

Macroprudential Tightening and Multiple Property Ownership:

New Evidence from European Wealth Microdata

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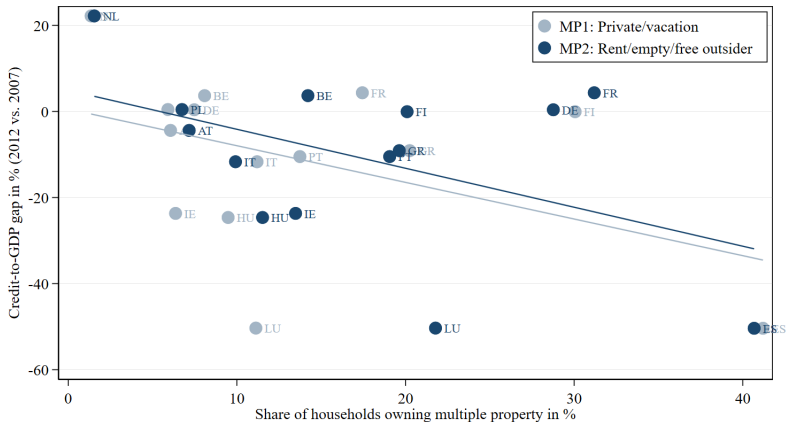
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Disclaimer: The views and results presented in this paper are those of the authors and do not necessarily represent the official opinions of the Slovak Academy of Sciences, National Bank of Slovakia, or the Eurosystem. This research has been carried out during Dr. Širaňová's visit at the NBS within the NBS Visiting Research Programme.

- Home ownership has several favorable private and social consequences
- However, housing markets are highly volatile and can cause widespread economic and financial disruptions
- Excessive housing demand and speculative housing investment contribute to increasing housing prices and economic expansion,
- As well as amplifying housing boom and bust cycles
- While there is some evidence of the amplifying effects of second-home buying on the housing boom and bust, the topic of multiple property ownership still remains relatively underresearched

Motivation

- Credit cycle bust was more pronounced after the GFC in EU countries with higher multiple property ownership



The presence of multiple property ownership

- In general, three demand-side drivers of multiple property ownership (MPO) identified in the literature:
 - **Compensation**, i.e. households purchasing second homes in order to compensate for deficiencies in their primary dwelling (Dijst et al., 2005; Quinn, 2004; Haldrup, 2004)
 - **Life cycle**, when second-home ownership is linked to retirement, future retirement plans or to a need for dual residence because of work (Bieger et al., 2007; Hall and Muller, 2004)
 - **Affluence**, linking second-home buying to wealth, the availability of mortgage credit and investment decisions (Kadi et al., 2020; Dijst et al., 2005)
- There is evidence of the affluence contributing to the recent trends of increasing multiple property ownership (Kadi et al., 2020; Norris and Winston, 2010)
- MPO is driven also by household structural characteristics, as richer, better educated households are more likely to hold several properties (Skak and Bloze, 2017; Torrado et al., 2020)

- Borrower-Based Measures (BBMs) have been increasingly used since the GFC to address systemic risks related to the credit and housing cycle
- Studies using micro-data (country-specific studies or multi-country analysis using HFCS data) document a positive impact of BBM tightening on household credit risk and a negative impact on the housing demand and consequently on property prices ([Abreu et al., 2024](#); [van Bakkum et al., 2024](#); [Galoia, 2024](#); [Hodula et al., 2023](#); [Nissen et al., 2022](#); [Albacete et al., 2017](#); [Giannoulakis et al., 2023](#); [Gross and Población, 2017](#))
- Only a few papers differentiate between the purpose of property transaction ([Hodula et al., 2023](#); [Galoia, 2024](#))

The impact of BBMs - theoretical foundations

- Agent-based models directly link the use of BBMs to the buy-to-let decision of individual households ([Baptista et al., 2016](#); [Tarne et al., 2022](#); [Carro et al., 2023](#))
- Applying LTV or LTI caps on mortgages decreases the share of owner-occupying households and increases the share of renting
- Shift in the distribution of properties per investor, with a decreasing share of households having only one, and increasing the share of households having multiple buy-to-let properties
- These results and a realistic housing cycle can be generated based on (inter alia) the assumption of:
 - Household heterogeneity in terms of income and wealth
 - Existence of a dynamic buy-to-let household sector

