

3 DEVELOPMENT OF A TOOL TO REGULARLY CONDUCT FORWARD-LOOKING ANALYSES OF SPANISH BANKS. METHODOLOGY AND INITIAL AGGREGATE RESULTS

3.1 Objectives

The last FSR indicated (in Box 2.3) that the Banco de España would include “prospective” or forward-looking analyses as part of the tool kit available to the supervisor to assess each bank and, where it necessary, to be able to take measures to correct their solvency situation. The Banco de España has thus adopted best international (US and UK) practices in the area, incorporating forward-looking analyses to its range of supervisory tools. The present chapter presents the work conducted since then by the Banco de España to equip itself with a tool (known as the FLESB — the Forward-Looking Exercise on Spanish Banks) that enables the solvency of Spanish banks in the face of different macroeconomic scenarios to be evaluated. It should be noted that this is not a forecast of the future solvency of institutions, but rather a sensitivity analysis in respect of a pre-determined set of shocks.

This tool will be subject to continuous improvement over time, both in the initial data it requires and in the calculation methods it uses. It is thereby sought to incorporate the best international practices in this area, in which connection assessment and advice has been sought from independent experts with long-dated experience in the field.

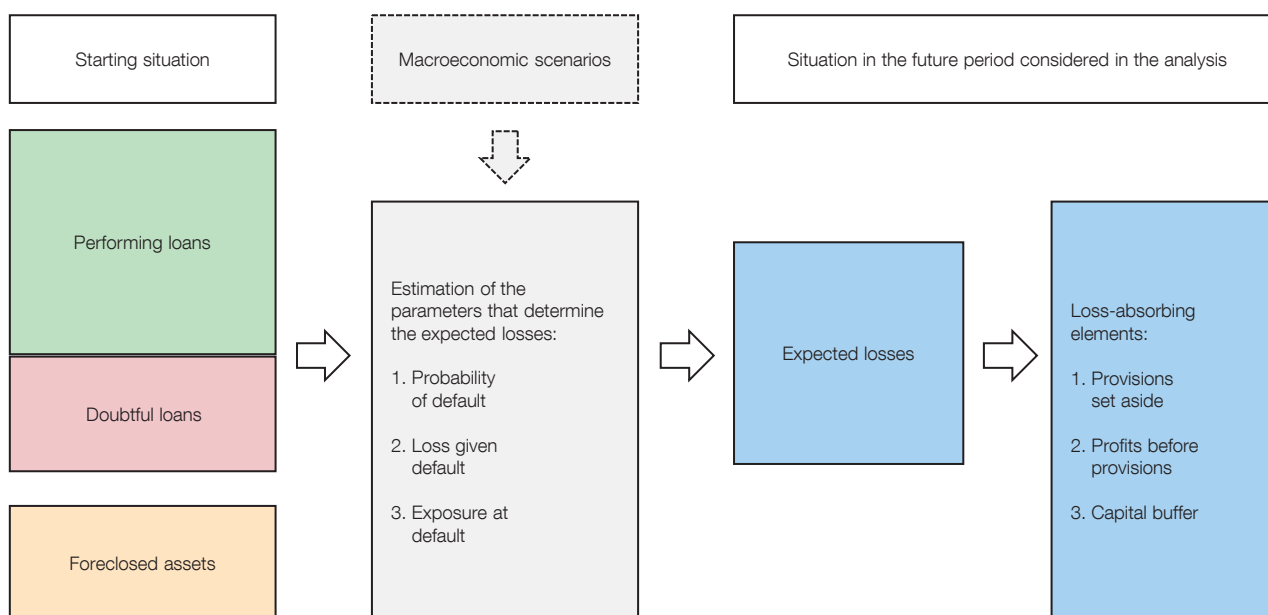
What is presented in this FSR is, therefore, the first step of this evolutionary process, including the results obtained for the system as a whole. From a methodological perspective, the objective initially pursued has been to develop a framework enabling a sensitivity analysis to be conducted using the supervisor’s own models (a top-down approach), and therefore without the need to draw on each bank’s own models. Nevertheless, this framework is enriched with numerous granular elements (a bottom-up approach) at the level of individual loans, including their guarantees. These bottom-up elements stem from the information that banks gather, prepare and process in their lending and guarantee-management activities, and from the forward-looking information they prepare on the different components of their income statements.

