

**MACROPRUDENTIAL POLICY:
OBJECTIVES, INSTRUMENTS
AND INDICATORS**

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Abstract

This document presents the analytical framework recently developed by the Banco de España for the implementation of its macroprudential policy. The methodology described uses a broad set of indicators that enables macroprudential risks to be monitored through risk mapping. This framework will provide support for the Banco de España's broad macroprudential policy stance.

Keywords: early warning indicators, macroprudential policy stance, macroeconomic actual conditions.

JEL classification: G21, G32.

Resumen

Este documento presenta el marco analítico desarrollado recientemente por el Banco de España para la puesta en marcha de su política macroprudencial. La metodología descrita incorpora un amplio conjunto de indicadores que permiten realizar un seguimiento de los riesgos macroprudenciales a través de un mapa de riesgos. El marco servirá de soporte para definir la orientación general de la política macroprudencial del Banco de España.

Palabras clave: indicadores de alerta temprana, orientación de la política macroprudencial, condiciones macroeconómicas efectivas.

Códigos JEL: G21, G32.

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1 Introduction

The scope and severity of the latest bank crisis, together with its impact on the economy, has led to a far-reaching reform of the regulatory framework to which banks are subject. Regulatory capital requirements have been notably tightened, in terms both of the minimum level of capital required and of their composition, with priority now being given to the quality of capital (based on the new definition of regulatory capital, namely common equity Tier 1 (CET1)). In parallel, the development of a set of regulatory capital instruments is under way, the use of which would form part of so-called macroprudential policy.

The aim of macroprudential policy is twofold. First, to contribute to checking the development of risks that may be systemic, affecting the whole of a country's banking system; and, further, to strengthen banks' solvency, generally through the construction of capital buffers enabling banks to be protected if, finally, the foregoing risks ultimately materialise. Macroprudential policy seeks, on one hand, to develop and apply instruments which enable the systemic risks that develop over the credit cycle to be reduced and withstood (the time dimension); and, on the other, to use another series of instruments with a cross-sectional dimension that has to do with the impact on systemic risk arising from the size, complexity and interconnectedness of banks (the structural cross-sectional dimension).

Macroprudential policy is not new. There are examples of supervisory authorities that undertook measures in the past aimed at restricting systemic risk and safeguarding financial stability. Spain, for instance, is a reference in the early use of macroprudential instruments and in the leadership role of the central bank in their development and implementation. The Banco de España developed and set in train 15 years ago dynamic or countercyclical provisioning, with the aim of protecting the banking system from a very pronounced and prolonged credit expansion, seeking to temper its effects both during the expansionary phase and during the subsequent contraction.

Unlike monetary policy – where a developed theoretical and empirical analytical framework has been tried and tested over the decades¹ – in the field of macroprudential policy a full analytical framework has yet to be developed with well-defined and quantifiable final objectives and a set of indicators and instruments of sufficiently tested effectiveness. Also, uniform criteria are likewise lacking as to the institutional arrangements governing the definition and application of macroprudential policy and, in particular, as to the role the central bank, the microprudential supervisor and the government authorities should play.

That said, Europe has paved the way for a set of policies aimed at protecting the stability of the financial system, with such policies including instruments that enable systemic risk

¹ In monetary policy there is fairly widespread consensus as to its objective and how to avail oneself of intermediate targets, indicators, instruments, procedures and institutions to meet that objective.

to be reduced and/or its impact – should it ultimately materialise – to be mitigated. Among these instruments, to cite some of those included in European solvency regulations (CRD IV, Directive 2013/36/EU and CRR, Regulation (EU) 575/2013), are: the countercyclical capital buffer (CCB); capital buffers for systemic risk; capital buffers for globally and locally systemic institutions; and the adjustment in the calculation of risk-weighted assets. Outside these regulations there are also instruments available to national authorities, such as the limits on the amount lent based on the value of the collateral, or of the good acquired with that loan [loan-to-value ratios (LTV)], or limits based on the borrower's income (debt-to-income ratios). Most of the instruments stemming from these European solvency regulations are voluntary, with the exception of the countercyclical capital buffer, which must be introduced before January 2016, and the treatment of domestic systemic institutions, which should also be announced before 2016.

As to the institutional framework for governing the application of these instruments, Europe has set up a body called the ESRB – the European Systemic Risk Board – which, under the “comply or explain” principle, can issue warnings and recommendations to Member States, to central banks and to national and European supervisors alike. The ESRB draws together the European Union countries' central banks and the national and European supervisory authorities of banks, of insurance and pension funds, and of securities and financial markets. Recently, precisely following a 2013 ESRB recommendation, the majority of European countries have created a macroprudential authority entrusted with risk analysis and macroprudential policy formulation, choosing the most suitable instruments to safeguard financial stability and reduce systemic risk. This macroprudential authority is structured differently in each country; but, generally, the central bank usually plays a leading role either because it is entrusted with providing analysis, because the instruments to be used fall within its remit and it is therefore designated to apply these instruments, or because it has veto power over the decisions of the macroprudential authority.

