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IN-DEPTH ANALYSIS

"Total Assets" versus "Risk Weighted Assets": does it matter for MREL requirements?

External authors: Rym Ayadi
HEC Montreal and IRCCF
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Provided at the request of the
Economic and Monetary Affairs Committee

July 2016
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Provided in advance of the public hearing
with the Chair of the Single Resolution Board
in ECON
on 13 July 2016

Abstract

Using a comprehensive sample of European banks by business model, ownership structure and systemic footprint, we calculate MREL requirements based on three hypotheses: i) 18% of RWA; ii) 6.75% of LRE; iii) EBA- RTS. The maximum of i) and ii) TLAC prescription – reveals different requirements across business models/ownership structures not in favour of traditional banking. Variations are reduced somewhat with EBA RTS and an 8% floor. Shocking banks in respect of tail risk events suggests that currently envisaged MREL levels might be insufficient for a smooth resolution for banks.

July 2016
ECON EN

PE 574.412

This paper was requested by the European Parliament's Economic and Monetary Affairs Committee.

AUTHORS

Rym Ayadi, HEC Montreal and International Research Centre on Cooperative Finance (IRCCF)
Giovanni Ferri, Libera Università Maria SS. Assunta (LUMSA)

RESPONSIBLE ADMINISTRATOR

Benoit Mesnard
Economic Governance Support Unit
Directorate for Economic and Scientific Policies
Directorate-General for the Internal Policies of the Union
European Parliament
B-1047 Brussels
Belgium

LANGUAGE VERSION

Original: EN

ABOUT THE EDITOR

Economic Governance Support Unit provides in-house and external expertise to support EP committees and other parliamentary bodies in playing an effective role within the European Union framework for coordination and surveillance of economic and fiscal policies.
E-mail: egov@ep.europa.eu

This document is also available on Economic and Monetary Affairs Committee homepage at:
http://www.europarl.europa.eu/committees/en/ECON/home.html

Manuscript completed in July 2016

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LIST OF ABBREVIATIONS

BBMM	Bank Business Model Monitor
BCBS	Basel Committee for Banking Supervision
BRRD	Bank Recovery and Resolution Directive
DSIB	Domestic systematically important bank
EBA	European Banking Authority
EEA	European Economic Area
FSB	Financial Stability Board
GSIB	Global systematically important bank
IRB	Internal risk-based
LRE	Leverage ratio exposure
MREL	Minimum requirement for own funds and eligible liabilities
NSB	Non-systemic bank
RWA	Risk weighted assets
RTS	Regulatory technical standards
TLAC	Total loss absorption capacity

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EXECUTIVE SUMMARY

In this paper, we estimate the MREL using the total asset versus risk-weighted assets-based formulae from a unique database of business models, ownership structures and systemic importance covering more than 2500 European banks based on data available from 2005 to 2014. The estimations follow a three-step procedure. First, we use the TLAC formula; second we compare the results with MREL estimation based on two criteria of the EBA RTS; and third we complement the analysis by shock simulations to assess the resilience of European banks in extreme stress conditions.

The results show that when using the RWA or LRE, there is either variability between bank business models, ownership structure, systemic importance and/or between formulae.

In particular, when using RWA formula, focused retail and investment banks have the highest requirements, followed by the diversified retail type 1. In contrast, diversified retail type 2 and wholesale banks have the lowest requirements, the mean and median of which are between 7 and 8%. Based on the LRE, mean and median requirements converge to values slightly lower than 6.75% for all business models. Thus, the LRE-based requirements do not backstop those based on RWA in most cases, as confirmed by the combined requirements based on RWA and LRE.

As regards to ownership structures MREL requirement based on RWA is particularly low for public banks. The LRE-based requirements slightly correct that low median level, pushing it from 5.69% to 6.77% in the combined maximum requirements. As well, mean requirements for nationalised banks noticeably increase between their RWA estimate and the combined RWA and LRE maximum requirements.

As for DSIBs and based on the RWA formula, the median and mean requirements are strikingly low (in the range of 4.3% to 5.4%) for diversified retail type 2 banks and wholesale banks, compared to the industry (9.23%). As a consequence, the LRE based requirements are binding for most banks in these business models, and the combined maximum requirements reflect this situation.

When compared to the EBA RTS criteria, the results show that mean and median requirements of market-funded business models (diversified retail type 2, wholesale and investment banks) are sensitive to the 8% floor on their MREL. In contrast, focused retail and diversified retail type 1 banks are hardly affected by that floor. For all banks, average and median changes are due to the introduction of the floor and are rather moderate because of the low number of market-funded business models. Indeed, these represent about a third of the sample.

Finally, when testing extreme shocks, the results suggest that under an extreme stress condition, such as the events experienced in the financial crisis 2007-08, on average 4.15% of losses shown as a percentage of liabilities and own funds are wiped out from the banking system. Hence, this result suggests a minimum loss absorption requirement of at least 4.15% for all banks. An additional requirement of up to 20% can be imposed on diversified retail type 2, so that it can cover the above average additional losses as a percentage of their liability and own funds. Similarly, wholesale banks would incur an additional requirement of up to 3.75% to account for the riskiness of their business models compared to the average bank. These results suggest that the MREL parameters may undergo serious tail risk for diversified retail type 2 banks and also, to a lesser extent, for wholesale banks.

