

BORROWER-BASED MACROPRUDENTIAL REGULATION

Carmen Broto

Macroprudential Analysis Unit, Bank of Spain

II COURSE ON FINANCIAL STABILITY

Digital course

November 19, 2020

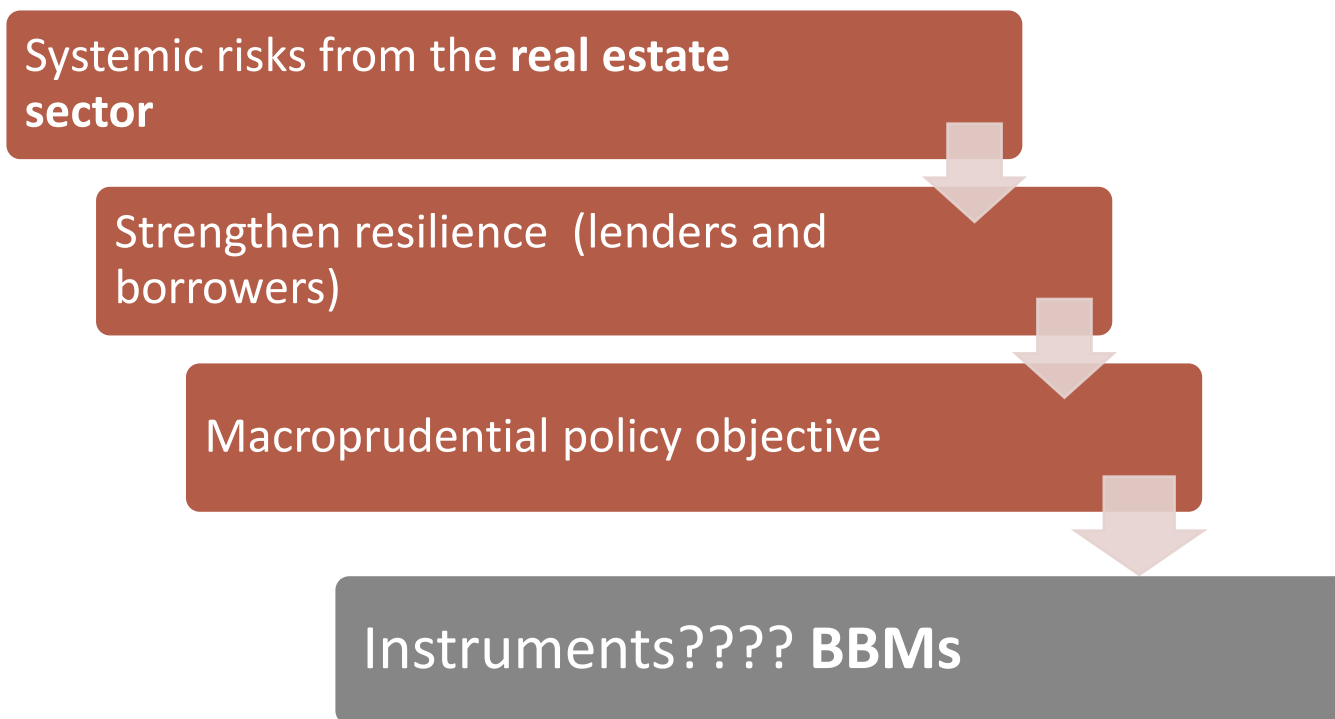


ÍNDICE

1. Rationales and objectives of borrower-based regulation
2. Caps on LTV and LSTI ratios
3. The interaction of BB and capital tools
4. Excursus: The operationalization of BB tools in Spain

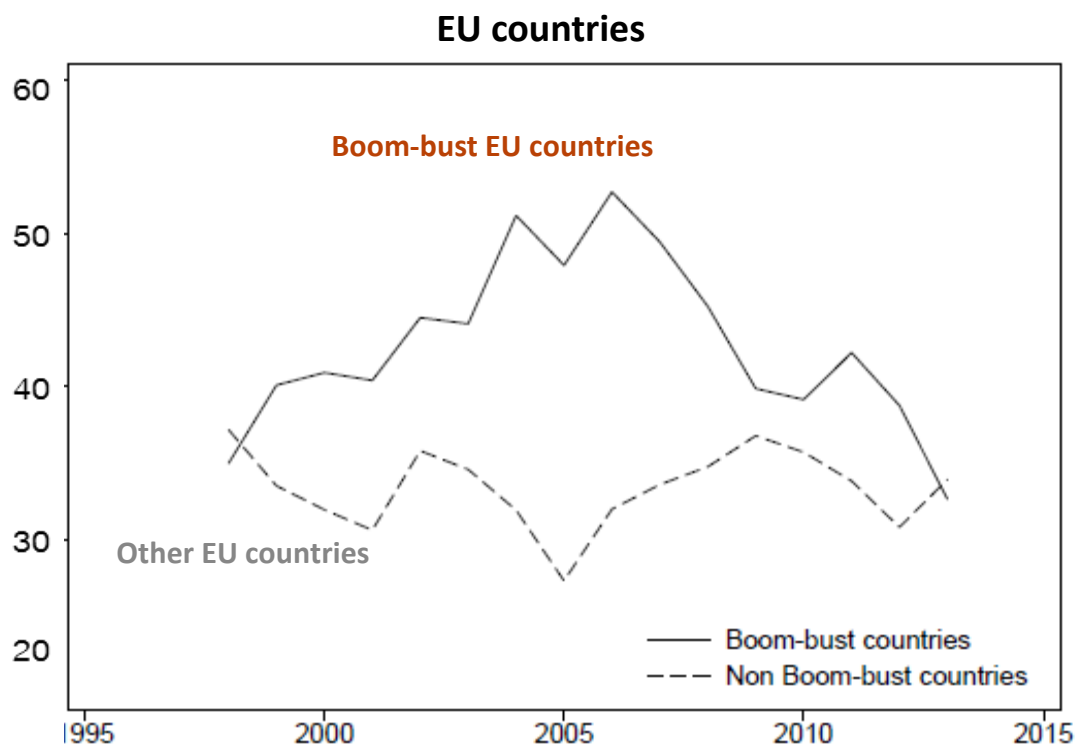


- The **objective** of BB measures is to strengthen the resilience of lenders and borrowers against the potential build-up of vulnerabilities stemming from the real estate market