In our paper, we provide

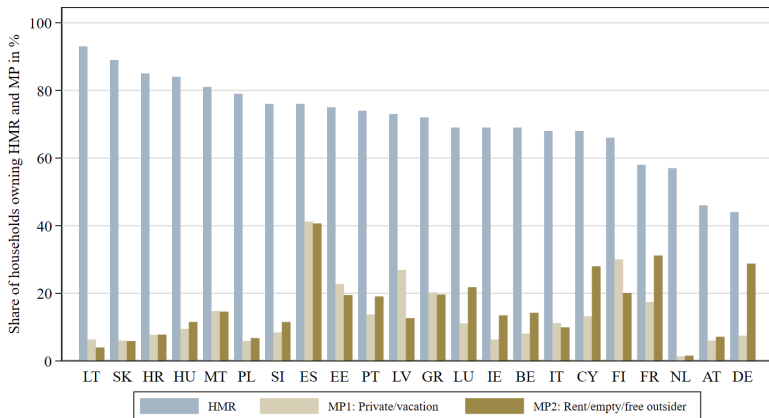
- Empirical evidence that it is mainly wealthier and better educated households who are more likely to hold several properties
- Tightening BBMs (LTV and DSTI) significantly decreases the propensity to engage in multiple home ownership, especially those held for investment purposes
- The impact of tightening is particularly pronounced for owners with up to three real estate assets, then the impact disappears/turns slightly positive

2017 - Household Finance and Consumption Survey (HFCS)

- National representative surveys on household wealth in 22 ESCB countries, around 91k hh-level observations
- Detailed information on real assets (including primary and secondary real estate), financial assets, debt, income, consumption
- Rich set of socio-demographic characteristics: age, gender, education, family structure, ...
- Our analysis on multiple-property ownership; sample restricted to only Household Main Residence (HMR) owners (N = 68k)
- Focus on HHs reporting less than 4 additional properties (on top of HMR) with flat/house type of a property

Main dependent variables

- Dummy variables: (0/1) if a household owns more than 1 real estate (overall, but we also distinguish between purpose: private / vacation or rent / empty / free outsider)



Main HH-level control variables

- Variables capturing economic resources: net wealth (value - liabilities, including HMR), income, employment status ([Torrado et al., 2020](#))
- Variables capturing HH characteristics and traits: household size, gender, level of education - proxy for fin. literacy ([Torrado et al., 2020](#))
- Variables to minimise the policy effects bias: year of the HMR acquisition, type of HMR acquisition

Others

- Structural characteristics - preferences in a country for real estate ownership, historical legacy
- General time trend - survey-year dummy
- Macroeconomic variables: inflation rate, real GDP per capita, house price growth, and employment rate.

Propensity to own household primary residence

- We first estimate household-level determinants of the propensity to own household primary residence by probit:

$$Pr(HMR_{ij} = 1|X_{ij}) = \Phi(\alpha + \beta X_{ij} + \lambda_j + \delta_t + \epsilon_{ij}), \quad (1)$$

- Pr denotes probability and Φ is the standard CDF
- HMR_{ij} denotes the ownership of household's main residence
- X_{ij} represents a set of relevant HH-level characteristics
- λ_j represents country-group (regional) fixed effects and δ_t captures survey-year fixed effects
- ϵ_{ij} is the error term; s.e. clustered at the country-wave level

Propensity to own multiple properties

- Similar probit regression for the household-level determinants of multiple property ownership:

$$Pr(MP_{ij} = 1|X_{ij}) = \Phi(\alpha + \beta X_{ij} + \gamma IMR_{ij} + \lambda_j + \delta_t + \epsilon_{ij}), \quad (2)$$

- The notation of RHS variables and the coefficients estimated is the same as in eq. 1
- MP_{ij} denotes the ownership of multiple real estate
- IMR_{ij} denotes the inverse Mill's ratio based on equation 1

Macroprudential BBMs policy changes

- We further explore the importance of the BBMs tightening by probit:

$$Pr(MP_{ij} = 1 | X_{ij}) = \Phi(\alpha + \beta X_{ij} + \gamma IMR_{ij} + \psi BBM_j + \lambda_j + \delta_t + \epsilon_{ij}), \quad (3)$$

