

### THE EFFECT OF CREDIT STANDARDS FOR MORTGAGE LOANS ON CREDIT GROWTH AND ON DEFAULT RISKS ASSUMED

A bank's lending policy sets out loan terms and conditions such as loan amount, interest rate, term, collateral and acceptable financial ratio levels. The latter include, in particular, the loan-to-income (LTI) and the loan-to-value (LTV) ratios.

The empirical evidence available globally shows that looser credit standards in good times have benefits in terms of stronger activity growth,<sup>1</sup> but may also lead to the build-up of vulnerabilities, specifically to the deterioration in the credit quality of bank loans.<sup>2</sup> This might exacerbate the adverse effects on financial stability and on real activity in crisis periods. In other words, credit standards could influence credit cyclicalities by directly affecting credit supply.<sup>3</sup> This requires ongoing monitoring and the use by macroprudential authorities of tools limiting too loose or too tight credit standards at different stages of the financial cycle.<sup>4</sup>

The various segments in the loan portfolio have different risk characteristics and a different degree of systemic importance. Therefore, lending policies should be assessed with an appropriate level of granularity. As a result, the analysis in this box focuses, on the effects of credit standards on the supply of mortgage loans and on the medium-term risks in terms of mortgage loan defaults. The large volume of mortgage lending (in June 2022, housing loans amounted to €503,254 billion, i.e. 45.1% of bank lending to households and firms in Spain) and its influence on economic decisions taken by households (in 2020, 39.3% of Spanish households had debts secured by their real estate properties) strongly warrant an empirical

analysis, as comprehensive as possible, of this portfolio to guide macroprudential policy.

Firstly, we use the data on mortgages in Spain between 2000 and 2015, available in the Banco de España's Central Credit Register (CCR). These data are aggregated to obtain the stock of mortgage loans and its growth, at postcode, bank and monthly level. Additionally, new mortgages for the same period (2000-2015) are identified and each one is associated with the average household's net income in the borrower's postcode area (using information from the tax authorities). This allows the LTI ratio for new mortgages to be calculated. Furthermore, the LTV ratio,<sup>5</sup> the interest rate margin at inception of the loan and other loan terms (maturity, amount, etc.) are obtained from the CCR. Lastly, the data on total mortgages and on new mortgages are matched with balance sheet and income statement banking data reported by banks to the Banco de España, and also with macroeconomic data on the change in GDP and in the (overnight) interbank rate.

These data are used to estimate a model for monthly growth in total mortgage lending, based on postcode and time fixed effects,<sup>6</sup> macroeconomic variables, bank characteristics (accounting variables or fixed effects) and terms (LTI, LTV, interest rate margin, etc.) of new loans granted in each postcode area in the preceding month.<sup>7</sup> The estimated impacts of these characteristics thus inform on each bank's supply conditions.<sup>8</sup>

The results of the estimation show that mortgage lending supply increases as banks' credit standards ease.<sup>9</sup> For

1 See P. O. Gourinchas and M. Obstfeld (2012), "Stories of the Twentieth Century for the Twenty-First", *American Economic Journal: Macroeconomics*, Vol. 4(1), pp. 226-265.

2 See A. Mian and A. Sufi (2009), "The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis", *Quarterly Journal of Economics*, Vol. 124(4), pp. 1449-1496, for the US mortgage market.

3 See G. Dell'Ariccia and R. Marquez (2006), "Lending booms and lending standards", *The Journal of Finance*, Vol. 61(5), pp. 2511-2546.

4 See, for example, Banco de España *Circular 5/2021* implementing the macroprudential tools introduced by Royal Decree-Law 22/2018 and Royal Decree 102/2019.

5 The LTV ratio is calculated for a sample of mortgages as those outstanding as at December 2016, since this is the date on which the collateral value was reported for the first time in the CCR.

6 Fixed effects relate to the average growth in each postcode area and month, aggregating all banks, and are intended to capture time-variant local demand.

7 The fixed effects and the time lag in loan term measurement seek to limit the so-called endogeneity issues, i.e. the possibility of their estimated effect on mortgage lending growth being due, at least in part, to non-observable factors which affect mortgage loan features and stock growth.

