



**BASEL III MONITORING EXERCISE –  
RESULTS BASED ON DATA AS OF 31 December 2017**

04 October 2018

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## Abbreviations

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<b>AMA</b>	advanced measurement approach
<b>ASF</b>	available stable funding
<b>BIA</b>	basic indicator approach
<b>BCBS</b>	Basel Committee on Banking Supervision
<b>BIC</b>	business indicator component
<b>CCB</b>	Capital conservation buffer
<b>CET1</b>	Common equity tier 1
<b>CRD</b>	Capital Requirements Directive
<b>CRR</b>	Capital Requirements Regulation
<b>CVA</b>	credit valuation adjustment
<b>EBA</b>	European Banking Authority
<b>FRTB</b>	fundamental review of the trading book
<b>G-SIIs</b>	global systemically important institutions
<b>HQLA</b>	high quality liquid assets
<b>ILM</b>	internal loss multiplier
<b>IMA</b>	internal model approach
<b>IRB</b>	internal ratings-based
<b>LC</b>	loss component
<b>LCR</b>	liquidity coverage ratio
<b>LR</b>	leverage ratio
<b>LRE</b>	leverage ratio exposure
<b>MRC</b>	minimum required capital
<b>NSFR</b>	net stable funding ratio
<b>OpRisk</b>	operational risk
<b>O-SIIs</b>	other systemically important institutions
<b>QIS</b>	Quantitative Impact Study
<b>RSF</b>	required stable funding
<b>RWA</b>	risk-weighted assets
<b>SA</b>	Standardised approach
<b>SMA</b>	standardised measurement approach
<b>T1</b>	Tier 1

## Executive summary

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The finalisation of post-crisis reforms of the Basel Committee on Banking Supervision (BCBS), as endorsed by the Group of Central Bank Governors and Heads of Supervision and published on 7 December 2017<sup>1</sup>, completes the Basel III framework and contributes to a more robust and resilient banking sector at the global level.

The present report assesses the impact on EU banks of the final revisions of credit risk, operational risk, and leverage ratio frameworks, as well as of the introduction of the aggregate output floor. It also quantifies the impact of the new standards for the market risk (fundamental review of the trading book, FRTB), as set out in January 2016 (see BCBS (2016), *Minimum capital requirements for market risk – standards*), and credit valuation adjustment (CVA)<sup>2</sup>. The impact is assessed on the assumption of the full implementation of the Basel reforms. In addition, in conjunction with the BCBS Basel III regular monitoring exercise, this report gives an update on the progress of the European banks in converging towards stricter capital requirements.

The impact assessment in the present report provides a **first indication** of the impact of final Basel III, in anticipation of a more detailed report, which will respond to the European Commission's Call for Advice<sup>3</sup> and be based on an expanded sample and on data as of June 2018. In addition, the findings of the current report should not be compared with those of the ad hoc monitoring exercise report, which was published by the EBA on 20 December 2017 based on 2015 data. The two reports are not directly comparable given that the FRTB and CVA components were not included in the impact assessment of the report, published in December 2017, and the composition of the sample is different (only 54 banks are common to both). Moreover, in the area of operational risk, the present report estimates the impact of the scenario using the actual internal loss multiplier (ILM), instead of  $ILM = 1$ , and it includes some elements of the revision, in most of the risk categories, that the previous report was not able to assess for lack of data.

The analysis of the present report refers to data as of December 2017 and uses a sample of 38 Group 1 banks and 63 Group 2 banks (101 in total)<sup>4</sup> for the cumulative impact<sup>5</sup>. It assesses the impact on the Total Tier 1 minimum required capital (T1 MRC)<sup>6</sup>, i.e. it assumes compliance with the higher of

<sup>1</sup> BCBS (December 2017), *Finalising Basel III: An overview of post-crisis reforms*; BCBS (December 2017), *Basel III: Finalising post-crisis reforms*.

<sup>2</sup> It should be noted that the numbers represented in this report do not constitute the final impact expected from the FRTB and CVA reforms. This is because the ongoing work at the BCBS includes a review of the calibrations of the standardised and internal model approaches to ensure consistency with the original expectations of the BCBS

<sup>3</sup> <https://www.eba.europa.eu/-/eba-will-support-the-commission-in-the-implementation-of-the-basel-iii-framework-in-the-eu>

<sup>4</sup> Group 1 banks are banks with Tier 1 capital in excess of EUR 3 billion and which are internationally active. All other banks are labelled as Group 2 banks.

<sup>5</sup> Only the banks that submitted data for at least one of the credit risk components (IRBA or SA) and the leverage ratio were included in the sample of the cumulative analysis. For banks that did not submit data for the specific components of the exercise, the cumulative analysis assumes that there is no impact arising from the revisions to those components.

<sup>6</sup> Capital requirement figures in this report include the capital conservation buffer (CCB) and the global systemically important institutions (G-SIIs) surcharge, where applicable. They do not incorporate any Pillar 2 requirements applied under the current supervisory framework, nor do they consider any higher loss absorbency requirements for other

the risk-based capital requirement (i.e. those based on risk-weighted assets, including the effect of the output floor) and the leverage ratio requirement, under the CRR/CRD IV and Basel III frameworks (both fully phased-in).

The weighted average change in total T1 MRC is 16.7% across all 101 banks, of which the FRTB and CVA contribute 5.3%, 18.7% for the large and internationally active banks (Group 1), of which the FRTB and CVA impact is 6.1%, and 3.8% for the other banks (Group 2), of which the FRTB and CVA impact is 1.0% (Table 1). The impact of the risk-based reforms across all banks (21.8%) is partially offset by the fact that some banks are constrained by the leverage ratio in the current framework. This offset indicates that the leverage ratio is becoming less constraining, i.e. it exceeds the risk-based requirements by less, in terms of MRC, for some banks in the sample (53 banks are constrained under the Capital Requirements Regulation (CRR)/Capital Requirements Directive (CRD) IV, which represent 42.9% of the total risk-weighted assets (RWA) of the sample; 36 are constrained under the final Basel III framework, which represents 14.9% of the total RWA of the sample)<sup>7</sup>.

The output floor and operational risk frameworks are the two major drivers of MRC increase across all banks, accounting for 6.3% and 5.7% respectively; however, the impact of the output floor should be interpreted in conjunction with the reduction of the leverage ratio (LR) impact, as the latter becomes relatively less constraining than the CRR/CRD IV, for some banks, and compensates for the impact of the output floor. The same applies to Group 1 (6.5% and 6.4% respectively) and G-SIIs (5.4% and 7.5% respectively). Credit risk is the third most important driver for Group 1 and G-SIIs (4.5% and 4.7% respectively).

Instead, for Group 2 banks, credit risk is the major driver of the impact (6.7%), followed by the output floor and operational risk. The offsetting effect of the leverage ratio is particularly important (-10.6%).

*Table 1: Change in total T1 MRC as percentage of the overall base MRC due to the full implementation of Basel III (2027) (%)*

	Credit risk	Market risk	CVA	Operational risk	Output floor	Total risk-based	Revised LR	TOTAL
<b>All banks</b>	4.5	2.0	3.3	5.7	6.3	21.8	-5.1	<b>16.7</b>
<b>Group 1</b>	4.1	2.3	3.8	6.4	6.5	23.0	-4.3	<b>18.7</b>
Of which: G-SIIs	4.7	3.4	5.4	7.5	5.4	26.4	-1.0	<b>25.4</b>
<b>Group 2</b>	6.7	0.6	0.4	1.4	5.3	14.4	-10.6	<b>3.8</b>

*Source: EBA Quantitative Impact Study (QIS) data (December 2017)*

Compared with the current fully phased-in CRR/CRD IV rules, the capital shortfall under the full implementation of the final Basel III reforms increases for all banks, but particularly for G-SIIs (Table 2). The total shortfall due to the implementation of the final Basel III minimum common equity tier 1 (CET1) required capital is EUR 6.0 billion (EUR 5.0 billion of which for G-SIIs), while the Tier 1 capital shortfall due to the risk-based capital requirements is approximately EUR 14.6 billion and the additional Tier 1 shortfall due to the revised LR is EUR 0.3 billion.

Since the actual capital held by banks also covers Pillar 2 requirements, O-SIIs surcharges, counter-

(domestic) systemically important institutions (O-SIIs) and countercyclical capital buffer requirements. For details on the methodology, see Annex.

<sup>7</sup> See Annex (section 9.1.6) for more details on the interpretation of the impact of the leverage ratio.

cyclical capital buffer and systemic risk buffer, the figures below may underestimate the actual shortfall. On the other hand, the assessment does not consider any scheduled measures that banks might undertake to comply with the revised framework between December 2017 and the Basel III full implementation date, nor does it consider the extent to which risks currently covered by a Pillar 2 add-on will be possibly covered by Pillar 1 charges under the new regime.

*Table 2: Shortfall of current available capital, due to the full implementation of CRR/CRD IV and Basel III (2027) (billion EUR)*

	Capital shortfalls – CRR/CRD IV (fully phased-in)			Capital shortfalls – Basel III framework (2027)		
	CET1	Tier1	Additional LR Tier 1	CET1	Tier 1	Additional LR Tier 1
<b>All banks</b>	0.0	0.0	1.1	6.0	14.6	0.3
<b>Group 1</b>	0.0	0.0	0.0	5.0	13.2	0.0
Of which: G-SIIs	0.0	0.0	0.0	5.0	12.0	0.0
<b>Group 2</b>	0.0	0.0	1.1	1.0	1.4	0.3

Source: EBA QIS data (December 2017)

When considering the entire sample, the risk-based capital ratios, namely the CET1, T1 and total capital ratios, fall by 280, 330 and 400 basis points respectively (Table 3). The leverage ratio of the entire sample increases by 30 basis points (from 5.1% to 5.4%). The drop is greater for Group 1 banks than for Group 2 banks.

*Table 3: Capital ratios: fully phased-in CRR/CRD IV and final Basel III framework (2027) (%)*

	Capital ratios – CRR/CRD IV (fully phased-in)				Capital ratios – Basel III framework (2027)			
	CET1	Tier 1	Total capital	LR	CET1	Tier 1	Total capital	LR
<b>All banks</b>	14.1	15.6	18.5	5.1	11.3	12.3	14.5	5.4
<b>Group 1</b>	13.8	15.4	18.3	5.1	11.1	12.1	14.3	5.4
Of which: G-SIIs	12.7	14.6	17.3	4.8	10.1	11.3	13.3	5.2
<b>Group 2</b>	16.1	16.7	19.5	5.4	13.1	13.7	15.9	5.5

Source: EBA QIS data (December 2017)

Beyond the impact of the final Basel III reforms, as finalised in December 2017, the current monitoring exercise report estimates the impact of implementing the net stable funding ratio (NSFR) framework. Banks in the sample need additional stable funding of EUR 27.8 billion to fulfill the minimum requirement of 100% (Table 13), equivalent to 4.2% of total weighted available stable funding (ASF) (EUR 666 billion) and 2.7% of total assets (EUR 1 trillion) of all non-compliant banks participating in the NSFR-related part of this exercise. The overall positive trend is also reflected in the reduction in the shortfall in stable funding needed to meet the 100% ratio requirement, which, compared with June 2011, decreased by 99% (from EUR 1,279 billion to EUR 3 billion) for Group 1 banks and by 98% (from EUR 158 billion to EUR 2 billion) for Group 2 banks.



# 1. Introduction

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This report presents the estimated impact of the Basel reform package on European banks as agreed in December 2017 by the Group of Central Bank Governors and Heads of Supervision (GHoS). The assessment of the final package includes the revisions to the internal ratings-based (IRB) approach<sup>8</sup>, the standardised approach to credit risk (SA)<sup>9</sup> and the standardised approach to operational risk<sup>10</sup>, as well as the revisions to the Basel III leverage ratio framework<sup>11</sup>. In addition, it includes the impact of the fundamental review of the trading book (FRTB)<sup>12</sup> and credit valuation adjustment (CVA) standards, although it should be stressed that it does not include the impact of the currently ongoing Basel Committee of Banking Supervision (BCBS) review of the calibrations of the standardised and internal model approaches to ensure consistency with the original expectations of the BCBS, as well as changes resulting from the revised securitisation framework<sup>13</sup>.

The analysis included in this report differs from the impact analysis published by the EBA in December 2017, right after the publication of the Basel reforms, in several respects. First, the report is based on more recent data, specifically collected for assessing the final version of the standards. Second, compared with the past reports, this report now includes the impact of the CVA and the FRTB rules, as they currently stand.

## 1.1 Data and sampling

The data submitted for the cumulative impact assessment, as of December 2017, cover a total of 134 banks from 18 EEA countries, including 44 Group 1 and 90 Group 2 banks. Only banks which submitted data for at least one of the credit risk components (IRB approach or SA) and the leverage ratio (LR) were included in the sample of the cumulative analysis. Based on this criterion and following data cleansing, 101 banks were included in the cumulative analysis: 38 Group 1 banks and 63 Group 2 banks (see Table 4).