With the creation of the Single Supervisory Mechanism (SSM), the European Central Bank has taken on competencies for the macroprudential policy pursued in the euro area. These competencies specifically entail the possibility of making the measures taken by national authorities more severe if they deem this advisable to protect financial stability, or to ensure consistency in risk-pricing and in the use of macroprudential instruments in all countries. For example, if a country sets its countercyclical capital buffer at 1%, the ECB may raise it. This is also the case for other macroprudential instruments, where risk-identification processes may be made stricter, extending for instance the list of institutions that the national authority classifies as domestic systemic institutions. In this way the ECB could correct hypothetical inaction bias on the part of the national authorities.

It is not surprising that, in relation to macroprudential policy, instruments and the institutional framework should have advanced notably in Europe, particularly in the euro area countries. The differences in respect of the business and financial cycle across countries subject to a common monetary policy may generate asymmetrical risks requiring a different complementary policy (more or less active) from one country to another. This differential policy

would be macroprudential policy. Thus, if one country is facing excessive credit growth, with very low nominal and real interest rates that are suitable for the euro area as a whole but not for the country in question, that were to prompt an increase in systemic risk in that country, it would surely make sense to resort to the arsenal of macroprudential instruments to attempt to reduce this risk or, where appropriate, to increase the protection for banks if the risk were ultimately to materialise.

There are interactions and even potential overlapping between macroprudential policy and other policies. Hence, macroprudential instruments relating to capital interact with those used by the microprudential supervisor, which also adjusts requirements on the basis of the situation of each of its supervised banks. The objectives of both supervisors may be perfectly aligned since both seek to increase the resilience of banks and of the banking system as a whole. On occasions, however, they may clash. For instance, in the event of a substantial slowdown in the economy, the microprudential supervisor may wish to preserve banks' capital, to withstand credit risk losses. The macroprudential supervisor, meanwhile, may be prepared to tolerate a reduction in capital ratios so that capital may be used to absorb losses and to prevent banks from reducing their supply of credit, in order to maintain the level of solvency, which might accentuate the economic contraction.

At a more practical level, the analytical framework has progressed in recent years although, once more, there is still no widespread consensus on which risk indicators should be used and, more importantly, how to relate these indicators to the activation or deactivation of specific macroprudential instruments. However, national and supranational authorities are moving ahead in the definition of a wide range of instruments that take the specific form of so-called heat maps, which in turn offer information on the development of and changes in risks and, therefore, on the need to activate or deactivate macroprudential instruments. The Banco de España has recently been working on the development of a framework that includes a set of indicators that may offer guidance, along with expert judgement, on the direction and intensity of macroprudential policy, the selection of the most suitable instruments and their level of application. This framework will provide analytical support for the Banco de España's broad macroprudential policy stance, but the specific analysis for the activation and calibration of each instrument will be conducted through specific studies and methodologies for each of them.

Section 2 of this document briefly describes the macroprudential instruments available to the Banco de España, with particular emphasis on the countercyclical capital buffer and the requirements for systemic institutions, both those of global importance and the rest. Section 3 presents the macroprudential indicators that have recently been developed and the heat map aggregation methodology. Section 4 presents the heat map obtained from these indicators, with both a backward and forward-looking analysis to illustrate their functioning. Section 5 briefly draws some conclusions.

2 Macprudential instruments

In step with the international progress in the development of macroprudential regulation in recent years, the Banco de España currently has a number of macroprudential instruments that should provide it with greater control in respect of the emergence of systemic risks in the future. As Table 1 shows, what are involved here are both capital instruments and liquidity instruments, or instruments that impact banks' assets. A portion of the instruments stem from CRD IV, which has been transposed into national legislation (Law 10/2014 of 26 June 2014 and Royal Decree 84/2015); others are from CRR (and directly applicable, not requiring transposition); and finally, some additional instruments would require implementation under national legislation.

There follows a more detailed analysis of the CCB, which is obligatory from January 2016, and the identification of systemic institutions.

2.1 *Countercyclical capital buffer (CCB)*

The CCB is a macroprudential instrument introduced under the Basel III framework whose primary objective is to ensure that the banking sector as a whole has a pool of capital that builds up in the cyclical upturn and which, in the downturn, enables losses to be absorbed, with the aim of helping stabilise the flow of credit to the economy. It is an instrument designed to address the time dimension of systemic risks, in this case those arising from excessive growth in aggregate credit.

The CCB regime, pursuant to the provisions of the European Directive and in line with Basel III, comes into force in January 2016. The setting of the level of the CCB follows a "guided (or bounded) discretion" approach, where, in addition to qualitative information and expert judgement, specific quantitative indicators are used as a source of guidance. In this respect, the initial benchmark quantitative indicator proposed by Basel III and also acknowledged in the European Directive and by the ESRB is the so-called credit-to-GDP gap. This indicator is calculated as the difference resulting from the ratio of total credit to the non-financial private sector divided by gross domestic product, minus the long-term trend of this ratio, estimated by statistical procedures. Following the initial reference rule proposed by the Basel Committee on Banking Supervision, the CCB would be activated when this indicator exceeded the threshold of 2% and it would attain a value of 2.5% when this indicator were 10%.

Following the aforementioned guided discretion approach and given that the credit-to-GDP gap does not function equally in all contexts and countries, the level of the CCB can be set taking into account various statistical specifications and other possible quantitative indicators (real estate sector indicators, measures of private-sector debt burden, measures of external imbalances), along with other qualitative criteria (expert judgement, market information).

