Understanding the Basel III Leverage Ratio Requirement

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Abstract
One of the main reasons for the global financial crisis was the excessive build up of leverage by the banks. To tackle this issue, the new set of Basel III regulations calls for a minimum leverage ratio requirement for banks, in addition to the existing risk-weighted capital requirement. In this article we explore in detail the main motivations for the introduction of the leverage ratio requirement. We also study how the banks' leverage ratio and the risk-weighted capital ratio are complementary to each other and how they co-move over the business cycle. Finally, we present the case of Portuguese banks faced with this new regulatory instrument. (JEL: G21, G28, G32)

Introduction

The recent financial crisis has exposed the shortcomings of one of the key instruments, used by policymakers, to regulate banks, namely, the risk-weighted capital ratio requirement. In the run up to the crisis, banks had been accumulating substantial amounts of leverage while maintaining robust capital ratios, all along. In the peak of the crisis, when credit risk materialization was high, banks were forced to rapidly deleverage to stay compliant with prudential regulations. This exacerbated the overall economic downturn. Having the benefit of hindsight, now, we know that ex ante high capital ratios were not adequate to absorb ex post losses on the balance sheets of troubled banks. What could be the reason behind this mismatch between ex ante safety and ex post distress? The answer lies in understanding how the regulation is devised in the first place. Put simply, the risk-weighted capital ratio requirement (RWR) is that the bank capital should be a certain fraction of its' risk-weighted assets (say 8%). The problem is that the risk-weights that are applied to the various asset categories might not be able to reflect the true risk of a particular asset. Despite numerous refinements and revisions over the last two decades, the weights applied to asset categories seem to have failed to

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fully reflect banks' portfolio risk causing an increase in systemic risk (Acharya and Richardson (2009), Hellwig (2010), and Vallascas and Hagendorff (2013)).

The new Basel III regulations proposes a minimum leverage ratio requirement (LR), defined as a bank's Tier 1 capital over an exposure measure, which is independent of risk assessment (Ingves (2014)), and this is the fundamental difference between this new requirement and the already existing risk-weighted capital requirement. The aim of the leverage ratio is to act as a complement and a backstop to the risk-weighted capital requirement. It should counterbalance the build-up of systemic risk by limiting the effects of risk weight compression during booms. The leverage ratio is therefore expected to act counter-cyclically, being tighter in booms and looser in recessions.[1] The leverage ratio indicates the maximum loss that can be absorbed by equity, while the risk-based requirement refers to a bank's capacity to absorb potential losses.

The main difference between the LR and the RWR stems from the risk weights that are applied to various asset categories. During the boom phase of the business cycle, credit risk materialization is low. Hence banks have an incentive to expand the size of their balance sheets. This results in the lowering of risk weights, giving the impression that banks are well capitalized. Overoptimistic assessment of risk weights lead to large-scale extension of credit and hence decline in lending standards. The reduction of risk weights could be particularly strong in a period in which interest rates are low.[2] When credit risk materializes, bank capital serves as a cushion to absorb the losses. It is mainly for this reason that we need a non risk based measure that will complement the RWR. The LR would counterbalance the effects of falling risk weights. It would be the stricter constraint during booms and thereby prevent excessive increase in the size of bank balance sheets.

The opposite happens during economic downturns. During such times, risk weights are high and hence the capital requirement constraint tightens but the leverage requirement is unaffected by the changes in risk weighting. The RWR will be the tighter constraint in recessions while the LR remains slack. It must be clarified here that the LR does not provide information about the underlying risks on the banks' balance sheets. This insensitivity to risk may incentivise banks to take on riskier positions, which is what the RWR should account for. The RWR and the LR, therefore, are complements - and not substitutes - within the broader regulatory framework. They should work together to limit the boom-bust cycle. For this synchronization to work, in technical terms, the LR should be more countercyclical than the RWR

1. We will demonstrate this with the help of a simple theoretical framework and also be specific about the Portuguese case later in the article.

2. This is the so-called the risk-taking channel (Borio and Zhu (2008), Adrian and Shin (2014), Altunbas et al. (2014)).

and indeed we have empirical evidence to show that it is the case, Brei & Gambacorta (2016).

The use of a LR requirement is not a new concept. A similar measure has been in force in Canada and the United States since the early 1980s. Canada introduced it in 1982 after a period of rapid leveraging-up by its banks, and tightened the requirements in 1991. In the United States, the LR requirement was introduced in 1981 amid concerns over bank safety due to falling bank capitalization and a number of bank failures. The introduction of a leverage ratio requirement for large banking groups was announced in Switzerland in 2009 (FINMA, 2009). Similar requirements have been proposed, more recently, in other jurisdictions as well, with a view to implementing them by 2018 (BCBS, 2014b).

The goal of this article to explore this new regulation further and understand some of the key issues involved. We first start with the formal definition and motivation of introducing this new regulation in the Basel III guidelines. Next, we try to analyze the dynamics (and understand the main mechanism) of the LR and RWR using a simple model. Lastly, we look at the case for Portuguese banks and how they are set to fare once this new regulation is fully implemented in Portugal.