Since the sample used for analysing the impact of the Basel revisions on individual risk categories is larger than the sample used for the overall cumulative analysis, the results relating to credit risk, operational risk and the leverage ratio may differ from those reported in the overall cumulative analysis (see shaded column in Table 4).

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<sup>8</sup> See BCBS (2016), *Reducing variation in credit risk-weighted assets – Constraints on the use of internal model approaches*, March 2016; BCBS (2017), *Finalising Basel III: An overview of post-crisis reforms*; BCBS (2017), *Basel III: Finalising post-crisis reforms*.

<sup>9</sup> See BCBS (2015), *Second Consultative document: Standards – Revisions to the Standardised Approach for credit risk*; BCBS (2017), *Finalising Basel III: An overview of post-crisis reforms*; BCBS (2017), *Basel III: Finalising post-crisis reforms*.

<sup>10</sup> See BCBS (2016), *Standardised Measurement Approach for operational risk: Consultative document*; BCBS (2017), *Finalising Basel III: An overview of post-crisis reforms*; BCBS (2017), *Basel III: Finalising post-crisis reforms*.

<sup>11</sup> See BCBS (2016), *Revisions to the Basel III leverage ratio framework - Consultative document*.

<sup>12</sup> See BCBS (2016), *Minimum capital requirements for market risk – Standards*.

<sup>13</sup> See BCBS (2016), *Revision to the securitisation framework*.

Table 4: Number of banks which submitted data and those included in the cumulative analysis, per country

Country (1)	Included	Submitted					
	Cumulative analysis of the impact on MRC (2)	Credit Risk (3)	Market Risk (4)	CVA (5)	Operational risk (6)	LR (7)	NSFR (8)
Austria	9	9	5	7	11	12	10
Belgium	4	4	3	4	4	4	4
Germany	25	30	9	21	37	36	39
Denmark	4	4	0	4	4	4	0
Spain	6	6	3	6	6	8	9
France	6	7	6	7	7	7	7
United Kingdom	8	9	5	5	10	8	9
Greece	4	4	4	4	4	4	4
Hungary	0	2	0	1	2	2	3
Ireland	8	8	0	7	8	8	8
Italy	10	10	5	10	12	12	12
Luxembourg	1	1	1	1	1	1	1
Malta	0	1	0	1	0	1	1
Netherlands	8	8	2	8	8	9	10
Norway	0	2	2	2	2	2	2
Poland	0	5	3	4	5	5	5
Portugal	2	2	2	3	2	3	3
Sweden	6	7	3	7	7	7	7
<b>All banks</b>	<b>101</b>	<b>119</b>	<b>53</b>	<b>102</b>	<b>130</b>	<b>133</b>	<b>134</b>
<b>Group 1</b>	<b>38</b>	<b>43</b>	<b>34</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>44</b>
<b>Of which: G-SIIs</b>	<b>10</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>
<b>Group 2</b>	<b>63</b>	<b>76</b>	<b>19</b>	<b>60</b>	<b>87</b>	<b>89</b>	<b>90</b>

Source: EBA QIS data (December 2017)

## 1.2 Methodology for impact estimation: aggregation and metrics

### 1.2.1 Minimum required capital (MRC) and differences with respect to methodology used by the BCBS

The report presents the impact of the reforms in terms of changes in Tier 1 minimum required capital (T1 MRC), comparing the fully implemented revised Basel III requirements and the fully phased-in Capital Requirements Regulation (CRR) / Capital Requirements Directive (CRD) IV requirements. The baseline for the estimation of the impact is the higher of the current risk-based T1 MRC and the current LR-based Tier 1 MRC. The target is the higher of the revised risk-based T1 MRC and the revised LR-based Tier 1 MRC.

Where explicitly indicated, the report provides evidence of the impact on other metrics, such as capital shortfalls of the current actual capital (common equity tier 1 (CET1), Tier 1 (T1), Total capital) vis-à-vis the CRR / CRD IV MRC metric and final Basel MRC metric.

The current risk-weighted assets (RWA), which are the basis for the calculation of risk-based T1 MRC, do not include the RWA add-on based on the ‘Basel I floor’<sup>14</sup> used by some EU jurisdictions, since it ceased to exist in the EU on 1 January 2018. As to the revised framework, the exercise assumes full implementation (as of 2027) of the output floor calibrated at 72.5% of the RWA calculated under the standardised approach of the revised framework, while the estimation of the LR-based Tier 1 MRC consists of the existing minimum requirement (3%) plus 50% of the risk-based global systemically important institutions (G-SIIs) surcharge<sup>15</sup>, where applicable<sup>16</sup>.

Overall, the analysis measures the impact of the reforms focusing on the ‘total Tier 1 MRC’, i.e. the higher of the risk-based MRC and the LR-based MRC. The results shown in the report are weighted averages, unless stated otherwise.

## 1.2.2 Description of impact metrics

The following variables are used in the analysis for assessing the cumulative impact, in terms of T1 MRC:

- ‘*Total*’ shows the overall changes in T1 MRC, from the current to the revised framework, taking into account that banks must meet the higher of the risk-based capital requirements (i.e. including the 72.5% output floor) and the revised Basel III LR requirement with respect to T1 capital.
- ‘*Total risk-based*’ shows changes to the risk-based T1 MRC, i.e. without including the impact of the changes in the revised Basel LR T1 MRC.
- ‘*Credit risk*’ shows the change in T1 MRC due to the revisions to the SA and internal ratings-based (IRB) approach for credit risk.
- ‘*Market risk*’ shows the change in T1 MRC due to the revisions to the SA and internal model approach (IMA) approach for market risk (FRTB).
- ‘*CVA*’ shows the change in T1 MRC due to the revisions to the CVA framework, including the removal of the CVA exemptions under Article 382 of the CRR.
- ‘*Operational risk*’ shows the change in T1 MRC due to the introduction of the new standardised measurement approach (SMA) assuming that the EU will not exercise any of the discretions allowed under the revised framework.
- ‘*Output floor*’ presents the change in the level of T1 MRC due to the application of the aggregate output floor on the total RWA. The output floor impact is the positive difference of deducting the 72.5% of the total SA-equivalent RWA from the IRB RWA estimations.

<sup>14</sup> The impact is measured without considering the current national implementation of the Basel I-based transitional floors set out in the Basel II framework. The transitional Basel I-based floor was implemented in Article 500 of Regulation (EU) No 575/2013 (CRR) as a floor to actual own funds rather than a floor to RWAs. The temporary requirement expired on 31 December 2017. Regulation (EU) No 575/2013 (CRR) as a floor to actual own funds rather than a floor to RWAs. The temporary requirement expired on 31 December 2017.

<sup>15</sup> For example, for a bank with a G-SIIs buffer of 1% the minimum LR T1 MRC would be 3.5% times the total exposure measure.

<sup>16</sup> See also BCBS (2013), *Global systemically important banks – updated assessment methodology and the higher loss absorbency requirement*; EBA (2014), *Final draft RTS on the methodology for the identification of global systemically important institutions*; FSB (November 2015): *2015 update of list of G-SIBs*.

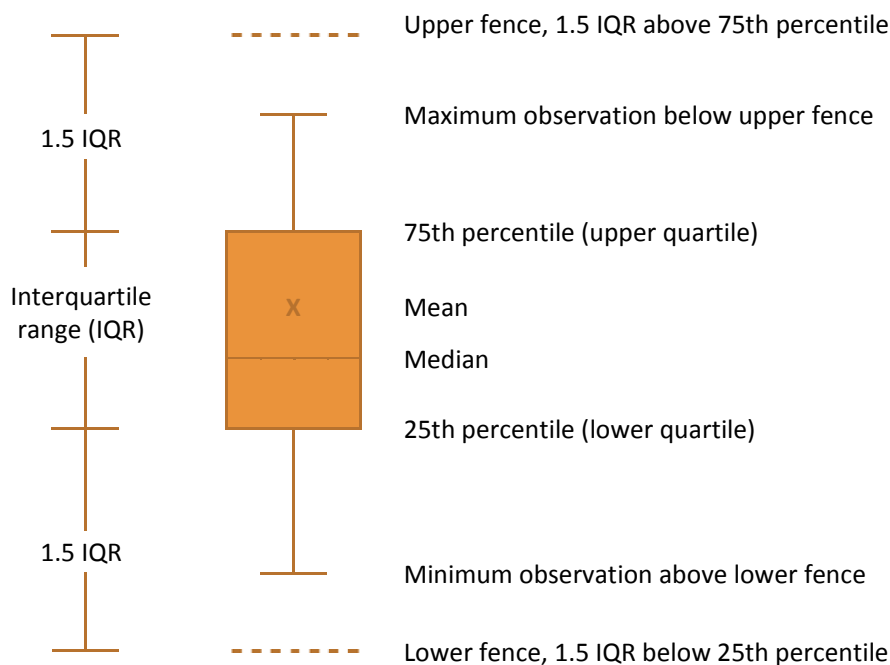
- ‘Revised Leverage ratio (LR)’ shows the change in LR-based T1 MRC add-ons (i.e. the additional MRC on the top of the risk-based MRC) due to the implementation of the revised LR framework. A positive change shows that the LR requirement<sup>17</sup> becomes more constraining under the new framework, i.e. the final Basel III LR framework increases the T1 capital add-on in relation to the CRR/CRD IV add-on. A negative change shows that the final Basel III LR T1 add-on becomes less constraining than the CRR/CRD IV add-on, i.e. the final Basel III LR T1 add-on is lower than the CRR-CRD IV add-on.

In addition, the impact of the final Basel III framework is assessed in terms of ‘capital shortfall’ of the actual CET1, T1 and Total capital, in relation to the MRC for CET1, T1, and total capital of the new framework, as follows:

- ‘Capital shortfall’ is estimated as the differences between the fully implemented MRC metric and the current actual capital set aside by the EU banks. Bearing in mind that the current actual capital metric (CET1, T1, total capital) includes a part attributed to Pillar 2 capital requirements, imposed by the relevant supervisor, the estimated shortfall is probably an underestimation of the actual shortfall.

### 1.3 Presentation of the distribution of the results (box plots)

To present more detailed results, while at the same time ensuring data confidentiality, some charts show box plots that give an indication of the distribution of the results among the participating banks. Those box plots are defined as follows:



<sup>17</sup> Currently, leverage ratio requirements are not yet binding in the EU; the proposed CRR II / CRD V will render the leverage ratio requirements binding.

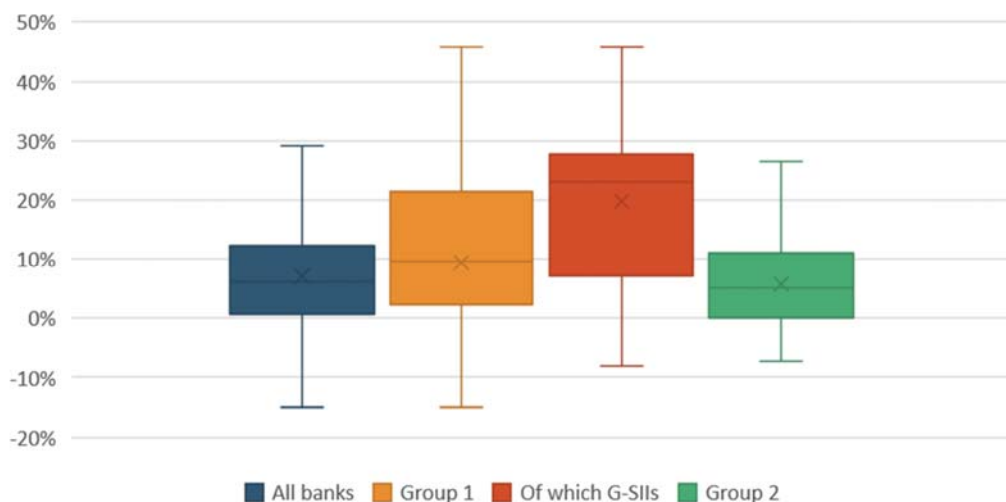
## 2. Regulatory capital ratios, capital shortfalls and impact on minimum required capital

This section presents the level of the risk-based and LR-based capital, as well as the capital shortfalls, (section 2.1), the impact per risk category (section 2.2) and the interaction between the output floor, applied to the risk-based metrics, and the new leverage ratio framework (section 2.3), due to the full implementation of the Basel reform package.

### 2.1 Cumulative impact analysis of the final Basel III reform

The analysis in the present section focuses on the impact of Basel III package on the fully phased-in CRR/CRD IV T1 MRC. The advantage of the MRC measure is that it is not affected by Pillar 2 capital requirements.

Figure 1: Distribution of changes in total T1 MRC (%)



Source: EBA QIS data (December 2017)

Figure 1 shows the distribution of T1 MRC across all banks, Group 1, Group 2 and G-SIs. The distribution of changes in T1 MRC for Group 1 banks spans a broader range than that of Group 2 banks. Group 1 and Group 2 banks exhibit median values lower than their respective average values, indicating that the average impact is driven by large banks.

Table 5 shows the impact of the Basel reform package assuming its full implementation. On average, the total increase in T1 MRC, after including the capital conservation buffer (CCB) and G-SIs surcharge, is 16.7% across all 101 banks in the sample, 18.7% for the large and internationally active banks (Group 1) and 3.8% for the other banks (Group 2).

