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A note on the effects of residential property price growth on bank profitability

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Overview

We explore the relationship between the real estate cycle and profitability of European banks. From 2010 to 2018, the divergent real estate dynamics across European countries explain nearly one fourth of the profitability gap between banks established in countries with a sluggish real estate market and those located in the other countries. As a counterfactual exercise, we estimate that the average ROE of Italian banks in 2010-18 would have been about 1.6 percentage points higher if real estate prices in Italy had grown on average at the same pace as the median European country. Finally, we find that banks established in countries that have been experiencing a sustained upswing in the real estate sector have not increased their capital position in response to the potential overheating of their domestic real estate sector.

1. Introduction and main conclusions

Since the global financial crisis the European banking sector has been experiencing a period of low profitability. Despite some recent improvements in asset quality, especially in countries that were hit harder by the sovereign debt crisis, the return on equity of European banks is far from pre-crisis levels: in 2018 it was 6 per cent, well below the level of 2007 (10 per cent).

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While on average the euro area and the UK banking sectors show a sizeable profitability gap relative to the US, there is significant cross-country heterogeneity within Europe with some well-known exceptions such as the Nordic countries. A recent ECB analysis points to structural factors as the main driver of low profitability.[1] However, the extent to which these differences depend on the structural efficiency of banks or on cyclical economic developments at the national level remains an open question.

In terms of cyclical factors affecting banks' profitability, real estate dynamics play a prominent role. It is noteworthy that since the global financial crisis property prices have grown at a rapid pace in some European countries only, while in others they have, on average, stagnated. In this note we explore the effects of the real estate cycle, proxied by residential property real price growth, on bank profitability. The main objective of our analysis is to quantify to what extent cross-country differences in European bank profitability may depend on different developments in property prices.

In the academic literature the link between rising real estate prices and higher bank profitability has been established both theoretically and empirically.[2] The real estate cycle may affect bank performance through two main channels. The first direct link is the collateral channel:[3] in real estate-related loans, an increase in the value of properties used as collateral has a positive effect on the recovery rates and on the wealth of borrowers,[4] reducing the riskiness of their loans. As a result, after an upswing in the real estate cycle, banks experience a reduction in loan loss provisions, an improvement in capitalization, and a rise in profitability. The second link is the macroeconomic channel: a rise in property prices increases the return on real estate investments and may incentivize new construction activity,[5] generating an economic expansion and an indirect positive effect on the banking sector.

We explore the relationship between the real estate cycle and bank profitability by adopting a reduced-form approach. Insufficiently detailed data prevents us from investigating the contribution of each channel, and from establishing a sharp causal identification, which is beyond the scope of this paper due to the lack of an exogenous source of variation for the purpose of this exercise. Nonetheless, the analysis provides a preliminary quantification of the effect of different real estate cycles on banks' profitability across Europe.

In our analysis we divide banks into two groups according to whether their domestic country experienced real estate price growth above or below the median rate, roughly distinguishing countries in which real estate prices increased or decreased in the 2010-18 period. Our estimates highlight that real estate price growth has a sizeable

1 *Weak euro area bank profitability – selected issues*, ECB report, June 2019.

2 See M. Arpa, I. Giulini, A. Ittner and F. Pauer, 'The influence of macroeconomic developments on Austrian banks: implications for banking supervision', BIS Working Paper, 2001; E.P. Davis and H. Zhu, 'Commercial property prices and bank performance', *Quarterly Review of Economics and Finance*, 49, 1341–1359, 2009; J.P. Niinimaki, 'Does collateral fuel moral hazard in banking?', *Journal of Banking and Finance*, 33, 514–521, 2009.

3 R.J. Herring and S. Wachter, 'Real Estate Booms and Banking Busts: An International Perspective', The Wharton Financial Institutions Center Working Paper, 1999.

4 C. Hott, 'Lending behavior and real estate prices', *Journal of Banking and Finance*, 35, 2429–2442, 2011.

5 E.P. Davis and H. Zhu, 'Commercial property prices and bank performance', *Quarterly Review of Economics and Finance*, 49, 1341–1359, 2009.

positive effect on bank profitability. In the 2010-18 period banks established in countries with a sluggish real estate market experienced, *ceteris paribus,* a profitability gap of nearly 5 percentage points (1.6 versus 6.5 per cent) in terms of return on equity (ROE), nearly one fourth of which may be explained by the divergent real estate dynamics.

