircraft (max LTV 60% for all). Credit institutions exposures (max 10% nominal value of the bond), derivatives (max 12% of cover assets).	102% minimum coverage ratio.	Certified auditor appointed by BaFin. BaFin must monitor the cover pool on average every 2 years. Pfandbierdbanks must carry weekly over collateralization stress tests & daily calculation of 180-day.	Legal req.: Quarterly disclosure of CBs outstanding and characteristics. Information about the legal structure. Private req.: vdp Transparency Initiative 2010.	BaFin, German Federal Financial Supervisory Authority.

COVERED BONDS AS AN ALTERNATIVE TOOL TO FINANCE THE MORTGAGE MARKET (cont.)

TABLE 3

	Date	Issuer	Issuance limit	Cover pool characteristic					Issuer supervisor
				Ring-fence of assets	Eligible assets	Over-collateralization limits	Cover pool monitoring	Transparency	
Norway	2007.	Specialized mortgage credit institution.	-	Held in the issuer's balance sheet. An administrator is appointed by court in case of bankruptcy of the issuer.	Residential (max LTV 75%) and commercial mortgages (max LTV 60%); public sector loans; derivative agreements; substitute assets.	100% minimum coverage ratio (issuer can establish a level above this one).	Independent appointed by FSA. Duties: control register of CBs and cover assets; and balance principle compliance. Reports annually to the FSA (or whenever there is no compliance).	The issuer and the independent inspector report periodically to the supervisor.	Financial Supervisory Authority of Norway (FSA).
Spain	1981 (modified in 2007 & 2009).	Credit institutions entitled to participate in the mortgage market (traditionally commercial, cooperative and savings banks).	-	Held in the issuer's balance sheet. Issuer must keep a special accounting cover asset register. CB holders have preferential claim against the insolvency estate. Insolvency body same as for the company.	Cédulas Hipotecarias(CH): secured by the entire mortgage loan book (excluding securitizations or loans securing mortgage bonds).	125% for CH. 143% for Cédulas Territoriales (CH whose cover assets are public administrations exposures).	Issuer must monitor the cover pool (as part of its risk management and auditing).	Monthly CB report to the Bank of Spain. Annual accounts contain the details of the register of loans. National transparency template consistent with ECBC label.	Bank of Spain.
Sweden	2004 (b).	Credit institutions with a special license.	-	Held in the issuer's balance sheet. The issuer must keep a cover pool register. In case of insolvency, registered cover assets and CBs are segregated from the general insolvency estate.	Residential (max LTV 75%) and commercial (max LTV 60%, max 10% of cover pool) mortgages; public sector assets; substitute assets.	102% minimum coverage ratio	Independent cover pool trustee (appointed by the SFSA). Duties: monitor the register and compliance with market and marching risks. It must submit an annual report to the SFSA.	Quarterly information about the cover pool and outstanding CBs (issuer website). Steps toward national transparency template.	Swedish Financial Supervisory Authority (SFSA).

SOURCE: ECBC. This table describes the main characteristics of each legal framework as of January 2013.

a Traditionally, mortgage banks issued mortgage bonds (Realkreditobligationer, ROs). The Danish Act on covered bonds of 2007 introduced two new instruments: Særligt Realkreditobligationer (SDROs) exclusively issued by mortgage banks and Særligt Dækkede Obligationer (SDO) issued by mortgage and commercial banks. All ROs issued before 1/1/2008 have maintained their covered bond status (10% risk weight instead of 20%) in accordance with the grandfathering option of the European Capital Requirements Directive (the only difference between ROs and SDROs is that LTV compliance is only required at disbursement of the loan in the case of ROs and not during all the term of the loan as in SDROs).

b In order to obtain the special license one requirement is the conversion of outstanding mortgage bonds in covered bonds, so most Swedish mortgage bonds issued before have now the status of covered bonds.

Sweden, 108% for mortgage banks in Denmark. In the case of Norway the minimum coverage ratio equals 100%, although issuers can voluntarily establish a certain level above this one. For Spanish covered bonds (cédulas hipotecarias) the minimum level of overcollateralization is 125% which is guaranteed by the fact that credit institutions are not allowed by law to issue more than 80% of total eligible assets (given that covered bonds are secured not only by eligible assets but by the entire mortgage loan book by Spanish law, the cap on issuance could be interpreted as a minimum level of collateralization).

Apart from these minimum coverage ratios, there are some requirements that enhance the quality of assets eligible as collateral such as loan-to-value limits,[20] geographical limitations for cover assets (for example, in Germany only loans originated in EU/EEA countries, Switzerland, USA, Canada and Japan are eligible for the cover pool), caps on the proportion of some specific assets in the cover pool and requirements over eligible substitute assets.

Typically, under these legal frameworks the cover pool remains on the issuer's balance sheet and a special register must be kept by the issuer by law, identifying cover assets and matching them with their respective cover pools. Under these legislations covered bondholders have a preferential right over the cover pool and also a claim against the issuer pari passu with the rest of bond holders, as it is usual for these debt securities (in those jurisdictions where the specialist banking principle applies, France and Norway, the claim is established also against the issuer and not against the originator[21]). The cover pool register attempts to ease the segregation of these assets from the insolvency estate, thus helping to isolate the credit rating of the cover pool from that of the issuer. In some countries, such as Germany and Denmark, the cover pool is managed by a special administrator/trustee who protects the interests of covered bondholders. In the case of Spain, where the entire mortgage loan book serves as collateral for its covered bonds, there is neither a special register requirement nor segregation of assets in case of insolvency.

Regarding the monitoring of the cover pool, in most of these jurisdictions there exists an independent monitor generally appointed (or, at least, agreed) by the national supervisor of the issuer. This independent monitor is named in order to check regularly whether assets in the cover pool comply with legal requirements (the toughness of these controls differs across countries) thus the evolution of the eligible asset pool is linked to the one of house prices. Alternatively, in the cases of Denmark and Spain there are no independent cover pool monitors, it is the issuer of covered bonds who is in charge of this duty. Differences in this area could contribute to explain the heterogeneity in the levels of overcollateralization (Table 3).

Finally, although there are some initiatives being developed in order to achieve larger consistency and homogeneity (such as the European Covered Bond

20 In most jurisdictions larger loans might be included although the excess of the maximum LTV is excluded from the cover pool [ECBC (2012), Packer et al. (2007)].

21 Danske Markets (2011). In the case of France, if the parent company is a going concern and the specialist subsidiary that issues covered bonds (SCF or SFH) enters into bankruptcy, the French banking regulators may exert pressure on the holding company to provide support (by law, there is no further claim against the parent bank if cover assets prove insufficient).

COVERED BONDS AS A BANK FUNDING DIVERSIFICATION TOOL

TABLE 4

	Date	Issuer	Issuance limit	Cover pool characteristic					Issuer supervisor
				Ring-fence of assets	Eligible assets	Over-collateralization limits	Cover pool monitoring	Transparency	
Autralia	2011.	Authorized deposit-taking institution.	8% of issuer's Australian assets.	Held in an insolvency remote SPV (CBs remain as direct, unconditional obligations of the issuer).	Residential mortgages (max LTV 80%), commercial mortgages (max LTV 60%), public sector exposures, credit institutions exposures.	103% minimum coverage ratio.	Auditor appointed by ADI. Duties: assess register, quality and nature of cover assets. Issuer duties: Monthly Asset Coverage Test (ACT), independently verified by the auditor.	Monthly CB reports agreed by the main banks. Contains: program rating, results of ACT, CBs outstanding and cover pool summary tables.	Australian Prudential Regulation Authority.
Canada	2012 (a).	Regulated Canadian financial institutions.	4% of bank's total assets.	Held in an insolvency remote SPV (the Guarantor).	Uninsured residential mortgages for Canadian properties (no more than four unit residential units) (max LTV 80%).	Issuers must establish a minimum and maximum under their programs.	Auditor appointed by the issuer. Monthly Asset Coverage Test (ACT).	Public Offering Document. Monthly Report (ACT results).	Canada Mortgage and Housing Association (reports to Office of the Superintendent of Financial Institutions).
United Kingdom	2008 (amended in 2011).	Deposit-taking institutions headquartered in the UK.	Case-by-case (agreed between issuer and FSA) (b).	Held by a Special Purpose Vehicle (CBs remain as direct, unconditional obligations of the issuer. Under IFSR assets remain in the issuer's balance sheet).	Residential (max LTV 80%) and commercial mortgages; public sector exposures.	108% minimum coverage ratio (since 1 January 2013).	Issuer is responsible of monthly Asset Coverage Test. Since 1 January 2013 an independent Asset Pool Monitor should be named, which must conduct semiannual inspections, annual review of ACT and report annually to the FSA.	Issuers are required to report detailed information to the FSA. Since 1 January 2013 new requirements introduced by HMT (loan level data and other transparency requirements) (c).	Financial Conduct Authority (FCA).

SOURCE: ECBC, Canada Mortgage and Housing Corporation. This table describes the main characteristics of each legal framework as of January 2013.

a Canadian covered bond market has developed since 2007 on a contractual basis (structured covered bonds). The amount outstanding of structured covered bonds was limited by the Office of Superintendent of Financial Institutions (OSFI).
b Traditionally the FSA has entered into discussions with issuers when CBs outstanding reached 20% of total assets (Will 2012).
c Moreover, the BoE published in November 2010 elegibility criteria for its covered bonds' schemes including provision of loan level data, publication of transaction documentation, homogeneized transaction summaries and standardised investor reporting, which adds to the transparency mechanisms in place.

Council (ECBC) covered bond label initiative, see Section 4.3), transparency is one of the characteristics that present more discrepancies among jurisdictions (Table 3 describes transparency characteristics in different countries).

b) Covered bonds as a diversifying bank funding tool

Covered bond markets in the UK and Canada have been developed through private contractual agreements (structured covered bonds) until the introduction of their respective recent national legislations. Australia is an additional example where covered bonds have just started to develop. These new legislations are aimed at providing a legal and homogeneous framework for covered bond issuance and, in general, are constructed with the objective of incentivizing bank funding diversification for all credit institutions. Moreover, these new frameworks do not follow the specialized banking model but all banking institutions are allowed to issue covered bonds (Table 4). At the same time, in order to guarantee the diversification of bank funding and avoid an increased concentration in this market segment, new legislations try to avoid the detriment to other (unsecured) sources of funding (such as unsecured senior debt or depositors) protecting them through the establishment of limits on issuance. This is one of the main differences between these new frameworks and the ones presented above. These limits are fixed attending to the proportion of covered bonds with respect to total assets of the issuing institution (in the case of the UK, it is established case-by-case by the UK Financial Conduct Authority).

Regarding the cover pool, under new legislations assets are held in a separate Special Purpose Vehicle in order to assure its insolvency remoteness. However, one important difference between this model and the one established in the ones presented before (such as France or Norway) is that the issuer is also the originator of the assets and covered bonds are its direct, unconditional obligations. Thus claims against the originator for covered bond holders remain in place. These frameworks also introduce requirements on the quality and nature of assets to be included in the cover pool, as well as a minimum over collateralization requirement (with the exception of Canada, where issuers must establish the minimum and maximum coverage ratios).

Regarding monitoring of the cover pool, in all of these jurisdictions an independent asset pool monitor is named and the issuer also has some monitoring duties that should satisfy. All of them include a regular asset coverage test that assures the quality and sufficiency of the cover pool of assets. Finally, these legislations already include provisions regarding transparency that draw a more homogeneous picture compared to those presented before.

4.2 INTERNATIONAL REGULATORY CHANGES RELEVANT FOR COVERED BONDS

The characteristics of covered bonds (double recourse, mortgage collateralization and long term maturity) explain why these instruments traditionally benefit from a favourable treatment both in capital regulation and as collateral in monetary policy operations. The global financial crisis has produced an intense revision of most of the regulatory framework, developing new regulatory topics (such as those related with liquidity risk and bail-in policies) and reviewing previous rules (capital, monetary policy framework or transparency). Overall, regulatory changes tend to be positive for covered bond markets although some initiatives could also have negative consequences for specific aspects or jurisdictions. Moreover, an important part of these amendments depend on the development at the

national level of international agreements, so the final configuration is still uncertain. For a matter of simplicity, this section focuses mainly on the initiatives taken by European authorities that are more relevant for the main covered bond issuers.

a) Markets in Financial Instruments Directive (MiFID) and transparency rules

European authorities introduced MiFID in 2004 in order to improve transparency and adequate the commercialization in equity markets. In October 2011, the European Commission published the MiFID 2 and the Markets in Financial Instruments Regulation (MiFIR), which are the basic regulations that broad the scope of MiFID and include, among other fixed income products, covered bonds. The consequence of these regulations mainly referred to pre-traded and post-traded requirements in secondary markets, and incentives to traded covered bonds on regulated markets or multilateral platforms. The final purposes of these new regulations are increasing liquidity and promoting transparency, something that, a priori, should positive. However, liquidity on secondary covered bond market traditionally has been reduced due to factors that will not be addressed by the MiFID such as the lack of harmonization on jurisdictions or the prevalence of investors that hold covered bonds to maturity. Industry participants therefore argue that these new proposals could be counterproductive reducing the number of trades due to the additional cost of improving transparency and damaging liquidity on secondary markets.

Apart from these regulatory changes, several private initiatives had been developed to promote higher standardization on disclosure practices. One of the most relevant is the ECBC covered bond label that improves access to information for investors, regulators and other market participants. In this case, this label has been backed by the ECB recognizing it in its collateral framework. Alternatively to this initiative from the issuers, the Covered Bond Investor Council (CBIC) has launched a European standards transparency template that contains key information which investors required to make well informed decisions.

b) Capital regulation

Investment in covered bonds has been traditionally implied less capital requirements than senior unsecured debt or securitization. European regulation in this area is contained in the Capital Requirement Directive (CRD). The new CRDIV includes significant improvement for the treatment of covered bonds by reducing their risk weighting. Moreover the preliminary draft of Solvency II (the basic capital regulation for insurance companies) also contains a beneficial treatment for investment in these instruments. It should be noted that, interestingly, the capital treatment under the CRDIV is linked to transparency from issuers.

c) Liquidity regulation

Liquidity risk was one of the features taken into account by the Basel III framework by means of what is called the Liquidity Coverage Ratio (LCR). European authorities will implement LCR trough the CRDIV. This ratio tries to ensure that banks have an adequate stock of unencumbered high quality liquid assets (HQLA) which can be converted into cash to meet its liquidity needs for a 30 calendar day liquidity stress scenario. The LCR considers two

kinds of HQLA, level 1 (compute without any restriction) and level 2 assets (could not account for more than 40% of HQLA and are subject to a range of haircuts). High rated covered bonds will be the only claim against private banking sector that could compute for LCR and will be consider in Basel III rule as a level 2 asset (with a haircut of 15%).

d) Recovery and resolution framework

In order to reduce the implicit public subsidy for financial institutions and ending too-big-to-fail firms, authorities are discussing new regulations to improve the recovery and resolution framework for financial institutions (most of these regulatory changes are being coordinated internationally). In particular, European lawmakers are finalizing the legislative process for the bank resolution directive. It is not straightforward to summarize the impact on covered bond markets of these new regulations since similar resolution and recovery rules could have different implications depending on the specificities of national legislations. Moreover, an increasing number of countries are introducing changes in their bank resolution legislations that contain significant differences that might have to be reviewed once international agreements are reached.