In view of these results, it is highly recommended to keep the two metrics RWA and LRE and apply the maximum in each case. This means a full alignment of MREL to TLAC. Moreover, the MREL should be calibrated to the business models and the systemic footprint of banks.

1. INTRODUCTION

In Europe, policy responses to the financial crisis of 2007-2009 that focused on ending bailouts of banks using taxpayers' money, have emphasised the completion of Banking Union and the furthering of international cooperation fostered by the Basel Committee on Banking Supervision (BCBS) and the Financial Stability Board (FSB).

This policy note delves into the debate on determining the Minimum Requirement on own fund and Eligible Liabilities (MREL) and provides estimates based on a broad set of European banks organised by business model, ownership structure and systemic footprint. The key areas cover: a) alignment of MREL calculation with the Total Loss Absorption Capacity (TLAC) put forward by the FSB, b) basis of MREL calculation, and finally c) systemic versus proportionality aspects.

TLAC versus MREL

European legislation on resolution schemes, known as the Bank Recovery and Resolution Directive (BRRD), has evolved in unison with the work of the FSB. The latter aimed at setting standards for the global systematically important banks (GSIBs) while BRRD addressed similar requirements for all credit institutions, regardless of their size and contribution to systemic risk.

To implement the BRRD, in July 2015 the European Banking Authority (EBA) released the Regulatory Technical Standards (RTS) for determining MREL for credit institutions in the European Economic Area (EEA). MREL is a loss absorption requirement on a going-concern basis. To comply with it, banks in Europe must issue enough bail-inable liabilities to allow a smooth resolution with the least possible reliance on taxpayers' money or the resolution fund. As it applies to all institutions, the scope of MREL is broader than that of TLAC standards which applies only to the GSIBs.

The TLAC approach is close to the capital buffer approach, while the European MREL approach combines both capital buffers and incentives.[1] The buffer approach is rooted in the view of risk as an exogenous factor, while the incentive approach acknowledges moral hazard issues in bank management and considers risk as an endogenous choice. It should also be remembered that BCBS and FSB have no legislative powers and only foster international cooperation. Their aim is, therefore, to set minimum international standards and leave discretionary rulemaking to the regulatory authorities of participating countries. It is no coincidence that Europe's MREL legislation includes more discretionary tools for supervision authorities than FSB's proposal for TLAC.

We should emphasize there are various similarities in the bail-in instruments allowed in each framework. Not surprisingly, both frameworks endorse the eligibility of the various capital instruments defined by the Basel agreements – subordinated debt, fixed term and corporate deposits and financial sector liabilities maturing after more than one year. Some differences for the eligibility of unsubordinated senior debt and structured notes are elicited (BBVA, 2016). A number of liabilities are excluded from bail-in. These are deposit guarantee scheme covered deposits, retail deposits of Small and Medium Enterprises, short-term corporate deposits, covered bonds, mortgage bonds, securitized liabilities, liabilities from repurchase agreement transactions, liabilities arising from derivatives, liabilities to employees and tax authorities, fiduciary liabilities and liabilities related to maintaining critical services at a bank under resolution.

[1] In their paper on bridging TLAC and MREL in European banks, Ayadi and Keoula (2016, forthcoming), assess impacts and differences of these requirements on business models, ownership structures and systemic banking groups.

Risk-weighted assets versus total assets

For a long time, regulators have used a basic approach to set banks' capital adequacy ratio transposing the concepts of non-financial firms, by setting a leverage ratio based on total assets and equity. Such comparisons – using the book value of assets and equity – are commonplace tools and give an idea of the leverage in the banking sector compared to other sectors of the economy. The leverage ratio is straightforward to compute. Its appeal hinges on its simplicity, combined with the fact it is close to the notion of multiples which are very popular in finance.

However, it has been quickly acknowledged that when analysing banks, capital adequacy ratios should be based on risk factors affecting the asset side of a bank. Theoretical literature in economics suggests that risk-insensitive capital regulations will favour allocating financial intermediation to the riskiest activities in order to counteract higher capital requirements (Kahane, 1977, Rochet, 1992). Empirical works further support that, with a flat capital requirement, by increasing it, this induces more risk-taking (Calem & Rob, 1999).

Thus, at least since the Basel I agreement, the risk-weighted assets (RWA) measure has been used to better align capital requirements to the risk profiles of banks. Initially, under Basel I, RWA only covered credit risk. Bank balance sheet assets were assigned risk weights on a rather arbitrary basis: investments in sovereign debt were deemed non risky, while corporate loans were assigned one of the highest risk weights. That is why the subsequent Basel agreements reviewed the credit risk weights, as well as integrated additional risk to the formula of RWA, so that credit risk, market risk and operational risk now contribute to the RWA calculation.

It is also noteworthy that, since the Basel I agreement, the computation of RWA has included off-balance-sheet items, like guarantees of commercial loans and standby letters of credit (Matthews & Thompson, 2014, p. 223). In addition, Basel II allowed a more open approach to quantifying risk-weighted assets, by allowing banks to use internal risk-based (IRB) models. In so doing, it was believed that the IRB approach would be an improvement on the standardized approach. However, the IRB approach has turned out to be challenging for supervisors as, due to complex modelling, making an assessment in many cases was unreliable. Fulfilling a mandate assigned to it by European legislation on capital requirements, the EBA has recently conducted various studies on the consistency of RWA covering samples of European banks (EBA 2014). The need to do this has emerged in order to harmonise practices across countries and even in respect of concepts used by the modelling staff of banks within the same country.