Instrument	Legal basis	Application	Description
Countercyclical capital buffer (CCB)	CRD: 130, 135-140	Compulsory	Additional capital buffer built up in expansions to absorb losses in recessions.
Systemically important institutions	CRD: 131	Compulsory for G-SIIs Optional for O-SIIs	Additional capital buffer for externalities caused by global systemically important institutions (G-SIIs) and domestic systemically important institutions (O-SIIs).
Systemic risk buffer (SRB)	CRD: 133, 134	Optional	Capital buffer to prevent and mitigate non-cyclical systemic risks not covered by the CRR.
Pillar 2 liquidity requirements	CRD: 105	Optional	Treatment of systemic liquidity risk through prudential liquidity charges.
Other macroprudential uses of Pillar 2	CRD: 103	Optional	Treatment of systemic risks derived from institutions with a similar profile.
Additional measures ("flexibility package")	CRR: 458	Optional	Stricter requirements on capital, capital conservation buffer, liquidity, large exposures, disclosure and risk weights.
Higher risk weights and stricter criteria for real estate loans	CRR: 124	Optional	Capital instruments focusing on a specific sector. The rationale is similar to that for the CCB, but applied to real estate.
Higher minimum LGDs	CRR: 164	Optional	

SOURCE: Banco de España.

a The CRD IV (Capital Requirements Directive) has been transposed into Spanish legislation and the CRR (Capital Requirements Regulation) is directly applicable.

2.2 Capital buffers for systemically important institutions

Additional capital requirements made of systemically important institutions seek to address macroprudential risks in their cross-sectional or structural dimension. Specifically, an additional capital buffer is required of the most systemically important institutions, both those considered globally important and those important at the national level. The aim thereby is to strengthen these institutions' solvency to reduce the adverse externalities on the overall banking system that might result from their failure. Furthermore, this additional requirement should mitigate the moral hazard entailed by the size ("too-big-to-fail") of some institutions, while it would offset the competitive advantage these institutions might have in the funding market due to their systemic nature and, therefore, the potential government support they may receive in the event of solvency difficulties.

For global systemically important institutions (G-SIIs), an internationally accepted methodology has been defined which allows them to be identified and assigned a capital surcharge based on objective criteria. However, national supervisors may designate as global systemically important institutions those that fall below the lower quantitative threshold, provided there is good reason for doing so (supervisory judgement). The additional requirements will be phased in from 2016, the schedule calling for 25% in 2016, 50% and 2017, 75% in 2018 and 100% in 2019. Also, from 2016, the Banco de España will identify other systemically important institutions (O-SIIs). To do so, it will apply the guidelines developed by the European Banking Authority (EBA/GL/2014/10) for identifying these institutions. This is a methodology also based

on quantitative criteria, although it allows a certain degree of national discretion for the purpose of closer adaptation to the characteristics of the national banking system. All O-SIIs will be required to have a capital buffer, determined by the Banco de España, of up to 2% depending on the following factors: the degree of systemic importance; the need for activation given the particular position of each institution; and the general situation in terms of risks and the macroeconomic environment.

2.3 Other instruments

The other instruments available, the use of which is optional, can supplement those described above to cover more fully the potential threats to the system. In particular, CRD IV allows the introduction of a systemic risk buffer to prevent and mitigate structural systemic risks by increasing the loss absorption capacity of the system or its components. It is a flexible instrument which can be applied to the banking system as a whole or to a subset of banks. Accordingly, it is also a cross-sectional tool. Additionally, CRD IV also allows a macroprudential use of the Pillar 2 tools available, such as capital surcharges or more transparent reporting.

For its part, the CRR provides flexibility to impose, at the national level, stricter prudential requirements in a number of instruments, such as the capital conservation buffer, liquidity requirements or large exposures. The CRR also allows risk weights and loss given default (LGD) to be raised for the real estate development sector. These measures should only be applied when the national authority determines that the other instruments available cannot adequately control systemic risk.

Lastly, although European legislation is silent in this respect, measures may be developed in national legislation to control the granting of credit through limits on the amount lent based on the collateral (loan-to-value or LTV) or on the debtor's ability to pay (debt-to-income ratio or DTI).

3 Macprudential indicators

Macroprudential policy requires monitoring and assessing the risks that threaten financial stability. In this connection, the ESRB recommends linking macroprudential policy objectives to appropriate instruments and indicators (ESRB/2013/1 Recommendation C). Macroprudential indicators perform a dual role: on the one hand they monitor how risks that may arise in the financial system evolve, and on the other they serve as a guideline for macroprudential policy decisions.

CLASSIFICATION OF MACROPRUDENTIAL INDICATORS

TABLE 2

Credit growth and leverage	Credit: intensity, imbalances, leverage. Housing market: prices, overvaluation. Borrower debt-to-income ratio.
Transformation of maturities and market illiquidity	Bank assets. Bank liabilities. Imbalances in banks' foreign currency exposure
Concentration	Reliance on bank lending in comparison with other sources of financing. Sectoral concentration. Sovereign exposure. Credit exposure in foreign currency.
Incentives and moral hazard	Risks at the tail of the distribution. Systemic stress.
Macroeconomic imbalances	External dependence. Fiscal imbalances.
Materialised risks	Real economy. NPLs and dependence on central bank.

SOURCE: Banco de España.