8 If the model were to replace bank characteristics with bank and month fixed effects, these effects would capture the variation in each bank's domestic supply. The regression of these fixed effects on bank characteristics and new mortgages in each month show that banks adjust their total domestic supply through changes in LTV, maturity and amount, in line with the estimated results for local supply.

9 See also Box 1 of "The Housing Market in Spain: 2014-2019", *Occasional Paper* No 2013, Banco de España, for a micro analysis using data from the Spanish Survey of Household Finances and data at municipality level on the loan-to-price ratio for housing which shows how housing affordability depends on changes in this ratio.

**THE EFFECT OF CREDIT STANDARDS FOR MORTGAGE LOANS ON CREDIT GROWTH AND ON DEFAULT RISKS ASSUMED**

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example, a one standard deviation rise (1.7 expressed as a decimal) in the LTI ratio raises lending by 4.3% and, in the case of the LTV ratio (0.39 expressed as a decimal), by 7.5%. Similarly, a one standard deviation increase in loan maturity (by 6 years) or decrease in the interest rate margin (by 0.6 pp) would raise lending by 4.3% and 3.2%, respectively. The effects of changing several standards at the same time are impacted by complementarities and interactions between them. For example, a simultaneous increase of one standard deviation in the LTI and LTV ratios would result in a 12.8% rise in lending (higher than the sum of individual effects). A simultaneous increase in the LTI ratio and the loan maturity (again by one standard deviation) would cause lending to grow by 9% (compared with 8.6% disregarding interactions).

In addition, credit standards become more relevant in good times, especially as regards the LTI ratio. Thus, the impact of the LTI ratio on credit growth is higher in expansionary periods. A one standard deviation increase in GDP growth (2.5 pp) or decrease in the interest rate growth path (1.2 pp) would result in the impact of one standard deviation increases in the LTI ratio on credit

growth reaching 8.4% and 6.9%, respectively (see Chart 1). Furthermore, the easing of credit standards would have stronger effects on banks subject to greater information asymmetries, which are identified as those less present in a specific area. For example, the effect of the LTV ratio on lending is larger for banks with a smaller market share or with a more recent presence in the geographical area considered. Thus, an additional one standard deviation decrease in these metrics (1.8 pp and 3.6 years, respectively) would make the LTV ratio easing effect stronger, leading to credit growth of 12.2% and 9.4%, respectively (see Chart 1).

Next, the effect of looser mortgage lending standards on future defaults (for example, higher LTI and LTV ratios) is assessed in a second exercise. The information on Spanish banks in the European DataWarehouse (EDW) – a mortgage-backed securitisation data repository – is used for this purpose. Although this database only contains securitised loans, it has loan-level historical data on the borrowers' individual LTI ratio which are not available from other sources. Specifically, it provides information on more than 232,000 mortgage loans granted from 1999 to

Chart 1  
IMPACT OF CREDIT STANDARDS ON RATE OF CHANGE OF MORTGAGE LENDING (a)

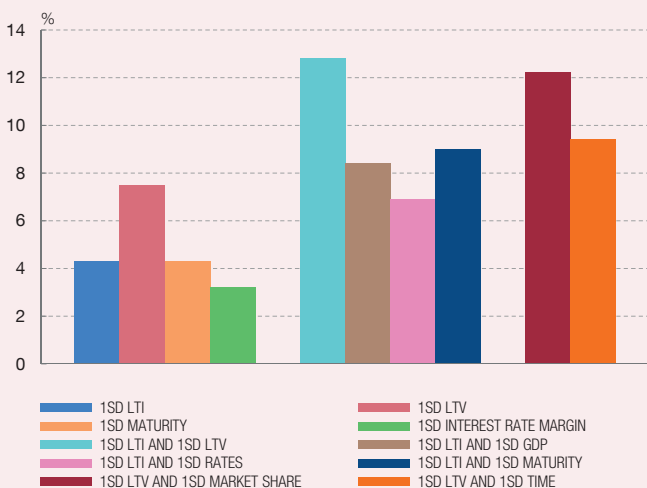
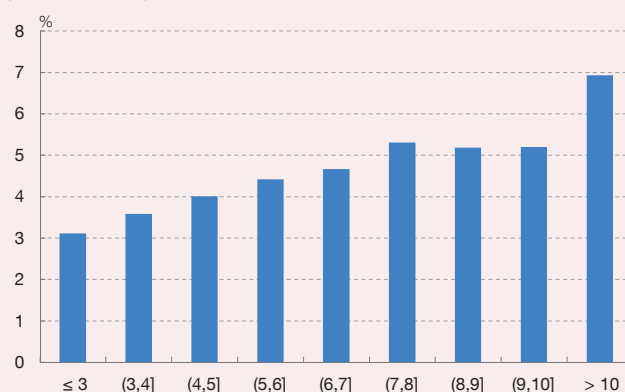