As predicted, as capital adequacy ratios were raised, banks found opportunities to undertake regulatory arbitrage. On one hand, this could be achieved by Basel risk weight manipulation at IRB banks (Mariathasan & Merrouche, 2014). Moreover, financial innovation made it easier for banks to offload risky assets from their balance sheets. Thus, it has been observed that many banks adopting risky business models report surprisingly low RWA. As a remedy, many stakeholders (regulators, academics, think-tanks) have strongly suggested that the RWA measure be completed by the leverage ratio (Ayadi et al, 2011). Basel III introduced the leverage ratio to backstop RWA and to curb the expansion of riskier bank business models.

In recent years, there has been an increasing convergence of views that complex regulation should be backstopped by simple rules. The regulatory toolkit should not only contain either risk-based or non risk-based measures but also a mix of both. The BCBS review into the integration of regulatory capital and liquidity instruments summarises the two distinctive characteristics of a simple rule: the cost of detecting violations are often low and they are "robust to changes in the incentives of regulated institutions" (BCBS, 2016, p. 39). Simple rules may even be the only available instruments in times of financial turmoil (Haldane & Madouros, 2012).

Systemic versus proportionality issues

Like regulation in other sectors, regulation of banks entails costs and benefits. For a prospective rule, the impact assessment will typically include direct and indirect costs, as well as private and social costs. The 'Too-big-To-Fail' problem stems from the fact that the systemic risks imposed on the financial system by those institutions are not internalised. Capital requirements on each banking institution are a way to mitigate their systemic footprint. European legislators recognised early on the need to regulate banks proportionally to their systemic risk. This is enshrined in EU legislation.

Many dimensions of proportionality have to be accounted for. The EBA Banking Stakeholder Group has pointed out that proportionality has to do with cumulative costs of regulation, as well as cumulative benefits. Compliance costs have to be outweighed by their benefits. A level of regulation seems to exist, above which the additional net benefit is very low. Another important dimension of proportionality is complexity. For example, from Basel I to Basel III, a measure of the complexity of the Accords is their length, which went from 30 to 616 pages (Matthews & Thompson, 2014, p. 227). It is believed that a mid-size European bank will need between 135 and 210 extra staff to comply with Basel III (Harle et al, 2010, p. 24). In addition, differentiated regulation could be soundly applied, taking into account the size, business models and ownership structures (EBA Banking Stakeholder Group, 2015, p. 20). Finally, a waiver from certain regulations should be granted to entities that are only marginally exposed to the type of risk they are meant to mitigate.

This note takes these proportionality concerns into account, by studying three dimensions in the empirical analysis that follows: business models, ownership structures and systemic footprint. The first two dimensions are developed according to the behavioural approach presented in the Banking Business Models Monitor 2015 Europe (Ayadi et al, 2016). The systemic footprint is proxied by the classification of banks into three groups: global systemically important banks (GSIB), domestic systemically important banks (DSIB) and non-systemic banks (NSB).

This paper attempts to shed light on the MREL requirements by bank business model, ownership structure and systemic footprint in Europe, while emphasising the potential impacts of using the total asset versus risk-weighted assets-based formulae. Estimates rely on a unique database of business models of more than 2500 European banks covering data available from 2005 to 2014.

The remainder of the paper provides the sample, the methodology and analysis of the estimations of the impacts of total assets versus RWA for MREL.

2. ESTIMATING THE IMPACTS OF RISK WEIGHTED ASSETS VERSUS TOTAL ASSETS FOR MREL

In the following, we propose to estimate the MREL requirements using a comprehensive sample of European banks categorised per business model, ownership structure and systemic footprint as well as alternative methodologies.

2.1. Sample

The sample used in this paper benefits from the database put forward in the Bank Business Models Monitor (BBMM) for Europe[2], (Ayadi et al, 2016). The database is comprised of up to 13,040 bank-year observations of 2,518 banks, covering more than 95% of assets of the EU plus EFTA countries from 2005 to 2014. The BBMM categorises the European banking industry following a novel behavioural approach that defines banks by the interaction between their funding (liability) and activity (assets) profiles and uses a state-of-the-art clustering methodology. The analysis results in five business models which can be summarised as follows: retail focused, retail diversified (type 1), retail diversified (type 2), wholesale and investment.

The **focused retail banks** provide traditional services, such as customer loans, and are funded by customer deposits. This is also reflected in their income, which consists mostly of net interest income and commission and fees, while trading income and other income are only minor components. The share of banks that were identified as focused retail remained similar during the crises. These banks have an ownership structure that is slightly skewed towards stakeholder value banks (cooperative and savings banks).

Diversified retail (type 1) banks combine lending to customers with a moderate percentage of trading activities (i.e. 31% on average) and they primarily use customer deposits. These banks are modest in size. The ownership structure is slightly skewed towards stakeholder value banks.

Diversified retail (type 2) banks' activities consist primarily of lending to customers mainly using debt liabilities and customer deposits. Notwithstanding that the largest share of assets are allocated to customer loans, this category of bank obtained twice as much from trading activities than the other retail-oriented banks. They are relatively large in size and internationally active, compared to the other retail-oriented banks.

Wholesale banks engage in interbank lending and borrowing and are mainly categorised as shareholder value banks. However, these also include the central institutions of cooperative and savings banks that provide liquidity and other services to local banks as well as public banks. They are among the smallest and most domestically oriented group.

