

MACROPRUDENTIAL POLICY IN PORTUGAL: EXPERIENCE WITH BORROWER-BASED INSTRUMENTS

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Abstract

A borrower-based macroprudential policy measure was recently adopted in Portugal targeting new loans for households, including both mortgage and consumer credit. The macroprudential measure recommends limits to LTV ratios, DSTI ratios and maturities of new loans, and the regular payments of interest and capital. The measure also encompasses interest rate and income shocks in its design. The purpose of this policy action is to ensure that credit institutions and financial companies do not take excessive risk when granting new household loans, promoting the resilience of the financial sector and the access of borrowers to sustainable lending. Taking into account the innovative and complex nature of the measure, this paper shares the Portuguese experience in operationalising borrower-based measures and discusses its appropriateness in light of the risks, the policy goals and the timing of the policy action.

1 Introduction

Banco de Portugal is responsible for promoting the stability of the financial system in Portugal. As the Portuguese macroprudential authority, Banco de Portugal identifies, assesses and monitors systemic risk and adopts measures aimed at preventing, mitigating or reducing this risk, so as to reinforce the resilience of the financial sector. Pursuant to its Organic Law and other applicable legislation, Banco de Portugal may issue orders, warnings and recommendations to public or private entities and authorities to meet its macroprudential policy goals.¹

In accordance with its mandate, on 1 February of 2018 Banco de Portugal issued a recommendation on new loans to households, including credit secured by residential immovable property, credit secured by a mortgage or equivalent guarantee, and consumer credit. This macroprudential measure was adopted with a view to introducing limits to some of the criteria that institutions use in the assessment of borrowers' creditworthiness, such as loan-to-value (LTV) ratios, debt-service-to-income (DSTI) ratios and maturities. In addition, it also introduced regular interest and principal payment requirements. The measure, translated into a recommendation that follows the 'comply or explain' principle, is addressed to all entities authorised to grant credit in Portugal and was implemented as of 1 July 2018.

The macroprudential measure aims at taking pre-emptive action in the field of household credit, in a context characterized by some easing of credit standards and the expectation of intensification of this trend, coupled with a high level of indebtedness and a low saving rate of Portuguese households. The measure is targeted at strengthening the adoption of prudent credit standards by the Portuguese financial system, improving its ability to withstand adverse shocks. By defining prudent credit standards in lending to the household sector, this measure also promotes the access of borrowers to sustainable financing and mitigates the risk of default. Given that the identified risks are still in an early build up stage, the macroprudential measure was designed to have an impact on loans to borrowers with a riskier profile, without significantly affecting lending activity to households in general. Overall, the measure mitigates the build-up of systemic risk related to excessive risk-

¹ According to the legal framework established in Portugal and in line with the formal mandate of Banco de Portugal as macroprudential authority, the National Council of Financial Supervisors plays an advisory role to Banco de Portugal in macroprudential matters. Furthermore, cooperation with the other two national financial supervisors – the Portuguese Securities Market Commission, which supervises and regulates the securities market and the Insurance and Pension Funds Supervisory Authority, which is responsible for supervising and regulating the insurance and pension funds sector – takes place under the auspices of the National Council of Financial Supervisors, in which the three national supervisors are represented.

taking by both lenders and borrowers, thus preventing potential serious consequences for the financial system and the economy going forward.

As also addressed by European Union and national legal initiatives governing credit to households, the macroprudential measure reinforces the importance of promoting an adequate assessment of risk in this type of credit, by assuming that a household loan should only be granted when the result of the creditworthiness assessment confirms that the borrower is likely to comply with the obligations of the credit agreement.

The macroprudential measure adopted by Banco de Portugal is in several aspects quite innovative and rich, taking into account the international experience with borrower-based instruments. First, it is pioneering since it targets both housing and consumer lending, while the common approach followed by other countries is to define limits to credit standards that only apply to mortgage credit. To the extent of our knowledge, among European countries, only Romania, Czech Republic and Slovakia have adopted measures on consumer lending. Second, the richness of the measure lies in the simultaneous introduction of limits to three instruments – LTV, DSTI and maturity – with a view of reinforcing their effectiveness by overcoming some shortcomings of each instrument when implemented single-handedly. Furthermore, the measure considers interest rate and income shocks in the calculation of the DSTI.

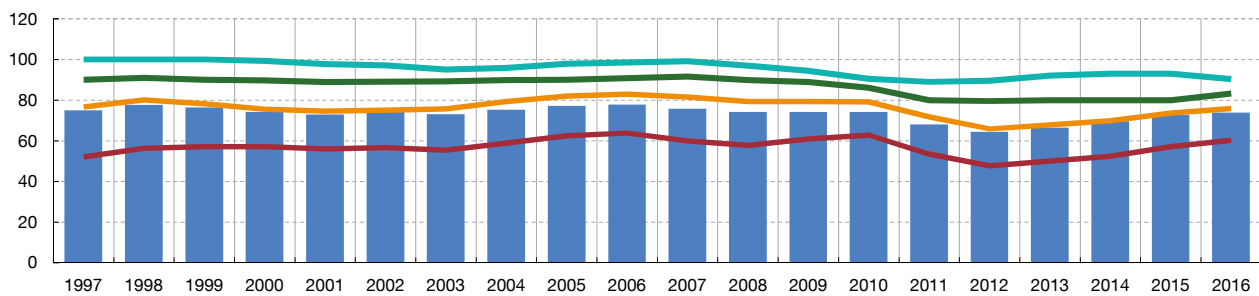
In this paper we recall the several stages of the decision and implementation process of the macroprudential measure, framed by the pillars of macroprudential policy strategy adopted by Banco de Portugal.² We start by providing an overview of the risk assessment that motivated this policy action and we introduce the policy objectives and the main components of the measure. As part of the design and calibration process, we discuss the selection of macroprudential instruments, their transmission mechanisms and the preference for a specific combination of macroprudential policy instruments, based on the assessment of the associated costs and benefits. Some features of the macroprudential measure reflect the need to establish a bridge between the legacy of the crisis, namely the level of non-performing assets, and the potential build-up of risks going forward. The interaction of the macroprudential measure with other policy fields, such as monetary policy and banking conduct supervision, was also a key concern of Banco de Portugal and is addressed in this paper. Another pillar of the macroprudential policy strategy relates to the communication of the adopted instruments. The tailor-made external communication strategy for borrower-based measures followed by Banco de Portugal is also worth sharing in this paper. Additionally, we discuss the Portuguese experience with borrower-based measures so as to point out knowledge gaps that, in our view, still persist. Finally, we conclude by dwelling on the way forward concerning policy monitoring and evaluation.

2 Risk assessment and policy objectives

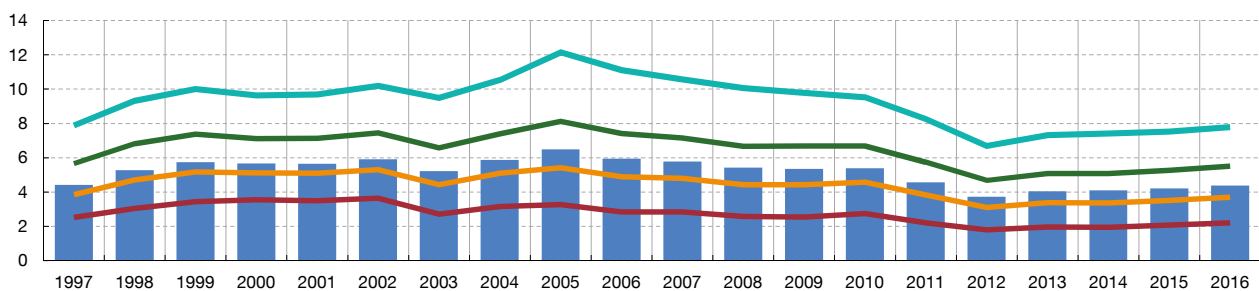
From the assessment of vulnerabilities and risks related to credit granted to households – both mortgage and consumer credit – Banco de Portugal identified some easing of credit standards in household lending. In fact, amid the economic recovery, the prolonged low interest rates environment, and the strong increase of new lending to households, although the outstanding amount of housing loans is still declining, the easing of credit standards could hamper financial stability in the future. These credit dynamics occur in a context characterized by still high household indebtedness, low saving rate and high exposure of the financial system to credit secured by residential real estate. In this context, it is worthwhile to highlight that, in Portugal, the proportion of owner occupied housing is among the highest of EU countries.