Although ROE has recently improved in all countries, for most banks it remains below 10 per cent – a level that analysts deem necessary to cover the cost of equity, especially in countries with subdued real estate prices relative to the pre-crisis period. As a counterfactual example, in 2018 the profitability gap of Italian banks relative to the 10 per cent target would have been reduced by over one third if Italian real estate prices, which contracted by 2 per cent, had instead grown at the median rate of European countries (2.8 per cent).[6]

Despite the positive impact on bank profitability, an overly rapid increase in real estate prices may pose a serious threat to financial stability and the real economy when an adjustment occurs. Banks currently reaping sizeable gains from a booming domestic real estate market are also the most vulnerable to an inversion of the cycle. The US real estate market meltdown in 2008-09 and the subsequent recession are only the most recent notable examples. In order to limit the macroprudential risk stemming from the real estate sector, the European Systemic Risk Board has recently issued macroeconomic policy recommendations to several countries that also recently experienced sustained growth in real estate prices.[7] Our analysis tends to support the importance of a timely adoption of macroprudential actions. Indeed, we find that banks established in countries that have been experiencing a sustained upswing in the real estate sector have not increased their capital position in response to the potential overheating of their domestic real estate sector.

2. Sample characteristics and methodology

We focus on the real estate cycle of 29 European countries (Table A.1) and a sample of 363 European banks (representing over 80 per cent of the total assets in these countries; Table A.2) between 2006 and 2018.

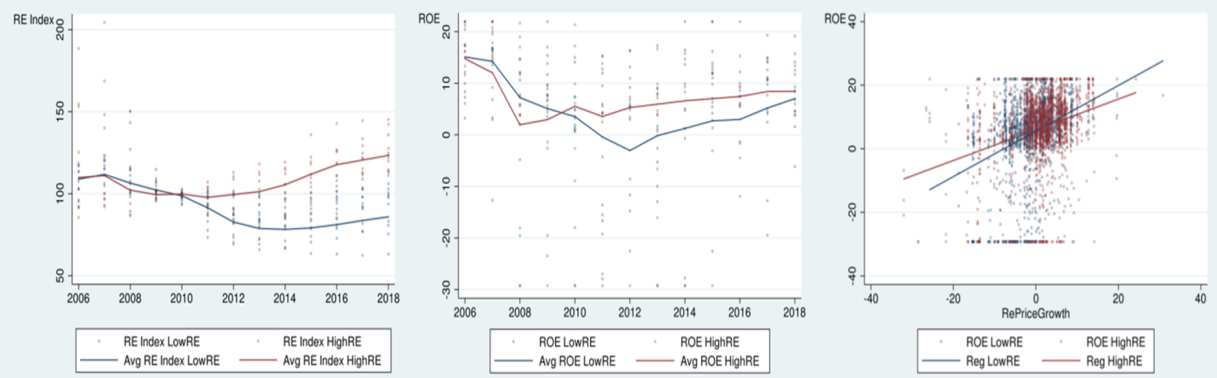
For each country, we estimate the annual residential property real price growth as the year-on-year change in the real price index obtained from BIS statistics. In the analysis we also employ bank-level variables obtained from SNL Financial.

[6] In Section 3 we show that in the period 2010-18 the average ROE of Italian banks would have been between 1.6 and 2.3 percentage points higher if real estate prices had grown on average at the same pace as the median European country.

[7] The ESRB report *Vulnerabilities in the residential real estate sectors of the EEA countries* (September 2019) indicates that most European countries present vulnerabilities in the real estate sector. The ESRB claims that the negative outlook for European economies may lead to an inversion of the real estate cycle and to a crystallization of the identified vulnerabilities. Most countries have already implemented both capital-based (e.g. risk weight floor for real estate exposures) and borrower-based (e.g. loan-to-value caps or debt-to-income limits) macroprudential measures to mitigate the identified financial stability risks. However, in eight countries the policy stance relative to the intensity of the risks was assessed to be only partially appropriate and partially sufficient (BE, CZ, DE, FI, FR, IS, NL, LU).

Figure 1: Residential property prices and bank profitability

a) Property price index b) Average ROE c) Price growth and ROE



Source: own calculations based on SNL Financial and BIS data.

We sort countries into two groups: 'HighRE' countries, which experienced a rate of growth in the residential property price index above the median between 2010 and 2018, and 'LowRE' countries, which grew less than the median country in this period. We consider 2010 as the reference date because afterwards the price indices of the two groups significantly diverged, as shown in Figure 1.a.