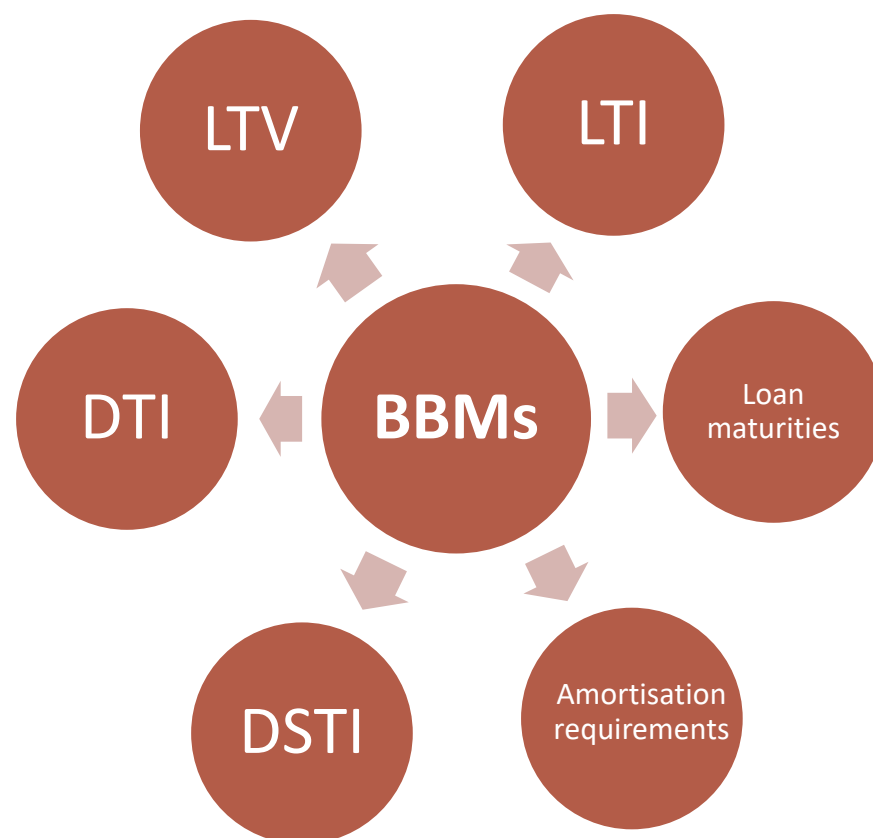
- **Implementation of borrower-based measures since the crisis to ensure sound lending standards over the cycle (Rünstler and Vlekke, 2017)**

Share (%) of new mortgages with LTV>90%



Source: Kelly et al. (2019)

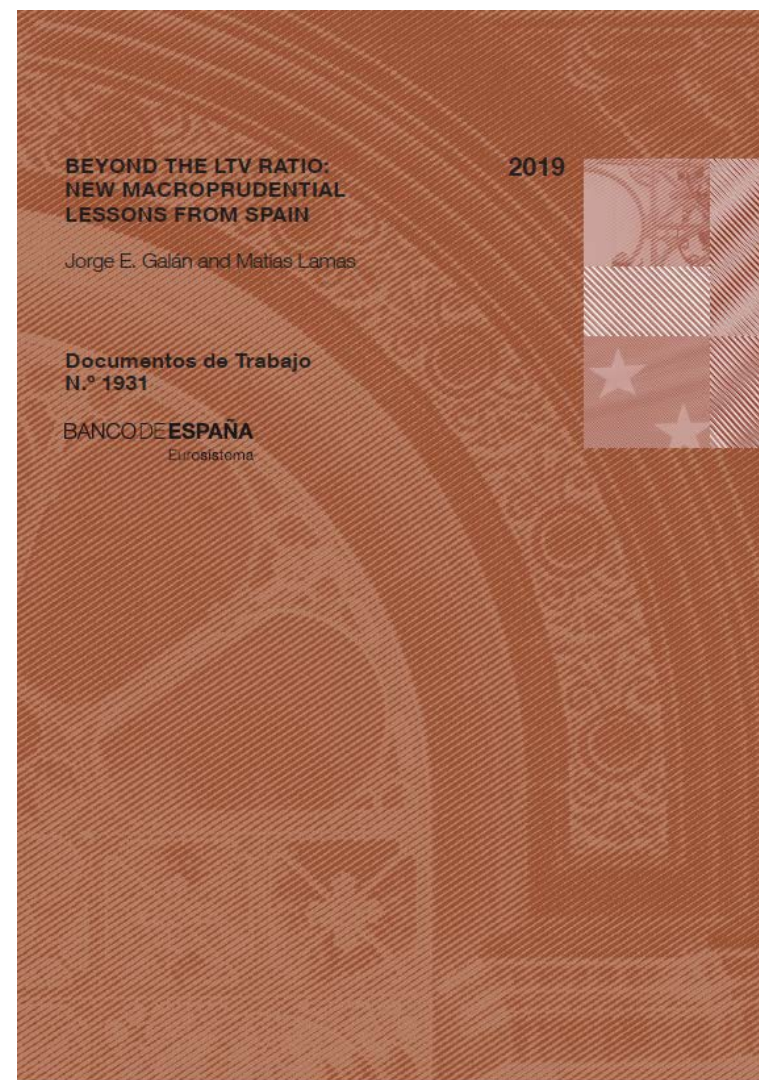
- **BBMs**: Directly affect the availability, terms and conditions of loans
- Depending on respective national laws, **different BB instruments**, may be available



“Beyond the LTV ratio: Macroprudential lessons from Spain”

Jorge Galán and Matías Lamas

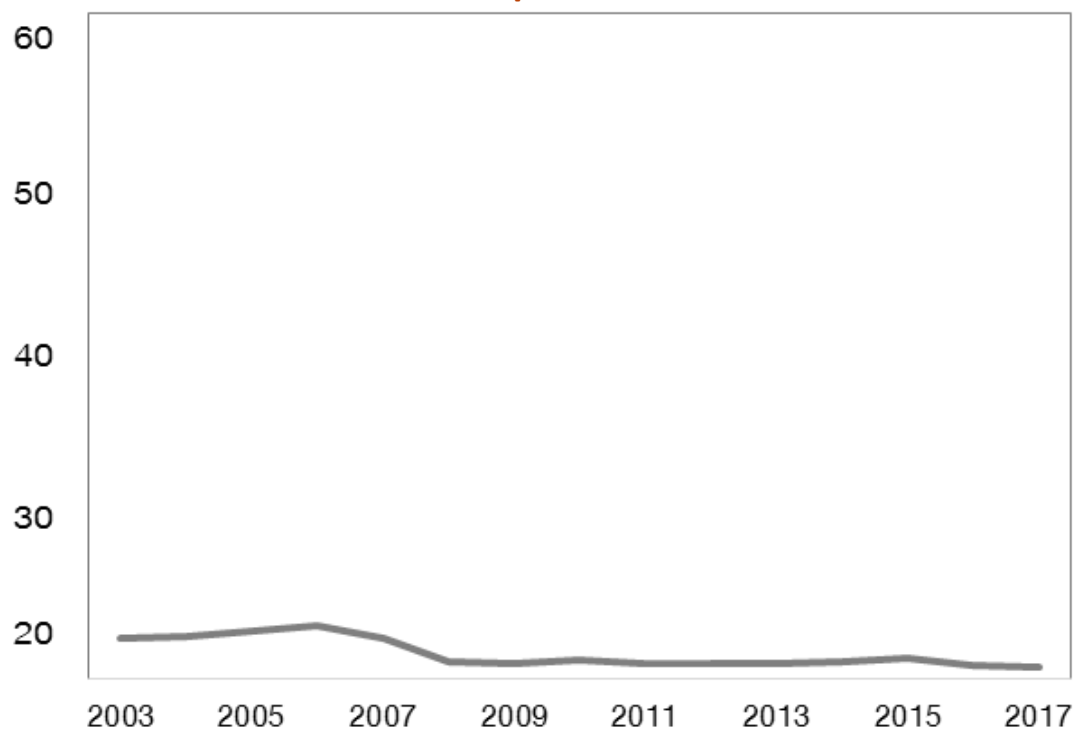
Documento de Trabajo del Banco de España No. 1931