The above-mentioned methodological developments have benefited substantially from interaction with the external consultant that carried out the bottom-up stress tests last year as part of the MoU between the Spanish and European authorities. This has allowed the tool’s application, scope and calibration to be improved. It will also provide for further improvements in the immediate future, particularly in methodological aspects and giving greater depth to elements already considered in the bottom-up approach.

The rest of this chapter broadly describes the approach followed, detailing thereafter the most significant features of the methodology employed in the development of each of the parts making up the FLESB. It concludes with the results obtained for the system as a whole.

3.2 General framework

As stated, the aim of the FLESB is to evaluate the solvency of banks in the face of different scenarios over a specific time horizon. Hence, given macroeconomic scenarios that must be demanding but plausible, the tool calculates the expected losses over the related period of time, and compares these losses with the elements banks have at hand to withstand such losses. As Chart 3.1 shows, projecting expected losses requires that three basic parameters be calculated: probabilities of default, losses in the event of default and exposure in the event of default. The elements at hand at banks to withstand expected losses will be provisions previously set aside, the profits before provisions that are estimated for the horizon of the analysis and the capital buffer available.



SOURCE: Banco de España.

The macroeconomic scenarios used in an exercise such as that pursued with the FLESB (see the section on results for an analysis of the specific scenarios used) must be demanding, but plausible, since otherwise they would give rise to results that are difficult to interpret and, above all, to translate, if necessary, into supervisory actions. A baseline scenario is used which, subject to the uncertainty macroeconomic forecasting entails in general, is the best estimate of future macroeconomic developments. That is to say, it is the scenario that is most likely to occur. In addition to the baseline scenario, several alternative scenarios with a differing degree of severity are considered which, in any event, must conform to a minimum level of occurrence, in an attempt to measure the sensitivity of banks' position to unfavourable, but plausible, changes in the economic environment. These alternative scenarios are generated in connection with the medium-term macroeconomic forecasting models regularly used by the Banco de España, by imposing adverse exogenous shocks on the baseline scenario.

3.3 Data needed for the analysis

Any tool for conducting forward-looking analyses with a high bottom-up component requires databases with a high level of granularity. The Banco de España has databases that offer a high degree of detail at the level of loans and borrowers, with information too on the collateral available. These are listed below:

- Central Credit Register (CCR). The Banco de España receives monthly information on loans granted by each of the banks operating in Spain to their customers, grouped by specific characteristics, if the financing extended to such customers exceeds the minimum threshold of €6,000. The CCR information allows the banking book to be segmented into performing and doubtful loans, and also provides information about other relevant characteristics for analysing the risk associated with each lending operation with the same characteristics (maturity, collateral, sector of activity, province, etc.). The CCR information is used to estimate several of the parameters needed in the calculation of expected losses, such as probabilities of default, cure rates and the credit conversion factors.

- Loans inventory. In addition, through the on-site inspections of institutions, highly detailed loan-by-loan information is available as is that on the collateral (if any) associated with the operation. Concerning collateral, the appraised value and the date of the latest appraisal are available, as is information on its geographical location. The loan-by-loan information here makes up the banks' lending portfolio in its entirety. This level of detail is also available for foreclosed assets. The loans inventory, and the details provided on collateral, comprise the underlying information for the calculation of the collateral values and that of the foreclosed assets.

These granular databases provide for detailed information on more than 30 million loans with their respective collateral, and some 3.5 million credit facilities.