Since 2010 the profitability of the banking sector has also been systematically higher in HighRE countries (Figure 1.b). Between 2010 and 2018, the ROE of banks in HighRE countries averaged 6.5 per cent, while that of LowRE countries was about 1.6 per cent. Also taking a more granular bank-level perspective, a positive correlation emerges between the growth rate of residential property prices and ROE (Figure 1.c); this relationship holds both for HighRE and LowRE countries. The figure shows that the sensitivity of ROE to the price index is greater for banks located in LowRE countries than for those established in HighRE countries, suggesting that this sensitivity to the property price growth rate is lower during the upward phase of the real estate cycle. This may be due to an asymmetric impact of the real estate cycle on loan loss provisions. Indeed, provisions are high during the downward phase of the cycle; as a result, an inversion of the cycle is associated with a reduction in provisions and should lead to significant benefits in terms of profitability. In contrast, since provisions are already low during the upward phase of the cycle, the potential benefits of an additional increase in real estate prices are limited. Meanwhile, the impact of the real estate cycle on banks' revenues is lower compared to that on loan loss provisions.[8]

We analyse the relationship between property real price growth rates and banks' profitability with a regression model using data from 2006 to 2018. We use a longer sample period to exploit all the information available. The resulting coefficients are then used for counter-factual exercises from 2010 onwards, i.e. when the real estate cycles started to diverge across the two groups of countries.

[8] In unreported analyses we find evidence consistent with both hypotheses. The correlation between the real estate cycle and the level of loan loss provisions is greater for banks located in LowRE countries. Moreover, the relationship between residential property prices and the net interest margin is not significant for banks established in both the HighRE and LowRE countries.

Our main model is described in Equation (1):

$$Y_{it} = \beta_1 HighRE_i + \beta_2 RePriceGrowth_{it-1} + \beta_3 RePriceGrowth_{it-1} * HighRE_i + \beta_4 GDPGrowth_{it-1} + \beta_5 GDPGrowth_{it-1} * HighRE_i + \gamma BankControl_{it-1} + \eta BankControl_{it-1} * HighRE_i + YearFE_t + CountryFE_i + BankFE_i + \varepsilon_{it} \quad (1)$$

The vector Y indicates the dependent variables, ROE and ROA of each bank in year t. All variables are winsorized at 5 per cent. The equation includes HighRE, a dummy variable equal to 1 if the country is included in the HighRE group, RePriceGrowth, the residential property real price growth rate, and GDPGrowth, the GDP growth rate of each country (retrieved from Eurostat), both lagged one year. To take into account the potential difference across groups in the sensitiveness of bank profitability to macroeconomic conditions, we interact both of them with the dummy HighRE.

We control for banks' characteristics at year t-1 by including a vector of bank controls: Size (logarithm of the total assets), Loans (ratio of loans to total assets), Loans_ Impair (ratio of impaired loans to total assets), Deposits (ratio of total deposits to total assets), and Tier1 (ratio of tier 1 capital to total assets). These variables are also interacted with HighRE. In addition, we add year, country, and bank fixed effects. This methodology is in line with that adopted in the related literature.[9]

Tables A.3 and A.4 in the Methodological Appendix present summary statistics of variables for HighRE and LowRE countries in the periods 2006-18 and 2010-18.

3. Results

Table 1 presents the results of Equation (1) for ROE. Consistent with the literature, we observe that bank profitability is positively correlated with the property price growth rate, as suggested by the positive and significant coefficients in all model specifications. The coefficient of the interaction between the growth of the real estate price index and the dummy variable HighRE is not statistically significant, highlighting how the intensity of this relationship does not differ between HighRE and LowRE countries. In columns (4)-(7) the coefficient of the real estate price growth has a similar magnitude, signalling a rather stable sensitivity of ROE to this variable after including GDP growth, bank controls, as well as country and year-fixed effects. These results highlight that on average the responsiveness of bank profitability to real estate market conditions follows a common pattern across financial institutions and over time as bank, country, and time fixed effects do not significantly change the price index coefficient.

[9] See E.P. Davis and H. Zhu, 'Commercial property prices and bank performance', *Quarterly Review of Economics and Finance*, 49, 1341–1359, 2009.