Chart 2  
PD OF MORTGAGE LOANS BY LOAN-TO-INCOME RATIO BRACKET (HORIZONTAL AXIS) (b)



SOURCES: Banco de España, Agencia Estatal de Administración Tributaria, INE and European DataWarehouse.

- a The chart shows the effect of certain variables on the annualised rate of change of mortgage lending using an econometric model that controls for postcode fixed effects that change over time to capture local demand. Specifically, the chart shows the direct impact of a one standard deviation change in the LTI, LTV, the maturity and the interest rate margin, and the combined impact of some of these changes in terms and conditions and one standard deviation changes in other variables: higher LTV, GDP and longer average maturity, and lower interest rate, interest rate margin, market share and shorter bank presence in the postcode.
- b The chart shows the probabilities of default or of foreclosure of a sample of securitised loans, calculated using a duration model that considers loan terms, which include the LTI and LTV ratios, at loan origination. Specifically, the chart shows the survival rates conditioned by the loans' LTI brackets.

## THE EFFECT OF CREDIT STANDARDS FOR MORTGAGE LOANS ON CREDIT GROWTH AND ON DEFAULT RISKS ASSUMED

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Chart 3  
PD OF MORTGAGE LOANS BY LOAN-TO-VALUE RATIO BRACKET (HORIZONTAL AXIS) (a)

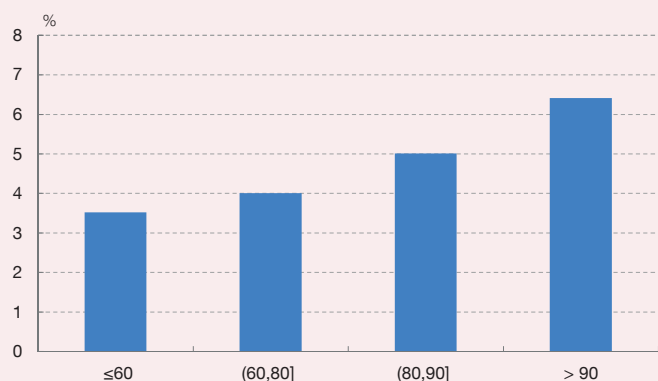
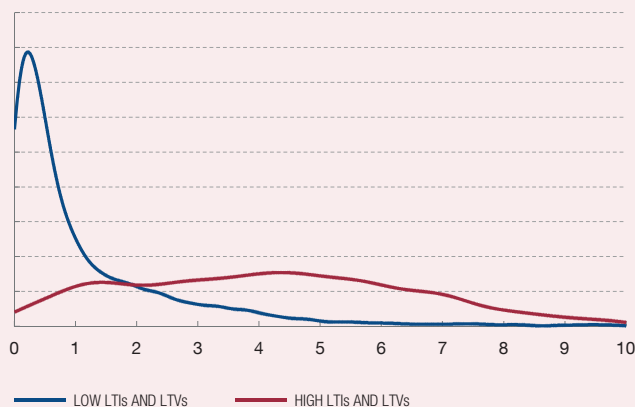


Chart 4  
DISTRIBUTION OF THE PDs OF MORTGAGES WITH LOAN-TO-INCOME AND LOAN-TO-VALUE RATIOS AT DIFFERENT LEVELS (b)



SOURCES: Banco de España and European DataWarehouse.