Investment-oriented banks engage in trading activities, while relying on debt securities and derivatives for funding. They are the smallest in number, but the largest in size and the most internationally oriented banks among the five models.

The sample is also organized by ownership structure among commercial, cooperative, savings, public and nationalized banks and by their systemic footprint among the GSIBs, the domestic systemically important banks (DSIBs) and the non-systemically important banks (NSIBs). The list of European banks and their business models is published in Ayadi et al (2016).

[2] LRE is assumed to be the difference between total assets and intangible assets. The original data is from the SNL database.

For the purpose of this assessment, we purged the database of subsidiaries of banks, which are not headquartered in the European Economic Area (EEA). Two reasons explain this choice. On the one hand, the database does not capture the profile of the resolution group or material subgroup to which they belong. On the other hand, and as a consequence, it is a necessary simplification because we are also making a comparison between MREL and external TLAC requirements for whole resolution groups. The selection brings the number of bank-year observations down from 13,040 to 10,980.

In addition, although the global systemic nature of the banks is a feature only available from 2011 onwards, in this paper we take the view that such a characterisation can be extended to the ten-year period under study, anytime a bank has been designated as systemic over three consecutive years. Accordingly, a variable called systemic group assigns each bank to either GSIB, DSIB or NSB. DSIB are significant entities directly supervised by the ECB that are not designated to be globally systemic by the FSB. The work of the SRB relies on the same list. Non systemic banks are less significant institutions under the direct supervision of a nationally competent authority, as per the list published by the ECB.

2.2. Methodology

To estimate the MREL, we follow a three step procedure; First, we use the TLAC formula; second we compare with the EBA RTS two criteria; and third we complement the analysis by shock simulations to assess the resilience of European banks in extreme stress conditions. These are necessary in order to provide a view as to whether the MREL requirements are sufficient. The simulations are applied to bank business models, ownership structures and systemic footprint using the BBMM database over the period 2005-2014.

Computation of MREL using the TLAC formula:

From the FSB term sheet, a formula for the TLAC according to the requirements of 2022, can be cast as: TLAC=Max (18% RWA, 6.75% LRE), where LRE is the Leverage Ratio Exposure. It is the denominator of the leverage ratio as per Basel III. The leverage ratio exposure of the Basel III agreement is the sum of Total assets on the balance sheet and a number of (potentially substantial) off-balance sheet adjustments. It is important to note that the leverage ratio framework is not yet implemented in most European countries, and is estimated in our study by subtracting intangible assets from total assets. The estimations are done separately for component 1 and component 2 of the formulae.

Computation of MREL using the EBA RTS criteria:

In a second step, we estimate the MREL using the EBA RTS six criteria (see Annex 1). In order to ensure comparability with the TLAC standard, our computations are based on the first two criteria. There will be a further restriction to the first criterion, in that we will disregard pillar 2 requirements.

It is expected that the first two criteria (loss absorption and recapitalisation) are more predictable than the other criteria.

We apply the method outlined in the examples proposed by the EBA in its RTS. This method provides a clear distinction between the three systemic institutional groups.

For the non-systemic banks (NSB), a total requirement of 8% RWA of minimum capital requirements and 2.5% RWA of capital conservation buffer applies for the loss absorption amount.

In total, this amounts to 10.5% RWA buffer requirement. Since they are deemed to be liquidated in case of insolvency, no recapitalisation amount will be imputed.

For the DSIB, a total requirement of 8% RWA of minimum capital requirements, 2.5% RWA of capital conservation buffer and an additional buffer requirement of 2% RWA will apply (systemic and/or countercyclical) for the loss absorption amount. In total, this amounts to 12.5% RWA buffer requirement. Since they are deemed to be wound down for half of their business, the total recapitalisation amount is 6.25% RWA.

For the GSIBs, a total requirement of 8% RWA of minimum capital requirements, 2.5% RWA of capital conservation buffer and additional buffer requirements of 2% RWA (systemic and/or countercyclical) and a global systemic risk buffer of 2.5% will apply for the loss absorption amount. In total, this amounts to 15% RWA buffer requirement. Since they are deemed not to be wound down, at least in the short run, the recapitalisation amount also totals 15% RWA.

To summarize, the NSB will face a total loss absorption and recapitalisation requirements of 10.5% RWA, the DSIB 18.75% RWA and the GSIB 30% RWA.

In addition, the contentious 8% of liabilities and own funds as MREL minimum requirement applies for the GSIB and the DSIB.[3]

Simulation of shocks:

In this method, the loss absorption amount is calibrated according to the peak losses over the ten-year period covered by the database (see Ayadi et al, 2016 and BCBS, 2010). It can be argued that, during this period, peak losses have been particularly high because of the worst financial crisis in a century. However, because of the bailouts enjoyed by the European financial system, the true picture of potential losses is probably worse than the results reported below. Thus, a calibration can use the 1st percentile plus an add-on of 2 to 4 percentage points to set a requirement for the loss absorption requirement.

2.3. Results

The results of MREL simulations cover the five business models identified in Ayadi et al (2016), ownership structures and systemic footprint of banking institutions, using the TLAC formula, the EBA RTS with two criteria and complemented with the simulation of shocks.

Using the TLAC formula

In this method, we assume that the MREL are computed based on the TLAC standard applied to the entire banking sector in Europe. The computation uses the formula max (18% RWA, 6.75% LRE) as a percentage of total liability and own funds. The results are reported for the first component (18% RWA) and for the second component (6.75% LRE) and for the max between the two. All results are reported un-weighted. This method compares the calculations of the MREL requirements using the RWA, the LRE and the max of the two.