One of the first consequences of recovery and resolution regimes is the possible existence of a substitution effect between debt instruments as senior unsecured debt becomes more prone to suffer losses (either by bail-in tools or through liquidation procedures) than covered bonds.[22] On the other hand, covered bond pools could be negatively affected by these bail-in provisions since senior debt is eligible as a substitute asset for the dynamic cover pool in most national legislations.

Another area which might affect covered bonds could be the resolution powers that allow the transferring of assets to bridge or bad banks. In this case some recent changes in legislations (France, Netherland or Spain) could permit that this power affects assets pledged to covered bond holders; however in other cases (Germany, Ireland or UK) similar changes has been introduced but with some clauses that exempt covered bonds pools from such possibility. Recent episodes of liquidation or nationalization in Cyprus, Netherlands or Spain suggest that, under these circumstances, authorities make use of several tools to protect covered bond holders.

Finally, the possibility to include deposit preference in the resolution regime could induce some inconsistency with covered bond legislation. This could be illustrated by the US discussion around the long awaited covered bond legislation. The US is one of the few countries with an explicit depositor preference regime; in this case the guarantor of depositors – the Financial Depositors Insurance Company (FDIC) – is against the introduction of a standard covered bond legislation on the basis that is inconsistent with deposit preference given that in case of liquidation covered bond holders maintain an over collateralized pool until maturity, something that limits the flexibility of the FDIC to preserve depositors interests (Krimminger 2010).

22 One notable exception is the recently approved Dutch legislation (2012), which does not exclude covered bonds from bail in interventions.

5 Conclusion: What's next?

Covered bond markets were traditionally more focused at the domestic level but their recent expansion, both geographically and in terms of size, have resulted in the emergence of a new globalized debt market. Not only demand has increased due to cyclical factors (risk aversion as a result of financial and sovereign debt crises or the higher yields they provide compared to public bonds), but there are some structural determinants that are increasing investors' appetite such as the favourable regulatory treatment of these debt securities. On the other hand, the supply is also growing with the emergence of new national covered bond legislations are entering into force and the older ones are being amended homogenizing this product across jurisdictions and opening the market to new issuers (as the specialist banking principle is being abandoned in some jurisdictions).

Under this new environment, adaptation of the structure of the covered bond market might be crucial in order to assure its development. The lack of harmonization between different legislations and the limited transparency of these instruments might be affecting or slowing down the growth of this market (especially in those jurisdictions with relatively more peculiarities). In this context, there are several initiatives aimed at enhancing disclosure, such as private sector initiatives to create homogeneous templates for public disclosure of covered bond information, promoted both by issuers (European covered bond label) and investors (CBIC European Transparency standards). Other alternative might be the strengthening and further development of market making commitments and impositions of minimum threshold issuance size (such as Jumbo covered bonds). Finally, the establishment of centralized institutions to operate in the market on behalf of covered bond issuers might also be considered. For example, French Caisse de Refinancement de L'Habitat (CRH) is an example of a company established independently[23] of the borrowing banks, which issues covered bonds in order to finance mortgage loans of these banks under a specific regulatory context. Nowadays, the size of covered bonds outstanding of CRH is quite important, they are very liquid, listed on MTS (electronic trading platform) and several banks are market markers of them [ECBC (2012)]. Notwithstanding these initiatives, fundamental liquidity in the covered bond market might be relatively lower compared to other markets. Given the characteristics of these bonds, the typical investors' base is in general relatively more risk averse compared to other markets and more focused in hold-to-maturity strategies reducing secondary market activity.

From a financial stability point of view, the treatment of these bonds in a new world that try to establish a framework where financial institutions could be resolved is one of the aspects that might have direct effects on the future configuration of the covered bond market. As is has been previously highlighted, covered bonds have some qualities that might create externalities for other unsecured creditors such as depositors or senior debt [Anand et al. (2012)]. In this context, the clarification of the reach of covered bond holders' statutory claims during resolution processes might be crucial investment decisions of economic agents in the market. In some countries that have adopted recently new legislations, where the covered bond market is being promoted as way to diversify bank funding, the establishment of caps on issuance has been used in order to protect unsecured creditors. However, this kind of limits are not easy to implement in those cases where this market is relatively more mature and has been promoted as a way to finance mortgage activities as an alternative to other mortgage funding models

23 CRH was created in 1985 with explicit guarantee by the French Government as a central agency to refinance French Banks. Nowadays, CRH's bondholders do no t enjoy a state guarantee buy they have a strong privilege by law over CRH's secured loans to banks.

(i.e. the establishment of caps on issuance might be similar to suddenly removing public support in those countries where public guarantees are in place in order to promote the mortgage market).[24]

One alternative to face this problem is the improvement of transparency on asset encumbrance (proportion of assets engaged by collateralized debt – covered bonds, repurchase agreements, etc), thus allowing the existence of market discipline from unsecured bond holders and avoiding the imposition of ad-hoc limits that might have undesirable effects on funding. Moreover, in order to ensure the protection of deposit insurance schemes and, ultimately, taxpayers' money, this discipline could be achieved by the design of a deposit guarantee model where contributions are determined, among other factors, by the level of asset encumbrance in the balance sheet.

Finally, covered bonds might also be affected by some macro prudential measures aimed at protecting not only unsecured creditors, but also the developments of the composition of bank's balance sheet. That is, eligible cover assets are composed by mainly mortgage loans (commercial and residential), public sector exposures and ships. In this context, other bank credit segments are excluded such as loan to enterprises or consumer credit. One example that illustrates this point is the recent announcement of the Financial Stability Authority of Norway that considers that the rapid increase of its covered bond market "may give rise to structural weaknesses in banks' funding and to detrimental incentives in their lending activities". Thus, it is considering the adoption of some macroprudential measures to individual institutions such as the imposition of higher capital charges or restrictions on access to covered bonds funding if the amount of assets posted as collateral is considered to be too high [Finanstilsynet (2012)].

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24 In the case of Spain this kind of limit is more complicated to implement since Spanish legislation states that not only the eligible but all the mortgage loans are pledge to cédulas hipotecarias.

TOP-DOWN STRESS TESTS AS A MACRO-PRUDENTIAL TOOL: METHODOLOGY AND PRACTICAL APPLICATION

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TOP-DOWN STRESS TESTS AS A MACRO-PRUDENTIAL TOOL: METHODOLOGY AND PRACTICAL APPLICATION

In this article, we present a practical guide for the implementation of top-down solvency tests capable of measuring the impact on individual and system level capital ratios of adverse macroeconomic and financial shocks. The advantages and limitations of this method are discussed in the context of the recent experience in the application of the different types of stress tests. We provide specific details on the experience of the application of this method during the Financial Stability Assessment Process conducted by the IMF on the Spanish banking sector in 2012.

1 Introduction

The macro-prudential policy framework is mainly orientated to ensure that the financial system is capable of absorbing adverse shocks without the participation of the public sector. This form of prudential policy is devoted to minimize the risk of a disruption in the provision of financial services in the economy, limiting the need for public rescue programs and other forms of government emergency aid.

The recent economic crisis has taken to the fore the relevance of the correct design and adequate implementation of macro-prudential policy. The application and development of this policy is perceived to be critical to reinforce the strength of financial systems around the world.

The toolkit of macro-prudential policy is still in phase of design and definition; however, some of its main elements have already been applied.[1] In particular, stress tests have recently been widely used to evaluate banking systems. It goes beyond the shadow of any doubt that the stability of the financial system as a whole rests essentially on that of the banking system. Thus, evaluating its resistance to shocks that can affect its normal functioning is considered of utmost importance and at the root of the main objectives of macro-prudential policy.

The guiding principle in the application of stress tests is that these exercises, considered as a diagnosis tool, must help to evaluate and formulate regulatory and supervisory policies with the aim of enhancing the soundness of the banking sector and the efficiency of financial intermediation. This would improve the overall allocation of scarce resources in the economy, with the resulting positive impact on social welfare. Stress tests are thus thought to enhance preventive policies which are at the core of macro-prudential mandates. These tests can also help credible disclosure of supervisory information to financial markets, as pointed out in Gick and Pausch (2012).

In their origin, stress tests were carried out by banks themselves with no need of prescriptive requirement to run them by the supervisory authorities. These tools were an element of business analysis and risk management, designed and implemented for strategic purposes: pursue of management policies more attuned to bank risks, better allocation of the funds raised by banks and improvement of the quality of their business in anticipation of possible unfavourable shocks. The extension of the VAR techniques to manage the risks of financial firms through the late 80s and early 90s exemplifies the private sector search

1 Other tools are countercyclical capital buffers [see Repullo, Saurina and Trucharte (2010) for a thorough discussion], dynamic or countercyclical provisions [see Saurina (2009)] or G-SIBs capital surcharges [see BCBS (2011)].

for stress testing tools. The collapse of the New York Stock Exchange in 1987 and the turbulence in the European monetary market in the early 90s provided strong incentives for more sophisticated risk management tools such as Value at Risk (VAR).[2]

Based on the initial impulse provided by banks, supervisors with micro-prudential responsibilities realized that they could also use stress tests as a tool to assess the overall resilience of individual entities. These are the so-called bottom-up stress tests where, under a certain economic shock, each bank assesses its individual solvency and resilience under the scrutiny of micro-prudential supervisors. A model of credit risk is at the heart of the internal ratings-based approach to capital requirement calculation in Basel II. Supervisors started to incorporate bottom-up stress test as an additional tool for market, credit and liquidity risk assessment, which has gained special relevance in recent years. In the context of Basel II regulation, the prudent management requirements under Pillar 2 would contemplate this use of stress tests.[3] The application of this tool is varied, and particularly adapted to the specific idiosyncrasies surrounding a given exercise: type of entity, business, analyzed portfolios, scope of the exercise, time-horizon, etc.

As a complementary tool to bottom-up stress tests, macro-prudential authorities, mainly central banks, with or without bank supervision responsibilities, have started to develop and use top-down stress tests. These alternative tests provide an overall picture of the resilience of the banking sector as a whole. They are becoming also a core macro-prudential tool for the achievement of an accurate and adequate assessment of the situation and condition of the whole banking system. Sorge (2004) provides an early overview of this form of stress test. Burrows *et al.* (2012) and FRB (2012) summarize the methods for the macro-prudential tests applied in the U.K. and the United States. Greenlaw *et al.* (2012) provide analysis of the recent international experience with this form of test.

In general, the main objective of top-down stress tests is to evaluate the loss absorption capacity of a system under scrutiny. These stress tests aim to identify vulnerabilities while assessing and evaluating the loss-absorption capacity of a given banking system when these vulnerabilities crystallise and become real shocks. Consequently, macro-prudential stress tests should be regarded as a supplementary tool for supervisory activity, which provide firm and certain criteria to take proactive and reactive measures to cope with the impact of a predefined shock to the system. Particularly, a top-down stress test aims to provide an order of magnitude estimate of capital needs. This is achieved by adding up bank by bank results based on a general model of the banking sector, rather than on specific information and models at the individual bank level, which is the aim of a bottom-up stress test.[4]

Hence, stress tests, run either by banks themselves (management purposes), or bottom-up carried out by micro supervisors, or top-down elaborated by macro-prudential authorities (diagnosis purposes), can serve as a basis for fostering prudential techniques of protection against adverse situations and, therefore facilitate prevention and early warning response tasks to deal with hypothetical but plausible adverse situations.

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2 See Jorion (2006) for a complete review of VAR techniques. J.P. Morgan is regarded as an early adopter of this technique in the late 1980's. This bank later spun-off its VAR analysis activities into the company Riskmetrics, which provides risk management services to this day.

3 See Part 2-Section III of BCBS (2006) for internal ratings-based calculation of Basel II capital requirements and Part 3 for Pillar 2 requirements. Supervisory expectations of standards for bottom-up stress-testing have developed over time. See CEBS (2010).

4 Individual bottom-up stress test results can also be added up to evaluate a system and gain insight from granular bank information and models. The use of bottom-up tests for this purpose implies a more complex implementation and heterogeneous treatment of different banks. Additionally, it must be noted again that the original purpose of bottom-up stress tests is to analyze individual banks.

In addition to the reasons considered above, the design and implementation of stress tests has taken on particular importance in recent years due to the recommendations of the International Monetary Fund (IMF) and the World Bank. These institutions recommend running stress tests regularly and these exercises have been assigned a major role in the FSAP program («Financial System Assessment Program») to assess the stability of international financial systems in both developed and emerging economies.[5] These recommendations and the concerns in relation to financial stability reviewed above highlight the need to establish a series of basic principles and guidelines for a systematic approach to stress tests. These principles would apply to both top-down and bottom-up stress tests, to enhance both their rigour and simplicity. This article is intended to contribute to this goal.

The rest of the article is organized as follows. Section 2 briefly describes the most representative features of stress test exercises and its main elements. Section 3 explains stress test methodology and design in depth. This section is presented, in indicative terms, as a practical guide on how to set up and carry out a stress test exercise appropriate for the structure, complexity and risk profile of a given system under examination. Section 4 describes the practical application of these methods to Spanish 2012 IMF's FSAP. Finally, Section 5 presents further considerations on the main objectives and actual effectiveness of this tool.

2 Description of the types and main elements of stress tests

A stress test is usually defined as a set of techniques, tools or, in general, procedures used by either individual institutions or supervisory authorities to gauge, as objectively as possible, the financial condition of the system under examination. In particular, stress tests are normally focused on the evaluation of the solvency and liquidity of the banking system. These tests aim not only to identify possible vulnerabilities (expressed in the form of adverse shocks) that can affect the financial situation of a certain institution or financial system, but also to estimate and evaluate as accurately as possible the quantitative impact of those shocks. In short, the objective is to test the stability and resilience of the system or institution being assessed and analysed.

It is generally accepted that carrying out any stress test normally involves the following stages: 1) Delimitation of the scope of application of the test; 2) Definition, design and calibration of the shocks with which the system under examination is to be stressed; 3) Estimation of the impact of the shocks chosen and quantification of that impact in terms of variables determining the financial condition of the system to be tested, and 4) Identification of the possible considerations and policy measures deriving from the results obtained in the point above. Figure 1 summarizes the details of each stage.