The Banco de España has recently developed a risk monitoring tool using a set of macroprudential indicators. For that purpose, it compiled information on a broad set of economic variables using aggregate data available to it. The methodology applied transforms this mass of information into a heat map that issues alerts on financial system risks and, more specifically, on banking risks. The map is a tool for visualising possible sources of systemic risk and for monitoring how those risks evolve over time. A flexible approach was followed to develop the indicators, so that new indicators may be added when other significant data sources are identified.

The methodology used exploits past experience of banking crisis episodes to study which indicators are capable of identifying them in advance. The indicators currently available (more than 100) have been structured around a series of categories that provides a better arrangement of the data. This classification is summarised in Table 2, taking as its starting point the ESRB work that has identified four intermediate macroprudential policy objectives,

each with its own indicators. This work has been supplemented with two additional blocks of indicators, which are needed in the Banco de España's opinion to complete the information on the macroprudential policy stance.

Table 2 thus shows first the indicators classified on the basis of the four intermediate objectives defined by the ESRB:

- i) Mitigate and prevent excessive credit growth and leverage: category headed credit growth and leverage

This category includes credit growth and leverage indicators: simple indicators, such as year-on-year rates of change in credit to different sectors, or house prices, and also more sophisticated indicators to assess the imbalance between these variables and possible long-term trends. Indicators measuring borrowers' debt-to-income ratios, which hinge, among other factors, on debt values, interest rates and disposable income, are also included.

- ii) Mitigate and prevent excessive maturity mismatch and market illiquidity: category headed transformation of maturities and market illiquidity.

The indicators belonging to this category aim to identify possible imbalances between banks' assets and liabilities. As is known, the fundamental role of banks is to manage the risk posed by the fact that their assets generally have longer maturities than their liabilities. However, a widespread increase of this maturity mismatch may constitute a systemic risk. Here, it is also important to assess the presence of available liquid assets in stress situations, given that the loans are generally quite illiquid.

- iii) Limit direct and indirect exposure concentrations: category headed concentration.

The indicators in this category monitor the credit exposure to different economic sectors, such as manufacturing industry, construction or real estate development. Excessive growth in the exposure to any one of those sectors might be a difficult risk to bear for banks if that sector were hit by a crisis. Other types of exposures are also considered, such as sovereign or foreign currency exposure.

- iv) Limit the systemic impact of misaligned incentives with a view to reducing moral hazard: category headed incentives and moral hazard.

This category encompasses a large amount of financial market data, such as stock market returns, key interest rate spreads or financial volatility estimates. Extreme values among these variables might encourage excessive risk-taking, or directly reveal that the risks are on the increase. Based on these data, more sophisticated

indicators are also generated to assess the scale of the so-called “tail risks” of the distributions of different variables using financial econometric models.

In addition to the indicators linked to the ESRB’s four intermediate objectives, the Banco de España has developed a fifth category grouping indicators relating to macroeconomic imbalances, which cover a series of measures on the external fragility and fiscal imbalances of the Spanish economy.

Lastly, a final set of indicators reflects the actual conditions in the economy and in the banking sector. In this case, it is not a question of indicators capable of issuing warnings alerting of potential risks in advance, but indicators that enable the position of the economy and of the banking sector within the macroeconomic and credit cycle to be assessed. Knowledge thereof is also essential as a guideline for macroprudential policy, as the measures to be adopted may vary considerably according to whether the economy is growing, in recession or flat. Hence, knowing the position of the Spanish economy and of the banks in the cycle will enable macroprudential policy to be adjusted so as to avoid unwanted effects, for example in situations of weak economic growth and banking fragility.

Some of the indicators grouped in the six categories described above directly use the data available, or a minimal transformation of these data (ratios of different variables or rates of change). Others, however, are derived from more sophisticated econometric modelling. The indicators are generally calculated with a quarterly frequency, although a sub set of indicators, which uses market data, is available with a weekly frequency. Historical data since 1971 are used, which allows for assessment of their behaviour in the banking crises experienced by the Spanish economy over the past 45 years, some of which may be classed as systemic.

The original indicators bring together a very broad and diverse dataset. Accordingly, a systematic analysis methodology is advisable to ensure that the most significant information is extracted. This may be achieved through two transformations in successive stages: the generation of a heat map, and its aggregation into a smaller-scale map to make it more useful as a guideline for macroprudential policy.

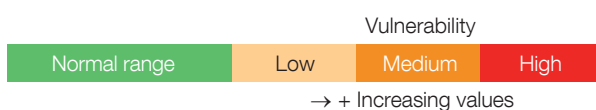
In the first stage, an extensive heat map is developed. This is generated by associating a level of alert with each value for the indicators. Table 3 summarises the possible levels of the alert. The indicators may be in a normal range of values (green colour coding), which does not pose a threat to the system. As an indicator departs from the normal range, the level of alert increases from a low level (yellow) to medium (orange) and finally the maximum level of alert (red). The thresholds of the levels of alert are calculated from the historical percentiles of the distribution of each indicator. Following international conventions, two types of indicators are distinguished: some indicators are one-tailed, since an increase in their value always signals greater vulnerability; other indicators are two-tailed, since both very high and very low values signal a risk to the system. An example of the first type of indicator is the non-performing loans ratio, while an example of the second type is the rate of change of credit.