- Credit Risk Distribution (DRC, by its Spanish abbreviation) table. What are involved here are supervisory reports made available to each institution in which the lending portfolio is detailed with a specific segmentation by purpose of the operations, and which allow the accounting information prepared by institutions to be reconciled with the details of the loans in the aforementioned loans inventory. This information is used as an anchor point and a means of reconciliation of the different databases used.
- Institutions' projections of their income statements. The projections made by institutions of their income statements over the time horizon of the exercise are also available. This information is used, after conducting a plausibility analysis, as detailed below, to project profits before provisions.
- Other information. Other information that institutions send periodically to the Banco de España as a result of their regulatory obligations or of supervisory requirements is also used. This includes, inter alia, information on balance sheets, income statements, the regulatory capital ratio and own funds requirements.

3.4 Constituent elements of the expected losses projection

The expected loss over the analysis period is the result of expected losses for performing loans, for loans classified as doubtful initially and that arising from foreclosures. For the portfolio of performing loans, the parameters for calculating the expected loss are the probability of default, the loss in the event of default and exposure in the event of default. For doubtful loans (given that they are already in a situation of default, i.e. their probability of default is 1), losses given default and the exposure must be calculated. Finally, the expected loss for foreclosed assets will depend on the projection of their value at the time of sale. Detailed below is the methodology applied for the calculation of each of the parameters needed to calculate the expected loss.

3.4.1 PROBABILITIES OF DEFAULT

The probabilities of default are estimated using the loan-by-loan information from the CCR. The loan-by-loan data are aggregated by credit segment in accordance with those included in the DRC statements which, as stated above, are the supervisory templates used as the starting point for obtaining the initial exposure in each portfolio and also for grounding and appropriately reconciling the different databases used. The six credit segments considered are: real estate developers, construction, corporates, SMEs, retail mortgage lending and consumer credit. This segment-based aggregation is done for each bank and over the period from 2000 to date in order to construct a panel with which to

estimate a probability of default model based on macroeconomic variables for each lending portfolio segment. Modelling probabilities of default with macroeconomic variables enables the former to be linked to the macroeconomic scenarios used in the exercise.

Once the probabilities of default have been modelled, and thereby linked to the scenario, three adjustments are applied to them.

- The probabilities of default are anchored to the detailed information on credit portfolios in the Credit Risk Distribution table. As a result, consistency is ensured between databases by classifying information on credit sub-portfolios, since the information available in the CCR is segmented by economic activity codes (NACE codes), and what is taken directly from the institutions' loan portfolio is segmented in accordance with the purpose of the loan.
- In calculating the probability of default, the relative size of the default is taken into consideration. In this regard, potential biases in estimated probabilities of default are thus avoided when the degree of heterogeneity of the size of loans in a portfolio is high.
- The probabilities of default are adjusted to incorporate the detailed refinancing analysis conducted by the Banco de España over the course of 2013 (see Box 2.1). The amount of loans recently reclassified from performing or sub-standard to doubtful are taken into consideration to adjust the starting point of the probabilities of default upwards

3.4.2 LOSS IN THE EVENT OF DEFAULT

Loss in the event of default is broken down into two factors. Once a loan becomes doubtful, it will be necessary to evaluate what possibility there is of it being cured, i.e. that it may be recovered and return to a situation of normality (first factor). If the loan has become doubtful and is not cured, the effective associated loss (second factor) will have to be calculated, taking into account the value of the collateral, if any.

