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Regulatory Arbitrage in EU Banking: Do Business Models Matter?

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Abstract

This paper has three main aims. First, by applying the Ayadi et al. (2016) approach, we provide fresh evidence of different levels of bank risk (measured by the distance to default), considering the possible specificities across business models of European banking. Second, we try to explain those differences via the adoption of IRB and RWA dispersion, which raises the suspicion of regulatory arbitrage to a different extent across bank business models. Third, we explore whether, and to what extent, the degree of regulatory arbitrage varies across bank business models. Our findings show that one of the five business models identified by Ayadi et al. (2016) is deviant. This is the case for the banks classified as Diversified Retail type 2 which seem to be mutants and systematically engage in regulatory arbitrage. Our conclusion is that bank business models matter in risk assessment and regulation.

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Introduction

Since the onset of the financial crisis, the banking sector has been in the spotlight. The previous decades saw a frenetic race to high returns on equity coupled with excessive risk taking, encouraged by a lax monetary policy and accommodating banking regulations. This led to major changes in the way banks conduct business. A large number of banks stretched the conventional intermediating role beyond its limits and also extended their proprietary activities. This resulted in an enlarged banking sector that attached less value to financing the real economy and put systemic stability at risk. The failures of several of these banks with unsustainable business models, such as Lehman Brothers and Northern Rock to name a few, spurred contagion and contributed to the global financial and Eurozone economic crises. Crises' episodes have been widely documented[1] and have sparked a fundamental overhaul of regulation and supervision.

However, not all types of banks are facing the same challenges or responding in the same way to crises. For this purpose, the business models analysis first introduced by Ayadi et al. (2011) – in an initial attempt to identify the business models of 26 European banking institutions and to assess their performance between 2006 and 2009 – is essential to better understand the contribution of each business model to systemic risk. The main finding indicated that the retail banking model has seemingly fared better through the crisis, compared to the other identified business models, namely investment and wholesale banks. Business models analysis also proved to be relevant in order to adapt the one-size–fits-all regulatory requirements that have pertained for decades under the Basel accords and their adaptation in Europe, US and elsewhere. In their research on "*Regulation of European banks and business models: Towards a new paradigm*", Ayadi et al. (2012) shed light on the potential limitations of the Tier-1 capital ratio and, hence, the Basel II risk–weights system, as it is far from sensitive to the business model of banks, in particular European banks. The authors recommended the inclusion of a legally binding leverage ratio and confirmed that the regulatory requirements should be adapted to bank business models to ensure they are better aligned with the underlying risk profiles of banks. The authors further recommended an annual monitoring exercise of bank business models, to better understand their evolution within macro and micro economic contexts. The first pilot exercise, monitoring the business models of 147 banks, was released in December 2014 in Ayadi & De Groen (2014) to test the relevance of this approach. For the first time, a diverse dataset of banks of different sizes and ownership structures, was analyzed, based on a new analytical framework for assessing business models. The findings reinforced previous conclusions and prepared the ground for more generalizations with larger samples and more countries. Ayadi et al. (2016) extended the analysis further, to more than 2,500 banks in Europe. Their findings provide new evidence about the role of different business models and ownership structures in European banking, in terms of financial performance and operational efficiency, contribution to the real economy, contribution to systemic risk and impact on financial (in)stability. The findings confirm that shareholder value banks, which are more of an investment and wholesale nature, are more oriented towards financial performance, while tending to accelerate the accumulation of risk at a system level and being less resilient to extreme stress conditions. In turn, retail-oriented banks, which are more stakeholder-oriented

[1] See, e.g., Acharya et al. (2013), Blundell-Wignall et al. (2008), Brunnermeier (2009), Gorton & Metrick (2012), Hellwig (2009), Reinhart & Rogoff (2009).

institutions, provide a larger contribution to the real economy, while maintaining equivalent levels of financial performance and contributing, to a lesser extent, to the accumulation of risk at a system level and being more resilient to extreme stress conditions. Those findings also shed light on the continuing misalignment of the regulatory indicators, in particular the risk weights and the Tier-1 capital ratio, to the underlying risks of European banks. This means that further improvements on the risk weights ought to be made to ensure that this misalignment is dealt with.

