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LEVERAGE RATIO AS A MACROPRUDENTIAL POLICY INSTRUMENT



Leverage Ratio as a Macroprudential Policy Instrument

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Abbreviations

BCBS	Basel Committee on Banking Supervision
CARW	critical average risk weight
CCoB	capital conservation buffer
CCyB	countercyclical capital buffer
CET1 capital	Common Equity Tier 1 capital
CRR/CRD IV	Capital Requirements Regulation and Capital Requirements Directive IV
EBA	European Banking Authority
EC	European Commission
ECB	European Central Bank
ESRB	European Systemic Risk Board
EU	European Union
G-SIB	global systemically important bank
G-SII	global systemically important institution
IRB	internal ratings-based approach
LR	leverage ratio
O-SII	other systemically important institution
OJ	Official Journal of the European Union
RWA	risk-weighted assets
SA	standardised approach
SSM	Single Supervisory Mechanism
UK	United Kingdom
US	United States

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Summary

The 2007–2008 global financial crisis demonstrated that prevailing capital requirements were insufficient to ensure sound operation of the financial system and healthy lending to the economy. As a response to the crisis, regulators, with the BCBS at the lead, took action to strengthen bank capital. One element of the response is strengthening the risk-based capital framework by both improving the quality of capital and increasing the minimum requirements. A second element concerns building additional resilience against risks that are systemic in nature through the active use of macroprudential capital buffers. Another step is to increase the robustness of the risk-based capital calculation and complement the framework with a LR requirement – a simple measure that would guard against excessive build-up of banks' leverage both on- and off-balance sheet.

The LR requirement is part of the Basel III reform, and it will be introduced as a Pillar 1 standard to supplement the existing risk-based capital requirements. Since 2015, the disclosure requirement has been in place, and banks have to regularly compute and report their LR. Both the BCBS and the EBA have confirmed that the minimum microprudential LR requirement of 3 per cent is appropriate and should become mandatory as of 2018. A minimum LR requirement will act as a backstop for risk-weighted capital requirements, by ensuring that a financial institution has a minimum level of equity.

A minimum LR requirement serves as the ultimate backstop against the shortage of equity based on risk-weighted capital requirements. The LR limits the exposure a bank can accumulate in relation to existing capital. It is calculated by dividing the amount of high-quality capital of a financial institution by its total non-risk-weighted exposure (the exposure measure includes off-balance sheet positions, but, in most cases, total assets can be an adequate approximation). The LR requirement adds an important backstop to the situation when observed risk levels differ significantly from actual unobserved levels, which could materialise quickly. At the end of 2017, the BCBS also agreed to complement banks' capital framework with the output floor for risk weights calculated by IRB models. Risk weight output floors limit the maximum distance between standard and model-induced risk weights, thus strengthening the level playing field and reducing so-called model risk. However, LR, as a bold, risk-neutral requirement, serves as the ultimate backstop. Recalling Thomas Reid's famous aphorism that a chain is only as strong as its weakest link, we might say that a regulatory capital framework is only as strong as its least properly set requirement.

There are merits to using LR requirement add-ons on a macroprudential basis as the internationally agreed-upon LR minimum (3%) might be an insufficiently effective addition to the robust capital framework. A handful of countries, such as the UK, US, Norway and Switzerland, use LR add-ons applied on top of the minimum microprudential LR requirement. However, none of the countries thus far follow a single, common framework when it comes to setting the LR requirement. In addition, when one takes into account recent research on optimal risk-weighted capital levels, the internationally agreed-upon minimum LR requirement of 3 per cent seems to lack effective backstopping power. Assuming that optimal risk-weighted capital ratio is in the area of 13.5–20 per cent, optimal LR should be higher than 3 per cent, further suggesting that the minimum requirement could be set at a higher level.

This paper aims to explain the relationship between risk-based and LR requirements and the motivation for the macroprudential use of LR requirements. The rest of the paper is structured as follows. First, we define the LR and the microprudential requirement that is based on it (Chapter 1) and discuss the merits and drawbacks of risk-weighted and non-risk-weighted capital requirements, assessing how LR requirements can improve the current capital regulation framework (Chapter 2). Then, we turn to the stylized quantitative relationship between the two kinds of requirements and illustrate the rationale for macroprudential LR add-ons (Chapter 3). Further on, we consider legal issues, with a focus on the EU (Chapter 4) and review the country experience with LR requirements (Chapter 5). Finally, we take a look at the LR situation in the Lithuanian banking sector (Chapter 6) and conclude.

1. Microprudential LR requirement

The LR requirement is part of the Basel III reform. Since its first formulation in 2010, Basel III featured an agreement to introduce a LR requirement as a Pillar 1 standard to supplement the existing risk-based capital requirements. Work on the design and calibration of the microprudential LR was undertaken by the BCBS and by the EBA in the EU with a view to introduce the mandatory requirement on 1 January 2018. Since 2015, the so-called disclosure requirement has been in place: banks have to regularly compute and report their LR and, at least annually, publish the information. The early disclosure requirement aimed to provide a source of information for an appropriate review and calibration of the final binding requirement. In 2016, both the BCBS and the EBA confirmed that the initially proposed 3 per cent minimum LR is appropriate. In the EU, the LR requirement will be introduced with the amendments of CRR, while third countries that follow Basel standards will implement (or have implemented) the new requirement at their own discretion (see Chapter 5).

The LR indicator is essentially the amount of capital of a financial institution divided by its total non-risk-weighted exposure¹. In the definitions provided by the BCBS and the EBA, only higher-quality capital (i.e. Tier 1) is included. The exposure measure, which is meant to cover an institution's total exposure, includes both on- and off-balance sheet items, and the treatment of certain asset classes is more conservative:

$$LR = \frac{\text{Tier 1 capital}}{\text{LR exposure measure}} \quad (1)$$

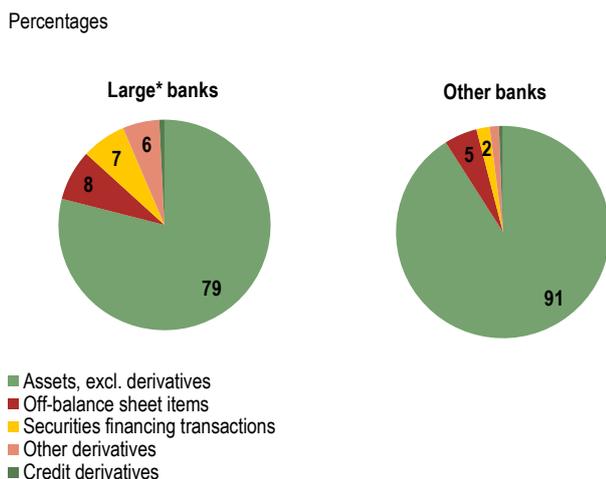
LR exposure measure ≠ Total assets

The LR exposure measure differs from total assets. When calculating the LR exposure measure, off-balance sheet positions, such as credit line and credit card commitments or guarantees, and derivatives with modified 'prudential' value (not the accounting value) are included². The LR exposure measure comprises:

- Assets (excl. derivatives) measured at their accounting value.
- Derivatives at modified value. Derivatives are measured at the replacement cost, and an add-on for potential future exposure is included³.
- Add-ons for counterparty credit risk for securities financing transactions, such as repurchase agreements.
- Off-balance sheet items, weighted using credit conversion factors between 10 and 100 per cent.

Additional changes to the exposure are more relevant, on average, for large banks that are involved in various types of activities. Thus, for the EU, the largest internationally active banks, derivatives, securities financing transactions and off-balance-sheet items account for 21 per cent of the LR exposure measure, compared to only 9 per cent for other banks (see Chart 1). According to Q2 2017 data, on average in the EU, the LR exposure measure exceeded total assets by 11 per cent, compared to 7 per cent in Lithuania (see Chapter 6 for more details on the Lithuanian banking sector).

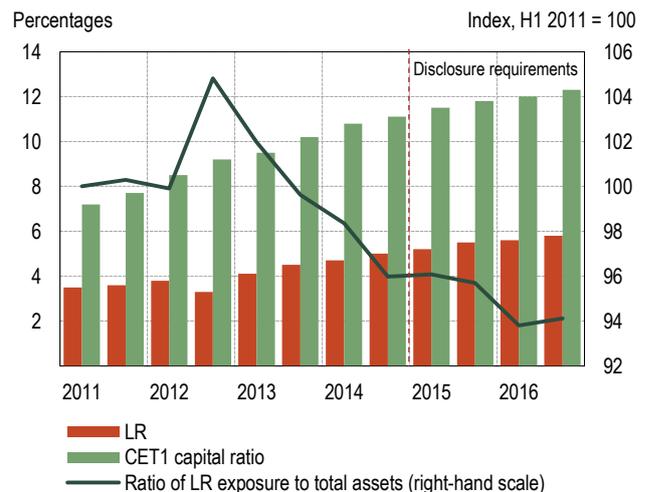
Chart 1. LR exposure measure composition in EU banks (Q4 2016)



Source: EBA CRD IV-CRR/Basel III monitoring exercise, September 2017; the sample comprises 164 banks established in the EU.

* Banks that have Tier 1 capital in excess of EUR 3 billion and are internationally active.

Chart 2. Development of LR, CET1 capital ratios and LR exposure measure in large* banks (H1 2011–H2 2016)



Source: BCBS, Basel III Monitoring Report, September 2017; the consistent sample comprises 93 global banks.