[3] In its sixth criterion for the calculation of the MREL, the RTS purports to uphold the provision in Art. 44 of the Bank Recovery and Resolution Directive (BRRD) that set a floor of 8% of total liabilities including own funds on the MREL of systemic banks as a condition of accessing the Resolution Fund. This aspect of the standard is considered to be the main requirement currently hindering the endorsement of the RTS by the European Commission (See EBA (2016)).

As a reference, we estimate the original TLAC for GSIBs (See Annex 2).

As displayed in Table 1, using the RWA formula, focused retail and investment banks have the highest requirements, followed by the diversified retail type 1. In contrast, diversified retail type 2 and wholesale banks have the lowest requirements, the mean and median of which are between 7 and 8%. Based on the LRE, mean and median requirements converge to values slightly lower than 6.75% for all business models. Thus, the LRE-based requirements do not backstop those based on RWA since the latter are much higher. The combined requirements based on RWA and LRE confirm these comments.

Table 1: MREL estimations by business models for all banks, unweighted

	18% RWAs			6.75% LRE			Max (18% RWA, 6.75% LRE)		
Business models	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
Focused retail	2,263	11.63%	11.43%	2,301	6.64%	6.64%	2,263	11.71%	11.43%
Diversified retail type 1	3,759	10.30%	10.00%	3,780	6.60%	6.59%	3,759	10.35%	10.00%
Diversified retail type 2	324	7.78%	7.15%	336	6.66%	6.74%	324	8.96%	7.15%
Wholesale	720	7.64%	7.03%	731	6.69%	6.71%	720	8.43%	7.04%
Investment	1,848	10.72%	11.21%	1,853	6.69%	6.70%	1,848	11.07%	11.21%
Total	**8,914**	**10.42%**	**10.33%**	**9,001**	**6.64%**	**6.64%**	**8,914**	**10.64%**	**10.33%**

Source: Authors

As regards to ownership structures (Table 2), median requirements based on RWA are particularly low for public banks. The LRE-based requirements slightly correct for that low median level, pushing it from 5.69% to 6.77% in the combined maximum requirements. As well, mean requirements for nationalised banks noticeably increase between their RWA estimate and the combined RWA and LRE maximum requirements.

Table 2: MREL estimations by ownership structure for all banks, unweighted

	18% RWAs			6.75% LRE			Max (18% RWA, 6.75% LRE)		
Ownership structure	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
Commercial	2114	10.84%	10.82%	2149	6.69%	6.70%	2114	11.21%	10.82%
Cooperative	4013	10.35%	10.36%	4053	6.62%	6.62%	4013	10.46%	10.36%
Nationalised	233	9.29%	9.87%	235	6.64%	6.64%	233	10.04%	9.87%
Public	179	7.63%	5.69%	181	6.70%	6.71%	179	9.36%	6.77%
Savings	2,375	10.48%	10.17%	2,383	6.62%	6.62%	2,375	10.59%	10.17%
Total	**8,914**	**10.42%**	**10.33%**	**9,001**	**6.64%**	**6.64%**	**8,914**	**10.64%**	**10.33%**

Source: Authors

As for DSIBs and based on the RWA (Table 3), the median and mean requirements are strikingly low (in the range of 4.3% to 5.4%) for diversified retail type 2 banks and wholesale banks, compared to the industry (9.23%). As a consequence, the LRE based requirements, which are

slightly lower than 6.75%, are binding for most banks in these business models, and the combined maximum requirements reflect this situation. Interestingly, the median requirement for DSIBs is not affected by the backstop of the LRE requirement which is an indication that the LRE-based requirement has indeed only affected the lowest requirements of banks in these two business models, which are also the least populated.

Table 3: MREL estimations by business models for DSIBs, unweighted

	18% RWAs			6.75% LRE			Max (18% RWA, 6.75% LRE)		
Business models	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
Focused retail	79	11.64%	12.04%	79	6.67%	6.67%	79	11.68%	12.04%
Diversified retail type 1	142	9.37%	9.76%	142	6.66%	6.67%	142	9.66%	9.76%
Diversified retail type 2	32	5.25%	4.32%	32	6.72%	6.72%	32	7.21%	6.74%
Wholesale	67	5.35%	4.52%	67	6.72%	6.73%	67	7.13%	6.76%
Investment	327	9.08%	9.17%	327	6.65%	6.64%	327	9.84%	9.17%
Total	**647**	**8.88%**	**9.23%**	**647**	**6.67%**	**6.67%**	**647**	**9.61%**	**9.23%**

Source: Authors

Previous comments on diversified retail type 2 banks and wholesale banks apply to public banks when it comes to ownership structures. The LRE-based requirements act as an effective floor or backstop, raising the median value from 3.54% RWA-based requirements to 6.75% combined requirements for this ownership structure (Table 4). In addition, the mean requirements of nationalised banks increase by more than 1% between the RWA-based measure and the combined maximum requirements.