For Group 1 banks, the overall increase in T1 MRC consists of a 23.0% increase in the risk-based components, mainly driven by the output floor (6.3%). The impact of the risk-based components on T1 MRC is partially offset by a 4.3% reduction in the add-on attributed to leverage ratio T1 MRC. This reduction reflects the fact that the revised Basel LR becomes less constraining, in the presence of the output floor on RWA, which increases the risk-based T1 MRC. The results are similar for the G-SIIs sample. For Group 2 banks, the overall 3.8% increase in T1 MRC is again driven by the 14.4% increase in the risk-based measure, consisting of an increase of 6.7% due to credit risk revisions, a 5.3% increase assigned to the output floor and a lower increase attributed to the operational risk (1.4%). This increase is partially offset by a 10.6% reduction in the leverage ratio impact (see Annex, section 9.1.6 for the detailed methodology).

Table 5: Changes in T1 MRC, per risk category, due to the implementation of the final Basel III framework (2027) (%)

	Credit risk	Market risk	CVA	Operational risk	Output floor	Total risk-based	Revised LR	TOTAL
<b>All Banks</b>	4.5	2.0	3.3	5.7	6.3	21.8	-5.1	<b>16.7</b>
<b>Group 1</b>	4.1	2.3	3.8	6.4	6.5	23.0	-4.3	<b>18.7</b>
Of which: G-SIIs	4.7	3.4	5.4	7.5	5.4	26.4	-1.0	<b>25.4</b>
<b>Group 2</b>	6.7	0.6	0.4	1.4	5.3	14.4	-10.6	<b>3.8</b>

Source: EBA QIS data (December 2017)

The CVA risk capital charge goes down by 3.3% between the Basel III and the CRR / CRD IV frameworks. The large impact of CVA can be explained by the difference in the scope of the CVA risk capital charge, primarily driven by the removal of the CVA exemptions for transactions with non-financial counterparties, sovereign counterparties, pension funds counterparties, client's transactions and intragroup transactions as specified under Article 382 of the CRR.

## 2.2 Capital ratios and capital shortfalls

This section presents the development of the capital ratios from the current to the full implementation framework, as well as the capital shortfalls that would arise from the full implementation of Basel III minimum capital requirements.

### 2.2.1 Capital ratios

Table 6 shows the results of the calculations for CET1, T1 and total capital ratios. It also shows the result of the calculations of the leverage ratio, assuming that the actual capital measure remains the same under the final Basel III, and the impact on the leverage ratio is entirely attributed to changes in the leverage ratio exposures.

Table 6: Comparison of risk-based capital ratios and leverage ratios under different states of implementation (%)

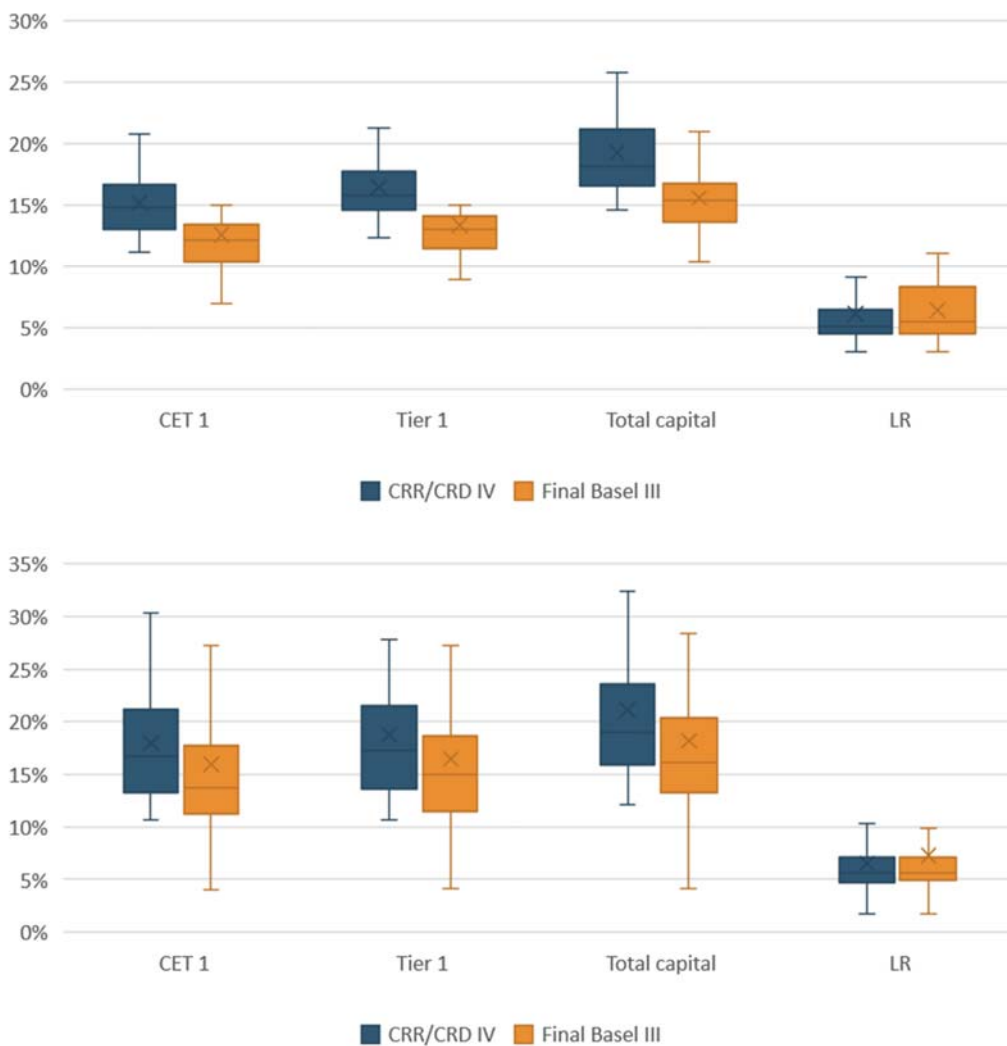
	CET1			Tier 1			Total Capital			Leverage Ratio	
	CRR/CRD IV	2022	2027	CRR/CRD IV	2022	2027	CRR/CRD IV	2022	2027	CRR/CRD IV	2027
<b>All banks</b>	14.1	13.7	11.3	15.6	14.9	12.3	18.5	17.6	14.5	5.1	5.4
<b>Group 1</b>	13.8	13.4	11.1	15.4	14.7	12.1	18.3	17.4	14.3	5.1	5.4

	CET1		Tier 1		Total Capital		Leverage Ratio				
Of which: G-SIIs	12.7	12.4	10.1	14.6	13.9	11.3	17.3	16.3	13.3	4.8	5.2
<b>Group 2</b>	16.1	15.7	13.1	16.7	16.5	13.7	19.5	19.0	15.9	5.4	5.5

Source: EBA QIS data (December 2017)

Although, on average, the impact on capital ratios is similar across all bank groups, the dispersion across the different types of capital ratios changes in different manners between the two frameworks (Figure 2). While the dispersion of CET1 and Tier 1 ratios remains almost unchanged, the dispersion of total capital ratios becomes narrower. On the contrary, the dispersion of LR becomes wider under the final Basel III framework.

Figure 2: Distribution of capital ratios under CRR/CRDIV vs. fully phased-in final Basel III framework, Group 1 banks (upper graph) and Group 2 banks (lower graph)



Source: EBA QIS data (December 2017)

### 2.2.1 Capital shortfalls

The capital shortfall compares the actual level of capital (CET1, Tier 1 and total capital) in December 2017 with the fully implemented MRC, after taking into account the CCB and G-SIIs surcharge, where applicable<sup>18</sup>. The capital shortfall under the current fully phased-in CRR/CRD IV is negligible and observed only in the Group 2 sample. The combined<sup>19</sup> Tier 1 capital shortfall under the full implementation of the final Basel III is mainly driven by G-SIIs. The shortfall for all banks, Group 1 banks, their subset of G-SIIs and Group 2 banks amounts to EUR 15.0 billion, EUR 13.2 billion, EUR 12.0 billion and EUR 1.8 billion respectively (Table 7).

The Basel III reforms introduce a change in the calculation of the leverage ratio exposure (LRE) measure, which stems from the definition of the eligible assets included in the calculation. This change in the definition, alone, has a negative impact in the calculation of the LR-based T1 MRC. The revisions to the risk-based capital requirements result in a CET1 capital shortfall of EUR 6.0 billion. For Tier 1 risk-based requirements, this shortfall increases to more than twice as much (EUR 14.6 billion). The application of both risk-based and LR-based requirements increases the Tier 1 capital shortfall further to EUR 15.0 billion.

Table 7: Capital shortfalls by bank group under full implementation of CRR / CRD IV and final Basel III (billion EUR)<sup>20</sup>  
Part 1: Full implementation of CRR – CRD IV

Bank group	CET1	Tier1			Total capital	
		Risk-based <sup>21</sup>	LR-based	Risk-based and LR-based Tier 1	Risk-based <sup>22</sup>	Risk-based total capital and LR-based Tier 1 <sup>23</sup>
All banks	0.0	0.0	1.1	1.1	1.0	2.1
Group 1	0.0	0.0	0.0	0.0	0.0	0.0
Of which: G-SIIs	0.0	0.0	0.0	0.0	0.0	0.0
Group 2	0.0	0.0	1.1	1.1	1.0	2.1

Part 2: Full implementation of final Basel III

Bank group	CET1	Tier1			Total capital	
		Risk-based	LR-based	Risk-based and LR-based Tier 1	Risk-based	Risk-based total capital and LR-based Tier 1
All banks	6.0	14.6	3.3	15.0	24.2	24.5
Group 1	5.0	13.2	2.2	13.2	21.8	21.8
Of which: G-SIIs	5.0	12.0	2.2	12.0	21.7	21.7
Group 2	1.0	1.4	1.1	1.8	2.4	2.7

Source: EBA QIS data (December 2017)

<sup>18</sup> This metric takes into account the deficit of capital on an individual basis without it being offset by the surpluses of other banks.

<sup>19</sup> Assuming joint implementation of the risk-based and leverage ratio requirements.

<sup>20</sup> The results presented in Table 7 differ slightly from those in Table 2 because of rounding of the differences.

<sup>21</sup> 8.5% (=minimum Tier 1 (6%) + capital conservation buffer (2.5%)).

<sup>22</sup> Assuming compliance with the risk-based capital ratio requirements only.

<sup>23</sup> Assuming compliance with both the risk-based capital ratio and leverage ratio requirements.

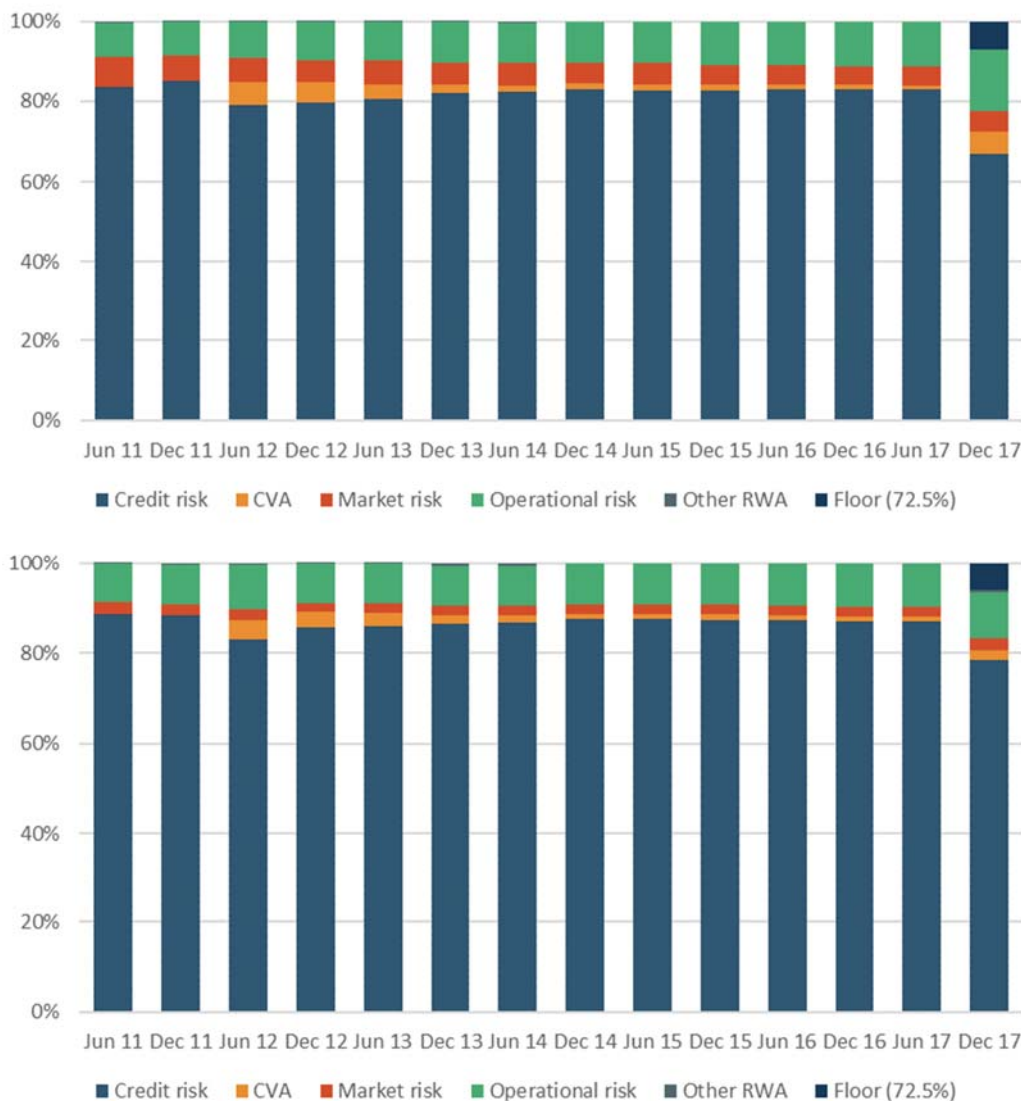


The full implementation of the Basel III reforms implies an increase in the minimum required capital across all categories of the risk-based framework. Nonetheless, this increase is not proportionate throughout the risk categories, causing a change in the proportion of each category in the total MRC. Moreover, the implementation of the output floor, which is considered separately in the analysis, reduces the proportion of all other factors.