2 Banco de Portugal, *Macroprudential policy strategy*, December 2015.

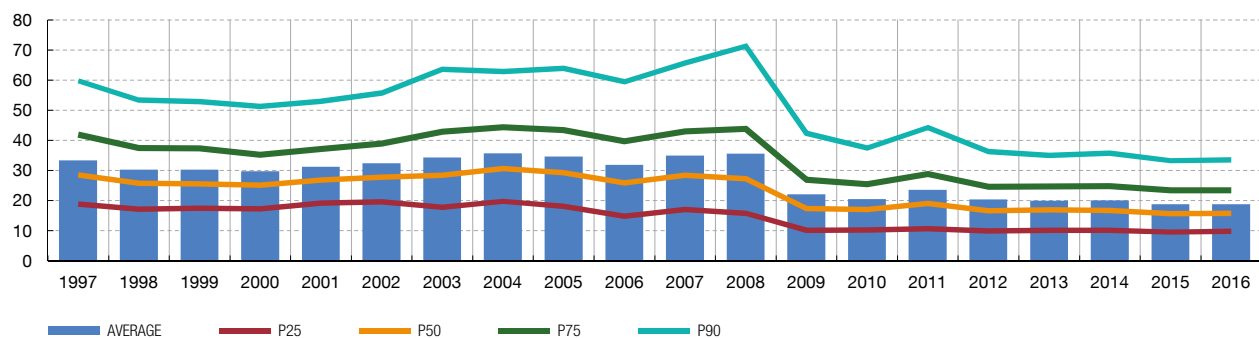
1 LTV AT ORIGINATION



2 LTI AT ORIGINATION



3 DSTI AT ORIGINATION



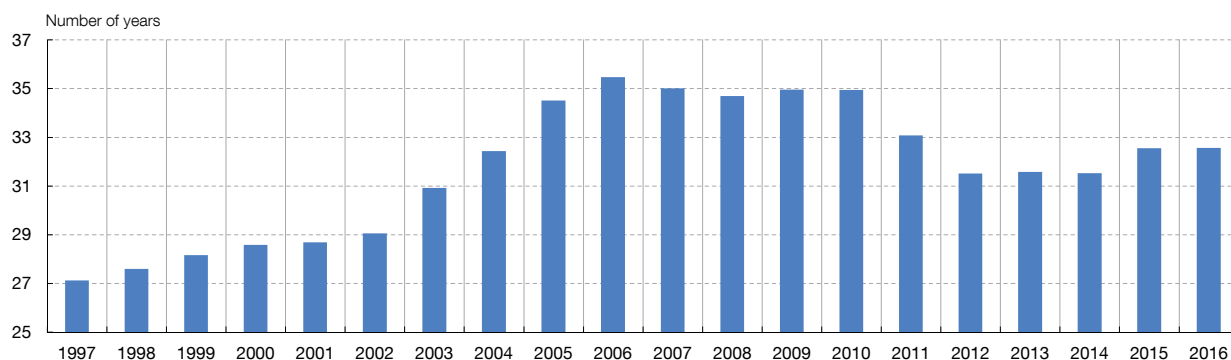
SOURCE: Banco de Portugal.

Note: Loan-level data collected for outstanding loans at year-end 2015 and 2016 through Instructions of Banco de Portugal.

A protracted low interest rate environment, coupled with the recovery of the economy and an improving real estate market, creates incentives for greater competition among banks and the consequent easing of credit standards. The current economic and financial conditions bolster demand for credit and may encourage the granting of credit to borrowers with a riskier profile, thus increasing the likelihood of default, in the case of short term interest rates increases and / or economic conditions deterioration.

There is evidence of some easing in credit standards in both mortgage and consumer credit in Portugal.³ For example, in the case of mortgage credit, the recent evolution of LTV, LTI ratios and loans maturities at origination of credit shows some signs of credit standards starting to be loosened (Chart 1). Following a tightening after the financial crisis,

³ See the Background document published by Banco de Portugal on 1 February 2018.



SOURCE: Banco de Portugal.

the LTV and LTI ratios reversed this trend since 2012, indicating less restrictive credit standards practiced by Portuguese banks in mortgage loans. The DSTI ratio at origination did not follow the same trend as LTV and LTI ratios: it was high until the onset of the financial crisis, following a downward path from that period onwards. The diverging path followed by DSTI ratios was driven by the effect of the decrease of short term interest rates that was observed throughout this period. As concluded in a study by Banco de Portugal, based on loan-level data collected for outstanding loans at year-end 2015 and 2016, high LTV, LTI and DSTI ratios tend to be associated with a higher default rate, in the absence of other factors that could mitigate credit risk.⁴

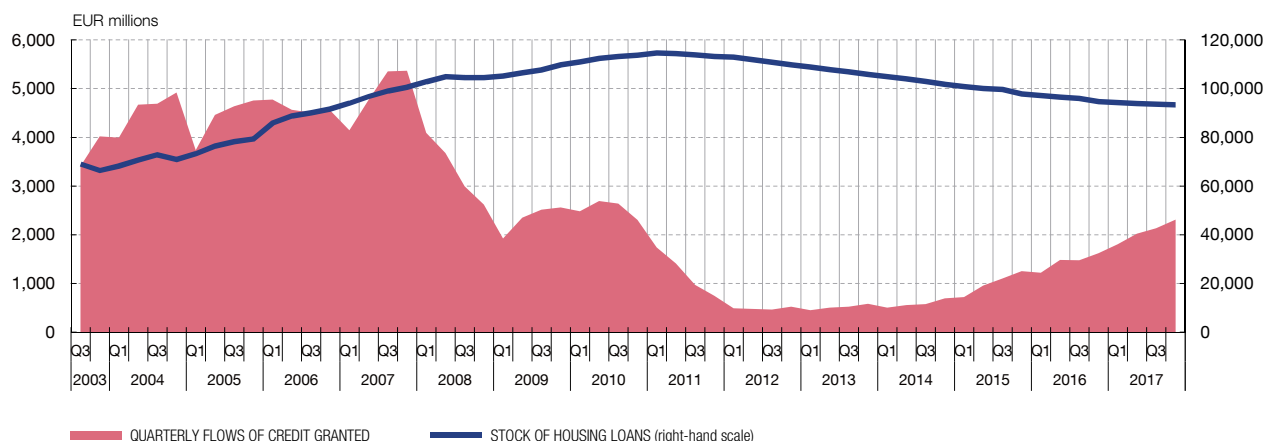
As mentioned, the easing of credit standards in new lending to households, especially in the case of credit secured by residential immovable property, also included the lengthening of the loan original maturity (Chart 2). From 2015 onwards the average maturity of new credit secured by residential immovable property increased further each year, reaching 33 years in 2016, which corresponds to a high level by European standards.⁵ Moreover, a significant share of new credit secured by residential immovable property has a 40-years maturity, according to the information provided by a sample of institutions which account for a very high share of this category of loans to households.

Longer maturities (up to 50 years) are reported by some institutions, which also grant credit to borrowers whose age significantly exceeds the expected retirement age at the expiry of the loan. The projections of replacement rates of the public old-age pensions system in Portugal point to the likely reduction in income that will tend to occur with the transition from working life into retirement [see European Commission (2018)]. These projections should be considered in the assessment of the borrower creditworthiness, so as to avoid the emergence of risks for financial stability in the long term related to situations of great financial vulnerability of borrowers and risk of default.

The trend of lengthening loan maturities has also occurred in consumer credit in recent years. The *Retail Banking Markets Monitoring Report* for 2015, 2016 and 2017 indicates that, in those years, average maturity increased in most consumer credit sub-segments. For example, car loans granted in 2017 presented an average maturity of 6.7 years and

⁴ See Banco de Portugal, *Financial Stability Report*, June 2017, Special Issue 3 “Banking sector’s exposure to mortgage loans: analysis of LTV and LTI/DSTI and implications for financial stability”.

⁵ Banco de Portugal (2018), *Retail Banking Markets Monitoring Report 2017*.



SOURCE: Banco de Portugal.

there is an increase in the importance of this credit segment with longer maturities. Notwithstanding this trend, the original maximum maturity in consumer loans has not exceeded 10 years so far.

Another sign of credit standards becoming less restrictive is related to the narrowing of credit spreads in new lending to households in recent years. After peaking in 2011, average spreads on new lending to households for house purchase have been declining considerably, even though their level remains clearly above the average spreads observed immediately before the financial crisis.

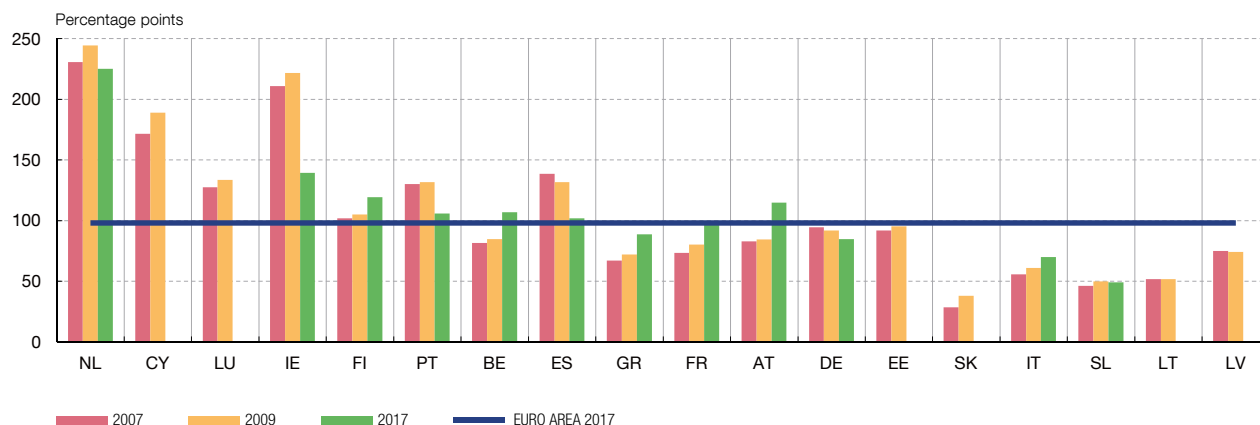
The Portuguese banking system is particularly exposed to residential real estate market developments, mainly through credit to households secured by residential immovable property, which accounted for 28% of total assets by the end of 2017. Despite of some easing in credit standards in new loans, the stock of housing credit continued to decline, although at a slower pace than observed in recent years (Chart 3). In turn, the amount of new business on housing credit has been increasing since 2013 and accelerated from 2015 onwards, albeit still remaining below the levels reported before the financial crisis. These developments have been determined, to a large extent, by new borrowers joining the credit market, i.e. households that in the previous year did not have any loans granted by resident financial institutions [see Banco de Portugal (2018b)]. At the same time, there was a significant amount of early repayments of housing loans granted in the past, without the borrowers being granted a new loan.

The stock of consumer credit has also reported high growth rates in recent years and these dynamics have also been dominated by new borrowers.