The Leverage Ratio Requirement

The Basel Banking Regulations have undergone quite a few changes since their inception in the late 1980s. The first accord (Basel I) was adopted in 1988. The aim of this accord was to harmonize bank capital regulation across countries. It also aimed at making the international banking system more resilient when faced with adverse economic scenarios. Different asset classes were assigned risk weights ranging between 0 and 100% according to the bank's perceived risks. The banks had to hold a minimum amount of capital relative to the total risk-weighted assets. Basel II was first published in 2004. There were quite a few changes made to the Basel I framework but, probably, the most significant deviation from Basel I was perhaps that it allowed banks to use their internal models to evaluate risk, once they were approved by the respective supervisory authorities. With the onset of the global financial crisis in 2008, a number of weaknesses were perceived in the existing regulatory framework. The Basel Committee on Banking Supervision developed the third Basel Accord (Basel III) with the aim of implementing it in 2018. The fundamental concern was that the risk weights applied to the various asset categories had failed to fully reflect the underlying risk in banks' portfolios. Therefore, there was need for an additional (complementary) instrument that could act as a backstop for the already existing risk-based capital ratio

requirements. This was the motivation for the introduction of the leverage ratio requirement.[3]

The leverage ratio requirement, as envisaged in the Basel III framework, is a simple and non-risk based regulatory instrument aimed to act as a credible supplement to the risk-weighted capital requirement. According to BCBS (2014a), the LR is intended to:

- Restrict the build-up of leverage in the banking sector and thereby avoiding the rapid deleveraging process that we observed during the great financial crisis. This is of paramount importance because such rapid deleveraging can be detrimental for the broader financial system and the real economy.
- Act as a "backstop" measure to the more complex RWR.

The LR can be formally written as:

$$\text{Leverage Ratio} = \frac{\text{Capital Measure}}{\text{Exposure Measure}} \geq 3\% \tag{1}$$

The 3% represents the latest regulation as envisaged in Basel III.[4] The capital measure is the Tier 1 capital, the same used in the RWR. The Tier 1 capital in turn consists of Common Equity Tier 1 and Additional Tier 1 capital. Common Equity Tier 1 capital consists of the sum of the following elements:[5]

- Common shares issued by the bank.
- Stock surplus (share premium) resulting from the issue of instruments included Common Equity Tier 1.
- Retained earnings (includes interim profit or loss).
- Other income and disclosed reserves.
- Common shares issued by consolidated subsidiaries of the bank.
- Regulatory adjustments in the calculation of Common Equity Tier 1.

Additional Tier 1 capital consists of the sum of all other instruments issued by the bank, or its' subsidiaries, that are not included in the CET 1 but are eligible to be included in the Additional Tier 1 category.

3. For a more detailed evolution of the Basel Banking Framework, refer Gambacorta and Karmakar (2017).

4. Refer the Group of Central Bank Governors and Heads of Supervision (GHOS) press release dated 11th January, 2016. (http://www.bis.org/press/p160111.htm). There is still an ongoing debate about the possibility of a leverage surcharge for global systemically important banks (G-SIBs). Most of the existing leverage ratio frameworks indicate an additional surcharge of 1-2% (Bank of England, Financial Stability Report, 2016). The additional surcharge for G-SIBs on the risk-weighted capital ratio has been already designed by the Basel III regulation following a bucket approach from 1-3.5% (http://www.bis.org/publ/bcbs255.pdf).

5. Dividends are removed from Common Equity Tier 1 in accordance with applicable accounting standards. Further details can be found in www.bis.org/publ/bcbs189.htm.

A bank's total exposure measure is the sum of: (a) on-balance sheet exposures; (b) derivative exposures; (c) securities financing transaction (SFT) exposures; and (d) off-balance sheet (OBS) items. Banks are not allowed to consider collateral guarantees (of any type) or other credit risk mitigation techniques to reduce the exposure measure. Banks must include all balance sheet assets in their exposure measure, including on-balance sheet derivatives collateral and collateral for SFTs. Liability items such as gains/losses on fair valued liabilities due to changes in the bank's own credit risk must not be deducted from the exposure measure. Off balance sheet items include commitments (including liquidity facilities), direct credit substitutes, acceptances, standby letters of credit, and trade letters of credit. In the risk-based capital framework, OBS items are converted under the standardised approach into credit exposure equivalents. For the purpose of determining the exposure amount of OBS items for the leverage ratio, the credit conversion factors are set out in paragraphs 14 to 22 of the Annex of BCBS (2014a).

Interaction with the Risk-Weighted Capital Requirement

While discussing the interaction between the LR and the RWR, a useful concept to keep in mind is the "density ratio", (DR), Fender and Lewrick (2015). DR is defined as the ratio of the risk-weighted assets (RWA) to the LR exposure measure. The density ratio can also be interpreted as an average risk weight per unit of exposure, for any given bank or banking system. A specific value of the DR for which it is equally likely to be bound by the RWR or the LR is called the Critical Average Risk Weight (CARW). Any bank having a DR less than the CARW is more likely to be constrained by the LR than the RWR while any bank presenting a DR above the CARW is more likely to be constrained by the RWR. The relationship between the LR and the DR can be obtained as follows:

$$\text{LR} = \frac{\text{Capital}}{\text{RWA}} * \frac{\text{RWA}}{\text{Exposure}} = \text{RWR*DR} \tag{2}$$

The LR can thus be expressed as the product of the risk-weighted capital ratio (RWR= Capital/Risk-weighted assets) and the DR. This relationship can help us calibrate a consistent minimum LR requirement.

Let us consider the last equation. If, all else equal, a bank's internal risk model underestimates the risk weights on the various asset classes, this will bias the Tier 1 capital ratio upwards, thereby satisfying the RWR. However, at the same time, the DR is also biased downwards, causing the LR to fall and making it the binding constraint. Conversely, for a given LR requirement, a bank with a relatively low DR will have an incentive to shift its balance sheet towards riskier assets to earn more income - a type of behavior that the RWRs

would constrain. This suggests that banks' risk-weighted capital ratios and the LR provide complementary information when banks' resilience is assessed.