Thus, the business model analysis contributes to a better understanding of financial and economic performance, risk behaviour, and governance at a system level. This is necessary for markets and regulators to assess the accumulation of risk for certain pre-defined financial businesses. It also serves to monitor the behaviour of banks and their contribution to systemic risk, which can be useful from both regulatory and market discipline perspectives. From a regulatory perspective, it can allow early identification of the potential of regulatory arbitrage engaged by certain types of banks and hence their mitigation (Ayadi et al., 2011 and 2012). Indeed, when a specific business model in banking tends to become a threat to systemic stability, macro-prudential regulators can act to prevent this threat through the use of appropriate mechanisms to curb excessive risk taking. From a market discipline perspective, analyzing business models requires more transparency from banks on their on-balance sheet and off-balance sheet risk exposures, especially when the multi-dimensional analyses prove to be insufficient to explain the behavioral change of individual banks within the same business model.

Banks may indulge in regulatory arbitrage to reduce the absorption of capital relative to their activities. Worries over this gained attention when evidence mounted of sizable dispersion in Risk Weighted Assets (RWAs) across otherwise similar banks. Regulatory arbitrage could jeopardize the effectiveness of regulation. Indeed, computing RWAs largely rests with individual bank regulatory accounting choices. If two otherwise equivalent banks in terms of risk profile report different RWA density, this may imply that one of the two found its way to underestimate risk and artificially reduce its capital requirements. Two issues emerge. First, fair treatment would be violated. Second, if arbitrage is widespread across banks in a country, that country will be prone to a higher systemic risk, compared to others.

Unfortunately, though, little is known on the true size of regulatory arbitrage and its causes remain largely unexplored. The scant evidence descends from the fact that – in spite of the requirements of the third pillar of Basel II – availability of micro data is still largely lacking.

This paper has three main aims. First, by applying the Ayadi et al. (2016) approach, we provide fresh evidence of different levels of bank risk (measured by the distance to default), considering the possible specificities across business models of European banking. Second, we try to explain those differences via the adoption of IRB and RWA dispersion, which raises the suspicion of regulatory arbitrage to a different extent across bank business models. Third, we explore whether, and to what extent, the degree of regulatory arbitrage varies across bank business models.

The remainder of the paper is structured, as follows: Section 2 summarizes the existing literature on the topic of banks' risk taking and regulatory arbitrage. Section 3 presents the data that we painstakingly compiled. In Section 4, we report and comment on the results of our econometric estimations. Finally, Section 5 recaps the thrust of our findings and discusses policy implications.

Survey of the literature

Adequate capitalization of banks has become the fulcrum of prudential regulation and supervision to restore the financial stability of individual banks and of banking systems (BCBS, 2012). However, aware that the level of capital needed to comply with the regulatory framework can undermine bank profitability, since the first version of the 1988 Accord (BCBS, 1988), supervisors have been lenient in allowing banks some leeway to reduce the negative effects of their requirements on profitability. Key to that end has been the accepting of a large number of typologies of risks under the Risk Weighted Assets (RWAs) formula (BCBS, 1996, 1997 & 1999), something that was confirmed in the Basel III framework (BCBS, 2011).

In practice, since the introduction of Basel II, banks have been permitted to choose risk measurement methods which, ceteris paribus, grant lower capital requirements. This is normally the case for Internal-Rating-Based (IRB) models, which differs significantly from the alternative Standard Model. Yet, with greater flexibility it is feared that IRB models may introduce large degrees of discretion. In particular, banks might find ways, although lawful, to lower their capital requirements that are not justified by sounder risk management. This would amount to regulatory arbitrage and such a situation might be identified by a large RWA dispersion across otherwise analogous banks.