In Portugal, mortgage loans account for the most significant share of household indebtedness (around 72% in 2017), although consumer credit has been increasing its weight in the total. Despite of its steady decline in the past few years (more than 20 percentage points between 2012 and 2017), a key vulnerability of the Portuguese economy and financial system is the still high level of aggregate household indebtedness ratio (around 106% of disposable income in 2017) (Chart 4). The increase in the outstanding amount of consumer loans coupled with the strong

PRIVATE INDIVIDUALS' INDEBTEDNESS RATIO

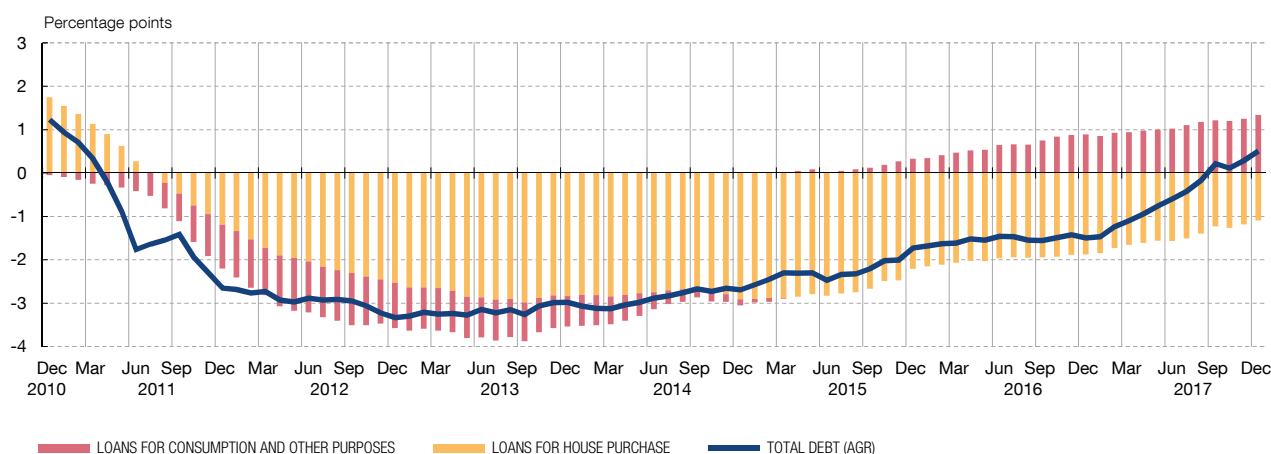
CHART 4



SOURCES: Banco de Portugal and Statistics Portugal.

CONTRIBUTIONS TO THE ANNUAL RATE OF CHANGE OF PRIVATE INDIVIDUALS' TOTAL DEBT

CHART 5

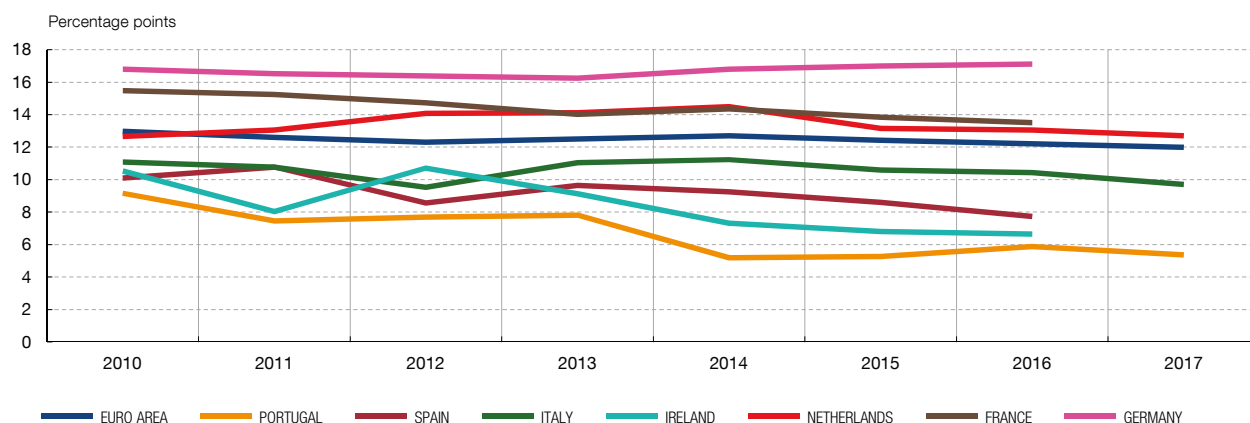


SOURCE: Banco de Portugal.

NOTE: Total debt includes loans and trade credits granted by the resident financial system, by other resident sectors (excluding private individuals) and by non-residents. Annual growth rates (AGR) are calculated on the basis of an index computed from adjusted transactions, i.e., end of period outstanding amounts' changes adjusted for reclassifications, write-offs, exchange rate and price changes and, whenever relevant, securitisation operations and outright sales. The total debt AGR stems from adjusted transactions of loans for house purchase and consumption (whose contribution is presented in the chart), and of loans for purposes other than house purchase and consumption, and trade credits.

growth of new housing loans have determined a slowdown in the decreasing path of the household indebtedness ratio. It is thus desirable, at this stage, to ensure that the current credit dynamics do not jeopardize the favourable decline of household indebtedness (Chart 5).

Evidence indicates that most debt is concentrated in middle-income households, who show significant shares of mortgage credit with debt service-to-income ratios close to critical values [Banco de Portugal (2018b)]. Furthermore, in spite of some measurement uncertainties, the saving rate of Portuguese households stands at rather low levels in international terms (Chart 6). The low saving rate and the still high households' indebtedness



SOURCE: Eurostat.

NOTE: The gross saving rate of households (including Non-Profit Institutions Serving Households) is defined as gross saving divided by gross disposable income, with the latter being adjusted for the change in the net equity of households in pension funds reserves. Gross saving is the part of the gross disposable income which is not spent as final consumption expenditure.

renders households more vulnerable to reductions in income and increases in short-term interest rates.

In Portugal, there are specific structural factors of the lending markets that may amplify or mitigate the shocks to financial stability. One important structural factor is the predominance of the floating rate regime in the mortgage credit market. This feature suggests that the interest rate pass-through to households' mortgage rates is faster in the Portuguese economy. However, in the last few years, mixed interest rates regime gained importance in new mortgage loans.

This structural characteristic of the mortgage lending market was beneficial for Portuguese households when the monetary policy interest rates began to decrease and remained at very low levels, because the accommodative monetary policy stance eased their debt-service burden. However, after a protracted period of short term interest rates at record low levels, market expectations point to an increase in the near future, although at a gradual pace.

In light of the conclusions of the risk assessment, with evidence of some easing of credit standards and expectations of further strengthening of this trend in the near future, Banco de Portugal deemed appropriate to recommend the setting of maximum limits to some of the credit criteria used by financial institutions in the assessment of the borrower's creditworthiness, indicating to both borrowers and lenders the need to pursue prudent credit standards in household lending.

At this initial stage of risk build-up, in a context of still high household indebtedness, economic recovery, very low interest rates and expectations of a gradual increase in the near future and an improving residential real estate market, the anchoring of credit standards at prudent levels is key to reinforce the resilience of the financial sector, by ensuring that the dynamics of credit granted to households do not promote the build-up of excessive risk in banks' balance sheet and that borrowers have access to sustainable funding, minimizing their risk of default.

LTV limits (Recommendation A)	<ul style="list-style-type: none"> – LTV \leq 90% - New credits secured by residential immovable property for the purchase or construction of own and permanent residence – LTV \leq 80% - New credits secured by residential immovable property or credit secured by a mortgage or equivalent guarantee for other purposes than own and permanent residence – LTV \leq 100% - New credits secured by residential immovable property and credit secured by a mortgage or equivalent guarantee for purchasing immovable property held by the institutions themselves and for property financial leasing agreements – The value of the property pledged as collateral is given by the minimum between the purchasing price and the appraisal value
DSTI limits (Recommendation B)	<p>DSTI \leq 50%, with the following exceptions on the total amount of credit granted by each institution in each year:</p> <ul style="list-style-type: none"> – up to 20%: DSTI \leq 60%; and – up to 5%: no DSTI limit <p>For the calculation of the DSTI, monthly instalments of new loans are assumed constant over the entire period of the loan. For variable and mix interest rate loans, the impact of an interest rate rise should be considered. The DSTI should also take into account the impact of a reduction in the borrower's income, if the borrower's age at the term of the loan contract is higher than 70 years old, except if the borrower is already retired at the time of the creditworthiness assessment</p>
Maturity limits (Recommendation C)	<p>For new loans secured by residential immovable property or credit secured by a mortgage or equivalent guarantee:</p> <ul style="list-style-type: none"> – Maturity \leq 40 years – Average maturity of new loans should gradually converge to 30 years until the end of 2022 <p>For new consumer loans:</p> <ul style="list-style-type: none"> – Maturity \leq 10 years
Requirement of regular payments (Recommendation D)	New loans should be granted with regular payments of interest and capital. The use of mechanisms such as the introduction of grace periods or forbearance should be reserved for loans intended to prevent or address arrears situations. Institutions must fully justify the existence of other types of loans

SOURCE: Banco de Portugal.

3 Overview of the macroprudential borrower-based measure adopted by Banco de Portugal

Banco de Portugal announced the macroprudential measure on 1 February 2018 and allowed a five months period for institutions to adapt their IT systems to the new requirements, namely to collect the necessary information. The macroprudential measure covers all new loans to households⁶ concluded from 1 July 2018 onwards falling within the scope of the recommendation.

The macroprudential measure takes the legal form of a recommendation that follows the “comply-or-explain” principle. This means that institutions are expected to comply with the recommendation. If they do not, they need to explain why and Banco de Portugal will assess the adequacy of the explanations provided by banks. Even when using the exceptions considered in the recommendation (and detailed below), institutions need to present the risk mitigants that in their view allows them to use the exceptions. The choice for a non-binding legal instrument was warranted taking into account the need to gather experience with the implementation and potential impact of such innovative and complex macroprudential measure. In the following we describe in detail the main components of the macroprudential measure.

Table 1 presents an overview of the main features of the measure – limits to LTV, DSTI, maturities and requirements of regular payments of capital and interest – while the other components are presented subsequently.