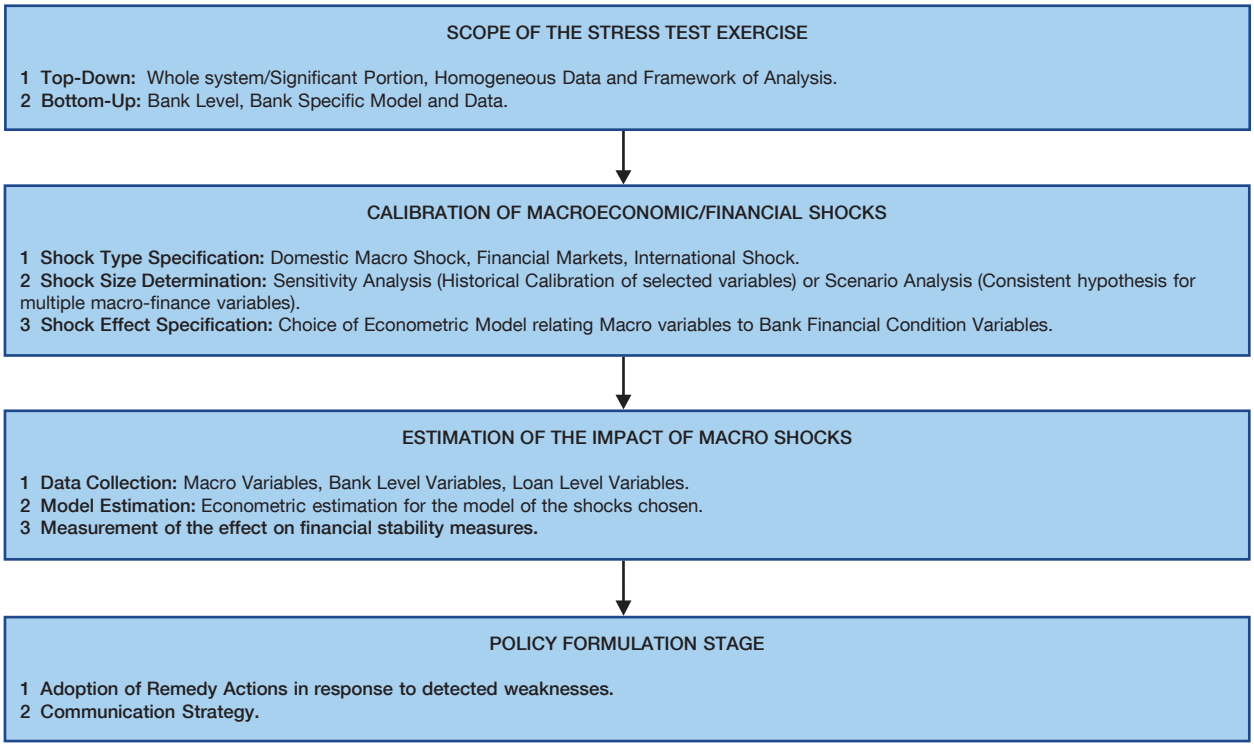
The scope of application is chosen based on the implications that are to be drawn from the stress exercise, which is basically a matter of selecting between a general analysis of the financial system and a study of specific portions.

Tests of a general nature (broadly speaking, macro-prudential tests) encompass the analysis of the greater part of the financial system, or at least that of its most significant components. Their objective is therefore to test the resilience and stability of the financial system as a whole.

In this type of exercise, the system can be treated at aggregate level (a general model of the banking sector is used), so that in order to subsequently descend to individual-institution

5 IMF (2010) details the incorporation of the financial stability tests to the FSAP exercises. IMF(2012a) provides guidelines for this exercise and a summary of the experience of the IMF in its application.

STRESS TEST IMPLEMENTATION FIGURE 1



SOURCE: Author's elaboration.

level, the results obtained are applied to each separate component of the system (top-down approach). Alternatively, if models and information at the individual level from a sufficiently representative number of financial institutions (by size or by type of business) are used, then this exercise is regarded as a bottom-up approach.

There is another type of stress tests of a much more specific nature. This is carried out at individual level (micro-test) and the analysis relates to one particular financial institution (or a very small group of them). A more specific form of stress test focuses within each institution on one or more portfolios, which are analysed because of their relative importance.

Additionally, the time horizon considered is another key parameter to be taken into consideration. Typical stress tests cover more than one business year (two or three business years). A trade-off arises at this point. On the one hand, sufficient time must be allowed for the consequences of the shocks to fully crystallise, and on the other hand, a longer time horizon may imply an excessive loss of reliability in the estimates with which to determine the final impact and results of the exercise.

The second stage of a stress test consists of establishing those improbable, but plausible adverse shocks that may negatively affect the stability of the system being tested and with respect to which the system's soundness and resilience is to be checked. The process of characterising the shocks to be considered consists in turn of various sub-stages.

First, the type of shock to be considered must be determined (identification and definition). Subsequently, the shock is calibrated (the size of the shock to be considered is specified) and then implemented (introduction into the system and quantification of its impact). It

must be noted that stress tests are not forecast exercises. On the contrary, shocks although plausible are highly improbable. The probability of occurrence is another parameter to be considered in the stress exercises. The credibility and utility of the results obtained depend to a great extent on the selection of acceptable scenarios both in terms of macro-variables affected and in the probability assigned to them.

Based on the above terms, once the shock is chosen on the basis of the risks to be measured and calibrated according to the type of analysis to be conducted, then it is implemented using the main variables (certain specific key parameters) that, due to their nature and availability, have the most significant direct or indirect effect on those risks.

The determination of the size of the shock (shock calibration) depends on the nature of the analysis to be conducted. In sensitivity analysis, the usual practice is historical calibration, under which the size of the shock is chosen according to the largest change that a certain variable to be shocked has undergone during a certain time period. The choice of this time period is closely related to the type of risk being analysed and to the market circumstances prevailing over that period. The periods are generally between 20 and 30 years, although in the case of certain variables lacking historical depth, this interval may be limited to 10 or 15 years.

The most complete and common approach to determine the size of the shock is using scenario analysis. In terms of completeness and adequacy, this is the best way of determining the resilience of a system under consideration. Scenario analysis contemplates the variations of a broad set of variables (macro-variables) and how these changes affect the system. As for the single variable case commented above, the scenario chosen is assigned a certain probability of occurrence. The final credibility and utility of the stress exercise depends again, among other factors, on the probabilistic calibration considered.

The third stage of a stress test is to specifically estimate the impact of each shock. In this stage, it must be decided how the shocks defined and calibrated in the previous stage are to be included in the system, i.e. a quantitative assessment is to be made of the impact on the system's financial condition, so that its resilience to the shocks used can be evaluated.

This stage is based on the relationships established (usually via an econometric model) between macro-variables and the main elements, under the form of economic and financial variables, of the banking system. It consists of choosing certain key variables that directly affect the financial condition of the system analysed (for example, a certain portfolio or some of its components) and estimating how they change in response to the defined shock.

This part of the stress test thus consists of determining how macro variables change and then expressing those changes in terms of the variables that determine the financial condition of the system under examination (generally profitability and solvency).

As a corollary to the previous stages, policy responses must be considered once the impact on financial stability and the estimated resilience of the system have been determined from the results of the stress exercise. There is a need to consider what measures will help the smooth working, efficiency and continued stability of the system under examination. This is usually known as the policy-oriented phase. If major weaknesses have been detected and remedying them is a priority, it will be necessary to focus on revising, adjusting and strengthening the existing prudential elements currently in place.

3 Methodology design and practical application of scenario analysis

This section deepens in the details of the design and practical implementation of a specific macro-stress exercise considering that the scope of application is the banking sector as a whole and that the objective of the test is to measure the solvency of this system. It is intended to serve as a model for how to approach stress testing and as a practical implementation guide for possible use by supervisory authorities.

Scope of the stress-test

As just mentioned above, the scope of application of this type of stress tests is the financial system as a whole, although depending on the type of analysis or risk considered, the scope may be confined to the most significant part of the system,[6] which is formed by a specific group of representative institutions (chosen either for their size or type of business) with a high relative importance within the system. The kind of approach (top-down or bottom-up) to be used in the stress test will be primarily determined by the availability of data to the supervisory authority. Both approaches have strengths and weaknesses.

From the supervisory standpoint, the top-down approach calls for a stress test structure that is both common (in terms of tools and methodology) and standard (applied identically to all participating entities). This normalised structure allows to define a test which is applied coherently and consistently regardless of the type and number of banks taking part in it. The use of a proprietary framework applied uniformly for all participants yields results free from the arbitrariness and heterogeneity caused by internal differences in the methodology, calculations, importance and type of business of each individual institution.

The main weakness of this approach is the lack of the detailed individual information that is the main strength of the bottom-up alternative. The richness of the information and the level of detail available to individual institutions enables a much more accurate perception of their risk profile and the impact that a particular shock would have. This greater level of detail, as compared with the uniformity of the common method, is the trade-off that must be weighed up when deciding which approach to use.

The most complete stress exercise would undoubtedly be one in which the data available to the supervisory authority and to the individual institutions are fairly similar (e.g. via regular reporting by the latter). The exercise would be carried out by the authority (top-down approach) for the system as a whole. Simultaneously, the participating banks would carry out exactly the same type of test (the same assumptions and shocks) as the supervisor. These results would then be aggregated (bottom-up approach) and examined for convergence between those obtained in the two different approaches. Ideally, it would be found that the exercise carried out by the authority replicates the results reported by the individual institutions using their own methodology.

In any event, the availability of data will determine the robustness of the analysis and whether the exercise can be conducted for the total system by the supervisory authority and/or individually by the participating institutions. Together with data availability, the quality of data is essential for the accuracy and appropriateness of the exercise.

Macro-financial model/ system shocks

A stress exercise generally involves two types of analysis: a very simple sensitivity analysis, and other much more complex and complete scenario analysis. Sensitivity analysis seeks to estimate how the main determinants of the financial condition of credit institutions are

6 Since the activity of the financial system of many countries is, in terms of relative weight, dominated by banks, its soundness can be gauged using a stress test confined to the banking system. This simplification, which does not limit the applicability and usefulness of the exercise described above, is followed in this article.

impacted by certain one-off shocks to specific risk factors (e.g. the determinants of credit risk) of bank portfolios. Unlike sensitivity analysis, scenario analysis generally uses econometric models to estimate how the main macroeconomic and financial aggregates of the system would be affected in a certain stress scenario.

The application of scenario analysis will use the balance sheet and the profit and loss account to model the transmission of the macroeconomic shock. That is, the shock will impact business risk that affects balance sheet items and certain elements of the profit and loss account, and credit risk affecting the profit and loss account via credit provisions - expected losses. Depending on the approach chosen, these financial statements would be either those of the system as a whole, or those of individual participating institutions.

We consider that the role of modelling in scenario analysis should not be reduced to estimating a single equation that, as usually occurs, is the bottom line of the profit and loss account; rather the analysis should be developed further so as to provide a more comprehensive breakdown that distinguishes different balance sheet items and their contribution to the profit and loss account. This approach considerably enriches the exercise and it enables step-by-step monitoring of the various items comprising a bank's main activities and operations. Basing the analysis only on the bottom line of the profit and loss account carries the danger of concealing individual effects that may be very significant for certain balance sheet groupings (or for their contribution to the profit and loss account). These concealed effects influence and alter the interpretation of the banks' risk profile and sensitivity to certain risks.

Distinct balance sheet items show differing sensitivities to certain shocks and they may also vary by different amounts in response to changes in the value of certain macroeconomic variables. For instance, interbank financing positions and equity instruments respond differently to a scenario of falling stock market prices. As an additional example, credit growth and fee and commission income respond differently to an economic recession deriving from a stress scenario of contraction in domestic demand. The items of the profit and loss account that would be typically considered in this exercise include interest income, fees and commissions, operating expenses and provisioning charges (impairment losses). We examine in more detail some of these income elements below.

Business risk

As stated above, business risk is measured by simulating the balance sheet and profit and loss account of the total system (or those of each individual bank), first under the conditions of a baseline scenario and then under those set in each stress scenario. This simulation consists of estimating certain balance sheet groupings, their implicit return and certain profit and loss account components. To do this, use is generally made of econometric models, accompanied by supervisory judgment in case of poor performance of regression equations.

We briefly consider the model for net interest income as an example. This is one of the main items that a stress test exercise should include. To model this item of the profit and loss account, different elements of the balance sheet are taken into consideration. Basically, financial products that produce income on the asset side (interest income), and products on the liability side that imply costs (interest cost). These elements are introduced in the stress framework with equations that relate interest rates and exposures to macro-variables. A particular example would be the mortgage credit portfolio, which is one of the elements from the asset side generating income and is subject to be included in the model. In this respect, the stress test framework models on the one hand the average rate charged

to the loans in this portfolio, an on the other hand, the average mortgage exposure. Their interaction (multiplication of the price and volume of this element) provides the contribution of this asset item to net interest income. The rest of the asset elements of the balance sheet that produce income are modeled in an analogous way.

Similarly, modeling financing costs (rates and amount of financing obtained) from the liability side provides its contribution to interest costs. Aggregating the cost of all financing sources allows us to arrive at the total cost of liabilities. Finally, net interest income is obtained by subtracting from the asset contribution the liability cost.

In Section 4, we provide a detailed description and explanation of the regression equations and the macro-variables in the model for the balance sheet and profit and loss items of the main banks in the Spanish financial sector.

Credit risk

Regarding the impact on credit risk (via borrowers' creditworthiness), the approach proposed here is not based on estimating an equation for credit loss provisions (based on macro and financial variables)[7] and using those estimates to adjust the bottom part of the profit and loss account. The basic weakness of this approach is the arbitrariness and lack of uniformity at international level in the regulation and application of the provisioning systems.

Stress tests for this type of risk should begin by distinguishing between portfolios (different asset types), e.g. a differentiation between risk exposures to firms and individuals (within the latter, mortgage loans should be distinguished from the rest, basically consumer credit). This separation enables the specific design, calibration and adequate determination of the impact of the shock in question on every differentiated exposure. A particular shock may have a different impact (to the point of having or not having an effect) depending on the portfolio considered. Given the different levels in the values of the risk parameters that characterise each portfolio, it is absolutely necessary to distinguish between them so that the amount of shock can be accurately determined for calibration purposes.

The key parameters in credit risk analysis are basically the following: probability of default (PD), loss given default (LGD) and exposure at default (EAD). Determining the amount of the shock to which they are to be subjected is the next step in the stress exercise for this particular risk.[8]

In order to measure more exactly the credit quality of the banks's borrowers, we use the obligors' probability of default (PD). The reason for this decision is based on the fact that this parameter is the measure generally used by banks in their internal models to evaluate and manage credit risk. Since the world-wide implementation of Basel II, it is also the basic reference parameter for the supervisory authorities in assessing this type risk.

We thus propose that the estimated change in credit loss provisions under each stress scenario be driven and, ultimately, determined by the change in the expected loss resulting from variations in the PD due to shocks to the economic variables used in each scenario.

7 The dependent variable explained by this equation is generally either the system's non-performing loans ratio, the projected value of which is the basis for determining the volume of provisions to be used given the stress macroeconomic scenario, or directly the volume of provisions (flow or stock).

8 The probability of default is one of the central concepts for measuring credit risk used by the Basel Committee on Banking Supervision in its publications, particularly that instituting the current framework for international convergence on capital measurement and capital standards. See BCBS (2006) for more details and for its definition.

The parameterisation of the PD entails the development of a statistical model to relate it to different factors, some of which must be macroeconomic and financial system variables, e. g., economic activity (GDP growth), unemployment rate, interest rates and other variables likely to affect the debt service capacity of bank borrowers. This would yield a cyclical PD dependent on the economic conditions of each scenario.

Granularity in the PD estimation is achieved by differentiating several key portfolios within total banks' credit exposures. Particularly, for our stress test framework, we distinguish among the mortgage portfolio, exposures to real estate developer loans, loans to other non-financial firms, and consumer lending. To take an example, the PD of the mortgage portfolio depends on interest rates, economic activity and the housing price index. As for business risk, details of this element of the model can be found in Section 4, together with the equations that relate the PD of the other portfolios to macroeconomic variables.

The full pass-through of a stress scenario to credit risk will be achieved once LGD and, where applicable, EAD can also be expressed in terms of macroeconomic variables, as described for the probability of default. For example, changes in loan-to-value ratios, real estate prices or interest rates directly affect the value of LGD for modelling purposes.

The customary procedure for LGD is to assume an ad-hoc increase by a given percentage thereof or to define some kind of range of variation and use it to calculate the change in credit risk.

As regards EAD, it will move in line with estimates of credit growth given by the macroeconomic scenario and the values assumed for the macroeconomic variables used. EAD should also be, in principle, dependent on cyclical fluctuations in economic activity, affecting total credit exposure of banks.

Once the stressed values of the risk parameters are known, the stressed expected losses associated with each scenario can be found immediately, and this determines the volume of provisions to be set aside by banks to meet those losses and, finally, their impact on the profit and loss account.