In this respect, the concerns of supervisors have emerged time and again. Perhaps most vocal on this issue was the European Banking Authority (see, e.g., EBA, 2013a; 2013b; 2013c; 2013d; 2013e; 2014). But also other bodies expressed their preoccupations: the Basel Committee on Banking Supervision (BCBS, 2013a; 2013b; 2013c), the Banco de España (Argimón & Ruiz-Valenzuela, 2010; Ledo, 2011; Arroyo et al. 2012), the Banca d'Italia (Cannata et al., 2012), the National Bank of Belgium (Gustin & Van Roy, 2014), and the IMF (Das & Sy, 2012; Le Leslé & Avramova, 2012). These authors show that the same levels of RWAs may be found within banks that clearly bear different levels of risk.

Two recent studies have reached the conclusion that banks adopting IRB models may be able to engage in regulatory arbitrage, by artificially lowering their capital requirements, via the manipulation of their Basel risk weights (Mariathasan & Merrouche, 2014; Ferri & Pesic, 2016).

At the same time, some authors find that banks engaging in regulatory arbitrage have a lower distance to default as measured by their Altman's z-score (Boyson et al., 2016; Bruno et al., 2015; Ghosh, 2013; Gong et al., 2015). Thus, it appears that, while possibly increasing profitability, regulatory arbitrage may undermine the stability of the banks that indulge in it.

Data

This paper is a novel investigation into the differences across different banking business models in Europe in terms of risk taking and how much the regulatory framework of prudential supervision, via the alternative measures for credit risk in RWA calculation, can explain it. In order to perform this analysis, we consider the density level of Risk Weighted Assets (RWAs), as shown by the ratio of RWAs to Exposures At Default (EADs), together with the percentage of the EAD portfolio under the IRB methodology, in order to account for the internal risk management actions implemented by each bank to manage the RWA formula. We collected this data from the statements of individual banks statements and Pillar Three reports, to augment the usual data (e.g., from BankScope or SNL).

For each bank, this provides us with, among other elements, its RWAs and EADs, together with the percentage of EADs referred to, respectively, the Standard model and IRB methodologies[2] of credit risk management. Specifically, we investigate to what extent the riskiness of each banking business model can be explained by the RWAs density and the progressive shift from Standard to IRB-models. In practice, we expect that higher levels of RWA density increase the riskiness of each bank, whilst IRB methodologies may reduce the level of risk for each bank.

To perform this analysis, we consider several control variables at an individual bank level, in order to correctly capture the determinants of each bank's "true risk exposure". We collected this data following the classification of banking business model by Ayadi et al (2016), categorizing banks into five alternative groups: 1) Focused Retail; 2) Diversified Retail type 1 (retail oriented on both the asset and liability side); 3) Diversified Retail type 2 (retail oriented on the asset side but wholesale oriented on the liability side); 4) Wholesale; 5) Investment. This categorized perspective, has enabled us to assemble data on a considerable number of individual banks (161) and of total bank-year observations (892) from 26 European countries.[3] Moreover, our dataset covers the period from 2008 up to 2013, deep into the euro sovereign crisis, which in various euro countries was much more extensive than the sub-prime crisis.

To test whether, and the extent to which, there was any significant dispersion in riskiness across different banking business models in Europe, we consider the well-known and established measure of risk, Altman's Z-score, which we calculated as a time-varying variable, like in Hesse & Cihák (2007),

$$Z_t = \frac{car_t + \mu_{roa,t}}{\sigma_{roa,t}}$$

where the standard deviation estimates σ_{roa} is calculated over the full sample [1 . . . T], whilst the bank's capital-asset ratio (*car*) and return on assets (*roa*) are time varying with *t*. Nevertheless, because of the large variability of economic performance during the analysis period, to more effectively account for the differences arising across different banking business

[2] We tested the differences existing between IRB Foundation and IRB Advanced, but at this stage of our analysis we detected no significant differences between the two approaches.