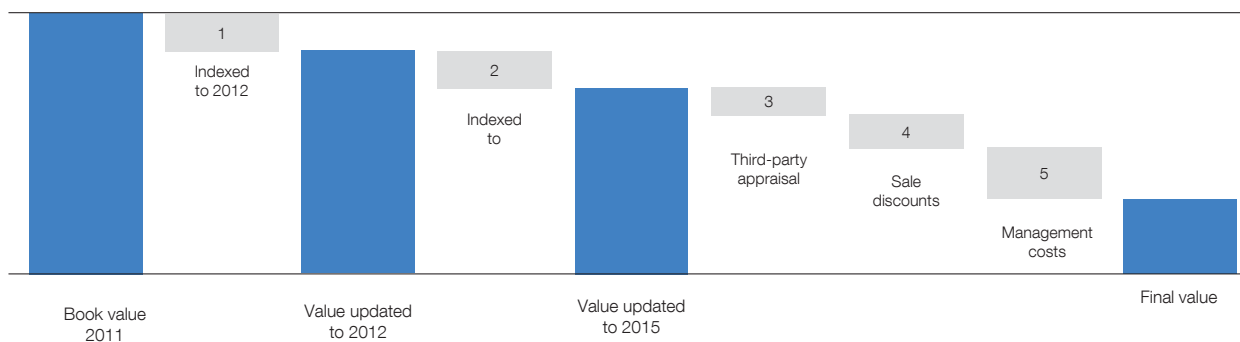
Cures

When a loan defaults, it is possible with the passage of time that the borrower may find sufficient funds to repay the debt and, therefore, the default "is cured". The information available in the CCR enables cure curves to be calculated, distinguishing between the six credit segments considered. That is to say, it is estimated, for each segment on the basis of the CCR loan-by-loan information, what percentage of the doubtful asset will be recovered on average, once a certain time in doubtful status has elapsed. In calculating cures, a distinction has been made between those loans that have been less time in a situation of default and those others that have had this status for longer. This is because, conceivably, the longer a loan has a default status, the more difficult it will be for it to return to normal.

The calculation of the cure curves based on the CCR is not free from difficulty, as the loans that have been cured are not specifically identified. The difficulty arises because, when a loan is removed from the doubtful category, it is not possible to identify accurately the underlying reason. To resolve this, it has been opted with the current roll-out of the FLESB to take the more conservative option, based on the expert criterion of the consultant who has offered advice on the development of the FLESB.

Valuation of collateral

For operations that default and that do not cure, the associated losses must be calculated. Thus, operations which do not cure finally turn into a loss if there is no collateral posted,



SOURCE: Banco de España.

or else the value of the collateral has to be calculated to obtain the residual value that the unpaid loan can yield once the attendant guarantee has been liquidated.

As the FLESB currently stands, the granular information available to the Banco de España and that obtained from the external consultant in the stress tests conducted last year has been intensively used. As earlier discussed, this information consists of the geographical location of the collateral, the type of asset, the appraised value at the latest available date and specific elements that reduce the value of the collateral owing to the potential existence of biases in appraisals, upkeep and management costs of such collateral, and the discounts institutions apply when selling such collateral (steps 3, 4 and 5 in Chart 3.2). Prices that are as granular as possible (by province, type of collateral, etc.) have been used to update the value of the collateral at the time it is used as a starting point of the forward-looking exercise, as has an own model to project the prices of such collateral over the time horizon in which the exercise is conducted (steps 1 and 2 in Chart 3.2). As a result, the final value of the collateral is obtained which, once deducted from the unpaid exposure, provides the final value of the loss in the original loan operation.

Given the granularity of the information available in 2011 and 2012 (the latter being the starting point of the exercise), it has been necessary to proportionately adjust the amounts so that there should be no discrepancies and to adjust the initial population characteristics to the level of the arrival point, as well as considering the transfer of assets from the Group 1 and 2 institutions to Sareb.

3.4.3 EXPOSURE IN THE EVENT OF DEFAULT

The CCR contains information on credit facilities, the amount drawn down at each point in time, the amount available and the date on which a company defaults. Accordingly, it is possible to calculate the drawn down credit conversion factor for each operation or, expressed otherwise, the additional amount of credit a company has by using its credit facility precisely at the moment prior to default. The conversion factors are calculated by credit segment and measure the increase in credit drawn down as a proportion of the amount available in the final period before default. If this is calculated operation by operation and aggregated by segment, implicit regard is had to differences in conversion factors that may arise as a result of the different collateral provided under each credit facility.