⁶ Household refers to a credit consumer that is a natural person who acts for purposes other than those of his or her commercial or professional activity in the credit agreements covered by the provisions of Decree-Law No. 133/2009 and Decree-Law No. 74-A/2017.

The recommendation applies to new loans secured by residential immovable property, credit secured by a mortgage or equivalent guarantee and consumer credit.⁷ According to the definition in the recommendation, a new loan is defined as a credit agreement whereby an institution grants or promises to grant credit to a household under the form of a loan, payment deferment, revolving credit or any other equivalent financial agreement, including financial leasing. This definition also applies to any credit, including credits granted before 1 July 2018, that is subject to changes of their terms and conditions after that date. The limits apply to all entities authorised to grant credit in Portugal, namely credit institutions and financial companies that have their head office or a branch in Portuguese territory and should be adopted upon conclusion of a credit agreement. The encompassing scope of the measure contributes to the prevention of potential competition distortions in the credit market.

There are several exclusions to the scope of the recommendation, that in some cases reflect other provisions already in place in Portugal concerning the regulation of creditworthiness assessment of borrowers and other legal provisions. These exclusions also reduce the costs arising from the implementation of the measure (as addressed in more detail in Section 4.1). Banco de Portugal will monitor developments of excluded loans to guarantee the effectiveness of the measure.

The scope of the recommendation excludes:

- Overrunning⁸ and loans intended to prevent or address arrears situations namely through refinancing or consolidation of other credits, as well as through the renegotiation of the terms and conditions of already existing loans.
- Loans for a total amount equal to or lower than the equivalent to tenfold the guaranteed monthly minimum wage, in accordance with the provisions of Notice of Banco de Portugal No. 4/2017. Specifically, in the event of a loan concluded for a total amount equal to or lower than the equivalent to tenfold the guaranteed monthly minimum wage, institutions may estimate the consumer's regular income based on sufficient information obtained from the potential borrower, and are not required to gather evidence of this income to assess the consumer's creditworthiness.
- Loans in the form of an overdraft facility and other credit with no defined repayment schedule (including credit cards and credit lines).

Although excluded from the scope of the macroprudential measure, all these loans should be considered in the calculation of the DSTI limit, provided that they present a defined repayment schedule.

In accordance with Recommendation A, new loans secured by residential immovable property and credit secured by a mortgage or equivalent guarantee should observe the limits presented in Table 1. The LTV ratio is calculated as the ratio of the total amount of loans secured by immovable property to the value of the immovable property. The numerator

⁷ There are exceptions set forth in Decree-Law No. 74-A/2017 and Decree-Law No. 133/2009 that also apply to the scope of the recommendation.

⁸ Overrunning means the overdraft tacitly accepted by the creditor, allowing consumers to have at their disposal funds in excess of the balance of their deposit account or of the agreed overdraft facility.

Interest rate regime	Maturity of the contract and increase in the reference rate		
	Up to and including 5 years	More than 5 and up to and including 10 years	Over 10 years
Variable and mixed (a)	+1 pp	+2 pp	+3 pp

SOURCE: Banco de Portugal.

NOTE: pp refers to percentage points.

a In the case of loans at a mixed interest rate, the institution should consider the higher instalment for the customer between that resulting from applying the increase in the reference rate, taking into account the maturity of the agreement in the variable interest rate period, and that resulting from the fixed rate period.

should consider the amount of a loan or loans secured by the same immovable property, thus considering the whole credit (fully or partially) secured by mortgages on the same property (linked credit) with a view to preventing regulatory arbitrage. In the denominator, the immovable property value should correspond to the minimum between the purchase price and the appraisal value of the immovable property pledged as collateral.⁹ The definition of the LTV ratio denominator is consistent with the Recommendation of the European Systemic Risk Board (ESRB) on closing real estate data gaps.

Recommendation B – Limits to the DSTI

Generally speaking, the DSTI is the ratio of the total amount of monthly instalments associated with the borrower's loans to his/her income (applied limits and exceptions are presented in Table 1). However, as set forth in the recommendation, there is a set of carefully considered specificities in the calculation of both the numerator and denominator of the DSTI ratio in light of the conclusions of the risk assessment and the policy goals.

As such, the calculation of the DSTI ratio numerator should consider:

- The instalments of loans already granted and the instalments of the new loan. The total amount of monthly instalments for all loans refers to the sum of instalments paid on a monthly basis regarding all of the borrower's loans, as reported in the Portuguese Central Credit Register, including the case of instalments of loans falling outside the scope of the recommendation, provided that they present a defined repayment schedule. The monthly instalment of the new loan should be calculated assuming that it is constant throughout its lifetime and consider the impact of an increase in the interest rate.
- The impact of an interest rate rise varies depending on the loan's original maturity and the interest rate regime (Table 2). The purpose of an interest rate test is to assess whether borrowers are able to withstand the increase in the debt service burden resulting from an expectable rise in the reference rates. It is important to underline, though, that the value of the effective DSTI ratio at the time the loan is granted for each borrower will be lower, because it will be calculated based on the current interest rate in order to create a buffer to withstand future increases in interest rates.

⁹ The property valuation should follow the guidelines set forth in the legal framework applicable to real estate appraisers, provided for in Law No. 153/2015 of 14 September 2015 governing the taking up and pursuit of the business of real estate appraisers providing services to entities within the Portuguese financial system.

The denominator of the DSTI should consider:

- The annual income of a borrower (divided by 12 months). Income is defined as the annual income of a borrower, less taxes and compulsory social security contributions, as per the latest tax statement and/or information on income received in the three months before the creditworthiness assessment.
- A reduction of, at least, 20% in the borrowers' income as of the age of 70, given that a material decrease is expected in the transition from working life into retirement. In the event the loan only has one borrower and assuming a reduction in income of at least 20%, the income to be considered for calculating the DSTI (Inc_{DSTI}) results from a weighted average, as described in the formula below:¹⁰

$$\text{Inc}_{\text{DSTI}} = x_1 \times \text{Inc} + x_2 \times \text{Inc} \times (1 - \alpha)$$

Where:

Inc: Current monthly net income of the borrower;

x_1 : Number of years along the lifetime of the loan in which the borrower is aged 70 or less divided by the total number of years of the loan;

x_2 : Number of years along the lifetime of the loan in which the borrower is aged over 70 divided by the total number of years of the loan;

$\alpha \geq 0.2$.

The consideration of increases in interest rates and decreases in income for the purposes of calculating the DSTI are in line with the European Banking Authority's Guidelines on the creditworthiness obligation. These Guidelines state, in particular, that if the maturity of the loan is extended beyond the borrower's expected retirement age, institutions should pay special attention to whether the borrower's probable income is adequate or if he/she is able to continue complying with the obligations resulting from the loan during retirement.

Finally, institutions may consider other important risk-mitigating elements other than the LTV and DSTI criteria, such as the existence of guarantors or additional guarantees. Hence, to prevent any disruptive impact on credit granting, the following exceptions have been introduced to the 50% limit to the DSTI: up to 20% of the amount of loans granted every year by each institution may exceed this limit, provided the DSTI, calculated according to recommendation B, is less than or equal to 60%. Institutions are also allowed to exceed these limits up to 5% of the credit amount granted every year. This exception may be particularly important, for example, in the case of loans for financing education services. Should credit institutions use these exceptions, they will have to submit to Banco de Portugal an explanation based on additional risk-mitigating elements considered in the loans covered by the exception, for an assessment of the compliance with the macroprudential measure.

¹⁰ As regards credits with more than one borrower and in which information on aggregate income is only available for the group of borrowers, the age of the borrower with the earliest date of birth will be considered for the purpose of calculating the reduction in income.

Assessment of the compliance with the macroprudential measure

The efficacy and effectiveness of a macroprudential measure depend on the degree of compliance by institutions. Acknowledging that the monitoring process is key for the success of the measure, Banco de Portugal needs to have access, in a timely way, to the relevant data and information for monitoring the respective compliance. Hence, institutions should ensure that they have the suitable means and processes to comply with it – in fact, the five-month period between the announcement of the recommendation and its application was provided with this purpose. Banco de Portugal will assess the adequacy of the justifications presented by institutions for not complying with the recommendation. Should Banco de Portugal consider the justifications presented by institutions to be inadequate, it may issue other measures within its competences as the national macroprudential authority. Banco de Portugal will monitor the implementation of the recommendation at least once a year and may require additional information to be reported.

Adequate risk management criteria

Institutions should apply adequate risk management criteria in all credit transactions, including those covered by the macroprudential measure. The limits introduced correspond to caps and do not replace the institutions' mandatory assessment of the adequacy of the values of the different indicators and other relevant criteria used in the assessment of each borrower's creditworthiness.¹¹ This means that a loan should only be granted when the outcome of the borrower's creditworthiness assessment indicates that the obligations resulting from the credit are likely to be met in the manner required under that credit's terms and conditions.

Complementarity of the macroprudential measure with other pieces of legislation

The macroprudential measure reinforces the importance of promoting an adequate assessment of risk in lending to households, which has also been addressed by a number of European Union and national legal initiatives governing loans for households. At the European level stands out the "Mortgage Credit Directive"¹², and the Directive on credit agreements for consumers¹³. At national level, the Notice of Banco de Portugal No. 4/2017 of 22 September 2017 lays down the principles and rules to be observed by institutions in the creditworthiness assessment. In accordance with this Notice, a household loan shall only be granted where the outcome of the borrower's creditworthiness assessment indicates that the obligations resulting from the credit are likely to be met in the manner required under its terms and conditions.

4 Appropriateness of the macroprudential measure

In this section, we explain why Banco de Portugal considers that this borrower-based macroprudential measure is appropriate to address the identified vulnerabilities and systemic risk and pursues the stated policy goals of reinforcing the resilience of the banking sector to withstand adverse shocks and promoting the access to sustainable financing by borrowers, minimizing their probability of default. Essentially, to design and implement an adequate macroprudential policy action a policymaker needs to answer three questions: 1. What are the risks? 2. What are the policy goals? 3. How is the macroprudential authority going to tackle the risks and achieve the policy goals?

