A LITERATURE REVIEW ON EX-ANTE AND EX-POST ANALYSIS OF THE IMPLICATIONS OF BORROWER-BASED MACROPRUDENTIAL MEASURES

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Abstract

This paper presents a comprehensive literature review on the effects of borrower-based macroprudential measures (BBMs)—such as loan-to-value (LTV), debt-to-income (DTI) and debt-service-to-income (DSTI) limits—with a particular focus on their effectiveness in mitigating systemic risks in housing markets. The review synthesizes findings from both empirical and theoretical studies. The evidence shows that BBMs are effective tools for addressing systemic risks arising from household over-indebtedness and real estate market imbalances. Empirical studies indicate that stricter mortgage lending standards significantly reduce the probability of default, moderate credit growth during expansionary phases and enhance the resilience of the financial system. Theoretical models further suggest that BBMs help stabilize credit cycles, lower the likelihood of financial crises and mitigate adverse welfare effects during downturns. However, they also highlight potential redistributive consequences. Overall, the evidence supports the inclusion of BBMs as core instruments within the macroprudential policy framework, while underscoring the need for flexible design and ongoing evaluation based on granular data and advanced modeling to ensure their effectiveness and minimize unintended effects.

Keywords: borrower-based measures, credit growth, defaults, house prices, macroprudential policy, models and mortgages.

JEL classification: C83, E44, E58, G21.

Resumen

Este documento presenta una revisión exhaustiva de la literatura sobre los efectos de los límites a los criterios de concesión de crédito hipotecario (BBM, por sus siglas en inglés), tales como los límites a las ratios préstamo-valor (LTV), deuda-ingresos (DTI) y servicio de la deuda-ingresos (DSTI), con especial atención a su eficacia en la mitigación de los riesgos sistémicos en el mercado inmobiliario. La revisión sintetiza los resultados de estudios tanto empíricos como teóricos. La literatura revisada ofrece evidencia de que las BBM son herramientas eficaces para mitigar los riesgos sistémicos derivados del sobreendeudamiento de los hogares y de los desequilibrios en el mercado de la vivienda. Los estudios empíricos indican que los estándares de concesión de hipotecas más estrictos reducen significativamente la probabilidad de impago, moderan el crecimiento del crédito en fases expansivas y fortalecen la resiliencia del sistema financiero. Por otra parte, los modelos teóricos destacan que las BBM contribuyen a estabilizar los ciclos crediticios, a reducir la probabilidad de crisis y a mitigar los efectos negativos sobre el bienestar durante las fases contractivas del ciclo económico. No obstante, también advierten sobre los posibles efectos redistributivos. En conjunto, la evidencia respalda la inclusión de las BBM como instrumentos fundamentales dentro del marco de política macroprudencial, al tiempo que subraya la necesidad de un diseño flexible y una evaluación continua basada en datos granulares y modelos avanzados para garantizar su eficacia y minimizar efectos no deseados.

Palabras clave: crecimiento del crédito, criterios de concesión de crédito, impagos, precios de la vivienda, política macroprudencial, modelos e hipotecas.

Códigos JEL: C83, E44, E58, G21.

Contents

1 Introduction

In recent decades, the expansion of mortgage credit and the volatility of housing markets have underscored the need for effective macroprudential tools to mitigate systemic risks. Among these tools, borrower-based measures (BBMs) have gained increasing relevance as key instruments to curb excessive household indebtedness, improve credit quality, and enhance the resilience of the financial system. These measures – such as limits on loan-to-value (LTV), loan-to-income (LTI), debt-to-income (DTI), loan-service-to-income (LSTI), debt-service-to-income (DSTI) ratios, or loan maturity – aim to establish prudential thresholds that condition access to credit based on borrowers' repayment capacity and financial soundness, with the goal of mitigating systemic risk at its source, before it materializes into broader financial instability.

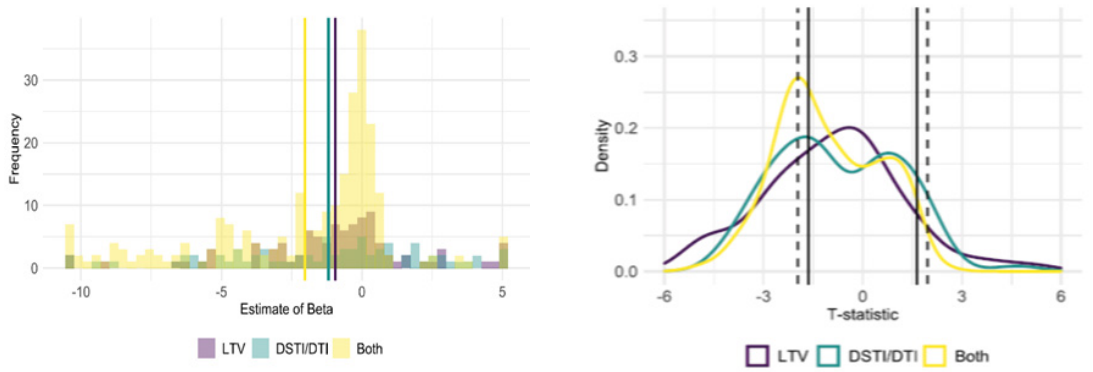
In this context, the global financial crisis (GFC) served as a turning point, revealing how lax lending standards had contributed to the buildup of financial vulnerabilities. Since then, both international institutions and national authorities have promoted the adoption of BBMs, leading to a growing body of empirical and theoretical research assessing their effectiveness. This literature spans ex-ante and ex-post empirical studies, theoretical and quantitative models, and both micro-level and aggregate approaches. Ex-ante studies typically focus on the predictive power of lending standards in explaining mortgage default risk, leveraging granular loan-level data and advanced econometric techniques. Ex-post analyses, on the other hand, assess the macroeconomic and financial outcomes following the implementation of BBMs, often using cross-country panel data or country-specific microdata to identify causal effects.

Despite the widespread use of BBMs, synthesizing the diverse empirical findings remains a challenge. The evidence on their effectiveness – particularly in curbing credit growth – is mixed and often context-dependent. A recent meta-analysis by Malovaná et al. (2024), which compiles over 700 estimates from 34 studies, reveals substantial heterogeneity in the reported effects of BBMs on bank lending. While the average estimated impact of BBM activation is negative, the magnitude varies widely across studies, with estimates ranging from −8.8 to +3.1 percentage points (pp) (see chart 1). Importantly, the authors identify strong publication bias in the literature, with a tendency to over-report negative and statistically significant results. Moreover, the study finds that income-based measures (LTI/DTI/LSTI/DSTI) tend to have a stronger impact than value-based measures (LTV), and that combining multiple BBMs yields the most pronounced effects.

These findings not only underscore the importance of methodological rigor and context-specific analysis when evaluating the effectiveness of BBMs but also highlight the need for a comprehensive synthesis of the literature that accounts for the wide variety of approaches, data sources, and institutional settings. This review aims to provide such a synthesis, identifying common patterns, heterogeneous effects, and remaining challenges in the design, calibration, and implementation of BBMs. It emphasizes the benefits of BBMs in curbing excessive credit growth during expansions of the financial cycle and improving

Chart 1

Distribution of the estimated coefficients and the associated T-statistic in regressions of LTV, DSTI/DTI or both measures on credit growth in a selection of papers



SOURCE: Malovaná et al. (2024). The sample encompasses 422 observations drawn from 23 studies.

credit quality, which translates into higher household resilience during crises. At the same time, it draws attention to the challenges posed by regulatory arbitrage, distributional consequences, and the context-dependent nature of BBM effectiveness.

By integrating results from diverse methodological approaches—including econometric analyses, dynamic equilibrium models, and agent-based simulations – this review also seeks to inform the ongoing policy debate on the optimal design and calibration of BBMs within a broader macroprudential strategy. Such a strategy should combine structural and cyclical tools to safeguard financial stability without compromising equitable access to credit.

The review is structured into four additional sections. First, it examines ex-ante studies that explore the relationship between lending standards and default risk, highlighting how BBMs influence the probability of mortgage default. Second, it reviews ex-post studies that evaluate the impact of BBMs implementation on macroeconomic and financial variables, including both cross-country and country-specific analyses. Third, it presents key theoretical contributions that model the macroeconomic effects of BBMs on credit cycles, housing markets, and financial stability, mainly using dynamic equilibrium models. It also discusses the development of agent-based models (ABMs), which allow for counterfactual simulations and the analysis of distributional and dynamic effects of BBMs. Finally, the main conclusions are presented.

2 Ex-ante empirical impact studies

In general, ex-ante empirical studies on the impact of BBMs focus on the association between lending standards and default risk. Jones and Sirmans (2016) provide a good review of this literature, which is mainly focused on the analysis of defaults in the US and the UK mortgage markets due to the availability of micro-data at loan- and borrower-level. These studies typically assess probabilities of mortgage default depending on the LTV ratio and income-based ratios such as DTI/LTI or DSTI/LSTI, while controlling by borrower and lender characteristics.

Regarding papers assessing LTV, an initial approach focused on negative equity as the main driver of defaults. Those studies grew out of the Black-Scholes-Merton model of derivatives pricing, in which a household decides to default when the value of the collateral drops below the value of the debt (Vandell, 1995). However, more recent studies conclude that negative equity is not a sufficient condition to default, and that adverse life events such as income shocks are a necessary condition in most cases. In this regard, Gerardi et al. (2018) find that households experiencing a double trigger situation present default rates up to 5 times higher than those experiencing only negative equity or cash flow problems. In line with this work, multiple studies include both LTV and DTI/DSTI (LTI/LSTI) conditions. Below we describe some results of relevant studies in this strand of literature. Table 1 provides a summary of details of the samples, methods, and results in each study.

Deng et al. (2000), using a sample of single-family US mortgage loans issued between 1976 and 1983 and purchased by Freddie Mac, apply a call-put options framework and find that default rates for loans with LTV ratios above 90% are four to five times higher than those for loans with LTVs between 80% and 90%which in turn exhibit default rates about twice as high as loans with LTVs below 80%.

