THE IMPACT OF SECTORAL MACROPRUDENTIAL CAPITAL REQUIREMENTS ON MORTGAGE LENDING: EVIDENCE FROM THE BELGIAN RISK WEIGHT ADD-ON*

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Abstract: In December 2013 the National Bank of Belgium introduced a sectoral capital requirement aimed at strengthening the resilience of Belgian banks against adverse developments in the real estate market. This paper assesses the impact of this macroprudential measure on mortgage lending. Our results indicate that the sectoral capital requirement on average did not affect IRB banks' mortgage rates and mortgage loan growth. However, the findings do indicate that IRB banks may have reacted heterogeneously to the introduction of the measure: capital-constrained banks with more exposures to the segment targeted by the additional requirement tended to respond stronger in terms of mortgage lending.

Keywords: Systemic risk, macroprudential policy, bank capital requirements, real estate.

JEL codes: E44, E58, G21, G28

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Introduction

In the Basel framework, capital requirements are a key tool to increase the resilience of the banking sector. The accumulation of macroprudential capital buffers on top of microprudential capital requirements makes banks more resilient to negative shocks, thereby limiting the impact of downturns on the financial system and on the broader economy. Macroprudential capital requirements, while sharing the ultimate objective of safeguarding the stability of the financial system, can either have a broad focus or can be designed to shield the banking sector from risks emerging from specific sectoral exposures.

Due to the detriment that systemic risks stemming from excessive developments in real estate markets can exert on financial stability, several European countries have in recent years activated capital-based macroprudential instruments targeting banks' real estate portfolios. In December 2013, the National Bank of Belgium introduced a macroprudential measure aimed at strengthening the resilience of Belgian banks against adverse developments in the real estate market. The measure imposed a 5 percentage point add-on to the RW on Belgian residential real estate exposures for banks calculating regulatory capital requirements through an internal ratings-based (IRB) approach.

Using bank-level data on mortgage loan portfolios, mortgage loan rates, regulatory capital requirements and additional bank balance sheet characteristics, this paper aims at quantifying the impact of the introduction of the macroprudential add-on to RW for domestic residential real estate exposures in Belgium on the pricing and growth of mortgage loans granted by Belgian IRB banks. To our knowledge, this paper is among the first to provide empirical evidence on the impact of introducing a sectoral macroprudential capital requirement on lending rates and growth. Documenting the impact of such macroprudential requirements is crucial for gaining experience with these instruments and for improving the effectiveness of macroprudential policies in general.

The Belgian macroprudential measure

The Basel Accord foresees two possible methods for calculating capital requirements for retail mortgage loan exposures. The standardised (STA) approach applies a fixed RW (35 percent) to all exposures secured by mortgages on residential property, which is then used as a basis for computing the amount of capital required under Pillar I for this exposure class. In contrast, the IRB approach allows banks to use internal models for estimating the key parameters (notably the probability of default and the loss given default) used as input in the Basel RW function for the calculation of the RW to be applied to the bank's mortgage loan exposure.

Against a background of rising vulnerabilities from the Belgian real estate market and banks' mortgage loan portfolios, the National Bank of Belgium introduced in December 2013 a macroprudential measure consisting in a 5 percentage point add-on to the RW on Belgian residential real estate exposures for banks calculating regulatory capital requirements through an IRB approach.[1]

The macroprudential measure was primarily aimed at increasing banks' resilience against potential losses stemming from less buoyant conditions on the residential real estate market. The immediate effect of the measure in terms of increased capital to absorb potential losses is readily measurable: as a consequence of the policy, the average RW on mortgage loan exposures used as input for calculating the capital requirements of Belgian IRB banks increased from 10 percent to 15 percent. At the sectoral level, the add-on resulted in a total additional capital requirement for all IRB banks in the sample of EUR 820 million (as of January 2014), representing in aggregate about 1.8 percent of these banks' outstanding Tier 1 capital.

The objective of the add-on was not to curb the supply of credit per se. Yet, to the extent that banks perceive higher capital requirements as increasing their cost of funding (and/or as decreasing their voluntary management buffer above minimum requirements below an internal or external target), they may pass on the cost of the additional capital requirement to their customers.