It must be highlighted here that the benefits of implementing the LR requirement outweigh the costs only when done in conjunction with the RWR. What would happen if the LR requirement were the only regulation in operation? The non-risk based nature of the LR would indeed incentivize risk taking by banks. The main concern relates to this risk-insensitivity: assets with the same nominal value but of different riskiness are treated equally and face the same capital requirement under the non-risk based LR. Given that an LR requirement has a skewed impact, binding only for those banks with a large share of low risk-weighted assets on their balance sheets, the move away from a solely risk-based capital requirement may thus induce these banks to increase their risk-taking potentially offsetting the benefit gained from requiring them to hold more capital. These concerns are valid but they need to be analyzed in light of the overall prudential framework in place and not in isolation. When banks increase the risk on their balance sheets, it raises banks' risk-weighted assets, provided that the risk weights are properly determined, so that at some point the risk-weighted capital requirement becomes binding again. Hence, the potential for a marginal increase in risk-taking owing to an LR requirement should be limited as long as both approaches to capital regulation are mutually reinforcing.

A Simple Theoretical Framework

In this section, we briefly discuss the model developed in Gambacorta and Karmakar (2017), which, to the best of our knowledge, is the first paper that attempts to model the two regulatory requirements in the realm of a medium sized dynamic stochastic general equilibrium (DSGE) model. It builds on the model by Gerali et al. (2010) and Angelini et al. (2014). It must be made clear at the very outset that there are some trade-offs to using this framework. The framework incorporates a non-naive financial sector, besides featuring credit frictions, borrowing constraints and a set of real and nominal rigidities. The households and the borrowing constraints of the agents are modeled as in Iacoviello (2005) while the real and the nominal rigidities are similar to the ones developed in Christiano, Eichenbaum and Evans (2005) and Smets and Wouters (2003). The borrowing constraints and the bank's regulatory constraints are always binding and not occasionally binding. Further, the banks take the regulation as exogenously given and they are not modeled with an aim to eliminate certain inefficiencies or market failures like moral hazard or bank runs. The model mainly studies the dynamics of the two ratios and how the cyclicality of the risk weights drives a wedge between the RWR and the LR. In that sense, this is a purely positive paper. It does not feature bank defaults and, hence, does not address normative questions regarding

the optimality of these ratios. We refer the reader to the paper (Gambacorta and Karmakar (2017)) for a detailed account of the different agents and their optimization problems. The model can be depicted by means of figure 1. A brief description of the environment is as follows.

- There are two types of households (patient and impatient) who consume, supply labor, accumulate housing (in fixed supply) and either borrow or lend.
- The two types of households differ in their respective discount factors. The difference in discount factors leads to positive financial flows in equilibrium. The patient households sell deposits to the banks while the impatient households borrow, subject to a collateral constraint.
- The entrepreneurs hire labor from the households, and buy capital from the capital goods producers, to produce a homogeneous intermediate good.
- Similar to the impatient households, the entrepreneur also faces a collateral constraint while drawing a loan from the bank.
- The banks accept deposits and supply business and mortgage loans. The banks have a wholesale and a retail unit. They are monopolistically competitive. In other words, they set lending and deposit rates to maximize profits.
- The banks can only accumulate capital through retained earnings i.e. we do not allow for equity issuance.
- On the production side, there are monopolistically competitive retailers and capital goods producers.
- The retailers buy intermediate goods from the entrepreneurs, differentiate and price them, subject to nominal rigidities.
- The capital goods producers manufacture the capital to be used in the production process and in the context of the model, they help us introduce a price of capital to study asset price dynamics.
- The model also features a monetary authority and a macroprudential authority. The monetary authority sets policy rates and follows a standard Taylor rule.
- The macroprudential authority sets the minimum risk based capital and leverage requirements.

We only recreate the two main constraints from bank's optimization problem to understand how the risk weights drive a wedge between the two regulatory ratios. The bank maximizes profits which include receipts from lending to households and entrepreneurs net of deposit financing costs and adjustment costs. Let B_t^H and B_t^E denote lending to households and firms respectively and K_t^b be the bank capital. Then the RWR and the LR can be written as:

$$\frac{K_t^b}{\omega_t^H B_t^H + \omega_t^E B_t^E} \geq \nu_t \tag{3}$$

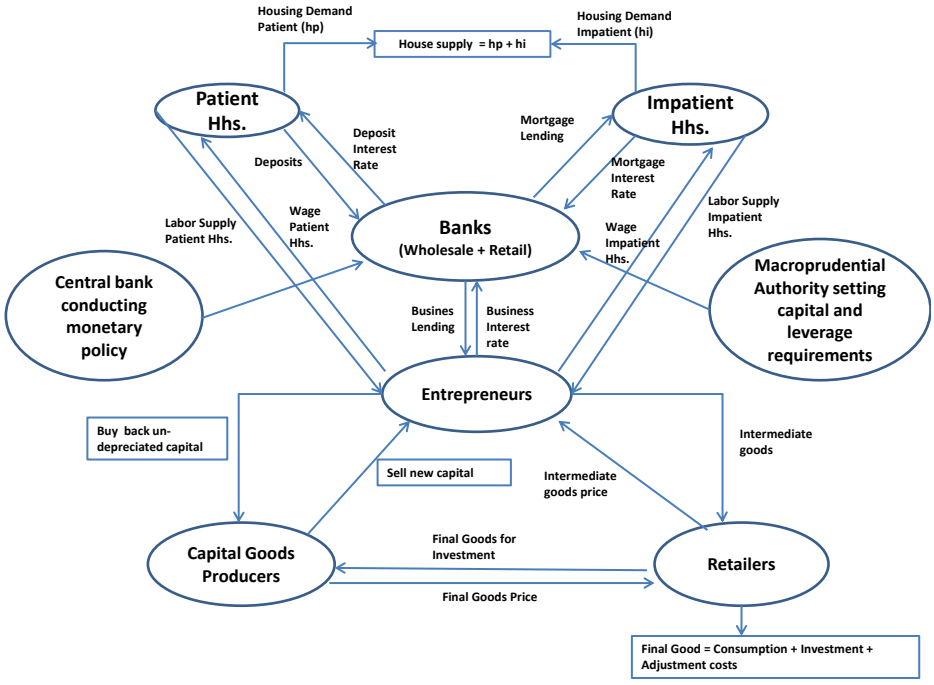


FIGURE 1: The Model Overview: Gambacorta & Karmakar (2017)