Also, under an option-pricing model approach, Ambrose et al. (2001) assess the role of LTV at origination in explaining defaults. The authors employ a sample consisting of 30-year fixed-rate single-family mortgages, insured by FHA and originated in 1989. They segment the initial LTV ratio into different groups and find that the initial LTV ratio is positively associated with default risk, and that the effect is most pronounced for initial LTV ratios exceeding 90%.

Following this strand, more recent studies have adopted binary outcome models that condition on loans and borrower characteristics. May and Tudela (2005) use data from 12 waves of the British Household Panel Survey between 1991 and 2004 to assess the impact of LTV and LSTI at origination on default risk. They find important differences in default rates of mortgages for various levels of LTV and LSTI ratios. In particular, loans with LTV above 90% have a 6 pp higher probability of default compared to those with LTV below 50%. As to LSTI, they find that borrowers with ratios above 20% face up to a 21 pp increase in the probability of default relative to those with lower LSTI levels.

Table 1

Summary of empirical papers on lending standards and defaults

Authors	Assessed measure	Sample	Methodology	Key results
Deng et al. (2000)	LTV	US (1976-1983)	Option-pricing model	Default rates for loans with LTV>90% are 4-5 times higher than for those with LTV in the range 80-90%.
Ambrose et al. (2001)	LTV	US (1989)	Option-pricing model	Initial LTV ratio is positively associated with default risk; most pronounced for loans with LTV>90%.
May and Tudela (2005)	LTV, LSTI	UK (1991-2004)	Binary outcome models	An LTV>90% increases the default probability of mortgages by 6 pp.
Ghent and Kudlyak (2011)	LTV	US (1997-2008)	Binary outcome models	Probability of default positively related to initial LTV ratio, and stronger for mortgages with LTV>80%.
Haughwout et al. (2008)	LTV, DSTI	US (2001-2007)	Binary outcome models	Mortgages with LTV>80% and DSTI>40% present significantly higher default risk.
Lazarov and Hinterschweiger (2018)	LTV, DSTI	UK (1972-2016)	Binary outcome models	A 1pp increase in the average LTV and DSTI, rises default probability by 0.26 pp and 0.03 pp, respectively.
Kelly and O'Toole (2018)	LTV, BTL-DSTI (house rental value to loan service)	UK (1987-2014)	Non-linear cubic spline model	A 1 sd increase in LTV and BTL-DSTI rises the default rate by 28% and 23%, respectively. Default probability doubles for mortgages with LTV >85% and BTL-DSTI>1.
Galán and Lamas (2025)	LTV, LTP, LSTI, Maturity	Spain (2004-2016)	Binary outcome models	Mortgages with LTP>80%, maturity>30 years and LSTI>50% present 1.7-, 1.5- and 1.1-times higher odds of default.
Heijlova et al. (2021)	LTV, LTI, LSTI	Czech Republic (2015-2017)	Macroprudential indicator, stress tests	Simultaneous adoption of several BBMs enhances their effectiveness without higher restrictions.

SOURCE: Author's own elaboration based on referenced publications.

Ghent and Kudlyak (2011) analyse US loans originated between 1997 and 2008 to assess the impact of mortgages with high LTV ratios (i.e. above 80%) under a recourse regime. The authors find that the probability of default is positively associated with the initial LTV ratio, with the relationship being particularly strong for loans exceeding 80% LTV. Further, when the initial LTV ratio is interacted with the probability of negative equity (capturing the default option value), the economic and statistical significance of the LTV ratio increases. These results underscore the importance of leverage at origination in explaining mortgage default risk, even in contexts where borrowers are legally obligated to repay outstanding debt after foreclosure.

Haughwout et al. (2008) use proprietary data on US mortgages originated between 2001 and 2007 to study the role of LTV and DSTI in early defaults—those occurring during the first year of the loan life. They find that mortgages with LTV ratios above 80% and DSTI ratios above 40% have significantly higher default risk. Moreover, the study identifies significant non-linear effects beyond these thresholds. Default risk increases more than proportionally with higher LTV and DSTI values. In particular, the marginal effect of mortgages with LTVs between 90% and 94% is twice that of loans with LTVs between 80% and 84%. Similarly, loans with DSTI ratios above 50% nearly double the marginal effect compared to those with DSTI ratios between 40% and 44%.

Expanding the analysis to the UK context, Lazarov and Hinterschweiger (2018) examine a large sample of 3.5 million loans originated between 1972 and 2016, representing

41% of the UK mortgage market. The authors evaluate the role of LTV and DSTI in default risk across owner-occupier and buy-to-ley mortgages. Their results suggest that buy-to-let borrowers are 2.6% more likely to default than owner-occupiers. However, buy-to-let borrowers are found to be less sensitive to changes in the average LTV ratios: a 1 pp increase in the average LTV raises the probability of owner-occupied borrowers falling into arrears by 0.26 pp, while the effect is about one-third lower for buy-to-let borrowers. In contrast, DSTI sensitivity is similar across both groups, with a 1 pp increase in DSTI raising the distress probability by 0.03 pp.

Also, using data on mortgages from the UK but focusing on the buy-to-let market, Kelly and O'Toole (2018) assess the non-linear effects of LTV at origination on default risk. They also introduce a debt service measure specific to rental properties, defined as a ratio of the rental income to loan service. Using a non-linear cubic spline model, the authors identify key thresholds and turning points in the relationship between lending standards and default. Their findings reveal that default rates remain stable for mortgages with an LTV ratio below 75%, but increase sharply beyond this threshold—doubling for mortgages with a LTVs of 85%. Beyond this point, default probability continues to rise, but at a slower pace. Similar non-linear patterns are observed for their debt service measure, which can be extrapolated to more conventional indicators such as LSTI or DSTI ratios.

In the Spanish context, Galán and Lamas (2025) employ a large dataset of over five million mortgages originated between 2004 and 2016 to investigate the role of inflated collateral valuations in distorting the power of the LTV ratio to predict defaults. The authors show that inflated appraisals weakened the reliability of LTV as a default predictor. When replacing appraisal values with transaction prices to construct a loan-to-price ratio (LTP), the authors find a strong and statistically significant association with defaults risk. In particular, mortgages with LTP above 80% present 1.7-times higher odds of default, rising to 2.6 times for LTPs above 100%. The authors also assess the impact of LSTI and maturity, finding that loans with maturities over 30 years and LSTI ratios above 50% have 1.5- and 1.1-times higher odds of default, respectively. These associations are particularly pronounced during boom periods. They also find significant interactions between lending standards. Overall, their results suggest that combining multiple BBMs enhances their effectiveness and reduce the scope for regulatory arbitrage.

More directly related to the calibration of BBMs, Heijlova et al. (2021) propose a macroprudential indicator of potential losses associated with new mortgage lending, which can be used to identify risky thresholds for LTV, LTI and LSTI through stress testing. The authors show the applicability of this approach in the Czech Republic mortgage market, concluding that a simultaneous adoption of multiple BBMs improves policy effectiveness without imposing excessive constraints on mortgage supply.

Overall, empirical evidence consistently shows that tighter lending standards – particularly lower LTV and DSTI ratios – are associated with significantly lower default probabilities. Early studies using option-pricing models already highlighted the strong link

between high LTV ratios and mortgage default risk, a finding that has been reinforced by more recent research employing granular loan-level data and advanced econometric techniques. The literature also reveals important non-linearities and threshold effects, with default risk increasing disproportionately beyond certain LTV and DSTI levels. Moreover, the predictive power of these indicators can be distorted by practices such as inflated collateral valuations, underscoring the importance of using more robust measures like LTP ratios. Finally, several studies emphasize the benefits of combining multiple BBMs, as their joint application appears to enhance effectiveness and reduce the scope for regulatory arbitrage.

3 Ex-post empirical impact studies

The most relevant question on the use of BBMs is whether they have been effective on containing systemic vulnerabilities. In recent years, several empirical studies have been published on the ex-post impact of BBMs, leveraging on the increasing use of these measures. In general, two types of research studies can be found. On the one hand, cross country assessments that evaluate the impact of these instruments on macroeconomic and macrofinancial aggregates. On the other hand, single-country studies, which try to identify the impact of the implementation of these measures in a specific jurisdiction focusing on the impact on mortgage lending growth, house prices, and the distribution of the lending standards of new mortgages. In section 3.1 we first review the results of cross-country studies, and in the next section we focus on single-country studies, which usually exploit granular data at the loan level.

3.1 Cross-country macroeconomic studies of BBMs

The post-GFC interest in macroprudential policy effectiveness has led to the development of international datasets – such as the IMF's iMaPP and ECB's MaPPED – that document the use of these tools across jurisdictions. Given the diversity and complexity of macroprudential instruments, most studies rely on dummy indicators or discrete indexes derived from these datasets to assess their impact. Several cross-country analyses have used this approach to evaluate BBMs, particularly LTV and DSTI limits, focusing on their effects on credit growth, house prices, and broader macroeconomic outcomes. The following section reviews key studies, summarizing their methodologies, samples, and main findings. Table 2 provides an overview.

Lim et al. (2011) is one of the first cross-country studies conducted after the GFC to assess the impact of macroprudential measures. Using data from the IMF's macroprudential policy surveys, the authors construct a set of dummy variables signalling periods in which specific macroprudential instruments were used, covering a sample of 49 advanced and emerging economies from 2000 to 2010. They find that LTV measures are effective in reducing systemic risk during expansionary phases of the financial cycle.

Claessens et al. (2013) analyse a wide sample of 2,800 banks across 48 countries over the period 2000-2010. They use a dummy variable to capture the implementation of macroprudential policies by instrument, based on information from the IMF's surveys. The authors find that tightening BBMs during boom periods is more effective at curbing credit and house price growth than easing them during busts is at stimulating these variables. Specifically, during financial expansions, these measures reduce total credit by between 0.5 pp and 2 pp one year after implementation. In contrast, the deactivation of these measures during crises appears to have no significant effect.