Empirical specification

To assess the impact of the macroprudential RW add-on on mortgage lending, we estimate the following equation:

$$Y_{b,t} = \alpha + \beta_{b,t}\, I(add\text{-}on_t) \times I(irb_t) + \gamma_{b,t} I(add\text{-}on_t) + \delta_{b,t} I(irb_t) + \theta X_{b,t-1} + FE_b + FE_t + \varepsilon_{b,t} \quad (1)$$

where $Y_{b,t}$ denotes either the mortgage loan rate charged by bank b in month t or the growth rate of bank b's mortgage loan stock over the next 12 months relative to the level observed in month t. $I(add\text{-}on_t)$ is an indicator variable that equals one during the months in which the RW add-on is in place (from December 2013 onwards) and zero otherwise, $I(irb_t)$ is an indicator variable that equals one for banks that use the IRB approach for determining the risk weights on mortgages and zero otherwise, $X_{b,t-1}$ is a vector of bank-specific control variables, FE_b and FE_t denote bank and time fixed effects, respectively, and $\varepsilon_{b,t}$ is a normally distributed error term.

[1] The choice to operate through RW rather than setting a higher regulatory capital requirement stems from restrictions in European legal framework (the Capital Requirements Regulation and Directive, CRR/CRD IV) laying out the prudential rules for the EU banking system. The scope of the measure is limited to IRB banks for two reasons. First, in Belgium, the STA approach is mainly used by small credit institutions, covering a small share of total mortgage loans held by the Belgian banking sector. Second, STA banks' RW for mortgage loan exposures are substantially larger than those of IRB banks.

The impact of the RW add-on on mortgage lending is captured by the difference-in-differences estimator $\beta_{b,t}$, which is defined as

$$\beta_{b,t} = \beta_0 + \beta_1 Sens_{b,t-1} \quad (2)$$

where $Sens_{b,t-1}$ is a subset of the vector of bank specific control variables $X_{b,t-1}$that we interact with $I(add\text{-}on_t) \times I(irb_t)$ to measure differences in sensitivity of IRB banks to the RW add-on. To control for a potential change in the relationship between $Y_{b,t}$ and $Sens_{b,t-1}$ for both IRB and STA banks after the introduction of the macroprudential measure and for IRB banks having a sensitivity of $Y_{b,t}$ to $Sens_{b,t-1}$ different from that for STA banks at all times, $\gamma_{b,t}$ and $\delta_{b,t}$ follow a similar specification. It should be noted that the constant terms γ_0 and δ_0 are not identified as a consequence of the inclusion of time and bank fixed effects, respectively.

Equation (1) can be rewritten as

$$Y_{b,t} = \alpha + \beta_0\, I(add\text{-}on_t) \times I(irb_t) + \beta_1\ I(add\text{-}on_t) \times I(irb_t) \times Sens_{b,t-1} + \gamma_1 I(add\text{-}on_t) \times Sens_{b,t-1} + \delta_1 I(irb_t) \times Sens_{b,t-1} + \theta X_{b,t-1} + FE_b + FE_t + \varepsilon_{b,t} \quad (3)$$

The parameter $\beta_{b,t} = \beta_0$ is obtained when the add-on indicator is not interacted with any sensitivity variables $Sens_{b,t-1}$ and therefore captures the average impact of the add-on on the IRB banks in the sample. When the variables in $Sens_{b,t-1}$ are included, $\beta_{b,t}$ equals the expression in equation (2), which allows us to quantify any heterogeneous reactions of mortgage lending across IRB banks.

Data

Our analysis relies on a sample of 14 Belgian banks, of which 8 banks use the IRB approach for the calculation of regulatory capital requirement (and are therefore directly affected by the macroprudential measure) and 6 banks use the STA approach. We have data for every month between January 2012 and December 2015, i.e. about two years before and after the introduction of the macroprudential measure in December 2013.