Table 1: Property price growth and ROE (Baseline model)

Dependent variable: ROE	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HighRE	1.869***	1.747***	1.443***	-	-	-	-
	(0.000)	(0.001)	(0.001)				
RePriceGrowth	-	0.479***	0.410***	0.396***	0.325***	0.338***	0.338***
		(0.000)	(0.000)	(0.000)	(0.002)	(0.001)	(0.000)
HighRE*RePriceGrowth	-	-0.002	0.041	-0.077	-0.061	-0.060	-0.124
		(0.983)	(0.719)	(0.499)	(0.584)	(0.605)	(0.247)
GDPGrowth	-	0.296*	0.752***	0.504*	0.322	0.359	0.471*
		(0.072)	(0.001)	(0.061)	(0.240)	(0.193)	(0.055)
HighRE*GDPGrowth	-	-0.462**	-0.386**	0.020	0.027	-0.031	-0.047
		(0.014)	(0.043)	(0.921)	(0.897)	(0.883)	(0.806)
Year FE	-	-	Y	Y	Y	Y	Y
Country FE	-	-	-	Y	Y	Y	Y
BankControl	-	-	-	-	Y	Y	Y
BankControl*HighRE	-	-	-	-	-	Y	Y
BankFE	-	-	-	-	-	-	Y
Observations	3718	3066	3066	2776	2544	2544	2535
Adjusted R-squared	0.006	0.074	0.091	0.151	0.219	0.229	0.462

The dependent variable is the ROE of each bank in the year t. HighRE is a dummy variable equal to 1 if the country is included in the HighRE group. RePriceGrowth is the residential property real price growth rate in the year t-1. GDPGrowth is the GDP growth rate of each country in the year t-1. Robust p-values in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

We use the coefficients reported in column (7) to quantify the impact of developments in property prices on the profitability gap between LowRE and HighRE countries in the period considered. First, we estimate the marginal effect of property price growth rates on profitability by multiplying the average of the real estate price growth rates in the period from 2010 to 2018 (reported in Table A.4) by the relative regression coefficients (presented in column (7) of Table 1), respectively for LowRE and HighRE countries. Then we calculate the difference between the two marginal effects on profitability and we compare this value with the difference between the average ROE of the two groups of countries in the same period. Based on our estimates, the growth in property prices accounts for 118 basis points of the profitability gap between HighRE and LowRE countries in this period (out of a difference of 491 basis points in ROE).[10]

As a counterfactual exercise, we then estimate how the average ROE in 2010-18 for each country would have changed if the yearly real estate price growth between 2010 and 2018 had been equal to that of the median country over the period (i.e. Portugal, 1.8 per cent in real terms). Our baseline prediction (named ROEPredictBaseline in Figure 2.a) makes use of the coefficients of LowRE and HighRE countries reported in column (7) of Table 1. We also formulate an alternative prediction

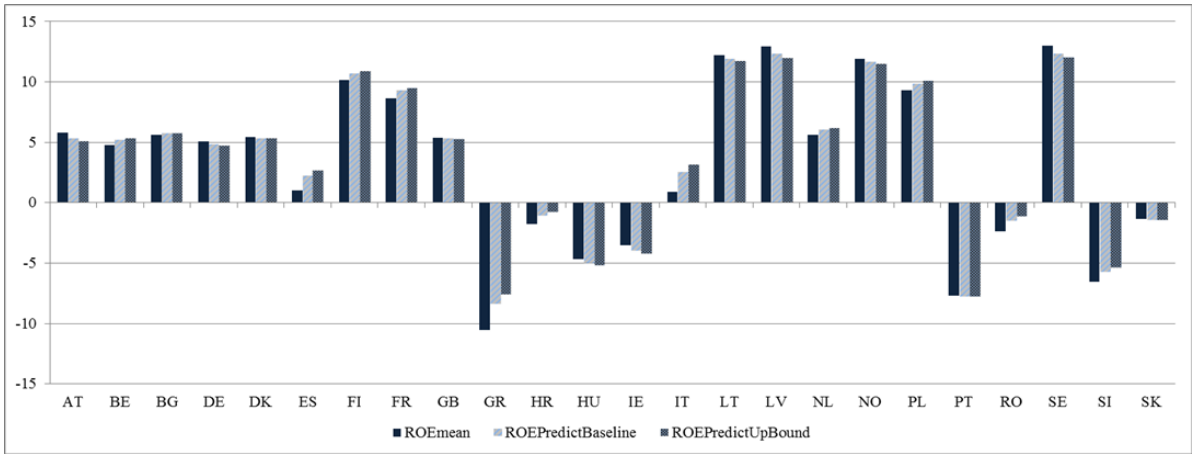
[10] Using the reported estimates: [2.77*(0.34-0.12)]-(-1.67*0.34)=1.18.