Cerutti et al. (2017) analyse a large sample of 119 countries over the period 2000-2013. The authors use a binary indicator of the activation of macroprudential policies by

Table 2

Summary of empirical cross-country studies on the impact of BBMs

Authors	Assessed measure	Sample	Dependent variables	Methodology	Key results
Akinci and Olmstead-Rumsey (2018)	Cumulative (-1/0/+1) index of LTV and DSTI measures in each quarter.	57 advanced and emerging economies, 2000Q1-2013Q4	Domestic bank credit, housing credit, and house prices.	Dynamic panel regressions with country-fixed effects, estimated by GMM.	BBM tightening reduces housing credit, and house price growth. Results stronger for EMEs.
Alam et al. (2024)	(1) BBM four-quarter cumulative (-1/0/+1) index. (2) Average of regulatory LTV limits of all existing limits in that country.	63 advanced and emerging economies, 1990Q1-2016Q4	Household credit, house prices, and macroeconomic outcomes.	Dynamic panel regressions with country- and time-fixed effects.	High negative impact on household credit and milder impact on consumption and house prices. Non-linear effect for LTV and dependent on initial level.
Cerutti et al. (2017)	LTV and DTI dummy variables signaling periods in which the limits are implemented.	119 advanced and emerging countries, 2000-2013	Real household and corporate credit growth, and house prices.	Dynamic panel regressions with country-fixed effects, estimated by GMM.	LTV and DTI lower household credit growth. No significant effects on house prices.
Claessens et al. (2013)	Binary indicator by instrument signaling whether a tool is activated or not.	48 advanced and emerging countries, 2000-2010	Bank risk indicators	Dynamic panel regressions with country- and time-fixed effects, estimated by GMM.	BBM are effective in reducing leverage, asset, and non-core to core liabilities growth during boom times. No effects during bust times.
Franta and Gambacorta (2020)	Discrete (-1/0/+1) index signaling changes in LTV limits.	56 advanced and emerging economies, 1980Q1-2012Q2.	GDP growth distribution. Focus on percentiles 5, 50, and 95.	Local projection quantile regressions.	Tightening LTV lowers the probability of observing extreme output growth rates in the mid-term.
Galán (2024)	(1) BBM four-quarters cumulative (-1/0/+1) index. (2) Average of regulatory LTV limits of all existing limits in that country.	36 advanced and emerging economies, 1990Q1-2016Q4	GDP growth distribution. Focus on percentiles 5 and 50.	Local projection quantile regressions.	Tightening BBMs during expansions improves GaR in the mid-term. No significant effects of easing BBMs during crises.
Galán (2025)	BBM four-quarters cumulative (-1/0/+1) index.	28 EU countries, 1990Q1-2019Q4	Credit growth distribution. Focus on percentiles 5, 50, and 95.	Local projection quantile regressions corrected by IPW.	Tightening BBMs during expansions has negative effects on the right tail of the credit growth distribution. No significant effects of easing BBMs during crises.
Kuttner and Shim - 2016	LTV and DSTI cumulative (-1/0/+1) indexes.	57 advanced and emerging economies, 1980Q1-2011Q1	Housing credit and house price growth	Dynamic panel regressions with country fixed effects.	LTV and DSTI ratios have strong negative effects on house prices and housing credit.
Lim et al. (2011)	Maximum LTV ratio and dummy variable signaling periods in which the limit is implemented.	49 advanced and emerging countries, 2000Q1-2010Q4	Systemic risk, as measured by credit growth, leverage, liquidity, and capital flows.	Dynamic panel regression with country fixed effects, estimated by GMM.	LTV is effective in reducing systemic risk during economic expansionary phases.
Poghosyan (2020)	BBM (-1/0/+1) quarterly index.	28 EU countries, 1990Q1–2018Q4	Household credit and house price growth.	Local projections with country- and time-fixed effects.	BBMs curb house prices and credit in the mid-term. Stronger results during expansions and for legally binding measures. Easing BBMs has positive effects.
Richter et al. (2019)	Changes in the LTV limit level. Changes in the scope are given a lower weight.	56 emerging and advanced economies, 1990Q1-2012Q2	Real GDP growth, inflation, house prices, and credit growth.	Local projections with country- and time-fixed effects.	Modest effects on output, negligible inflation, and substantial on credit growth and house prices.

SOURCE: Author's own elaboration based on referenced publications.

groups of instruments based on the IMF's Global Macroprudential Policy Instruments Survey. They examine the impact of these policies on credit growth by sector (household and corporate) and on house price dynamics. Among the different types of macroprudential tools, BBMs appear to be the most effective in curbing household credit growth, with

estimated reductions between 1 and 2 pp at a one-year horizon. However, BBMs do not show significant effects on house price growth. Finally, the authors find that restrictive measures are more effective in smoothing credit growth during boom periods.

Kuttner and Shim (2016) analyse a sample of 57 countries, some with long time series beginning as early as 1980. They construct a cumulative index of macroprudential policies aimed at curbing housing credit and house prices to examine how effective are different instruments, including LTV and DSTI restrictions, in achieving these objectives. The authors find that tighter LTV and DSTI limits significantly reduce housing credit growth after four quarters, with DSTI restrictions having the strongest impact and LTV limits a more moderate effect. In contrast, neither LTV nor DSTI restrictions have significant effects on house price growth.

Richter et al. (2019) analyse a panel of 56 countries to investigate whether changes in LTV ratios affect output growth and inflation, in addition to their impact on credit growth. They find that tighter LTV limits have relatively large negative effects on credit growth, with reductions of up to 6 pp after 16 quarters. They also find that LTV limits negatively affect output growth, although the effect is small: a 10 pp reduction in the LTV ratio reduces output growth by approximately 1% over four years. The authors note that this effect is comparable to that of a 25 basis points (bp) in the monetary policy interest rate. Overall, they conclude that imposing LTV limits can significantly reduce credit and house price growth, with relatively low costs.

Akinci and Olmstead-Rumsey (2018) study the impact of macroprudential policies in a panel of 57 advanced and emerging economies over the period 2000 - 2013. Drawing on data from the IMF's macroprudential surveys, the authors identify that limits on LTV and DSTI ratios reduce total credit by 0.6 pp in the quarter following their implementation. This effect is primarily driven by household credit, which declines between 1,4 and 2 pp. In contrast, capital measures do not exhibit significant effects.

Alam et al. (2024) use cross-country data for a large sample of 63 countries spanning 1999 to 2016, based on the IMF's macroprudential database (iMaPP). They estimate the impact of LTV restrictions using both a four-quarter cumulative index that signals tightening or loosening actions, and a continuous variable capturing average regulatory LTV limits. In both cases, they find that LTV measures reduce household lending. Specifically, the index-based approach identifies reductions of up to 2 pp one year after implementation, while the continuous measure suggests a decline of approximately 0.5 pp following a 10 pp tightening in the LTV ratio. In contrast, no significant effects are found on house prices. Similarly to other studies they find no significant effects of capital-based measures.

Also using a discrete index, Poghosyan (2020) evaluates the impact of lending restriction policies on household credit and house price growth in a sample of 28 EU countries over the period 1990-2018. The author finds that lending these measures are generally effective in curbing both house prices and credit, although the effects are delayed, peaking

at around –1.5 pp after three years. The impact is found to be stronger for legally binding measures, those involving sanctions, and those implemented prior to the GFC. The author also evaluates the effects of loosening measures, finding moderate positive responses in both credit and house prices during crises periods.

Using a growth-at-risk (GaR) framework, Franta and Gambacorta (2020) evaluate the impact of tightening the LTV on the GDP growth distribution. Using a discrete index to signal changes in this policy, they estimate models for a sample of 56 countries over the period 1980-2012. The authors find that, in the medium term, both tails of the GDP growth distribution are affected. The left tail improves, indicating reduced downside risk, while the right tail contracts, implying a lower probability of observing high GDP growth rates. Together, these results imply that tightening the LTV limits lowers the probability of extreme output growth rates.

Similarly, Galán (2024) employs the GaR methodology to assess the effects of macroprudential policy in a sample of 36 advanced and emerging economies over the period 1990-2016. The main findings point to a positive effect of macroprudential policy in reducing GaR, although the effects vary significantly depending on the tool used and the phase of the financial cycle. Regarding BBMs, the author finds that tightening lending standards during expansionary periods improves GaR by approximately 0,75 pp between three and eight quarters after implementation. In contrast to Poghosyan (2020), easing BBMs during financial crises does not yield significant effects. These findings suggest asymmetric effects of BBMs over the cycle, which can be related to the fact that credit institutions tend to tighten credit standards during crises, often beyond regulatory limits. These results are confirmed using a continuous measure of LTV limits, finding that a 10 pp reduction in the LTV ratio improves GaR by around 0.5pp, an impact that is rapidly observed and persistent over eight quarters.

Building on this framework, Galán (2025) extends the GaR approach to analyse the impact of macroprudential policy on the credit growth distribution. Using a sample of European Union countries from 1990 to 2019, the author finds that BBMs have a negative and significant effect on the right tail of the household credit growth distribution in the medium term, mainly during financial expansions. This impact is found to be twice as large as that of capital-based tools. Interestingly, tightening BBMs are also found to have a positive impact on the right tail of corporate credit growth, suggesting that such measures may induce banks to reallocate credit towards this sector. Consistent with previous findings on GDP growth, easing BBMs during crises does not significantly affect the credit growth distribution.

Overall, cross-country evidence suggests that BBMs are generally effective in curbing household credit growth, particularly during financial expansions, while their effect appear more limited when eased during downturns. In particular, LTV and DSTI restrictions are consistently found to reduce household credit, although their impact on house prices and output growth appears to be more muted and context dependent. Several studies highlight the asymmetric nature of BBM effects across the financial cycle, with stronger results for legally binding measures, and those implemented prior to the GFC. Moreover,

recent applications of the GaR framework underscore the role of BBMs in reducing downside risks to both GDP and credit growth, reinforcing their relevance in mitigating the build-up of systemic vulnerabilities.