- a The chart shows the probabilities of default or of foreclosure of a sample of securitised loans, calculated using a duration model that considers loan terms, which include the LTI and LTV ratios, at loan origination. Specifically, the chart shows the survival rates conditioned by the loans' LTV brackets.
- b The chart shows the density functions of the probabilities of survival of loans with LTIs and LTVs below the median ("Low LTIs AND LTVs") and with LTIs and LTVs above the median ("High LTIs AND LTVs") of a sample of securitised loans. The density functions are approximated using a kernel estimator, which enables a non-parametric estimation and provides a continuous, smoothed graphical representation of the functions.

2007,<sup>10</sup> which allows the influence of mortgage lending standards during the global financial crisis to be measured.

Based on the EDW data, the probability of default (PD) on mortgages is modelled using a duration model, which estimates the probability of survival (inverse of the PD) in the loan life based on its features, such as lender, year of origination, province in which the property is located, certain borrower attributes, such as employment status, and some additional aspects, including the variables under analysis: LTV and LTI ratios at the loan origination date. The probability-of-survival estimation horizon in these exercises is 25 years, which coincides with the current average mortgage term at origination.

The results show that loans with looser credit standards (higher LTI or LTV ratios) generally have lower levels of survival. For example, with all other loan features remaining constant, loans with high LTI ratios – above 6 – have a probability of default 2 pp to 4 pp higher than loans with lower LTI ratios – below 3 – (see Chart 2). The behaviour of the LTV ratio is similar in qualitative terms (see Chart 3). The results reveal some non-linearities, since loans with a

very high LTI ratio (above 10) or with a very high LTV ratio (above 90%) show a particularly high risk compared with those standing at lower thresholds.

At the same time, based on an additional exploratory analysis, the probability of default would increase significantly in stressed scenarios of a fall in GDP or interest rate rises, reflecting how mortgages with higher LTI or LTV ratios would be more sensitive to a worsening in economic and financial conditions.

Therefore, a credit expansion prompted by an excessive easing of credit standards (higher LTI and/or LTV ratios) would result in a larger share of troubled loans. Based on the model, *ceteris paribus*, a one standard deviation increase in the observed average value of the LTI (2.6 expressed as a decimal) or the LTV (0.21 expressed as a decimal) ratio would raise the probability of default by slightly over 0.5 pp. This impact would be stronger taking into account that the borrower population is uneven. Indeed, high LTI or LTV borrowers tend to have lower and more unstable income, which is associated with higher default rates, particularly during periods of stress. This

<sup>10</sup> The sample corresponds to mortgages which reflect all the borrowers' income.

**THE EFFECT OF CREDIT STANDARDS FOR MORTGAGE LOANS ON CREDIT GROWTH AND ON DEFAULT RISKS ASSUMED**

(cont'd)

circumstance would explain that the expected survival varies considerably for borrowers based on their LTI and LTV ratio levels, even if stress scenarios for the macroeconomic variables are disregarded (see Chart 4). This result points to the significant potential effects of changes in credit standards on the composition of the mortgage loan portfolio.

In sum, this specific analysis of Spanish mortgage loans confirms the hypothesis of opposing effects in the event of an easing of credit standards. Such an easing may boost credit growth, which is associated with stronger activity and greater access to funding for house purchase, but also with increased risk-taking, making households more vulnerable to potential macroeconomic shocks. These results point to the crucial importance of further developing

databases and methodologies to obtain in-depth knowledge of the links between credit standards and macro-financial risks.

This analysis also corroborates the important role that macroprudential tools applied to credit standards could play in the event credit standards are eased excessively. Despite the short-term costs to economic growth that would result from establishing limits on a potential loosening of credit standards, the impact of too high LTI and LTV ratios on future credit quality is significant and could have a destabilising effect on the financial system as a whole. In Spain, most credit standards have remained stable at prudent levels in recent years, which reduces the banking sector's vulnerabilities to a potential deterioration in the macroeconomic situation.