- **LTV ratio in Spain: Have Lending standards deteriorated?**

Share (%) of new mortgages with LTV>90%

Spain



Source: Colegio de Registradores

➤ This paper

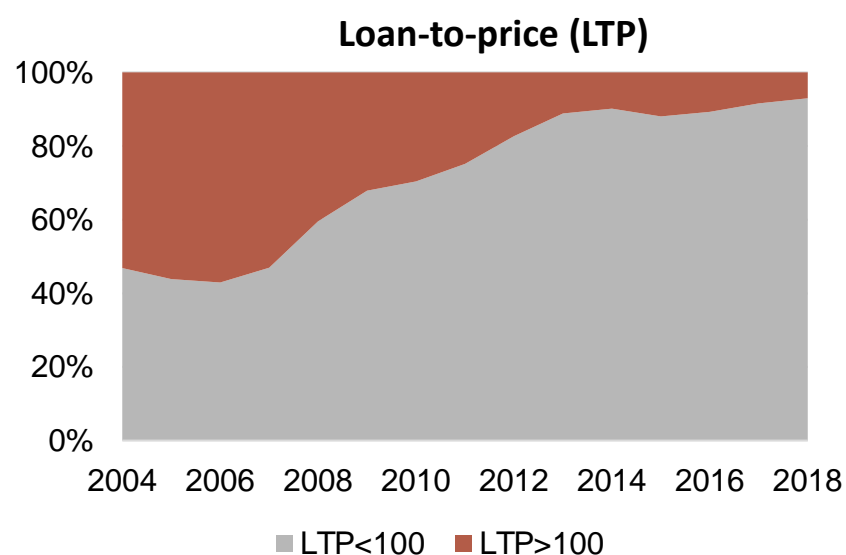
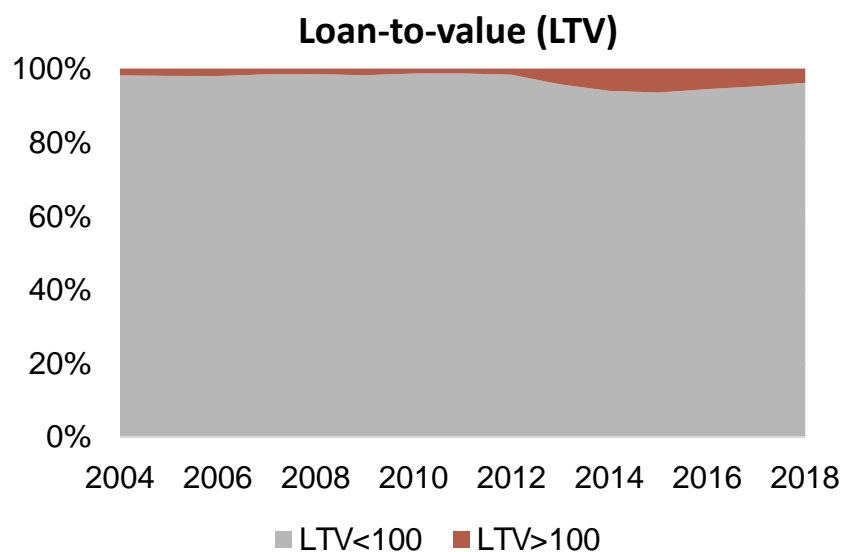
- Large dataset of mortgages in Spain, at loan-level
- Empirical exercise: estimate the PD of mortgages given their terms *at origination*

➤ Two main findings

- LTV distorted by optimistic appraisals, impairing risk identification
 - Alternative leverage metrics/other indicators are better predictors of the PD of mortgages
- Non-linearities in the relationship lending standards-risk
 - No 1:1 relationship and pockets of risk when considering the joint distribution of indicators
 - Dynamic, not static relationship

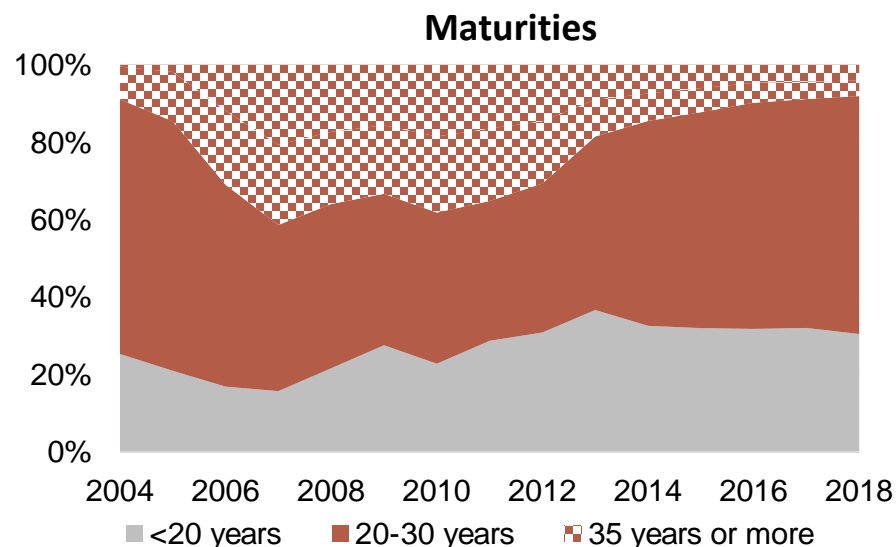
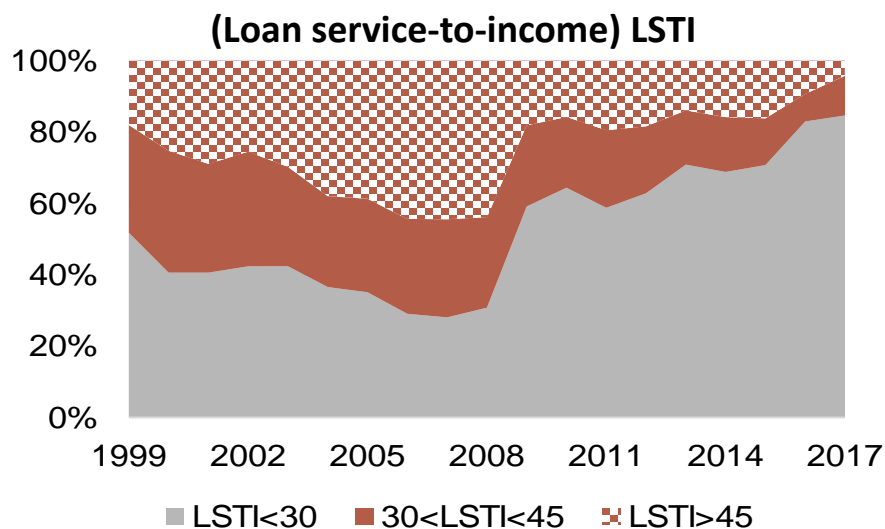
$$LTV \text{ ratio} = \frac{\text{Principal amount of the mortgage}}{\text{Appraisal value of the property}}$$

$$LTP \text{ ratio} = \frac{\text{Principal amount of the mortgage}}{\text{Price of the property (properties registers' records)}}$$