Thus, the share of credit risk decreases, while all other risk categories (operational risk, CVA, market risk) show increased proportion in the formulation of the total MRC.

Figure 3 exhibits the composition of MRC by risk category across time.

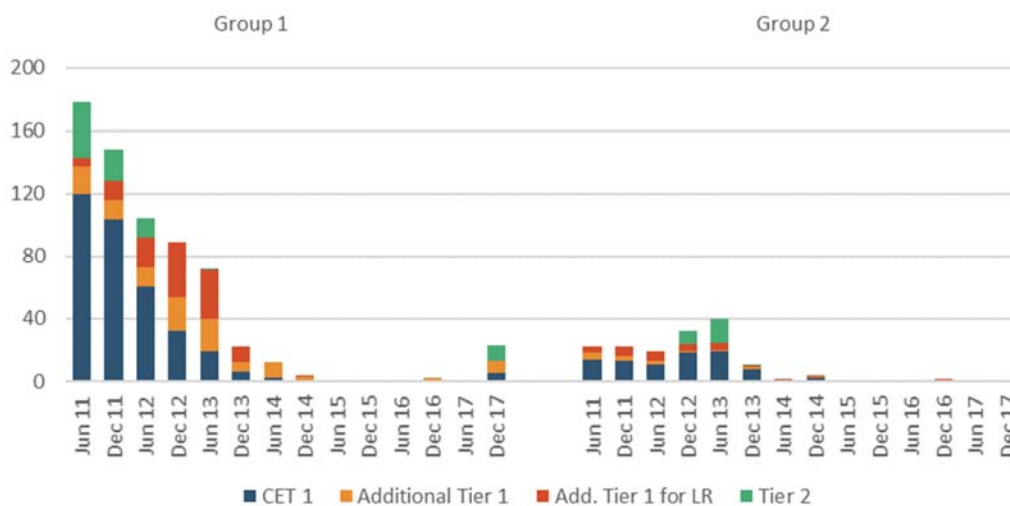
Figure 3: Development of the composition of MRC by risk category under full implementation of the CRR / CRD IV (Jun-11 to Jun-17) and Basel III (Dec-17) over time, for Group 1 (upper graph) and Group 2 (lower graph) banks



Source: EBA QIS data (December 2017)

The capital shortfall analysis, for the subsample of banks which participated in all exercises, shows a continuous decrease, since the introduction of the initial Basel III proposals (2011) and until the previous monitoring exercise (as of end-June 2017). The implementation of the final Basel III framework implies an increase in the shortfall, which, however, is only a small fraction of the impact observed in 2011, and mainly affects Group 1 banks (Figure 4).

Figure 4: Trend in capital shortfalls, for the consistent sample of banks, by type of capital and bank group over time (billion EUR)



Source: EBA QIS data (December 2017)

## 2.3 Interactions between risk-based and leverage ratio capital requirements

### 2.3.1 Contribution of the leverage ratio impact

As mentioned in the assessment of the cumulative impact, and described in detail in the Annex (section 9.1.6), the leverage ratio impact assesses whether or not the Basel III framework renders the leverage ratio requirements more constraining than the CRR/CRD IV requirements. Figure 5 describes, in graph form, the mechanics for the estimation of the leverage ratio impact.

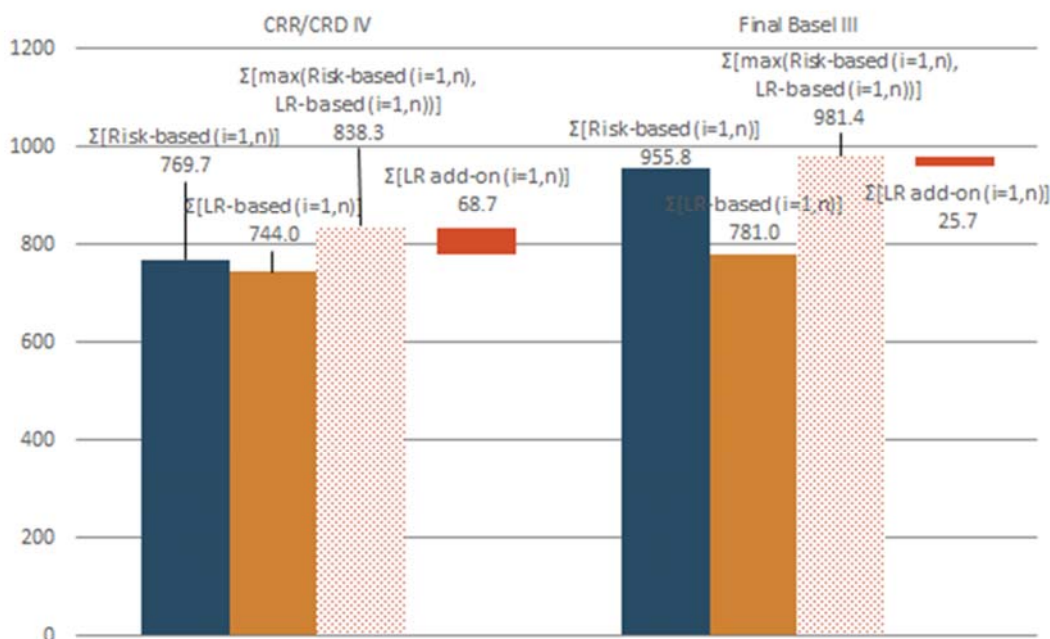
The aggregate risk-based and LR-based MRCs, for all banks under the CRR/CRD IV, are EUR 769.7 billion and EUR 744.0 billion respectively. Despite the fact that the aggregate risk-based MRC is higher than the aggregate LR-based MRC, the LR-based MRC is higher than the risk-based MRC for some of the banks in the sample, which produces LR-based MRC add-ons<sup>24</sup>. Under the CRR/CRD IV, the sum of the LR-based add-ons, for all banks participating in the cumulative analysis, is EUR 68.7 billion.

<sup>24</sup>  $\sum \max(LR\_based\_MRC - Risk\_based\_MRC, 0)$ .

Similarly, the aggregate risk-based and LR-based MRC, for all banks under the final Basel III framework, are EUR 955.8 billion and EUR 781.0 billion respectively. The sum of LR-based MRC add-ons, under the final Basel III framework, is EUR 25.7 billion.

The comparison between the CRR/CRD IV and final Basel III frameworks indicates that the leverage ratio requirements become less constraining by EUR 43.0 billion under the final Basel III framework. In percentage terms, this amount corresponds to the leverage ratio impact of -5.1% (= -43.0 / 838.3) shown in Table 1 and Table 5.

Figure 5: The mechanics of the calculation of actual leverage ratio MRC impact, Tier 1 MRC (billion EUR)



$\Sigma[\text{Risk-based}(i=1,n)]$ , the aggregate risk-based Tier 1 MRC;  
 $\Sigma[\text{LR-based}(i=1,n)]$ , the aggregate leverage-ratio-based Tier 1 MRC;  
 $\Sigma[\max(\text{Risk-based}(i=1,n), \text{LR-based}(i=1,n))]$ , the aggregate total Tier 1 MRC, which ensures compliance, at individual bank level, with both risk-based and leverage ratio requirements;  
 $\Sigma[\text{LR add-on}(i=1,n)]$ , the aggregate amount of leverage ratio add-ons, i.e. the sum of the differences where the LR-based Tier 1 MRC is higher than the risk-based Tier 1 MRC

Source: EBA QIS data (December 2017)

### 3. Credit risk

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This section assesses the isolated impact of the Basel reforms related to the revisions to the SA and the IRB approach for credit risk. All banks that delivered high-quality data on the SA or the IRB approach are considered in this section, irrespective of whether or not they submitted data for other sections. The available dataset, as of December 2017, does not track the guaranteed part of IRB exposures, which, because of the revised rules on the treatment of guarantees, will be under the SA in the revised framework.

The changes in final framework aim, among other objectives, at increasing the comparability by aligning definitions and taxonomies between the SA and IRB approach to credit risk. In particular, they (1) introduce new asset classes, or split the existing asset classes, and (2) revise the eligibility and/or scope of using the IRB approaches for some asset classes<sup>25</sup>. These changes do not allow a direct comparison between the proposed and current frameworks. As a consequence, the estimated impact is an approximation.

The analysis faced many data quality issues arising mainly from difficulties in allocating portfolios according to the revised categorisation of the asset classes and from different interpretations of the revised framework. However, the outcome of data cleansing showed that banks opted to be rather conservative when providing data for the revised framework. This also implies that the impact shown in the report could be an overestimation of the actual impact. Since the final Basel framework allows banks to use either the loan-splitting approach or the whole-loan approach for residential and commercial real estate, the current analysis assumes that the loan-splitting approach is the method for EU banks.

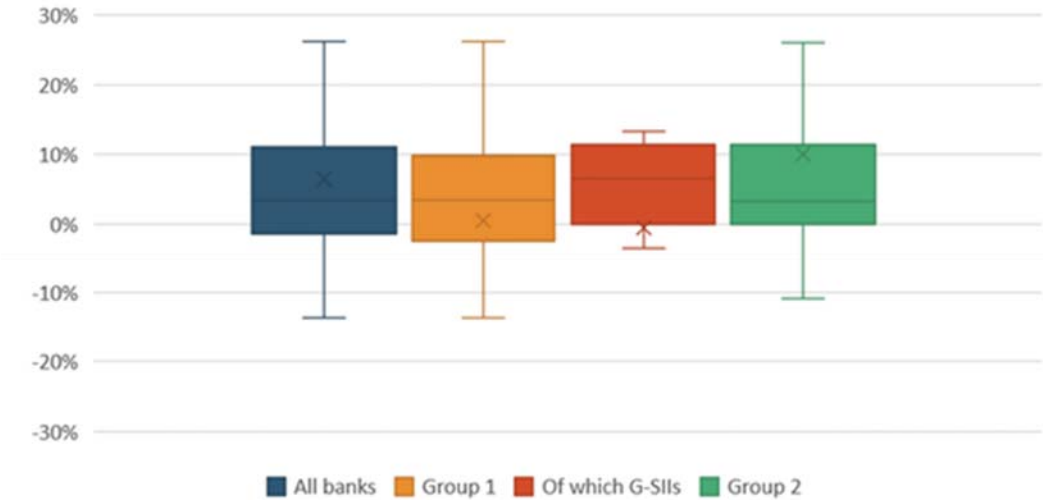
Figure 6 shows the distribution of changes in Tier 1 MRC assigned to the revisions of the SA and IRB approach for credit risk. The median impact over all banks, as a percentage of the current Tier 1 MRC, assigned to credit risk only, is 3.4%.

When the overall impact is broken down into asset classes, the largest increases for Group 1 banks are observed for 'equities', 'equity investment in funds' and 'subordinated debt and capital instruments other than equity'.