In what follows, we explain the rationale underlying the selection of the macroprudential instruments, focusing, in particular, on their transmission channels, and how these instruments may be effective in addressing the identified risks to attain the policy

11 As provided for in Notice of Banco de Portugal No. 4/2017 of 22 September 2017 and other applicable legislation.

12 Directive 2014/17/EU of 4 February 2014 on credit agreements for consumers relating to residential immovable property (the "Mortgage Credit Directive"), partially transposed by Decree-Law No. 74-A/2017 of 23 June 2017.

13 Directive 2008/48/EC of 23 April 2008 on credit agreements for consumers, transposed into Portuguese law through Decree-Law No. 133/2009 of 2 June 2009.

objectives. We also consider the business and credit cycles positions and the timing of the implementation of the measure in the design of the macroprudential measure.

4.1 SELECTION OF MACROPRUDENTIAL INSTRUMENTS

Banco de Portugal has at its disposal a set of macroprudential instruments that can be used to ensure financial stability and reinforce the resilience of the Portuguese financial system to adverse shocks. As set out in the macroprudential policy strategy framework of Banco de Portugal, the design of a macroprudential policy measure entails the selection of the most appropriate instrument or combination of instruments to address the identified systemic risk. In turn, the instruments selection process includes an assessment of their transmission channels, a cost/benefit analysis, an assessment of the leakages or potential regulatory arbitrage and the interaction with other policies.

The macroprudential toolkit adopted by Banco de Portugal includes instruments that, from a conceptual point of view, are deemed more appropriate in light of the systemic risks pointed out in the risk assessment and the stage of the business and credit cycles. The macroprudential toolkit comprises sectoral macroprudential tools that can be used in a targeted manner to build the resilience of the financial system, including capital-based tools, such as risk weights, and borrower-based instruments, such as limits on LTV ratios and caps to DSTI or loan-to-income (LTI) ratios.

There is evidence that both capital-based and borrower-based tools can be effective in increasing the resilience of borrowers and of the financial system to income, house price or interest rate shocks. On the one hand, risk weights requirements are adequate tools to increase the resilience of lenders, since they increase their ability to absorb losses. On the other hand, LTV and DSTI caps increase the resilience of borrowers to asset prices, income or interest rates shocks, but also of lenders by restricting the amount of lending relative to the borrower's income or collateral value and reducing the probability of default or the loss given default for the specific exposure. The borrower-based instruments directly impact on debt affordability and credit conditions faced by borrowers, while capital-based instruments directly impact on the resilience of banks by requiring higher capital levels.

Capital-based measures, such as risk weights add-ons, imply higher capital requirements for a specific credit exposure with the purpose of strengthening banks' resilience. Capital requirements apply to the stock of loans, so they are especially effective in the case of already accumulated risks, which usually characterize the expansion phase of the credit cycle.

As concluded in the risk assessment, the systemic risks related to household lending are still building up, as the stock of housing credit continues to decline and the amount of new business on housing credit has been gradually increasing but remains clearly below the pre-financial crisis levels. However, consumer credit is growing at a fast pace. Notwithstanding this, there is recent evidence of some easing of credit standards applied to loans granted to households and that this trend is expected to accelerate in a procyclical fashion, but this evidence also underlines that the overall credit standards applied to this segment are still significantly tighter than in the pre-crisis period.

In fact, the timing of the policy intervention is another key aspect to take into account when selecting the most appropriate macroprudential instruments and should be assessed together with the phase in the credit cycle. A preemptive and forward-looking macroprudential measure should act ahead of the accumulation of vulnerabilities and systemic risks, when vulnerabilities and systemic risks start to build up, but the likelihood

of risk materialization is low. Macroprudential instruments that have a direct impact on the flow of new lending are likely to be more effective in smoothing the cyclical fluctuations if they are activated in the build-up phase of the credit cycle. As such, borrower-based measures are seen as primary tools to be adopted in such a context.

The activation of borrower-based measures at this stage in the cycle has the purpose to anchor current credit criteria at standards that Banco de Portugal see as prudent, impeding them of deteriorating in future stages of the business and credit cycles. By acting pre-emptively, the policy measure prevents risks from building up, reducing the need for further policy measures in the future and for the adoption of stricter measures in later stages of the cycle. On the other hand, this policy measure also plays a non-negligent role in containing the risk of self-reinforcing credit and residential real estate prices spiral by promoting that credit standards remain appropriate.

Given the policy objectives, but also the initial stage of systemic risk build-up, Banco de Portugal considers the adoption of borrower-based measures more appropriate than capital-based instruments for two main reasons. First, borrower-based measures only impact on the flow of new credit and, depending on the way the limits are defined, they may only bind the access to credit by high risk profile borrowers. Second, borrower-based instruments may more directly enhance the sustainability of households' borrowing, which renders these tools more appropriate in a context of still high household indebtedness levels and low saving rate.

Against this background, we discuss the transmission mechanisms of borrower-based instruments, when single and jointly considered and we address their benefits and potential unintended effects. Borrower-based measures consist in the adoption of upper limits to variables, and, generally speaking, the limits are to be complied with at the moment the credit is granted, impacting on the flow of new lending.¹⁴ By having a direct effect on lending terms and conditions, a tightening of borrower-based measures affect households' borrowing capacity and lending flows in the short term (and also the stock of lending in the long term). In addition, by restricting the amount of lending relative to households' income or the value of collateral, these instruments reduce the probability of default of borrowers and the loss given default for the specific exposure, improving the soundness of banks' portfolios and their resilience to withstand shocks related to house prices reductions or default of borrowers. Borrower-based instruments also increase resilience of the households by limiting the degree of households' leverage, which is beneficial in case of the materialisation of risks related to interest rates, house prices or income adverse shocks.

Moreover, borrower-based measures may also impact on other economic and financial variables, through the interaction of their effects with banks' and borrowers' balance sheets. Households for whom the limits are binding will borrow less, and, in aggregate, depending on the design and calibration of the instruments, they may slowdown the dynamics of new lending and dampen the credit cycle. Through the credit channel, the residential real estate cycle is also affected, since less mortgage lending will tend to reduce housing demand and residential real estate prices. The cyclical loops between credit and real estate markets, which are self-reinforcing and tend to pose serious risks to financial stability, are thereby

14 Although Banco de Portugal's macroprudential measure also recommends the application of the limits in case of a change of the terms and conditions of the loans originated before 1 July 2018.

curtailed with the adoption of borrower-based measures, if addressed in early stages of systemic risk build up.

Along the instruments selection process, Banco de Portugal has also considered alternative borrower-based instruments, such as the introduction of limits to LTI and debt-to-income (DTI) ratios. After balancing the advantages and shortcomings of these income-related instruments against DSTI limits, Banco de Portugal preferred to apply limits to the latter ratio because it allows to consider the total debt servicing obligations that a borrower must comply with (as opposed to LTI caps) and to test the ability of a borrower to meet debt obligations in the event of shocks, such as those that can affect interest rates and income levels (contrary to DTI limits). Last but not least, borrowers are more familiar with the DSTI indicator, having a better understanding regarding its economic meaning.

The appropriateness of a policy measure depends on how the nature of the identified risks and their position in the business and credit cycles are addressed by the available instruments in the macroprudential toolkit, taking into account the desired policy goals. The design and calibration of a policy measure should be undertaken carefully to take the most of its benefits while minimising the costs. Given the intended preventive nature of the macroprudential action, with systemic risks starting to build up, Banco de Portugal considers that the introduction of limits to the LTV and DSTI ratios, as well as the limits to the maturity of loans and the adoption of amortisation requirements (which, in the Portuguese case, means the requirement to have regular payments of principal and interest), are the most appropriate instruments to promote the Portuguese financial system's sustained adoption of prudent credit standards.

Evidence suggests that domestic credit is not the key driver for the current sustained increase in residential real estate prices as the housing credit stock continues to decline, and recent developments in the residential real estate market appear to be associated, to a significant extent, to direct investment by non-residents and to the expansion of tourism [see Banco de Portugal (2018b)]. However, there are some limited signs of overvaluation in the residential property market in aggregate terms, which may imply risks to financial stability in case these dynamics persist or are reinforced. Against this background, by ensuring that credit standards remain appropriate, the policy action will limit the flows of new credit and may also have an additional dampening effect on the risk of a self-reinforcing credit and residential real estate prices spiral. Moreover, by limiting flows of new credit, in particular new loans to borrowers with a riskier profile, the macroprudential measure will not only contribute to prevent a potential reversal of a decreasing trend of households indebtedness, but will also lead to a better credit risk profile of banks' credit portfolio.

In the following, for each single instrument, we describe the underlying transmission channels to the financial system and the economy. A particular emphasis is put on the strengths of each instrument that justified its activation and on the weaknesses that made its combination with other instruments warranted. Finally, we also present how the combination of the chosen instruments reinforce their effectiveness and efficiency.

LTV limits

The LTV ratio is defined as the ratio between the amount of the loan and the value of the collateral. The higher the value of the LTV ratio, the larger the credit availability of a borrower, *ceteris paribus*. Limits on LTV ratios may require a minimum down payment on borrowing households relative to the value of the property. The requirement of a down-payment may also contribute to incentivise household savings. As such, LTV caps make both households and banks less vulnerable to house prices reductions thereby minimizing

the losses for banks given the default of borrowers, but also help reducing the borrowers' probability of default as the use of equity is required. Ultimately, LTV limits increase the resilience of the banking sector and of the borrower.