* Banks that have Tier 1 capital in excess of EUR 3 billion and are internationally active (so-called Group 1 banks).

¹ The LR indicator represents the ratio of capital to assets, in line with the definitions of existing supervisory requirements for a financial institution's own funds. The term *leverage* is often used to denote the degree to which a bank's assets exceed its own funds. Therefore, setting the minimum LR requirement implies setting the maximum leverage level for a given institution. One of the intermediate objectives of macroprudential policy, namely to 'mitigate and prevent excessive leverage', is expressed in terms of the latter definition.

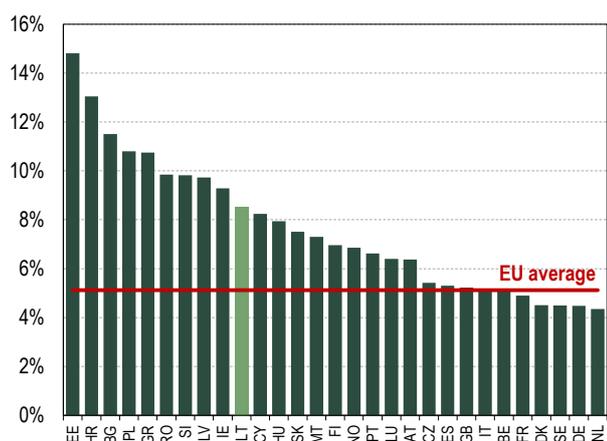
² Details of the calculation of the LR exposure measure have been evolving over time; moreover, there are some discrepancies between the BCBS and EU definitions.

³ Under certain conditions, netting between protection sold and protection bought on the same underlying reference entity is permitted.

The internationally agreed-upon level of the minimum LR requirement is 3 per cent. Initially, this level was chosen by the BCBS as a potential value for the minimum requirement, which had to be tested during the observation period in 2010–2017. At the beginning of the Basel III reform, this level was binding for a number of banks. According to the BSBC, in 2009, large banks (average LR of 2.8%) were considerably more leveraged than smaller banks (average LR of 3.8%)⁴. Until the last stages of the reform, banks' capital position improved significantly: by end-2016, the average LR of large banks and G-SIBs was 5.8 per cent; for smaller banks, the average was 5.5 per cent⁵. This increase was broadly in line with the increase of risk-weighted capital ratios and the gradual phase-in of several macroprudential capital buffers (CCoB, buffers for systemically important institutions, etc.). Nevertheless, the impact of disclosure requirements cannot be dismissed as it further incentivised the most leveraged institutions to strengthen their LR, e.g. by constraining the expansion of total exposure (which increased less than total assets, as can be seen in Chart 2). Subsequently, in 2016, the final minimum Basel III requirement was set at 3 per cent⁶. Notwithstanding the internationally agreed-upon minimum level, the BCBS saw room for further increasing the LR requirement for G-SIBs⁷, and some countries have chosen to apply higher LR requirements at their discretion, especially for systemically important institutions (these requirements are further discussed in Chapter 5).

Chart 3. LR in the EU

(Q2 2017)

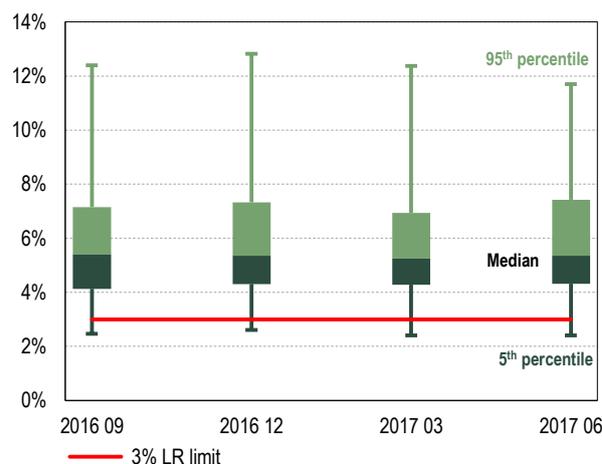


Source: EBA Risk Dashboard.

Note: weighted average by country and in the EU.

Chart 4. Range of individual LR in the EU

(Q3 2016–Q2 2017)



Source: EBA Risk Dashboard.

Note: columns indicate interquartile range.

The EBA found that the minimum LR requirement of 3 per cent is appropriate for the EU⁸. The assessment was made with several principles in mind, namely: (i) the backstop role of the LR requirement should be ensured, (ii) LR should be the more constraining requirement for about a half of the institutions, and (iii) not too many institutions should be below the minimum LR, in order to have a neutral impact on the functioning of the market⁹. In Q2 2017, the average LR has been above the minimum of 3 per cent in all EU member states (see Chart 3), although more than 5 per cent of EU banks still have not complied with the minimum requirement of 3 per cent (see Chart 4). The EBA concluded that the majority of institutions in the sample across all business models have enough capital to meet a LR at 3 per cent in the baseline scenario, and the estimated exposure reduction by certain institutions at 3 per cent under the baseline scenario is very small in relation to both institutions' total exposures and the excess capacity in the system to absorb such reductions.

2. LR requirement as a complementary measure alongside risk-weighted capital requirements

While it is widely agreed that the bank capital toolkit is not complete, there is no consensus on how LR requirements should be incorporated within it. There is an ongoing discussion on how actively LR should be used in such a toolkit, and opinion is divided into two camps. On one side of the spectrum, there are those who believe that the LR encourages banks to invest in higher-risk assets and thus punishes them for taking small risks. On the other side of the spectrum, the argument runs along the lines of risk-weighted capital requirements being too complex and, thus, LR having the potential to be used in the financial regulatory framework as an easy-to-understand supplementary requirement.

The LR requirement could be a complement to the traditional risk-weighted capital requirements rather than a substitute. In other words, a minimum LR requirement could be a 'backstop' for risk-weighted capital requirements, by ensuring that a financial institution has a minimum level of equity. To some extent, the LR requirement mitigates the

⁴ A total of 263 banks from 23 jurisdictions participated in the study (BCBS, [Results of the comprehensive quantitative impact study](#), December 2010). Large banks here are those that have Tier 1 capital in excess of EUR 3 billion, are well diversified, and are internationally active. The LR was calculated according to the prevailing definition at that time.

⁵ BCBS, [Basel III monitoring report](#), September 2017.

⁶ Press release '[Revised market risk framework and work programme for Basel Committee is endorsed by its governing body](#)', BCBS, 11 January 2016.

⁷ Press release '[Governors and Heads of Supervision finalise Basel III reforms](#)', BCBS, 7 December 2017.

⁸ Press release '[EBA recommends introducing the Leverage Ratio in the EU](#)', EBA, 3 August 2016.

⁹ [EBA report on the leverage ratio requirements under Article 511 of the CRR](#) (EBA-Op-2016-13), August 2016.

weaknesses of risk-weighted capital requirements while the risk-weighted capital requirements mitigate the risks of the LR, thus accentuating their complementarity (see Table 1).

Table 1. Pros and cons of the risk-weighted and non-risk-weighted capital requirements

	Risk-weighted capital requirements	Non-risk-weighted (LR) requirements
Pros	<ul style="list-style-type: none"> • Consider risk of individual types of assets • Mitigate incentives for excessive risk-taking • Promote more effective risk management practices 	<ul style="list-style-type: none"> • Ensure minimum level of equity • Guard against the build-up of excessive leverage • Simple and comparable across both banks and countries • Reduce model risk • Countercyclical
Cons	<ul style="list-style-type: none"> • Complex • Rely on known and quantifiable risks • Rely on models which are simplifications of the real world, data issues are important • Pro-cyclical (especially for IRB banks) 	<ul style="list-style-type: none"> • Do not consider risk of individual types of assets • Encourage banks to invest in higher-risk assets and thus 'punish' for taking low risks • Might create incentives to move towards a high-risk or universal bank business model

Source: compiled by the authors.

Note: for the sake of simplicity, pros and cons are listed in the table as if the two kinds of requirements were applied independently, i.e. their interaction is not taken into account.

Risk-weighted capital requirements are featured by granularity, which by nature could increase complexity and possible miscalibration risk. No method for determining risk weights for assets – either as a standardised approach (set by a regulator) or an internal model¹⁰ – reflects with total accuracy the risks of each individual asset at all times. Both methods rely on known and quantifiable risks, and for these methods to work, long time series data are required, which might turn out to be unavailable. Furthermore, even long time series of past data do not permit the accurate prediction of future losses in all states of financial cycle. Models are just simplifications of the real world. Thus, methodological flaws may result in an underestimation of risks and poorly estimated capital requirements. In an effort to achieve precision, the models have been made extremely complex, and complex models are difficult to compare across banks and countries¹¹. Moreover, capital ratios based on risk weights are more procyclical and tend to increase when the economy or financial asset evaluation is growing. This can be quite an issue for the banks that have adopted the IRB approach.