(ROEPredictUpBound) based on the estimates from a less conservative model adopting a two-step procedure. In the first step, we regress GDP growth on the real estate price index. Then we replace GDP growth in Equation (1) with the residuals of the first step regression. This model indicates an upper bound of the examined effect because the coefficient associated with real estate price growth now also absorbs the impact of GDP changes on real estate prices. The results of this model, presented in Table A.5, show that the real estate price index has a sizeable impact in all model specifications, larger than that estimated in Table 1, and its magnitude is not significantly affected by the inclusion of our control variables. We employ the coefficients reported in column (7) of Table A.5 to calculate an upper bound of the predicted average ROE in the 2010-18 period.

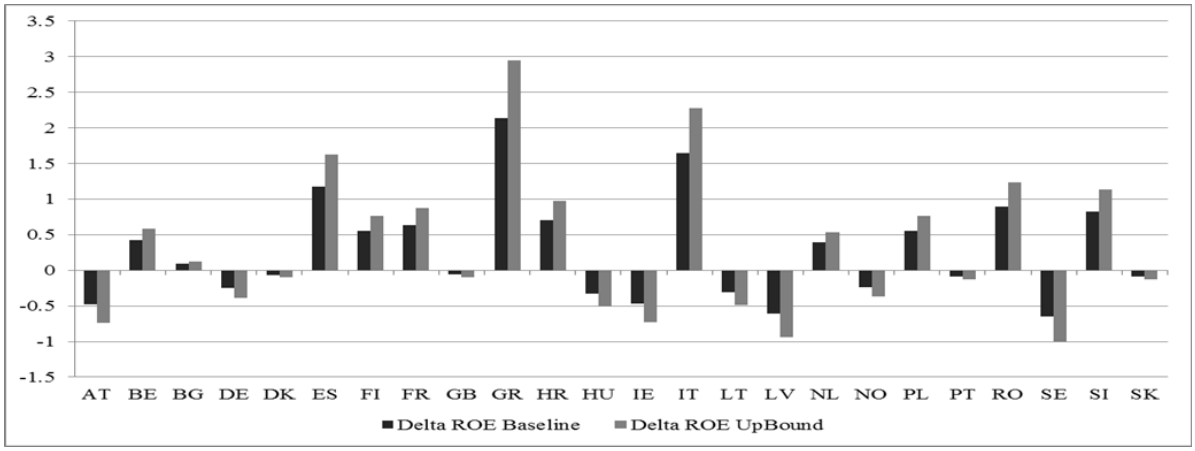
Figure 2 shows the results of this analysis. Figure 2.a presents the average ROE observed in 2010-18 and the predicted value of ROE estimated with less (ROEPredictUpBound) or more (ROEPredictBaseline) conservative assumptions. Figure 2.b shows the predicted changes in the average ROE obtained by estimating both models.

Figure 2: Predicted average ROE between 2010 and 2018

a) Predicted avg. ROE in 2010-18 using the yearly real estate price growth of the median country



b) Predicted changes in avg. ROE in 2010-18 using the yearly real estate price growth of the median country



Source: own calculations based on SNL Financial and BIS data.

In Italy, average ROE in 2010-18 would have been between 1.6 and 2.3 percentage points higher if real estate prices had grown at the same pace on average as the median European country. By comparison, the same exercise applied to Swedish banks leads to a ROE that is lower by between 0.6 and 1 percentage point.

Qualitatively similar results are obtained by examining differences in terms of ROA (Table A.6). The estimates indicate that ROA and real estate market dynamics are significantly correlated and this relationship is not driven by bank and country characteristics. The growth in property prices accounts for 6 basis points of the difference in ROA between HighRE and LowRE countries in 2010-18 (40 basis points).[11]

4. Macroprudential risks

Despite the benefits in terms of banks' profitability, an overly rapid increase in real estate prices may entail the buildup of financial stability risks. Due to the significant sensitivity of bank lending to the real estate cycle, banks may suffer significant losses during the downward phase of the cycle,[12] as experienced after the 2008 collapse of real estate prices in the United States and in several European countries. In this sense, it is interesting to note that the ESRB warns that the residential real estate sector of most of the HighRE countries poses a medium or high macroprudential risk.

Finally, we explore whether the different real estate market conditions between banks established in HighRE and LowRE countries are associated with a difference in capitalization among banks. The underlying rationale of this exercise is to test whether banks in HighRE countries have partly set aside the profitability gains from a booming real estate market to create an additional capital buffer to mitigate the procyclicality of the capital position in the event of an inversion of the real estate cycle.