The first dependent variable that we consider is the interest rate applied to new mortgage loans to households in Belgium. The data on mortgage rates are obtained from the National Bank of Belgium's MFI Interest Rate (MIR) statistics and cover four repricing segments: loans with repricing period up to 1 year, loans with repricing period between 1 and 5 years, loans with repricing period between 5 and 10 years, and loans with repricing period longer than 10 years. The MIR data contain monthly observations of individual banks' average mortgage rates in each of the four repricing segments. We define the dependent variable as the weighted average mortgage loan rate in basis points, whereby the weights correspond to the volume of new loans per bank and per period within a

given repricing segment. Table 1 shows that the mortgage rates on average are almost 20 basis points lower for IRB banks than for STA banks, but the dispersion around the mean is large for both groups of banks.

Our second dependent variable is the growth rate of a bank's mortgage loan stock over the next 12 months. The data used to compute the mortgage growth rate is obtained from the National Bank of Belgium's supervisory statistics.[2] Table 1 indicates that the growth of IRB banks' mortgage loan portfolios has been stronger on average than that of STA banks during the sample period. However, like for mortgage rates, the dispersion around the means is large.

<INSERT TABLE 1 HERE>

To account for differences in mortgage rates and mortgage loan growth across banks and over time, we control for bank and time fixed effects in the sample. In addition, we consider a broad set of control variables, which we obtain from Datastream and supervisory reporting (see Table 1).

The last three control variables in Table 1 are (also) used to assess to what extent IRB banks' response to the macroprudential measure in terms of mortgage loan supply and pricing differs according to specific characteristics of IRB banks. In particular, the share of Belgian mortgage loan exposures in the banks' total balance sheet and the additional capital required by the measure as a share of RWA capture the relative degree to which IRB banks are affected in terms of additional capital requirements following the increase in the risk weight.[3] The capital buffer relative to RWA variable captures the degree to which the affected banks have room to absorb this additional capital requirement by reducing the voluntary management buffer they hold above minimum regulatory requirements. In our analysis below, we transform these last two variables into an indicator variable that equals one if the observation belongs to the upper quartile of the variable's distribution (for the sample of IRB banks after the introduction of the measure) and zero otherwise.

Results

Table 2 presents the results of model specifications both without and with sensitivity variables. In addition, they allow us to investigate whether the impact of the RW add-on is more pronounced in one of the two years after its introduction.

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[2] The mortgage growth rate is calculated as $100 \times \frac{\sum_{i=1}^{12}(S_{b,t+i} - S_{b,t+i-1} - (reclassifications_{b,t+i} + write\text{-}offs_{b,t+i}))}{S_{b,t}}$, where $S_{b,t}$ is the outstanding amount of loans to Belgian households for house purchase corrected for securitisations in month *t*. In contrast to the simple annual percentage change of the mortgage loan stock, this approach allows accounting for reclassifications and write-offs.

[3] The additional capital required by the measures is obtained by multiplying the amount of Belgian mortgage loans on the balance sheet with the bank's Tier 1 capital requirement and the change in the mortgage loan RW introduced by the add-on (0.05).

The second column of the table shows that the RW add-on on average did not have a significant impact on mortgage rates. However, the third column indicates that IRB banks with a larger share of mortgage loans to Belgian households in their balance sheet did increase mortgage rates more (in relative terms) in the first year after the introduction of the measure and charged relatively lower rates in the second year. In a simulation of this model for the individual IRB banks in our sample, the impact of the RW add-on on the mortgage rate ranges from -7 basis points to +21 basis points across individual IRB banks in the first year after the introduction, with the lower bound of the range not being statistically significantly different from zero. The range of impacts across individual IRB banks narrows in the second year, with values going from -12 basis points to +12 basis points. Neither the lower nor the upper bound of this range is significantly different from zero.