$$\frac{K_t^b}{B_t^H + B_t^E} \geq \varphi^b \tag{4}$$

where, φ^b is the LR requirement calibrated at 5%[6] and ν_t is the countercyclical capital requirement which responds to changes in the credit-to-GDP ratio around its steady state value. The steady state value of the risk-weighted capital requirement is set at 8.5%. ω_t^H and ω_t^E are the risk weights attributed to mortgage and business loans respectively. They follow the law of motion:

$$\omega_t^i = (1-\rho^i)\overline{\omega}^i + (1-\rho^i)\chi^i log\left(\frac{Y_t}{Y_{t-4}}\right) + \rho^i\omega_{t-1}^i, \quad i = H, E \tag{5}$$

In the above equation, $\overline{\omega}^i$ corresponds to the steady-state risk weights on household and business lending. $\chi^i < 0$ which means the risk weights tend to be low during booms and high during recessions. The cyclicality of the risk weights is what differentiates a bank's regulatory capital ratio

6. This is a bit higher than the 3% requirement imposed on European banks but this can be justified by the fact that we do not include some of the other exposures that banks might hold, like public debt.

from its leverage ratio. The law of motion for risk weights, though simple, captures one of the main ideas embedded in the Internal Risk Based (IRB) approach to computing risk weight functions. Credit risk in a portfolio may arise owing to systematic or idiosyncratic factors, (BCBS 2006). Systematic risk represents the effect of unexpected changes in macroeconomic and financial market conditions on the performance of borrowers while idiosyncratic risk represents the effects of risks that are particular to individual borrowers. As a lender's portfolio becomes more granular idiosyncratic risk can be completely diversified away. But the situation is completely different for systematic (aggregate) risk as very few firms are completely shielded from the macroeconomic environment in which they operate. Therefore this risk is undiversifiable and hence can cause the riskiness of the borrowers to move countercyclically. The risk-weight function is motivated from this idea. We allow the risk weights attributed to a specific asset class to move with the growth rate of real GDP at time 't', Y_t, which is our proxy for the aggregate risk factor.

Discussion of findings

The authors study the response of the economy to a positive productivity (TFP) shock and a positive shock to the loan to value ratio on mortgage lending.[7] The main mechanism is illustrated by the figure 2. Following a positive TFP shock, the systematic risk in the economy is significantly reduced which is reflected in the dynamics of risk weights, as shown in the left panel. This decline in risk weights could encourage excessive risk taking during booms while maintaining healthy risk-weighted capital ratios and this is precisely what the leverage ratio aims to correct. The right hand panel shows how the leverage ratio and the risk-weighted capital ratio evolve. During booms, lending to households and firms increases, driving down the leverage and the capital ratio. However, risk weights also decline and therefore the decline in the leverage ratio (non-risk-sensitive) is larger than the capital-to-RWA ratio and is hence the more stricter constraint in booms. Note that the reverse happens in recessions when the risk weights increase. The RWR becomes the more binding constraint in economic downturns. Thus the leverage ratio is intended to be the constraining ratio in booms and the milder constraint in a downturn. Note that the assumption made here is that the numerator (bank capital) adjusts slowly and therefore the dynamics of the ratios are mainly driven by the elements in the denominator.

Through a number of other exercises the authors document that the introduction of the leverage ratio requirement can lead to a loss in steady state output and consumption but the volatility reduction in real and nominal

7. The dynamics of the entrepreneurial lending are similar.

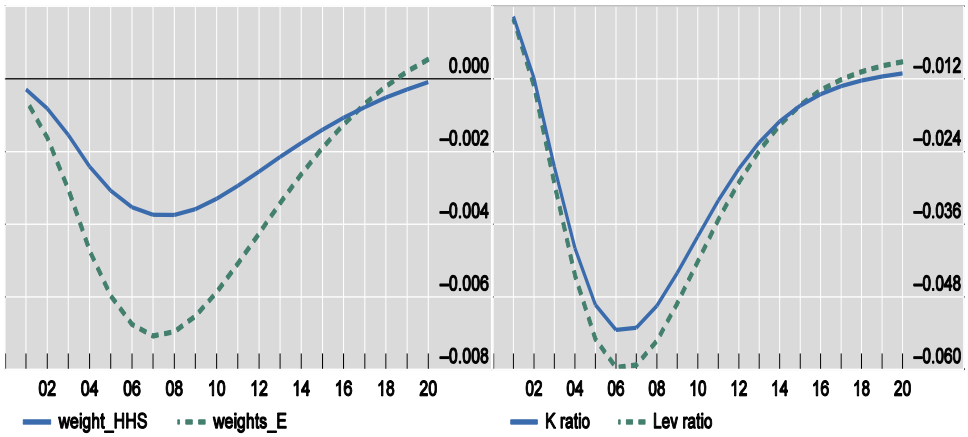


FIGURE 2: Risk Weights & Regulatory Ratios

variables is significantly higher. To provide an example, the authors mention that the introduction of the LR requirement generates a loss in steady-state output in the range of $0.7 - 1.7\%$ but it also reduces output volatility around $24 - 28\%$. To put these magnitudes in perspective, they make a comparison with other studies that have evaluated the impact of Basel III. Simulations conducted in BCBS (2010) using a wide range of econometric tools, mostly DSGE models, find that on average a 2% increase in risk-weighted capital requirements leads to a reduction in the steady-state output of 0.2% and output volatility of 2.6%. The numbers presented in Gambacorta & Karmakar (2017) indicate that introducing the leverage ratio produces a somewhat larger cost on steady state output but the benefits in terms of reduction of output volatility are substantially larger. Besides studying the impact of a positive TFP shock and a shock the LTV ratios, the authors also discuss what would happen if the cyclicality of risk weights were to change. They show that the

benefits of introducing the leverage ratio can be substantially higher when risk weights are more sensitive/responsive to the business cycle.[8]