Once the general heat map has been constructed from a substantial number of indicators, the second stage consists of aggregating them. The level of the financial system's aggregate vulnerability is difficult to evaluate from direct observation of the indicators. For this reason, aggregation allows the main trends of the disaggregated information to be identified more readily. In particular, the objective is to aggregate the individual series in a comprehensive heat map which reflects the main categories described in Table 2. This is done by linear aggregation of the heat map, weighted by two adjustment factors. The first adjustment factor takes into account the capacity of indicators to anticipate future crises, based on their behaviour in the years prior to the Spanish crises of the last 45 years. Hence, those indicators with greater predictive power will be weighted more highly in the aggregation. The second adjustment factor takes into account the correlation between different indicators. Some indicators may be correlated because they use similar information. To avoid the multiple counting of a single possible source of vulnerabilities, the weight of correlated indicators is reduced by assigning them a lower weight. Finally, before carrying out the aggregation, two-tailed indicators are converted into one-tailed indicators to ensure that all series fluctuate in the same range of values.

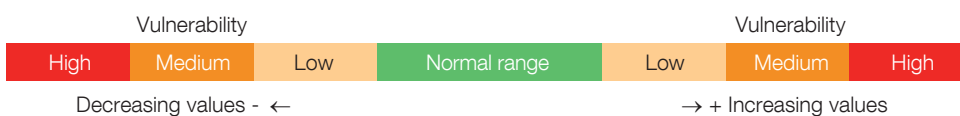
HEAT MAP COLOUR CODING

TABLE 3

One-tailed indicators



Two-tailed indicators



SOURCE: Banco de España.

The final result of the aggregation of the more than 100 indicators translates into five categories of potential risks, in accordance with the first five blocks explained in Table 2. The first four reflect the ESRB's intermediate objectives (credit growth and leverage, transformation of maturities and market liquidity, concentration of exposures, and incentives and moral hazard), to which is added the indicator summarising macroeconomic imbalances. These five composite indicators are aggregated into a single final indicator (aggregate assessment), supplemented by the indicators of the actual conditions in the economy and in the banking sector. Table 4 in the following section illustrates the aggregate heat map, with the aforementioned composition.

4 Heat map analysis

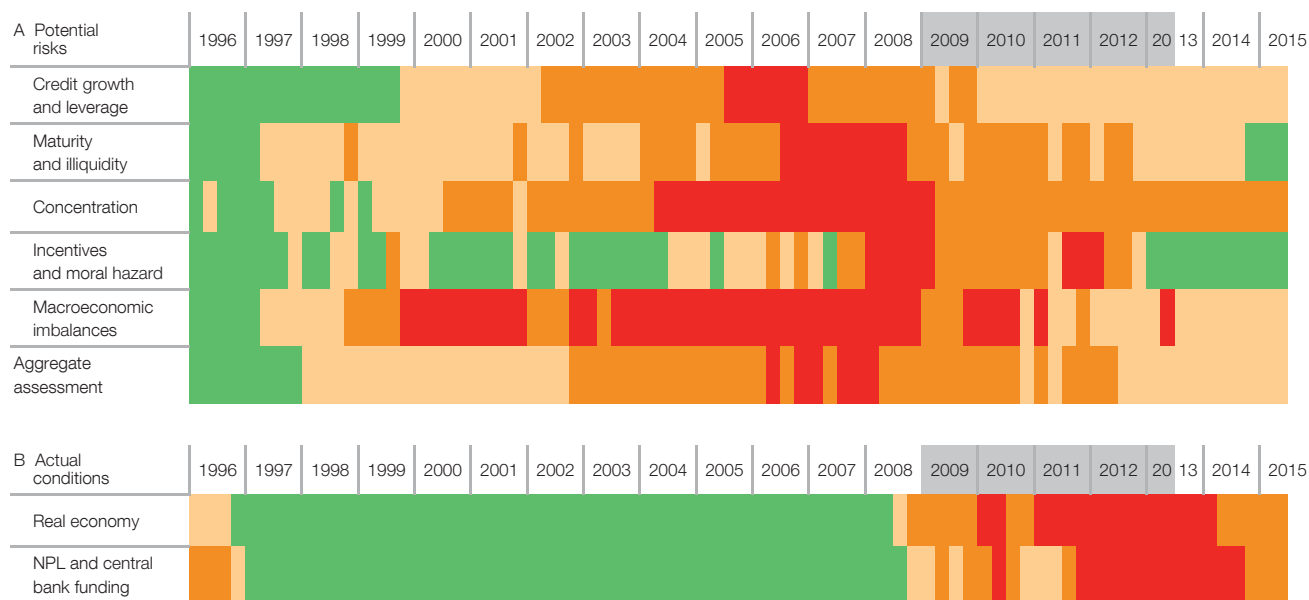
4.1 Backward-looking analysis

Although the indicators have been subject to backward-looking assessment since the 1970s, for the sake of simplicity and in keeping with its merely illustrative purpose, this section focuses on the period from 1996 to the present. The aim is to show how the recently developed indicators would have behaved in the past. The illustrative nature of the section is reinforced as the stress is on exhaustively known and analysed events.