3.2 Single-country and microlevel data studies

In addition to cross-country analyses, which offer broad insights into the effectiveness of BBMs, a multitude of recent empirical literature have emerged focusing on country-specific analysis. Although they are limited to the context of a single country, rely on highly detailed and granular data sources – typically at the loan or borrower level – , which allow for a precise assessment of the impact of BBM measures on credit dynamics, housing markets, and the behaviour of market participants. Since BBMs can influence borrowers' housing choices and lead lenders to revise credit standards or adjust the composition of their portfolios, single country analysis helps to clarify the transmission mechanisms of BBMs, and reveal heterogeneities often linked to the stage of the economic cycle or the institutional setting. This section reviews some of the main contributions in this area. Table 3 summarizes the main characteristics of the reviewed studies.

Armstrong et al. (2019), provide an insightful contribution on this topic using a difference-in-differences (DiD) strategy that leverages exemptions from macroprudential measures to construct control groups. They analyse the effect on housing prices of a sequence of LTV restrictions implemented in New Zealand between 2013 and 2017, which varied in intensity and geographic scope – some involving nationwide tightening and others selectively loosening constraints outside major urban centres. The first intervention, introduced in October 2013, capped high-LTV lending (above 80%) at 10% of new mortgage issuance. It led to a 2.4 pp reduction in house price growth over a 12-month period. The second measure, in November 2015, tightened investor LTV limits in Auckland to 70% (with a 5% speed limit) while easing restrictions elsewhere (raising the speed limit to 15%).[1] This had no significant effect in Auckland but coincided with a 3% increase in house prices in the rest of the country, where conditions were relaxed. The third intervention, in October 2016, further tightened investor lending nationwide by lowering the cap to 60% with a 5% speed limit, leading to a 3.1% decline in house prices in Auckland, with minimal impact elsewhere.

Acharya et al. (2022) analyse the effects of the introduction of LTV and LTI limits in Ireland in 2015, focusing on their impact on house prices, credit, savings, and consumption. Despite initially affecting a significant share of mortgage origination (43%), mortgage lending continued to grow through credit reallocation across borrower types – shifting from low to high-income borrowers – and across regions, from urban counties where borrowers were closer to the regulatory limits to rural counties where borrowers were further from those thresholds. Regarding prices, the measures reduced house price dispersion by slowing growth in overheated markets. Moreover, the authors document portfolio shifts among banks more affected by the limits, towards riskier, non-targeted asset classes such as securities

1 A speed limit refers to the share of new lending that can exceed the regulatory limit.

and corporate credit-, revealing both intended and unintended transmission channels of BBMs. Additionally, the authors find an increase in savings rates among constrained households—particularly younger and lower-income borrowers—suggesting potential effects on aggregate demand and real economic activity.

Van Bekkum et al. (2024) analyse the effects of the introduction of an LTV limit in the Netherlands in 2011 on mortgage lending, household liquidity, and financial stability using a DiD approach. The initial cap was set at 106%, with exemptions for households refinancing existing mortgages and those selling homes with negative equity. Drawing on comprehensive administrative data, the authors show that the policy led to a 4.9 pp reduction in LTV ratios at origination. This reduction was more pronounced among low-income borrowers, highlighting the heterogeneous effects of the measure. They also estimate a 9.5 pp drop in mortgage debt and a 5.7 pp decline in home prices among affected households. As a result, annual mortgage payments fell by 8.8 pp, and both mortgage and total household DTI ratios declined by 10 pp. Despite no substitution into other forms of debt, household liquidity decreased by 33 pp. Policy changes improved household solvency, resulting in a 0.8 pp reduction in mortgage arrears over the short term (18 months) and a lower sensitivity to income shocks among low-income households. These outcomes suggest an ex-post welfare gain, as the measures not only enhanced financial stability but also reduced vulnerability among more exposed segments of the population.

Peydró et al. (2024) examine the effects of a cap introduced in the UK in October 2014, which limited high LTI (≥ 4.5) mortgages to 15% of new lending, focusing on its impact on interest rates, credit allocation, default rates and house prices. Using mortgage register data from 2012Q3 to 2016Q2, the authors identify heterogeneous effects among borrowers and lenders. The policy led to a 3.9 pp decline in the share of high-LTI loans issued by constrained lenders, a 4.5% increase in interest rates on such loans, and a 6.1% reduction in high-LTI lending to borrowers in the lowest income quintile. Affected borrowers responded by decreasing average loan size, property value, and LTV ratios, suggesting behavioural adjustments in response to the regulation. The measure also contributed to a moderation in house price growth in areas more exposed to constrained lending, although these areas experienced smaller price declines following the Brexit referendum. Importantly, the policy was associated with a reduction in default rates, particularly among lower-income borrowers, indicating improved credit quality. Moreover, affected households reduced total leverage and interest expenses. These findings highlight both the stabilising and distributional consequences of BBMs.

Unlike the previously discussed studies that rely on administrative or loan-level data, Fuster and Zafar (2021) adopt a survey-based approach to explore behavioural responses to varying degrees of borrowing limits, focusing on households' willingness to pay (WTP), a variable closely linked to housing demand and prices. Using data from the Federal Reserve Bank of New York's Survey of Consumer Expectations, the authors examine how WTP responds to hypothetical financing scenarios involving strict versus more flexible leverage constraints. Specifically, participants were asked to state their WTP for a

house similar to their current one, assuming an immediate move to a comparable location. Four experimental conditions were tested: (1) a fixed 20% down payment with randomized mortgage rates (4.5% vs. 6.5%); (2) a flexible down payment, with a minimum of 5% of WTP; (3) a mortgage rate switch (from 6.5% to 4.5% or vice versa); and (4) a positive wealth shock in the form of a $100,000 inheritance. The study finds that down payment constraints exert the strongest influence on WTP, particularly among financially constrained households. While lower mortgage rates increase WTP, their impact is relatively modest compared to easing payment requirements. These results suggest that relaxing leverage constraints – especially for liquidity-constrained buyers – may be a more effective policy tool for stimulating housing demand and prices than reducing interest rates.

Cokayne et al. (2024) analyse the impact of tightening Denmark's LTV cap from 98% to 95% on financial stability and household welfare using both empirical and theoretical approaches. Focusing on the empirical part, the authors use a DiD approach to examine the impact of the measure on mortgage credit, the probability of negative equity, house prices, consumption, and homeownership. They find that the LTV cap reduced high-risk mortgage issuance by 30%, lowered the probability of negative equity by 25%, and moderated house price growth by 10%. While credit conditions tightened, household consumption remained stable as borrowers adjusted their behaviour. Entry into the housing market was only slightly delayed, with an 11% increase in required income and minimal impact on homeownership rates. The authors also show that young households were generally more likely to enter the housing market, suggesting that the introduction of binding BBMs did not significantly distort access to homeownership for younger cohorts, although lower-income households may have faced increased barriers.

DeFusco et al. (2020) examine the impact of leverage limits introduced in the United States in 2014 under the Dodd-Frank Act on total credit, mortgage pricing, and loan performance. Using a DiD approach, they compare jumbo mortgages with DTI ratios above and below the Qualified Mortgage threshold (DTI > 43%) before and after the policy's implementation. Their findings reveal that the regulation significantly altered the distribution of DTI, led to an increase in mortgage interest rates by 10-15 bp per year for loans above the threshold, and reduced lending, with 20% of borrowers experiencing a decline in leverage. However, the policy resulted in only a minimal reduction in aggregate default rates.

Abreu and Passinhas (2024) analyse the effects of LTV limits introduced in Portugal in June 2018 on mortgage characteristics and housing market outcomes. The regulation capped LTV ratios at 90% for primary residence, 80% for other properties, and 100% for properties held by credit institutions and for leasing agreements. Using a DiD approach and loan-level data from the Portuguese Central Credit Register, the authors examine new mortgages issued between 2017 and 2019. They find that the regulation led to a 5.9 pp reduction in LTV ratios, a 7.5% decrease in average loan amounts, and a 0.31 pp decline in LTI ratios. However, LSTI ratios increased by 1.9 pp, and constrained borrowers faced slightly higher interest rate spreads (0.03 pp). Monthly instalments rose by €40 on average, while transaction prices fell by 2.1%. The effects were more pronounced among middle-

income borrowers. Banks with higher pre-policy exposure to high-LTV lending – those in the third quartile – and those with greater market power – top quartile of the Lerner index – adjusted pricing and lending more aggressively.

Caloia (2024) examines how BBMs – specifically LTI and LTV limits – affect mortgage credit demand and household indebtedness, using detailed data from the Netherlands. Employing a DiD approach, the author finds that a 1% increase in borrowing capacity leads to a rise in aggregate mortgage debt ranging from 0.2% to 0.6%, depending on borrower characteristics (first-time vs. repeat buyers) and the specific BBM used to define borrowing capacity. The effect is particularly pronounced among first-time homebuyers. Stricter BBMs increase the likelihood that households borrow at the regulatory limit, especially among highly leveraged borrowers: a one-unit tightening in the LTI limit raises the probability of bunching by 0.074% for first-time buyers and 0.048% for repeat buyers. The study highlights a strong relationship between household debt and borrowing capacity, especially during housing booms, and shows that credit-driven housing demand varies significantly across borrower types and property markets. BBMs are found to reduce household leverage by constraining borrowing capacity, with LTI limits proving especially effective in lowering both debt levels and financial risk.

Hodula et al. (2023) examine the impact of BBMs – specifically, limits on LTV, DTI, and DSTI ratios – on mortgage lending in the Czech Republic, using a dataset of individual loans from 2016 to 2019. Their analysis focuses on two sequential BBM recommendations issued in 2017 and 2018. The first, implemented in June 2017, recommended capping mortgage loans with LTV ratios above 90% and limiting the share of loans with LTVs between 80% and 90% to no more than 15% of total mortgage credit. The second, introduced in October 2018, added income-based restrictions: a DTI cap of 9 and a DSTI cap of 45%. Under this framework, only 5% of new loans were permitted to exceed the DTI and DSTI thresholds, while the 15% exemption for loans with LTVs between 80% and 90% remained in place.