[3] The countries included are: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, and United Kingdom.

models, we considered a more robust measure of risk given by the dummy variable RISKY, which takes the value of 1, when the Z-score of a bank is below the median value of the whole sample over the entire period considered, and 0 otherwise.

Accordingly, we use a logit model to investigate the determinants of riskiness for European banks. We view the Z-score as the best measure of risk for our purposes, considering that our dataset includes a large number of banks which are not listed, which meant that other measures of market risk, such as stock volatility, equity risk-premium, etc. were not available for the entire sample.

Table 1 reports the complete list of variables considered in our regressions, their definitions and sources, while the basic descriptive statistics are presented in Table 2.

Table 1 – Description of the variables

Name	Definition	Source
	Dependent variable	
RISKY	Dummy variable for riskier banks (level of risk measured with Altman's Z-score calculated as in Hesse and Cihák, 2007). The dummy variable is 1 when the Z-score is below the median of the total sample, and 0 otherwise	SNL
	Independent variables	
RWA/EAD	Ratio of RWA to EAD (Exposure at Default)	Banks' Pillar 3
IRB	% of IRB methodology upon EAD	Banks' Pillar 3
EQUITY	Ratio of equity to total assets * winsorized at 1%	Bankscope
SIZE	Logarithm of total assets	Bankscope
ASSETS GROWTH	Increase in total assets	Bankscope
NLOANS	Ratio of net loans to total assets	Bankscope
LOAN IMPAIRMENT	Ratio of impairment to total net income * winsorized at 5%	Bankscope

Source: Authors.

The bank level independent variables we consider are:

- RWA/EAD – RWAs density (ratio between RWA and EAD), the most consolidated measure of risk for prudential supervision,
- IRB – EAD portfolio coverage by IRB methodologies, the most common regulatory option aiming to reduce both the RWA/EAD (namely "roll out" effect) and a bank's level of risk;
- EQUITY – ratio of equity to total assets, where we expect a negative relationship since higher values of it should determine lower level of risk. We define this ratio similarly to the *leverage ratio* of the Basel III capital framework, which is viewed as a more effective safeguard against

model risk and measurement error, than other ratios accounting for the level of bank capitalization – i.e. ratio between equity and EAD, or ratio between equity and RWA;
- SIZE – logarithm of total assets, to account for possible size related differences, though we have no a priori on its sign;
- ASSETS GROWTH – increase in total assets, though we have no a priori on its sign;
- NLOANS – ratio between net loans and total assets, viewed as a proxy of the exposure of banks to credit risk, though we have no a priori on its sign;
- LOAN IMPAIRMENT – cost of credit losses to the profit account (ratio of impairment to total net income), which, by its nature, we expect to increase the level of risk.

Table 2 – Descriptive Statistics

Statistics	RISKY	RWA/EAD	IRB	EQUITY	SIZE	ASSETS GROWTH	NLOANS	LOAN IMPAIRMENT
Mean	0.465	46.949	36.809	6.135	17.703	4.160	56.358	22.496
Max	1.000	118.182	100.000	30.100	21.512	233.760	94.700	82.200
P90	1.000	72.900	94.000	10.000	20.277	17.860	79.300	59.900
P75	1.000	58.450	75.800	7.700	19.063	8.010	70.800	27.750
P50	0.000	46.400	27.850	5.400	17.504	1.450	60.000	16.350
P25	0.000	34.200	0.000	3.600	16.588	-3.910	43.700	5.850
P10	0.000	20.300	0.000	2.100	15.342	-10.750	28.200	0.900
Min	0.000	0.000	0.000	0.000	11.605	-79.890	0.000	0.000
SD	0.499	20.000	39.032	4.009	1.851	20.521	19.881	22.989
N	892	892	892	892	892	872	892	892

Source: Authors.