3.4.4 FORECLOSED ASSETS

The foregoing treatment applied for the calculation of the value of collateral is very similar to that applied to the calculation of expected losses on foreclosed assets (see Chart 3.2). In this case, in addition to taking into account the transfers to Sareb, stratified sampling has been used to move from highly granular asset-by-asset information, as at end-2011,

to more aggregated information in the case of 2012, the rest of the adjustments being very similar to those seen for collateral.

3.5 Absorption of losses

As a result of the interaction between the highly granular databases of loans, collateral, credit lines and foreclosed assets, the models estimated and the various scenarios used, it is possible to obtain estimations of expected losses by portfolio, by bank and under various macroeconomic scenarios. These expected losses are compared with the resources available at each bank for absorbing them.

3.5.1 PROVISIONS

The first element available for absorbing expected losses are the loan-loss provisions existing at the starting date of the exercise. In this case, all the existing provisions for business in Spain are calculated because it is deemed that they could all be used in the hypothetical case that expected losses materialised. Only existing provisions in Spain are used, excluding those from abroad, because the target of this forward-looking exercise is the loan portfolios of the resident private sector in Spain. Expected losses in the first year are compared with the volume of provisions. If they are lower, the surplus provisions are used in the following year to absorb the losses of the second year, and so on.

3.5.2 PROFITS BEFORE PROVISIONS

If at any time the provisions are insufficient for absorbing expected losses, the amount not covered is charged to profits. Consequently, once the provisions have been exhausted, it is possible to use profits (before provisions) to absorb the remaining expected losses. This requires estimating profits before provisions for the time horizon considered and for each scenario.

In order to project profits before provisions, as they currently stand, the FLESB has adopted an all-encompassing approach.

- An econometric model of different factors determining the various items in the income statement was developed, linking these items to the usual macroeconomic variables. The level of detail is significant, with ROA, the cost of liabilities, the volume of interest-earning assets and interest-bearing liabilities, fees (broken down by type), gains or losses on financial transactions and operating expenses having been modelled separately. This model provides for an aggregate numerical reference, linked to each macroeconomic scenario, which enables the greater or lesser plausibility of the complementary expert approach developed to be assessed.
- An expert approach has been developed, based on the forward-looking information on each institution's balance sheet and income statement, to which access is had as a result of the banking supervision function. The information thus obtained is filtered and in some cases institutions' over-optimistic estimations are adjusted both in terms of prices and volumes. The consistency of the information with the aggregate macroeconomic scenario is also checked. Similarly, the impact of the expected losses is incorporated by suspending the accrual of interest in proportion to these losses. The exercise involving the expert estimation of profits before provisions is complemented by adjusting the other items to the information available to the supervision teams, which filter the institutions' plans, and to other judgments which are taken into account in the scenario. For institutions with business abroad an estimation of their net profit, with a 30% haircut, is used, in line with the common practice in this type of exercises performed recently in Spain.

Once profits before provisions adjusted for outliers and in line with the baseline scenario and the above-mentioned aggregate quantitative forecast are obtained, the results under scenarios which are further removed from the baseline scenario are obtained, incorporating the effect of higher expected losses in net interest income and more stringent assumptions in the evolution of the other captions, using the supervisor's expert opinion and econometric estimations as a point of reference.

3.5.3 FINAL IMPACT ON CAPITAL

Once the provisions and profits available to the institutions have been used, the remainder of the expected losses impacts capital directly, reducing it by that amount. The net amount of capital is compared with risk-weighted assets to determine the solvency ratio. Risk-weighted assets show changes in assets according to the scenario.

The comparison of this ratio at the end of the analysis period with the capital threshold established determines the institution's relative solvency position in the various scenarios envisaged. The supervisor will use this information in conjunction with other data to enrich the dialogue process with the institution about its current and future capital levels in relation to its risk level.