The case of Portugal

Having built up a broad understanding of the leverage ratio requirement, we now focus our attention to the specific case of Portugal. We address questions such as (i) How do the Portuguese banks' balance sheets fare once faced with the new set of regulations? (ii) How do Portuguese banks compare with their European peers? (iii) Are they likely to be constrained by the RWR or the LR? (iv) What are the cylical properties of the two ratios in Portugal? and (v) Will this regulation be effective for Portugal going ahead in the future, say 2020 when the capital conservation buffer of 2.5% is fully phased in?[9]

Over the recent years major Portuguese banking groups have consistently increased their risk weighted capital ratios, as well as improved their leverage ratios, in line with the current Basel III definitions.[10] In this regard they have accompanied their European peers in the convergence process towards more demanding supervisory requirements, encompassed in the Basel III agreement and in the European regulatory framework. This can be observed in the left panel of figure 3 which plots the RWR and the LR for the Portuguese banks, from March 2005 onward.[11] On the right panel we decompose the ratios and plot the numerator and denominator separately, all normalized to be 1 in Q1:2005.[12]

It is visible that the upward trend of the ratios has been driven by sustained increases to banks' capital, accompanied by the deleveraging process that has been occurring since 2010. By the end of the second quarter 2012 a considerable number of institutions, subject to Banco de Portugal's supervision, had already achieved a Core Tier I ratio in excess of the 10% objective defined in the Economic and Financial Assistance Program, to be

8. If risk weights are calculated using the 'through the cycle' approach (as in Basel III), they are expected to be less procyclical than the formerly used 'point in time' estimates.

9. The capital conservation buffer is designed to ensure that banks build up capital buffers outside periods of stress which can be drawn down as losses are incurred. The requirement is based on simple capital conservation rules designed to avoid breaches of minimum capital requirements.

10. This section is based on the analyses to be published in the December 2017 Financial Stability Report, regarding the introduction of the leverage ratio in the Portuguese macroprudential toolkit.

11. Focusing on the LR it appears that the banks in Portugal are well in compliance with the 3% minimum envisaged in Basel III. The United States and Canada, however, have a requirement which is around 5%.

12. The Portuguese banks who participated in the transparency exercise were Banco BPI, BCP, Caixa Central de Credito Agricola Mutuo, Montepio, CGD, and Novo Banco.

achieved by December 2012. The four major Portuguese banking groups also complied with the prudential recommendations of the European Banking Authority (EBA) for June 2012. This significant increase of original own funds reflected the capitalization operations of the main banking groups. Besides the solvency requirement, the Portuguese banks also had to meet a maximum loan-to-deposit ratio. This accounts for the deleveraging observed in the series for risk-weighted assets and the exposure measure.

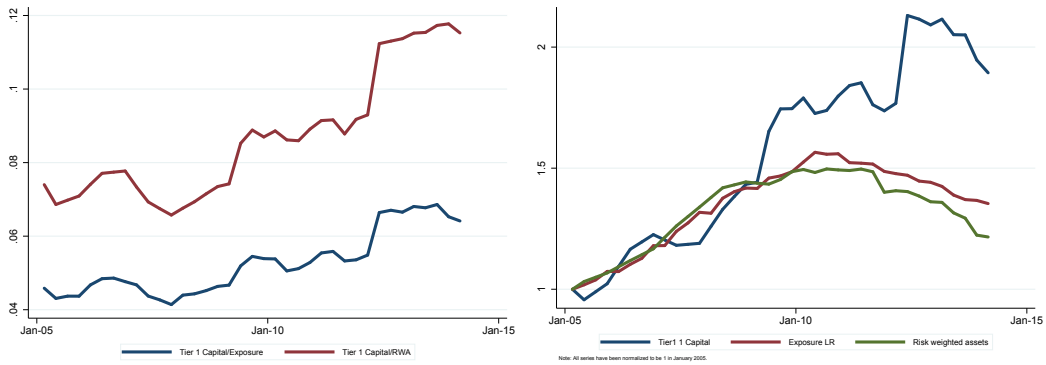
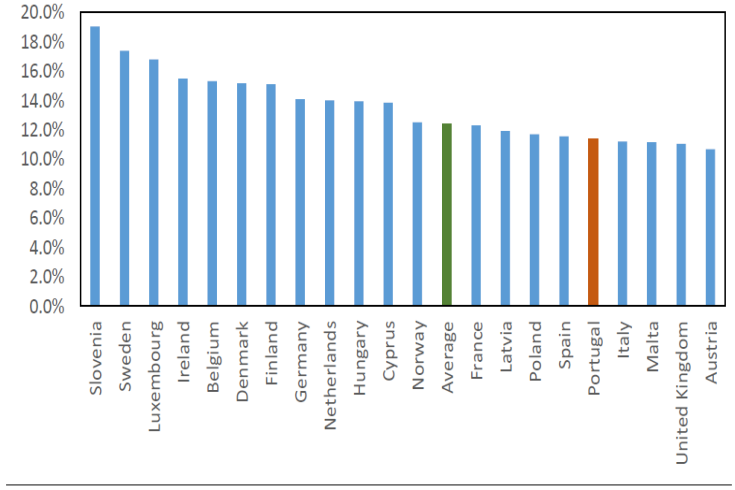