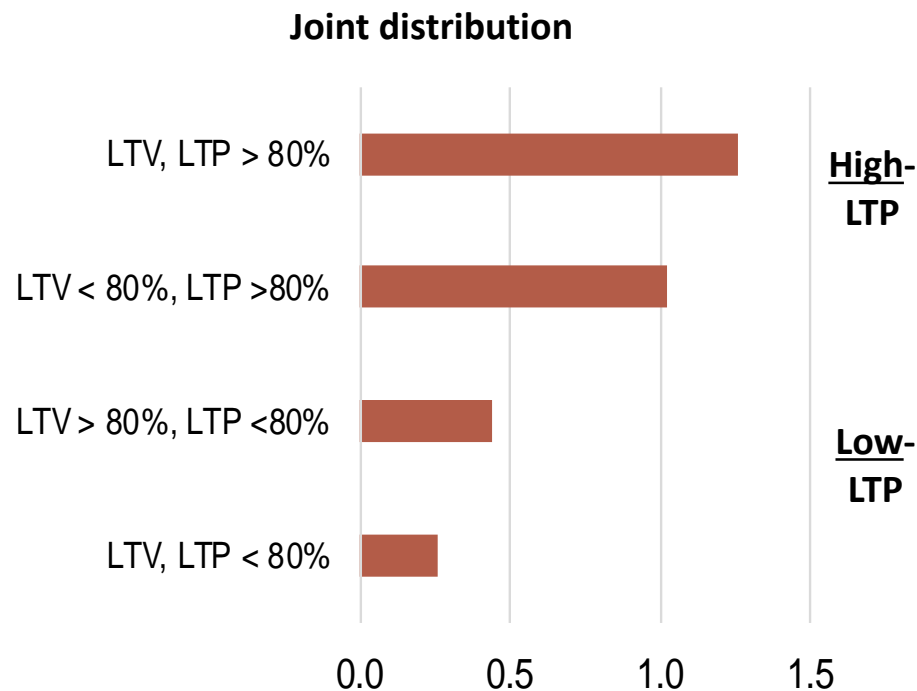
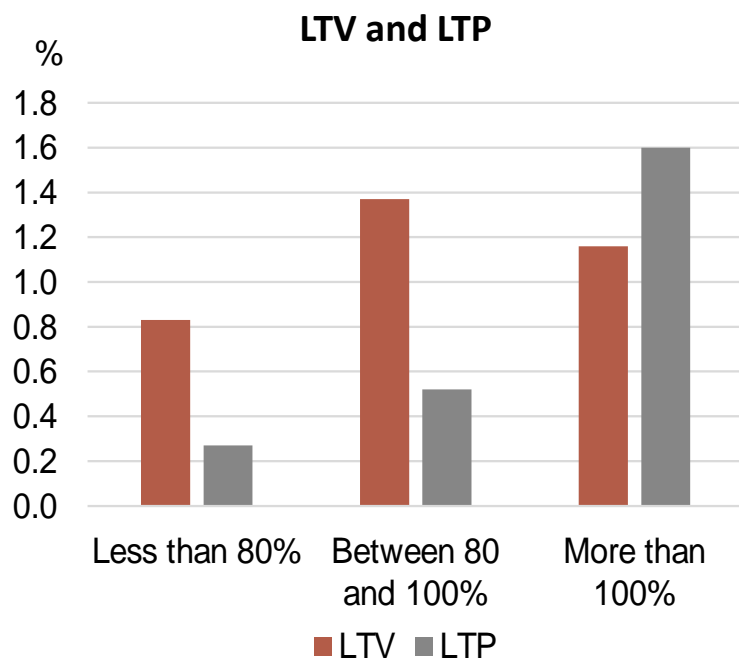
- 50% mortgages with LTP > 100% in 2007 (close to 0% if LTV is used)
- LTP better for monitoring, Would the LTP better explain loans failures?

$$LSTI \text{ ratio} = \frac{\text{Debt service during the first year of the mortgage}}{\text{Annual income of the primary borrower}}$$



- The LSTI appears more volatile/sensitive to shifts in the RE cycle
- The share of mortgages with terms over 35 years increased importantly ahead of the crisis (to alleviate debt service payments?)

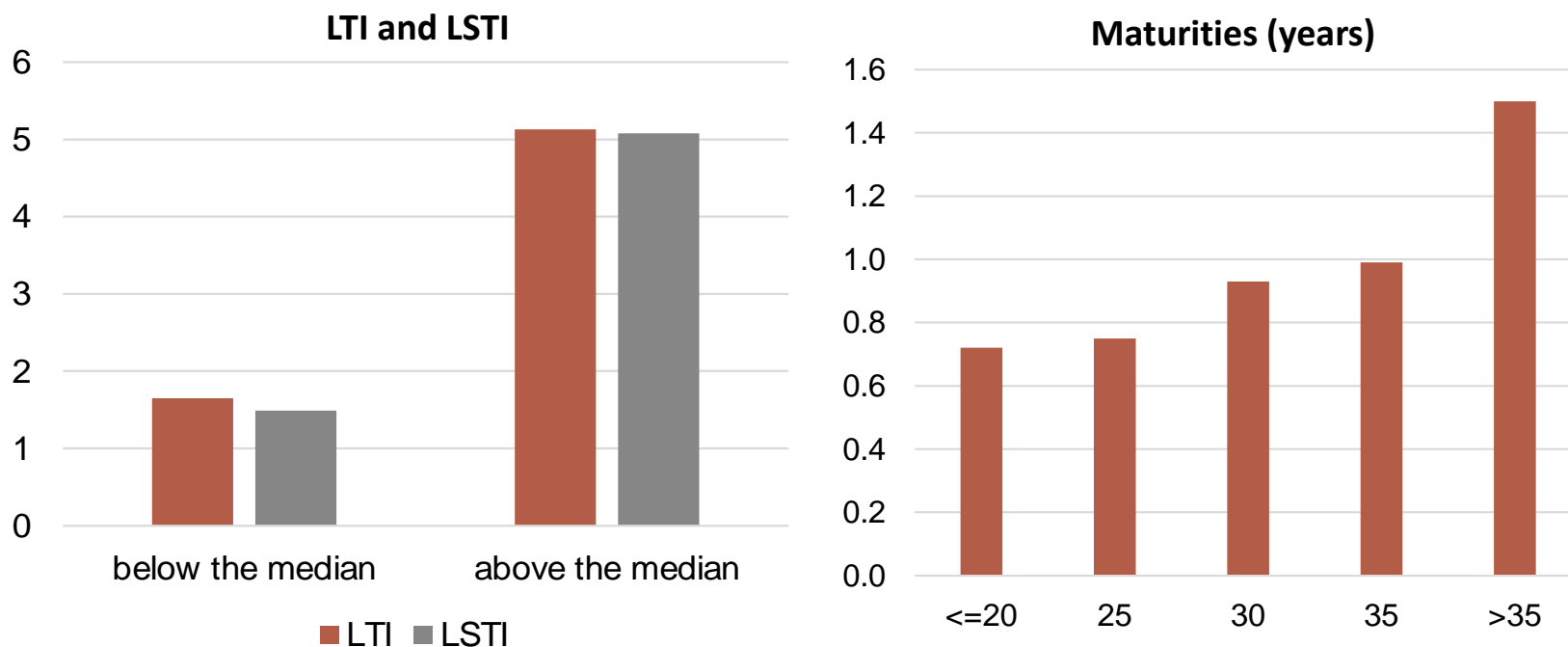
Default frequency of mortgages (%)



Source: Colegio de Registradores (LTV, LTP and maturities) and European DataWarehouse (LSTI)

- Default frequencies augment for loans with high-LTV and high-LTP values, but the increase is more evident for the LTP
- PD high if LTP is high, low if LTP is low, no matter LTV values!