Moreover, households for which the limits are binding will borrow less, which may result in lower housing demand with dampening effects in house prices growth. As O'Brien and Ryan (2017) note, restrictions to LTV ratios may prevent some of the pro-cyclicality associated to the exuberant developments that may affect housing markets, but are not strictly countercyclical. In fact, when house prices are continually increasing, two effects occur. On the one hand, the amount of credit that is available through the LTV ratio channel increases proportionally to the rise of house prices. On the other hand, the value of the housing collateral also increases, expanding the households' capacity to finance a higher down-payment on a subsequent property and the credit availability for property purchase.

These effects may increase housing demand, leading to further increases in residential real estate prices. Hence, the collateralization in mortgage contracts amplifies the credit and real estate cycles and adds to the propagation of the shocks. The pro-cyclicality of the LTV ratio may hamper the efficacy of a macroprudential measure that envisages the introduction of a permanent cap on this indicator.

The limits applied to the LTV ratio by Banco de Portugal, calculated using the minimum between the appraisal and the acquisitions values, are expected to minimize the loss given default of banks and help reducing the borrower's probability of default, given that it requires the use of equity. Both effects contribute to mitigate the building up of systemic risk and increase the resilience of the financial sector. There are also positive side-effects related to the adoption of this instrument. First, households for which the limits are binding will borrow less, which may reduce housing demand and dampen residential real estate prices growth. Second, in a context of still-high indebtedness and low saving rate of Portuguese households, the requirement of a down payment implied by a LTV limit may foster household savings, which would result in an additional positive side-effect of this instrument.

To assess the impact of the LTV limit, structural models, econometric analysis and general equilibrium frameworks were used (see Section 6 for a discussion on the modelling gaps). According to those models, LTV restrictions would lead to a decrease in the demand of mortgage loans as well as to some negative impact on GDP growth, while improving banks' overall solvency. As a side-effect the LTV limit would reduce the growth rate of housing prices, albeit in a limited manner.

With the aim of minimizing expected costs related to the introduction of LTV limits, Banco de Portugal has opted for defining three distinct limits to the LTV ratio depending on the purpose of the loan. In its design, the macroprudential measure takes into consideration the fact that it is more likely that, in the event of financial difficulties, borrowers favour compliance with the obligations of loans for the purchase of or secured by own and permanent residence because they value the safeguarding of their house. In this vein, the LTV limit for the purchase or construction of own and permanent residence (90%) is less strict than the limit for other purposes (80%). Also, the need for institutions to continue with the reduction of non-performing assets on their balance sheets, which are partly comprised of real estate owned assets, warranted the introduction of a limit of 100% to the LTV ratio to be applied to loans financing the purchase of property held by the institution. The necessity of selling these assets puts downward pressure on their prices, and, as such, a LTV of 100% in this type of loans cannot be

considered as risky as in typical mortgage credits. Finally, the distinct features of property financial leasing agreements compared to conventional housing loans – the legal ownership of the immovable property remains with the institution until the end of the agreement – justified the introduction in the former case of a limit of 100% to the LTV ratio.

DSTI limits

From a conceptual point of view, the DSTI ratio relates the amount of monthly debt payments with the level of the income of the borrower. Limits to the DSTI ratio operate by imposing credit restrictions relative to income, reducing the probability of default of the borrower. Depending on the macroprudential authority's choice, this instrument may consider the debt service associated with the total amount of debt of the borrower and the effects of potential increases of interest rates and/or potential reductions in income. This feature turns this instrument more adequate to tackle risks related to household vulnerability related to the prevalence of household loans with variable interest rates compared to LTV limits, for example. Since it reduces the probability of default, lower DSTI ratios strengthen both the resilience of banks and borrowers, as these measures provide for a greater income shock absorption capacity of the borrower. The DSTI ratio also tend to be a more commonly known credit criterion among borrowers.

Moreover, compared to LTV measures, DSTI limits (as well as LTV limits) have a more direct and effective impact on reducing pro-cyclicality, given that, in general, house prices tend to grow faster than borrowers' income. As such, DSTI limits become tighter than LTV in the expansionary phase of the credit cycle, acting as automatic stabilisers in a context in which sharp increases of house prices may render LTV limits less effective. However, DSTI limits can be easily circumvented by the lengthening of mortgage maturities.

Against this background, there are a number of benefits underlying the limit applied by Banco de Portugal to the DSTI ratio. By restricting the monthly instalment associated with loan amounts for a given income level, the measure increases borrowers' resilience and reduces their probability of default. Also, the DSTI limit considers the impact of an interest rate rise in the numerator, which varies according to the original maturity of the loans, in the case of variable or mixed interest rate loans. In a context of historically very low levels of interest rates, the aim is to test whether borrowers are able to withstand the effects of an expectable rise in interest rates on the debt service. As such, the measure fosters the resilience of borrowers and reduce the probability of default over the lifetime of the agreement. By the same token, in the event the loan agreement extends beyond 70 years of age of the borrower, the DSTI calculation establishes an income cut, which contributes to an increase in borrowers' resilience, leading to a reduction of the probability of default and banks' credit risk.

Moreover, the monthly instalment of the new credit agreement should be calculated assuming that it is constant throughout the loan lifetime. In non-constant instalments schemes, such as with increasing instalments, grace periods or forbearance, there are incentives to consider the lowest-value instalments in the calculation of the DSTI, implying a more favourable DSTI for households in the short term. In fact, non-constant instalments schemes tend to be associated with higher default ratios. This requirement aims at avoiding the illusion effect on borrowers' ability to pay the debt throughout the lifetime of the loan and at reducing the probability of default. Additionally, households for which the limits are binding will borrow less, which may result in lower housing demand and have a dampening effect on residential real estate price dynamics.

A maximum proportion of loans with a DSTI above the limit set has been allowed in the recommendation, given that the application of a DSTI limit may lead to distributional effects. To overcome this, Banco de Portugal has introduced the possibility that a predetermined proportion of loans granted may exceed the predetermined threshold of 50%. As such, up to 20% of the total amount of credit granted by each institution in each year may be granted with a DSTI of up to 60%, and up to 5% of the total amount of credit granted by each institution in each year may exceed the limits to the DSTI. In fact, the DSTI is an indicator of the borrower's degree of financial effort associated with debt service. Although this criterion is key for ascertaining, in general terms, the probability of credit default, there are other important criteria for assessing credit risk. For example, the borrower's level of wealth, the existence of a guarantor, or the amount of the borrower's other regular expenses also affect the loan repayment ability. However, Banco de Portugal requires institutions to justify the use of these exceptions, namely by mentioning mitigation elements of the credit risk considered in the analysis.

Maturity limits and amortisation requirements

By reducing the term of the loan, a limit on loan maturity also decreases the probability of occurrence of a negative event before the full repayment of the credit, adding to the reduction of the probability of default of the borrower. In turn, long repayment periods limit the introduction of any adjustments that may be necessary for borrowers to overcome difficulties in paying their loans. In fact, loans with lower maturities are easier to adjust in case of borrowers' arrears, facilitating loan restructuring and potentially reducing the loan probability of default over its lifetime. Banco de Portugal has also adopted limits to the original maturity of the loans to prevent the circumvention of the limit to the DSTI ratio by the lengthening of the loan maturity. Finally, by recommending a convergence towards an average maturity of 30 years of new loans by the end of 2022, Portuguese banks will be more in line with the European banking systems' standards.

The introduction of amortisation requirements has the purpose to prevent financial difficulties related to the concentration of large amounts of the loan in its final periods. The regular payments of capital and interest requirement expected benefit is the reduction of the probability of default over the lifetime of the credit agreement. The use of mechanisms such as the introduction of grace periods or forbearance should be reserved for loans intended to prevent or address arrears situations, which also contributes to reducing the probability of default. Moreover, the regular amortisation of the principal will translate in a lower loss given default, thus increasing bank resilience.

Combined use of LTV, DSTI and maturity limits, amortisation requirements and of other features envisaged in the macroprudential measure

As discussed above, the specificities of each borrower-based instrument individually considered may affect their efficiency and effectiveness once adopted. To maximize the strengths of each instrument and minimize their costs and unintended negative effects, Banco de Portugal has opted for the jointly adoption of multiple borrower-based instruments as a way of improving efficiency and effectiveness of the macroprudential measure. In particular, when LTV and DSTI limits are used as complements, they may have a positive reinforcing effect on the borrower's probability of default. The DSTI limit increases resilience of borrowers by creating a buffer against income and interest rate shocks, while LTV limits require a minimum down payment and thus reduce not only the loss given default, but also borrowers' incentive to default on their debt obligations in case of house prices decreases. The requirement of regular payments of principal and interest also adds to the reduction of the probability of default. Additionally, the combined use of LTV and DSTI limits reinforces the dampening effect in residential real estate price dynamics. The enforcement of maturity limits complement the effectiveness of DSTI limits, by precluding circumvention strategies, at the same time it allows adjustments in case of repayment hurdles of the borrowers.

There are other features of the macroprudential measure that, taken together, also contribute to reduce expected costs and unintended effects. For example, Banco de Portugal has considered that the macroprudential measure should be implemented as a recommendation, following the 'comply or explain' principle, to benefit from the greater flexibility associated with this type of measure and avoid market disturbances, which are difficult to forecast in the current circumstances, given the more recent nature of macroprudential policy, the greater uncertainty about its impact and the early stage in the build-up of systemic risk. Importantly, this flexibility is granted under the assumption that it is used carefully and according to strict risk analysis standards.

Furthermore, a set of loans was excluded from the scope of the measure, particularly low-amount credits, loans intended to prevent or address arrears situations and loans with no predefined repayment schedule, including credit cards. In the case of low-amount loans, their exclusion was due to the operational burden implied by the implementation of the procedures of the macroprudential measure, which might excessively hamper the consumer credit market. In the view of Banco de Portugal, these costs would outweigh the benefits from including these small amount loans under the scope of the recommendation. This was also the main reason underlying the exclusion of loans with no predefined repayment schedule, including credit cards, notably as regards the calculation of limits to the DSTI and the application of limits to the loans original maturity, given that this type of loans has no previously defined repayment schedule or determined duration.