3.6 Approach of the exercise

As explained throughout this chapter, the FLESB has been conceived as a tool necessarily subject to development and continuous refinements. As it currently stands, it has been deemed of use for evaluating the solvency position of the Spanish banking sector as part of a forward-looking exercise that considers different macroeconomic scenarios.

The aim is to perform a forward-looking exercise which, taking December 2012 as a starting point, spans a three-year period from 2013 to 2015.

The exercise targets the resident private sector's credit portfolio in respect of business in Spain, along with foreclosed assets. The institutions' credit portfolio has been divided into six segments (real estate developers, construction, corporates, SMEs, retail mortgage lending and consumer loans), which have been modelled taking into account the characteristics proper to the loans and collateral comprising them.

It has been borne in mind that in December 2012 and in February 2013 the Group 1 and 2 institutions, respectively, transferred assets to Sareb, with these assets and the provisions set aside for them therefore being excluded from the scope of the analysis.

The set of institutions considered are those which were already included in the exercise conducted last year by the external consultant as part of the implementation of the MoU, i.e. Santander, BBVA, La Caixa, Kutxabank, Sabadell, Bankinter, Unicaja, BMN, Liberbank, Popular, NCG, CX, BFA-Bankia, Ibercaja-Caja3, and CEISS.

The benchmark capital ratio for this exercise is Common Equity Tier 1 (CET1), as defined in the CRR/CRD IV, the regulations that transpose Basel III into the EU regulatory framework. In accordance with these regulations, both the calculation of CET1 and the application of specific deductions and filters needed for its calculation will be progressive during its phase-in from 2014 to 2017. The rules envisage a minimum regulatory capital (in terms of

¹ If any institution has an asset protection scheme which guarantees coverage of a portion of the losses by an external third party, this will have been taken into account in the final calculation of the expected loss absorption capacity.

CET1) of 4% in 2014, which would be increased to 4.5% from 2015. For the purposes of this forward-looking exercise, the timetable set by the regulations for the definition of the CET1 ratio that will be in force at each point in time² has been considered.

3.7 Macroeconomic scenarios used in the exercise

In performing this exercise, two alternative and less probable scenarios, characterised by a more unfavourable performance of the main macro-magnitudes, have been considered along with a baseline macroeconomic scenario. To design these scenarios a macroeconomic model was used in which a set of technical assumptions was introduced regarding the path of the main exogenous variables, such as interest rates and the growth of world markets, up to end-2015.

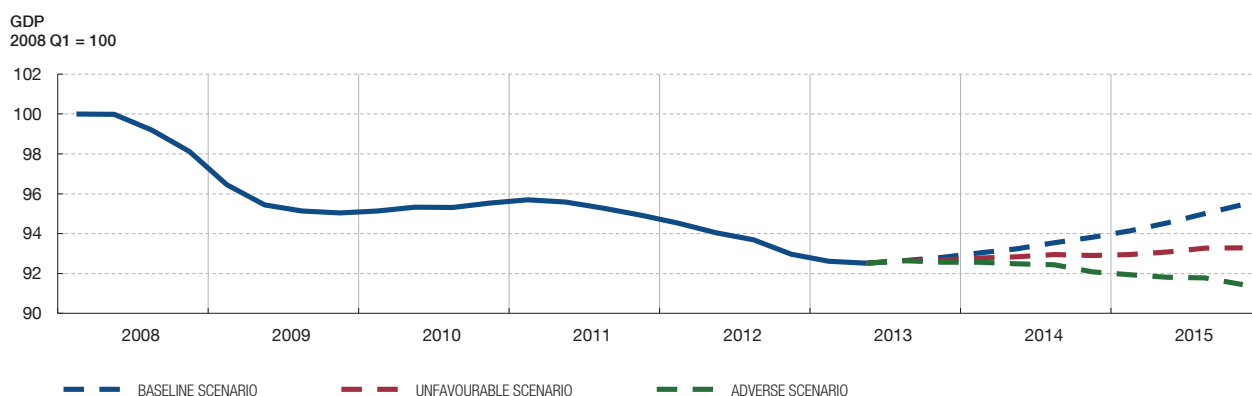
In the baseline scenario, the economy experiences a modest recovery, which progressively gains momentum as private domestic demand increasingly accompanies exports as the driver of activity. In this scenario, the Spanish economy would leave behind the second recession it has undergone since the start of the crisis, although the level of GDP at the end of the exercise's horizon would still be noticeably lower than the cyclical peak attained in 2008 Q1 (see Chart 3.3). What is involved, therefore, is a scenario of gradual growth, in which the process of correction and adjustment of the imbalances built up in the Spanish economy continues.