Default frequency of mortgages (%)



Source: Colegio de Registradores (LTV, LTP and maturities) and European DataWarehouse (LSTI)

- Larger LTI, LSTI and longer maturities increase (unconditionally) risk
- Jump in default frequencies for maturities > 35 years

- Battery of conditional logit models
- Two different databases, separate regressions for each

Probability of default = f [**lending standards (LTV, LTP, LSTI, maturities)** , controls]

VARIABLES	COLEGIO DE REGISTRADORES	EUROPEAN DATAWAREHOUSE
Dummy for problematic mortgages (dependent variable)	Issuance of certificates of foreclosure	Defaults (+ foreclosures)
Lending standards at origination	LTV Maturity LTP	LTV Maturity LSTI
Mortgage/borrower/collateral characteristics (<i>Z</i>)	Second-hand Subsidised-housing	Employment status Variable rate Remortgage Second-house Non-RRE
Fixed effects (<i>FE</i>)	Region Year of origination	Region Year of origination Bank

Colegio de Registradores (land registries)

	Model 3	Model 4	Model 5
LTV	0.8254***	1.9581***	1.7872***
Maturity	0.0176***	0.0599***	0.0473***
LTP	1.1096***	4.1987***	3.6942***
LTV ²		-0.0001***	-0.0001***
Maturity ²		-0.0008***	-0.0009***
LTP ²		-0.0001***	-0.0001***
LTV x LTP			0.0001*
LTP x Maturity			0.0002***
Second-hand	0.2641***	0.2582***	0.2563***
Subsidised-housing	0.1693***	0.1792***	0.1781***
Region effects	Y	Y	Y
Origination year effects	Y	Y	Y
McFadden R ²	0.088	0.092	0.093
Observations	1,255,649	1,255,649	1,255,649

1 Strong link between lending standards and the PD (LTV vs LTP)

2 Presence of non-linearities: quadratic (-) and interaction terms (+)

European DataWarehouse (securitized credit)

	Model 6	Model 7	Model 8
LSTI	0.0032***	0.003***	0.002***
LTV	1.56***	1.90***	1.60***
Maturity	0.0271***	0.073***	0.027***
LSTI^2		-0.0000	-0.0000
LTV^2		-0.00002***	-0.0001***
Maturity^2		-0.0008***	-0.0011***
LSTI*Maturity			-0.0000
LSTI*LTV			0.0001***
LTV*Maturity			0.0003***
status: civil servant	-0.861***	-0.861***	-0.861***
status: unemployed	0.653***	0.658***	0.664***
status: self-employed	0.459***	0.461***	0.466***
(...)			
Region effects	Y	Y	Y
O. year effects	Y	Y	Y
Bank effects	Y	Y	Y
McFadden R2	0.160	0.160	0.160
Observations	1,674,398	1,674,398	1,674,398

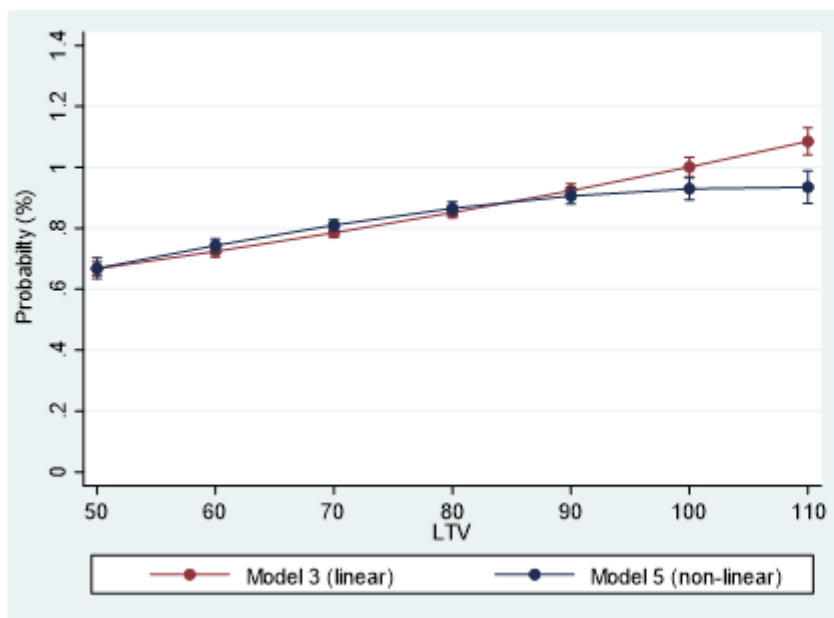
Leverage and repayment capacity are important drivers of the PD

Again, presence of non-linearities

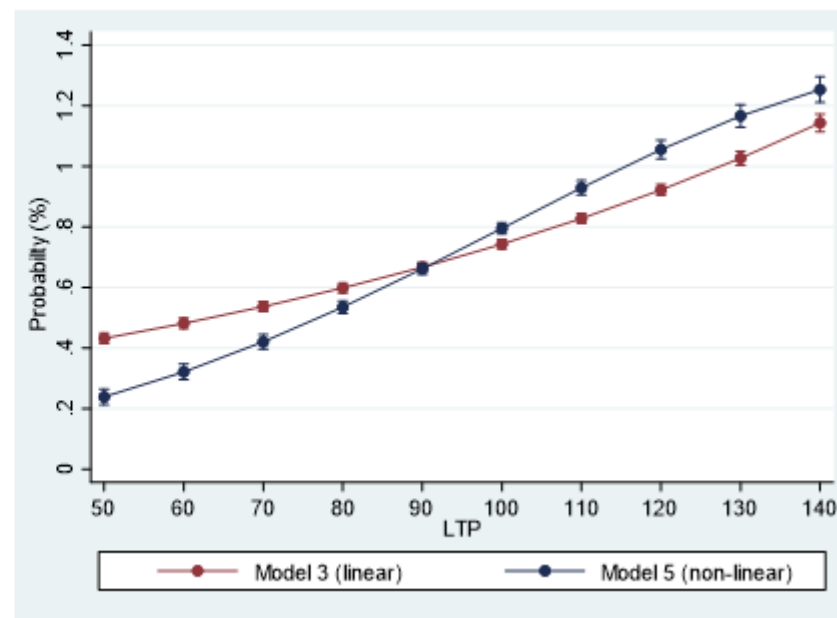
Expected *signs* for job status: more stable jobs are *safer* in terms of risk