Because the LR measure does not require banks or regulators to make a judgement on the riskiness of banks' assets, it is simpler, more transparent and less subject to risk-weight arbitrage¹². Indeed, those were among the reasons a number of countries, including the US and Canada, had a LR regime ahead of the crisis, and a number of countries, including the UK, introduced LR capital requirements in the aftermath of the crisis. In normal times, the LR is a bit countercyclical (some may argue 'less procyclical') than the alternative capital adequacy ratios (Tier 1-to-Total assets and capital-to-RWA ratio)¹³. This result is driven by the inclusion of guarantees and other off-balance sheet items (credit lines, acceptances and other off-balance sheet items connected with securitisation activity) in the exposure measure definition. However, because of the reduced correlation of the denominator used in the calculation of both the LR and the capital adequacy ratio (i.e. lending is included in the exposure as well as the total assets measure) with the cycle due to the recognition of losses or deleveraging practices, both LR and capital adequacy ratios tend to portray some countercyclical properties during a crisis period. Also, during the upturn of a financial cycle, risk weights have a tendency to decrease due to limited historical data used in a model, as the included sample of approximately five years sooner or later results in economic downturns being excluded from calculations.

However, the LR has some drawbacks, as it does not take into account certain factors which risk-weighted capital requirements account for. Unlike risk-weighted capital requirements, the LR only considers the risk of total assets, not the individual risk of each type of asset. Furthermore, the LR requirement encourages banks to invest in higher-risk assets, thus penalising banks for taking low risks. Recent research by Acosta-Smith et al. (2017)¹⁴ has considered how the announcement of the LR requirement influenced behaviour among a panel of over 650 European banks. A significant increase in risk-taking was found among those banks for which the introduction of the LR was a binding constraint. This risk-taking was greater the further these banks were from meeting the new 3 per cent threshold: banks with LR of 1.5, 2 and 2.5 per cent were found to increase their risk-taking by 3.4, 2.3 and 1.1 percentage points of RWA, respectively. Empirical evidence seems to support the idea that the risk-shifting channel indeed plays a role when the LR is regulated.

¹⁰ There are two ways of computing minimum capital requirements for credit risk: the standardised approach (SA) and the internal ratings-based (IRB) approach. In the SA, risk weights are provided by the regulator – they are somewhat diversified, depending on the type of borrower and credit risk category, but they do not vary over time. In the IRB approach, the calculation of RWA is based on estimated key risk parameters of an exposure, such as PD (probability of default), LGD (loss given default, i.e., the loss rate in the event of a default) and EAD (exposure size at default), which in turn are a function of economic conditions as well as borrower and exposure characteristics. The foundation IRB approach requires only PDs to be estimated (other parameters are pre-set), while in the advanced IRB, all parameters are estimated. Banks develop models to estimate the parameters and use them under approval of a supervisor. According to CRR, the historical observation period for models should be at least five years.

¹¹ BCBS, *Analysis of the trading book hypothetical portfolio exercise*, 2014.

¹² A. Haldane, V. Madouros, *The dog and the frisbee*, *Proceedings – Economic Policy Symposium – Jackson Hole*, Federal Reserve Bank of Kansas City, pp. 109-159, 2012.

¹³ M. Brei, L. Gambacorta, *The leverage ratio over the cycle*, *BIS Working Papers*, No 471, 2014.

¹⁴ J. Acosta-Smith, M. Grill, and J. H. Lang, *The leverage ratio, risk-taking and bank stability*, *ECB Working Paper Series*, No 2079, 2017.

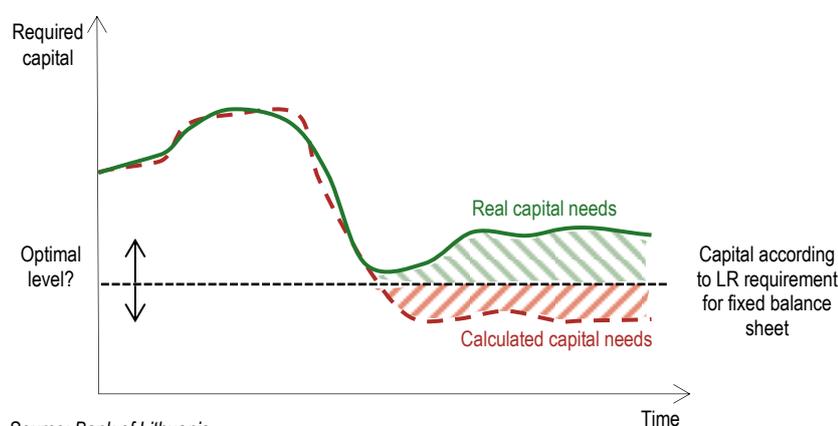
Additionally, the LR requirement might make different banks' business models more alike¹⁵. In other words, as banks become more homogenised (less diversified), they are more likely to react with great sensitivity even to the slightest shocks (as they impact the whole structure due to the uniformity of its elements). This imposes certain systemic risks and creates problems throughout the financial system and the economy. For example, LR application could incentivise banks with a higher risk appetite (higher risk weights and hence more lending capacity within the LR requirement) to invest in low-risk asset classes such as retail mortgages. Conversely, banks with low-risk investments (e.g. investment banks holding bonds) will be incentivised to accumulate higher-risk assets such as corporate loans. These effects could lower business model diversity and hence increase the probability that shocks could have more homogenous and widespread effects across the market.

The optimal level of capital should ensure that banks could withstand severe unexpected shocks and continue lending to the economy in all phases of a financial cycle. The global financial crisis and its aftermath brought to the fore basic principles that an effective capital framework should encompass. First, optimal risk-weighted capital ratios (Tier 1) should be much higher, compared to pre-crisis levels¹⁶. Second, capital requirements should not only reflect idiosyncratic but also systemic risks with the help of structural and countercyclical macroprudential buffers. Finally, a robust capital framework should incorporate non-risk-weighted LR, thus ensuring that inadequate risk weights would not deplete granularly estimated risk-weighted capital requirements. Recalling Thomas Reid's famous quip that a chain is only as strong as its weakest link, a regulatory capital framework is only as strong as its least-well set requirement.

The optimal level of LR should strike a delicate balance between serving as an appropriate backstop and allowing risk-weighted capital requirement do the job when risk weights accurately reflect underlying asset risks. Broadly taken, risk-weighted capital requirements are designed to accumulate 'known' credit losses, and this capital dimension should be appropriate most of the time. However, on rare (but critically important) occasions, granularly estimated risk weights could get off track and significantly deviate from underlining risk levels (Chart 5). In such situations, the LR requirement, as a last line of defence, should stand at the levels capable of absorbing an appropriate amount of 'unknown' credit losses.

Assuming that the optimal risk-weighted capital level reflects recent advances in research and is in the area of 13.5–20 per cent, the optimal LR ratio should be higher than 3 per cent. Results from the initial Long-Term Economic Impact study conducted by the BCBS in 2010¹⁷ were consistent with socially optimal Tier 1 capital ratios within a range of 16–19 per cent¹⁸. Numerous subsequent studies concluded that optimal capital levels could range from 13.5 per cent¹⁹ to around 20 per cent²⁰. In post-crisis periods, the cost of a too-high LR requirement might have particularly large restrictive effects in terms of credit supply. At such times, regulators should be able to countercyclically reduce LR requirements to the base level. However, aiming to address the moments of large spread between observed and actual risk levels, optimal LR could be derived from optimal risk-weighted capital estimates, assuming some particular level of average risk weights. To this end, an effective backstop LR requirement in post-crisis periods could be at least 4 per cent (based on back-of-the-envelope calculation with a 13.5% average minimum capital adequacy ratio and a 30% risk weight, which is at the lower end among EU countries) and could be elevated to 6 per cent in the upswing of the financial cycle (assuming 20% capital adequacy ratio and 30% backstop risk weight). The analysis by Fender and Lewrick²¹, building on the results and conceptual framework of the BCBS's Long-Term Economic Impact study, also suggests that the minimum LR requirement could be higher than the 'test' value of 3 per cent, within a range of about 4–5 per cent.

Chart 5. Stylised scheme to determine the optimal level of LR



Source: Bank of Lithuania.

¹⁵ A. Haldane on Financial Stability, [Rethinking Macroeconomic Policy IV Conference](#), October 2017.

¹⁶ A. Haldane, D. Aikman, S. Kapadia, and M. Hinterschweiger, [Rethinking Financial Stability](#), Rethinking Macroeconomic Policy IV Conference, Conference materials, October 2017.

¹⁷ BCBS, [An assessment of the long-term economic impact of stronger capital and liquidity requirements](#), 2010.

¹⁸ The figures are expressed according to current definitions of Tier 1 capital and RWA, as provided by Brooke et al (M. Brooke, O. Bush, R. Edwards, J. Ellis, B. Francis, R. Harimohan, K. Neiss, and C. Siegart, [Measuring the macroeconomic costs and benefits of higher UK bank capital requirements](#), Bank of England, Financial Stability Paper No. 35, 2015).

¹⁹ Bank of England, [Financial Stability Report](#), Issue No. 38, December 2015. See Box 1, 'The framework of capital requirements for UK banks'.

²⁰ D. Miles, J. Yang, and G. Marcheggiano, Optimal bank capital, *Economic Journal*, Vol. 123, pages 1–37.

²¹ I. Fender, U. Lewrick, [Calibrating the leverage ratio](#), *BIS Quarterly Review*, pages 43–58, December 2015.