Using machine learning techniques – specifically, random forest algorithms – applied to granular data collected through a survey of banks conducted by the Czech National Bank to assess compliance with regulatory recommendations, the authors evaluate the effects of BBMs. They find that the introduction of LTV limits resulted in a modest 1.2% reduction in loan size and an 8.5% increase in collateral value, accompanied by a 0.18 pp rise in mortgage interest rates. These effects were more pronounced in regions where property prices were initially lower, likely reflecting converged toward areas with higher initial prices. The subsequent implementation of income-based caps on DTI and DSTI had a significantly stronger impact, reducing loan sizes by 20.6% and increasing mortgage rates by 0.34 pp, while leaving collateral values largely unaffected. The study concludes that combining income-based restrictions with LTV limits is more effective in cooling mortgage markets than relying on LTV limits alone.

Tzur-Ilan (2023) examines the impact of the implementation of LTV limits on residential choices and the unintended consequences of such policies. The study exploits

Table 3

Summary of single-country studies on the impact of BBMs

Authors	Assessed measure	Sample	Dependent variables	Methodology	Key results
Abreu et al. (2024)	• LTV: 90% main residence; 80% other purposes; 100% properties held by credit institutions and leasing agreements. • DSTI: 50%. • Maturity: maximum 40 years and on average 30 years.	Country: Portugal Data: Credit Register Sample: New mortgages for own residence. Excl. loans with LTV <65 or > 110. Period: 2017/01-2019/12.	• LTV • log (log amount) • LTI • LSTI • Interest rates spreads • Monthly instalments • Transaction prices	DiD	• LTV: 5.9 pp lower; higher reduction in quartiles 2 and 3. • Loan amount: 7.5 % smaller. • LTI: 0.31 pp lower. • LSTI 1.9 pp higher. • Monthly instalments: 40 € higher. • Transaction prices: 2.1 % lower. • Banks with high LTV charged higher spreads to constrained borrowers.
Abreu and Passinhas (2021)	• LTV: 90% main residence; 80% other purposes; 100% properties held by credit institutions and leasing agreements. • DSTI: 50%. • Maturity: maximum 40 years and on average 30 years.	Country: Portugal Data: Banco de Portugal, INE, OECD, and ECB. Period: 2017–2018	• New loans for consumption • New loans for house purchase • Real house price index • Economic activity (coincident indicator)	Counterfactual analysis using a Bayesian VAR model	• New loans for consumption decrease (recorded negative year-on-year rates of change after October 2018). • New loans for house purchase remain stable. • House prices increase faster • No significant short-term impact on economic activity.
Acharya et al. (2022)	• LTV limit by borrower type: • PDH(1) 80%; • FTB (2) 90% • BTL (3) 70% • LTI limit 3.5 (except investment properties).	Country: Ireland. Data: Central Bank of Ireland, ECB. Period: 2013/01-2016/06.	• Mortgage credit • House prices	DiD	• Mortgage credit growth is stable, through loans reallocation (towards less-constrained borrowers and regions). • House prices: Decrease but with regional disparities.
Armstrong et al. (2019)	Three consecutive changes in LTV: • LTV 1st (2013): 80% (10% SL(4)) • LTV 2nd (2015): 70% in AUCK(5) (5% SL); rest of country 15% SL • LTV 3rd (2016): 60% investors (5% SL); 80% owner-occupiers (10% SL)	Country: New Zealand. Data: CoreLogic. Period: 2013/01-2017/05.	• House prices	DiD	• House price growth: LTV 1st: -2.4% reduction. LTV 2nd: no significant effect in AUCK; a 3% increase in the rest of the country. LTV 3rd: -3.2% reduction in AUCK; no significant effect in the rest of the country.
Caloia (2024)	LTV: 2012 at 106% and gradually tightened (1 pp per year to 100% in 2018). LTI: As a result of DSTI limits set by the NIBUD recommendation. These limits vary with their income given the maximum maturity of 30 years and are reviewed annually.	Country: Netherlands. Data: Dutch central bank. Sample: 85% of the population of RRE mortgages. Period: Q4 2012 - Q4 2018.	• Mortgage amount	POLS estimates	• Average elasticity of credit demand to borrowing capacity: 62% (FTB), -40% (STB) when LTI is binding; 18.5% (FTB), -15.1% (STB) when LTV is binding; 25.5% (FTB), -18.1% (STB) when both limits are binding. • Bunching at the limits.
DeFusco et al. (2020)	• DTI: 43%. Exemptions: Loans eligible to be purchased by the GSEs (6) or eligible to be insured by other government agencies.	Country: US. Data CoreLogic Sample: Jumbo loans with DTIs between 36% and 50%. Period: 2010/01-2015/12	• Mortgage credit • Interest rates • Loan performance (default rates)	DiD	• Interest rates: non-QM (7) loans (DTI>43), have an interest rate premium on the order of 10-15 bp. • Mortgage volume: Reduction in mortgage originations (15% of jumbo loans in 2014 that would have had a DTI above 43% were eliminated). • Default rates: small positive impact.

SOURCE: Author's own elaboration based on referenced publications.

Table 3

Summary of single-country studies on the impact of BBMs (cont'd)

Authors	Assessed measure	Sample	Dependent variables	Methodology	Key results
Hodula et al. (2023)	• LTV: 90% and soft limit for loans with LTV 80–90% (15% total loans). • DTI: 9 • DSTI: 45%.	Country: Czech Republic Data: Surveyed individual loans. Sample: 81,844 mortgages. Period: 2016–2019.	• Size of mortgage-loan • Value of collateral • Mortgage rates	Regression tree and the random forest algorithms	• After the LTV limit, mortgage size reduced by 1.2%, and collateral value increased by 8.5%. • Distance to average mortgage rate increased by 0.18 pp. • After DTI and DSTI limits, mortgage loan size reduced by 20.6%; no significant statistical changes in collateral value; average mortgage rate increased by 0.34p.p.
Peydró et al. (2024)	• LTI: 4.5 for large lenders (>£100 million and more than 300 annual mortgages, with SL of 15%. Exemptions: remortgages with no change to the outstanding principal and lifetime mortgages.	Country: United Kingdom Data: Bank of England, and UK Land Registry Sample: Mortgages subject to the LTI limit. Period: 2012Q3 to 2016Q2.	• % High-LTI mortgages • Interest rate • Borrowers Income quintile (Q) and substitution effects • House price indices • Mortgage defaults	DiD	• Share of high-LTI loans: drop by 3.9%; decreases by 6.1% in the lowest Q (but increases in the higher Q). • Interest rate: 4.5% increase for high-LTI loans. • Substitution effects: constrained lenders (CL) increased high-LTI loans; contraction in lending for low-income borrowers in areas more exposed to CL. • House prices: Slower growth in affected areas; milder drop post-shock. • Defaults: decreased -0.24 pp for low-income borrowers in affected areas.
Tzur-Ilan (2023)	• Soft LTV limit (sLTV): Capital surcharge for mortgages with LTV > 60% and loans > US$200,000. • Hard LTV limit (hLTV): •FTB (2): 75% •BTL (3): 50% •Rest: 70%	Country: Israel. Data: Tax authority and Land Registry Sample: Transactions with LTV 80-120. Period: 2010/08-2012/06.	• LTV at origination • Mortgage debt • Type and location of purchased properties • Interest rates • DSTI and maturity • Unsecured loans	DiD	• Price of purchased houses: -5% (sLTV); -10% (FTB, hLTV); -22% (BTL. hLTV). • Size of purchased houses: -9% (FTB, hLTV), -14% (BTL, hLTV). • Distance from city centers: +14% (sLTV, and FTB, hLTV); +24% (BTL, hLTV). • Interest rate: +0.21 pp (sLTV); +0.41 pp (FTB, hLTV); +0.62 pp (BTL, hLTV). • Maturity: +9 months (sLTV); +22 months (FTB, hLTV); +18 months (BTL, hLTV).
Van Bekkum et al. (2024)	• LTV: 106% Exemptions: Households refinancing existing mortgages and those selling homes with negative equity. FTB for financing energy saving facilities	Country: Netherlands. Data: Tax authority and Land Registry Sample: Transactions with LTV 80-120. Period: 2010/08-2012/06.	• LTV at origination • Mortgage debt • Value of Home • Annual mortgage payment) (DS) • LSTI and LTI • DTI • Liquid Assets • Mortgage arrears	DiD	• LTV: 4.9 pp reduction at origination. • Mortgage debt: 9.5 pp decrease. • Value of home: 5.7 pp decrease. • Annual payment: falls by 8.8 pp. • LSTI: falls by 0.009. • LTI falls by 0.362. • DTI falls by 0.360. • Household liquidity: drops by 33 pp. • Mortgage arrears: reduction of 0.8 pp (1.4 pp for low-income borrowers).

SOURCE: Author's own elaboration based on referenced publications.

the introduction of both a soft and a hard LTV restriction in Israel. The first policy, introduced in 2010, imposed a capital surcharge on mortgages with LTV ratios above 60% for loans exceeding approximately US$200,000. The second policy, implemented in 2012, set hard LTV caps by buyer type: 75% for first-time buyers, 70% for second time and subsequent buyers, and 50% for property investors. The results show that LTV limits prompted borrowers to select more affordable housing, often located farther from central districts and in lower socioeconomic areas. Specifically, affected borrowers purchased homes with prices about 5% lower after the soft limit and up to 22% lower after the hard limit, and smaller homes (between 9% and 14% less area after the hard limit). Furthermore, these restrictions led to higher interest rates (+0.21 pp after the soft limit and up to 0.62 pp after the hard limit) and reduced loan sizes (by about 5% after the soft limit and up to 15% after the hard limit). In general, the effects of the hard limit were larger, with the greatest impact observed among investors compared to first-time buyers. Additionally, the study finds that the hard limit led to unintended consequences, such as an increase of unsecured lending (e.g. personal loans), which worsened borrowers' DSTI ratios and resulted in longer mortgage maturities (an increase of 9 months after the soft limit and up to 22 months after the hard limit).