- The notation of RHS variables and the coefficients estimated is the same as in eq. 2
- BBM_j considers both tightening in the LTV separately, and accumulation of LTV tightening periods together with utilization of the DSTI measure

Results: Determinants of primary and MP ownership

	HMR		MP		MP1		MP2	
	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.
Age	0.006***	(0.00)	0.002***	(0.00)	0.001**	(0.00)	0.001**	(0.00)
Female (1=yes)	-0.016	(0.02)	-0.004	(0.01)	0.009***	(0.00)	-0.014*	(0.01)
<i>Household structure</i>								
Single (1=yes; ref: widowed)	-0.029**	(0.01)	0.021*	(0.01)	0.017	(0.01)	0.016	(0.01)
Married (1=yes; ref: widowed)	0.081***	(0.01)	0.024*	(0.01)	0.029***	(0.01)	0.008	(0.01)
Children (1=yes)	0.033***	(0.01)						
Size of household			-0.016	(0.01)	-0.015	(0.01)	-0.007	(0.01)
<i>Job status (ref: employed)</i>								
Self-employed (1=yes)	-0.006	(0.02)	0.058***	(0.02)	0.042***	(0.01)	0.036*	(0.02)
Unemployed (1=yes)	-0.071***	(0.02)	-0.028	(0.02)	-0.005	(0.02)	-0.022	(0.02)
Retired (1=yes)	0.002	(0.02)	0.009	(0.02)	0.010	(0.01)	0.005	(0.01)
Other (1=yes)	0.002	(0.04)	-0.016	(0.04)	0.004	(0.02)	-0.029	(0.03)
<i>Educational level (ref: primary)</i>								
Lower secondary (1=yes)	-0.020	(0.02)	0.006	(0.01)	0.000	(0.01)	0.007	(0.01)
Upper secondary (1=yes)	0.016	(0.02)	0.054***	(0.02)	0.018**	(0.01)	0.048***	(0.01)
Post secondary (1=yes)	0.038**	(0.02)	0.119***	(0.02)	0.062***	(0.02)	0.100***	(0.01)
<i>HH monthly income (ref: Decile 1)</i>								
Decile 2	0.013	(0.02)	0.026***	(0.01)	0.006	(0.01)	0.015	(0.01)
Decile 3	0.044***	(0.01)	-0.022	(0.02)	-0.019	(0.03)	-0.029**	(0.01)
Decile 4	0.071***	(0.01)	-0.009	(0.02)	-0.008	(0.02)	-0.020**	(0.01)
Decile 5	0.091***	(0.02)	-0.018	(0.03)	0.007	(0.02)	-0.040	(0.03)
Decile 6	0.111***	(0.02)	0.004	(0.04)	0.008	(0.03)	-0.014	(0.03)
Decile 7	0.143***	(0.02)	0.017	(0.04)	0.017	(0.03)	-0.004	(0.03)
Decile 8	0.145***	(0.02)	0.033	(0.05)	0.026	(0.04)	0.007	(0.04)
Decile 9	0.136***	(0.02)	0.050	(0.04)	0.039	(0.04)	0.015	(0.03)
Decile 10	0.151***	(0.03)	0.087	(0.05)	0.076*	(0.05)	0.047	(0.04)
<i>HH wealth (ref: Decile 1)</i>								
Decile 2	0.071***	(0.02)	-0.016	(0.05)	-0.003	(0.02)	-0.010	(0.04)
Decile 3	0.160***	(0.02)	0.019	(0.03)	0.000	(0.01)	0.030	(0.03)
Decile 4	0.201***	(0.02)	0.014	(0.04)	0.014	(0.02)	0.011	(0.03)
Decile 5	0.245***	(0.03)	0.030	(0.04)	0.020	(0.02)	0.028	(0.04)
Decile 6	0.271***	(0.03)	0.050	(0.04)	0.035	(0.02)	0.042	(0.04)
Decile 7	0.274***	(0.02)	0.058	(0.04)	0.035	(0.02)	0.053	(0.03)
Decile 8	0.316***	(0.03)	0.103**	(0.04)	0.050*	(0.03)	0.092**	(0.04)
Decile 9	0.333***	(0.02)	0.111***	(0.04)	0.056**	(0.03)	0.098***	(0.03)
Decile 10	0.342***	(0.02)	0.162***	(0.04)	0.069***	(0.02)	0.151***	(0.04)
N	85,398		44,919		38,973		41,094	
# countries	19		19		19		19	
Pseudo R. sq	0.237		0.112		0.176		0.111	