Results

We perform our analysis by considering alternative specifications of a logit model to determine the dependent dummy variable RISKY. In particular, by using alternative specification with increasing complexity, we aim to account for the different determinants of bank riskiness, as captured by Altman's Z-score.

Table 3 presents the base specification run on six different samples. Column 1 refers to the total sample, while columns 2 to 6 consider the different banking business models as distinguished in Ayadi et al. (2016): 1) Focused Retail; 2) Diversified Retail type 1; 3) Diversified Retail type 2; 4) Wholesale; 5) Investment. Column 1 results are in line with expectations.

Table 3 – Base Model

	Total Sample	Focused Retail	Diversified Retail 1	Diversified Retail 2	Wholesale	Investment
RWA/EAD	0.0255***	-0.0199	0.0141	0.0358***	0.0286**	0.0310***
	0.004	*0.018*	*0.014*	*0.013*	*0.012*	*0.008*
IRB	-0.0040*	-0.0098	0.0017	0.0107**	-0.0118*	-0.0127***
	0.002	*0.008*	*0.006*	*0.005*	*0.007*	*0.004*
EQUITY	-0.1349***	-0.2246***	-0.1949**	-0.1633**	-0.2253**	-0.1048*
	0.030	*0.087*	*0.085*	*0.075*	*0.092*	*0.056*
SIZE	0.0819*	0.0732	0.0646	0.0701	-0.0074	0.1352
	0.046	*0.224*	*0.120*	*0.129*	*0.106*	*0.087*
tau2009	-0.2972	-0.1478	-1.0216	0.3724	-0.1598	-0.3777
	0.250	*0.677*	*0.629*	*0.683*	*0.567*	*0.447*
tau2010	-0.4223*	-0.0624	-1.0959*	-0.4287	-0.2059	-0.3879
	0.247	*0.670*	*0.617*	*0.656*	*0.567*	*0.443*
tau2011	-0.4745*	-0.2285	-0.998	-0.2935	-0.1861	-0.6375
	0.246	*0.673*	*0.611*	*0.647*	*0.567*	*0.449*
tau2012	-0.6174**	-0.6496	-1.0316*	-0.3875	-0.3766	-0.7546*
	0.249	*0.698*	*0.619*	*0.651*	*0.579*	*0.451*
tau2013	-0.6170**	-0.368	-0.7808	-0.7319	-0.2641	-0.8741*
	0.251	*0.670*	*0.625*	*0.682*	*0.589*	*0.461*
Constant	-1.4424*	1.7835	0.0831	-2.0639	0.7569	-2.4356
	0.875	*4.584*	*2.226*	*2.413*	*2.001*	*1.616*
N	892	126	162	137	177	290
Chi2	69.51	12.79	12.62	25.18	18.62	42.08
Pseudo R2	0.05	0.07	0.05	0.13	0.07	0.10

Source: Authors.

*The table reports different logit estimations for the dependent variable RISKY upon the total sample and the different groups of banks. Besides the other independent variables, which are explained in the main text, here we have tau2009, tau2010, tau2011, tau2012, and tau2013 that are time dummies capturing specific year effects. As usual, ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels respectively.*

RWA/EAD shows a positive and significant coefficient, confirming the effectiveness of prudential regulation to capture the riskiness of banks whilst in contrast, the level of EQUITY and the percentage of IRB coverage upon the EAD portfolio seem to make a bank less risky. In this case, SIZE appears to increase the riskiness of banks.