In addition to micro-level studies, a complementary strand of the literature employs a time-series approaches to assess the aggregate impact of BBMs within single-country settings. Abreu et al. (2021) evaluate the impact of a comprehensive set of recommendations on lending conditions implemented in Portugal in June 2018. These measures included limits on LTV and DSTI ratios, restrictions on loan maturity, and requirements for regular payments on interest and principal. To isolate the effects of the policy intervention, the authors conduct a counterfactual analysis using a Bayesian Vector Autoregression (BVAR) model. The model estimates how new household loans (for both consumption and house purchases), house prices, and economic activity would have evolved in the absence of the recommendation, using monthly interpolated data from 2003 to mid-2018. The model includes exogenous controls for domestic and foreign residential investment, interest rates, and euro area GDP growth. Results show that the policy curbed new lending volumes (both housing and consumption), with effects becoming significant four months after implementation. Interestingly, while house prices were expected to continue growing at pre-policy rates, observed prices rose even faster, likely due to strong foreign investment. No significant short-term impact on economic activity was detected.

4 Theoretical impact studies

This section synthesizes recent literature using economic models to assess the effects of borrower-based macroprudential policies. These models provide a framework for understanding the complex interplay between credit constraints, housing markets, and broader macroeconomic dynamics. This section reviews two types of studies: those employing partial and general equilibrium models, and those using ABMs.

4.1 Equilibrium models

Recent years have seen significant development in partial and general equilibrium models designed to study the effects of BBMs. At a foundational level, partial equilibrium models offer targeted insights by isolating a single market – such as housing or mortgages – to analyze the direct impact of BBMs. For a more holistic assessment, researchers turn to general equilibrium models, particularly Dynamic Stochastic General Equilibrium (DSGE) frameworks, which capture the complex interplay and spillover effects between the housing market, household credit, and broader macroeconomic variables. A crucial evolution in this area is the incorporation of household heterogeneity; by modeling differences in age, wealth, income, and access to credit, these advanced models allow for a nuanced analysis of the distributional consequences of BBMs. Table 4 presents an overview of these studies, summarizing their main results, which we describe in detail below.

Arce and López-Salido (2011) develop a theoretical overlapping generations model where collateral constraints, in the form of an LTV, play a relevant role in the emergence of housing bubbles. They argue that financial frictions tying household borrowing capacity directly to the value of housing assets can restrict the supply of loans to young, borrowing-constrained homebuyers, leading to an excess of savings among middle-aged households, especially in low-interest-rate environments. These excess funds may flow into speculative assets, making a bubble a more likely outcome in the event of positive credit supply shocks.

Gete and Reher (2016) explore optimal LTV regulation through a partial equilibrium tractable model with closed-form solutions for variables like mortgage rates, credit ceilings, and LTV/LTI ratios under both recourse and nonrecourse loans. They build an analytical model of collateralized lending with heterogeneous households and perfectly competitive lenders, where house prices and future income are subject to an aggregate business cycle shock.

Their research identifies two extensive margins of credit: a supply-driven margin where lenders ration credit to risky borrowers, and a demand-driven margin based on households' preferences for renting versus homeownership. On the supply side, the results reveal that low risk-free rates lead to comparatively lower mortgage rates for high-LTI households. On the demand side, mortgage applications depend on the reaction of the rent-to-price ratio. Moreover, households face lower mortgage rates when lenders' loan recovery rates are high and demand higher LTV ratios.

Table 4
Summary of studies using dynamic equilibrium models

Authors	Methodology	BBM	Key results
Arce and Lopez-Salido (2011)	General equilibrium model of housing bubbles	LTV	Tighter LTVs may increase bubbles risk if excess savings are redirected to speculative assets.
Gete and Reher (2016)	Partial equilibrium model with closed-form solutions	LTV and LTI	Optimal LTV should balance housing access and risk; nonrecourse loans increase inequality.
Favilukis, Ludvigson, and Van Nieuwerburgh (2017)	Quantitative dynamic general equilibrium model calibrated to US data	LTV	Relaxed constraints drive booms; low interest rates alone are insufficient.
Greenwald (2018)	Quantitative dynamic general equilibrium model calibrated to US mortgage data	LTV and DSTI	DSTI constraints amplify cycles; DSTI limits are more effective than LTV caps.
Ingholt (2022)	DSGE model with time-varying constraint estimated to historical US data	LTV and DSTI	LTV is more binding pre-2008 while DSTI dominates post-2011.
Greenwald and Guren (2025)	General equilibrium model with housing market segmentation calibrated to the US	LTV and DSTI	Credit shocks (relaxation of LTV) affect prices more than ownership; segmentation of home purchase and rental markets matters.
Castellanos et al. (2024)	Life-cycle general equilibrium model with non-segmented housing markets calibrated to Ireland	LTV and LTI	Caps reduce prices but raise rents; hurt young/mid-income.
Drechsel and Kim (2024)	Theoretical model with numerical exercises	Earnings- vs. assets-based constraints	Asset-based measures (LTV) lead to over-borrow while earnings-based measures (LTI) lead to under-borrowing.
Ferreira, Gálvez, and Pidkuyko (2024)	Life-cycle general equilibrium model with partially segmented housing markets calibrated to Spain	LTV and DSTI	Changes in credit requirements help explain declines in homeownership rates, with little effect on prices.
Alpanda and Zubairy (2017)	Two agent DSGE model with long-term fixed-rate borrowing	LTV	LTV limits reduce household DTI ratio upon monetary tightening.
Chen et al. (2023)	New Keynesian DSGE in a ZLB environment	LTV and LTI	Moderate long-run costs of BBMs; in the short-run LTV more contractionary than LTI.
Ferrero et al. (2023)	New Keynesian model with financial frictions and ZLB	LTV	Optimal LTV limits are countercyclical.
Cokayne et al. (2024)	DSGE with financial frictions and heterogenous expectations calibrated to Denmark	LTV	LTV limit reduces house price volatility and increases consumption smoothing, generating welfare gains.

SOURCE: Author's own elaboration based on referenced publications.

Furthermore, nonrecourse mortgages lead to a demand for larger LTVs due to their convex gamble on house prices but also correlate with higher default rates and can increase inequality in credit access. Based on these findings, the theoretical result recommends that optimal LTV policy should balance promoting access to homeownership with mitigating negative externalities of default, suggesting that regulation should include procyclical elements driven by homeownership affordability concerns.

Favilukis, Ludvigson, and Van Nieuwerburgh (2017) investigate the macroeconomic consequences of housing wealth and housing finance changes, specifically addressing

whether relaxed financing constraints (in the form of LTV limits) or low interest rates can explain large booms in house prices, and how these factors impact risk premia and wealth inequality. They use a quantitative general equilibrium model of housing and non-housing production, featuring heterogeneous homeowners, incomplete financial markets, and collateralized borrowing constraints. Crucially, the model also incorporates aggregate business cycle risk and a realistic wealth distribution driven by bequest heterogeneity. The authors model the endogenous determination of interest rates, housing, and equity returns. Their findings show that a relaxation of financing constraints generates a significant house price boom, largely due to a decline in the housing risk premium—housing return in excess of the risk-free rate. Such a relaxation, holding the level of business cycles constant, leads to less volatile consumption but is unable to explain the observed low interest rates. Low interest rates from foreign capital inflows cannot explain the housing boom because they expose domestic savers to greater systematic risk, leading to an offsetting increase in housing risk premia. However, the combination of a relaxation of financing constraints together with foreign capital inflow can generate both a housing boom and low interest rates by shifting households' wealth towards housing, increasing financial wealth inequality but reducing housing and consumption inequality. The results of the study suggest that shifts in financing constraints act as a source of aggregate risk through its effects on housing risk premia and that optimal housing credit policy should take this effect into account.

Greenwald (2018) investigates how the structure of the mortgage market influences macroeconomic dynamics, specifically examining (i) how mortgage credit growth propagates and amplifies economic fluctuations, (ii) the effect of mortgage finance on monetary policy's ability to influence economic activity, and (iii) the role of changing credit standards in recent boom-bust cycles. The methodology in this study involves a novel general equilibrium framework that crucially incorporates two borrower-based measures: a standard LTV limit and a less studied limit on the DSTI. The later proves essential for reproducing empirical boom-bust dynamics in the U.S. mortgage market.

The results in this study show that this framework greatly amplifies the transmission from nominal interest rates into debt, house prices, and overall economic activity, with DSTI limits being highly sensitive to interest rate changes. Key findings include the "constraint switching effect," where changes in which constraint (DSTI or LTV) binds for borrowers translate into large movements in house prices, significantly boosting housing demand and credit growth following looser DSTI limits. The option of borrowers to prepay their loans turns out to be crucial. A fall in interest rates leads to an increase in prepayment followed by new debt issuance and spending on impact. This "frontloading effect" amplifies output responses.

The paper further argues that a relaxation of DSTI standards was vital for explaining the mid-2000s credit boom, contributing significantly to observed increases in price-to-rent and LTI ratios and amplifying other forces, and finds that monetary policy, while more effective at stabilizing inflation, contributes to larger swings in credit growth, posing a trade-off for central bankers. In terms of policy recommendations, the research strongly concludes that

a DSTI limit, rather than an LTV limit, is the more effective macroprudential policy for limiting future boom-bust cycles. While there is no optimal policy exercise, the author quantifies the ability of DSTI limits – Dodd-Frank's legislation introduces a 43% DSTI cap – in dampening potential booms.

The dynamic and time-varying nature of credit constraints is addressed by Ingholt (2022), who investigates the macroeconomic implications of borrowers facing both LTV and DSTI limits, aiming to identify which constraint dominated in the U.S. from 1985-2021, that is whether looser LTV or DSTI limits drove the pre-Great Recession credit boom, and how switching between these constraints affects shock propagation. The paper estimates a New Keynesian DSGE model with long-term, fixed-rate mortgages and two occasionally binding credit constraints (LTV and DSTI), estimated using Bayesian maximum likelihood on U.S. time series (1985-2021), and complemented by county-level panel data (1991-2017) to empirically test state-dependent elasticities. Importantly, the endogenous switch between the binding constraints amplifies non-linear responses to shocks to the real economy.