Following the crisis derived from the 1993 recession and the intervention of Banesto at the end of that year, the risk indicators were in the range considered to be normal (Table 4.A). However, the real economy was still beset by some problems in 1996, which disappeared in 1997 (Table 4.B). From the late 1990s, low-level liquidity and concentration risks started to become apparent, derived basically from macroeconomic, liquidity and concentration imbalances. From 2002, credit expansion and leverage took on medium levels of risk, which gave way to maximum alert in the second half of 2005. A similar pattern was seen in the other categories, although the date of activation of the alerts varied (second half of 2006 for liquidity, 2004 for concentration). The only exceptions are the indicators of incentives and moral hazard, which, as they are based on market variables, tend to be contemporaneous with crises. The macroeconomic imbalances built up continuously and substantially from 2003. The combination of the various risk indicators raised the aggregate indicator to the maximum alert in 2006.

AGGREGATE HEAT MAP (a)

TABLE 4



SOURCE: Banco de España.

a The period of the systemic crisis experienced by the Spanish banking system, running from the first quarter of 2009 to mid-2013, is highlighted in a box. The meaning of the colours is as follows: green denotes a normal, riskless situation; yellow indicates low risk; orange is medium risk; and red is maximum risk or alert. The colour coding is explained in greater detail in Section 3.

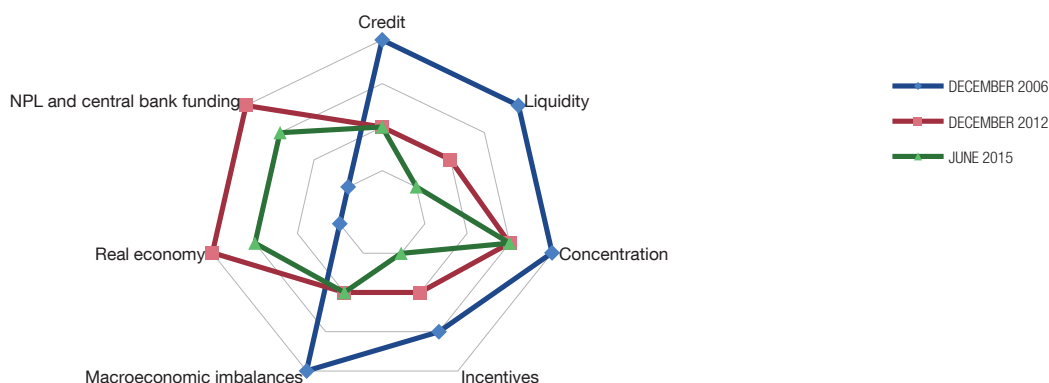
It should be highlighted, as indicated in the introduction, that the Banco de España had set in train dynamic or countercyclical provisions in 2000, maintaining them with the onset of IFRSs (International Financial Reporting Standards) in 2005, which allowed provisions to be built up throughout this strongly expansionary period that would otherwise not have been available as the crisis broke. What was involved here was a macroprudential instrument, a subsequent source of inspiration for the CCB, seminally applied in a period in which no other supervisor or central bank was using such instruments. Only after the crisis did the macroprudential dimension begin to be widely incorporated into banking supervision and public policies.

Since the indicators are mostly leading indicators, the level of alert tends to decrease from 2008, as the onset of the crisis approaches. In the case of the recent crisis, this does not mean the risks would have disappeared, but that they were materialising rapidly both in the real economy and in terms of non-performing loans and increased funding from the central bank. That is to say, the indicators of actual conditions begin to worsen rapidly from the second half of 2008 (Table 4.B). These effects are interrelated, insofar as the macroeconomic downturn has an adverse impact on the quality of bank assets. Subsequently, the general pattern shown by the heat map during the crisis was one of gradual correction of the potential risks, while the impact of the crisis translated into a severe cost in terms of actual conditions of the economy and of the banking system.

Chart 1 summarises this behaviour by portraying the risks and the actual conditions, separating the real economy and the banking sector, in a cobweb chart at specific dates. In particular, this chart allows comparison of the situation in December 2006, before the crisis broke, with what may be considered its peak in December 2012. In December 2006 most of the potential risks were at maximum alert levels, but both the real economy and the levels of bank loan non-performance did not yet reflect these latent risks. In 2012 the indicators of materialised risks worsened considerably, while potential risks underwent a sharp correction.

COMPARISON OF THE HEAT MAP AT THREE KEY DATES

CHART 1



SOURCE: Banco de España.

a The chart depicts heat map levels. The concentric line nearest the centre of the chart represents the normal situation, and the risk level increases the greater the distance from the centre.

4.2 Forward-looking analysis

Regarding the current situation (June 2015), the heat map (Table 4 and Chart 1) shows medium alerts in concentration and in actual conditions. The change in colour (from red to orange) in the heat map in the indicators of actual conditions (earlier in the economy and later in the banking sector) shows, on one hand, the return to the economic growth path, but still with a high level of unemployment; and, on the other, the turnaround in non-performing loans and the use of ECB credit facilities, both of which variables are on a clearly declining path, though still at higher values compared with pre-crisis levels (Chart 2). As is the case with unemployment, the level of non-performing loans is highly persistent over time, meaning that correction requires a longer period than other variables.

ACTUAL CONDITIONS (a)

CHART 2

A NON-PERFORMING LOANS RATIO OF OTHER RESIDENT SECTORS



B LOANS FROM THE CENTRAL BANK TO MONETARY FINANCIAL INSTITUTIONS AS A PROPORTION OF THEIR TOTAL ASSETS



SOURCE: Banco de España.

a The shaded area represents the crisis period.