Other modelling considerations and interpretation of results

A remaining challenge in scenario analysis is to take into account second-round and feedback effects not usually addressed in this type of stress exercise. As mentioned above, in the scenario analysis described so far, shocks only move in one direction. However, a complete analysis of their total impact should reflect the amplified effects on the financial system once the initial consequences of the original impact are reintroduced into the macro model equations of the real sector.

We present a simplified example to illustrate the feedback problems. We assume a scenario of zero growth in economic activity. This, among other effects, will induce a decrease in the credit quality of banks' borrowers (increase in credit risk). Banks will react by cutting back on new lending, which will clearly affect economic agents (basically households' and firms' borrowing capacity), aggravating the initial general economic situation and therefore amplifying the original shock. The initial scenario of zero growth will worsen, turning into one of negative growth, which obviously will affect obligors' credit quality more adversely than initially. The convergence mechanisms of the multi-equation model would eventually bring the feedback process to an end and the total amount of the shock would be fully determined.

The dynamics of the effects described so far seem, in principle, easy to understand. However, the complicated relations between the financial and the real sector are hard to define and accurately estimate. Nevertheless, a very simplistic approach could be used to approximately evaluate these feedback effects. This would consist of amplifying, to some extent, the initial amount of shock coming from the originally predefined stressed scenario. That increase must be large enough to account for the additional impact that feedback effects would have on the financial system.

In all, once a shock and its size have been determined, its impact on the financial condition of the system is estimated with the final aim of testing the system's resilience. This is done by assessing that impact on the different items of the profit and loss account. Additionally, the impact on expected losses is derived from the estimated change in the PD and LGD and, where applicable, from the exposure to be considered.[9] Once the bottom line of the profit and loss account is obtained, the impact on solvency is calculated accordingly. The change in the capital ratio is determined from the estimated loss (or lower profits) and therefore the decrease in reserves.

Although the calculation of the impact on profit and solvency seems to be immediate, care must be taken with how this is done when the time horizon exceeds one year. Apart from the mere comparison of annual figures in the baseline and stress scenarios, it is of interest to analyse the effect of the shocks by aggregating the profit figures for each year to give, finally, the cumulative figure for the last year of the time horizon. This aggregated figure best reflects the impact of the stress test on the system's financial condition for each of the scenarios considered.

Accordingly, the impact on profitability is obtained as the difference between the profits calculated under the baseline scenario and those for each of the specified scenarios. Similarly, the impact on solvency is determined by comparing the ratio of the baseline scenario with that of each of the stress scenarios taking the cumulative effect of that comparison on the capital ratio at the end of the predefined time horizon (last year of the period considered).

In principle, the guidelines given in this paper for treating business and credit risk in scenario stress tests would be valid for gauging whether the capital of banks would be able to absorb a given shock or, for example, whether the capital cushion in excess of the regulatory minimum requirement is sufficient to cope with the related shock.

4 A practical application of top-down stress testing methodologies: International Monetary Fund's 2012 FSAP in Spain

During the first half of 2012, the International Monetary Fund, IMF henceforth, carried out, in close collaboration with the Banco de España, a top-down stress test exercise as an important part of the 2012 FSAP of Spain.[10] A FSAP is designed to assess the stability of the financial system as a whole and, as such, a stress test exercise is one of the most relevant elements of this assessment process.

4.1. DESCRIPTION OF 2012 FSAP IN SPAIN

The top-down stress test framework detailed in previous sections was used for the implementation of a solvency exercise included in the FSAP. It was conducted to assess solvency risks under a baseline and two adverse scenarios (see Table 1). The stress test covered over 95 percent of the domestic banking sector (by total assets, excluding foreign branches), over a two-year horizon (2012-2013), with use of end-2011 supervisory information as base for the balance sheet and profit and loss projections of the exercise.

9 In principle, the amount of impairment losses would be equal to the point-in-time expected losses on the loan portfolio.

10 For more details see: http://www.imf.org/external/pubs/ft/scr/2012/cr12137.pdf.

FSAP SCENARIOS

TABLE 1

Variable		Scenarios					
		Baseline		Scenario 1		Scenario 2	
	2011	2012	2013	2012	2013	2012	2013
Real GDP Growth (in percent)	0.7	-1.7	-0.3	-2.5	-0.7	-4.1	-1.6
GDP deflator (in percent)	1.4	1	1	0.6	0.5	0	-0.5
Nominal GDP growth (in percent)	2.1	-0.7	0.7	-1.9	-0.2	-4.1	-2.2
3-month Euribor rate (in percent)	1.4	0.9	0.8	1.4	1.3	1.9	1.8
12-month Euribor rate (in percent)	2	1.6	1.5	2.1	2	2.6	2.5
Change in consumer price index (in percent)	3.1	1.8	1.6	1.6	1.2	1.1	0.2
Unemployment rate (in percent)	21.6	23.8	23.5	24.2	24.5	25	26.6
Exchange rate in US dollar	1.4	1.3	1.3	1.3	1.3	1.3	1.3
	–						
Madrid Stock Exchange index price	-14.6	-1.3	-0.4	-21.3	-0.4	-51.3	-0.4
Credit growth (in percent):							
Households	-1.5	-3.8	-3.1	-4.9	-5.8	-6.8	-10.5
Non-Financial Firms	-3.6	-5.3	-4.3	-5.6	-3.8	-6.4	-3
House price change (in percent)	-5.6	-5.6	-2.8	-10.6	-3.1	-19.9	-3.6

SOURCE: IMF (2012b).

The baseline economic growth projections for Spain were consistent with the IMF's World Economic Outlook Update (January 2012), while the two adverse scenarios comprised more adverse economic scenarios, with a specific focus on real estate prices. These alternative scenarios are purely hypothetical and designed to test the resilience of the system. They are not forecasts and they do not even represent probable economic conditions. However, the scenarios are internally consistent, as they are elaborated with a general equilibrium model of the Spanish economy.

(Scenario 1) A "double-dip" recession scenario of one standard deviation from the baseline GDP growth trend over the two-year horizon ("IMF adverse" scenario). In this scenario, most of the shock to economic growth occurs in the first year resulting from a sharp decline in output, further declines in house prices close to levels observed in 2002, and rising unemployment.

(Scenario 2) An alternative adverse scenario ("BdE adverse") where the shock to the two-year real GDP growth is more modest, i.e., the fall in GDP is reduced by 2.5 percentage points relative to the "IMF adverse" scenario.

The scenarios also included valuation haircuts on sovereign debt held in trading and available for sale portfolios. The haircuts were estimated based on the impact of the forward term structure of sovereign credit default swap (CDS) spreads on sovereign benchmark bonds as of the end of 2011.

Additionally, the flexibility of the framework allowed us to include additional provisioning requirements affecting expected losses. In particular, those introduced in the Royal Decree Laws of February and May of 2012, which were approved by the Spanish government to complete the reform of the banking sector.

The staff of the Banco de España involved in the FSAP 2012 completed a top-down stress test based on a model derived from the principles described in this

article.[11] They also participated in the adaptation of the general top-down stress test solvency framework developed by the IMF to the prevailing conditions of the Spanish banking system.[12] The communication and joint work of the Banco de España and IMF staff facilitated to adjust both the Banco de España stress test framework and the IMF general methods to the specific circumstances of the Spanish banking sector at the end of year 2011. The participation of staff teams of both institutions in the application of all the different methods also contributed to their cross validation.

The results for the solvency and liquidity stress tests are available publicly in the report FSAP (2012), which presents detailed information for the different scenarios.

4.2. ANALYTICAL MODEL FOR A SOLVENCY TOP-DOWN STRESS TEST

The stress test framework presented in this article is supported by an econometric model which relates balance sheet and profit and loss (P&L) account items with macroeconomic variables. The core elements of the econometric model are the forecasting equations for net interest income, with a distinction of the evolution of exposures and interest rates, net fees and commissions, operating expenses, and credit losses, with differentiated models for different types of credit exposures. These elements are complemented with additional predictions for other elements of the P&L. We detail next the main elements of the model. The Annex to this article contains a full list and description of the model variables.

Net interest income

The interest rate $rate_{ist}$ earned (paid) on a class of financial products s corresponding to an asset (liability) is forecasted by projecting the historical series of this variable onto its own lags and the contemporary and lagged values of the interbank rate, i. e., the Euribor 12 months ($euribor_t$). The subindexes i, t and s denote the bank, time period and the class of financial product, with s = FA for financial assets with interest producing income, and s = FL for onerous financial liabilities with interest cost.

The growth in the exposure of the bank to different assets and liabilities ΔExp_{ist} is modelled separately with a projection on its own lag and macroeconomic variables such as growth in real gross domestic product ΔGDP_t and growth in the housing price index ΔREP_t. The forecast of the exposure to a financial product in a given year t is then calculated as:

$$Exp_{ist} = Exp_{ist-1} (1+\Delta Exp_{ist}) \quad [1]$$

It follows that the forecast of total income or expense from a class of financial products is then defined as:

$$Inc_{ist} = Exp_{ist} (1 + rate_{ist}) \quad [2]$$

The net interest income is then calculated as the difference of interest income on financial assets and interest expense from financial liabilities:

$$NII_{it} = Inc_{i,s = FA,t} - Inc_{i,s=FL,t} \quad [3]$$

Net commission fees

The net commission fees are split into fees for banking services (s'= B) and fees for brokerage services (s'= BR). We model the growth of commissions, $\Delta Com_{is't}$, and its contribution to the margin from each of the previous two categories separately with a

11 The whole stress framework benefited from the interaction and collaboration with the IMF staff.

12 The description of the IMF methods for top-down solvency and liquidity stress tests can be found at Schmieder *et al.* (2011) and Schmieder *et al.* (2012). The market based approach used in the IMF (2012b) of Spain originates from the work in Gray *et al.* (2010).

projection on their own lags and macroeconomic variables such as growth in real domestic product ΔGDP_t and the growth in the Madrid Stock Exchange Index ΔMI_t . The final forecast for the net fees of each class s´ in a given time period t is then defined:

$$Com_{is't} = Com_{is't-1} (1 + \Delta Com_{is't}) \quad [4]$$

and the total net fees and commissions add up over the subclasses corresponding to banking (B) and brokerage services (BR):

$$Com_{it} = Com_{i,s'=B,t} + Com_{i,s'=BR,t} \quad [5]$$

Other financial Income

Income from other financial operations, income from equity instruments, exchange differences and other operating income are calculated using both expert judgement and auxiliary equations. In particular, the auxiliary equation of the growth in return from financial operations, $\Delta RFO_{it,}$, projects this variable onto its own lags, macroeconomic variables and credit growth. The forecast of income from financial operations RFO_{it} is then given by:

$$RFO_{it} = RFO_{it-1} (1 + \Delta RFO_{it}) \quad [6]$$

The auxiliary equation of the growth of equity instruments, ΔEII_{it} , projects this variable onto its own lag and macroeconomic variables. The forecast of income from equity instruments EII_{it} is given by:

$$EII_{it} = EII_{it-1} (1 + \Delta EII_{it}) \quad [7]$$

The auxiliary equation of the growth in other operating income, ΔOI_{it} , projects this variable onto its own lag, macroeconomic variables and credit growth. The forecast of other operating income OI_{it} is given by:

$$OI_{it} = OI_{it-1} (1 + \Delta OI_{it}) \quad [8]$$

The auxiliary equation of the growth in gains from exchange differences, ΔFX_{it} , depends on its own lags and macroeconomic variables. The forecast of income from foreign exchange differences DFX_{it} is given by:

$$DFX_{it} = DFX_{it-1} (1 + \Delta DFX_{it}) \quad [9]$$

The gross operating margin GOM_{it} is then computed as:

$$GOM_{it} = NII_{it} + Com_{it} + RFO_{it} + EII_{it} + OI_{it} + DFX_{it} \quad [10]$$

The model for the growth in operating expenses ΔGX_{it} is also given by an auxiliary equation for the growth of this variable as a function of its own lag, macroeconomic variables, labor costs DEX_{it} and credit growth. The level forecast for operating expenses is then:

$$GX_{it} = GX_{it-1} (1 + \Delta GX_{it}) \quad [11]$$

Credit risk, expected losses and provisions

Expected losses and their translation into specific provisions for particular classes of risk (asset classes) are calculated from regulatory data on credit exposures and the risk embedded in those exposures.

We model separately the evolution of credit performance for the mortgage portfolio, the non-financial firms (excluding real estate developers) portfolio, real estate developers' portfolio and consumer lending.

The default events (probabilities of default) are modelled using a logistic model by which a given loan u in credit class NFF (Non Financial Firm), credit class RED (Real Estate Developer) or MORT (Mortgages) in the loan book of bank i defaults at period t if the latent variable $\omega_{s,u,it}$ is below zero ($\omega_{s,u,it} < 0$), where s indexes the credit classes. The latent variables are defined as the sum of a bank-class specific factor $\delta_{s,it}$ and an idiosyncratic component $\varepsilon_{s,u,it}$: $\omega_{s,u,it} = \delta_{s,it} + \varepsilon_{s,u,it}$. Under the assumption that $\varepsilon_{s,u,it}$ follows a type-I extreme value distribution, the probabilities of loan default in large portfolios conditional on asset class factors are given by:

$$PD_{NFF,\,it} = \frac{\exp\left(\delta_{NFF,\,it}\right)}{1 + \exp\left(\delta_{NFF,\,it}\right)} \quad [12]$$

$$PD_{RED,\,it} = \frac{\exp\left(\delta_{RED,\,it}\right)}{1 + \exp\left(\delta_{RED,\,it}\right)} \quad [13]$$

$$PD_{MORT,\,it} = \frac{\exp\left(\delta_{MORT,\,it}\right)}{1 + \exp\left(\delta_{MORT,\,it}\right)} \quad [14]$$

The asset class specific factors ($\delta_{NFF,it}$, $\delta_{RED,it}$, $\delta_{MORT,it}$) are forecasted with projections of these variables on their own lags and macroeconomic variables, creating an effective link between the macro scenario and credit conditions. The asset class specific factors are not observed but they can be recovered from data on default rates with a simple non-linear transformation. For example, a data observation $PD_{NFF,it}$ implies that $\delta_{NFF,it} = \ln(PD_{NFF,it}) - \ln(1 - PD_{NFF,it})$.

The expected losses materialised corresponding to the estimated credit risk incurred is finally calculated as the product of exposure $Credit_{ist}$, times loss given default LGD_{ist} and expected probability of default PD_{sit} :

$$SPROV_{ist} = Credit_{ist} \times LGD_{ist} \times PD_{sit} \quad [15]$$

Regarding consumer lending, expected losses and therefore, specific provisions, $SPROV_{i,CONS,t}$ are backed up with application of expert judgment to the data on total specific provisions and the specific provisions on other classes of risk. The total credit provisions $PROV_{it}$ to be deducted as an expense adjust additionally for the changes in the generic provision, according to the regulation of the Banco de España.