3. Motivation for macroprudential LRs

Risk-weighted capital adequacy and LR requirements are related as they both set the minimum capital amount a given bank must hold. Depending on the riskiness of the bank's assets, one of them is usually more constraining, i.e. results in a higher minimum required capital amount. The two requirements are quantitatively related through the so-called critical average risk weight (CARW):

$$\frac{LR_{req}}{CAR_{req}} = CARW \cdot \frac{Total\ assets}{LR\ exposure\ measure}, \quad (2)$$

where LR_{req} – LR requirement, CAR_{req} – risk-based capital adequacy requirement, $CARW$ – critical average risk weight. For simplicity, it is often assumed that the LR exposure equals total assets (we will exploit this assumption further on), and the relationship is expressed as

$$\frac{LR_{req}}{CAR_{req}} = CARW. \quad (3)$$

The CARW is a synthetic metric that depends on the relative calibration of risk-based and non-risk-based capital requirements. The most widely used value of CAR_{req} for the calibration of the LR requirement in the literature is 8.5 per cent, meaning the sum of minimum Tier 1 capital requirement (6%) and the fully phased-in capital conservation buffer (CCoB, 2.5%). Then, taking minimum LR_{req} of 3 per cent results in the standard CARW value of 35.3 per cent (see the grey row in Table 2). However, if a different risk-weighted capital requirement is assumed for such a calibration, holding LR_{req} at the same minimum of 3 per cent would result in different CARW values (see Column 4 in Table 2).

Table 2. Dependency of the CARW on the size of risk-weighted and LR requirements
(percentages)

Items in risk-weighted capital requirement	CAR_{req}	LR_{req}	CARW	Potential LR_{req} to maintain CARW = 35.3
(1)	(2)	(3)	(4)	(5)
Tier 1	6.0	3.0	50.0	
Tier 1 + Tier 2	8.0	3.0	37.5	
Tier 1 + CCoB	8.5	3.0	35.3	
Tier 1 + Tier 2 + CCoB	10.5	3.0	28.6	3.7
Tier 1 + CCoB + O-SII buffer*	10.5	3.0	28.6	3.7
Tier 1 + Tier 2 + CCoB + O-SII buffer*	12.5	3.0	24.0	4.4
Average total req. in Lithuania in Q3 2017 (incl. P2)	14.5	3.0	20.7	5.1

Source: Bank of Lithuania calculations.

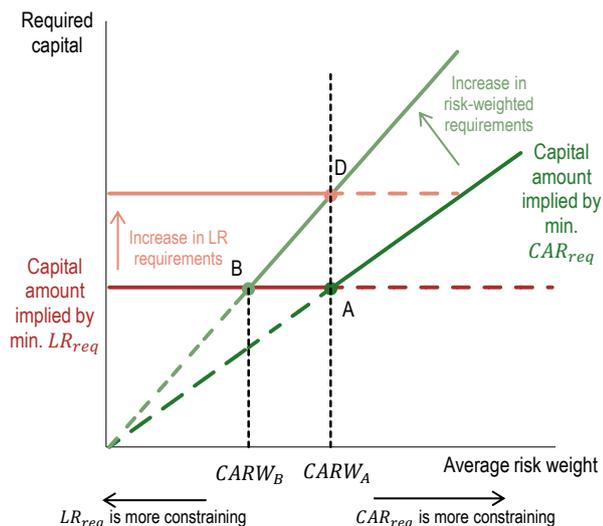
* Assuming an O-SII buffer of 2 per cent.

The relative stringency of risk-based and LR requirements for a bank depends on its average risk weight \overline{RW} across the portfolio. As shown in Chart 6,

- if $\overline{RW} < CARW$, then LR_{req} is more constraining,
- if $\overline{RW} > CARW$, then CAR_{req} is more constraining,
- if $\overline{RW} = CARW$, then both requirements are equally constraining.

In other words, for institutions which only just meet the required risk-weighted capital ratios, the LR acts as a floor on average risk weights. As mentioned above, if LR_{req} is held constant, different CAR_{req} lead to different CARW values, causing changes in the relative stringency of risk-based and LR requirements. That is, if CAR_{req} differ for banks while LR_{req} is the same, the backstop role of LR_{req} will be distorted: banks with higher CAR_{req} will be allowed to have a lower average risk weight than the ones with lower CAR_{req} until LR_{req} becomes binding. Structural capital buffers, which are usually institution-specific and applied to a subset of institutions, produce such variability among institutions. Time-varying capital buffers add to this distortion by generating variability in time.

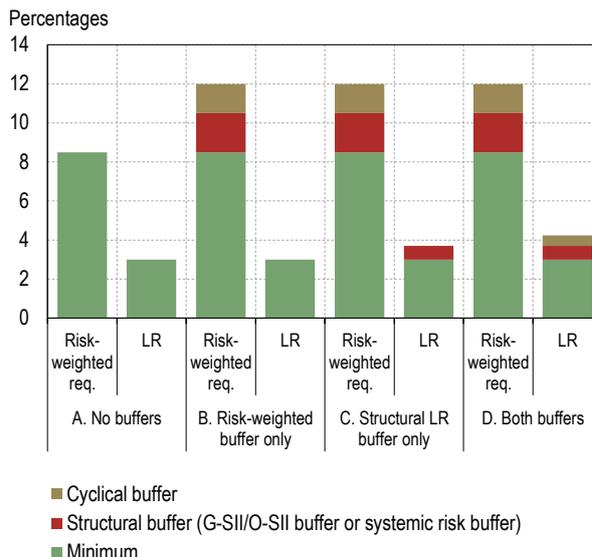
Chart 6. Stylised capital requirement implied by risk-weighted and LR requirements



Source: adapted from the ESRB handbook (ESRB, [The ESRB Handbook on Operationalising Macroprudential Policy in the Banking Sector. Addendum: Macroprudential Leverage Ratios](#), 2015).

Notes: 1) Point A shows corresponding CARW in the base case, 2) Point B shows how CARW changes when risk-weighted capital requirements are increased (e.g. through introduction of macroprudential buffers), 3) Point D illustrates CARW when, in addition to B, corresponding macroprudential LR are activated, 4) constant balance sheet size is assumed.

Chart 7. Stylised relationship between risk-weighted and LR requirements



Source: adapted from the ESRB handbook.

Notes: 1) Case A shows the base case with no macroprudential buffers, 2) Case B illustrates how the relationship between risk-weighted and LR requirements changes if risk-weighted macroprudential buffers are activated, 3) Cases C and D illustrate corresponding macroprudential LRs in these circumstances, 4) Cases A, B and D correspond to Points A, B and D in Chart 6.

In the framework with macroprudential capital buffers, macroprudential LR add-ons would help to maintain the constant backstop role of the LR requirement. The introduction of macroprudential capital buffers results in a higher capital adequacy requirement, producing differences in CARW for different institutions or across time. An additional LR requirement would help to maintain constant CARW (see the last column in Table 2) and hence, the same stringency of LR requirement both across institutions and time (see Chart 7 for a stylised illustration). Macroprudential LRs would help to reinforce the effect of macroprudential capital buffers. For example, if risk-weighted macroprudential buffers are introduced without LR add-ons, banks for which the LR requirement is the more stringent constraint may not need to take any action at all (e.g. Bank A in Table 3). Other banks would have the option of meeting the buffer requirement without raising any new capital but rather by rebalancing their asset portfolio towards assets with lower risk weight. The architecture of possible macroprudential LRs could mirror structural (G-SII, O-SII buffer, systemic risk buffer) or/and cyclical (CCyB) buffers in the risk-weighted framework. In other words, capital add-ons could be applied on top of the microprudential LR requirement.

Table 3. Hypothetical example of bank capital needs when a macroprudential buffer is introduced

Bank	Average risk weight %	Required capital according to CAR_{req}		Required capital according to LR_{req}		Binding requirement	Required capital EUR mln.	Increase in required capital EUR mln.
		% of RWA	EUR mln.	% of LR exposure	EUR mln.			
Requirements at t_0								
Bank A	25.0	8.5	2.1	3.0	3.0	LR_{req}	3.0	
Bank B	35.3	8.5	3.0	3.0	3.0	Both	3.0	
Requirements at t_1, after introduction of a macroprudential buffer of 1 per cent of RWA								
Bank A	25.0	9.5	2.4	3.0	3.0	LR_{req}	3.0	0.0
Bank B	35.3	9.5	3.4	3.0	3.0	CAR_{req}	3.4	0.4

Source: Bank of Lithuania calculations.

Note: assuming total assets and LR exposure equal to EUR 100 mln.

From the structural perspective, the LR could be helpful in implementing the intermediate objectives of macroprudential policy that concern limiting misaligned incentives of financial institutions, concentration of exposures and generally preventing excessive indebtedness. A higher LR requirement for systemically important institutions could be justified because the economic consequences of the distress or failure of these institutions are more

severe than for other banks²². In addition, large and complex banks rely more on their own IRB models, which tend to drive down risk weights; thus, they are more exposed to model risk and usually have significant trading books which further lower their average risk weights.