When we move from the whole sample to the five subgroups of banks, the results become more nuanced. Specifically, Wholesale and Investment banks perform similarly to the Total Sample. Conversely, Focused Retail and Diversified Retail type 1 banks only maintain a negative and significant coefficient for EQUITY, whilst the other variables are insignificant. Of great interest in this case, is the subgroup Diversified Retail type 2. On one hand, these banks, in line with the Total Sample, exhibit a positive (negative) and significant coefficient for RWA/EAD (EQUITY). On the other hand, IRB has a positive effect on these banks, signaling that prudential regulation in this case fails to predict the riskiness of the bank. This can be interpreted as a signal of regulatory arbitrage taking place within this banking business model, possibly via Basel risk weights manipulation (Mariathasan and Merrouche, 2014; Ferri and Pesic, 2016). And it is worth underlining that Diversified Retail type 2 banks were identified as potentially the most fragile in the risk and regulatory assessment carried out by Ayadi et al. (2016).

Table 4 – Base Model + Interaction IRB*EQUITY

	Total Sample	Focused Retail	Diversified Retail 1	Diversified Retail 2	Wholesale	Investment
RWA/EAD	0.0251***	-0.0247	0.0109	0.0339***	0.0371***	0.0296***
	0.004	*0.019*	*0.014*	*0.013*	*0.013*	*0.008*
IRB	0.0017	0.0108	0.0237*	-0.0095	0.0253**	0.0000
	0.004	*0.017*	*0.014*	*0.011*	*0.013*	*0.008*
EQUITY	-0.1101***	-0.1371	-0.1186	-0.2385***	-0.0273	-0.051
	0.034	*0.102*	*0.092*	*0.089*	*0.107*	*0.063*
IRB*EQUITY	-0.001	-0.0032	-0.0037*	0.0031*	-0.0092***	-0.0023*
	0.001	*0.002*	*0.002*	*0.002*	*0.003*	*0.001*
SIZE	0.0719	0.0319	0.0264	0.0881	0.1643	0.093
	0.047	*0.224*	*0.123*	*0.133*	*0.125*	*0.090*
tau2009	-0.2906	-0.2036	-0.9449	0.3888	-0.1003	-0.3468
	0.250	*0.678*	*0.630*	*0.699*	*0.585*	*0.449*
tau2010	-0.4129*	-0.1045	-1.0301*	-0.457	-0.0503	-0.3531
	0.247	*0.669*	*0.620*	*0.667*	*0.586*	*0.447*
tau2011	-0.4583*	-0.2108	-0.8899	-0.3604	0.0518	-0.624
	0.247	*0.668*	*0.613*	*0.657*	*0.590*	*0.452*
tau2012	-0.5965**	-0.6983	-0.9735	-0.4992	-0.0393	-0.7129
	0.250	*0.697*	*0.620*	*0.664*	*0.605*	*0.455*
tau2013	-0.5949**	-0.4371	-0.7247	-0.8724	0.2614	-0.8237*
	0.252	*0.672*	*0.626*	*0.698*	*0.629*	*0.465*
Constant	-1.4308	2.1462	0.3349	-1.7235	-4.1951*	-1.9967
	0.873	*4.568*	*2.244*	*2.486*	*2.536*	*1.624*
N	892	126	162	137	177	290
Chi2	71.80	14.93	15.90	29.33	32.38	45.64
Pseudo R2	0.05	0.07	0.08	0.15	0.13	0.11

Source: Authors.

The table reports different logit estimations for the dependent variable RISKY upon the total sample and the different groups of banks. Besides the other independent variables, which are explained in the main text, here we have tau2009, tau2010, tau2011, tau2012, and tau2013 that are time dummies capturing specific year effects. As usual, ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels respectively.

In Table 4, we enlarge our model specification accounting for the interaction between IRB and EQUITY. In this case, the Total Sample exhibits results similar to those in Table 3, except for the variable IRB, which loses its significance. In this case, among the subgroups, Investment banks reveal a negative indicator for the interaction term IRB*EQUITY. For Wholesale banks and for Diversified Retail type 1 banks, we notice a double effect of IRB. Namely, for them, the positive indicator of IRB must be compared with the negative indicator of the interaction term IRB*EQUITY, which seems to be stronger. Finally, in this respect, the subgroup Diversified Retail type 2 also appears to be deviant, because of the positive indicator for the interaction term IRB*EQUITY. This seems to confirm the potential failures of prudential regulation at measuring bank risk. Thus, Table 4 results also seem to support the suspicion of regulatory arbitrage by Diversified Retail type 2 banks.