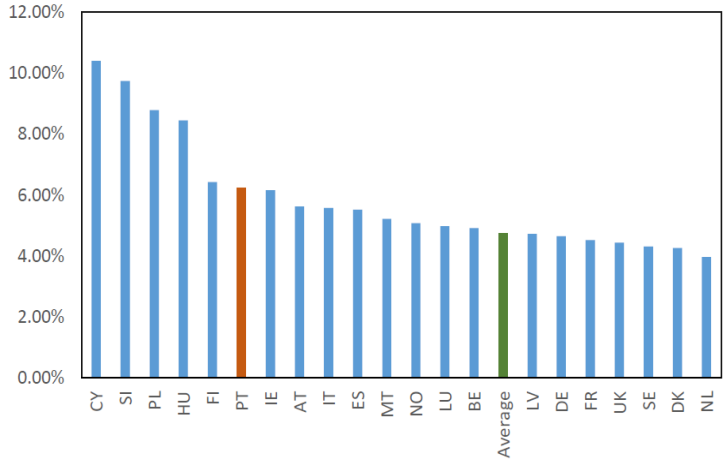
FIGURE 3: Regulatory Ratios & Decomposition

In spite of this recent trend, Portuguese banks have consistently ranked among the lowest capitalized banks in Europe. In fact, in the latest European Banking Authority transparency exercise (December 2016, with reference date June 2016) the participating Portuguese banking groups ranked last regarding the average CET1 ratio. In the previous EBA transparency exercise published on November 2015, with reference date December 2014, the major Portuguese banking groups that participated in the exercise (CGD, BCP, and BPI) presented an average Tier 1 ratio of 11.4%, below the average for European banks (12.4%). In fact, Portuguese banks in the sample ranked 17th out of the 21 countries, regarding the Tier 1 capital ratio, as can be observed from the top panel of figure 4.

In the same exercise, the major Portuguese banking groups presented a weighted average leverage ratio (LR) of 6.2%, which compares with a weighted average of 4.7% for all European banks in the sample. In terms of ranking, Portuguese banks demonstrated the 6th highest average ratio in a sample of 21 countries, bottom panel of figure 4. These, apparently, inconsistent findings can be rationalized if one compares the density ratio (DR) of the Portuguese banks vis-à-vis their European peers. In fact, both in December 2014 and in in long run analysis since the year 2000, the Portuguese banks' risk exposure to total assets has persistently presented higher values than their European counterparts.



Source: 2015 EBA transparency exercise. Tier I capital ratio computed as the quotient between Tier I capital and Risk Weighted Assets.

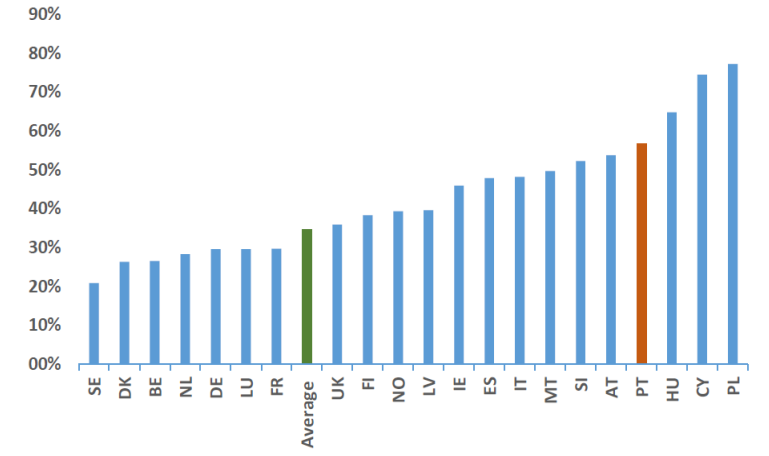


Source: 2015 EBA transparency exercise. Leverage ratio computed as the quotient between Tier I capital and Total Exposure.

FIGURE 4: Tier 1 Capital Ratios & Leverage Ratios

Regarding December 2014, it can be observed that the sample of Portuguese banking groups ranked 4th highest regarding RW density, with an average of 57%, well above the average risk weight density for the European

sample (35%).[13] Results are depicted in figure 5 below and the heterogeneity among European banking systems can also be observed, with average risk weights ranging from 21% in Sweden to 77% in Poland.[14]



Source: 2015 EBA transparency exercise (RWA) and SNL (Assets). Average Risk Weight computed as the quotient between Risk Weighted Assets and Total Assets.

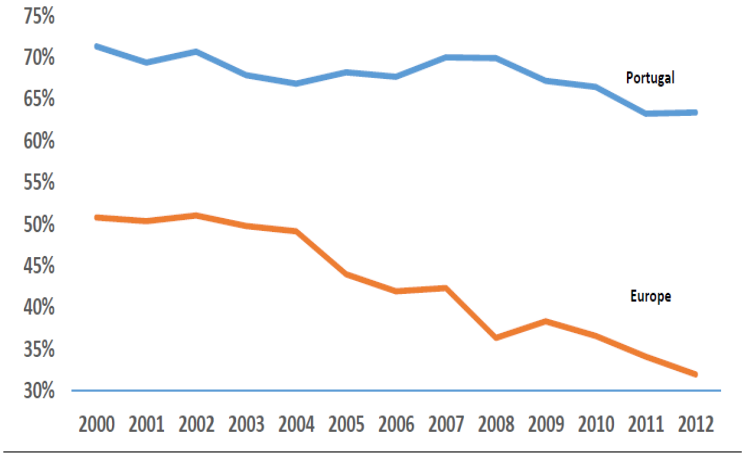
FIGURE 5: Risk Weight Densities

The fact that the Portuguese banks present higher density ratios can also be seen in figure 6, which presents a long run analysis of a larger sample of banks. The density ratio has been falling, both in Portugal and in the sample of other European countries, but at a greater pace in Europe as a whole, thereby, widening the gap that could already be observed in year 2000. Albeit European DR increased slightly in 2009, following the financial crisis, Portuguese DRs kept its downward path and has stabilized in recent periods, above 65%.