<INSERT TABLE 2 HERE>

Like for mortgage rates, the first column of the rightmost section of Table 2 shows that the RW add-on on average did not affect mortgage loan growth. The remaining three columns of the rightmost section show that the heterogeneous reactions across IRB banks in terms of curbing mortgage loan growth are only present in the first year after the introduction of the measure: IRB banks having a larger share of affected mortgage loans in their balance sheet and facing a relatively larger additional capital requirement due to the RW add-on reduce mortgage lending growth relatively more, and IRB banks with a larger voluntary management capital buffer exhibit stronger mortgage loan growth after the introduction of the measure. A simulation of the impact across individual IRB banks according to the model based on the share of mortgage in total assets shows that the impact of the RW add-on on mortgage loan growth ranges from -5.96 percentage points to +4.13 percentage points in the first year after the introduction. While the latter value is not statistically significant, the above findings suggest that there may have been a shift from IRB banks with a large focus on mortgage loans to more diversified IRB banks. These effects are temporary, however, and no longer significant in the second year after the introduction.

Conclusion

The results in this paper suggest that banks may react in a heterogeneous way to sectoral macroprudential capital requirements. In particular, banks that are relatively more affected by the additional requirement and that are more capital-constrained tend to respond stronger in terms of mortgage lending. However, the impact of the macroprudential measure on mortgage lending is overall limited, both in terms of statistical and economic significance. This raises the question on what should be the calibration of sectoral capital requirements if they were intended to have material impact on credit supply. More research is needed on assessing whether sectoral capital

requirements could be effective in curbing credit supply, or whether instead, alternative measures, such as borrower-based instruments (e.g. LTV caps) would be needed to achieve this objective.

Tables

Table 1 - Summary statistics

	IRB banks					STA banks				
Variable	Obs.	Mean	Std. Dev.	Min.	Max.	Obs.	Mean	Std. Dev.	Min.	Max.
Mortgage rate	343	317.02	64.21	186.07	463.11	207	334.19	144.58	168.65	995.00
Mortgage loan growth	336	5.20	3.92	-4.10	17.17	195	3.04	11.54	-14.95	28.51
Swap rate	343	153.81	48.18	48.52	268.62	207	150.05	58.05	13.7	265.99
Repricing segment 1	343	6.79	7.47	0.00	36.59	207	11.66	17.49	0.00	100
Repricing segment 2	343	20.74	18.38	0.21	82.08	207	21.92	25.79	0.00	100
Repricing segment 3	343	17.71	16.88	0.17	65.29	207	10.96	13.14	0.00	100
Repricing segment 4	343	54.76	30.38	0.00	97.76	207	55.47	31.04	0.00	100
Total assets (EUR bill)	343	99.76	77.00	17.42	292.47	207	3.58	2.70	0.47	9.99
Loan to deposit ratio	343	84.42	12.21	64.78	107.57	207	85.45	26.50	18.86	178.63
Mortgage loans to total assets	343	28.35	15.46	12.03	57.64	207	30.55	17.73	7.86	63.05
Additional capital to RWA	198	0.67	0.53	0.16	2.04	0				
Capital buffer to RWA	198	3.39	2.27	-2.43	11.33	0				

Source: NBB MIR statistics, NBB supervisory statistics (Schema A, COREP), NBB SREP, Datastream.
Notes: The swap rate proxies for the banks' funding cost corresponding to the repricing profile of their new mortgage production. The four repricing segments are the following: loans with repricing period up to 1 year, loans with repricing period between 1 and 5 years, loans with repricing period between 5 and 10 years, and loans with repricing period longer than 10 years. The 1 year swap rate is assigned to mortgage loans with repricing period up to 1 year, the 5 year swap rate to mortgage loans with repricing period between 1 and 5 years, the 10 year swap rate to mortgage loans with repricing period between 5 and 10 years, and the 20 year swap rate to mortgage loans with repricing period longer than 10 years. Like the average mortgage loan rate, the swap rate is expressed in basis points and amounts to the volume-weighted average swap rate across the four repricing segments in a bank's new mortgage loan production.We only show summary statistics for Additional capital to RWA for IRB banks after the introduction of the measure, as the additional capital requirement implied by the RW add-on is strictly positive only for IRB banks from December 2013 onwards and zero otherwise. The number of observations for Capital buffer to RWA is lower due to data availability.

