INCOME-BASED TOOLS TO MITIGATE HOUSING MARKET RISKS: WHERE MIGHT WE HAVE BEEN WITHOUT THEM?

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INTRODUCTION

- Debt servicing obligations $\rightarrow$ central role in driving adverse dynamics between household leverage, economic downturns and busts (eg Drehmann et al 2023)
- Mortgage debt servicing payments consume a substantial portion of income
- When obligations become difficult to meet
  - Default risk rises
  - Households curtail consumption $\rightarrow$ spreading weakness to the broader economy (Cloyne et al 2019, Cumming and Hubert 2022, Drehmann et al 2023, Bracke et al 2024)
- Macroprudential authorities are increasingly turning to tools which limit the issuance of loans with high debt service to income (DSTI or DTI limits)
  - Income-based borrower-based measures (I-BBMs)

CONTRIBUTION

- Despite the growing popularity of I-BBMs, the empirical literature on their influence is limited
- Our paper seeks to fill this gap by employing the novel framework of Elsayed et al (2025) to jointly evaluate:
  - Key costs - restricting borrowers' access to high DSTI/DTI household loans
  - Benefits - stabilising key macro variables
- We do this for multiple economies - currently 5, aiming for 6
- Quantifing trade-offs $\rightarrow$ aids the evaluation and communication of macropru policy (CGFS 2023)

LITERATURE

- Microeconometric literature examining cross-sectional effects of BBMs
  - eg DeFusco et al 2019, Tzur-Ilan 2023, Gaffney 2022, HCFS 2024, Levina et al 2019
  - We contribute by integrating elements from the micro studies to study the broader macroeconomic effects
- Micro to macro effects of BBMs
  - eg Gross and Población 2017, Giannoulakis et al 2023
  - Relative to these papers, we study the actual impact of I-BBMs on macroeconomic variables
- Macroeconomic effects of BBMs
  - eg Kuttner and Shim 2016, Akinci and Olmstead-Rumsey 2018, Bruno et al 2017
  - Our study focuses on I-BBMs and does not rely on changes in policy calibration to identify effects
- Costs vs benefits of macroprudential policy
  - eg Richter et al 2019, Brandao-Marques et al 2021
  - Our study bridges the gap between micro studies that capture the share of constrained households (eg DeFusco et al 2019) with the macroeconomic stabilisation benefits (eg IMF 2024)

EMPIRICAL FRAMEWORK

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Leverage the “Meso-econometric" framework of Elsayed et al (2025)

1. Integrates macro identification of SVAR models
   - External instrument to identify lending standard shocks (Basset et al 2014)

   External instrument | Lending standards shock IRFs
2. With micro-level identification strategies to disentangle lending standards shocks into:
   - Banks’ own lending standards that would have prevailed in the absence of the I-BBM (bank lending standards shocks)
   - Lending standards directly attributable to the influence of I-BBMs (I-BBM induced shocks)

$$\underbrace{\epsilon_{L,t}}_{\text{lending standards shock}} = \begin{cases} \epsilon_{L,t}^{BANK}, & t < T^*, \\ \underbrace{\epsilon_{L,t}^{BANK}}_{\text{Bank induced}} + \underbrace{\epsilon_{L,t}^{BBM}}_{\text{I-BBM-induced}}, & t \geq T^*, \end{cases} \tag{1}$$

DISENTANGLE BANK and I-BBM SHOCKS

- Exploit the heterogeneous impact of the I-BBM across the borrower distribution
  - Micro-level identification strategies that exploit administrative data (eg DeFusco et al 2019, Tzur-Ilan 2023, Gaffney 2022, HCFS 2024, Levina et al 2019)
  - Compare the evolution of lending to borrower segments near the DSTI/DTI limit – the treatment group – against segments further below – the control group

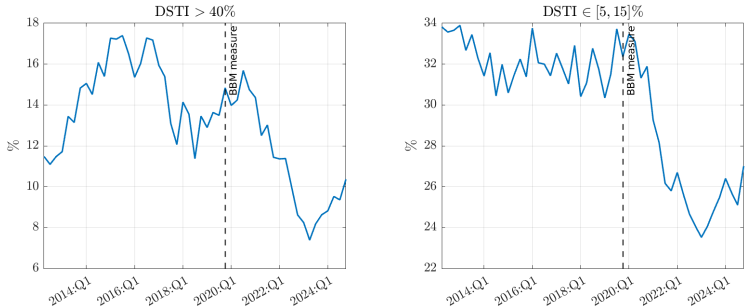


Figure: Korea: Treatment group - above the limit (left) and control group - far below the limit (right)