In the first alternative scenario, known as the unfavourable scenario, the Spanish economy would scarcely grow in the period considered (see Chart 3.3), meaning that cumulative output growth from 2013 to 2015 would be 1.7 pp lower than in the baseline scenario. This gap between cumulative GDP growth in the two scenarios matches that implicit in the forecasts of the IMF's October 2013 World Economic Outlook, forecasts which, among those recently formulated by national and international agencies, are those that project a more adverse baseline scenario. In the construction of this scenario, consideration is given to a hypothetical worsening of financial conditions, a slowdown in Spanish export markets and a fall-off in the level of domestic private spending. In combination, these factors would give rise to a virtual flattening of GDP, with a more negative performance by the main variables of interest, such as unemployment and house prices, compared with the baseline scenario.

² Given that the exercise begins in 2013, it has been assumed, for the sake of consistency with the definition of the capital ratio, that the definition established in CRR/CRD IV for 2014 would have to be met as at that date.

PATH OF GDP UNDER DIFFERENT SCENARIOS

CHART 3.3



SOURCES: INE and Banco de España.

Finally, the second alternative macroeconomic scenario, known as the adverse scenario, would entail a fresh dip in the Spanish economy (see Chart 3.3). This scenario, which is assigned a very low probability of occurrence, would be the outcome of a combination of adverse shocks qualitatively similar to those of the foregoing unfavourable scenario, but on a more acute scale. Specifically, the gap between GDP growth in the baseline scenario and in this more pessimistic scenario would almost be double the cumulative relative loss in the unfavourable scenario, climbing to 3.2 pp, with a likewise more adverse impact on the other macro-financial variables.

3.8 Results of the exercise

The results of the exercise show that the expected losses generated in the credit portfolio, and in the foreclosed assets portfolio, grow as the scenario worsens. That is to say, as the macroeconomic scenario moves away from the baseline scenario and pivots towards an adverse scenario whose likelihood of occurrence is low, the resulting expected losses naturally increase.