Table 2 - Impact of the RW add-on on mortgage lending: timing effects

	Mortgage rate				Mortgage loan growth			
		Mortgage loans to total assets	Capital amount to RWA	Capital buffer to RWA		Mortgage to total assets	Capital amount to RWA	Capital buffer to RWA
$I(add\text{-}on) \times I(irb) \times I(2014)$	4.094	-15.286	3.698	4.913	0.470	7.345	1.455	-0.355
	(9.983)	(10.605)	(10.495)	(9.798)	(3.139)	(4.386)	(2.891)	(3.032)
$I(add\text{-}on) \times I(irb) \times I(2015)$	6.619	19.737*	7.201	6.024	0.889	4.921	1.196	0.890
	(6.050)	(9.267)	(6.109)	(5.441)	(2.550)	(6.933)	(2.670)	(2.655)
$I(add\text{-}on) \times I(irb) \times I(2014) \times Sens$		0.651**	1.143	-3.083		-0.240**	-3.135*	3.330*
		(0.241)	(4.184)	(3.241)		(0.086)	(1.502)	(1.712)
$I(add\text{-}on) \times I(irb) \times I(2015) \times Sens$		-0.566**	-2.471	2.522		-0.135	-0.754	-0.454
		(0.252)	(3.504)	(6.173)		(0.164)	(1.523)	(1.382)
$I(add\text{-}on)) \times I(2014) \times Sens$		-0.994***				0.203**		
		(0.119)				(0.072)		
$I(add\text{-}on)) \times I(2015) \times Sens$		0.064				0.169		
		(0.187)				(0.149)		
$I(irb) \times Sens$		0.913				-0.079		
		(0.796)				(0.428)		
Mortgage loans to total assets	1.269*	1.310*	1.294*	1.243*	-0.439**	-0.404**	-0.389*	-0.422*
	(0.608)	(0.682)	(0.649)	(0.604)	(0.200)	(0.138)	(0.203)	(0.197)
Log total assets	29.506**	33.071***	29.312**	28.440**	-13.837**	-13.437**	-12.718**	-12.609*
	(10.413)	(8.307)	(10.728)	(10.341)	(6.214)	(5.975)	(5.621)	(5.853)
Loan to deposit ratio	0.300**	0.318**	0.292**	0.296**	-0.105*	-0.127	-0.108*	-0.099*
	(0.120)	(0.129)	(0.120)	(0.123)	(0.055)	(0.096)	(0.056)	(0.054)
Swap rate	0.902***	0.888***	0.914***	0.910***	0.052	0.062	0.042	0.044
	(0.207)	(0.188)	(0.213)	(0.210)	(0.035)	(0.045)	(0.032)	(0.031)
Repricing segment 1	0.874**	0.859**	0.896**	0.892**	0.125**	0.135**	0.113**	0.110**
	(0.369)	(0.361)	(0.377)	(0.376)	(0.049)	(0.062)	(0.049)	(0.042)
Repricing segment 2	0.973**	0.940**	0.983**	0.989**	0.029	0.040	0.024	0.019
	(0.403)	(0.396)	(0.404)	(0.406)	(0.042)	(0.055)	(0.043)	(0.038)
Repricing segment 3	0.426*	0.407*	0.427*	0.429*	-0.025	-0.027	-0.021	-0.029
	(0.216)	(0.208)	(0.218)	(0.216)	(0.032)	(0.034)	(0.032)	(0.032)
Constant	-657.172**	-758.884***	-654.335**	-632.294**	347.220**	333.699**	320.631**	318.435**
	(276.058)	(223.981)	(283.567)	(273.643)	(153.202)	(147.963)	(139.556)	(144.798)
Adjusted R^2	0.882	0.889	0.881	0.882	0.295	0.354	0.316	0.319
Obs.	550	550	550	550	531	531	531	531

Notes: Standard errors are in parentheses. $I(add\text{-}on_t)$ is an indicator variable that equals one during the months in which the RW add-on is in place (from December 2013 onwards) and zero otherwise, $I(irb_t)$ is an indicator variable that equals one for banks that use the IRB approach for determining the risk weights on mortgages and zero otherwise. The variable name in the header specifies the *Sens*-variable that is interacted with the various indicator variables. All bank-specific control variables are lagged by one period. All specifications include bank and time dummies. Significance: *** 1 percent, ** 5 percent, * 10 percent.