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<sup>25</sup> For more information, please refer to <https://www.bis.org/bcbs/publ/d424.htm>

Figure 6: Changes in Tier 1 MRC for credit risk (SA and IRB) exposures due to the final Basel III standards



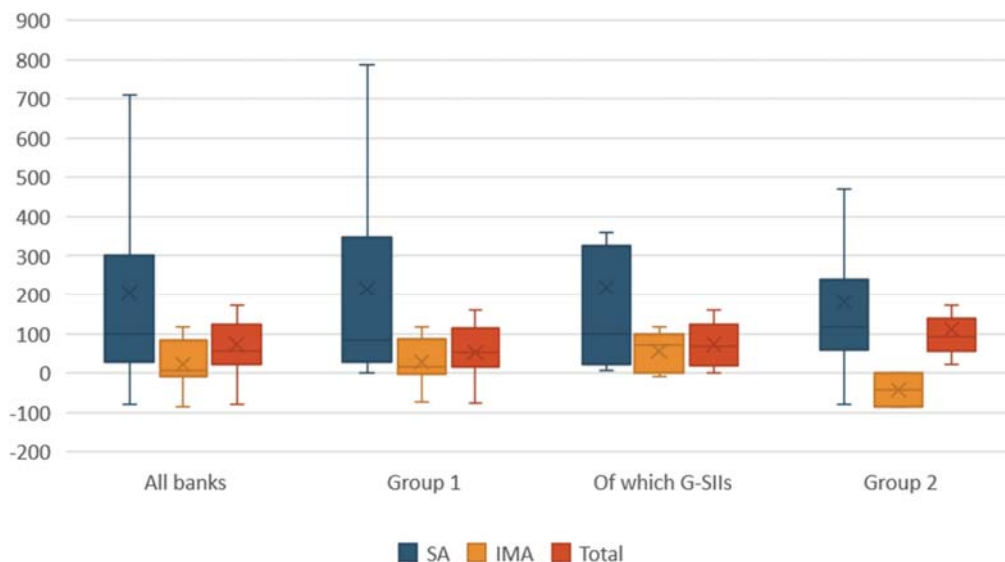
Source: EBA QIS data (December 2017)

## 4. FRTB

This section assesses the isolated impact of the January 2016 BCBS reforms related to the capital requirements for market risk. As the BCBS is currently reviewing the calibrations of the standardised and internal model approaches (see the BCBS (2016) standards on *Revisions to the minimum capital requirements for market risk*), further revisions to the impact are expected, but the preliminary figures are presented here for completeness. In addition, as in other sections, data quality checks have identified some issues and limitations in the information submitted by banks. Thus, the findings should be interpreted with some caution.

Since not all participating banks / jurisdictions confirmed the accuracy of outlier data submissions, please note that the outliers constituting incorrect data submissions affect the summary results. Although the results include the impact of the outliers, Figure 7 does not show them graphically.

Figure 7: Change of market risk capital requirements after FRTB implementation, without floor (%), broken down by approach and bank group



Source: EBA QIS data (December 2017)

Figure 7 shows the impact of the revised market risk standards on Tier 1 MRC assigned to market risk. The average impact for all banks is 72%, masking significant heterogeneity across banks (with an average impact of 52% for Group 1 banks and 111% for Group 2 banks).

With regards to the approach, the minimum capital requirements under SA increase significantly (204%), while the impact on IMA capital requirements is much more muted (22%)<sup>26</sup>. In addition, the outliers under the SA are far more extreme than those under the IMA. This also explains the higher impact of Group 2 banks than Group 1 banks, as the standardised approach makes up the

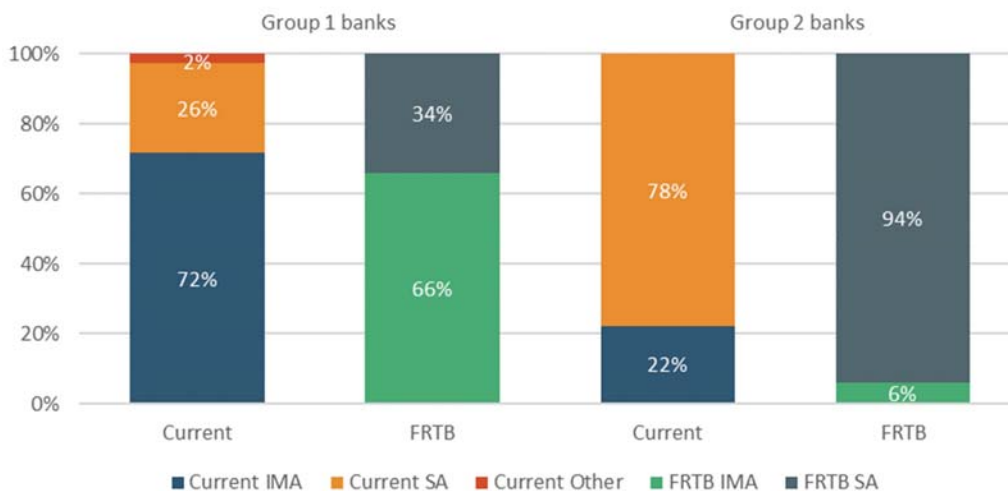
<sup>26</sup> Please note that many Group 2 banks migrate to SA under the revised standards, resulting in very few data points for the impact of IMA under this group.

biggest proportion of minimum capital requirements for this group (see also Figure 8). Nevertheless, 25% of IMA banks still exhibits a minimum capital requirements increase of over 83%.

Figure 8 shows the proportion of market risk capital requirements attributable to the approaches under the current rules and the revised standards. For Group 1 banks, the key driver under the current rules is the IMA (72%), followed by the SA (26%), while other market risk capital requirements are negligible. Under the revised rules, the proportion of minimum capital requirements calculated under IMA decreases to 66% while the SA proportion increases to 34%.

In contrast, Group 2 banks currently have most of their minimum capital requirements computed under the SA (78%), with just 22% under the IMA. Under the revised rules, the SA makes up almost the entire minimum capital requirement (94%), with IMA making up only 6%.

Figure 8: Contribution to the total market risk RWAs by each calculation methods before and after FRTB



Source: EBA QIS data (December 2017)

## 5. Operational Risk

The final Basel III framework replaces all existing approaches, including the model-driven advanced measurement approach (AMA), with a new approach, the SMA.

Under the new operational risk framework, banks can use only the new SMA. Small banks will have to calculate the MRC based only on the business indicator component (BIC) while large banks, in addition, will have to calculate the so-called loss component (LC).

According to Table 8, the revisions to the framework generate an aggregate increase in operational risk MRC of approximately 38.0% for Group 1 banks and 17.1% for Group 2 banks. The results show that, on average, the revisions affect banks migrating from the AMA more than banks currently using other approaches. AMA banks will be affected for various reasons.

First, they are mainly large banks with more complex and more fee-driven business models, unlike other banks, which provide universal and diversified bank services that do not rely significantly on fees. For the fee-driven business models, the new indicator will be more conservative in addressing the higher risk observed, after the outbreak of the financial crisis, for this kind of business model.

Second, the large banks are also affected by the high business indicator but also by the high marginal coefficients assigned to larger banks belonging to buckets 2 and 3 (see Annex, section 9.1.4). Third, the main driver of this increase is the fact that some of the AMA banks have significantly lower MCR for operational risk (OpRisk) than banks that use the current indicator-based approaches. Therefore, the fact that the AMA is an approach that has less stringent operational risk capital requirements for many of the banks is the main explanation of the increase in capital requirements.

Table 8: Changes in T1 MRC assigned to operational risk only (% of the MRC T1 assigned to operational risk under CRR/CRD IV)

	Migrating from AMA	Others	Total
<b>All banks</b>	63.7	16.9	24.8
<b>Group 1</b>	65.8	22.9	38.0
Of which: G-SIIs	67.1	42.5	57.3
<b>Group 2</b>	56.9	14.4	17.1

Source: EBA QIS data (December 2017)

A deeper look into the data shows that, for Group 1 banks and for G-SIIs in particular, the variance in the proportion of operational risk MRC in the total MRC is significantly lower than for Group 2 banks. This is because of the business model of Group 1 banks, which offer universal services and thus have, more or less, similar operational risk characteristics, whereas Group 2 banks offer specialised, or less diverse, services following different business models. Some of Group 2 banks are particularly specialized, with only fee-driven services, and without credit or market risk-bearing services, which renders their operational risk the most dominant risk category. This does not apply for Group 1 banks, where most banks provide diverse services, with a significant part of their services bearing credit and/or market risk.



Besides the business model, the use of the AMA affects the proportion of operational risk in relation to the total risk. The dominant factor, within the operational risk models, is the high past losses, which can drive the risk exposure and therefore the proportion of operational risk. The European AMA banks have had different loss experiences in the past 10 years. For example, some of them suffered high conduct risk losses, which has increased their MRC for OpRisk significantly. Other banks, which have not experienced such losses, may have **used the flexibility of the internal model** to keep the operational risk MRC low, which could have been the underlying reason for low operational risk MRC and a low proportion of operational risk in the total MRC.

Table 9 presents the different findings for AMA banks. The first type comprises AMA banks with a low proportion of operational risk and low past operational losses. These banks show a mild capital increase due to the dominant impact of the BIC-driven capital requirement, which appears slightly reduced amid the lower past operational risk losses which affect the internal loss multiplier (ILM) values, which in turn adjusts the capital requirements produced by the BIC alone (see Annex, section 9.1.4). Similar capital impacts are also observed for the second type of AMA banks, which exhibit high proportions of operational risk and high past losses. However, the BIC of these banks dampens the capital increase triggered by the ILM.

Table 9: Capital impact attributed to certain types of AMA banks

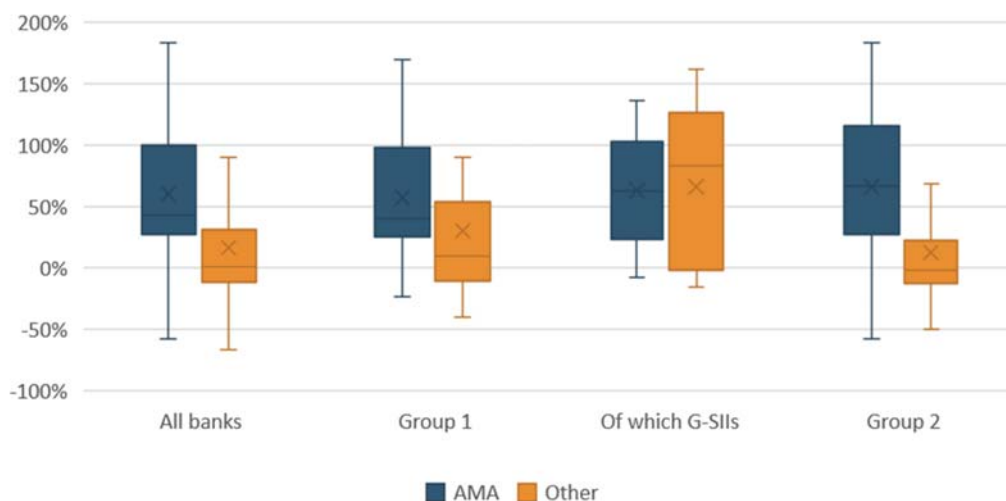
		Proportion of OpRisk MRC in total MRC	
		Low	High
Level of past losses	Low	Type 1 AMA (normal AMA): <ul style="list-style-type: none"> <li>• BIC increasing impact</li> <li>• LC/ILM decreasing impact</li> </ul> → most likely increase in MRC due to the higher weight of BIC	Type 3 AMA (conservative AMA): <ul style="list-style-type: none"> <li>• BIC decreasing impact</li> <li>• LC/ILM decreasing impact</li> </ul> → significant reduction in MRC
		Type 4 AMA (progressive AMA): <ul style="list-style-type: none"> <li>• BIC increasing impact</li> <li>• LC/ILM increasing impact</li> </ul> → significant increase in MRC	Type 2 AMA (normal AMA): <ul style="list-style-type: none"> <li>• BIC decreasing impact</li> <li>• LC/ILM increasing impact</li> </ul> → dependent on the level of past losses: slight reduction in MRC due to the higher weight of the BIC or slight increase due to extreme losses which even compensate for the dominant effect of the decreasing BIC
	High		

The third type of AMA banks has a higher proportion of operational risk in the total MRC and low past losses. This type of AMA banks seldom benefit from capital reductions because of a dampening effect of BIC and ILM values. The fourth and last type of AMA banks are have a low proportion of operational risk and high past losses. This type of banks suffers significant capital increase due to the double hit, i.e. increases in the BIC and ILM values. The first hit is the pure AMA migration to a standardised approach, so that already the BIC increases the MRC. The second hit is the fact that these banks have past losses significantly above the average, so that these banks show a capital add-on, via the application of  $ILM > 1$ , in comparison with the MRC of a bank with average losses.

The analysis of the operational risk findings refers to the banks that participated in the Quantitative Impact Study (QIS) sample only. However, the fact that the sample covers almost the entire population of large AMA banks, which face more significant capital increases than Group 2 banks, which use mainly simple approaches and are underrepresented in the sample, may create a bias towards higher impact. In addition, some of the banks currently have Pillar 2 capital add-ons because of weaknesses in the model and/or their operational risk management, which are not considered in the current analysis. As a result, the total impact shown in *Table 8* may be overestimated.

The average change in the operational risk capital requirements for AMA banks is clearly higher than the corresponding value for banks that currently apply other methods. The differences between AMA banks and other banks are more pronounced when comparing the 75<sup>th</sup> percentiles of the operational risk capital requirements changes (*Figure 9*).