In terms of potential risks (Table 4A), the adjustment of the imbalances which gave rise to the past crisis is continuing. Thus, the indicators linked to credit, the housing market and to debt and the ability to pay (first block of Table 2, relating to credit growth and leverage) show, on average, a level of low risk (Chart 3). Hence, the decline in credit has now eased substantially, house prices are beginning to show positive rates of change and, although debt remains persistently high in historical terms, low interest rates have made interest payment easier and have slightly reduced the burden that debt repayment entails.

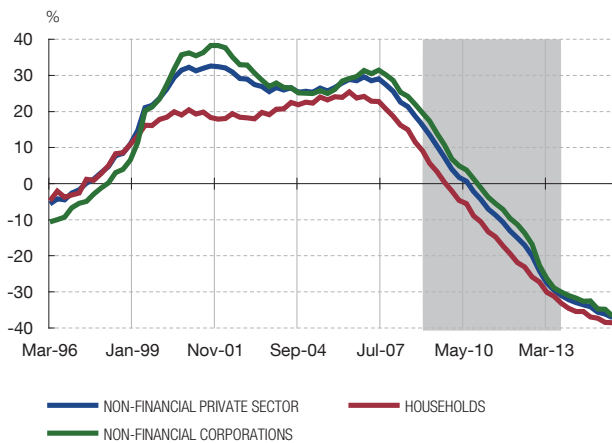
In the category of transformation of maturities and market illiquidity (the second block of indicators), alerts disappeared during the final quarter of 2014 thanks to the improvement in the aggregate loan-to-deposit ratio and to the increase in the proportion of overall liquid assets in the banking system (Chart 4.A).

The concentration category still shows median levels of alert. As with other variables, the concentration in certain economic sectors, such as real estate development, has a considerable structural components which can only be corrected over longer timeframes (see Chart 4.B).

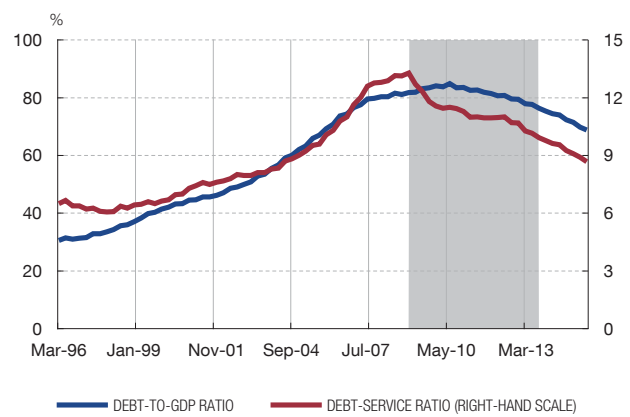
CREDIT GROWTH AND LEVERAGE (a)

CHART 3

A CREDIT GAP (b)



B DEBT SERVICE AND DEBT-TO-GDP RATIO. HOUSEHOLDS (c)



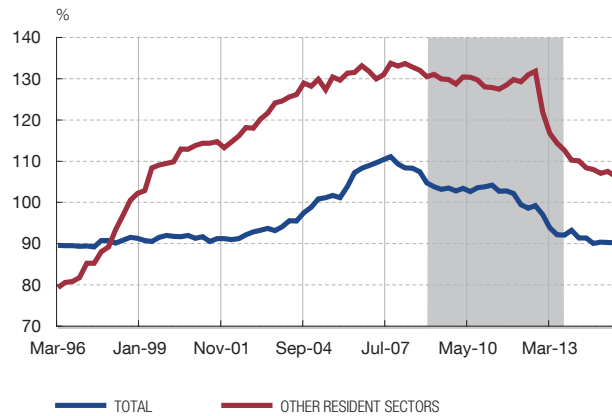
SOURCE: Banco de España.

- a The shaded area represents the crisis period.
- b Total credit to the economy, including both bank and other credit. The credit gap is calculated taking the difference between credit and a statistical trend estimated using the Hodrick-Prescott filter.
- c The debt service of households is an estimate of their debt service burden given their disposable income (see Castro, Estrada and Martínez, Revista de Estabilidad Financiera, 27, 2014).

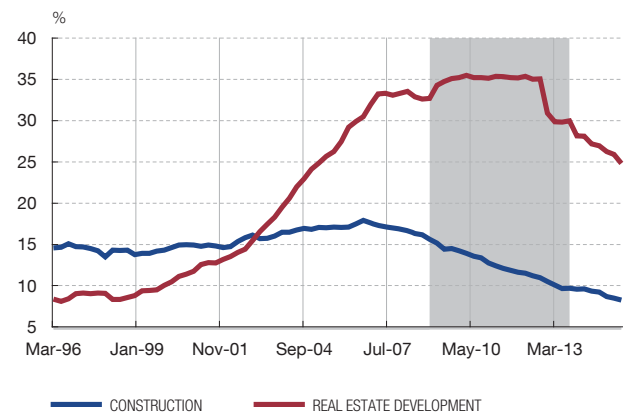
LIQUIDITY AND CONCENTRATION (a)

CHART 4

A LOAN-TO-DEPOSIT RATIO



B BANK EXPOSURE TO REAL ESTATE CONSTRUCTION AND DEVELOPMENT LOANS (b)



SOURCE: Banco de España.