The framework also includes an auxiliary equation for the growth of provisions related to personnel expenses $\Delta LPROV_{it}$ such as pension fund provisions. These provisions are not related to credit risk. The forecast of the level of this category of provisions is then:

$$LPROV_{it} = LPROV_{it-1}\,(1 + \Delta LPROV_{it}) \quad [16]$$

Net operating income and pre-tax income

The net operating income is given by the following equation:

$$NOI_{it} = GOM_{it} - GX_{it} - LPROV_{it} - PROV_{it} \quad [17]$$

The calculation of pre-tax income PTI_{it} can incorporate two additional adjustments from the auxiliary equations or expert judgment for the loss on assets LOA_{it} and other non operating income NOP_{it}:

$$PTI_{it} = NOI_{it} - LOA_{it} - NOP_{it} \quad [18]$$

5 Further considerations

The main objective of stress test exercises as a diagnosis tool is to test the resilience of individual banks and of the whole banking system. When restricted to achieve that goal, stress tests can be considered as a quite useful tool for macro-prudential regulation and supervision. Additionally, stress tests can provide a better knowledge of the financial system under scrutiny to all of its stakeholders. The macro-prudential regulator is well positioned to collect the most comprehensive dataset of the banking sector, and it can then perform better informed stress tests than those elaborated by private agents. Regarding their implementation, they are based on methodologies which are relatively simple. Furthermore, it can be said that they had contributed to foster development of data availability processes.

Stress tests can be an important resource to increase the transparency of the banking sector and, more generally, the financial sector. These exercises can be seen as an auxiliary tool to restore confidence or a mechanism to set up recapitalization schemes. Stress tests on their own are not enough to restore the confidence on a distressed financial system, but they have proved to be an efficient instrument to guide policy action.

However, a problem is certainly posed when too many objectives are placed upon them. The assignment of too many objectives to a single policy instrument can reduce its effectiveness and, in the limit, it can be left with a nihil effect. Stress tests are mostly a diagnostic tool and additional policy instruments must be considered when aiming for more objectives than initially assigned to them. In the case of recapitalization plans, additional elements such as reworking of business strategies, restructuring plans for the sector and recapitalization mechanisms should also be taken into consideration for the success of the entire plan.

It goes without saying that for the sake of reliability of the results obtained from a stress test exercise, data quality is an issue. If the underlying data that feeds the exercise is under question, the usefulness of the stress test as a mean to increase transparency is lower. As commented above, the development and wide use of these exercises heavily dependent on data, have contributed to the refinement of data quality checks and processes, and further improvements can be expected in the future. The better modeling of feed-back effects between the macroeconomic environment and the financial sector condition constitutes an additional avenue for future improvement of this type of stress test exercises.

ANNEX-DEFINITIONS OF THE VARIABLES IN THE P&L MODEL

We use throughout this section the sub index i to refer to an individual bank, t to refer to a time period and s to refer to a class of financial products (s=FA for financial assets and s=FL for financial liabilities). The variables are listed in approximate order of appearance in Section 5:

1 $rate_{ist}$: Interest rate earned on financial assets (s=FA) or paid on financial liabilities (s=FL).

2 $euribor_t$: Annual average of the Euribor 12 months.

3 Inc_{ist} : Income from financial assets or expense from financial liabilities.

4 Exp_{ist} : Exposure to financial assets and financial liabilities.
5 ΔExp_{ist} : Growth in the exposure to financial assets and liabilities.
6 ΔGDP_t : Growth of real GDP.
7 ΔREP_t : Growth in the Housing Price Index.
8 NII_{it} : Net Interest Margin.
9 $\Delta Com_{is't}$: Growth in net fees and commissions from service class s´.
10 Com_{it} : Net fees and commissions.
11 ΔMI_t : Growth of the stock market index.
12 ΔRFO_{it} : Growth in income from financial operations.
13 RFO_{it} : Income from financial operations.
14 ΔEII_{it} : Growth in income from equity instruments.
15 EII_{it} : Income from equity instruments.
16 ΔOI_{it} : Growth in other operating income.
17 OI_{it} : Other operating income.
18 ΔDFX_{it} : Growth in income from exchange rate differences.
19 DFX_{it} : Income from exchange rate differences.
20 FX_{it} : Euro Dollar exchange rate.
21 GOM_{it} : Gross Operating Margin.
22 ΔGX_{it} : Growth in Operating Expenses.
23 GX_{it} : Operating Expenses.
24 DEX_{it} : Direct cost per employee.
25 $\Delta Credit_{ist}$: Growth in credit exposure to risk class s.
26 $Credit_{ist}$: Credit exposure to risk class s.
27 LGD_{ist} : Loss Given Default to be applied to loans of risk class s.
28 $SPROV_{ist}$: Specific Provision for risk class s.
29 $PROV_{it}$: Sum of Generic and Specific Credit Provisions.
30 $\Delta LPROV_{it}$: Growth in provisions related to labor expenses.
31 $LPROV_{it}$: Provisions related to labor expenses.
32 $employee_{it}$: Number of employees.
33 NOI_{it} : Net Operating Income.
34 LOA_{it} : Loss on Assets.
35 NOP_{it} : Non Operating Income.
36 PTI_{it} : Pre tax Income.

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FINANCIAL INTEGRATION AND STRUCTURAL CHANGES IN SPANISH BANKS DURING THE PRE-CRISIS PERIOD

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FINANCIAL INTEGRATION AND STRUCTURAL CHANGES IN SPANISH BANKS DURING THE PRE-CRISIS PERIOD

This paper presents a descriptive analysis about how financial integration into the Euro zone could have affected the business model, capital structure and solvency of Spanish banks. Using data from Dealogic and from public reports of Banco de España, the paper explores three main changes in the composition of assets and liabilities of Spanish banks during the years 1998-2007 that preceded the financial crisis: (i) Spanish banks get funds from international financial markets and increasingly substitute deposits for wholesale instruments to finance their activity, becoming increasingly dependent on foreign wholesale markets; (ii) Spanish banks use the new funding sources to finance the exponential growth of their lending activity, especially real-estate loans; (iii) Spanish banks fulfill Basel capital ratios loosely, but the weight of core equity capital within regulatory capital decreases in favor of hybrid securities at the time that the average risk of the assets in their balance sheet increases.

1 Introduction

This paper studies structural changes of Spanish banks during the pre-crisis period which were possible due to their financial integration into the Euro and foreign financial markets. These changes affected banks in different aspects: growth, business model, capital structure and solvency. We present descriptive evidence that some of these changes reduce the liquidity position and core capital solvency ratios of Spanish banks and increase their fragility in front of the financial and economic crisis.

During the period from 1998 to 2007, financial markets around the globe undergo through an impressive development: the volume of assets traded in financial markets increase exponentially, enhanced by a surge of financial innovations in the form of new products whose functions are not only restricted to raise funds, but to transfer risk, hedge risks or arbitrage capital. The dependencies and interconnections among financial markets rise as a natural consequence of their development, increasing the degree of financial integration among financial markets around the world.

In Europe, countries have aimed at achieving a higher degree of politic and economic integration and one of its main targets is the financial and banking integration of the European Union (EU) members. Indeed, the European Central bank (ECB) follows closely this process, and it publishes an annual report[1] that analyzes a large list of indicators of the degree of financial integration among EU members. In the 2012 report, the ECB argues that banking and financial integration in the EU is desirable because (i) it strengthens the mechanism of transmission of the monetary policy, (ii) it contributes to achieve a higher efficiency in the allocation of resources and capital, (iii) contributes to productivity gains that increase competition within national markets of member states and (iv) reduces the financial barriers among member states and facilitates the access to financial markets, instruments and services.

In this paper, we provide some evidence that financial integration could have also entangled other consequences, in terms of liquidity imbalances and risk exposure, not so desirable as those listed above and that Diamond and Rajan (2009) have pointed out as the proximate causes of the crisis. More concretely, we explore how the reduction of financial barriers among markets, which is in the ECB's list of the positive contributions

1 *Annual Report on Financial Integration,* ECB.

of financial integration,[2] has turned into a lower level of solvency ratios for Spanish banks.[3] The reasons that we identify in this paper are basically three: First, international markets have financed a large part of the high growth of banks focused on real-estate activities. The joining of Spain into the European Monetary Union (EMU) grants Spanish banks the access to cheap and almost unlimited financing from Euro and foreign markets, which absorb more than 70% of the debt instruments that they issue from 1998 to 2007. The destination of these funds to finance real-estate loans contributed to enhance the housing bubble in Spain, whose worst effects could have been not so devastating (evictions, credit crunch, losses of billions of euros,…), provided that banks had rationed their growth policy and the recourse to international wholesale financing.

Second, banks end up with a large dependence on wholesale financing while the importance of traditional, more stable sources of funds (i.e., deposits) dwindles in banks' balance sheets. As a consequence, Spanish banks have become directly exposed to the shutdown of international financial markets with the outburst of the financial crisis and they have undergone through serious liquidity problems due to difficulties to refinance debt instruments reaching maturity. Third, Spanish banks' risk-weighted assets increase as a result of the lending expansion and they are obliged to raise fresh regulatory capital in order to comply with Basel regulation. It happens that banks choose hybrid capital instruments to cover the main bulk of their regulatory capital needs and, hence, the quality of regulatory capital worsenes: the core capital (equity and reserves) looses weight in favor of debt-like instruments and, thus, the capacity of regulatory capital to absorb loan losses dwindles. This result has been more evident when holders of subordinated debt and preferred stock had to share the burden of losses, claiming that they bought those securities misguided by banks themselves. The experience alerts on the limitations of hybrid regulatory capital instruments as a true loss absorbing regulatory capital and it justifies the new core capital standards set by Basel III.

The rest of the paper is organized as follows. Section 2 describes the data that is used in the paper. Section 3 explores the consequences of financial integration on the banks' balance sheets in terms of assets and liabilities. Section 4 analyzes the change in the composition of regulatory capital during the period under study. Section 5 presents the conclusions and summarizes the main results of the paper.

2 Data

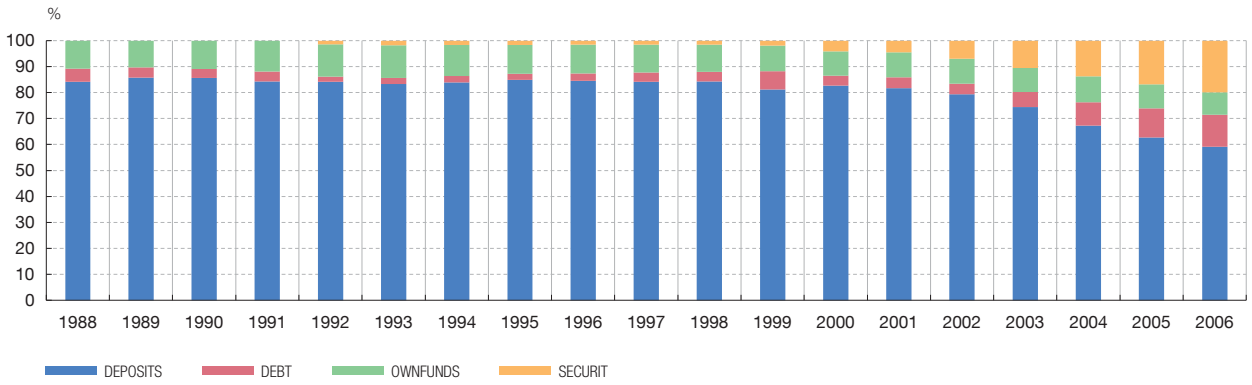
This paper gathers information of Spanish banks during the period 1998-2007 from different sources of data. The database of issuances of financial instruments has been constructed with individual data from Dealogic; the aggregate information from assets and volume of credit comes from the Statistical Bulletin of the Banco de España and the regulatory capital data has been drawn from the Annual Report on Supervision of the Banco de España

The issuances of financial instruments from Dealogic gather information of all the issuances of Spanish banks in financial markets during the period from 1998 to 2007. We do not consider later years because in 2008 financial markets stop operating normally for Spanish banks. The issuances are classified into two groups, debt issuances and regulatory capital issuances, following the criteria of whether the corresponding instrument can absorb losses without risking the viability of the bank. Under this notion of capital, ordinary shares, convertible debt, preferred shares and subordinated debt have the capacity of absorbing

2 The list of positive contribution can be found in Chapter IIA "The benefits of the EU's single financial market revisited in the light of the crisis" of the report *Financial Integration in Europe,* April 2012, European Central Bank.

3 Martín-Oliver, Ruano and Salas-Fumás (2012) analyze the impact of financial integration on the productivity of Spanish banks. They show that around 2/3 of the productivity gains were attributed to change of the business model of Spanish banks during the pre-crisis period.

CHANGE IN THE COMPOSITIONOF LIABILITIES. SPANISH BANKS CHART 1



SOURCE: Almazán, Martín-Oliver and Saurina (2013), mimeo.

losses because it is the ultimate stakeholder the one that assumes the loss of value. On the other hand, we group the issuances of senior debt, covered bonds and securitization as debt issuances because their value and proceeds do absorb losses of the bank only in the event of severe instability and bankruptcy. This is one of the two notions of capital in Acharya *et al.* (2011) that coincides with the list of eligible capital of Basel I and II.

The section that analyzes the evolution of the asset side of banks is based on aggregate data of assets and the balance of credit by categories published in the Statistical Bulletin of the Banco de España during the period from 1998 to 2011. Here we extend the sample period to the latest year available to analyze the change in the composition of assets as a result of the crisis. Further, the analysis of regulatory capital uses data from the annual *Report on Banking Supervision in Spain* by the Banco de España for the variables risk-weighted assets (RWA), total regulatory capital and core regulatory capital of all Spanish banks, also during the period 1998-2011.

3 The evolution of banks' balance sheets with financial integration

The traditional activity of a bank is the intermediation between investors and savers, that is, the collection of funds from the savers of an economy, with short- and medium-term inter-temporal consumption preferences, and the transformation into loans of different maturity that match the needs of the investors of that economy. In traditional banking, deposits constitute the basic source of funding of banks' lending activity. This is the business model of the Spanish banking industry until the end of the 90s: Chart 1 shows that during those years, the average composition of the liability side is made up of 84% deposits and around 11% own funds (capital, reserves and accumulated loans loss provisions). Only a marginal 5% of the banks' balance sheet is financed with debt instruments, thus, banks do not consider debt as a close substitute of deposits prior 2000. However, during the next years the traditional intermediation model begins to fade: Chart 1 shows that the weight of deposits decreases from 84.28% in 1998 to 59.11% in 2006 in favor of debt (from 3.67% in 1998 to 12.34% in 2006) and, specially, securitization[4] (from 1.54% in 1998 to 19.84% in 2006). Banks no longer base their growth and financing only on deposits because they can access to alternative sources to finance their banking activity.

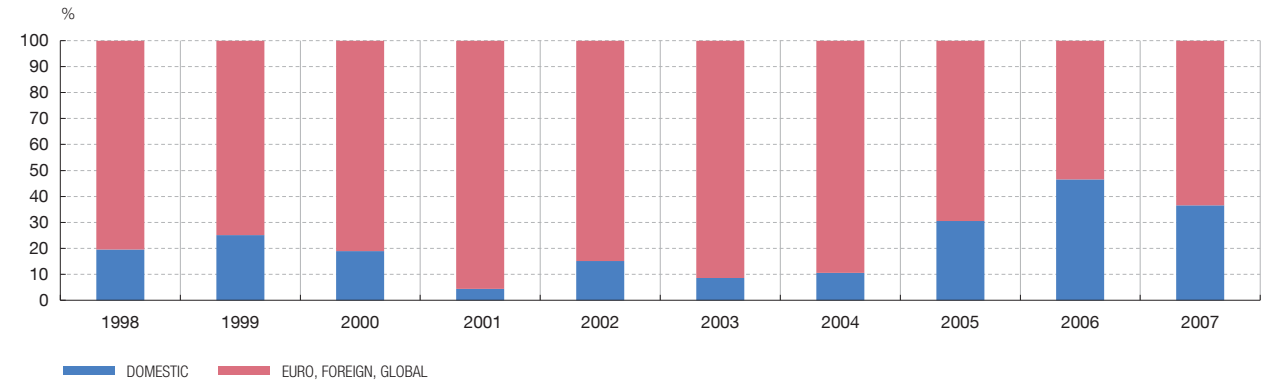
3.1 FINANCIAL MARKETS AND THE LEVERAGING PROCESS OF SPANISH BANKS

The explanation of this breaking point, from which debt and securitization become a real alternative to banks' deposits, can be located around the introduction of Spain in the EMU and the consequent access of banks to the European and international capital markets.