Figure 9: Distribution of changes in T1 MRC assigned to operational risk only



Source: EBA QIS data (December 2017)

The final Basel III framework provides supervisors with the discretion to set the past losses threshold at EUR 100000 or ILM equal to 1 for all banks in the EU. For the sake of comparability with the operational risk impact, which appears in the cumulative impact analysis (Table 1 and Table 5), the analysis below presents the alternative impact arising from the exercise of jurisdictional discretions. To this end, the analysis compares the operational risk capital requirements arising from the actual calculation of ILM with the capital requirements assuming the exercise of the discretion to set the loss materiality threshold at EUR 100000 for bucket 2 and 3 banks<sup>27</sup> and the discretion to set ILM = 1 for all banks. As provided by the final Basel III framework for operational risk, 'for banks in bucket 1 (ie with BI ≤ EUR 1 billion), internal loss data does not affect the capital calculation. That is, the ILM is equal to 1, so that operational risk capital is equal to the BIC (=12% · BI)' (see BCBS (2017), *Basel III: Finalising post-crisis reforms*, page 129, para 11).

<sup>27</sup> See BCBS (2017), *Basel III: Finalising post-crisis reforms*, page 131, para 19(d): '...At national discretion, for the purpose of the calculation of average annual losses, supervisors may increase the threshold to €100,000 for banks in buckets 2 and 3 (i.e. where the BI is greater than €1 bn)'.

Table 10 includes an analysis of the impact on the T1 MRC for operational risk assigned to each jurisdictional discretion (ILM=1 and actual ILM based on EUR 100000 operational loss materiality threshold for banks with a BI level > EUR 1 billion [or BIC > EUR 120 million]). Discretions 1 and 2 affect only banks with BI > EUR 1 billion. The impact is shown for the cumulative analysis sample (101 banks) to allow comparisons between the baseline Basel III operational risk framework and the discretions applied.

*Table 10: Comparison of operational impact on T1 MRC of the application of baseline Basel III full implementation, i.e. ILM with EUR 20000 loss materiality threshold, the discretion to apply a loss materiality threshold of EUR 100000 threshold for the estimation of ILM (discretion 1) and the discretion to apply ILM = 1 (discretion 2) (%)*

	<b>Basel III baseline (loss materiality threshold: EUR 20000)</b>	<b>Basel III discretion1 (loss materiality threshold: EUR 100000)</b>	<b>Basel III discretion2 (ILM = 1)</b>
<b>All Banks</b>	5.7	4.9	1.4
<b>Group 1</b>	6.4	5.6	1.5
Of which: G-SIIs	7.5	6.6	1.2
<b>Group 2</b>	1.4	0.9	1.1

*Source: EBA QIS data (December 2017)*

## 6. Output floor

According to the provisions of the Basel III reform package, there will be a 5-year transitional period for the implementation of the output floor, according to which the percentage of the floor, i.e. the percentage of the non-modelled RWA, will gradually increase from 50% in 2022 to fully phased-in level of 72.5% in 2027. The impact of the output floor during the first 2 years of the phase-in period is negligible for G-SIIs, while it is significantly above 1% for Group 2 banks. Table 11 shows that the increase in the output floor percentage has an impact on the output floor during the phase-in period.

The final Basel III framework allowed the application of a discretion to apply a transitional cap in the incremental increase in a bank's total RWAs, that results from the application of the floor<sup>28</sup>. The results Table 11 do not include the effect of the application of the transitional cap.

*Table 11: Cumulative output floor impact during the implementation phase (% of the CRR / CRD IV Tier 1 MRC)*

	2022 [50%]	2023 [55%]	2024 [60%]	2025 [65%]	2026 [70%]	2027 [72.5%]
<b>All banks</b>	0.3	0.6	1.4	2.7	4.6	6.3
<b>Group 1</b>	0.2	0.4	1.2	2.6	4.6	6.5
Of which: G-SIIs	0.0	0.1	1.0	2.3	3.8	5.4
<b>Group 2</b>	1.4	2.0	2.6	3.5	4.6	5.3

Source: EBA QIS data (December 2017)

The highest increase in the output floor impact is observed for Group 1 banks in 2026, where the percentage of the output floor increases from 65% (2025) to 70% (2026) and the impact increases by approximately 190 basis points. This indicates that the MRC impact increases by approximately 38 basis points per percentage point of increase in the output floor<sup>29</sup>. Nonetheless, the highest sensitivity of the increase is observed in 2027, where the impact increases by approximately 68 basis points (=170/2.5) of output floor impact per percentage point of output floor increase.

<sup>28</sup> See BCBS (2017), *Basel III: Finalising post-crisis reforms*, page 139, para 10: 'During the phase-in period, supervisors may exercise national discretion to cap the incremental increase in a bank's total RWAs that results from the application of the floor. This transitional cap will be set at 25% of a bank's RWAs before the application of the floor...'

<sup>29</sup> 190bp / 5 = 38bp of impact per percentage point of output floor increase

## 7. Revised leverage ratio

This section assesses the impact of the amendments to Basel III LR requirements<sup>30</sup>. Figure 10 compares the distribution of the leverage ratio levels according to the current fully phased-in definition and the final Basel III definition. Results in this section include all banks that submitted leverage ratio data<sup>31</sup>.

Looking at the leverage ratio impact in isolation from the other Basel III reforms (Table 12), the results show that the leverage ratio exposure measure, which is the basis for the estimation of the LR Tier 1 MRC, decreased by 4.7%, in relation to the current framework, if taking into account the entire sample of participating banks. However, the introduction of 50% of the G-SIIs surcharge, resulted in an overall increase of LR Tier 1 MRC by 5.1%.

*Table 12: Impact of LR, in isolation from the risk-based provisions, due to changes in the definition of leverage ratio exposures (LRE) and changes in the calculation (50% of G-SIIs surcharge) of the LR T1 MRC (%)*

	CRR/CRD IV LR exposure	Impact due to changes in the definition of LRE only	Impact due to the definition of LRE and inclusion of 50% of G-SIIs surcharge
<b>All banks</b>	100.0	-4.8	5.1
<b>Group 1</b>	100.0	-5.9	5.8
Of which: G-SIIs	100.0	-7.8	12.9
<b>Group 2</b>	100.0	1.3	1.3

The examination of the leverage ratio levels shows that the average LR for Group 1 banks increases from 5.2% to 5.5% when applying the revised rules. This increase is higher when analysing only G-SIIs (4.8% to 5.3%). For Group 2 banks, the LR remains stable at 5.8%. In general, for both groups, the application of the revised rules results in higher LR levels. Banks are more concentrated in lower ranges of LR (see Figure 11). The implementation of the revised leverage ratio exposure measure results in higher leverage ratios as a consequence of lower average leverage ratio exposures. Nevertheless, no general conclusion can be presented about the impact of the revisions in the calculation of the leverage ratio exposure when analysing bank by bank data. Approximately 42% of the banks showed an increase in the leverage ratio exposure due to the implementation of the 2017 revisions, while approximately the other 55% displayed lower levels.

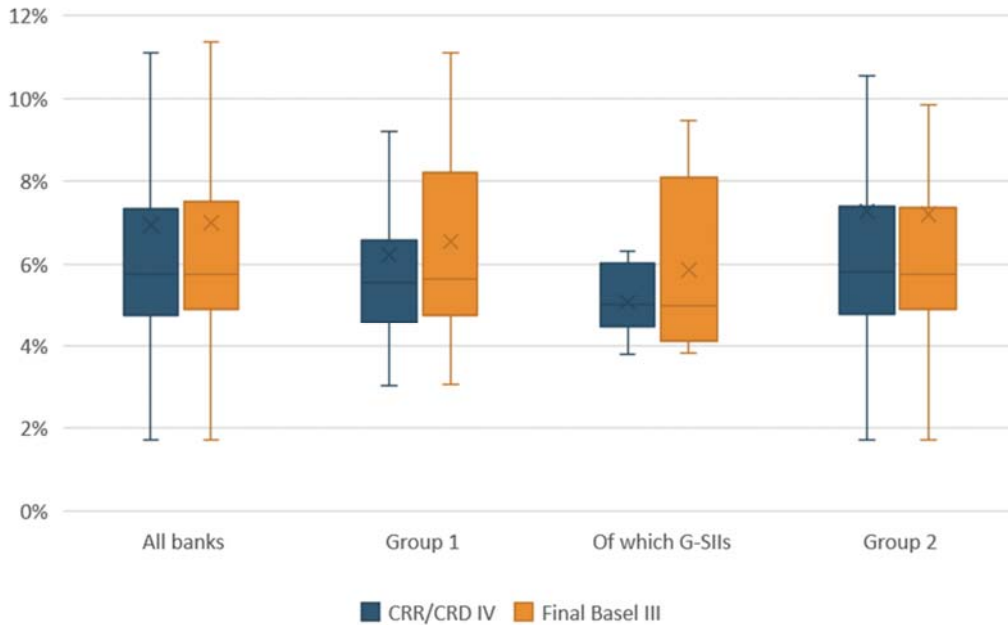
In terms of Tier 1 MRC, the impact of the revisions changes direction when one analyses jointly the changes in the definition of leverage ratio exposure and the implementation of an additional 50% of the G-SIIs surcharge, as a component of determining the minimum capital requirement. This

<sup>30</sup> The amendments to the current Basel III LR exposure measure agreed by the BCBS and expected to have the more visible impact are the following: implementation of a specific treatment of pending settlement transactions; clarification on cash-pooling transactions; reduction of specific and general provisions as well as prudential valuation adjustments from the Basel III LR exposure measure; replacement of the current exposure method by a modified version of the SA to counterparty credit risk for measuring derivative exposures; clarification on the treatment of credit derivatives and derivative-clearing services within multi-level client structure; incorporation of identical credit conversion factors to off-balance-sheet items as for the SA for credit risk; and introduction of an add-on buffer to the minimum LR requirement, calibrated at 50% of the current G-SIIs buffer in the risk-weighted surcharge ratio.

<sup>31</sup> 137 banks provided Leverage Ratio data whereas Table 3 and Table 6 provide LR levels for a sample of 101 banks that are included in the cumulative impact analysis.

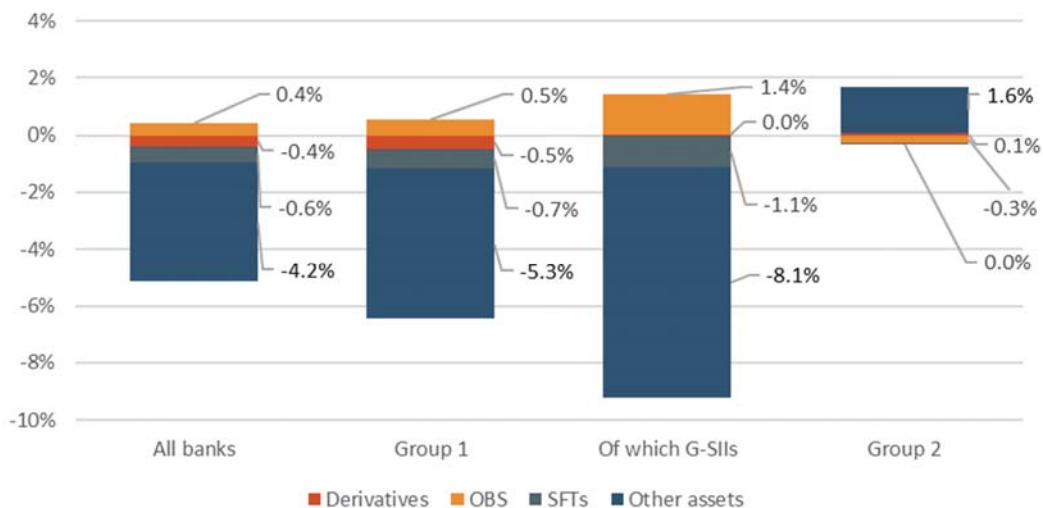
change of direction appears only in G-SIIs, which in turn affects the averages of Group 1 and ‘all banks’. Group 2 banks are not subject to the G-SIIs surcharge, and, therefore, the average impact of the LR revisions is solely due to changes in the definition of LR exposure.

Figure 10: Comparison of fully phased-in EU LR, and final Basel III LR, as finalised in December 2017



Source: EBA QIS data (December 2017)

Figure 11: Drivers of change in leverage ratio exposure in the final Basel III standards



Source: EBA QIS data (December 2017)

Figure 11 shows the impact that the changes in the definition of the final Basel III standards have on the main components of leverage ratio exposure. The main driver of the changes in the exposures values is driven by other assets, although the direction of this change varied in the different group of banks. For Group 1 banks, other assets exposures decreased by 5.3%. For Group

2 banks, the revised framework results in an increase in the leverage ratio exposure mainly due to changes in the treatment of other assets (+1.6%). For G-SIIs, the impact of the changes in the treatment of other assets is -8.1%.

## 8. Net stable funding ratio

The CRD IV package includes two regulatory measures of liquidity risk. The liquidity coverage ratio (LCR) requires banks to have a sufficient level of high-quality liquid assets (HQLA) to withstand a stressful funding scenario for 30 days. The monitoring of the LCR is assessed separately in the EBA's report on liquidity measures under Article 509(1) of the CRR<sup>32</sup>.