LTV vs LTP: Non-linearities

LTV



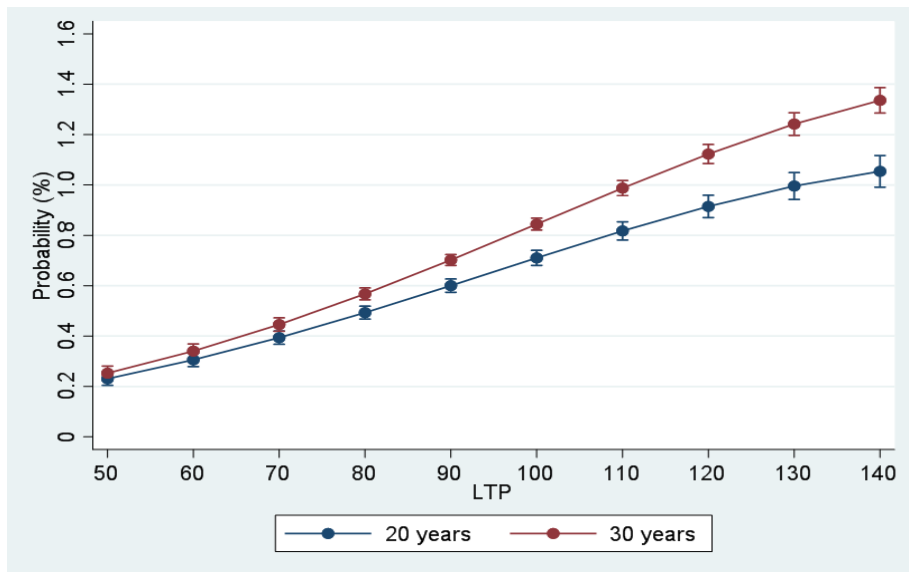
LTP



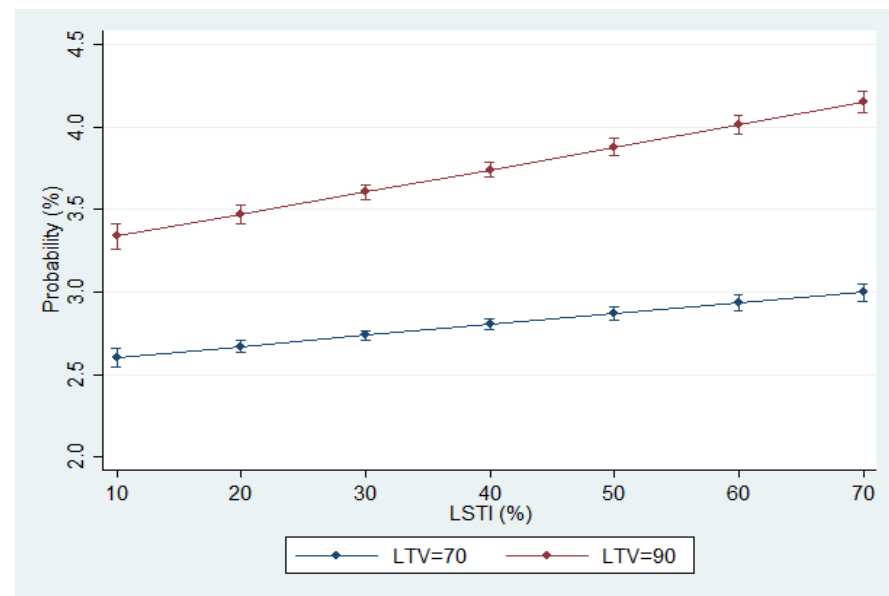
- **LTV.** Non-linearities are important: The PD does not grow for LTV>90%
- **LTP.** Much more dispersion in the PD for low vs. high LTP values

Interactions

LTP x Maturities



LSTI x LTV



- **LTP x Maturities.** Higher PD but only for highly leveraged borrowers
- **LSTI x LTV.** Stronger impact on the PD in all segments of the distribution

- **Spain was not different to other markets with exuberant conditions in the housing sector**
 - ✓ Lending standards did deteriorate
 - ✓ “Appraisal bias” → use the right leverage metric (LTP)
 - ✓ **Spain is different? Distortion in appraisals could be present in other jurisdictions (De Nederlandsche Bank, 2019)**

- **Non-linearities**
 - ✓ PD might increase only marginally for some indicators
 - ✓ More intense effects found for the joint distribution of lending standards
 - ✓ **Policy implications: LTV caps ineffective if set at high levels; pockets of risk better addressed if joint setting of BBM**
 - ✓ **Costs of BBM? More research is needed on this front**

Galán (2020) “The benefits are at the tail: Uncovering the impact...”

“The benefits are at the tail: Uncovering the impact of macroprudential policy on growth-at-risk”

Jorge Galán

Documento de Trabajo del Banco de España No. 2007



- Objective of macroprudential policy:

“to contribute to the safeguard of the stability of the financial system as a whole... thereby ensuring a sustainable contribution to economic growth” ... (ESRB/2011/3)

...to mitigate the “risk of disruption in the financial system with the potential to have negative consequences for the real economy” (ESRB, 2014).

... to mitigate the “risk that financial instability becomes so widespread that... economic growth suffers materially” (ECB, 2009).

Aim: To assess the **impact of MPP** on the conditional distribution of GDP growth, and in particular, on the left-tail (**downside risk**), by identifying non-linear effects of MPP that could be related to **costs and benefits**. The purpose is **not to forecast GDP growth**.

Objective of the paper:

- Two strands of the literature: i) the identification of the effects of financial variables on economic growth, and ii) the impact of MPP
- Identify non-linear effects of macrofinancial variables on the GDP growth distribution via quantile regressions (QR) (Adrian et al., 2019)
- This approach allows assessing both costs and benefits of MPP in terms of GDP growth. We estimate QR of GDP growth conditional on macrofinancial variables and MPP. Different effects related to MPP direction, specific instruments and the cycle

Galán (2020) “The benefits are at the tail: Uncovering the impact...”

- **Sample:** 28 EU countries. 1970Q1 – 2018Q4. Unbalanced panel composed of 5,488 observations. Source: BIS, ECB-SDW, Macroprudential Policies Evaluation Database (MaPPED)
- **Model:** Fixed effects quantile panel regressions (Koenker, 2005; Arellano, 2015)

$$\widehat{Q}_{y_{i,t+h}|x_{it}}(\tau|\mathbf{X}_{it}) = \widehat{\alpha}_{i\tau} + \widehat{\beta}_{1\tau}y_{it} + \widehat{\beta}_{2\tau}CLIFS_{it} + \widehat{\beta}_{3\tau}Credit_{it} + \widehat{\beta}_{4\tau}HP_{it} + \widehat{\beta}_{5\tau}CAB_{it} + \widehat{\beta}_{6\tau}MPP_{it}$$

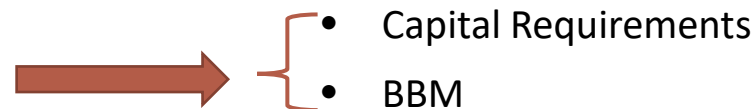
$$(\widehat{\beta}_{\tau}, \widehat{\alpha}_{i\tau}) = \arg \min_{\alpha_i, \beta_{\tau}} \sum_{i=1}^n \sum_{t=1}^{T-h} \rho_{\tau} |y_{it+h} - \mathbf{X}_{it}\beta_{\tau} - \alpha_i| \quad \tau = 5,10, \dots 90,95$$

$$\rho_{\tau} = \tau \cdot 1_{(y_{i,t+h} \geq \mathbf{X}_{it}\beta + \alpha_i)} + (1 - \tau) \cdot 1_{(y_{i,t+h} < \mathbf{X}_{it}\beta + \alpha_i)}$$

Variables:

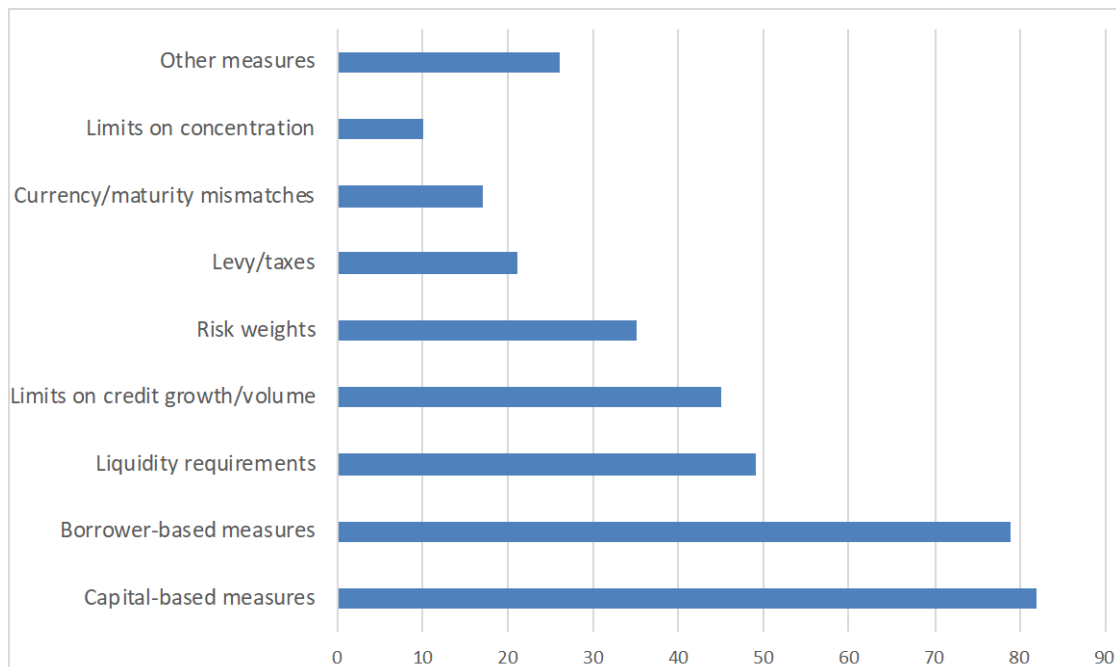
- y_{it+h} : Real GDP growth h periods ahead:
- $CLIFS_{it}$: Financial stress index
- $Credit_{it}$: Credit-to-GDP ratio (2-year avg. change)
- HP_{it} : House prices growth (2-year avg. growth)
- CAB_{it} : Current account balance (% of GDP)
- MPP_{it} : Macroprudential policy measures