Table 5 – Base Model + Interaction IRB*EQUITY + Other Controls

	Total Sample	Focused Retail	Diversified Retail 1	Diversified Retail 2	Wholesale	Investment
RWA/EAD	0.0201***	-0.0540**	-0.0126	0.0138	0.0287**	0.0286***
	0.005	*0.023*	*0.018*	*0.020*	*0.013*	*0.008*
IRB	0.0088*	0.0471**	0.0289*	-0.0085	0.0393***	0.0086
	0.005	*0.022*	*0.016*	*0.012*	*0.015*	*0.008*
EQUITY	-0.0511	-0.067	-0.0067	-0.2125**	0.0639	0.0104
	0.037	*0.115*	*0.109*	*0.106*	*0.119*	*0.066*
IRB*EQUITY	-0.0019***	-0.0110***	-0.003	0.0030*	-0.0140***	-0.0031**
	0.001	*0.003*	*0.002*	*0.002*	*0.003*	*0.001*
SIZE	0.0819	-0.0974	-0.1586	0.1632	0.3402**	0.0834
	0.050	*0.266*	*0.154*	*0.151*	*0.145*	*0.099*
ASSETS GROWTH	-0.0093**	-0.0045	-0.0445**	-0.016	-0.0172	-0.0052
	0.004	*0.010*	*0.019*	*0.016*	*0.011*	*0.006*
NLOANS	0.0019	-0.041	0.0498***	-0.0018	0.0062	0.0038
	0.004	*0.031*	*0.018*	*0.014*	*0.011*	*0.011*
LOAN IMPAIRMENT	0.0318***	0.0619***	0.0594***	0.0413***	0.0429***	0.0252***
	0.004	*0.016*	*0.014*	*0.014*	*0.014*	*0.006*
tau2009	-0.5899**	-0.6188	-1.8619**	0.3382	-0.5024	-0.6768
	0.270	*0.736*	*0.770*	*0.780*	*0.671*	*0.490*
tau2010	-0.4638*	-0.5726	-1.2366*	-0.3075	-0.0624	-0.4011
	0.265	*0.763*	*0.725*	*0.729*	*0.624*	*0.480*
tau2011	-0.6175**	-0.8358	-1.2291*	-0.3644	-0.0138	-0.8182*
	0.264	*0.757*	*0.738*	*0.722*	*0.626*	*0.488*
tau2012	-0.9523***	-2.2898**	-1.4452*	-0.8175	-0.327	-0.9859**
	0.276	*0.953*	*0.747*	*0.763*	*0.680*	*0.500*
tau2013	-1.0669***	-1.9325**	-1.4989*	-1.3058	0.0761	-1.2713**
	0.284	*0.860*	*0.781*	*0.816*	*0.728*	*0.530*
Constant	-2.3612**	7.8329	0.1321	-2.942	-8.2669***	-2.9309
	0.992	*5.662*	*2.800*	*2.915*	*3.037*	*2.001*
N	872	124	156	133	175	284
Chi2	156.91	47.50	62.29	39.06	49.78	63.61
Pseudo R2	0.13	0.27	0.28	0.21	0.20	0.16

Source: Authors.