This paper finds that the LTV constraint dominated from 1985 to 2011 due to loose DSTI standards and low house prices, while the DSTI constraint prevailed from 2012 onward due to tighter standards and surging house prices, with the mid-2000s credit boom attributed to a relaxation of DSTI limits. The research highlights that a countercyclical LTV limit was effective until 2011, but its effect declined as DSTI became dominant, making countercyclical DSTI limits highly effective thereafter. Empirically, elasticities of mortgage origination with respect to house prices are confirmed to depend on the price-to-income ratio, showing that income growth drives debt growth when DSTI is binding, and house price growth drives debt growth when LTV is binding.

The study advocates for a "two-pronged" approach combining both LTV and DSTI policies for optimal debt volatility and consumption risk redistribution from borrowers to lenders. While consumption-at-risk increases for lenders under the "two-pronged" regime, it decreases for borrowers. The findings in this work also indicate that the macroprudential effects of monetary policy increases with the share of DSTI-constrained households, since their borrowing capacity is directly linked to interest rates. However, monetary policy "leaning against the wind" redistributes consumption risk from lenders to borrowers offsetting the effect of the "two-pronged" approach to borrower-based measures.

Greenwald and Guren (2025) investigate whether credit conditions drove the 2000s U.S. housing cycle and aim to reconcile disparate findings in the literature. The central research question revolves around how the degree of housing market segmentation – how easily existing housing units can be transferred to the rental market –, particularly the extent to which landlords absorb credit-driven demand, influences the impact of credit on house prices. The methodology involves developing a general equilibrium model that nests cases between perfectly segmented and frictionless rental markets, allowing for intermediate levels of frictions, represented by an upward sloping "tenure supply" curve. To estimate the slope of this curve, the authors employ three

identification strategies from existing literature – using changes in conforming loan limits, pre-emption of state anti-predatory lending laws, and expansion of the private label securitization market – as instruments for credit supply, and introduce a new, less noisy microdata-based homeownership rate.

The results consistently show that shocks to credit supply – including a relaxation of LTV and DSTI – significantly increase house prices and the price-rent ratio, with much smaller effects on the homeownership rate, implying a high degree of market segmentation (estimates of the slope are at least 3.8, indicating strong frictions). The calibrated model reveals that a relaxation of credit standards alone explains 32% (with a lower bound of 22%) of the rise in the price-rent ratio during the boom, a figure that increases to 70% when combined with a 2 pp decline in mortgage rates. The study concludes that credit standards played a significant role, explaining 32% to 53% of the boom. While not explicitly detailing policy recommendations, the findings strongly imply that macroprudential policies restricting credit standards can effectively slow house price growth, but only in the presence of strong segmentation as found in the U.S. market.

Beyond the direct impact on housing prices, researchers have also examined the broader macroeconomic and distributional consequences of credit shocks. Castellanos, Hannon, and Paz-Pardo (2024) develop a general equilibrium model with heterogeneous households and a life-cycle component to study the aggregate and distributional impacts of credit shocks, such as the introduction of LTV and LTI limits or unexpected rises in real interest rates, on house prices, rents, and household welfare, particularly focusing on the Irish economy as a case study. Importantly, the model features landlords -households with more than one unit of housing- and a non-segmented housing market.

They use their model to study the effects of the LTI and LTV limits introduced in Ireland in 2015 and show that these measures increase the rent-to-price ration, almost entirely driven by an increase in rents coming from the marginal landlord extra compensation to meet increased rental supply. This measure disproportionately harms young and middle-income households who face greater difficulties in accessing mortgages, higher rental costs and lower consumption and welfare. Conversely, landlords and higher-income individuals benefit from increased returns on their housing investments and enjoy increased welfare.

The empirical validation using the 2015 Irish macroprudential reform indicates that LTV and LTI limits curtailed house price growth in Ireland but accelerated rental price increases in affected areas, largely due to an upward-sloping rental supply curve driven by constrained landlords. According to this article, the key macroprudential policy implication is that while borrower-based measures effectively cool housing markets, policymakers must recognize substantial distributional costs. For example, these policies can lead to a significant redistribution of wealth from poorer renters to richer landlords, emphasizing the necessity to carefully model rental markets when evaluating the macroeconomic and distributional effects of borrower-based measures.

Drechsel and Kim (2024) challenge the conventional wisdom in macroeconomic models with asset-based collateral constraints, which typically conclude that agents 'over-borrow' due to their failure to internalize the effects of their choices on asset prices, leading to an optimal policy advocating for debt-reducing policies. Their research, employing a theoretical framework for earnings-based borrowing constraints in both closed and open economies, which are empirically more prevalent for firms, reaches the opposite conclusion: agents 'over-save' (and 'under-borrow') relative to the social optimum. This is because agents do not internalize how their current saving decisions influence future wages, which, in turn, affect firms' earnings and thus their borrowing limits. Whenever higher savings lead to higher wages, the under-borrow situation arises.

A numerical exercise further shows that incorrectly applying tax policies designed for asset-based constraints to an economy with earnings-based borrowing can result in significant welfare losses, up to 2.55% in aggregate consumption. The primary macroprudential policy implication is that optimal regulatory policy critically depends on the specific form of financial constraints. If borrowing is earnings-based, the policy should potentially encourage borrowing (e.g., through subsidies) rather than restrict it, to correct for the "under-borrowing" externality arising from agents not internalizing the wage effects of their saving decisions. This underscores the necessity for policymakers to precisely identify the nature of borrowing constraints in the economy to implement effective macroprudential measures.

Ferreira, Gálvez, and Pidkuyko (2024) investigate the drivers of Spain's housing 2007 bust. Using granular data from the Spanish Survey of Household Finances, the authors document a sharp decline in homeownership among younger cohorts, a broad-based drop in consumption, and significant shifts in the rent-to-price ratio. To explain these dynamics, they develop and estimate a life-cycle model that incorporates non-linear income processes, mortgage constraints, and housing market frictions. The model is calibrated using pre-crisis data and simulates counterfactual scenarios reflecting the tightening of lending standards (lower LTV and DSTI), worsening income dynamics (lower and more volatile earnings), and the removal of mortgage tax deductions.

Their findings show that these three factors together explain nearly all the observed decline in homeownership, three-quarters of the drop in consumption, and about one-third of the fall in house prices. On aggregate terms, lower demand due to deteriorating income prospects explains 60% of the model implied drop in house prices. Notably, stricter credit conditions affected younger households significantly, delaying their entry into homeownership, and reducing their welfare. The elimination of mortgage deductibility had a more muted effect, primarily influencing middle-aged households' consumption rather than tenure decisions.

Herrera (2025) shows the importance of considering credit supply frictions and collateral constraints to analyse the effectiveness of BBMs. Empirical evidence, estimated using a local projection model, suggests that both household indebtedness and bank

vulnerabilities independently amplify financial shocks, with their interaction further exacerbating that amplification. The author builds a DSGE model to capture this empirical evidence and analyse the role of BBMs in the broad economy. The analysis suggests that the activation cost of BBMs strongly depends on banks vulnerabilities. Overall, the study suggests that BBM policies should focus on preventing financial distress rather than substantially reducing household indebtedness.

Herrera et al. (2025) analyse the side effects of monetary policy tightening on financial stability through the lens of a DSGE model where banks and households endogenously default. They find that a combination of borrower- and capital-based macroprudential policies can mitigate these side effects and improve welfare. More specifically, structurally tighter capital requirements and LTV caps improve financial stability by reducing the likelihood of default by banks and households. However, tighter structural policies reduce access to credit, triggering a negative effect on welfare. Time-varying policies, such as counter-cyclical capital buffers (CCyB) and adjustable LTV caps, can mitigate ex-post adverse effects, allowing for less tight optimal structural policies and thus significantly improving welfare.

Alpanda and Zubairy (2017) build a two-agent DSGE model with LTV constraints which are always binding in steady state, long-term mortgages and home equity loans. They compare different policy tools to reduce household over-indebtedness. In particular, they evaluate the tightening of the LTV limit. Since borrowers are forced to reduce their demand for housing, in general equilibrium, house prices. The fall in investment decreases output which in turn lowers wages leading to borrowers decreasing their consumption demand. Overall, they find that tightening of LTV limits is welfare-superior to property tax increases or mortgage tax deductibility reductions.

Chen et al. (2023) build a similar model to Alpanda and Zubairy (2017) long-term debt and illiquid housing but considering an effective lower bound for the monetary policy rate. They simulate an activation of different BBMs (LTV, LTI, DSTI) under different monetary policy responses and initial household indebtedness. They find that when monetary policy does not accommodate the introduction of BBMs, their activation costs are higher. They also find that LTV activation costs are much higher than LTI costs if initial household indebtedness is high and monetary policy does not accommodate.

Ferrero et al. (2023) build a neo-Keynesian DSGE model with LTV constraints and a credit supply friction. They simulate a credit supply easing mimicking a housing bubble and show that the optimal LTV limit is countercyclical and can help avoid deep recessions. Importantly, they also show that BBMs and monetary policy – when jointly optimized to maximize welfare – can be complementary since a strongly countercyclical LTV can reduce the likelihood of entering a liquidity trap.

Cokayne et al. (2024) use a DSGE model to analyse the macroeconomic impacts of an LTV cap and find that the policy halved default risk, cut leverage volatility by two-thirds, and made banks safer. Long-term consumption rose (3% on average), though

credit moderation during booms introduced some costs. Overall, the LTV cap enhanced macroeconomic stability and reduced systemic risk with limited welfare trade-offs.

4.2 Agent-based models

Agent-based models (ABMs) offer a powerful framework to analyse the potential effects of BBMs on the housing market. First, ABMs are well-suited to represent the substantial heterogeneity that characterises housing markets, including households with diverse demographic and financial attributes (e.g., age, income, and wealth) as well as houses that differ in quality or other characteristics. Second, ABMs can generate complex non-linear patterns that resemble those occurring in real housing markets, such as boom-bust cycles, which emerge endogenously from the interactions between the various types of agents. Finally, the flexibility of this methodology enables the integration of complex policy architectures – such as measures targeted at specific market segments (e.g., differentiated limits for buy-to-let investors) or those involving conditional thresholds (e.g., soft limits or exceptions) – while also allowing the simulation of scenarios where multiple policies operate jointly. Table 5 synthetizes the main characteristics of these studies, which are detailed below.