Even though these results can be regarded as reflecting the higher riskiness of these banks' portfolio, including country specific risk factors, the result can also be partly attributed to a more conservative methodology in

13. The latest transparency exercise published in December 2016 does not include data regarding the leverage ratio.

14. In this regard, it should be noticed that when the Basel II agreement was implemented regulators set up a backstop system, the so called Basel I floor. In fact, to prevent banks' internal risk weights from reducing risk-weighted assets and thus banks' capital needs too much and too quickly, temporary, lower limits were set for how much capital could be reduced. These limits were set relative to the previous framework, Basel I, which had a fixed set of risk weights and are referred to as the "Basel I floors". It can be argued that the Basel I floor is akin to an implicit leverage ratio requirement.



Source: Bankscope. Average Risk Weight computed as the quotient between Risk Weighted Assets and Total Assets.

FIGURE 6: Risk Weight Densities Overtime in Portugal & the European Union

the assessment of risk weights, in some jurisdictions than others. In fact, simulations with a theoretical portfolio conducted by the Basel Committee on Banking Supervision (BCBS) and the European Banking Authority (EBA) have shown that different institutions obtain results that differ materially, for the same theoretical portfolio.[15] Further, one of the arguments to introduce the LR as binding prudential requirement has been its ability to mitigate the variability in risk weights, for a fixed portfolio. In fact, if a banks' RWA is very low, then, given the same quantum of capital, this bank will have higher capital ratios than a bank with a higher average risk weight. Whether risk based or non-risk based capital requirements are the most constraining depends, inter alia, on the (i) relative calibration of the requirements and (ii) the specific balance sheet of the institution and the risk weights assets calculation, and (iii) the cyclical properties of the regulatory ratios. Let us elaborate on each of these factors.

Relative calibration of the requirements

Equation (2) derives the density ratio given the calibration of the LR and the RWR. We also remind the reader that the CARW is that value of the density

15. https://www.eba.europa.eu/risk-analysis-and-data/review-of-consistency-of-risk-weighted-assets.

ratio such that it is equally likely to be constrained by the LR or the RWR.[16] We reproduce equation (2):

$$\text{LR} = \frac{\text{Capital}}{\text{RWA}} * \frac{\text{RWA}}{\text{Exposure}} = \text{RWR*DR}$$

Hence, given a minimum LR requirement of 3% and a minimum RWR requirement of 8.5%, the CARW would be 0.35. An institution having a DR equal to 0.35 is equally likely to be constrained by either of the two regulatory ratios while an institution with a DR below 0.35 would be more likely to be constrained by the LR requirement. It is clear that each bank will have a different CARW, since some institutions are subject to additional risk weighted requirements, given their systemic relevance (G-SIIs; O-SIIs).[17] Moreover, the countercyclical capital buffer (CCyB) requirements are institution specific, as a result of country specific countercyclical requirements and different country exposures.[18]

In 2017, risk based requirements for all Portuguese banking groups amounts to 7.25% of the total risk exposure amount. This includes the phasing in of the capital conservation buffer, which is currently set at 1.25%. Pillar II requirements are institution specific and confidential. In particular, institutions under the direct supervision of the ECB/SSM, pillar II requirements are material and influence the balance of both requirements. It must be noted that higher pillar II requirements only reinforce our conclusions.

In 2020, the capital conservation buffer will reach its steady state level of 2.5%, hence, total RWR is going to be 8.5% of RWA (6%+2.5%). The maximum O-SII buffer set by the macroprudential authority in 2016 is 1% of risk weighted assets, although it varies across institutions. Therefore, taking this additional 1% O-SII buffer into consideration, the total requirements in 2020, excluding pillar II, are expected to be 9.5% of the risk exposure amount.[19]

Considering a leverage based requirement of 3%, the CARW will be 41% in 2017 and 32% in 2020. Three points should be noted: (i) changes in any one of the requirements alters the CARW and the relative stringency of the

16. It should however be noted that this specification overlooks that the RWR is based on exposure at default values and not total assets and that the LR capital requirement is based on the LR exposure measure and not total assets. Nevertheless, both measures relate to total assets and the additional complexities would not render additional value.

17. G-SIIs implies Globally Systemically Important Institutions and O-SIIs implies Other Systemically Important Institutions. Portugal does not have any banking group categorized as G-SII.

18. For further information, please refer to the Financial Stability Report, Bank of Portugal, November 2016, Box 1.

19. The Countercyclical Capital Buffer (CCB) has been set at zero per cent of the RWA and the Other Systemically Important Institutions buffer (O-SII) will only start to be phased-in in 2018 and, as such, is also zero.

requirements; ii) the relative stringency of the LR will decline with the gradual phasing in of the capital conservation buffer, and iii) for the Portuguese banks, in both of the above situations (2017 and 2020), the average risk weight is above the CARW implied by the given set of regulations.