We replicate the analysis by examining the capital ratios of the banks included in the sample. For each bank we estimate the variable Capital Ratio, which is the ratio of total regulatory capital to risk-weighted assets of each bank in year t.[13]

Figure 3.a shows that the average bank capitalization in HighRE countries is higher than in LowRE countries over the period examined. The bank-level analysis suggests a potential positive correlation between the growth rate of residential property prices and the capital ratios of banks for both HighRE and LowRE countries (Figure 3.b), but the correlation seems spurious. Indeed, Table 2 presents the results of Equation (1) estimated by adopting Capital Ratio as the dependent variable,[14] and it shows that the relationship between residential property prices and bank capitalization is weak and not significant in the period examined once the control variables have been included.

[11] In unreported analyses we verify that our results hold by estimating Equation (1) for ROE and ROA in a weighted regression framework. The weights used are the ratio of the total assets of each bank to those of the banks established in the same country.

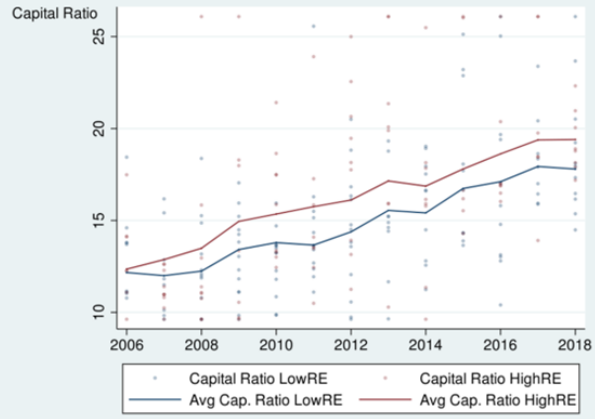
[12] See E.P. Davis and H. Zhu, 'Commercial property prices and bank performance', *Quarterly Review of Economics and Finance,* 49, 1341–1359, 2009; C. Hott, 'Lending behavior and real estate prices', *Journal of Banking and Finance*, 35, 2429–2442, 2011; M. Koetter and T. Poghosyan, 'Real estate prices and bank stability', *Journal of Banking and Finance*, 34, 1129–1138, 2010.

[13] The variable Capital Ratio is winsorized at 5 per cent.

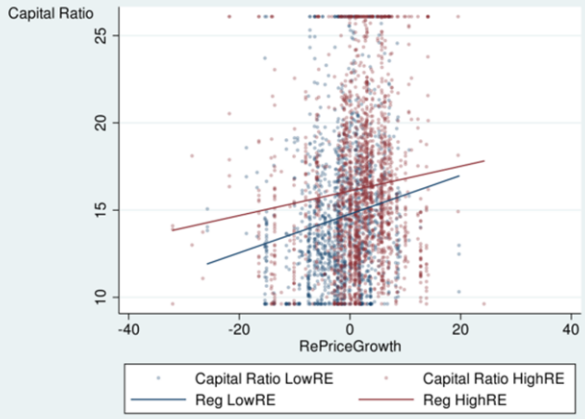
[14] In this model we exclude Tier1 from the vector of bank control variables.

Figure 3: Residential property prices and bank capitalization

a) Average Capital Ratio



b) Price growth and Capital Ratio



Source: own calculations based on SNL Financial.

Table 2: Property price growth and Capital Ratio

Dependent variable: Capital Ratio	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HighRE	1.680***	1.333***	1.417***	-	-	-	-
	(0.000)	(0.000)	(0.000)				
RePriceGrowth	-	0.084***	0.031	0.024	0.011	0.012	0.004
		(0.002)	(0.205)	(0.348)	(0.676)	(0.636)	(0.816)
HighRE*RePriceGrowth	-	-0.009	-0.090***	-0.080**	-0.067**	-0.072**	-0.039
		(0.784)	(0.003)	(0.014)	(0.032)	(0.024)	(0.115)
GDPGrowth	-	0.115**	0.150***	0.089	0.080	0.084	0.115**
		(0.014)	(0.004)	(0.165)	(0.211)	(0.186)	(0.019)
HighRE*GDPGrowth	-	-0.028	-0.015	-0.001	-0.011	-0.019	-0.035
		(0.653)	(0.793)	(0.990)	(0.858)	(0.763)	(0.425)
Year FE	-	-	Y	Y	Y	Y	Y
Country FE	-	-	-	Y	Y	Y	Y
BankControl	-	-	-	-	Y	Y	Y
BankControl*HighRE	-	-	-	-	-	Y	Y
BankFE	-	-	-	-	-	-	Y
Observations	3449	2914	2914	2627	2563	2563	2551
Adjusted R-squared	0.037	0.056	0.212	0.302	0.337	0.339	0.699