From the cyclical perspective, the LR could be helpful in pursuing the intermediate objective of mitigating and preventing excessive credit growth and leverage. LR requirements would help to ensure that the banking system is sufficiently capitalized at the height of a boom. The LR requirement is a tighter constraint than the risk-weighted requirement for banks in booms and a looser constraint in recessions (due to procyclicality in calculation of risk weights). As such, it might be more effective than just CCyB if risk weights are falling or banks rebalance portfolios towards assets with lower RWs. In addition, uncertainties, model risk and excessive balance sheet growth may be particularly acute at the peak of a credit boom, and modelled risk weights may not fully take asset correlations into account. Lastly, low interest rates and quantitative easing have resulted in an excess liquidity environment, which may weaken creditor discipline in a chase for yield and induce exploitation of the underpricing of risk to expand exposure for higher profits. The macroprudential LR could also be a tool to mitigate risks stemming from the prevailing low interest rate environment.²³

There is a trade-off between the benefit of maintaining the constant backstop role of the LR requirement and the additional complexity in the capital framework. Regarding type of add-on, static add-ons, such as those applied to systemically important institutions, would be a relatively simple complementarity. Such an application would prevent distortions in terms of variability in the CARW across the largest and most complex institutions. At the same time, the requirement will potentially be more relevant, since the LR, as a rule, is more binding for large institutions that use IRB models. On the other side of the spectrum, time-varying, exposure-based add-ons would introduce a layer of complexity with frequent recalibration (e.g. quarterly, if based on CCyB) and related setting procedures, involvement of other authorities through reciprocity arrangements, etc. The burden of additional complexity could be partially alleviated if clear rules linking the two kinds of requirements were put into place.

4. Legal framework for LR requirements in the EU

Currently, the LR requirement can be used at the discretion of EU Member States. Thus far, EU legal acts²⁴ only define the LR calculation and disclosure requirements for the EU financial institutions and foresee a common binding LR requirement in the future²⁵. Several European countries following the common EU capital requirements (Norway and the UK) have introduced LR requirements early, through national regulations. Generally, supervisory authorities of several EU member states and the SSM²⁶, as members of the BCBS, were expected to implement and apply the LR requirement as defined in Basel III standards from 1 January 2018.

With the forthcoming amendments to the CRR/CRD IV package, the minimum LR will become a binding requirement for financial institutions in the EU. The amendments were proposed by the EC in November 2016 and are currently under discussion. Part of the proposal is dedicated to implementing the remaining elements of the Basel III framework in the EU that have been developed since the adoption of the CRR/CRD IV package (June 2013), including the LR requirement. It has been suggested that the current risk-based minimum requirements for own funds²⁷ are complemented by a minimum LR requirement of 3 per cent. The amendments are expected to come into force in 2018–2019, which is somewhat later than the timeframe set by the BCBS.

The EU legal framework does not yet provide for the macroprudential use of the LR requirement. While the minimum LR requirement is going to be defined by the EU law, macroprudential LR add-ons will still have to be implemented through national legislation, if deemed necessary. In case of Lithuania, since the Bank of Lithuania has been granted a full-scale macroprudential policy mandate, LR-like macroprudential measures could be implemented by a resolution of the Board of the Bank of Lithuania. The option of using the LR for macroprudential purposes is foreseen in the Macroprudential Policy Strategy of the Bank of Lithuania²⁸.

In December 2017, the BCBS endorsed the final package of Basel III elements, which includes a LR surcharge for global systemically important banks from 2022²⁹. The surcharge is a Tier 1 capital buffer set at 50 per cent of a G-SIB's risk-weighted capital buffer and will be applied on top of the minimum LR requirement of 3 per cent. According to the BCBS, the main motivation for the add-on is to maintain the role of the LR as an appropriate backstop to the risk-based requirements for G-SIBs³⁰. In addition, other relevant changes to the reform package include changes to the LR exposure measure, a more risk-sensitive standardised approach for calculating credit risk, constraints on using internal models and the so-called output floor, i.e. a limit on how much banks' RWAs can differ from RWAs calculated by SA³¹. As the proposed

²² See, e.g. BCBS, [Global systemically important banks: updated assessment methodology and the higher loss absorbency requirement](#), 2013; FSB, [Strengthening Oversight and Regulation of Shadow Banking – Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos](#), 2013.

²³ E. Avgouleas, [Bank leverage ratios and financial stability: a micro- and macroprudential perspective](#), Levy Economics Institute, Working paper No 849, 2015.

²⁴ CRR and [Commission delegated regulation \(EU\) 2015/62 of 10 October 2014 amending CRR with regard to the LR](#), OJ L 11, 17.1.2015, p. 37–43.

²⁵ See parts 93–94 of the preamble of CRR.

²⁶ Belgium, France, Germany, Italy, Luxembourg, the Netherlands, Spain, Sweden, UK, the EU (represented by the ECB and the SSM) are all members of the BCBS.

²⁷ Current risk-based minimum requirements for own funds are defined by [CRR](#) Art. 92: a) CET1 capital ratio of 4.5 per cent; b) Tier 1 capital ratio of 6 per cent; c) total capital ratio of 8 per cent.

²⁸ See [Macro-prudential Policy Strategy](#), approved by the Resolution No. 03-31 of the Board of the Bank of Lithuania on 12 March 2015 (Section 3, Art. 11).

²⁹ See Footnote 7.

³⁰ BCBS, [Basel III: Finalising post-crisis reforms](#), December 2017.

³¹ The output floor is set at 72.5 per cent, meaning that a bank's aggregate RWA generated by internal models (or a mix of approaches) is no lower than 72.5 per cent of RWA as calculated by SA. The output floor will be phased in from 50 to 72.5 per cent over 2022–2027.

amendments should add to the credibility of the RWA metric and make the LR requirement less constraining for most of the banks, they might also somewhat weaken the role of the LR requirement. The latter amendments should be adapted to the EU single market and implemented in the common EU regulations by 1 January 2022.

Ongoing discussions in international fora advocate macroprudential use of the LR requirements beyond the global systemically important institutions. Since 2013, the ESRB has been highlighting the usefulness of the macroprudential LR requirement. This is evident in its Recommendation on intermediate objectives and instruments of macroprudential policy³² and its Handbook on Macroprudential Policy³³. The ESRB reaffirmed this view in the response³⁴ to the EC's public consultation on the Review of the EU Macro-prudential framework³⁵. The ECB also agrees that the LR requirement should be included in the macroprudential toolkit, although further analysis on the efficiency of its macroprudential use is needed³⁶. These discussions might regain focus once the implementation process for Basel III LR surcharge for G-SIBs starts in the EU.

In terms of design, a macroprudential LR requirements framework should build on the microprudential one. First, it should use the same definition of the LR and calculation of the exposure measure so that macroprudential LR requirement add-ons could be a natural extension of the microprudential LR requirement, just as capital buffers extend the minimum capital adequacy requirements. One difference would be required, though, to ensure sufficient capital quality for the LR buffers: as risk-weighted buffers must be met entirely with CET1 capital, it seems sensible to require the same for macroprudential LR add-ons. Another option would be to limit the amount of additional Tier 1 capital in the LR buffers³⁷. Secondly, in terms of other important elements for a macroprudential LR requirements design, LR add-ons could be applied at consolidated, sub-consolidated, individual entity or exposure level, correspondingly to risk-weighted capital buffers they follow. In terms of the breach of macroprudential LR buffers, the schedule of automatic restrictions on distributions which affect regulatory capital should be mirrored. Building on the existing framework would limit the additional complexity of macroprudential use of LR requirements.

If macroprudential LR requirements are applied to exposures, reciprocity issues become important for their effectiveness. Reciprocity would be relevant for the cyclical use of macroprudential LR requirements when they are applied in correspondence to a CCyB on domestic exposures and for the structural use of macroprudential LR requirements when they are applied in correspondence to a systemic risk buffer applied to a set of exposures, e.g. domestic exposures. Reciprocity would help to ensure that the banks hold sufficient capital against the risks identified in the given jurisdiction, promote a level playing field between domestic and foreign bank lending in that jurisdiction, and reduce the risk of leakages in applying the measure. Currently, only a few macroprudential measures are subject to mandatory reciprocity³⁸, while for the remaining exposure-based measures reciprocity is voluntary, although promoted by the ESRB³⁹. The voluntary reciprocity framework is meant to cover all harmonised and country-specific macroprudential measures; however, it has been tested thus far only for the EU-harmonised macroprudential measures defined in the CRR/CRD IV. If exposure-based macroprudential LR add-ons are excluded from the EU common regulation, ensuring reciprocity of these measures might be a challenge.

5. Country experience with the application of LR requirements

The range of implemented and considered LR frameworks is quite vast; to date, no country follows one single framework when it comes to setting LR requirement. LR frameworks mainly vary with respect to the macroprudential tool – the size of add-ons and the types of institutions it is applied to. We looked at the countries which have the LR requirement in place (Canada, Norway, Switzerland, the UK, the US) and also at the countries which assessed the impact of the LR requirement and, while deciding not to implement it before the requirement becomes mandatory in 2018, still had the assessment reports published (the Czech Republic, Denmark, the Netherlands, Sweden). All of the countries, apart from Canada, the Czech Republic, Denmark and Sweden, introduced the LR measure both as a microprudential and macroprudential tool, where the LR add-on complements the mandatory LR requirement of at least 3 per cent.

The macroprudential LR add-ons are in most cases applied to institutions that are considered of systemic importance, that is, those whose failure might trigger a financial crisis and are often referred to as 'too big to fail' or carrying out functions that are critical to the economy. The size of these macroprudential add-ons ranges up to 3 per cent (for the summary of LR requirements applied in different countries see Table 4). Smaller banks are generally only subject to the minimum LR requirement, or at least the LR add-ons are smaller for them than for systemically important institutions (as in Norway and UK).