4 Almazán, Martín-Oliver and Saurina include covered bonds in their definition of securitization and so do we in the comments of Figure 1, following the source of reference.

ISSUANCE OF DEBET, BY MARKET TYPE

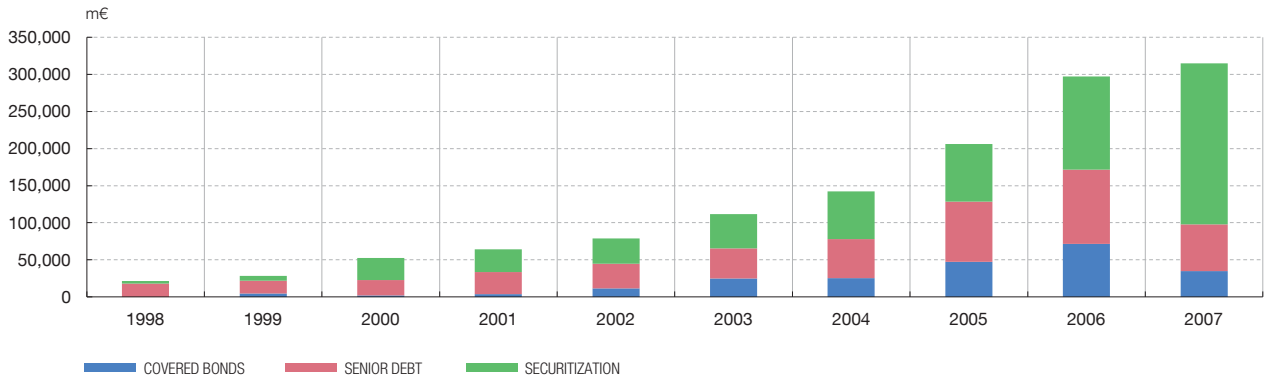
CHART 2



SOURCE: Dealogic and own elaboration.

ISSUANCE OF DEBET, BY MARKET TYPE

CHART 3



SOURCE: Own elaboration with Dealogic.

The access to new sources of funding is accompanied with the fall of the cost of funds, in part because of the translation of the lowering Spanish sovereign risk premium to the funding cost of Spanish firms. Additionally, the huge increase in the volume of assets traded in global markets, enhanced by financial engineering, also contributes to explain the exponential raise of wholesale financing of Spanish banks.

Chart 2 provides evidence of the importance of international markets in the issuances of debt of Spanish banks during the period 1998-2007: Euro and foreign markets concentrated more than 60% of the total issuances (versus less than 40% from domestic market), except in 2006 when the volume amounted to 53.4%. Adding up the volumes of all the years under study, the issuances in euro and foreign markets amounts to 71.12%. In absolute values, Chart 3 illustrates that the issuances of debt-like instruments increases exponentially during the 2000s, consistent with the increasing weight of debt and securitization observed in Chart 1. Comparing the beginning and the end of the period analyzed, the volume of total debt-like instruments issued in 2007 is multiplied by a factor of 18 compared to 1998; the highest contributor to this growth is securitization.

The high surge of securitization in Spain, especially from 2005 to 2007, coincides with the high demand from financial markets towards this type of products, as well as with other factors that contributed to its growth (i.e., growth of bank credit, housing bubble,…). During these years, financial engineering generates a wide range of financial products related to

securitization, risk transfer and tranching and markets are eager to absorb large volumes of these instruments issued by banks around the globe. Part of this interest is justified by the low-risk perception that investors have towards securitization bonds because they are backed by an a priori diversified loan portfolio and credit agencies rate the main part of the issuance with top grades. During the period analyzed, Spanish banks realize that securitization represents an opportunity to obtain funds at costs at least as low as other alternatives, since some tranches could have even better ratings than the senior debt of the issuer.

Compared to traditional deposits, securitization has the advantage that banks do not have to compete with other banks to collect funds in branches because there is a large demand willing to buy both the issuances of a particular bank and those from the competitors'. As well as this, securitization represents a gate to enter international financial markets for small- and medium-size banks. These banks did not have the opportunity to issue securities in wholesale markets due to asymmetric information problems [Almazán *et al.* (2013)], but thanks to financial innovation they could issue asset back securities (ABS) bonds that the markets were eager to buy at a cost similar to that of big, well-known banks. The strategy is that a group of banks, usually from different regions of Spain, put in common mortgages and real-estate loans from their balance sheet and issue securitized bonds backed by this common portfolio. In this way, markets understand that the geographical risk of loans granted by a single regional bank is diversified with the rest of loans backing the issuance. Thereby, small and medium banks could also become less dependent of the traditional deposits to fund their lending activity.

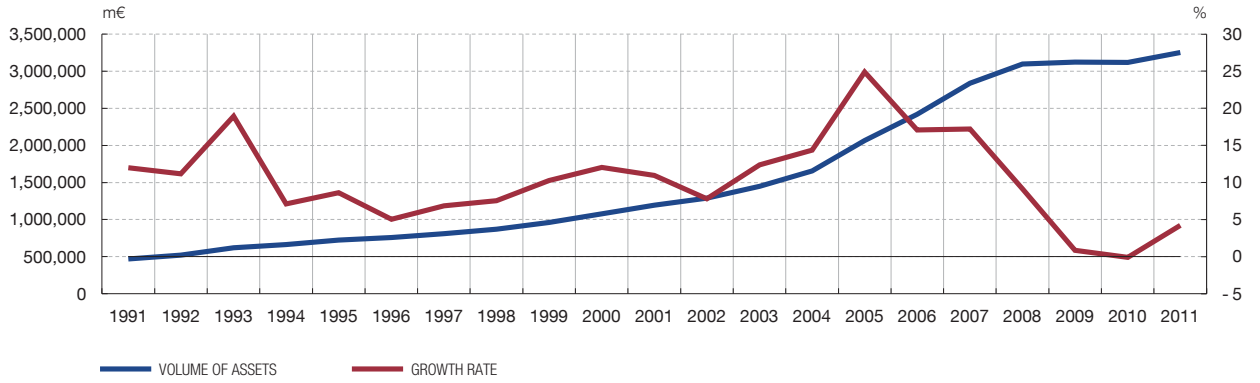
As said, the increasing recourse to securitization and debt is translated into a higher weight of wholesale funding in banks 'balance sheet, whereas deposits become less important to finance banks' activities. A positive consequence is that Spanish banks no longer depend on the collection of deposits to finance loans and projects with positive net present value. The drawback is that Spanish banks become more dependent on wholesale funding to refinance debt issuances reaching maturity and to the conditions of foreign markets, given that 71.12% of the total volume have been issued in non-domestic markets. Deposits might limit the capacity to growth, but they constitute a sounder and more stable source of funds not so dependent on external factors of the bank. With the outburst of the crisis in 2008, international markets shut down and banks around the globe have difficulties to refinance debt. For Spanish banks, the situation becomes even worse because the Euro sovereign crisis makes the access to foreign refinancing even more difficult, aggravating their liquidity problems. The only exit for Spanish banks during these years has been the recourse to the ECB that has provided the liquidity that financial markets do not grant.

Summing up, financial integration allowed Spanish banks to access sources of funds alternative to deposits from international financial markets. However, they have become structurally dependent on the conditions affecting international wholesale markets. The outburst of the crisis has entangled liquidity problems for Spanish banks due to difficulties to refinance past debt issuances. A more limited recourse to foreign wholesale funding during the pre-crisis period could have limited the liquidity problems faced by Spanish banks during the crisis.

3.2 THE USE OF THE FINANCIAL RESOURCES IN THE ASSET SIDE

In this section we comment that the real-estate bubble that burst during the economic crisis is in part a consequence of financial integration. The access to international financial markets allows Spanish banks to finance the high credit growth rates in their balance sheets concentrated on the lending to the real-estate sector, something recurrent in the idiosyncrasy of Spanish crisis over time.

TOTAL ASSETS OF DEPOSIT INSTITUTIONS. LEVELS AND GROWTH RATES CHART 4



SOURCES: Banco de España, *Boletín Estadístico,* and own elaboration.

Chart 4 shows that total assets of Spanish banks increase at a constant rate of around 10% during the pre-euro years. After the entrance of Spain in the EMU (especially from 2003, coinciding with the largest debt issuances in international markets) the slope of total assets becomes steeper and the average growth rates amount to 13.84%, peaking in 2005 with a growth rate of 24.9%. If we analyze the evolution of the lending activity in Chart 5.1 and Chart 5.2, we also observe that the growth rates soar during the years of higher increase of wholesale financing. The yearly average growth rate of banks' loans to the private sector amounts to 16.67% during the Euro period from 2000 to 2007, a figure that results from the growth of mortgages (18.42%) and, especially, loans to real-estate firms (25.91%). These high figures contrast with the more modest growth rates of the previous years: during the (pre-euro) period 1992-1999, the yearly average growth rate of loans to private sector, real-estate firms and mortgages amounts to 5.95%, 5.96% and 2.59%, respectively.

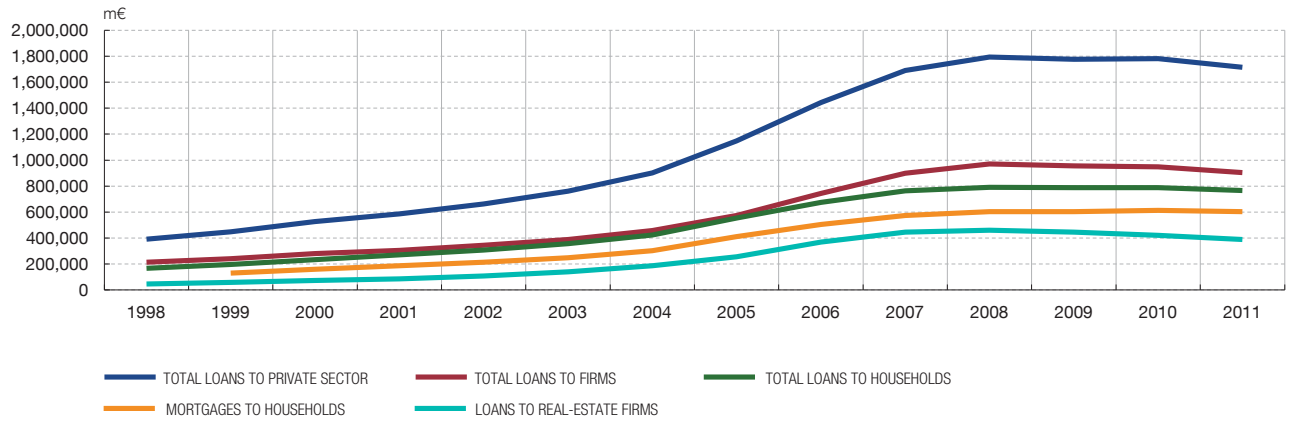
During the expansion years preceding the crisis, the Banco de España repeatedly warns banks of the potential risks embedded in their strategy of excessive loan growth and concentration in real-estate sector[5] (i.e., reduction of lending standards, enhancement of housing bubble, etc). This happens while banks' credit indicators give a very different and more positive view of the situation: non-performing loans (NPL) ratios are around 1% (Chart 5.3) and that of real-estate firms amounts to 0.37% in 2006, one of the lowest ratios in these series. It is the outburst of the global crisis and the deterioration of the Spanish economy what uncovers the unbalances of the previous period: loans begin to default and NPL ratios start an increasing trend that beat previous historic peaks of the series, especially in the case of real-estate firms whose NPL ratio amounted to 20.63% in 2011. The deterioration of the loan portfolio has resulted in billions of losses, public capital injections, bailouts and the restructuring of the whole Spanish banking sector, still under way in 2013.

To a large extend, the almost inelastic demand of international markets for bonds issued by Spanish banks has enhanced the growing housing bubble financed by Spanish banks. Back to Charts 2 and 3, we have inferred that if Spanish banks had not had access to international markets they could only have raised 28.88% of the total volume issued during the years 2000-2007. This does not mean that raising funds from foreign markets is negative and/or should be controlled. Rather, we claim that the fact of banks not having a

5 See for example the introduction of the *Financial Stability Report,* November 2006 and November 2004, Banco de España.

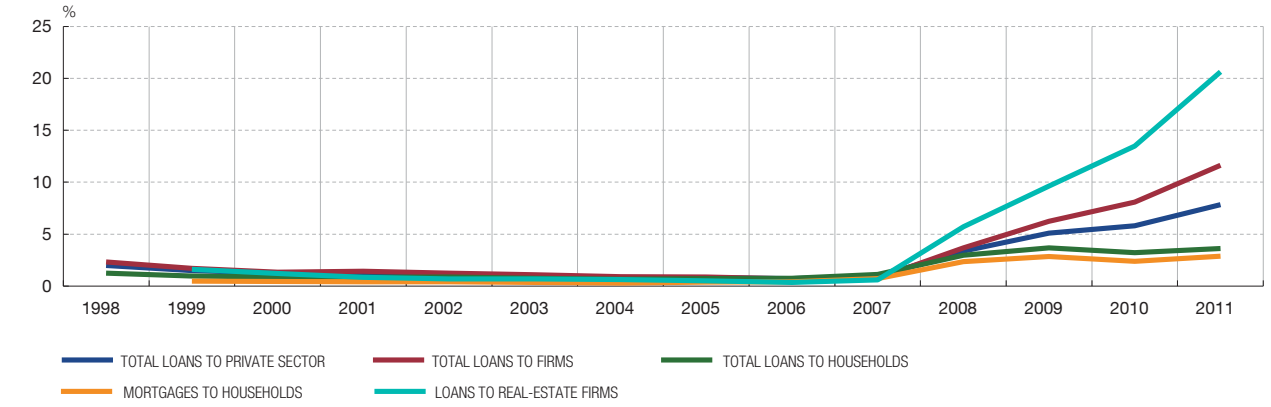
EVOLUTION OF THE CREDIT CHART 5

A. VOLUME OF CREDIT



B. GROWTH RATE

C. NON-PERFORMING LOANS



SOURCE: Almazán, Martín-Oliver and Saurina (2013), mimeo.