The model by Baptista et al. (2016), later improved, consolidated and fully calibrated by Carro et al. (2023), was the first housing ABM developed to study the impact of housing borrower-based tools on the housing and mortgage markets. This model incorporates realistic life-cycle dynamics, both a buy-to-let sector and an autonomous rental market, as well as a realistic double-auction market mechanism. The authors analyse the impact of housing policies on different types of households in the United Kingdom, such as renters, first-time buyers, home movers, and buy-to-let investors. This model has been extended and improved in various directions, as well as adapted and calibrated to different national housing markets: in Denmark by Cokayne (2019) and Cokayne et al. (2024); in Italy by Catapano et al. (2021) and Catapano (2023); and, in Spain by Carro (2023).

These models are used to conduct counterfactual analyses to understand the impact of different LTV and LTI limits on credit and house price cycles. In particular, these studies find a dampening effect of these housing tools on mortgage lending and house price cycles. Some other key findings from these studies can be summarized as follows: BBMs targeting the housing market lead to a reduction in household indebtedness, loan riskiness, mortgage default, and negative equity, and an increased demand for lower quality houses; first-time buyers are affected more by these policy interventions; policies targeting the owner-occupier mortgage market can have spillover effects to buy-to-let mortgages/house purchases, and therefore affect the rental market as well; when calibrating an individual housing tool, the calibration of other policies and the joint distribution of risk characteristics should be taken into account.

Building on Baptista et al. (2016), though significantly departing from it, Hosszú et al. (2024) develop a 1:1 scale model (where each household in the model represents one

Table 5
Summary of studies using agent-based models

Authors	Calibration country	Assessed measure	Key results
Baptista et al. (2016)	United Kingdom	LTI (with a 15% speed limit), exception for BTL investors	• Policy dampens house price cycle and increases credit to BTL investors
Carro et al. (2023)	United Kingdom	LTV and LTI (with a 15% speed limit), exception for BTL investors for both policies	• Policies dampen boom-bust cycles in house prices, transactions, mortgage approvals • Policies targeting a risk metric have effects on other metrics • Both policies benefit BTL investors, LTV at the expense of FTBs, LTI at the expense of both FTBs and HMs
Cokayne (2019)	Denmark	LTV and LTI (with a 15% speed limit)	• Policies dampen house price cycles • Fraction of mortgages affected by policies influence their impact • Impact of LTV policy driven by its strong effect on FTBs
Cokayne et al. (2024)	Denmark	LTV	• Dampens house price cycle • Households less likely to become FTBs below 30 • Income of FTBs increases • Lower rates of negative home equity • DSGE: Policy is welfare improving, leading to lower bank risk (via both lower household defaults and smaller house price cycles) and higher long-run consumption
Catapano et al. (2021)	Italy	LTV and DSTI	• Both policies smoothen the credit cycle and reduce the probability of mortgage defaults • Effects are small on property prices and mortgage defaults • Restrictive policies lead to a shift in demand toward lower quality dwellings
Catapano (2023)	Italy	LTV	• Highlights the benefits of a gradual introduction of the policy • Highlights the benefits of a preemptive introduction of a moderate LTV cap at the onset of an upward trend in prevailing LTV and LSTI
Carro (2023)	Spain (with comparisons to the United Kingdom)	LTV and LTI (with a 15% speed limit)	• Both policies dampen house price and credit cycles • Both policies reduce sale prices and increase rental prices • Policies targeting a risk metric have effects on other metrics • Both policies benefit BTL investors, increasing their access to credit and the share of housing stock they own, LTV at the expense of FTBs, LTI at the expense of both FTBs and HMs • Both policies increase rental tenure at the expense of homeownership • LTV policy has a strong intergenerational impact, increasing credit to older households at the expense of younger ones • Policies increase the number of properties per investor
Hosszú et al. (2024)	Hungary	LTV and DSTI	• LTV loosening helps socially vulnerable households, enhances construction, but leads to higher price volatility and higher default rates • Combining a looser LTV with a stricter DSTI offers an optimal trade-off
Laliotis et al. (2020)	European countries	LTV	• Policy has a stronger impact on lower value house segments, as these are characterized by higher pre-policy LTVs
Bardoscia et al. (2025)	United Kingdom	LTI (with a 10% speed limit), exception for BTL investors, and capital requirements	• Tightening capital requirements leads to a sharp decrease in commercial and mortgage lending, and housing transactions • LTI leads to fall in house prices relative to income and in homeownership rate • When both policies are combined, housing transactions and prices drop • Both policies have a positive impact on real GDP and unemployment, while there is no material impact on inflation and the real interest rate

SOURCE: Author's own elaboration based on referenced publications.

household in reality) for the Hungarian residential housing market, incorporating detailed characteristics of four million households and the entire housing stock. This type of very granular and detailed ABM is useful for studying the impact of a range of policies, from

macroprudential tools to family support programs. Furthermore, this high level of granularity allows for close monitoring of the effects of these policies across, for instance, different regions of the country. Laliotis et al. (2020) build on the original model of Axtell et al. (2014) to develop housing ABMs for European economies. These models are then used to evaluate the impact of an LTV cap.

It is important to note that all these models are partial, in the sense that they focus exclusively on the housing and mortgage markets, thereby neglecting feedback effects between these sectors and the rest of the economy. A breakthrough in this regard is the model recently proposed by Bardoscia et al. (2025), which integrates the housing ABM developed by Carro et al. (2023) into the macroeconomic ABM framework of Popoyan et al. (2017). By properly accounting for these feedback effects in a stock-flow consistent manner, this model enables researchers to understand the impact of housing tools on the broader economy as well as to conduct comprehensive cost and benefit analyses.

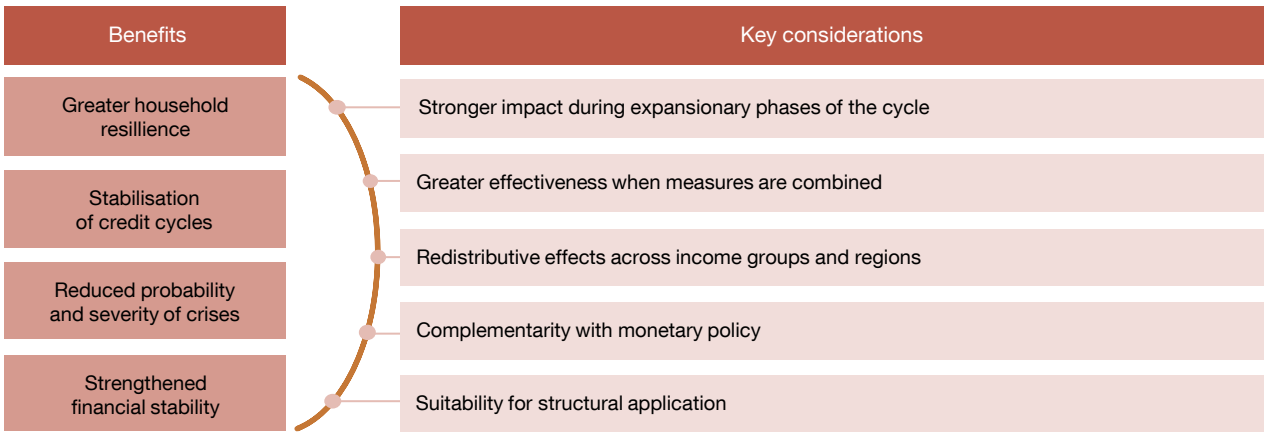
5 Conclusions

The literature reviewed provides strong evidence that BBMs are effective in addressing systemic risks linked to excessive household leverage and imbalances within the housing market. These measures contribute to smoothing credit cycles and bolstering both household resilience and overall financial stability. The studies also highlight important considerations such as distributional impacts, the interplay with monetary policy, and other valuable insights that inform the optimal design of BBMs and enhance their effectiveness (see Figure 1).

Empirical studies consistently show that tighter lending standards – particularly lower LTV and DSTI ratios – are associated with significantly lower default probabilities, reduced credit growth during financial booms, and improved financial system resilience. In this context, ex-ante studies, which focus on the relationship between lending standards and default risk, demonstrate that high LTV and DSTI ratios substantially increase the likelihood of mortgage default, especially beyond certain thresholds. Moreover, the interaction between different BBMs (e.g., LTV and LSTI) appears to enhance their predictive power, while practices such as inflated collateral valuations can undermine their effectiveness.

Ex-post studies, both cross-country and country-specific, confirm that BBMs reduce household credit growth, moderate house price increases, and improve credit quality – particularly during expansionary phases of the financial cycle. However, these studies also reveal heterogeneous effects and unintended consequences, such as credit reallocation toward less-constrained borrowers, rising rents, or reduced credit access for lower-income households. These findings highlight the importance of considering distributional impacts and designing complementary policies to mitigate potential adverse effects.

Figure 1
Benefits of BBMs and policy-relevant considerations from the literature reviewed



SOURCE: Author's own elaboration based on referenced publications.

From a theoretical perspective, general equilibrium models underscore the relevance of BBMs in stabilizing credit cycles, reducing crisis probabilities, and enhancing welfare – especially when applied countercyclically. ABMs further enrich the analysis by capturing household heterogeneity and housing market dynamics, offering valuable tools for policy calibration and evaluation.

Overall, the reviewed literature provides robust evidence that BBMs are effective tools for mitigating systemic risks arising from household over-indebtedness and imbalances in the property market. This evidence suggests that BBMs should be a central component of the macroprudential policy toolkit. However, their design must be context-sensitive, considering institutional settings, the phase of the financial cycle, and interactions with other policies such as monetary and fiscal measures. Combining multiple BBMs, applying them flexibly, and continuously evaluating their effects using granular data and advanced modelling techniques are essential to maximizing their effectiveness and minimizing their costs. In an increasingly complex financial environment, BBMs offer a powerful means to preserve stability without sacrificing fairness or efficiency in credit markets.

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