Banking organisations in the US and Canada have long been subject to non-risk based leverage regulation, while more recently they introduced LR requirements in line with Basel III requirements. In the US, a 4 per cent minimum domestic LR requirement (Tier 1 capital divided by average consolidated assets) was applicable for all banking organisations

³² [Recommendation of the ESRB of 4 April 2013 on intermediate objectives and instruments of macro-prudential policy](#) (ESRB/2013/1), OJ C 170, 15.6.2013, p. 1–19.

³³ The ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector, [Addendum: Macroprudential LRs](#), June 2015.

³⁴ [ESRB response to the European Commission's Consultation Document on the "Review of the EU Macro-prudential Policy Framework"](#), 24 October 2016.

³⁵ See [Review of the EU Macro-prudential Policy Framework](#).

³⁶ [ECB contribution to the European Commission's consultation on the review of the EU macroprudential policy framework](#), 2016.

³⁷ However, the current Basel III LR framework for G-SIBs does not entail such restrictions: the LR add-on is to be met either with CET1 or additional Tier 1 capital.

³⁸ Countercyclical capital buffer rates up to 2.5% and risk weight adjustments according to Article 124 and 164 CRR.

³⁹ [Recommendation of the ESRB of 15 December 2015 on the assessment of cross-border effects of and voluntary reciprocity for macroprudential policy measures](#) (ESRB/2015/2), OJ C 97, 12.3.2016, p. 9–14.

since the early 1990s, while the general capital-to-assets ratio has been regulated since the mid-1980s. In 2015, the Revised Capital Framework⁴⁰ took effect, complementing the domestic LR framework with the 3 per cent supplementary LR requirement for large banking organisations, which is in line with Basel III rules. In Canada, Basel III LR rules replaced the previous assets-to-capital multiple leverage requirement that had been in place since 1982. It is worth noting that the regulation in Canada, unlike the US, already included certain off-balance-sheet items in the determination of the total exposure of banks.

Table 4. Summary of LR requirements in different countries

Country	Minimum (%)	Add-ons	Enforcement date
Switzerland	3	2% for G-SIIs	2013 – 4% LR for G-SIIs 1 January 2018 – 3% LR to small banks 2019 – 5% LR for G-SIIs
Canada	3	Supervisory authority prescribes higher LR requirements for individual institutions without disclosing them	Q1 2015 – minimum LR for all banks
Norway	3	2% for all banks excl. O-SIIs; 3% for O-SIIs	30 June 2017
The United Kingdom	3.25 ¹	1. A supplementary LR buffer for systemically important institutions at 35% of the bank's G-SII or systemic risk buffer rate; 2. A countercyclical LR buffer at 35% of the bank's CCyB rate;	1 January 2016 – GSIIIs, other major banks and building societies 2018 – all banks, building societies and regulated investment firms
The United States	4 (domestic definition)	-	Early 1990s
	3 (Basel III definition) ²	2% for G-SIIs at the bank holding company level 3% for G-SIIs' subsidiary insured depository institutions	1 January 2018

Source: compiled by the authors.

Notes: 1) In October 2017, the minimum LR requirement was increased from the previous 3 per cent; 2) applied to advanced approaches banking organizations – bank holding companies or depository institutions that have total consolidated assets of USD 250 billion or more or total consolidated on-balance sheet foreign exposure of USD 10 billion or more, or are subsidiaries of such bank holding companies or depository institutions.

Switzerland and the US resort to using macroprudential LR add-ons for G-SIIs or their subsidiaries. In Switzerland, the LR add-on of 1 per cent has been applied to its two G-SIIs and will double to 2 per cent in 2019. Compared to other countries, Switzerland's systemically important banks are very large in comparison to its GDP. To address the greater risk of undercapitalisation that is borne by the largest US banking organisations, the US G-SIIs and their subsidiaries are subject to an enhanced supplementary LR as of 1 January 2018: G-SIIs are required to maintain the LR of at least 5 per cent (otherwise they are subject to limitations on capital distributions and discretionary bonus payments), while their subsidiary depository institutions are considered well capitalised by the supervisor if they maintain a LR of at least 6 per cent. However, the higher LR constraint shall not be binding, as in Q3 2017 all eight US G-SIIs had a LR higher than 6 per cent⁴¹.

Norway increased the LR requirements for all banks, but even higher add-on is applied to O-SIIs. Norway has decided to implement a 2 per cent LR requirement add-on for all banks and 3 per cent for O-SIIs, effective as of 30 June 2017. According to Norges Bank, the proposed 3 per cent minimum LR is too low to function as a credible backstop to risk-based capital for Norwegian banks⁴². At the end of the first quarter of 2017, the average LR for Norwegian banking system was 7.3 per cent⁴³, which is much higher than the anticipated minimum requirement in the EU. Also, compared with large Nordic banks, Norwegian banks have higher LR and lower CET1 capital ratios (see Chart 8), mainly due to the higher risk weights used by Norwegian banks.

⁴⁰ Office of the Comptroller of the Currency, Treasury; the Board of Governors of the Federal Reserve System; and the Federal Deposit Insurance Corporation, [Regulatory Capital Rules: Regulatory Capital, Revisions to the Supplementary Leverage Ratio](#), Federal Register/Vol. 79, No. 187/Friday, September 26, 2014/Rules and Regulations.

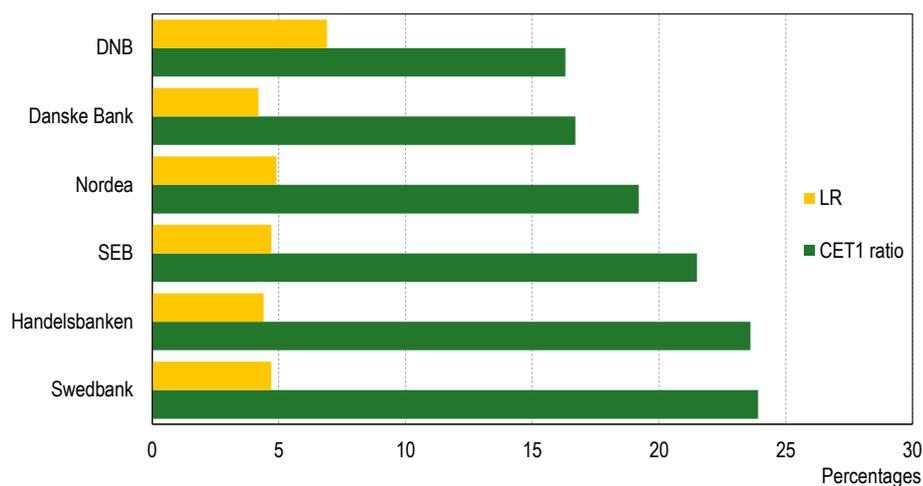
⁴¹ Bank holding companies' Pillar III disclosure reports, as of 30 September 2017.

⁴² [Finanstilsynet and Norges Bank's letter of 24 June 2016 to the Basel Committee on Banking Supervision](#).

⁴³ [Finanstilsynet, Risk Outlook 2017](#) (9/2017), 7.6.2017.

Chart 8. LRs and CET1 capital ratios for large Nordic banking groups

(Q3 2017)



Source: banks' quarterly reports.

Regarding the design of LR frameworks, the UK's approach seems to be the most comprehensive thus far and is the only framework that explicitly employs the rule of linking LR add-ons to all macroprudential capital buffers. While the minimum LR requirement was originally 3 per cent in the UK, in October 2017, it was recalibrated to 3.25 per cent on a revised leverage exposure measure that excludes claims on central banks (i.e. central bank reserves). UK banks were allowed to exclude central bank reserves based on a temporary rule from 2016, and once this amendment was included in the framework, the minimum level was recalibrated to restore the level of resilience LR provided before those temporary amendments⁴⁴. Since the introduction of the LR framework, it has been applied only to G-SIIs and other major banks and building societies; however, from 2018 on, it is expected to apply to all banks, building societies and regulated investment firms. The additional buffer requirements in the UK mirror the risk-weighted framework and consist of: a 3.25 per cent minimum requirement and two macroprudential buffers – a supplementary LR buffer for firms of global or domestic systemic importance⁴⁵, and a countercyclical LR buffer (CCLB) for all firms. The supplementary and countercyclical LR buffers are translated into LR requirements using a conversion factor of 35 per cent (e.g. if a bank is subject to countercyclical capital buffer of 1% then the CCLB is 0.35%). The conversion factor aligns LR and risk-weighted requirements so that they move at the same time and same rate, minimising the risk of distorting risk-taking incentives as capital requirements vary over time and across firms.

The Netherlands and Sweden are eying an introduction of additional LR requirements or increasing the minimum requirement. The Netherlands government has expressed intentions to be stricter than the mandatory requirement and wishes to impose a 4 per cent minimum LR, at least for its O-SIIs. Sveriges Riksbank (Sweden) released a recommendation that the Swedish Financial Supervisory Authority (Finansinspektionen) should introduce, as soon as possible, a LR requirement for the major Swedish banks of 5 per cent. Although the major Swedish banks' risk-weighted capital requirements are currently higher than the international minimum requirements, the LR is needed as a complement (a backstop) to the risk-weighted requirements⁴⁶.