These broad calculations point to the fact that the Portuguese banks are overall not expected to be constrained by the implementation of the LR requirement. One final point or counterfactual could be taken into consideration. The calculations above consider a LR requirement of 3%, which is indeed the calibration in the latest Basel III guidelines. But, as has been mentioned earlier, in some other jurisdictions like the USA or Canada, the requirement is higher at around 5%. Should the LR requirement be raised in the future, then, considering the pilar I requirement to be 9.5%, the CARW would turn out to be 0.53. With this significantly higher CARW, it is possible that some banks would find themselves constrained. The broad message is that given the current set of regulations, the constraint does not appear to be a binding one in the future but it could be, given alternative calibrations of the key policy parameters.

Institutions' Balance Sheets

It is clear that the specific balance sheet of the institution impacts the average risk weight across portfolios and, as such, if an institution should be above or below the CARW and, consequently if it is constrained by the RWR requirement or by the LR requirement. For instance, if all the assets of a Portuguese bank were constituted by sovereign debt for which a zero risk weight is applicable, then the average risk would be very low and much below the CARW. As such, the LR would be the binding requirement.[20] Therefore the asset composition of banks are crucial in determining which of the regulatory constraints might be the more stringent one.[21]

Cyclicality of the LR and the RWR

One of the main motivations for introducing the LR requirement in addition to the RWR requirement is that the LR is supposed to be more countercyclical than the RWR, thereby, being the binding constraint in booms and the slack constraint in busts. When countercyclical properties of a particular capital ratio is assessed vis-à-vis other capital ratios, the one that demonstrates more countercyclical properties will be the first to signal the need for corrective action from the bank. In this sense, it would be a tighter constraint in booms

20. That is, if it issued by any of EU central governments and also denominated and funded in euros.

21. Indeed that is what happens, inter alia, with Public Development banks in France and Germany, which hold large portfolios of exposures that are guaranteed by the Government.

and a looser constraint in recessions. So, what are the cyclical properties of these ratios in Portugal? In other words, *Is the leverage ratio more countercyclical, than the risk weighted capital ratio, for the Portuguese banking system?*

Building on the methodology implemented by Brei and Gambacorta (2014, 2016), Batista (2015) assesses the cyclical properties of the leverage ratio of the banks in Portugal and compares them with those of other capital ratios (Tier 1 ratio and the accounting leverage ratio). Further, the cyclicality of the various components of the ratios was also assessed. The study was conducted using a sample of the largest banking groups operating in Portugal.[22]

Brei and Gamabacorta (2014, 2016) and EBA (2016)[23] were the first studies to have used the leverage ratio and document its higher countercylicality compared to other risk-based measures. A similar result was expected for Portugal as well. Batista (2015) documents that both Basel III leverage ratio and Tier I ratio are counter-cyclical in Portugal, in line with earlier studies. However, the Tier 1 ratio shows a slightly higher counter-cyclical behavior than the LR. These results tie in with the observations above regarding the average risk weight for Portuguese banks. It has been documented earlier that the average risk weights for Portuguese banks is significantly above the CARW and the empirical analysis simply corroborates the fact these banks are more likely to be constrained by the RWR than the LR.

This difference with other studies could also be attributed to the fact that majority of Portuguese banks use the standardized approach of reporting rather than the internal ratings based methodology, where the risk weights are more sensitive to the business cycle and move countercyclically. The analysis of the data for the major Portuguese banking groups leads to the conclusion that given the relative calibration of risk-based and leverage-based requirements and the high risk weight density of the Portuguese banks, the leverage ratio is not expected to be the constraining capital requirement for these banks. Additionally, the use of the LR as a macroprudential tool does not appear effective at present. Further, any macroprudential add-on to the requirement would have to be calibrated at a very high level in order to contain the buildup of pro-cyclical leverage. Alternatively, if these banking groups increase the holdings of sovereign debt or other low risk weight exposure assets, the existence of the LR requirement will put a limit to the balance sheet size, given a determined risk-weighted capital requirement.

22. Caixa Geral de Depósitos (CGD); Banco BPI (BPI); Banco Comercial Português (BCP); Banco Espírito Santo (ES); Banco Santander Totta (BST), and Caixa Económica Montepio Geral (CEMG).

23. This study adapts Brei and Gambacorta (2014), while focusing on the sample of European banks that have been included in the quantitative impact analysis of Basel III requirements, conducted by the EBA.

Conclusion

In this article we have put forward the rationale for having an additional leverage ratio requirement over and above the risk weighted capital ratio requirement. When risk weights are countercyclical, then in good times, banks can increase the size of their balance sheets while maintaining sound capital ratios. However, as we now know after the financial crisis, sound capital ratios ex ante do not guarantee bank solvency, ex post, in the event of a stress scenario. The LR requirement is aimed at limiting bank leverage and act as a backstop to risk sensitive requirements. In the case of Portugal however this does not seem to be be applicable presently because the average risk weights on the balance sheets of Portuguese banks are significantly higher than their European peers and than the CARW implied by the current set of regulations. Hence the Portuguese banks are more likely to be constrained by the RWR than the LR. Moreover, the LR does not appear to be more countercyclical than the RWR and this could be due to the fact that most Portuguese banks use the standardized method rather than the internal ratings based models, which are far more sensitive to the business cycle.

Even in the near future (in 2020) when the capital conservation buffer comes into full force, the banks in Portugal are unlikely to be constrained by the LR requirement given its current calibration of 3%. It must be noted that if Portuguese banks augment their holdings of sovereign bonds or other assets with low risk weights, that would significantly reduce the average risk weight or the risk weight density on their balance sheets. In that case, the LR could be an effective constraint. The LR could also be binding if the calibration was done at a significantly higher level than what is currently envisaged in Basel III.

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