The second liquidity standard is the net stable funding ratio (NSFR) — a longer-term structural ratio that addresses liquidity mismatches and provides incentives for banks to use stable sources to fund their activities. This section aims to monitor the impact of the BCBS standard on NSFR on EU banks.

The NSFR is defined as the amount of available stable funding (ASF) relative to the amount of required stable funding (RSF). The Basel framework intends that, from 1 January 2018, this ratio should be equal to or higher than 100%<sup>33</sup>. The ASF is defined as the portion of capital and liabilities expected to be reliable over the time horizon considered by the NSFR, which extends to 1 year. The amount of RSF is a function of liquidity characteristics and residual maturities of the various assets held by a particular institution, as well as those of its off-balance-sheet exposures.

Table 13 provides an overview of the NSFR levels within the bank's groups and the amount of shortfall to comply with the 100% requirement set in the Basel framework.

*Table 13: NSFR and NSFR shortfall in stable funding*

	NSFR (%)	Shortfall (billion EUR)
<b>All Banks</b>	113.5	27.8
<b>Group 1</b>	112.3	23.1
Of which: G-SIIs	112.7	0.0
<b>Group 2</b>	118.6	4.7
Of which: Large Group 2	117.2	3.6
Of which: Medium-sized Group 2	121.1	0.1
Of which: Small Group 2	119.9	1.0

Source: EBA QIS data (December 2017)

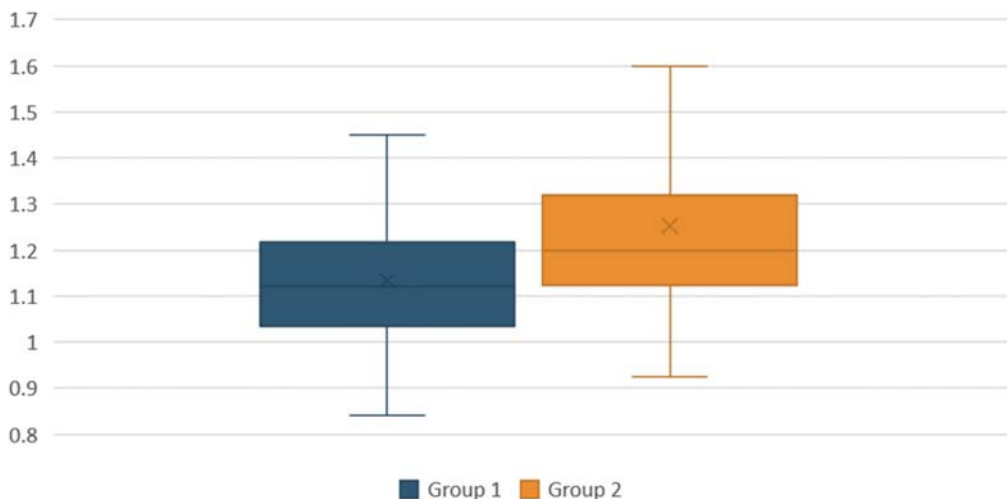
Overall, as of December 2017, banks in the sample needed additional stable funding of EUR 27.8 billion (Table 13), equivalent to 4.2% of total weighted ASF (EUR 666 billion) and 2.7% of total assets (EUR 1 trillion) of all non-compliant banks participating in the NSFR-related part of this exercise. The need for stable funding is estimated by aggregating only the positive differences between RSF and ASF (RSF minus ASF) – the deficit in the stable funding of banks whose NSFR is below the 100% requirement – and does not account for any surplus of stable funding observed in banks with an NSFR above the 100% requirement.

<sup>32</sup> The Report was published on 27 September 2018.

<sup>33</sup> Nevertheless, the NSFR ratio is not yet binding in the EU.



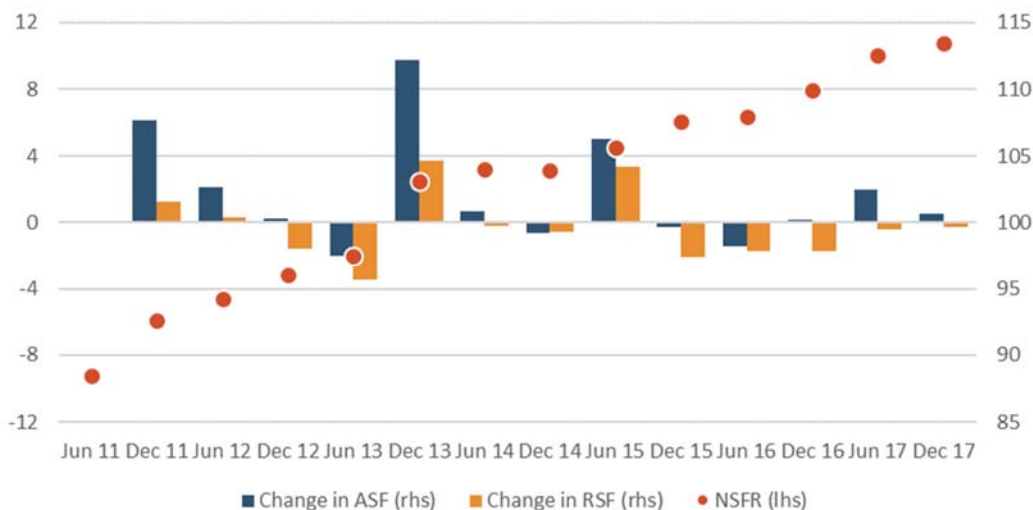
Figure 12: Distribution of NSFR by bank group



Source: EBA QIS data (December 2017)

Figure 12 shows the distribution of NSFR per bank group, while Figure 13 illustrates the development of the NSFR over time using a balanced sample of banks. The figure also shows the changes in the NSFR components (ASF and RSF), showing which is the main driver of the NSFR change in each period.

Figure 13: NSFR (left scale: lhs) and change in its determinants (right scale: rhs) – balanced sample (%)



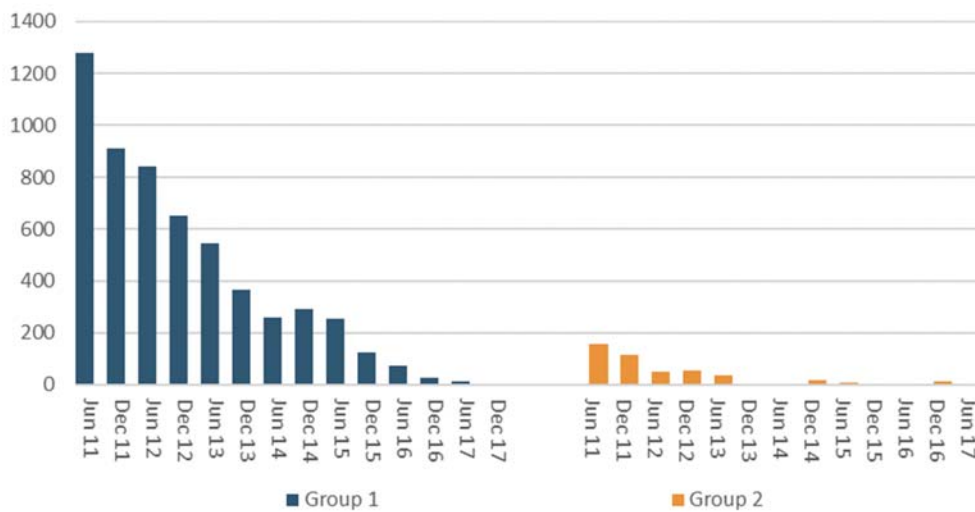
Source: EBA QIS data (December 2017)

The findings show that between June 2011 and December 2017 the average NSFR followed a positive trend and increased by 25 percentage points. The driver of the continuous increase varies between the different periods and have been either an increase in the AFS or a reduction of the RSF. The significant increase in banks’ NSFRs in December 2013 is driven by a major increase in the AFS, which may also have been driven by the revisions made by the BCBS, which were considered

for the first time in December 2013. Since the previous reporting date of June 2017, the NSFR has increased by 0.9 percentage points mainly because of an increase in AFS with a slight reduction of RFS.

The overall positive trend is also reflected in the reduction in the shortfall in stable funding needed to meet the 100% ratio requirement, which, compared with June 2011, decreased by 99% (from EUR 1,279 billion to EUR 3 billion) for Group 1 banks and by 98% (from EUR 158 billion to EUR 2 billion) for Group 2 banks (Figure 14).

Figure 14: Development of the NSFR shortfall of RSF over time, by bank group – balanced sample



Source: EBA QIS data (December 2017)

## 9. Annex

### 9.1 Methodology for the estimation of the impact per category

#### 9.1.1 Credit risk impact

$$\% \Delta T1MRC (\text{Credit risk}) = \% \Delta T1MRC (SA) + \% \Delta T1MRC (IRB \text{ approach})$$

*$\% \Delta T1MRC(\text{Credit risk})$  is the percentage difference in MRC attributed to credit risk;  
 $\% \Delta T1MRC(SA)$  is the percentage difference in MRC attributed to the standardised approach for credit risk;  
 $\% \Delta T1MRC(IRB)$  is the percentage difference in MRC attributed to the internal ratings-based approach to credit risk.*

#### Standardised approach for credit risk

$$\% \Delta T1MRC(SA) = \frac{\left[ \sum_{i=1}^n \left\{ \begin{array}{l} \text{'Final Basel III } SA_{RWA}' \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \end{array} \right\} - \sum_{i=1}^n \left\{ \begin{array}{l} \text{'CRR\_CRDIV } SA_{RWA}' \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \end{array} \right\} \right]}{\sum_{i=1}^n \max\{\text{'CRR\_CRDIV total risk\_based Tier1 MRC'}, \text{'CRR\_CRDIV total LR\_based Tier1 MRC'}\}}$$

where,

Tier 1 MRC% = 6%; and,

capital conservation buffer% = 2.5%

#### IRB approach for credit risk

$$\% \Delta T1MRC(IRB \text{ approach}) = \frac{\left[ \sum_{i=1}^n \left\{ \begin{array}{l} \text{'Final Basel III } IRBA_{RWA}' \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \\ - \min(0, Provisions^{IRB} - EL^{IRB\_Basel III}) \end{array} \right\} - \sum_{i=1}^n \left\{ \begin{array}{l} \text{'CRR\_CRDIV } IRBA_{RWA}' \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \\ - \min(0, Provisions^{IRB} - EL^{IRB-CRR\_CRDIV}) \end{array} \right\} \right]}{\sum_{i=1}^n \max\{\text{'CRR\_CRDIV total risk\_based Tier1 MRC'}, \text{'CRR\_CRDIV total LR\_based Tier1 MRC'}\}}$$

### 9.1.2 Market risk impact

$$\% \Delta T1MRC(\text{Market risk}) = \frac{\sum_{i=1}^n \left\{ \begin{array}{l} \text{'Final Basel III FRTB capital'} \times 12.5 \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \end{array} \right\} - \sum_{i=1}^n \left\{ \begin{array}{l} \text{'CRR_CRDIV market risk capital'} \times 12.5 \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \end{array} \right\}}{\sum_{i=1}^n \max\{\text{'CRR_CRDIV total risk\_based Tier1 MRC'}, \text{'CRR_CRDIV total LR\_based Tier1 MRC'}\}}$$

### 9.1.3 CVA impact

$$\% \Delta T1MRC(\text{CVA}) = \frac{\sum_{i=1}^n \left\{ \begin{array}{l} \text{'Final Basel III CVA capital'} \times 12.5 \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \end{array} \right\} - \sum_{i=1}^n \left\{ \begin{array}{l} \text{'CRR_CRDIV CVA capital'} \times 12.5 \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \end{array} \right\}}{\sum_{i=1}^n \max\{\text{'CRR_CRDIV total risk\_based Tier1 MRC'}, \text{'CRR_CRDIV total LR\_based Tier1 MRC'}\}}$$

### 9.1.4 Operational risk impact

$$\% \Delta T1MRC(\text{Operational risk}) = \frac{\sum_{i=1}^n \left\{ \begin{array}{l} \text{'Final Basel III operational risk capital'} \times 12.5 \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \end{array} \right\} - \sum_{i=1}^n \left\{ \begin{array}{l} \text{'CRR_CRDIV operational risk capital'} \times 12.5 \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \end{array} \right\}}{\sum_{i=1}^n \max\{\text{'CRR_CRDIV total risk\_based Tier1 MRC'}, \text{'CRR_CRDIV total LR\_based Tier1 MRC'}\}}$$

Small banks calculate the MRC by simply calculating the BIC, which is a proxy for the risk exposure for a certain confidence level. The BIC is calculated in two steps. In the first step, the business indicator (BI) is the sum of three subcomponents: the interest, leases and dividends component; the services component; and the financial component, which are based on accounting figures. The second step assigns the BI to one of the three different BI buckets, i.e. bucket 1, 2 or 3, depending on its level. Each bucket has a greater marginal coefficient than the previous one, so large banks, with high BIs, will receive an exponential MRC increase. More specifically, the first bucket, for BIs up to EUR 1 billion, has a marginal coefficient of 0.12, the second bucket, for BIs between EUR 1 billion and EUR 30 billion, has a marginal coefficient of 0.15 and the third bucket, for BIs

above EUR 30 billion, has a marginal coefficient of 0.18. Thus, the new SA takes into account the fact that during the financial crisis large banks with more complex business models suffered much higher operational risk losses.