$$y_{t+h} = \ln\left(\frac{GDP_{t+h}}{GDP_{t+h-4}}\right); h = 1 \dots 16$$

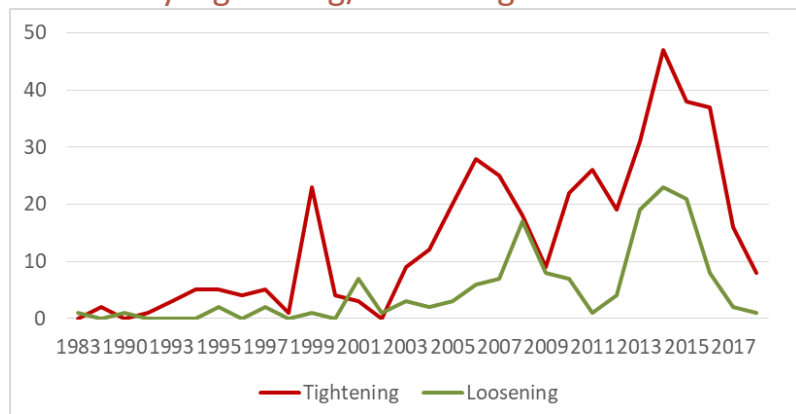


Galán (2020) “The benefits are at the tail: Uncovering the impact...”

By type of measure



By Tightening/Loosening over time



Macroprudential Index (MPI)

Simple sum of the scores on j different policies for each country i every quarter t (Cerutti et al., 2017; Kim and Mehrotra, 2018; Alam et al., 2019):

$$MPI_{it} = \sum_{j=1}^9 SP_{jit} ;$$

$$SP_{jit} = SP_{jit-1} + \Delta SP_{jit}$$

The Index is not intended to capture the intensity of the measures or their changes over time.

For the assessment of capital- and borrower-based measures, specific score of policy is used :

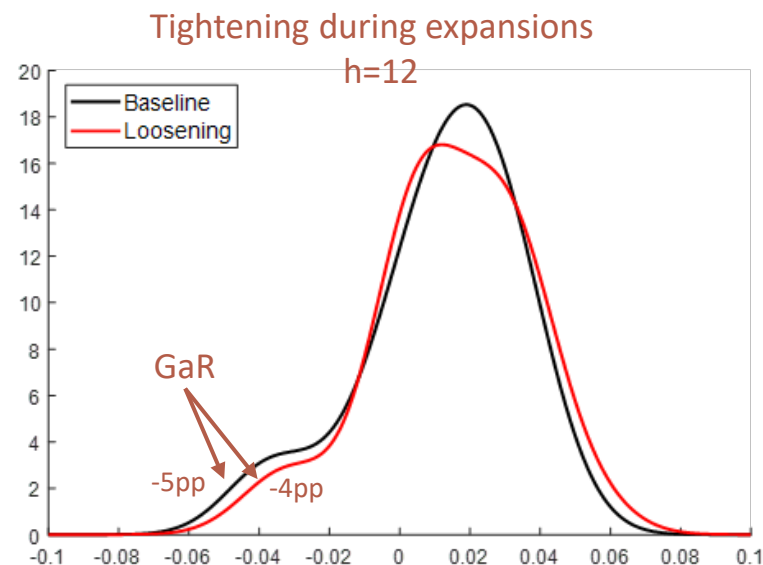
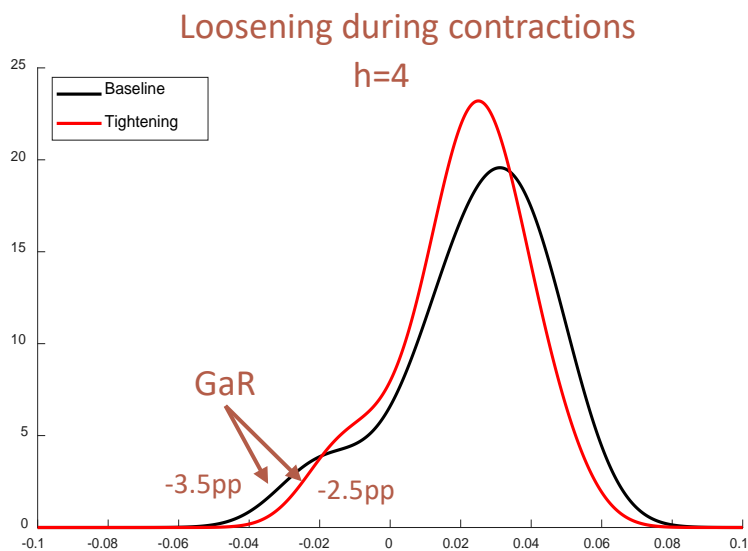
$$SP_{capital_{it}}$$

$$SP_{bbm_{it}}$$

Galán (2020) “The benefits are at the tail: Uncovering the impact...”

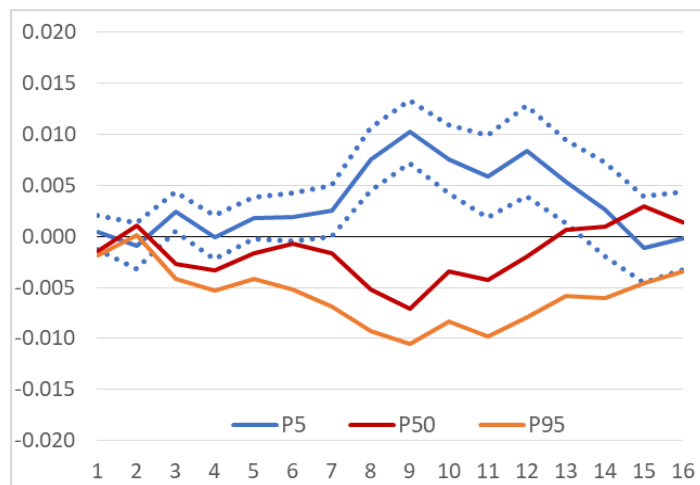
Probability density functions:

Non-parametric weighted Kernel interpolation (Gallant et al., 1992; Galvez and Mencia, 2014)