- a The shaded area represents the crisis period.
- b Bank exposure to real estate construction and development loans is measured as a percentage of the total credit to other resident sectors.

The systemic risk indicators based on market data (incentives and moral hazard block) show a substantial and continuous improvement with respect to the 2012-2014 situation, having stabilised at lower levels over the past year (Chart 5). This is largely due to improved financing conditions in the debt markets and to the across-the-board reduction in market volatility (Chart 5.B). As previously mentioned, these indicators are usually contemporaneous with the crisis.

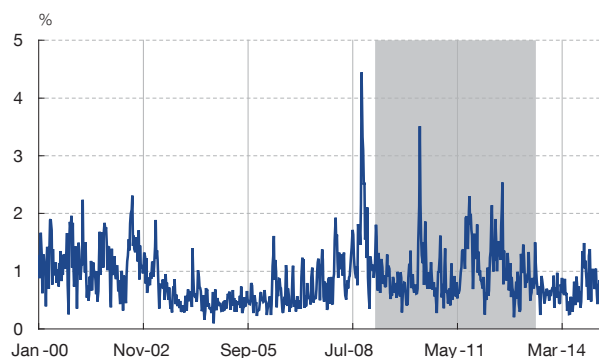
INCENTIVES AND MARKET VARIABLES (a)

CHART 5

A PROBABILITY OF AT LEAST ONE BANK FAILURE (b)



B STOCK MARKET VOLATILITY OF THE NON-FINANCIAL SECTOR (c)



SOURCES: Datastream and Banco de España.

- a The shaded area represents the crisis period.
- b The probability of at least one bank failure in the Spanish banking system is estimated using a multivariate probabilistic model which combines information from the stock, credit derivatives (CDS) and equity derivatives markets.
- c The stock market volatility of the non-financial sector is an estimate calculated as the weekly average of the daily changes in the absolute value of the Datastream index for Spanish non-financial corporations.

Finally, the macroeconomic imbalances category has been at a low level since 2011 owing to the rapid correction during the crisis of the current account balance, which is the variable in this category with the most crisis-anticipation capacity (Chart 6.A). However, considerable risks persist owing to the Spanish economy's heavy external indebtedness and to the increase in public debt during the crisis years (Chart 6.B). These potential risks have a limited impact on the heat map owing to the fact that they receive a lesser weight in the aggregation as they have a lower crisis early warning capacity; but it will be essential to monitor their course in the future owing to the potential adverse effects they may prompt.

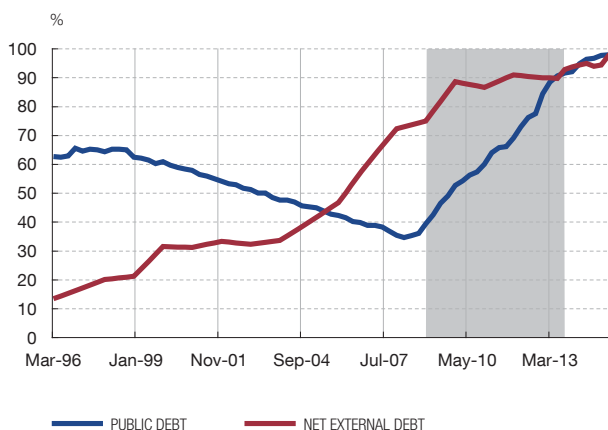
MACROECONOMIC IMBALANCES (a)

CHART 6

A CURRENT ACCOUNT BALANCE AS A PROPORTION OF GDP



B NET EXTERNAL DEBT AND PUBLIC DEBT AS A PROPORTION OF GDP



SOURCE: Banco de España.

- a The shaded area represents the crisis period.

Accordingly, the indicators available do not signal risks requiring the activation of macroprudential measures in the short term. This is a consequence of the absence of warning signals by the indicators of potential risks and the fact that a favourable economic and financial situation – the one still showing factors of vulnerability – is in place. In this respect, the appropriate direction of macroprudential policy is to maintain neutrality: to neither activate nor deactivate instruments (if previously activated).

5 Conclusions

This document has set out a general description of new macroprudential policy developments and of the analytical framework recently developed by the Banco de España for the monitoring of macroprudential risks through a broad set of indicators analysed using a heat map. This framework will serve as guidance for the broad macroprudential policy stance of the Banco de España, though not for the calibration of particular instruments, which will be done through a specific analysis in each case.

Along with the description of the methodology, the document has set out a heat map of the current situation. This heat map shows a low level of macroprudential alert, derived from the correction of a good number of the imbalances that caused the last crisis, both in the credit market and the housing market, and in terms of liquidity, incentives and macroeconomic imbalances. However, the Spanish financial system is still emerging from a very severe crisis which has lasted over 5 years, meaning that actual conditions are still not optimal (e.g. declining but still high non-performing loans). As a result, the macroprudential indicators analysed by the Banco de España, and summarised in the heat map, are consistent with a neutral stance in macroprudential policy.

Looking ahead, it will be necessary to ensure that the correction of past imbalances proceeds at an appropriate pace and that new imbalances do not emerge, against a backdrop of recovery in the Spanish economy. Also, it will be important to analyse at each point in time whether macroprudential policy may be appropriate for reducing existing threats or mitigating their possible impact, developing specific instruments or using existing ones, or, on the contrary, whether it is for other policies to deal with them.

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