Results: Effects of LTV tightening on MP ownership

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Multiple property ownership							
LTV tightening (1=yes)	-0.244*** (0.05)	-0.184*** (0.05)	-0.165*** (0.06)	-0.179*** (0.07)	-0.207*** (0.06)	-0.216*** (0.07)	-0.119*** (0.00)
N	44,919	44,919	44,919	44,919	44,919	44,919	44,919
Pseudo R. sq	0.045	0.032	0.085	0.080	0.090	0.088	0.138
Panel B: Multiple property ownership – private / vacation							
LTV tightening (1=yes)	-0.074** (0.03)	-0.044 (0.03)	0.021 (0.06)	0.009 (0.04)	-0.018 (0.07)	-0.005 (0.08)	-0.065* (0.04)
N	38,973	38,973	38,973	38,973	38,973	38,973	38,973
Pseudo R. sq	0.121	0.139	0.159	0.168	0.138	0.152	0.174
Panel C: Multiple property ownership – rent / empty / free outsider							
LTV tightening (1=yes)	-0.182*** (0.04)	-0.130*** (0.05)	-0.168*** (0.05)	-0.188*** (0.05)	-0.191*** (0.05)	-0.232*** (0.06)	-0.111*** (0.00)
N	41,094	41,094	41,094	41,094	41,094	41,094	41,094
Pseudo R. sq	0.072	0.083	0.088	0.098	0.093	0.092	0.142
Panel D: Control variables							
Household characteristics	YES	YES	YES	YES	YES	YES	YES
Other variables	YES	YES	YES	YES	YES	YES	YES
Survey fixed effects	NO	YES	YES	YES	NO	YES	YES
Region fixed effects	NO	NO	YES	NO	YES	YES	NO
Macroeconomic variables	NO	NO	NO	YES	YES	YES	NO
Country fixed effects	NO	NO	NO	NO	NO	NO	YES

Results: Effects of cumulative LTV and DSTI tightening

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Multiple property ownership							
Cum. LTV and DSTI tight.	-0.057*** (0.02)	-0.055*** (0.02)	-0.059*** (0.02)	-0.059*** (0.02)	-0.073*** (0.02)	-0.080*** (0.02)	-0.133*** (0.00)
N	44,919	44,919	44,919	44,919	44,919	44,919	44,919
Pseudo R. sq	0.092	0.102	0.100	0.101	0.092	0.097	0.138
Panel B: Multiple property ownership – private / vacation							
Cum. LTV and DSTI tight.	-0.026** (0.01)	-0.020 (0.02)	-0.001 (0.02)	-0.004 (0.01)	-0.003 (0.02)	-0.003 (0.02)	-0.050*** (0.00)
N	38,973	38,973	38,973	38,973	38,973	38,973	38,973
Pseudo R. sq	0.102	0.119	0.130	0.155	0.089	0.100	0.191
Panel C: Multiple property ownership – rent / empty / free outsider							
Cum. LTV and DSTI tight.	-0.051*** (0.01)	-0.043* (0.02)	-0.058** (0.02)	-0.045* (0.03)	-0.063*** (0.02)	-0.052** (0.02)	-0.131*** (0.00)
N	41,094	41,094	41,094	41,094	41,094	41,094	41,094
Pseudo R. sq	0.076	0.075	0.073	0.083	0.085	0.124	0.142
Panel D: Control variables							
Household characteristics	YES	YES	YES	YES	YES	YES	YES
Other variables	YES	YES	YES	YES	YES	YES	YES
Survey fixed effects	NO	YES	YES	YES	NO	YES	YES
Region fixed effects	NO	NO	YES	NO	YES	YES	NO
Macroeconomic variables	NO	NO	NO	YES	YES	YES	NO
Country fixed effects	NO	NO	NO	NO	NO	NO	YES