Table 4: MREL estimations by ownership structure for DSIBs, unweighted

	18% RWAs			6.75% LRE			Max (18% RWA, 6.75% LRE)		
Ownership structure	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
Commercial	142	10.17%	10.12%	142	6.68%	6.66%	142	10.47%	10.12%
Cooperative	179	9.71%	10.28%	179	6.67%	6.68%	179	10.21%	10.28%
Nationalised	144	8.65%	9.61%	144	6.65%	6.67%	144	9.58%	9.61%
Public	51	4.67%	3.54%	51	6.72%	6.72%	51	7.64%	6.75%
Savings	131	8.23%	8.07%	131	6.65%	6.64%	131	8.68%	8.07%
Total	**647**	**8.88%**	**9.23%**	**647**	**6.67%**	**6.67%**	**647**	**9.61%**	**9.23%**

Source: Authors

Comparison with EBA RTS computations

The results of the MREL simulations using the EBA RTS criteria (Appendix 1) are reported by business model, ownership structure and for the DSIBs with and without the 8% floor and un-weighted.

Table 5: MREL estimations by business model for all banks, unweighted

	With 8% floor			Without 8% floor		
Business models	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
Focused retail	2,263	6.98%	6.71%	2,263	6.97%	6.71%
Diversified retail type 1	3,759	6.26%	5.90%	3,759	6.24%	5.89%
Diversified retail type 2	324	5.05%	4.54%	324	4.78%	4.28%
Wholesale	720	5.47%	4.71%	720	5.20%	4.52%
Investment	1,848	7.40%	7.14%	1,848	7.19%	6.89%
Total	**8,914**	**6.57%**	**6.26%**	**8,914**	**6.48%**	**6.18%**

Source: Authors

The results in Table 5 show that mean and median requirements of market-funded business models (diversified retail type 2, wholesale and investment banks) are sensitive to the 8% floor on their MREL. To the contrary, focused retail and diversified retail type 1 banks are hardly affected by that floor. For all banks, average and median changes are due to the introduction of the floor and are quite moderate because of the low population of the market-funded business models. Indeed, these represent about a third of the sample.

Table 6: MREL estimations by ownership structure for all banks, unweighted

	With 8% floor			Without 8% floor		
Ownership structure	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
Commercial	2114	7.06%	6.94%	2114	7.02%	6.87%
Cooperative	4013	6.30%	6.14%	4013	6.26%	6.10%
Nationalised	233	9.02%	8.02%	233	8.18%	8.02%
Public	179	6.17%	6.65%	179	5.06%	4.00%
Savings	2,375	6.37%	6.06%	2,375	6.32%	6.03%
Total	**8,914**	**6.57%**	**6.26%**	**8,914**	**6.48%**	**6.18%**

Source: Authors

As far as ownership structures (Table 6) are concerned, public banks clearly emerge as the group that is really affected by the floor, which has driven up their median requirement from 4% to 6.65% and their mean requirement from 5.06% to 6.17%. Another change of non-negligible magnitude is observed for the mean requirements of nationalised banks which rise from 8.18% to 9.02%.

Table 7: MREL estimations by systemic group for all banks, unweighted

	With 8% floor			Without 8% floor		
Systemic groups	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
GSIB	134	11.47%	10.15%	134	11.28%	10.15%
DSIB	647	10.37%	9.61%	647	9.25%	9.61%
NSB	8,133	6.18%	6.08%	8,133	6.18%	6.08%
Total	**8,914**	**6.57%**	**6.26%**	**8,914**	**6.48%**	**6.18%**

Source: Authors

The stability of the median requirements and the slight progression of the mean values of the requirements of the GSIBs, suggest that the floor is not supportive for most of them during most years (Table 7). For the DSIBs, the median value has remained the same, the mean has increased from 9.25% to 10.37% which suggests that the requirement would have affected a sizable proportion of those in the majority of years.

It is remarkable that requirements of 12.5% RWA for the NSB, 18.75% RWA for the DSIB and 30% RWA for the GSIB would translate into much lower median numbers of liabilities and own funds. Mean values tell a similar story. In particular, the narrow gap between the GSIB and the DSIB central tendency measures reflects a proportionally much lower RWA for large banks, which is a reminder of the probable miscalibration of this regulatory indicator for those banks.

Based on their mean and median requirements, one notices that the floor of 8% MREL mostly affects the market-funded business models (diversified retail type 2, wholesale and investment banks), while also impacting a handful of banks in the remaining two retail-oriented business models (Table 8). While the median of all banks remains unchanged, the mean has increased by about one percentage point, a sizable progression.

Table 8: MREL estimations by business models for DSIBs, unweighted

	With 8% floor			Without 8% floor		
Business models	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
Focused retail	79	12.22%	12.54%	79	12.13%	12.54%
Diversified retail type 1	169	10.95%	10.50%	169	10.53%	10.50%
Diversified retail type 2	32	8.23%	8.00%	32	5.47%	4.50%
Wholesale	129	8.81%	8.00%	129	7.29%	7.75%
Investment	372	10.84%	9.74%	372	9.79%	9.74%
Total	**781**	**10.56%**	**9.69%**	**781**	**9.60%**	**9.69%**

Source: Authors

Again, public banks are seriously impacted by the 8% MREL floor. Also nationalised banks are noticeably affected, as per the increase of 1.27% of their mean (Table 9).