Denmark and Czech Republic have assessed the need for an LR in their jurisdictions and decided to introduce the minimum 3 per cent requirement. Denmark has the lowest average LR in Europe and thus only the minimum LR requirement of 3 per cent will be applied to banks as of 2018. The Group of Experts appointed by the Danish government has advised that the LR requirement should not become a binding requirement for Danish financial institutions, as the overly high minimum LR requirement could incentivise banks to include relatively riskier assets on the balance sheet⁴⁷. In Czech Republic, a 3 per cent LR is expected to become effective in 2020⁴⁸.

6. LR of Lithuanian banks

Lithuanian credit institutions are less leveraged than their counterparts across the EU (see Chart 9). The average LR of banks in Lithuania comprised 8.5 per cent and was significantly higher than 5 per cent average in the EU. In fact, only the newer EU member states had higher LRs in their financial systems than those in Lithuania. Since the risk weights used by Lithuanian banks are more or less in line with those of their counterparts across Europe (see Chart 9), this might reflect the general propensity of banks in this region to operate with more capital. Alternatively, higher LRs might mean that banks do perceive these countries as riskier (e.g. due to their experience with relatively larger losses during the financial crisis of 2009 in the region).

⁴⁴ Bank of England, [The Financial Policy Committee's powers over leverage ratio tools](#), Policy Statement, July 2015 (updated in October 2017).

⁴⁵ The supplementary LR buffer for domestic systemically important banks in the UK will be implemented in parallel to the systemic risk buffer, which will apply from 2019.

⁴⁶ Sveriges Riksbank, [Financial Stability Report](#), 2017:2

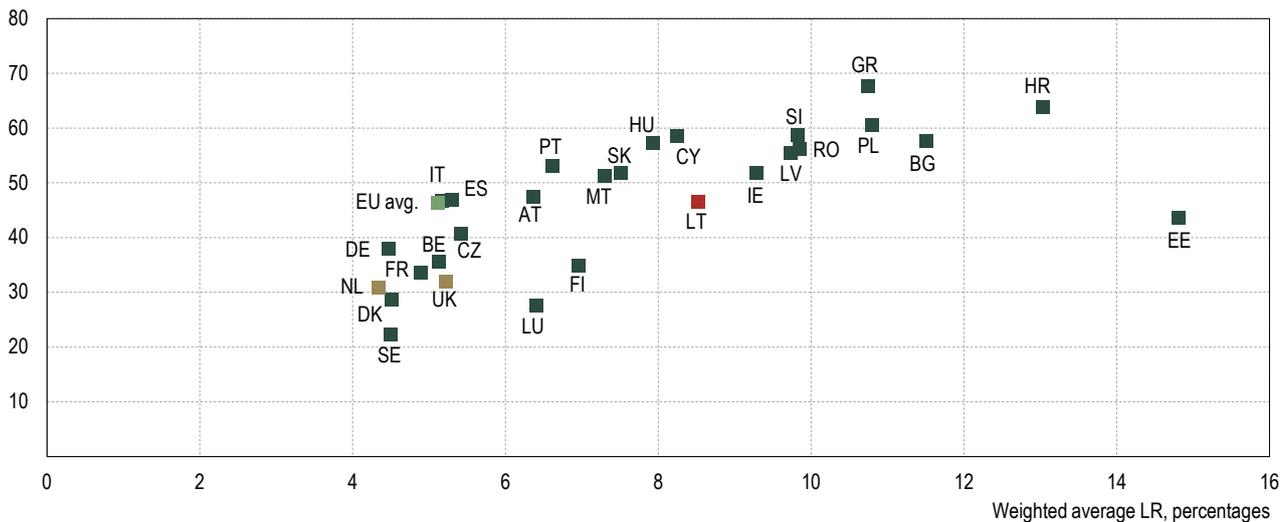
⁴⁷ [Group of Experts on a Minimum Leverage-Ratio Requirement for Credit Institutions](#), 12.2015.

⁴⁸ IMF Report on 2017 [Article IV Consultation with Czech Republic](#).

Chart 9. Average LR vs. risk weights in EU member states

(Q2 2017)

Ratio of RWA to total assets, percentages



Source: EBA, ECB and Bank of Lithuania calculations.

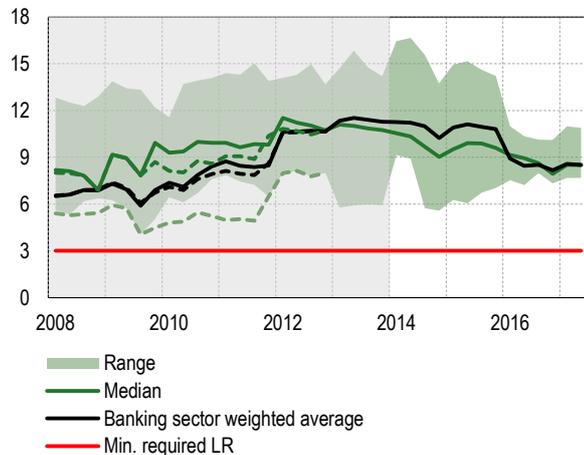
Note: brown rectangles show countries that have or are planning to have LR add-ons in place.

The minimum regulatory LR requirement of 3 per cent would be far from binding for institutions in Lithuania (see Chart 10). The banks in Lithuania historically had a higher LR than the assumed minimum requirement. Even at the trough of the financial crisis of 2009, the average LR hovered around 6 per cent, which shows that a LR of no less than 6 per cent could be considered a standard by the industry⁴⁹.

Chart 10. LR of banks in Lithuania

(Q1 2008–Q2 2017)

Percentages



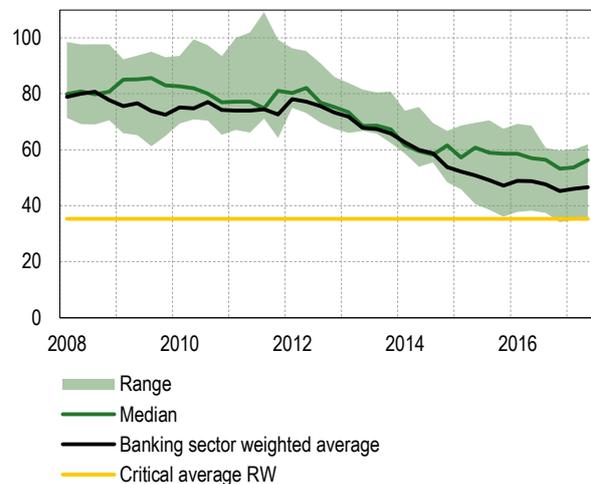
Source: Bank of Lithuania calculations.

Notes: 1) grey area denotes proxy values (ratio of Tier 1 capital to total assets), 2) dotted lines indicate average, median and the bottom range including AB Ūkio bank and AB bank SNORAS which had their licences revoked respectively in 2011 and in 2013.

Chart 11. Average risk weight of banks in Lithuania

(Q1 2008–Q2 2017)

Percentages



Source: Bank of Lithuania calculations.

Note: including AB Ūkio bank and AB bank SNORAS which had their licences revoked respectively in 2011 and in 2013.

Generally, risk-based capital requirements would be the more constraining requirements for Lithuanian banks, since their average risk weights are higher than the critical average risk weight (CARW)⁵⁰. However, the average risk weights have been decreasing since 2012, and one bank currently has an average risk weight close to the standard CARW (see Chart 11). Since only two banks employ IRB models, the downward trend presents not only the perceived decreasing riskiness of banks' assets but also a general shift to less risky loans such as mortgages (see discussion on risk weights below). Should this trend continue, the minimum LR requirement could become the constraining requirement for some banks

⁴⁹Admittedly, the statement is applicable to the current structure of the banking sector. If institutions that follow different business models enter the market in the longer-term, they might prefer having a lower LR. For example, AB bank SNORAS, which had its licence revoked in 2011, operated with the lowest LR (measured as the ratio of Tier 1 capital to total assets) in the Lithuanian banking sector – around 5 per cent. Despite being 3–4th largest bank (by assets), it pushed the sector's average LR downwards only slightly (see Chart 10).

⁵⁰With assumption that CARW is equal to 35.3 per cent, as previously discussed in this paper.

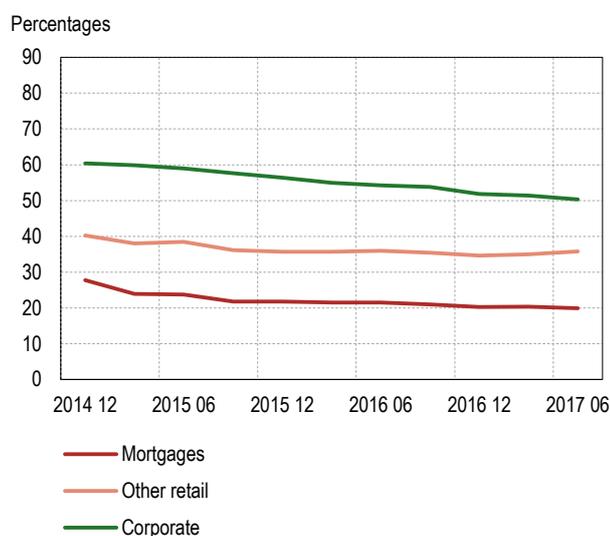
in the Lithuanian banking sector. In that case, additional macroprudential add-ons to the minimum LR requirement would have the potential to alter risk appetite.