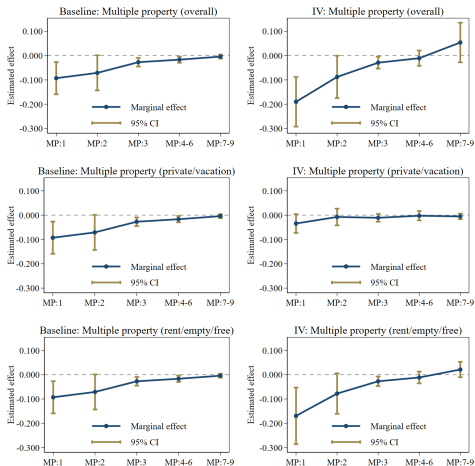
Endogeneity of policy changes

- Macroprudential policy often reacts (especially in case of BBMs) to development in credit markets, house markets included
- This may give rise to reverse causality between multiple property ownership and macroprudential tightening
- One possible approach is to use instrumental variable
- In this case, the instrument is constructed from the information regarding the compliance of national authorities with the 2011 recommendation of the ESRB that that the central bank should play a leading role in macroprudential policy ([Gadatsch et al., 2018](#))
- Hypothesis: a higher degree of central bank involvement in the conduct of macroprudential policy indicates a higher degree of independence in the decision-making process, and thus a higher propensity to tighten macroprudential tools

Results: Effects of BBM tightening - IV approach

I. LTV tightening			II. Cumulative LTV and DSTI tightening		
LTV tightening (1=yes)	-0.216*** (0.07)	-0.256*** (0.07)	Cum. LTV and DSTI tight.	-0.080*** (0.02)	-0.091*** (0.03)
<i>Ist stage regression</i>			<i>Ist stage regression</i>		
Instrument		2.627*** (0.62)	Instrument		10.59*** (2.86)
N	44,919	44,919	N	44,919	44,919
Pseudo R. sq		0.089	Pseudo R. sq		0.096
Panel B: Private / vacation			Panel B: Private / vacation		
LTV tightening (1=yes)	-0.005 (0.08)	-0.057 (0.08)	Cum. LTV and DSTI tight.	-0.003 (0.02)	-0.014 (0.01)
<i>Ist stage regression</i>			<i>Ist stage regression</i>		
Instrument		2.638*** (0.60)	Instrument		10.60*** (2.78)
N	38,973	38,973	N	38,973	38,973
Pseudo R. sq		0.154	Pseudo R. sq		0.178
Panel C: Rent/Empty/Free outsider			Panel C: Rent/Empty/Free outsider		
LTV tightening (1=yes)	-0.232*** (0.06)	-0.255*** (0.06)	Cum. LTV and DSTI tight.	-0.052** (0.02)	-0.067** (0.03)
<i>Ist stage regression</i>			<i>Ist stage regression</i>		
Instrument		2.667*** (0.62)	Instrument		10.83*** (2.85)
N	41,094	41,094	N	41,094	41,094
Pseudo R. sq		0.093	Pseudo R. sq		0.085
Panel D: Control variables			Panel E: Control variables		
Household characteristics	YES	YES	Household characteristics	YES	YES
Other variables	YES	YES	Other variables	YES	YES
Survey fixed effects	YES	YES	Survey fixed effects	YES	YES
Region fixed effects	YES	YES	Region fixed effects	YES	YES
Macroeconomic variables	YES	YES	Macroeconomic variables	YES	YES

Heterogeneity in the number of multiple properties



This result strongly resembles the (agent-based model generated and calibrated) recent finding of [Carro et al., \(2023\)](#) for Spain, and [Bardoscia \(2025\)](#) for the UK.

- *Year of HMR acquisition* - estimating the impact of BBMs based on different time-windows of the acquisition of the main residence (before 2014, between 2009 and 2013, before the GFC)
- *Selection of macroprudential policy database* - alternative database ([Cerutti et al., 2017](#)), containing less countries but a wider set of macroprudential tools, no distinguishable response between MP1 and MP2 ownership
- *Other policy controls*
- *Modeling the policymaker function*
- *Clustering at regional level*

- The propensity to own multiple properties is associated with standard socio-economic and demographic characteristics (for example, higher household wealth and education, age)
- Tightening of borrowed-based measures, both LTV alone and LTV together with DSTI limits, significantly decrease the propensity to own multiple real estate properties
- The purpose of MP ownership matters, as BBMs have a more significant impact on investment-oriented ownership
- The negative impact of BBMs on MP ownership weakens with the increasing number of these properties

Thank you for your attention!

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