Table 9: MREL estimations by ownership structure for DSIBs, unweighted

	With 8% floor			Without 8% floor		
Ownership structure	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
Commercial	249	11.41%	10.57%	249	11.03%	10.57%
Cooperative	195	10.85%	10.38%	195	10.09%	10.38%
Nationalised	155	10.37%	10.05%	155	9.10%	10.05%
Public	51	8.77%	8.00%	51	4.86%	3.69%
Savings	131	9.44%	8.40%	131	8.58%	8.40%
Total	**781**	**10.56%**	**9.69%**	**781**	**9.60%**	**9.69%**

Source: Authors

Shocks simulation

The results displayed by bank business model (Table 10) suggest that under an extreme stress condition, such as the events experienced in the financial crisis 2007-08, on average, 4.15% losses as a percentage of liabilities and own funds are wiped out from the banking system. Hence, this result suggests a minimum loss absorption requirement of at least 4.15% for all banks. An additional requirement of up to 20% can be imposed on diversified retail type 2, so that it can cover the above average additional losses as a percentage of their liability and own funds. Similarly, wholesale banks would incur an additional requirement of up to 3.75%, to account for the riskiness of their business models compared to the average bank. These results suggest that the MREL parameters may undergo serious tail risk for diversified retail type 2 banks and also, to a lesser extent, for wholesale banks.

Table 10: Profit/loss by business model as a percentage of liabilities and own funds, unweighted

Business model	**No. Obs**	**Mean**	**Median**	**1st perc.**	**5th perc.**	**10th perc.**
Focused retail	2,301	0.52%	0.53%	-3.83%	-1.04%	0.03%
Diversified retail type 1	3,777	0.46%	0.49%	-3.33%	-0.29%	0.13%
Diversified retail type 2	336	0.24%	0.39%	-24.23%	-2.20%	-0.18%
Wholesale	729	0.53%	0.45%	-7.92%	-1.50%	-0.36%
Investment	1,852	0.30%	0.38%	-3.58%	-1.20%	-0.42%
Total	**8,995**	**0.44%**	**0.48%**	**-4.14%**	**-0.89%**	**0.01%**

Source: Authors

Similarly, the results per bank ownership structure (Table 11) suggest a penalty of up to 8.9% can be imposed on nationalised banks so that their requirement will cover the more than 13% of losses as a percentage of their liability and own funds. Similarly, commercial banks would incur a penalty of about 3.3% to account for the particular riskiness of their ownership structure, while public banks will face an additional 2.25% of MREL requirement.

Of course, the regulator would apply some combination of the penalty formulae to account simultaneously for the business model and the ownership structure.

Table 11: Profit/loss by ownership structure as a percentage of liabilities and own funds, unweighted

Ownership structure	No. Obs	Mean	Median	1st perc.	5th perc.	10th perc.
Commercial	2,145	0.48%	0.61%	-7.48%	-2.36%	-0.86%
Cooperative	4,053	0.45%	0.48%	-2.16%	-0.24%	0.13%
Nationalised	235	-0.60%	0.11%	-13.08%	-6.64%	-2.62%
Public	181	-0.11%	0.27%	-6.41%	-1.97%	-0.10%
Savings	2,381	0.53%	0.46%	-2.14%	-0.07%	0.11%
Total	**8,995**	**0.44%**	**0.48%**	**-4.14%**	**-0.89%**	**0.01%**

Source: Authors

Peak losses at the 1st percentile seem to really discriminate among the three systemic groups. Up to a 3.9% penalty should be imposed to DSIB on top of the basic requirement of 4.15%, so as to cover 8.05% potential losses in case of distress.

It is important to notice that the real picture is somewhat blurred because of the bail outs of EU banks since the beginning of the financial crisis. Without any bailouts, the losses results would have been much higher than reported in these estimations, especially for the GSIBs.

Table 12: Profit/loss by systemic group as a percentage of liabilities and own funds, unweighted

Systemic group	No. Obs	Mean	Median	1st perc.	5th perc.	10th perc.
GSIB	132	0.50%	0.51%	-1.84%	-0.37%	-0.04%
DSIB	646	0.12%	0.33%	-8.05%	-1.84%	-0.80%
NSB	8,217	0.47%	0.48%	-3.89%	-0.79%	0.04%
Total	**8,995**	**0.44%**	**0.48%**	-4.14%	-0.89%	0.01%

Source: Authors

3. CONCLUSIONS

In this paper, we estimate the MREL using the total asset versus risk-weighted assets-based formulae from a unique database of business models, ownership structures and systemic importance covering more than 2500 European banks based on data available from 2005 to 2014. The estimations follow a three steps procedure. First, we use the TLAC formula; second we compare the results with MREL estimation based on the EBA RTS two criteria; and third we complement the analysis by shock simulations to assess the resilience of European banks in extreme stress conditions.

The results show that, when using the RWA or LRE, there is either variability between bank business models, ownership structures, systemic importance and/or between formulae.

In particular, when using RWA formula, focused retail and investment banks have the highest requirements, followed by the diversified retail type 1. In contrast, diversified retail type 2 and wholesale banks have the lowest requirements, the mean and median of which are between 7 and 8%. Based on the LRE, mean and median requirements converge to values slightly lower than 6.75% for all business models. Thus, the LRE-based requirements do not backstop those based on RWA, as confirmed by the combined requirements based on RWA and LRE.

As regards to ownership structures MREL requirement based on RWA are particularly low for public banks, pushing it from 5.69% to 6.77% in the combined maximum requirements. The LRE-based requirements make a slight correction to that low median level. As well, mean requirements for nationalised banks noticeably increase between their RWA estimate and the combined RWA and LRE maximum requirements.