More recently, average risk weights of banks' IRB portfolio have been decreasing across various asset classes (see Chart 12). This is especially pronounced for corporate loans, which have experienced a 10-percentage-point risk weight drop over 2014–2017. Other major asset classes have also seen their risk weights shrink, although to a lesser extent. In the end, retail mortgages remain the least risky asset class in the IRB portfolio of the banks. On average, in mid-2017, they carried an average 20 per cent risk weight, which is significantly lower than that of other retail (on average about 36%) or corporate (on average about 50%) loans.

Average risk weights of banks' SA portfolio remained, as implied by the design of the method, stable over the same period (see Chart 13). In terms of relative riskiness, mortgage loans were the least risky (around 40% risk weight on average), while corporate loans find themselves on the other side of the spectrum (around 80% risk weight on average). Thus, regardless of what credit risk evaluation method is used, rebalancing portfolio towards more mortgage loans will lead to shrinking average risk weights.

Chart 12. Average risk weight of IRB portfolio by asset class in Lithuania

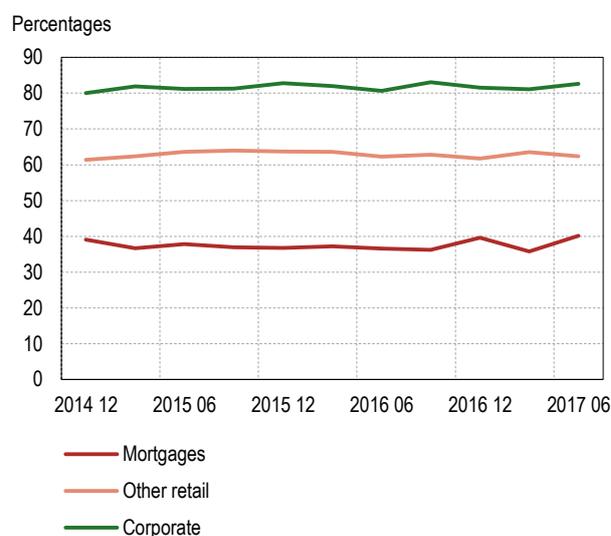
(Q4 2014–Q2 2017)



Sources: banks' annual reports and Bank of Lithuania calculations.

Chart 13. Average risk weight of SA portfolio by asset class in Lithuania

(Q4 2014–Q2 2017)



Source: Bank of Lithuania calculations.

Discrepancies between total assets and the corresponding LR exposure measure have not been large in Lithuania (see Chart 14). Since 2014, the ratios of LR exposure measure to total assets of banks have fluctuated in the range of 97–115 per cent. While the ratio did not show any trend over the period for which the data is available, the range became tighter recently and spans between 100 and 110 per cent (and is below the EU average). All this means that off-balance sheet positions and derivatives with modified 'prudential' value make up a relatively small amount compared to total assets in the Lithuanian banking sector.

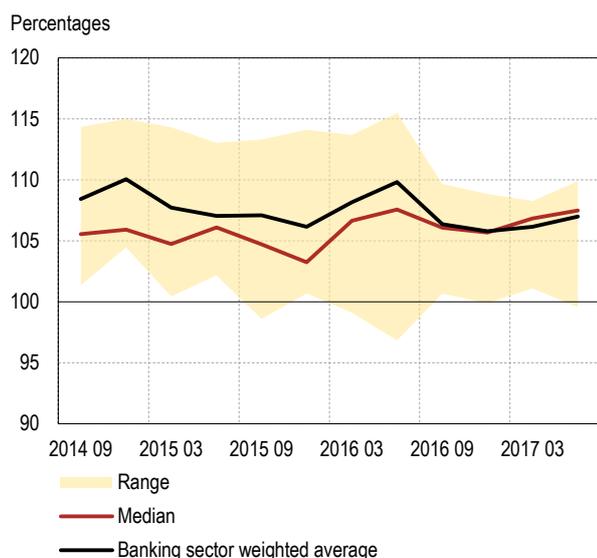
If credit institutions concentrate their portfolios too heavily on perceived low-risk asset classes, macroprudential LR add-ons might provide them with headroom for diversifying portfolios. While mortgage loans are indeed less risky compared to, e.g. corporate loans, them becoming a dominant part of portfolio across banks could be a systemic risk *per se*. It could be argued⁵¹ that corporate loans are more productive than other types of credit (in terms of contributing to creating added value in the economy). Therefore, should evidence of over-reliance on perceived low-risk asset classes emerge, macroprudential LR add-ons could be employed to steer credit institutions into diversifying their credit portfolios.

Currently, it seems that only a couple of banks have concentrated on lower-risk assets. As can be seen from Chart 15, a higher CET1 capital ratio could be associated with a higher LR in the cases of Citadele Bank, AB Šiaulių bankas, UAB Medicinos bankas and AB DNB bankas. However, for AB SEB bankas and "Swedbank", AB, this correlation breaks down. This breakdown is probably due to their high presence in the mortgage market coupled with the use of IRB credit risk models that have recently experienced a decrease in risk weights. The latter banks had the highest CET1 capital ratios at the end of 2016 in the Lithuanian banking system but, at the same time, they were the most leveraged.

⁵¹ See, e.g. Bezemer, D. J. (2014). [Schumpeter might be right again: the functional differentiation of credit](#), *Journal of Evolutionary Economics*, 24(5), 935–950.

Chart 14. Ratio of LR exposure measure to total assets of banks in Lithuania

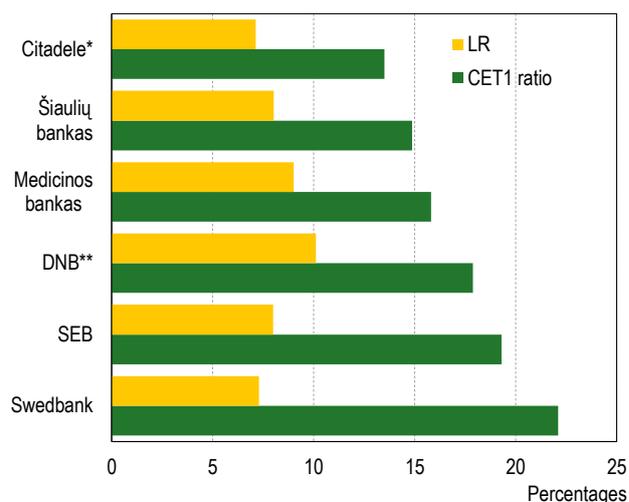
(Q3 2014–Q2 2017)



Source: Bank of Lithuania calculations.

Chart 15. LRs and CET1 capital ratios for Lithuanian banks

(31 December 2016)



Source: banks' annual risk and capital adequacy reports.

* Data for Citadele Group.

** DNB and Nordea merged in the Baltics as Luminor Bank on 1st October 2017.

Presumably, credit institutions in Lithuania would not be bound by macroprudential LR add-ons if such were introduced, judging by the current situation and their past behaviour. The industry, as compared to their counterparts across Europe, tends to remain minimally leveraged. While there is some evidence that banks have rebalanced their portfolios towards less risky asset classes, it would be premature to conclude that the consequent portfolio concentration poses a systemic risk. Having said this, introducing macroprudential LR add-ons could be used in the future as a way to anchor the good practice that has emerged in the Lithuanian banking system of staying on the safe side with LR.

Concluding remarks

The on-going introduction of LR requirements is welcome, as it will increase the resilience of the financial system.

The microprudential LR requirement will act as a backstop to existing capital requirements. This is particularly true for banks that employ low average risk weights. The harmonised application of a macroprudential add-on for G-SIIs, as implied by the final Basel III reform package, would further increase the resilience of the largest banks and provide for a safer global financial system.

Although the internationally minimum LR requirement is set at 3 per cent, this level should not be treated as a target. Based on recent research on optimal capital levels, the appropriate level of LR could be substantially higher. The perception that the prescribed minimum requirement is probably not sufficient is further confirmed by the choice of LR frameworks by national regulators, all of whom employ some kind of add-on above the minimum requirement.

The main two questions that should be answered by policymakers in determining the need for additional macroprudential LR add-ons in any jurisdiction are the following:

1. Is the microprudential LR requirement (i.e. 3%) a sufficient backstop for the banking system, and, if not, what would be the sufficient level of LR requirement?
2. What level of consistency between risk-based and non-risk-based capital requirements is sought, keeping the trade-off in the increased complexity of the capital regulatory framework in mind?

The second question needs to be viewed in the light of both structural and cyclical systemic risks. Firstly, the LR requirement could be diversified for systemically important institutions or institutions that contribute more to the structural risk in the financial system and other banks. In practice, different risk-based capital requirements are applied to banks, which may lead to inconsistencies between the two kinds of capital requirements across institutions. Secondly, risk-based capital requirements include a time-varying component, namely the CCyB. Tailoring the LR requirement to changes in cyclical systemic risk could also improve the backstop role of LR across time.

Banks in Lithuania hold sufficient voluntary capital buffers. Thus, there is no immediate concern about inadequacy of bank equity levels in Lithuania. Risk weights used by the banks in Lithuania, in general, are higher than the standard CARW in the LR framework. Therefore, risk-based capital requirements, including macroprudential buffers, will most probably be the binding requirements for Lithuanian banks if their capital levels decreased for any reason. Nevertheless, implementation of LR requirements would be a safeguard for a more robust capital framework.