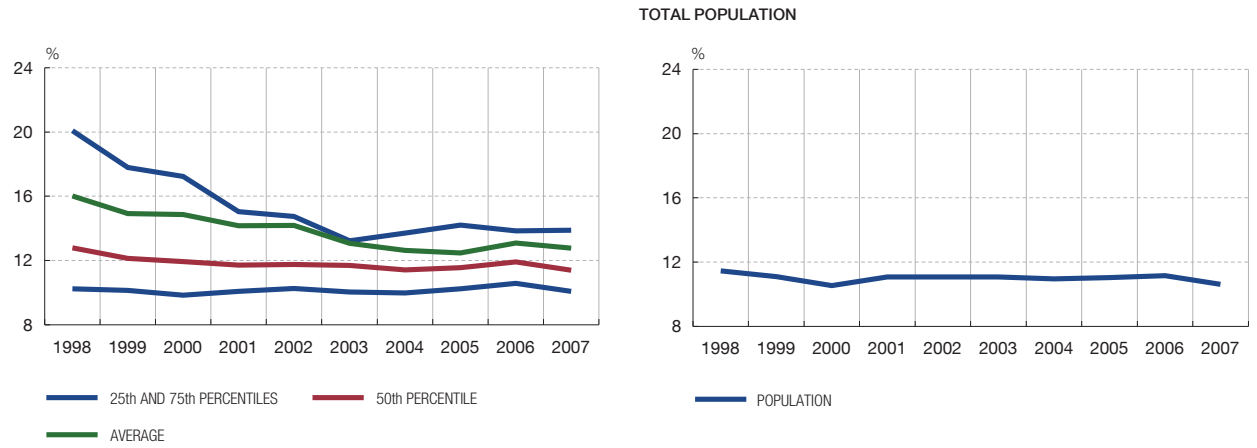
limited amount of resources that obliged them to screen and select across potential borrowers probably resulted in incentives to lower credit standards and expand their business granting risky loans.

4 Financial integration and the quality of capital

This section studies how the structural changes of Spanish banks during the pre-crisis period which are possible due to financial integration are also related with changes in the quantity and quality of banks 'capital. During the period under study, Spanish banks have to fulfill the regulatory capital requirements set by the Basel Accord in 8% of the risk-weighted

DESCRIPTIVE STADISTICS OF THE REGULATORY CAPITAL RATIO

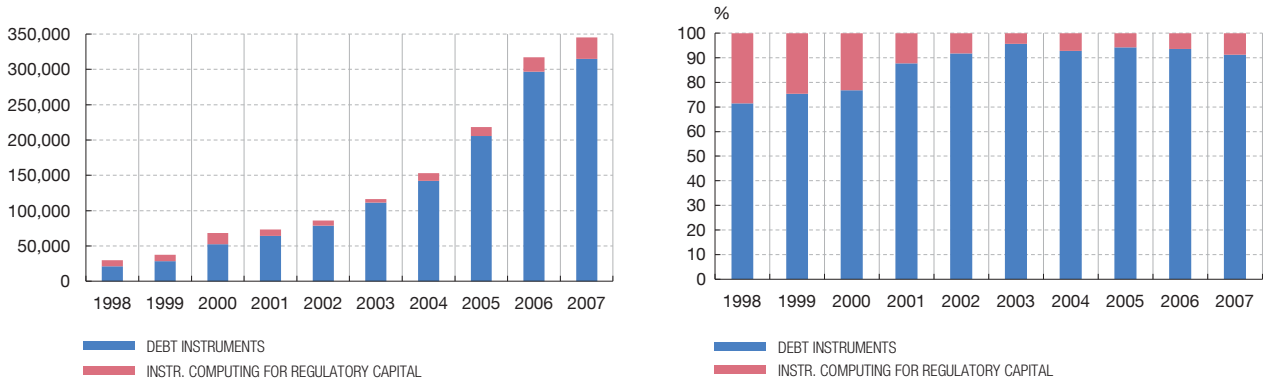
CHART 6



SOURCE: Martín-Oliver, Ruano and Salas-Fumás (2012) and own elaboration with *Report on Banking Supervision in Spain*, Banco de España.

COMPOSITION OF ISSUANCES

CHART 7



SOURCE: Own elaboration with Dealogic.

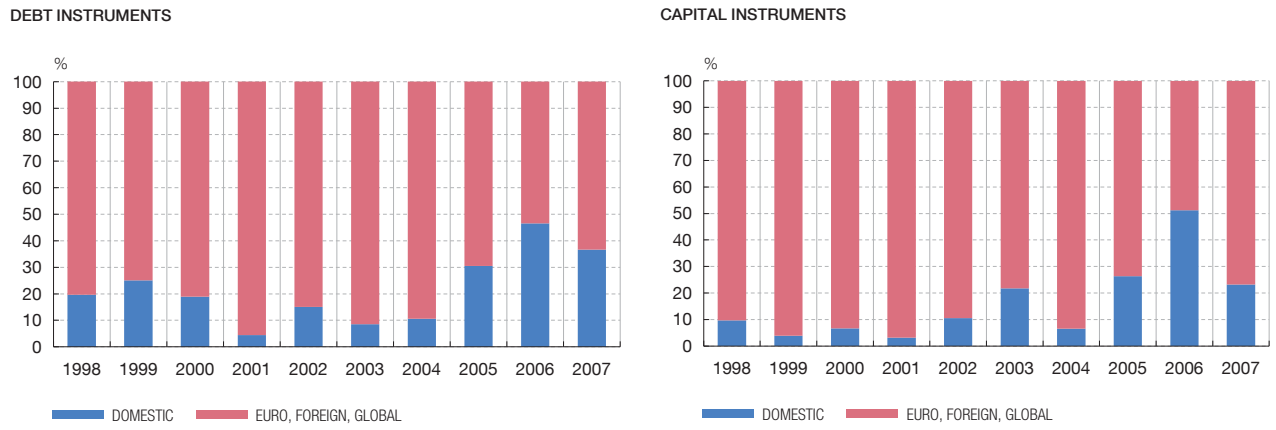
assets (RWA). The growth in volume of assets (Section 3) is parallel to a higher risk embedded in the granted loans and, thus, the level of RWA increases during the period under study. Banks could have responded either by absorbing the higher RWA with the buffer of regulatory capital accumulated during previous years (with a reduction of the Basel capital ratio), or they could have offset the rise in RWA by increasing the volume of regulatory capital (numerator of the regulatory capital ratio). Chart 6 shows that Spanish banks opt for the second option. The level of regulatory capital remains constant over time around values quite above the regulatory minimum: both the average of the population of banks and the median of the distribution of regulatory capital remain stable around 12% during the whole sample period. The simple average of the Basel ratio across banks decreases from 16% to levels around 14%, which in part can be explained by the reduction of the buffer held by banks in the highest percentiles.

Therefore, the coefficient of regulatory capital does not decrease due to the growth of its denominator; rather it remains well above the level of the regulatory minimum obliged by Basel I. To do so, they need to raise fresh regulatory capital.[6] Chart 7 shows that banks issue instruments computing as regulatory capital, amounting to 8.91% of the total

6 There is a literature focused on the use of different instruments, especially loan loss provisions, to manage the capital ratios. Examples of these papers are Pérez, Salas-Fumás and Saurina (2008); Bikker and Metzemakers (2005); Ahmed, Takeda, and Thomas (1999); Kim and Kross (1998).

ISSUANCE OF DEBT AND CAPITAL, BY MARKET TYPE

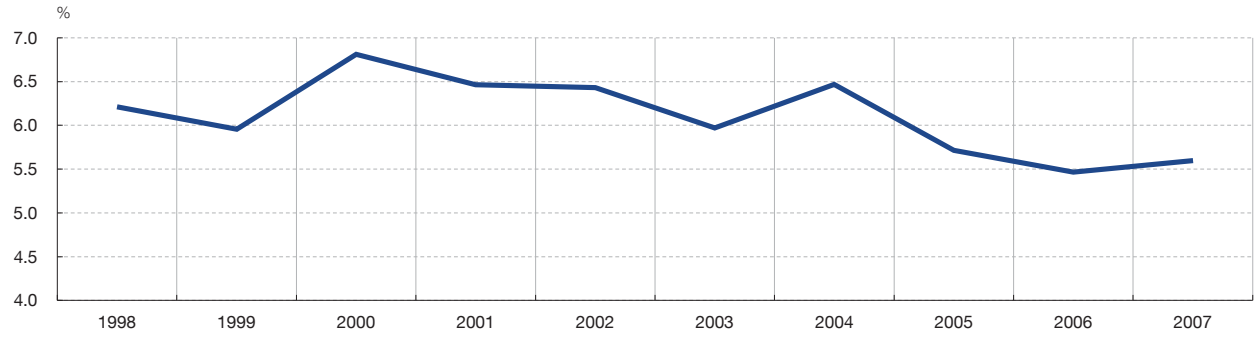
CHART 8



SOURCE: Own elaboration with Dealogic.

CAPITAL RATIO OF SPANISH BANKS

CHART 9



SOURCES: Banco de España, *Boletín Estadístico,* and own elaboration.

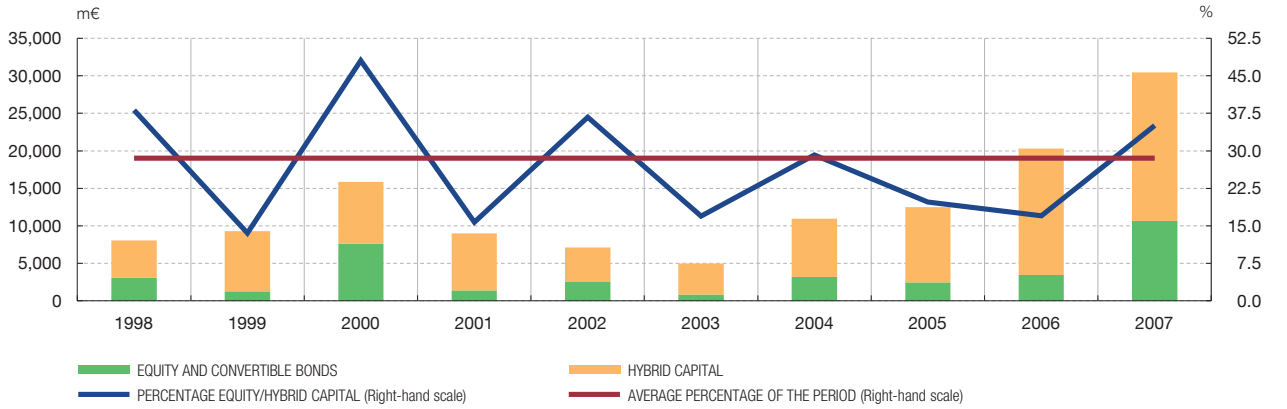
issuances during the period 1998-2007. Again, Chart 8 shows this has been possible due to the access of Spanish banks into the international financial markets. More concretely, the percentage of capital issuances in international markets amounted to 79.1% from 1998 to 2007, a proportion even higher than that of debt instruments, 71.4%

So far, we have shown that, in terms of the amount of regulatory capital, banks' solvency has not been affected by banks' growth. Now we turn our attention to the composition of regulatory capital during this time period and study. Recent papers provide descriptive evidence of a deterioration of bank capital in US banks prior and during the crisis that reduces the capacity of capital to act as a corporate governance mechanism, since the participation of owners in potential losses has become smaller [Acharya *et al.* (2009) and Mehran, Morrison and Shapiro (2011)]. According to Acharya, Gujral, Kulkarni and Shin (2011) this dwindling weight of common capital could also explain the difficulties of banks to raise new funds, since creditors will only lend if common shareholders are bearing a significant part of the risk. We study whether this has been the case for Spanish banks and the high ratio of the Basel coefficient is hiding a deterioration of the quality of regulatory capital.

First, we study the evolution of the common capital, defined as the sum of capital and reserves (core capital), which is the capital of highest quality to absorb losses. Chart 9 shows that the capital ratio of the banking system has decreased from its peak of 6.81% in 2000 to 5.59% in 2007, implying a reduction of 1.22 percentage points of the weight of

COMPOSITION OF CAPITAL ISSUANCES

CHART 10



SOURCE: Own elaboration with Dealogic.

core capital with respect to total assets. Even though the accounting capital ratio does not adjust by risk measures, we appreciate a fall of the weight of top-quality capital in the balance sheet of Spanish banks. We find that the main cause of the decreasing trend of the equity capital ratio is that the issuances of regulatory capital are mainly in form of hybrid capital, that is, preferred shares and subordinated debt.

Basel I and II consider preferred shares as a component of Tier 1 capital, within certain limits, and Spanish banks use them to fulfill regulation taking advantage of their benefits as a debt-like instrument (i.e., tax-deductible interest rates, lower cost of capital). Nonetheless, the recent financial crisis has shown, especially in the Spanish case, that preferred shares are not as good as equity to absorb losses. To analyze capital deterioration, we take the current criterion of Basel III that does not include preferred shares in the list of capital instruments that compute as core Tier 1 capital, and we consider them as hybrid instruments in the same terms as subordinated debt.

Chart 10 shows the composition of the capital issuances of Spanish banks during the sample period, differentiating between hybrid capital and equity and convertible bonds. For all the years, hybrid capital represents more than 50% of the total issuances of regulatory capital and, for the whole period, the average proportion (dashed line) amounts to 71.5%. That is, banks manage their regulatory capital ratios to maintain the levels above the regulatory minimum, but the strategy consists on issuing only 3 units of core capital out of 10 units issued of regulatory capital instruments. In doing so, banks are taking advantage, on the one hand, of the high demand of international markets during the pre-crisis years and, on the other hand, of the advantages of the debt-like capital instruments that compute as regulatory capital, both Tier 1 (preferred shares) and Tier 2 (subordinated debt). As a result, the quality of capital deteriorates and looses capacity to absorb looses.

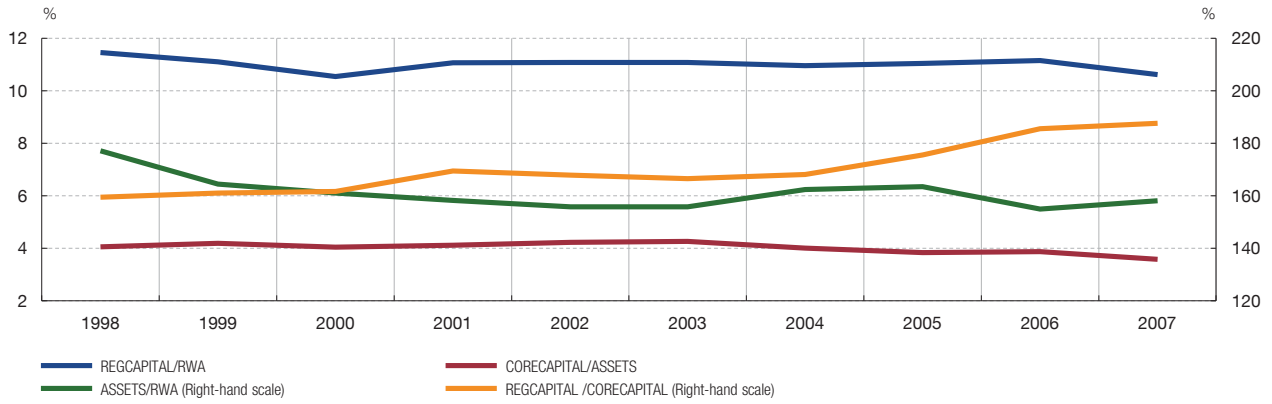
Decomposition of the regulatory capital

So far, we have seen that banks issue hybrid capital to maintain the regulatory capital ratio constant and this action results in a decreasing trend of the accounting capital ratio. Now, we decompose the regulatory capital ratio into three components to understand how this ratio was kept constant at the same time that the equity capital ratio decreased:

$$\frac{\text{Regulatory Capital}}{\text{RWA}} = \frac{\text{Regulatory Capital}}{\text{Core Capital}} \cdot \frac{\text{Core Capital}}{\text{Assets}} \cdot \frac{\text{Assets}}{\text{RWA}}$$

DECOMPOSITION OF THE REGULATORY CAPITAL RATIO

CHART 11



SOURCES: Own elaboration with *Report on Banking Supervision in Spain,* Banco de España.