The dependent variable is the capital ratio of each bank in the year t. HighRE is a dummy variable equal to 1 if the country is included in the HighRE group. RePriceGrowth is the residential property real price growth rate in the year t-1. GDPGrowth is the GDP growth rate of each country in the year t-1. Tier1 is excluded from the vector of bank control variables. Robust p-values in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

The inclusion of year-fixed effects controls for common factors, notably the regulatory environment, and absorbs the impact of real estate market dynamics on bank capitalization. In other words, the increase in the capital ratio observed is perhaps related to the gradual phase-in of more stringent capital requirements rather than the real estate cycle. Consequently, this analysis suggests that different developments in property prices explain most of the profitability gap between LowRE and HighRE

countries, while they are not a main driver of the heterogeneity in capitalization among the banks examined.[15]

Financial institutions in countries that recently experienced a booming real estate market may also be more vulnerable to an inversion of the real estate cycle. However, despite the profitability gains obtained, their capital position has not concomitantly increased. In line with the ESRB report, this evidence supports the importance of macroprudential actions to mitigate the potential threat to financial stability and to the real economy associated with overheated domestic real estate sectors.

Methodological Appendix

Table A.1: HighRE and LowRE countries

Country	Property price growth after 2010	Group
GR	-34.72	LowRE
CY	-24.26	Dropped
IT	-23.05	LowRE
ES	-21.40	LowRE
RO	-12.26	LowRE
HR	-8.45	LowRE
SI	-7.61	LowRE
PL	-7.30	LowRE
NL	-5.20	LowRE
FR	-4.19	LowRE
FI	-1.68	LowRE
BE	2.24	LowRE
PT	4.79	LowRE
BG	7.04	LowRE
SK	9.66	LowRE
DK	11.86	HighRE
GB	14.79	HighRE
CZ	15.23	No Observations
HU	18.26	HighRE
IE	19.95	HighRE
LT	21.09	HighRE
DE	21.13	HighRE
MT	21.49	Dropped
NO	24.72	HighRE
LU	26.08	Dropped
AT	28.69	HighRE
LV	30.02	HighRE
SE	43.00	HighRE
EE	56.66	No Observations

[15] In unreported analyses we obtain qualitatively similar results by replacing the capital ratio with the CET1 ratio and the Tier1 ratio.

Table A.2: Banks included in the sample for each country

Group	Country	Number of Banks	Num. of Bank-Year Obs.
LowRE	BE	7	91
	BG	4	52
	ES	51	663
	FI	4	54
	FR	8	104
	GR	12	156
	HR	9	117
	IT	38	494
	NL	12	156
	PL	10	130
	PT	7	91
	RO	3	39
	SI	3	39
	SK	1	13
Total LowRE		**169**	**2199**
HighRE	AT	22	286
	DE	59	767
	DK	35	455
	GB	24	312
	HU	3	39
	IE	8	104
	LT	4	52
	LV	4	52
	NO	28	364
	SE	7	89
Total HighRE		**194**	**2520**
Overall Sample		**363**	**4719**

Table A.3: Summary statistics of variables for HighRE and LowRE countries in 2006-18

Variable	HighRE countries				LowRE countries			
	N.	Mean	Median	Std. Dev.	N.	Mean	Median	Std. Dev.
ROE	2164	6.73	7.83	10.38	1554	4.86	7.39	12.97
ROA	2165	0.52	0.49	0.75	1555	0.38	0.48	0.94
Capital Ratio	1998	16.19	15.60	4.28	1451	14.51	13.60	4.15
RePriceGrowth	2510	1.64	2.26	6.03	2094	-1.30	-1.25	5.97
GDPGrowth	2326	1.44	1.70	2.84	2030	0.69	1.10	2.78
Size	2168	16.25	16.12	2.04	1557	16.94	16.88	2.06
Loans	2158	62.93	65.93	17.88	1557	61.70	64.90	17.05
Loans_Impair	2123	0.40	0.16	0.91	1549	0.88	0.40	5.78
Deposits	2166	53.63	56.30	22.10	1555	56.34	56.84	19.33
Tier1	2013	6.94	6.30	3.68	1446	6.63	5.96	3.36