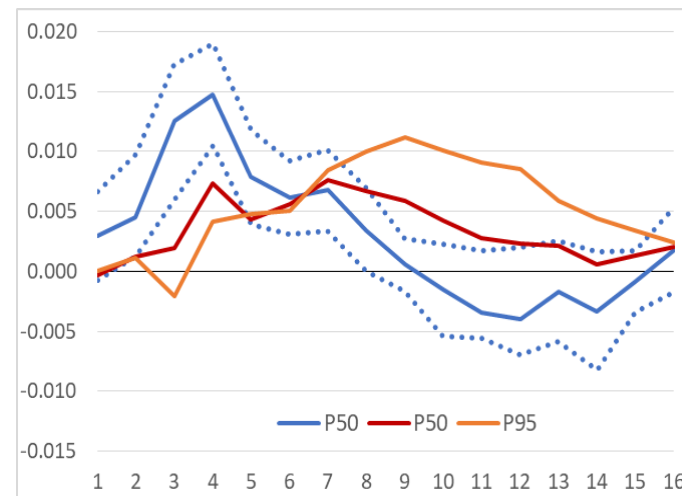


Impact of tightening/loosening capital- and borrower-based measures over the cycle

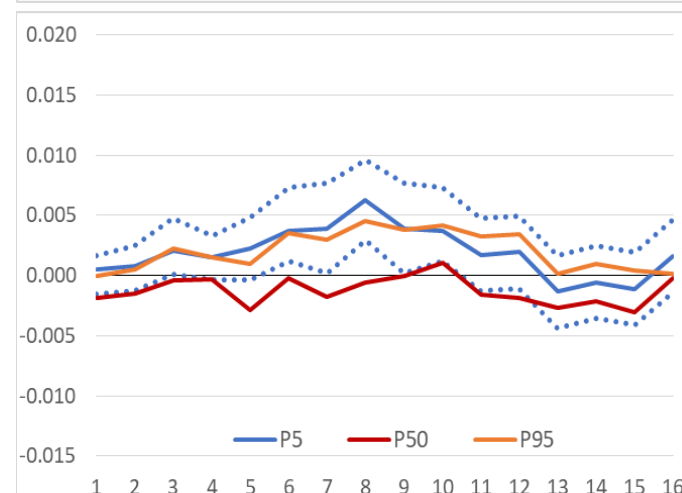
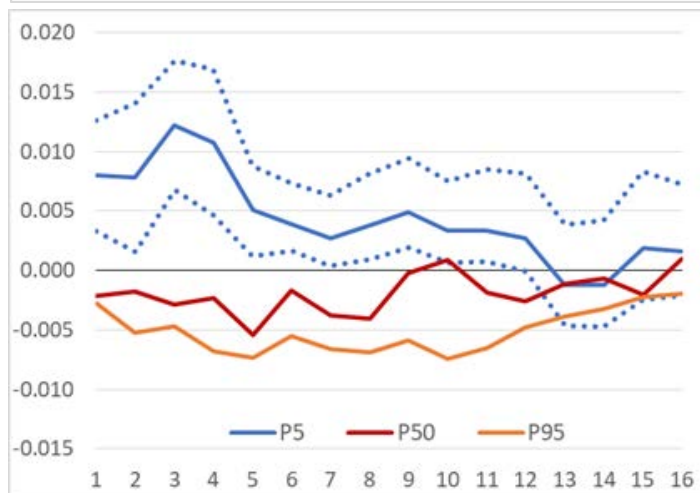
Tightening during expansions



Loosening during contractions



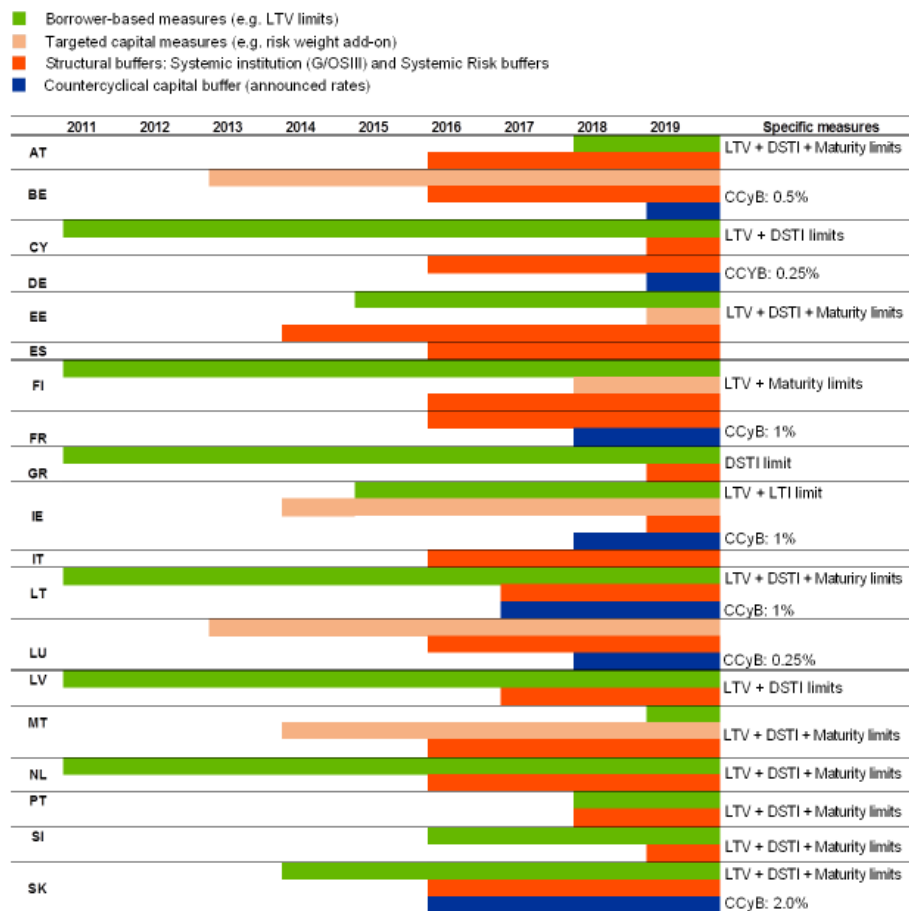
Borrower-based measures



Main results:

- Non-linearities on the effects of MPP on GDP growth: **positive on the left tail** of the distribution and **negative on the median**
- Tightening and loosening of MPP have **different effects depending on the position in the financial cycle**. Tightening in expansions has a larger impact in the mid-term, while loosening in busts has an immediate positive effect on reducing the downside risk of GDP
- Benefits of **tightening BBM are rapidly observed and persistent**, while those from **tightening capital requirements present delay**. The opposite is found when loosening during busts

- A number of countries (in the EU and elsewhere) have introduced additional instruments to mitigate systemic risks stemming from the real estate sector
- The instruments include BBMs: limits (or caps) to Loan to Values (LTV), as well as Loan to Income (LTI), Debt to Income (DTI), Debt Service to Income (DSTI)
- Spain currently lacks the legal basis for the use of macro-prudential instruments other than those foreseen in the EU legislation (CRR/CRD IV)



Sources: ECB and ESRB.

Notes: Borrower-based measures include non-legally binding measures. For Luxembourg, the targeted capital measure refers to a risk weight floor on mortgage exposures for banks following the internal ratings-based (IRB) approach on the basis of a 2016 recommendation of the Systemic Risk Committee. Systemic institution and risk buffers include G-SII (global systemically important institution) and O-SII (other systemically important institution) buffers and any systemic risk buffer (SyRB), the date refers to the earlier of either activation of SyRB or start of phase-in of G-SII or O-SII buffer..

THANKS FOR YOUR ATTENTION

Disclaimer: The views expressed are those of the presenter and do not necessarily reflect those of the Banco de España or the Eurosystem.