The first ratio, $\frac{\text{Regulatory Capital}}{\text{Core Capital}}$, is the inverse of the weight of the core capital within the regulatory capital. The definition of core capital has been constructed with data of the regulatory statements drawn from the annual *Report on Banking Supervision in Spain* and, thus, it does not coincide with the accounting concepts of capital and reserves used in Chart 9. Here, we define core capital as the Tier 1 capital once we remove the preferred shares[7] and the part of the deductions from Tier 1 and Tier 2 funds that corresponds to original own funds.[8] The second ratio, $\frac{\text{Core Capital}}{\text{Assets}}$, informs of the weight of the core capital computed with regulatory statements with respect to accounting assets. As said, this ratio is not the same than the ratio presented in Chart 9 because there we only used accounting data. Next, the third ratio is $\frac{\text{Assets}}{\text{RWA}}$ equal to the total accounting assets divided by the risk-weighted assets of Spanish banks and it informs of the evolution of the risks of the banks' assets.

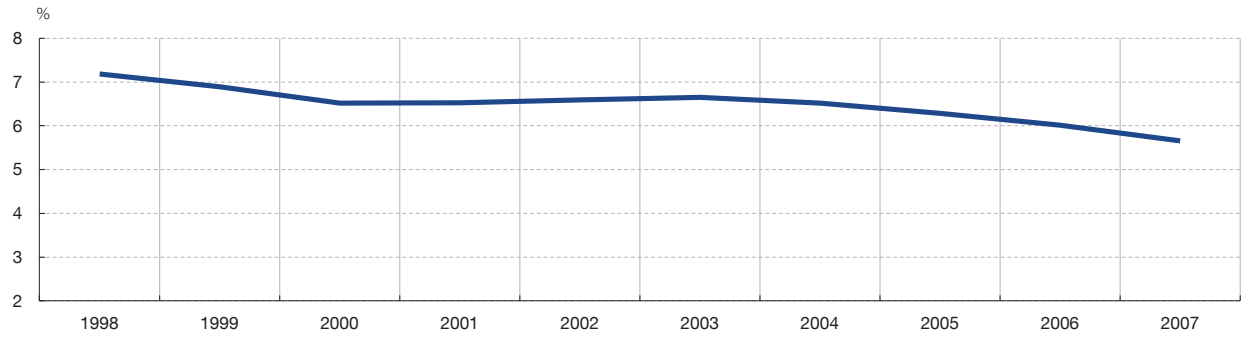
Chart 11 shows the flat trend of the regulatory capital ratio occurs at the same time that there are time variations of different sign in each of its components that compensate each other. The time evolution of $\frac{\text{Core Capital}}{\text{Assets}}$ confirms the negative trend of the core capitalwith respect to assets observed in Chart 9 from accounting data; here the ratio decreases 0.5 percentage points, from 3.58% in 1998 to 4.06% in 2007. More importantly, we observe that the weight of core capital also decreases in terms of total regulatory capital (the ratio $\frac{\text{Regulatory Capital}}{\text{Core Capital}}$ increases over time) and by 2007 it has fallen to 85% of its value in 1998. These Figures confirm that regulatory capital in Spanish banks has deteriorated as in US banks, [Acharya *et al.* (2011), Acharya *et al.* (2009) and Mehran *et al.* (2011)]. Thus, the higher proportion of hybrid capital in banks' capital is not compensated with retained earnings or other sources of common capital. On the contrary, banks are substituting core capital with hybrid capital, probably because it has a lower cost and, thus, profits increase.

7 Regulation establishes that the volume of preferred shares that can compute as Tier 1 cannot exceed 30% of total Tier 1 capital. According to the data of the annual *Report on Banking Supervision in Sapin,* preferred shares are below this limit during the period under study and, thus, we assume that there is no deduction in Tier 1 for exceeding the 30%.

8 From 2008 onwards, the deductions of regulatory capital are divided in deductions corresponding to Tier 1 capital and deductions corresponding to Tier 2 capital, each of them representing around 50% of total deductions during the period 2008-2011. For the previous years, the information of capital deductions is aggregated and we cannot obtain the exact figure that corresponds to Tier 1 capital. As an approximation, we take the weight of deductions of Tier 1 capital during the period 2008-2011, that is, 50%.

CORE CAPITAL WITH RESPECT TO RISK-WEIGHTED ASSETS

CHART 12



SOURCE: Own elaboration with *Report on Banking Supervision in Spain,* Banco de España.

Further, the weight of core capital dwindles at the same time that the risk of the banks' assets increases, since $\frac{\text{Assets}}{\text{RWA}}$ shows a decreasing trend in Chart 11. In 2007, the average risk per unit of asset has increased in 12.85% with respect that of 1998, according to the Basel I methodology to compute risk-weighted assets. This implies that the quality of the regulatory capital to absorb losses is worsening at the same time that the assets of the banks become riskier; Chart 12 shows that the ratio of core capital with respect to risk-weighted assets decreases from 7.19% in 1998 to 5.66% in 2007.

Summing up, during the years previous to the crisis, the quality of regulatory capital of Spanish banks deteriorates as the weight of core capital decreases in favor of debt-like instruments, which computed as Tier 2 and Tier 1 (up to a limit) under Basel I and II. The consequences have been the lower capacity of regulatory capital to absorb the loan losses arisen during the crisis and the higher difficulty of Spanish banks to obtain external funding in international markets since the beginning of the crisis.

5 Conclusion

The entrance of Spain into the EMU has been a breaking point in the financial structure and lending activities of Spanish banks. Funds are no longer limited to domestic deposits because banks can issue debt instruments at low cost that attract international investors. Adding up all the issuances of debt-like instruments, the funds obtained from international markets represent the 71.12% of the total issuances of Spanish banks from 2000 to 2007. A great deal of the large volume of issuances responds to the enrollment of Spanish banks in the list of entities issuing tranched products related to securitization; by 2007 they become the second largest issuer of ABS in Europe, after British banks. At the same time, real-estate prices increase at exponential rates due to the combination of the higher economic value of the generated rents, discounted at lower interest rates, and the unlimited supply of credit granted to firms and households.

There are sound arguments about the potential benefits of financial integration, but the recent experience of Spanish banks alerts about potential social costs that should be taken into account as lessons for the future: (i) wholesale funding of loans creates a liquidity gap that increases the exposure of banks to the business cycle and poses systemic risks, especially when these funds are channeled towards long-term maturity assets such as real-estate assets; (ii) the situation is aggravated by the fact that the providers of funds are international wholesale markets where investors have strong pressures of short-term financial returns; (iii) the expansion of the assets and liabilities of Spanish banks takes place under a capital regulation that keeps the minimum of equity-core capital at low levels

and gives a lot of room for meeting the capital requirements with debt-like instruments. The experience has proved that the loss-absorption capacity of these hybrids is smaller than anticipated, which contributes to explain the solvency problems faced by Spanish banks during the crisis. As well as this, the low ratio of equity capital fuels the liquidity gap because creditors only lend if common shareholders bear a significant part of the risk [Acharya *et al.* (2011)]. The revealed superior quality of equity capital justifies the stricter definition of core Tier 1 capital included in Basel III.

The structural dependence on international wholesale markets, built during the period 2000-2007, has resulted in liquidity problems with the outburst of the crisis and in the stagnation of the bank credit and the economy activity. Though we are not blaming financial integration for this situation, we claim that during the period of high growth preceding the crisis, financial integration is not backed by mechanisms of crisis resolution in concordance with the potential liquidity and solvency problems that are being generated. The end of the story about the banking crisis in Spain has not been written yet. Meanwhile, the restructuring process has entangled the reduction of the number of banks operating in Spain through mergers and acquisitions, the conversion of savings banks into commercial banks, the bailout of banks, the injection of public capital in banks, the revision of the mechanisms of supervision of the Bank of Spain, the creation of a "bad bank" to absorb toxic assets and the drastic reduction of the number of branches and workers, among others.

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Francisco Sánchez Ferrero y Juan Andrés Yanes Luciani

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Número 15 – noviembre 2008

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José María Roldán

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José Antonio Álvarez

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Manuel González Cid

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Santiago Fernández de Lis y Alfonso García Mora

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Fernando Vargas y José María Lamamié

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Charles Goodhart

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Jordi Gual

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Linette Field, Daniel Pérez y José Pérez

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Enrique Martín Barragán y Ángel Berges

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Estaban van Hemmen

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Jesús Saurina

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Juan Serrano

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John Palmer

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José Manuel Marqués Sevillano y Alicia Sanchis Arellano

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Isabel Argimón

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Dirk Schoenmaker

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Rosa M.ª Lastra

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Beatriz M.ª Domingo Ortuño

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Francisco Uría

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Elena Rodríguez de Codes Elorriaga

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Ángel Gavilán

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SIGLAS, ABREVIATURAS Y SIGNOS UTILIZADOS

AAPP	Administraciones Públicas
AIAF	Asociación de Intermediarios de Activos Financieros
BCE	Banco Central Europeo
BCN	Bancos centrales nacionales
BE	Banco de España
BOE	Boletín Oficial del Estado
BPI	Banco de Pagos Internacionales
CBE	Circular del Banco de España
CCAA	Comunidades Autónomas
CCLL	Corporaciones Locales
CECA	Confederación Española de Cajas de Ahorros
CEM	Confederación Española de Mutualidades
CFEE	Cuentas Financieras de la Economía Española
CNAE	Clasificación Nacional de Actividades Económicas
CNE	Contabilidad Nacional de España
CNMV	Comisión Nacional del Mercado de Valores
CNTR	Contabilidad Nacional Trimestral de España
DEG	Derechos Especiales de Giro
DGSFP	Dirección General de Seguros y Fondos de Pensiones
DGT	Dirección General de Tráfico
DGTPF	Dirección General del Tesoro y Política Financiera
EC	Entidades de crédito
EFC	Establecimientos financieros de crédito
Eonia	Índice medio del tipo de interés del euro a un día *(Euro Overnight Index Average)*
Euríbor	Tipo de interés de oferta de los depósitos interbancarios en euros *(Euro Interbank Offered Rate)*
Eurostat	Oficina de Estadística de las Comunidades Europeas
EPA	Encuesta de población activa
FAAF	Fondo para la Adquisición de Activos Financieros
FFPP	Fondos de pensiones
FIAMM	Fondos de Inversión en activos del mercado monetario
FIM	Fondos de inversión mobiliaria
FMI	Fondo Monetario Internacional
FMM	Fondos del mercado monetario
FOGASA	Fondo de Garantía Salarial
FROB	Fondo de Reestructuración Ordenada Bancaria
IAPC	Índice armonizado de precios de consumo
ICO	Instituto de Crédito Oficial
IFM	Instituciones financieras monetarias
IGAE	Intervención General de la Administración del Estado
IIC	Instituciones de inversión colectiva
INE	Instituto Nacional de Estadística
INVERCO	Asociación de Instituciones de Inversión Colectiva y Fondos de Pensiones
IPC	Índice de precios de consumo
IPI	Índice de producción industrial
IPRI	Índice de precios industriales
IPSEBENE	Índice de precios de servicios y de bienes elaborados no energéticos
ISFLSH	Instituciones sin fines de lucro al servicio de los hogares
IVA	Impuesto sobre el valor añadido
NEDD	Normas especiales de distribución de datos del FMI
OBS	Obra benéfico-social
OCDE	Organización de Cooperación y Desarrollo Económicos
OIFM	Otras instituciones financieras monetarias
OM	Orden Ministerial
OOAA	Organismos Autónomos
OOAAPP	Otras Administraciones Públicas
OPEP	Organización de Países Exportadores de Petróleo
OSR	Otros sectores residentes
PDE	Protocolo de Déficit Excesivo
PEC	Pacto de Estabilidad y Crecimiento
PIB	Producto interior bruto
PIBpm	Producto interior bruto a precios de mercado
PNB	Producto nacional bruto
RD	Real Decreto
RM	Resto del mundo
SAREB	Sociedad de Gestión de Activos Procedentes de la Reestructuración Bancaria
SCLV	Sistema de Compensación y Liquidación de Valores
SEC	Sistema Europeo de Cuentas
SEPE	Servicio Público de Empleo Estatal
SICAV	Sociedad de Inversión de Capital Variable
SIFMI	Servicios de Intermediación Financiera Medidos Indirectamente
SME	Sistema Monetario Europeo
TAE	Tasa anual equivalente
TEDR	Tipo Efectivo Definición Restringida
UE	Unión Europea
UEM	Unión Económica y Monetaria
UE-15	Países componentes de la Unión Europea a 30.4.2004
UE-25	Países componentes de la Unión Europea desde 1.5.2004
UE-27	Países componentes de la Unión Europea desde 1.1.2007
VNA	Variación neta de activos
VNP	Variación neta de pasivos

SIGLAS DE PAÍSES Y MONEDAS

De acuerdo con la práctica de la UE, los países están ordenados según el orden alfabético de los idiomas nacionales.

BE	Bélgica	EUR (euro)
BG	Bulgaria	BGN (lev búlgaro)
CZ	República Checa	CZK (corona checa)
DK	Dinamarca	DKK (corona danesa)
DE	Alemania	EUR (euro)
EE	Estonia	EUR (euro)
IE	Irlanda	EUR (euro)
GR	Grecia	EUR (euro)
ES	España	EUR (euro)
FR	Francia	EUR (euro)
IT	Italia	EUR (euro)
CY	Chipre	EUR (euro)
LV	Letonia	LVL (lats letón)
LT	Lituania	LTL (litas lituano)
LU	Luxemburgo	EUR (euro)
HU	Hungría	HUF (forint húngaro)
MT	Malta	EUR (euro)
NL	Países Bajos	EUR (euro)
AT	Austria	EUR (euro)
PL	Polonia	PLN (zloty polaco)
PT	Portugal	EUR (euro)
RO	Rumanía	RON (nuevo leu rumano)
SI	Eslovenia	EUR (euro)
SK	Eslovaquia	EUR (euro)
FI	Finlandia	EUR (euro)
SE	Suecia	SEK (corona sueca)
UK	Reino Unido	GBP (libra esterlina)
JP	Japón	JPY (yen japonés)
US	Estados Unidos	USD (dólar estadounidense)

ABREVIATURAS Y SIGNOS

M1	Efectivo en manos del público + Depósitos a la vista.
M2	M1 + Depósitos disponibles con preaviso hasta tres meses + Depósitos a plazo hasta dos años.
M3	M2 + Cesiones temporales + Participaciones en fondos del mercado monetario e instrumentos del mercado monetario + Valores distintos de acciones emitidos hasta dos años.
m€/me	Millones de euros.
mm	Miles de millones.
A	Avance.
P	Puesta detrás de una fecha [ene (P)], indica que todas las cifras correspondientes son provisionales. Puesta detrás de una cifra, indica que únicamente esta es provisional.
SO	Serie original.
SD	Serie desestacionalizada.
T_j^i	Tasa de la media móvil de i términos, con j de desfase, convertida a tasa anual.
m_j	Tasa de crecimiento básico de período j.
M	Referido a datos anuales (1970 M) o trimestrales, indica que estos son medias de los datos mensuales del año o trimestre, y referido a series de datos mensuales, decenales o semanales, que estos son medias de los datos diarios de dichos períodos.
R	Referido a un año o mes (99 R), indica que existe una discontinuidad entre los datos de ese período y el siguiente.
...	Dato no disponible.
—	Cantidad igual a cero, inexistencia del fenómeno considerado o carencia de significado de una variación al expresarla en tasas de crecimiento.
0,0	Cantidad inferior a la mitad del último dígito indicado en la serie.