CONTROL AND TREATMENT GROUP - ANOTHER EXAMPLE

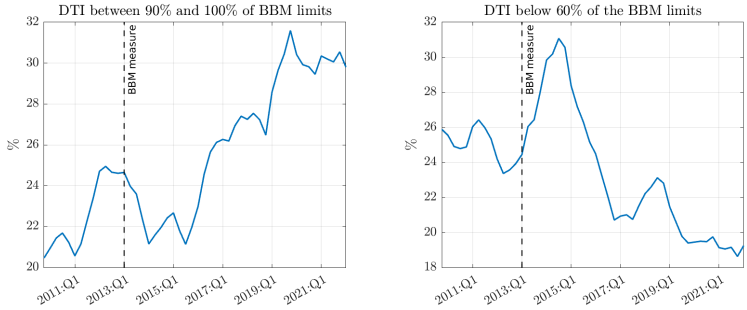


Figure: Netherlands: Treatment group - bunching just below the limit (left) and control group - far below the limit (right)

Details on control and treatment groups | Sources for loan distribution data

IDENTIFICATION OF I-BBM-INDUCED SHOCKS (1)

Purge the fraction of new loans in the treatment and control groups f_t^j from their correlation with VAR variables and the shocks (excluding the lending standards shock)

Assume that purged control series is uncorrelated with the I-BBM shock

$$E[\tilde{f}_t^{control} \epsilon_{L,t}^{BBM}] = 0 \tag{2}$$

whereas for the treatment series

$$E[\tilde{f}_t^{treat} \epsilon_{L,t}^{BBM}] \neq 0 \tag{3}$$

As a result, the treatment series load on both $\epsilon_{L,t}^{BANK}$ and $\epsilon_{L,t}^{BBM}$

$$\tilde{f}_t^{treatment} = \alpha_{treat,1} \epsilon_{L,t}^{BANK} + \alpha_{treat,2} \epsilon_{L,t}^{BBM} + \psi_{treat,t} \tag{4}$$

while the control series only load on $\epsilon_{1,t}$

$$\tilde{f}_t^{control} = \alpha_{control,1} \epsilon_{L,t}^{BANK} + \psi_{control,t} \tag{5}$$

IDENTIFICATION OF I-BBM-INDUCED SHOCKS (2)

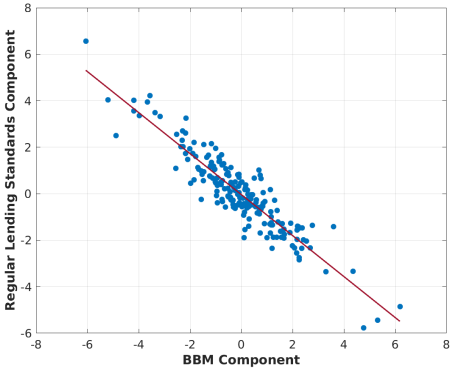
Elsayed et al (2025) propose two methods to identify the I-BBM shocks

1. The "variance minimisation", two step procedure
   - Method to estimate $\alpha_{i,j}$'s
   - Select the sequence of $\epsilon_{L,t}^{BBM}$ that minimises the difference between the variance-covariance matrix of innovations to the treatment and control series estimated in the pre- and post-BBM samples
2. The "K-method"
   - Assume that the lending standards shock $\epsilon_{L,t}$ is a weighted sum of the $\epsilon_{L,t}^{BBM}$ and $\epsilon_{L,t}^{BANK}$, with weights k and $(1-k)$ respectively.
   - To pin down the parameters, assume that $\alpha_{control,1}$ does not change between the pre-and post-BBM sample periods and that for periods after the I-BBM implementation the I-BBM shock is proportional to the lending standards shock.

RESULTS

DO I-BBM INDUCED SHOCKS OFFSET BANK LENDING STANDARDS SHOCKS?