As for DSIBs and based on the RWA formula, the median and mean requirements are strikingly low (in the range of 4.3% to 5.4%) for diversified retail type 2 banks and wholesale banks, compared to the rest of the industry (9.23%). As a consequence, the LRE based requirements are binding for most banks in these business models, and the combined maximum requirements reflect this situation.

When compared to the EBA RTS criteria, the results show that mean and median requirements of market-funded business models (diversified retail type 2, wholesale and investment banks) are sensitive to the 8% floor on their MREL. In contrast, focused retail and diversified retail type 1 banks are hardly affected by that floor. For all banks, average and median changes are due to the introduction of the floor and are rather moderate because of the low population of the market-funded business models. Indeed, these represent about a third of the sample.

Finally, when testing extreme shocks, the results suggest that under an extreme stress condition, such as the events experienced in the financial crisis 2007-08, on average, 4.15% losses as a percentage of liabilities and own funds are wiped out from the banking system. Hence, this result suggests a minimum loss absorption requirement of at least 4.15% for all banks. An additional requirement of up to 20% can be imposed on diversified retail type 2, so that it can cover the above average additional losses as a percentage of their liability and own funds. Similarly, wholesale banks would incur an additional requirement of up to 3.75% to account for the riskiness of their business models compared to the average bank. These results suggest that the MREL parameters may undergo serious tail risk for diversified retail type 2 banks and also, to a lesser extent, for wholesale banks.

In view of these results, it is highly recommended to keep the two metrics RWA and LRE and apply the maximum in each case. This means a full alignment of MREL to TLAC. Moreover, the MREL should be calibrated to the business models and the systemic footprint of banks.

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ANNEX 1. EBA RTS SIX CRITERIA

The following six criteria, set out in the RTS issued by the EBA and endorsed by the Single Resolution Board (SRB) (See SRB, 2016), are to be considered in setting the MREL.

The first and second criteria (loss absorption and recapitalisation) refer to the capital adequacy requirement.

i) The first criterion is a baseline and mandates the Resolution Authority to ensure that losses equal to regulatory capital requirements (both pillars 1 and 2) and buffers can be absorbed.

ii) The second criterion concerns the recapitalisation amount needed, in case liquidation is not the preferred resolution method. It is the minimum capital standard that should be met for (re)authorisation after resolution. This assessment should use, as denominators for capital ratios (RWA, leverage ratios), the most recent reported values or adjusted values if needed. Also, sustaining market confidence may imply that capital buffers be restored. Appropriateness of the resulting capital level should also be assessed with respect to the firm's peer group.

iii) The third criterion allows the Resolution Authority to increase the MREL to account for the impact of the exclusion of some bail-inable liabilities from loss, so that their holders risk receiving worse treatment than in case of insolvency and are, therefore, eligible for compensation by the resolution fund. Hence, the condition "no creditor worse off than under normal insolvency procedures" (NCWO) applies. The Resolution Authority is also allowed in such cases to determine whether this objective is better met through other measures that improve resolvability.

iv) According to the fourth criterion, the Resolution Authority can decide to reduce the MREL amount by the estimated contribution from the Deposit Guarantee Scheme. Article 110 of the BRRD states that this should be limited to the lesser of:
   a) The amount of losses covered depositors would have borne in insolvency
   b) 50% (or a higher percentage set by the Member State) of the target level of the deposit guarantee fund.

v) The fifth criterion requires that the Resolution Authority takes into account the size, business model, funding model and risk profile of the institution [article 45 (6) of the BRRD Directive]. The Resolution Authority should seek the transfer of the expertise of the Supervisory Authority, in particular knowledge from the Supervisory Review and Evaluation Process (SREP).

vi) The sixth criterion requires the Resolution Authority to have regard for the potential adverse systemic effect of the institution's failure. Some institutions, other than G-SIBs and DSIBs, can be identified as such (having a large systemic footprint). Additionally, Article 44 of the BRRD elicits the conditions for use of the resolution fund, namely that holders of relevant capital instruments and other eligible liabilities should have made a minimum contribution of 8% of total liabilities including own funds[4].

[4] This is considered as the main requirement currently hindering the endorsement of the RTS by the European Commission. See EBA (2016)

ANNEX 2. ESTIMATON OF TLAC

The TLAC applies only to GSIBs. Following are the results of the estimation.

By business models, unweighted

	18% RWAs			6.75% LRE			Max (18% RWA, 6.75% LRE)		
Business models	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
Diversified retail type 1	27	8.75%	8.53%	27	6.60%	6.60%	27	8.79%	8.53%
Wholesale	62	5.49%	5.35%	62	6.70%	6.70%	62	6.89%	6.71%
Investment	45	7.34%	7.90%	45	6.65%	6.65%	45	8.05%	7.90%
Total	**134**	**6.77%**	**6.09%**	**134**	**6.66%**	**6.68%**	**134**	**7.66%**	**6.76%**

By ownership structure, unweighted

	18% RWAs			6.75% LRE			Max (18% RWA, 6.75% LRE)		
Ownership structure	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**	**No. Obs**	**Mean**	**Median**
Commercial	107	6.96%	6.41%	107	6.66%	6.67%	107	7.85%	6.84%
Cooperative	16	5.90%	5.52%	16	6.72%	6.72%	16	6.86%	6.74%
Nationalised	11	6.14%	6.03%	11	6.66%	6.65%	11	7.00%	6.71%
Total	**134**	**6.77%**	**6.09%**	**134**	**6.66%**	**6.68%**	**134**	**7.66%**	**6.76%**