According to the definition envisaged in the macroprudential measure, situations of renegotiation of the loans' terms and conditions are considered new loans. However, if loans renegotiations are due to financial difficulties of the borrowers and are intended to prevent or address arrears situations, their exclusion from the scope of the macroprudential measure is justified, because these are situations in which credit risk has already materialised or is about to materialize. As such, from the risk management perspective it was acceptable to allow for greater flexibility in the design of these loans, not to condition even further borrowers that are already financially constrained. Furthermore, this exclusion is aligned with adequate banks incentives, as these loans are (or will be) considered non-performing and therefore will be subject to higher provisioning and capital requirements.

Notwithstanding these aspects that contribute to reduce the costs of the implementation of the macroprudential measure, the evolution of the credit categories excluded from its scope will be closely monitored by Banco de Portugal to prevent unintended effects and ensure its effectiveness.

4.2 CALIBRATION STRATEGY OF THE MACROPRUDENTIAL MEASURE

In the design of the macroprudential measure, the combination of limits was chosen taking into account an analysis of the costs and benefits associated both with each instrument and with their combination. The calibration of the various instruments' levels was based on the analysis of both international experience in the adoption of similar instruments and current lending standards in Portugal. Over the course of this process, Banco de Portugal collected cross-country experiences with borrower-based measures adopted by other macroprudential authorities (Cyprus, Ireland, Slovenia, Slovakia, Lithuania, Estonia, Czech Republic, Romania and the UK).¹⁵ In addition, Banco de Portugal analysed information on the credit standards applied by Portuguese institutions, in the past and at the current

¹⁵ Although the evidence is not limited to European countries, these country experiences were taken into account by Banco de Portugal given the stronger commonalities of these countries with the Portuguese case, for

juncture, and also assessed expectations as to the future evolution of these standards in view of their procyclical nature.

Banco de Portugal applied both empirical and theoretical modelling approaches to evaluate the *ex-ante* impact of the measure and inform calibration levels of the instruments, which also benefitted from micro data analysis. Banco de Portugal collected loan-level information concerning the credit contracts secured by residential immovable property, reported to Banco de Portugal by the eight major banking groups. These credit contracts accounted for nearly 98% of the total number of outstanding loans in December 2015 and almost 92% of the total amount of mortgage loans.¹⁶ A Special Issue based on this dataset was published in the June 2017 *Financial Stability Report* of Banco de Portugal.

In this study, the analysis of the distribution of mortgage loans per percentile indicated some easing in credit standards, namely in terms of LTV, LTI, DSTI and maturity of loans. However, the percentage of loans for which the two indicators (LTV/LTI) were in the intervals with higher risk was very low. While calibrating the macroprudential measure, information regarding percentile thresholds was duly taken into account.

Since the treatment given to data (aggregation of loans) and some caveats to reported information restricted the number of observations available for the calculation of the indicators, affecting to some extent the sample representativeness, and taking into account that this dataset is about mortgage lending only, Banco de Portugal has conducted market intelligence initiatives with institutions and respective associations to gather information on current and expected future practices in both mortgage and consumer lending. Banco de Portugal has also consulted the Associação Portuguesa para a Defesa do Consumidor (the Portuguese Consumer Protection Association) and the National Council of Financial Supervisors.

In addition, the calibration process of instruments also entailed quantitative assessments of the impact of the measures on the level of risk and on financial and macroeconomic variables, such as credit, house prices and GDP. Both empirical and theoretical modelling approaches were applied to evaluate *ex-ante* the expected impact of the measure and inform calibration levels of the instruments.

The limits were calibrated in order to have an impact on loans to borrowers with a riskier profile, without significantly affecting lending to households in general and to accommodate the expected rise in interest rates and the likely reduction in the borrower's income at the time of retirement. The final calibration of the measure corresponded to the standards that Banco de Portugal considered to be adequate for household credit, and in some cases does not differ substantially from current banking practices, anchoring credit standards so as to avoid further procyclical easing.

4.3 INTERACTION WITH OTHER POLICY FIELDS

According to the macroprudential policy strategy, the interaction of macroprudential policy with other policy fields is a component of the policy design and implementation. In the specific case of the adopted macroprudential measure, the financial stability risks posed by the current and expected monetary policy stance were carefully taken into account

example, all of them belong to the European Union and most of them are part of the euro area. For other international experiences see, for example, Kuttner and Shim (2016).

¹⁶ These data has been collected on a yearly basis since 2015.

during the risk assessment, as aforementioned. The design and calibration of some aspects of the measure intended to prevent and mitigate those risks, namely by including interest rate shocks in the calculation of the DSTI.

Monetary policy

The current low interest rate environment may be an incentive for risk-taking and leverage, leading to the emergence of speculative asset price bubbles. However, low interest rates also contribute to lower debt service and credit risk (particularly relevant to economies with high levels of debt). In this context, a less accommodative monetary policy stance may exacerbate these risks in the transition phase to a lower debt level. Furthermore, significant heterogeneity of financial cycles in euro area countries implies that the common monetary policy stance may be less appropriate at the national level.

A question that arises often in the literature is whether macroprudential policy can mitigate possible negative effects of a single monetary policy stance. While economic literature seems to suggest that macroprudential policy may counter negative monetary policy shocks and contribute to financial stability – [see Brzoza-Brzezina et al. (2015), Quint and Rabanal (2014) and Rubio and Carrasco-Gallego (2014)] – the efficacy of macroprudential policy relies primarily on its pre-emptive nature and, as such, it is important to take also into account effects of a future change in the stance of monetary policy.

The macroprudential measure adopted by Banco de Portugal promotes the adoption of prudent credit standards on new mortgage and consumer loans granted to households by the Portuguese financial system, in order to enhance the resilience of the financial sector and the sustainability of households' financing. In its design, special attention was devoted to the implications for financial stability of the current low interest rate environment (through the *risk-taking and leverage channel*) and future phasing-out of the accommodative euro area monetary policy stance (through the *credit channel*).

Given potential risks stemming from the current stance of monetary policy, limits were calibrated in order to prevent excessive risk taking by the financial sector, since less restrictive credit standards have been observed in the Portuguese banking sector and, against a background of a prolonged low interest rate environment, economic recovery and improvement in the residential real estate market, leading to the intensification of competition among institutions, this trend was expected to intensify. By anchoring the adoption of credit conditions on prudent standards, the calibration of the limits aimed at reducing lending to borrowers with a riskier profile, preventing excessive risk taking by the Portuguese financial system, and, at the same time, contributing to dampening residential real estate prices dynamics to avoid feedback loops between credit and prices spirals in this market.

In addition, monetary policy stance is expected to become less accommodative in the near future, leading to a gradual increase of interest rates. According to market expectations, short-term interest rates are likely to reach positive values in the second semester of 2019. Households are often “short-sighted” and focus on the short term neglecting the future, and a protracted low interest rates environment may induce households to take floating rate mortgages without considering that interest rates may increase in the future, and to borrow excessively [see ESRB (2016)]. In Portugal most mortgage credit is granted at a floating rate, the most common being loans with interest rates linked to the Euribor rate. More recently, the mixed interest rates regime has gained importance in new mortgage loans, though interest rates are fixed over periods that are significantly shorter than the maturity of the loan.

Banco de Portugal took into account the possible adverse effects of a future rise in interest rates in households' debt servicing capacity and designed and calibrated the measure so as to prevent or mitigate credit defaults from occurring due to a change of the monetary policy stance in the euro area. This was implemented through the consideration of interest rates shocks in the calculation of the DSTI limit. Specifically, interest rate increases of, at most, 3 percentage points were considered in the calculation of the numerator of the DSTI, to ensure that the value of the indicator resulting from a loan granted at a variable or mixed rate would be able to accommodate an expected rise in interest rates, by creating a buffer to withstand future shocks. As already mentioned, the calibrated values of the interest rate positive shocks varied according to the maturities of the loans.

Banking Conduct Supervision

Banco de Portugal has also the responsibility to supervise the banking conduct and its role encompasses, among others, the regulation, oversight and sanctioning the conduct of credit institutions, financial companies, payment institutions and electronic money institutions offering retail banking products and services.

Along the design and implementation process with respect to the borrower-based measure adopted by Banco de Portugal, there was intense collaboration with the Banking Conduct Department, since it is also responsible for the regulation of the institutions' conduct regarding consumer and mortgage lending in Portugal. There was an effort to align the concepts of consumer and mortgage lending, taking into account the need to avoid regulatory arbitrage and circumvention of the measure.

A close cooperation was also undertaken regarding the drafting of the criteria for the assessment of the impact on creditworthiness of borrowers of increases in the reference rate applicable to variable or mixed interest rates loans. In particular, the calibration of the interest rates shocks in accordance to credit maturities was jointly defined by the two teams.

5 External communication strategy

It could be argued that external communication may be used as a separate tool of macroprudential policymaking. In this vein, Banco de Portugal has put forward an external communication framework for systemic risk assessment and macroprudential policy as one of the four pillars of the strategy framework of macroprudential policy. The main purpose of Banco de Portugal's communication on systemic risk assessment and macroprudential policy is to inform the public and targeted institutions regarding the identified risks to financial stability and the implementation of macroprudential measures. To achieve this goal, communication to the public should be as clear, concise and transparent as possible.

In general terms, the views on financial stability and systemic risk assessment are communicated to the public mainly via the *Financial Stability Report*. This publication assesses emerging or existing systemic risks in the Portuguese markets and financial system, entailing the identification of adverse shocks and the likelihood of their materialization, as well as an evaluation of the implications of such shocks for the stability of the financial system. The announcement of policy measures is generally accompanied by the disclosure of background assessments, information on the operational features of activated instruments and the connection with the associated policy objectives. Moreover, a dedicated webpage was created with an overview of the macroprudential toolkit as well as information on the underlying legal framework.