*The table reports different logit estimations for the dependent variable RISKY upon the total sample and the different groups of banks. Besides the other independent variables, which are explained in the main text, here we have tau2009, tau2010, tau2011, tau2012, and tau2013 that are time dummies capturing specific year effects. As usual, ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels respectively.*

In Table 5, further control variables are introduced to better capture the determinant of bank riskiness. Across all the subsamples considered, our results detect that LOAN IMPAIRMENT is associated with higher riskiness, whilst ASSETS GROWTH indicates a negative and significant value for the Total Sample and for the Diversified Retail type 1 banks. The level of NLOANS only shows a positive indicator in the case of Diversified Retail type 1 banks. The other variables exhibit effects that are substantially in line with the ones already found in Table 4, apart from the counterintuitive negative indicator of the variable RWA/EAD for the Focused Retail banks. In the case of the Total Sample, for Focused Retail and Wholesale banks, the IRB variable shows a positive indicator, but the interaction term IRB*EQUITY exhibits a negative effect that seems to dominate the former. In the case of Diversified Retail type 2 banks, the interaction IRB*EQUITY continues to perform on a counterintuitive basis, confirming the potential phenomenon of regulatory arbitrage taking place at these banks. Finally, in this respect, the Diversified Retail type 1 banks exhibit a positive indicator for the IRB variable, which is also suggestive of regulatory arbitrage by risk weights manipulation.

Conclusions

We have addressed the impact of regulatory arbitrage on the fragility of individual banks by taking the perspective of bank business models, as introduced in Ayadi et al (2016). In spite of the stiffening of banking regulation, for various reasons, it is lawful to fear that banks may still be prone to fragility due to regulatory arbitrage (see, e.g., Masciandaro, 2011). One of the weak spots where regulatory arbitrage may dent the effectiveness of banking regulation, stems from the degrees of freedom that the Basel Accords – both Basel II and Basel III – have given to banks, by allowing them to use Internal-Rating-Based (IRB) models and their discretionary adaptation in Europe. In practice, besides legitimate capital savings, IRB models may allow banks to indulge in manipulating risk weights (Mariathasan & Merrouche, 2014; Ferri & Pesic, 2016). If that happens, banks may end up bearing more risk than they actually report. As such, a bank's proximity to default could be reduced.

In recent decades, a distortion in the way that regulation has been introduced has ignored that different business models produce different levels of risk exposures within banks. Ayadi et al. (2016) convincingly argue that certain bank business models produce more systemic risk, while some intensify other types of risk. Specifically, more financial market oriented banks develop risks linked to the financial cycle, while risks at retail oriented banks more closely follow the real economy cycle. Is there anything regulators and supervisors can learn from this evidence and methodology? Most likely, yes.

The analysis we carried out delivered clear results. Bank business models matter in risk assessment and regulation. Specifically, we found evidence that one of the five business models identified by Ayadi et al. (2016) is deviant. This is the case for the banks classified as Diversified Retail type 2. While the two more genuinely retail oriented business models – Focused Retail banks and Diversified Retail type 1 banks – and the two models more attuned to financial market activity – Wholesale banks and Investment banks – seem able to preserve their own consistency, this is not true for the banks classified as Diversified Retail type 2. These banks look like odd fellows, or perhaps mutants. In fact, they are predominantly retail oriented on the asset side, but wholesale oriented on the liability side. As such, particularly during phases of lax monetary policy, these banks can be prone to take large risks on themselves. Consistent with this, we found that indications of regulatory arbitrage only emerge systematically for banks adopting the Diversified Retail type 2 business model.

The policy implication we may derive from our analysis is that regulators and supervisors ought to factor in bank business model analyses and to continue to monitor them systematically. It's true that the bank business model analysis may appear less sophisticated than advanced risk metrics' methodologies. However, the Great Financial Crisis is there to testify that fancy algorithms will always be incomplete and, at times, even deceptive. Had pre-crisis regulators monitored leverage ratios, instead of Risk Weighted Assets, the crisis might have been avoided! It is to be hoped that scholars and professionals devote increasing attention to bank business model analysis. Awareness of the mistakes of the past should also make policy makers and regulators more humble. Realizing that any single regulatory and supervisory tool will always be imperfect, it could lead policy makers and regulators to rely on more than one method. That would also pave the way for paying close attention to bank business models.

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