Table A.4: Summary statistics of variables for HighRE and LowRE countries in 2010-18

Variable	HighRE countries				LowRE countries			
	N.	Mean	Median	Std. Dev.	N.	Mean	Median	Std. Dev.
ROE	1298	6.47	7.56	9.32	849	1.56	5.31	13.80
ROA	1299	0.54	0.52	0.71	849	0.14	0.35	1.00
Capital Ratio	1252	17.53	16.81	4.07	815	15.87	15.09	4.25
RePriceGrowth	1550	2.77	2.79	4.20	1351	-1.67	-1.07	6.04
GDPGrowth	1550	2.05	2.00	2.07	1354	0.88	1.40	2.37
Size	1302	16.32	16.18	1.98	851	17.10	17.08	2.10
Loans	1301	63.81	67.10	17.27	851	59.49	62.10	16.78
Loans_Impair	1292	0.33	0.12	0.84	848	1.16	0.47	7.77
Deposits	1301	56.74	61.22	21.84	851	58.21	58.94	19.41
Tier1	1260	7.33	6.77	3.73	816	6.82	6.35	3.19

Table A.5: Property price growth and ROE (upper bound model)

Dependent variable: ROE	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HighRE	1.869***	1.243***	1.022**	-	-	-	-
	(0.000)	(0.006)	(0.028)				
RePriceGrowth	-	0.552***	0.597***	0.521***	0.405***	0.428***	0.455***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HighRE*RePriceGrowth	-	-0.117	-0.055	-0.072	-0.054	-0.068	-0.136
		(0.254)	(0.599)	(0.480)	(0.588)	(0.531)	(0.177)
Residuals	-	0.296*	0.752***	0.504*	0.322	0.359	0.471*
		(0.072)	(0.001)	(0.061)	(0.240)	(0.193)	(0.055)
HighRE*Residuals	-	-0.462**	-0.386**	0.020	0.027	-0.031	-0.047
		(0.014)	(0.043)	(0.921)	(0.897)	(0.883)	(0.806)
Year FE	-	-	Y	Y	Y	Y	Y
Country FE	-	-	-	Y	Y	Y	Y
BankControl	-	-	-	-	Y	Y	Y
BankControl*HighRE	-	-	-	-	-	Y	Y
BankFE	-	-	-	-	-	-	Y
Observations	3718	3066	3066	2776	2544	2544	2535
Adjusted R-squared	0.006	0.074	0.091	0.151	0.219	0.229	0.462

The dependent variable is the ROE of each bank in the year t. HighRE is a dummy variable equal to 1 if the country is included in the HighRE group. RePriceGrowth is the residential property real price growth rate in the year t-1. The variable Residuals represents the residuals of the regression of GDPGrowth on RePriceGrowth. Robust p-values in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table A.6: Property price growth and ROA

Dependent variable: ROA	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HighRE	0.137***	0.150***	0.134***	-	-	-	-
	(0.000)	(0.000)	(0.000)				
RePriceGrowth	-	0.034***	0.024***	0.027***	0.021***	0.022***	0.022***
		(0.000)	(0.002)	(0.000)	(0.004)	(0.004)	(0.002)
HighRE*RePriceGrowth	-	-0.002	0.001	-0.004	-0.003	-0.003	-0.009
		(0.818)	(0.960)	(0.599)	(0.743)	(0.760)	(0.236)
GDPGrowth	-	0.040***	0.079***	0.059***	0.042***	0.044***	0.056***
		(0.000)	(0.000)	(0.000)	(0.009)	(0.007)	(0.000)
HighRE*GDPGrowth	-	-0.043***	-0.037***	-0.006	-0.002	-0.005	-0.011
		(0.001)	(0.008)	(0.663)	(0.860)	(0.711)	(0.340)
Year FE	-	-	Y	Y	Y	Y	Y
Country FE	-	-	-	Y	Y	Y	Y
BankControl	-	-	-	-	Y	Y	Y
BankControl*HighRE	-	-	-	-	-	Y	Y
BankFE	-	-	-	-	-	-	Y
Observations	3720	3068	3068	2778	2546	2546	2537
Adjusted R-squared	0.006	0.086	0.112	0.168	0.270	0.279	0.511

The dependent variable is the ROA of each bank in the year t. HighRE is a dummy variable equal to 1 if the country is included in the HighRE group. RePriceGrowth is the residential property real price growth rate in the year t-1. GDPGrowth is the GDP growth rate of each country in the year t-1. Robust p-values in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.