The external communication framework laid down in the macroprudential policy strategy was followed in the case of the macroprudential borrower-based measure, although some

aspects were carefully thought of in view of the specific nature of the macroprudential measure. Borrower-based measures may require a different communication strategy compared to capital-based measures, since they have a direct impact on potential borrowers. In turn, capital-based measures may only indirectly affect borrowers, given that the impact of higher capital requirements on borrowers may occur through higher spreads and the underlying magnitude depends on how the institution reacts to increase capital ratios.

Against this background, Banco de Portugal has set forth a tailor-made strategy to communicate the borrower-based measure. The main challenge was to clearly communicate the objectives of the measure. The intended policy goals consisted of reinforcing the resilience of financial sector to withstand adverse shocks and to promote access to sustainable financing by Portuguese households. These goals should be attained through the anchoring of lending standards in credit granted to households at adequate levels. By simultaneously introducing limits to LTV, DSTI and maturity, housing demand will tend to decrease via the impact on credit for house purchase, and may lead to a dampening effect on residential real estate prices. By the same token, the risk of loops between credit and residential real estate prices is mitigated. However, the objective of the macroprudential measure was not to directly target residential real estate prices. At the current juncture there is no evidence of domestic credit dynamics being the key factor driving the growth in residential real estate prices, given that the stock of mortgage credit continues to decline. As mentioned, the dynamics in residential real estate markets are associated, to a significant extent, to the demand from non-residents and the increase in tourism.

In the course of this process, Banco de Portugal organised a press conference and television interviews with the member of the Board of Directors in charge of financial stability issues to carefully present the policy objectives, the design of the measure and its underlying rationale. Moreover, a dedicated internet page within the institutional website of Banco de Portugal was created with relevant information, and, besides the usual information disclosure, such as background analysis documents and short descriptions of the goals of the macroprudential measure, a frequently asked questions section was also included to respond to questions that a wider audience could have regarding the measure. More recently, a video containing a detailed explanation of the measure, including a numerical example, has been disseminated via Youtube and other social media. As a result, so far, the response to the adoption of the measure has been positive.

6 Discussion on knowledge gaps

In this section, we discuss topics raised upon the recent experience of Banco de Portugal in designing and implementing borrower-based measures that, in our view, need further research and experience. From the experience of Banco de Portugal, the main challenges in setting macroprudential borrower-based measures relate to: i) improving micro-data coverage; ii) the development of methodological frameworks to calibrate the instruments and assess their potential impact and unintended effects on key macro-financial variables; iii) the choice between capital-based or borrower-based instruments, and iv) the choice between rules and discretionary actions from macroprudential policymakers in the case of adoption of borrower-based measures.

First, in order to be able to identify vulnerabilities and risks related to consumer and mortgage lending to households, it is important to have access to aggregate credit data, but most importantly to data at the loan level, as it allows to explore the distributions of variables used to assess credit standards. Micro-data is crucial to calibrate borrower targeted macroprudential measures and to evaluate their impact on lending. Micro-level

data can be reported by institutions in credit registers or collected based on loan-level or household surveys. There is a Central Credit Register, in Portugal, which is managed by Banco de Portugal. In addition, loan-level information concerning credit contracts secured by immovable property was collected in the recent years with the purpose of assessing risks related to household lending. Still, there was the need to gather additional information for a wider range of variables to assess the compliance with the macroprudential measure and also for the *ex-post* evaluation process.

Second, with the aim of assessing *ex-ante* the potential impact of macroprudential measures on a set of macro-financial variables, macroprudential authorities must be endowed with methodological frameworks to calibrate the level of the instruments and assess their potential impact on key variables, such as credit, house prices, and other macroeconomic variables. As already referred, to evaluate the *ex-ante* impact of the borrower-based measure, Banco de Portugal has used a range of modelling techniques, such as general equilibrium frameworks, econometric analysis and structural models. In fact, given their complexity, these models should be developed well in advance by macroprudential authorities to inform policymakers on the potential impact of the measures on lending, house prices, GDP, among other aggregates, and help fine-tuning the decision-making process. Policymakers, central bankers and researchers have advanced significantly in the development of models and methods to evaluate the transmissions mechanisms, measure the costs and benefits and effectiveness of macroprudential instruments. Nonetheless, these models usually focus on the impact of the implementation of one single macroprudential tool, such as the ones developed and used by Banco de Portugal to assess the impact of the macroprudential measure, and not on the effects of a combination of several instruments.

There is indeed a lack of models and tools to assist the *ex-ante* calibration and the *ex-post* assessment of a combination of instruments, such as envisaged in the Portuguese macroprudential measure that has introduced three limits simultaneously. There are overlaps and differences in the transmission channels of instruments, as discussed in Section 4.1, and models could be developed to inform the design and calibration process of borrower-based measures. For example, more knowledge is needed regarding the impact of certain combinations of instruments on segments of credit and the potential for assets' reallocation by banks, the impact of potential leakages and circumvention on the adequacy and sufficiency of certain combinations of instruments, or the implications of country specificities and other policies on the transmission channels of combinations of instruments.

In addition, the targeting of specific activities or exposures may have unintended or unexpected effects on the allocation of credit. For example, the activation of the countercyclical capital buffer on mortgages in Switzerland triggered a rise in the amount and in the cost of lending to corporations, that is, a targeted macroprudential measure led to the squeeze of lending in "one place" and an expansion of lending in another "adjacent place" [see Auer and Ongena (2016)]. Borrower-based measures that target mortgage loans only, namely through the setting of limits to LTV, may face this problem, since lenders may offer consumer credit to top up the amount of housing credit demanded by the borrower. In this case, there is a shift from mortgage credit to consumer credit that may hamper the effectiveness of the measure. In the Portuguese case though, given the systemic risk associated to lending to households, the scope of the macroprudential measure includes both mortgage and consumer lending. Compared to other countries experiences, the wider scope of the measure entails the benefit of preventing, to some

extent, this reallocation effect from happening between sub segments of household credit.

Third, the choice of the type of instruments should be motivated by the phase in the cycle of the financial stability risk. Commonly, the choice of borrower-based measures, which restrain the flow of new lending, is more appropriate in the case the risk is starting to building up and policymakers prefer to take a pre-emptive action. The selection of capital-based instruments, which also affect the stock of credit, may be more adequate when systemic risk is already elevated and close to materialize. Certainly there are situations in which the macroprudential toolkit is not complete and the policymaker may have to choose an (imperfect) substitute of the most adequate instrument to tackle the identified risk.

Along the process of choosing and designing the most adequate borrower-based instruments, macroprudential policymakers also need to evaluate how to operationalize them: should the instrument be designed as a rule or should the macroprudential authority choose to act in a discretionary manner? If the latter option is chosen, should it commit to regular reviews of the impact and effectiveness of the measure to mitigate against any potential inaction bias? Would this commitment contribute to enhance the effectiveness of such measures? Should the macroprudential authority start by adopting a binding measure or opt for a non-binding one and monitor the degree of compliance and effectiveness? Banco de Portugal opted for choosing a non-binding legal instrument given the initial stage of systemic risk build up and the necessity to gather experience on how institutions will implement such a complex macroprudential measure and on its potential impact. Although it is not a binding measure, the degree of compliance by institutions will be assessed and the justifications they present will be duly appraised.

International experience is quite heterogeneous on these matters, which may be a consequence of the specific characteristics of national housing markets, the position in the business and credit cycles and the preferences of macroprudential authorities, among other factors. There are, therefore, important operational aspects to consider when designing instruments to tackle financial stability risks associated to lending to households, of which these are only a few examples.

7 Concluding remarks

Banco de Portugal considers that, in the current Portuguese economic environment, there is a still high household indebtedness level by international standards, although declining very significantly in the last few years, and that the financial system is still highly exposed to credit secured by residential immovable property. In Portugal, the proportion of owner occupied housing is among the highest of EU countries. Also, new mortgages have increased strongly, despite the still declining stock, and the outstanding amount of consumer credit has grown significantly. In addition, the recent economic recovery, amid very low interest rates and a rebound in house prices, has been accompanied by some easing of credit standards, in an environment of increased competition among institutions.

Based on the analysis of the transmission channels of each borrower-based instrument and the position in the business and credit cycles, Banco de Portugal decided to combine LTV, DSTI and maturity limits, coupled with regular payment of principal and interest requirements, to enhance the effectiveness of the policy action in the domain of household credit (both mortgage and consumer credit).

In order to be effective, the macroprudential measure was designed to act in a preventive way, seeking to mitigate risks, strengthening the resilience of credit institutions and

creating conditions for borrowers to have access to sustainable financing. With these policy goals in mind, Banco de Portugal will monitor the compliance with the measure at least once a year. The monitoring process is very important for the adequate implementation and effectiveness of the measure, especially in the case of a recommendation where exceptions are foreseen. As such, Banco de Portugal will assess in a thorough way banks' justifications under the comply-or-explain mechanism, underlying the recommendation, and has already defined the type of information that needs to be reported by each institution at the contract level. This additional information was included in the new version of the Portuguese Central Credit Register and it will be reported on a monthly basis. The new loans granted from 1 July to 31 December 2018 will be monitored first based on that dataset.

Given the innovative nature and complexity of this measure, we are aware that experience must be gained first. Although its design and calibration entails a thoughtful consideration of the strengths and weaknesses of each adopted macroprudential instrument (which justified their combined use), unexpected spillover effects may occur. The transmission mechanisms of such a combination of multiple instruments are not yet fully assessed in practice, since there is not, to the extent of our knowledge, empirical evidence regarding the impact of a measure with these specificities. The cross-country experience with borrower-based measures tends to opt for LTV and / or DSTI / LTI limits, and, in the majority of the cases, consumer lending is not targeted and interest rate and income shocks are not considered.

Against this background, Banco de Portugal will evaluate *ex-post* the effects of the measure, not only with respect to the impact it might have on credit aggregates and the distribution of credit conditions, but also in terms of the potential unintended effects, regulatory arbitrage and leakages that may occur, and will take additional action if needed.

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