Variance min. method



K-method

Economy	Estimated k	CI
France	1.04	[0.40, 1.68]
Hong Kong	0.998	[0.74, 1.28]
Ireland	0.94	[0.04, 1.85]
Korea	1.36	[0.20, 2.52]
Netherlands	1.14	[0.54, 1.74]
United Kingdom	1.29	[0.69, 1.99]

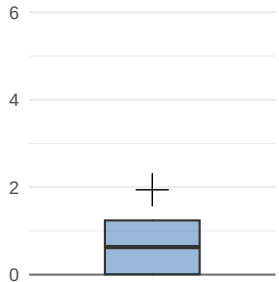
- Both methods suggest that I-BBMs-induced shocks tend on average to offset the procyclicality of bank-induced lending standards shocks

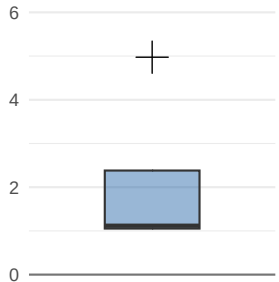
QUANTIFYING THE COSTS and BENEFITS OF I-BBM POLICIES

- Evaluate the costs and benefits using historical forecast decompositions
- Compare actual outcomes to counterfactual scenarios in which I-BBM induced shocks are absent

- **Costs** - share of loans that would have had DSTI/DTIs above the macroprudential limit
- **Benefits** - extent to which I-BBM policy stabilised the evolution of macroeconomic variables
  - Assess stabilisation effects over the period 2019 Q1 to 2024 Q3 - period of significant macroeconomic shocks

COSTS - SHARE OF LOANS THAT WERE CONSTRAINED BY I-BBM POLICIES





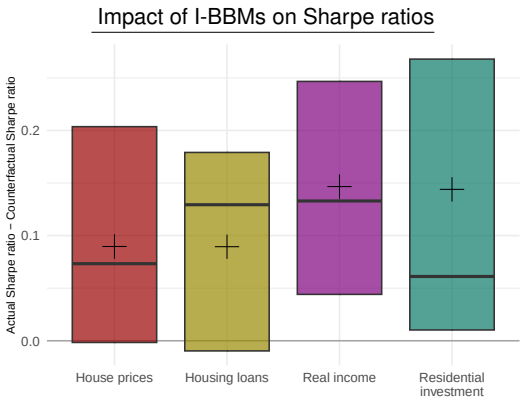
- Pooling data across all of the five economies and all time periods since I-BBMs were introduced
  - On average, 0.5% – 2% of new lending was constrained by the I-BBM policies
  - Average maximum share of constrained new lending is between 1% – 6% of total new lending

BENEFITS - MACROECONOMIC STABILISATION

- Actual volatility (i.e. with I-BBM induced shocks) $\leq$ counterfactual volatility
  - I-BBMs stabilised house price growth and real income growth by around 10%
  - Less obvious stabilisation of housing credit

COSTS vs BENEFITS

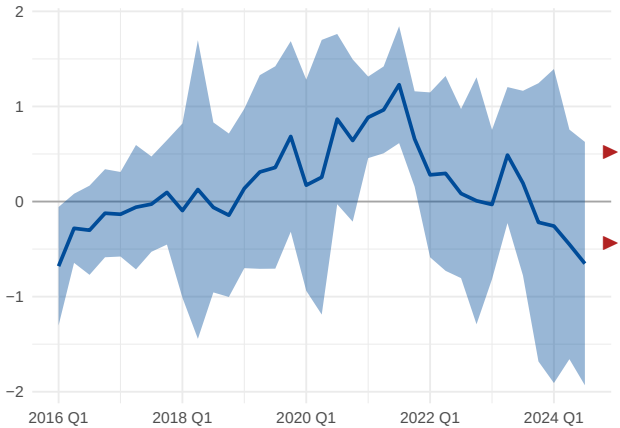
- Constraining around 0.5% to 6% of new housing loans
- Associated with a 10% reduction in volatility of real income growth, house price growth and residential income growth between 2019 and 2024
  - I-BBMs may have dampened macro volatility by about one quarter of that which occurred during the great moderation
- Sharpe ratios improve as well