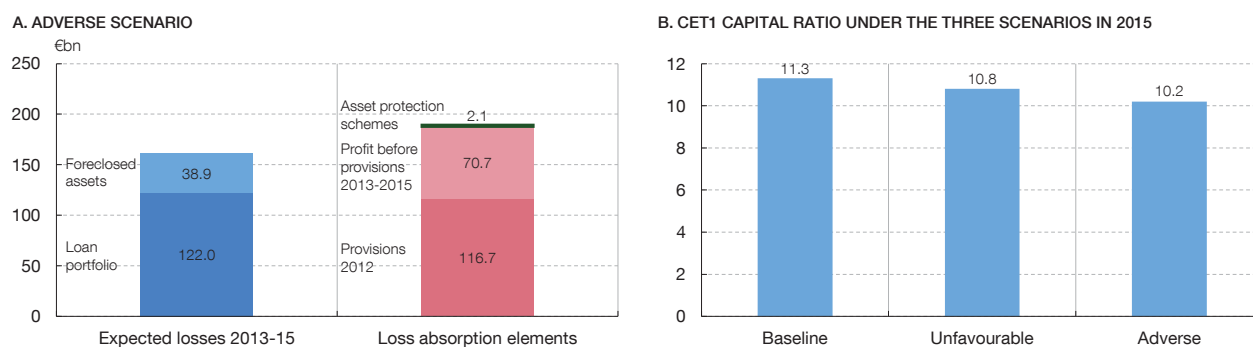
Thus, in the baseline scenario, the expected losses in the credit portfolio resulting from the exercise for the 2013-2015 period account for 7.6% of total credit. This percentage of expected loss would be 8.8% in the unfavourable scenario and would rise to 9.7% in the adverse scenario. If the expected losses associated with foreclosures are added, the percentages of total expected losses (losses on the credit portfolio plus those of the foreclosures over credit exposures plus foreclosures) increase in each of the scenarios. Thus, in the baseline scenario, the percentage of total expected loss would be 10.1%, standing at 11.3% for the unfavourable scenario and at 12.1% for the adverse scenario. The increase in the expected loss in the unfavourable scenario with respect to the baseline scenario is 12%, whereas this increase in the expected loss is 20.4% between the baseline and the adverse scenarios.

The resources available to withstand these expected losses, that grow in terms of the degree of severity of the scenario, follow the opposite path, i.e. they fall from the baseline scenario to the adverse scenario, but moderately so. On one hand, the volume of provisions the institutions have is constant in the three scenarios, as this is the amount that is already set aside on balance sheets at the start of the exercise. This amount accounts for 8.8% of the total exposure analysed. In relation to the overall expected loss in each scenario, the total provisions already set aside would account for 87.3% of total expected losses in the baseline scenario, 78% in the unfavourable scenario and 72.5% in the adverse scenario.

On the other hand, the resources available from the use of asset protection schemes³ increase as losses do (i.e. there are more resources available from APSs in the adverse scenario than in the baseline one), but their relative increase and their total amount are of little significance for the institutions analysed as a whole. Hence, in the baseline scenario, the APSs available account for 1% of expected losses, for 1.2% in the unfavourable scenario and rise to 1.3% in the adverse scenario.

Finally, institutions' pre-provisioning profit-generating capacity diminishes as the scenario becomes more severe, essentially as a reflection of the greater reduction in activity and as a result of more defaults arising in the adverse scenario, which entails the interruption of the accrual of interest for a higher volume of assets. A further factor is the conservative

³ Asset protection schemes (APSs) are resources available for absorbing expected losses for those institutions that have such schemes. They have been taken into account in each specific case, and always according to the concession and approval conditions under which these APSs were agreed.



SOURCE: Banco de España.

assumptions made in respect of the generation of income on financial transactions, which is considered to be zero in 2014 and 2015 under the adverse scenario, with only that recorded in the first half of the year being admitted in 2013. The pre-provisioning profit-generating capacity of institutions as a whole analysed in the baseline scenario would cover 58.2% of the expected losses generated in that scenario. As stated, the reduction in profits and, more importantly, the increase in total expected losses in the different scenarios explains the gradual reduction in this percentage of coverage. Thus, in the unfavourable scenario, the coverage of total expected losses with profits before provisions would be 50.1%, while in the adverse scenario it would be 43.9%.

Accordingly, the results of the exercise for the set of 15 institutions analysed show a fairly comfortable solvency position at the aggregate level in 2015. Chart 3.4.A shows that, in the worst scenario, loss-absorption capacity exceeds expected losses by €28.6 billion. The CET1 capital ratio in 2015 for the institutions considered as a whole would be 11.3% in the baseline scenario, 10.8% in the unfavourable scenario and 10.2% in the adverse scenario (see Chart 3.4 B).

The methodology used (despite using quite granular information at the level of each institution) does not allow the prospective solvency position of each bank to be estimated precisely. However, the analysis shows that all the institutions would easily satisfy the minimum levels of regulatory capital, even in the adverse scenario.