INFLUENCE OF I-BBMs OVER TIME

TIME-SERIES VARIATION IN SHARE OF CONSTRAINED LENDING

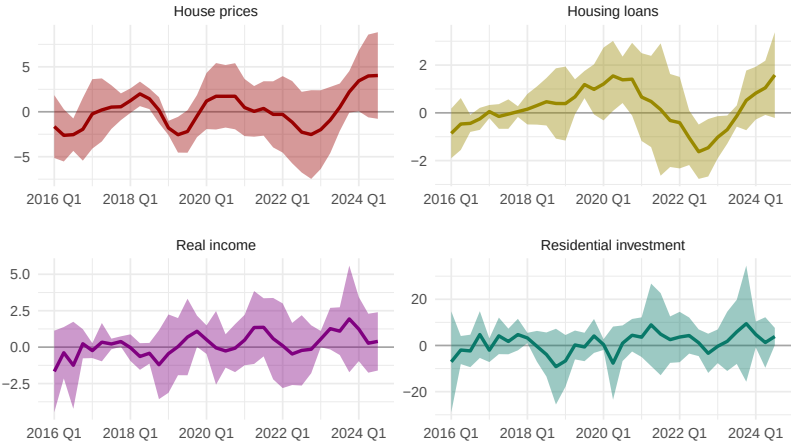
Mean standardised share of lending constrained by I-BBMs



- I-BBMs constrained access to loans as housing markets boomed
- More recently, I-BBMs have helped support access to high DSTI/DTI loans

TIME-SERIES IMPACT OF I-BBMS ON MACRO VARIABLES

Actual relative to counterfactual (mean across economies and SD)



- 2016-2019: Macro variables somewhat weaker than the counterfactual
- Post 2023: Macro variables somewhat stronger than counterfactual

CONCLUDING REMARKS

- We take a step towards quantifying some of the key costs and benefits of I-BBMs
  - Doing this in a single framework
- We find that there are meaningful trade-offs. On average:
  - I-BBMs constrain access to high DSTI/DTI loans for about 0.2 to 0.5% new lending
  - I-BBMs reduce volatility of real incomes by around 5% to 30%
- Our results indicate that I-BBMs tend to counteract the procyclicality of banks' lending standards
- Foundations laid by Elsayed et al (2025) can help policymakers calibrate, evaluate and communicate the costs and benefits of I-BBMs
  - Clearly there remains scope for further refinement
  - Hopefully this paper stimulates more research that quantifies the macroprudential policy calculus

Annex slides

INSTRUMENT STRENGTH OF PROXY VARIABLE

Model	F-Statistic
HK	Identified via sign/zero restrictions
IE	16.91
KR	9.49
NL	13.56
NZ	3.69
UK	10.49
FR	11.03

Table: **Instrument strength of the proxy variable used for the identification of the lending standard shocks:** First-stage F-statistics

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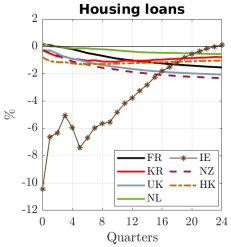
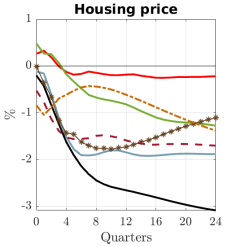
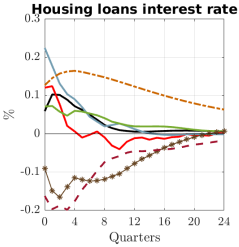
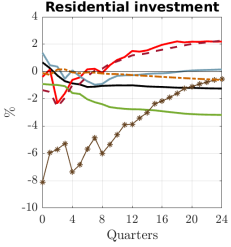
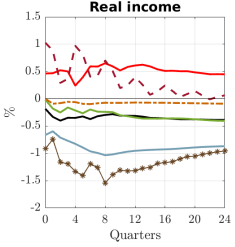
IMPACT OF LENDING SHOCKS











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CONTROL AND TREATMENT GROUPS

	Control	**Treatment**		T^*
	Far below limit	Just below limit	Above limit	
France	DSTI $<$ 20% and 10 $<$ Maturity $\leq$ 15 years		DSTI $>$ 35% and Maturity $>$ 25 years	2019 Q4
Hong Kong[1]	Mortgages not affected by macroprudential policy changes and DSTI within 10% of current limit	Mortgages affected by DSTI policy change and DSTI within 10% of current limit		2015 Q1
Ireland	2.5 $<$ LTI $\leq$ 3		LTI$>$ 3.5	2015 Q1
Korea	5% $<$ DSTI $\leq$ 15%		DSTI $>$ 40%	2019 Q4
Netherlands	DTI $<$ 60% of borrower-specific Nibud limit	90% $<$ DTI $\leq$ 100% of group limit		2013 Q1
New Zealand[2]	Owner occupiers: DTI $<$ 3 Investors: DTI $<$ 3		DTI $>$ 6 DTI $>$ 7	2024 Q3
United Kingdom	LTI $<$ 3		LTI $>$ 4.5	2014 Q3

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