Large banks will also have to calculate the LC, as an additional proxy for risk exposure. The Basel framework necessitates the use of LC for bucket 2 and bucket 3 banks. The proxy value of the LC is determined by multiplying the average annual operational loss of the past 10 years by 15. To calculate the average annual loss, the new framework requires the aggregation of all losses above the EUR 20 000 threshold. All in all, the BIC and LC are proxies for operational risk, but based on different input data, i.e. they are observing the operational risk through different viewpoints. While the BIC relies on stable, but less risk-sensitive, accounting data, the LC relies on risk-sensitive, but volatile, internal loss observations. To balance the risk-sensitivity without excessive capital volatility, the ILM is used to adjust the BIC. The ILM compares the BIC and LC in a way that imposes a capital add-on where the LC is larger than the BIC; otherwise, it allows a capital discount.

The influence of the LC is limited by the dampening features of the logarithm and the exponent of 0.8 in the end-point formula for the calculation of the ILM. Although the calculation of the ILM is easy, thanks to the simple formula applied, it becomes complex because of the difficulty in gathering additional data. To gather comprehensive and sufficient loss data, banks need to implement clear processes to identify all relevant operational risk losses. The additional burden to fulfil these requirements should be limited to the banks that currently apply the BIA and belong to bucket 2 and bucket 3, as the current framework for AMA and SA banks requires them to have proper loss data collection already in place<sup>34</sup>.

The formula for the calculation of ILM is  $\ln[\exp(1) - 1 + (LC/BIC)^{0.8}]$ , where the LC is calculated as 15 times the average losses above EUR 20 000 (with national discretion to increase this threshold to EUR 100 000).  $BIC = 0.12 \times BI$  for  $BI \leq \text{EUR } 1 \text{ billion}$ ,  $BIC = \text{EUR } 120 \text{ million} + 0.15 \times (BI - \text{EUR } 1 \text{ billion})$  for  $\text{EUR } 1 \text{ billion} < BI \leq \text{EUR } 30 \text{ billion}$ , and  $BIC = \text{EUR } 4470 \text{ million} + 0.18 \times (BI - \text{EUR } 30 \text{ billion})$  for  $BI > \text{EUR } 30 \text{ billion}$ , where  $BI = ILDC_{avg} + SC_{avg} + FC_{avg}$  and  $ILDC = \text{Interest, Lease and Dividend Component}$ ,  $SC = \text{Services Component}$ ,  $FC = \text{Financial Component}$ . When  $LC < BIC$ , then  $ILM < 1$ ; when  $LC > BIC$ , then  $ILM > 1$ ; when  $LC = BIC$ , then  $ILM = 1$ .

### 9.1.5 Output floor impact

$$\% \Delta T1MRC(OF) =$$

$$\frac{\left[ \sum_{i=1}^n \max \{ 0, 'Final \text{ Basel III total } SAequivalent_{RWA}' \times OF\% - 'Final \text{ Basel III total } RWA' \} \right]}{\sum_{i=1}^n \max \{ 'CRR\_CRDIV \text{ total risk\_based Tier1 MRC}', 'CRR\_CRDIV \text{ total LR\_based Tier1 MRC}' \}}$$

<sup>34</sup> See Article 320(a) of the CRR and Article 322(3) of the CRR.

where

*Final Basel III total SAequivalent RWA* = the total RWA assuming that all exposures under internal models are exclusively calculated according to the pertinent standardised approaches under the revised BCBS package, i.e. market and credit risk; the new RWA amount is the SA equivalent;

*Final Basel III total RWA* = the total RWA under the proposed BCBS framework, i.e. where relevant the calculation of RWA according to internal models is allowed;

*OF%* = 72.5%, which, when multiplied by the SA equivalent RWA, provides the output floor level for internal models' RWA.

### 9.1.6 Leverage ratio impact

$$\% \Delta T1MRC(LR) = \frac{\left[ \sum_{i=1}^n \max \left\{ \begin{array}{l} 0, \\ ('Final\ Basel\ III\ total\ LR\_based\ T1\ MRC' - \\ 'Final\ Basel\ III\ total\ risk\_based\ T1\ MRC') \end{array} \right\} - \sum_{i=1}^n \max \left\{ \begin{array}{l} 0, \\ ('CRR\_CRDIV\ total\ LR\_based\ T1\ MRC' - \\ 'CRR\_CRDIV\ total\ risk\_based\ T1\ MRC') \end{array} \right\} \right]}{\sum_{i=1}^n \max \{ 'CRR\_CRDIV\ total\ risk\_based\ T1\ MRC', \\ 'CRR\_CRDIV\ total\ LR\_based\ T1\ MRC' \}}$$

where

Final Basel III total LR\_based T1 MRC = Final Basel III total leverage ratio exposure × (3% + 0.5 × G-SIIs surcharge));

CRR – CRDIV total LR\_based T1 MRC = CRR/CRD IV total leverage ratio exposure × 3%.

n, the number of banks in the sample

The analysis adopts the BCBS methodology for how the leverage ratio impact is estimated<sup>35</sup>. This methodology quantifies the impact of the leverage ratio as the change in the LR add-ons between the proposed and current regulatory frameworks, as a metric of the change in the LR's constraining power in determining the total T1 MRC.

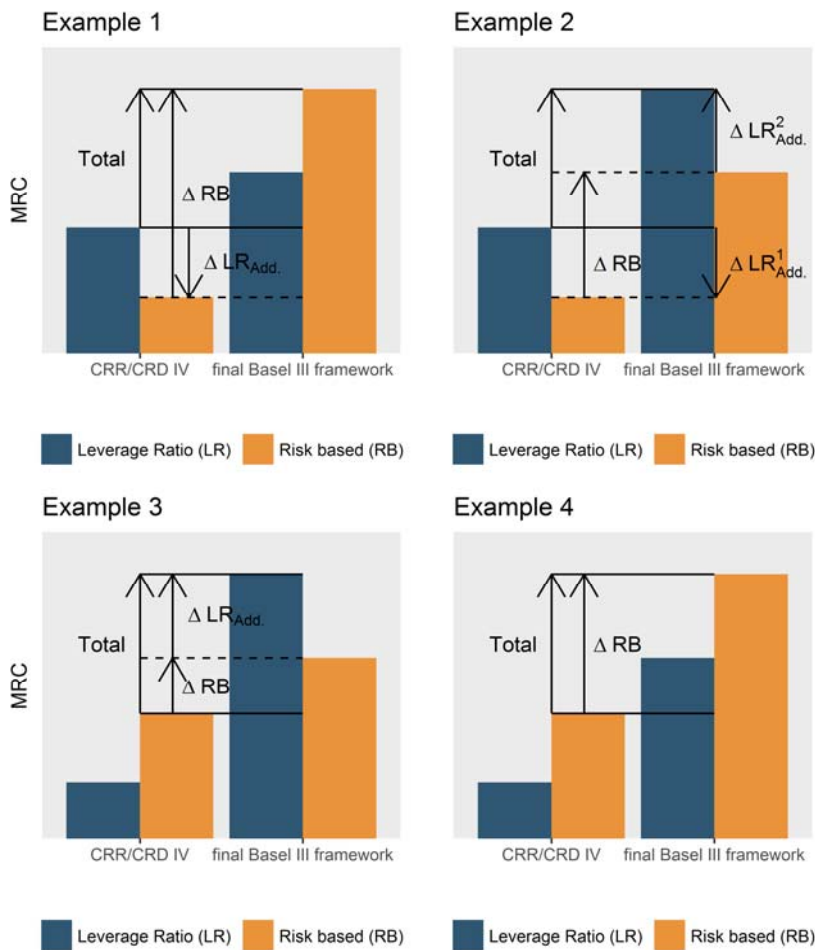
The leverage ratio impact would be negative (see  $\Delta LR_{add}$ . – Example 1 of Figure 15) if the Tier 1 LR add-on of the full implementation of the final Basel III framework (equal to 0 in Example 1 of Figure 15) were lower than the Tier 1 LR add-on of the full implementation of the CRR / CRD IV (positive in Example 1 of Figure 15). This particular case indicates that the leverage ratio is less constraining under the final Basel III framework than the CRR / CRD IV framework.

<sup>35</sup> see BCBS (2017): *Basel III monitoring report December 2017: Results of the cumulative quantitative impact study*.

The leverage ratio impact would be positive (see  $\Delta LR_{add}$  – Example 3 of Figure 15) if the Tier 1 LR add-on of the full implementation of the final Basel III framework (positive in Example 3 of Figure 15) were higher than the Tier 1 LR add-on of the full implementation of the CRR / CRD IV (0 in Example 3 of Figure 15). This can be interpreted as the leverage ratio becoming more constraining under the final Basel III framework than under the CRR/CRD IV framework.

The leverage ratio impact would be 0 in cases where either the T1 LR add-on of the CRR/CRD IV and the T1 LR add-on of the final Basel III framework are both zero (Example 4, Figure 15), or the T1 LR add-on remain the same under the CRR/CRD IV and the final Basel III framework (Example 2, Figure 15, where  $\Delta LR^1_{add} = \Delta LR^2_{add} \implies \Delta LR_{add} = 0$ ). Both cases illustrate that the LR is equally constraining under the CRR / CRD IV and the final Basel III frameworks. Figure 15 illustrates all four cases of the relationship between the T1 LR-based MRC and T1 risk-based MRC, under the CRR/CRD IV and final Basel III frameworks.

Figure 15: Integration of changes in risk-based and leverage-ratio-based MRC



Source: Based on the BIS Basel III Monitoring report as of Dec. 2017

### 9.1.7 Capital shortfalls

Table 7 – Part 1 – column ‘Risk-based and LR-based Tier 1’

$$\begin{aligned}
 & \mathbf{T1Shortfall}_{CRR\_CRDIV} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[ \begin{array}{l} \text{'Risk\_based\_Tier1\_Shortfall}_{CRR\_CRDIV}\text{'}, \\ \text{'LR\_based\_Tier1\_Shortfall}_{CRR\_CRDIV}\text{'}, \end{array} \right] \right\} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[ \begin{array}{l} \max (0, \text{'Risk\_based\_Tier1\_MRC}_{CRR\_CRDIV}\text{' - 'Actual\_Tier1'\text{'}), \\ \max (0, \text{'LR\_based\_Tier1\_MRC}_{CRR\_CRDIV}\text{' - 'Actual\_Tier1'\text{'}) \end{array} \right] \right\}
 \end{aligned}$$

Table 7 – Part 2 – column ‘Risk-based and LR-based Tier 1’

$$\begin{aligned}
 & \mathbf{T1Shortfall}_{Basel_{III}} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[ \begin{array}{l} \text{'Risk\_based\_Tier1\_Shortfall}_{Basel_{III}}\text{'}, \\ \text{'LR\_based\_Tier1\_Shortfall}_{Basel_{III}}\text{'}, \end{array} \right] \right\} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[ \begin{array}{l} \max (0, \text{'Risk\_based\_Tier1\_MRC}_{Basel_{III}}\text{' - 'Actual\_Tier1'\text{'}), \\ \max (0, \text{'LR\_based\_Tier1\_MRC}_{Basel_{III}}\text{' - 'Actual\_Tier1'\text{'}) \end{array} \right] \right\}
 \end{aligned}$$

Table 2 – column ‘Capital shortfalls – CRR/CRD IV (fully phased-in) – ‘Additional LR Tier 1’

$$\begin{aligned}
 & \mathbf{Add. LR}_{T1Shortfall}_{CRR\_CRDIV} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[ \begin{array}{l} \max (0, \text{'Risk\_based\_Tier1\_MRC}_{CRR\_CRDIV}\text{' - 'Actual\_Tier1'\text{'}), \\ \max (0, \text{'LR\_based\_Tier1\_MRC}_{CRR\_CRDIV}\text{' - 'Actual\_Tier1'\text{'}) \end{array} \right] \right\} \\
 & - \sum_{i=1}^n \left\{ \max [\max (0, \text{'Risk\_based\_Tier1\_MRC}_{CRR\_CRDIV}\text{' - 'Actual\_Tier1'\text{'})] \right\}
 \end{aligned}$$

Table 2 – column ‘Capital shortfalls – Basel III framework (2027) – ‘Additional LR Tier 1’

$$\begin{aligned}
 & \mathbf{Add. LR}_{T1Shortfall}_{Basel_{III}} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[ \begin{array}{l} \max (0, \text{'Risk\_based\_Tier1\_MRC}_{Basel_{III}}\text{' - 'Actual\_Tier1'\text{'}), \\ \max (0, \text{'LR\_based\_Tier1\_MRC}_{Basel_{III}}\text{' - 'Actual\_Tier1'\text{'}) \end{array} \right] \right\} \\
 & - \sum_{i=1}^n \left\{ \max [\max (0, \text{'Risk\_based\_Tier1\_MRC}_{Basel_{III}}\text{' - 'Actual\_Tier1'\text{'})] \right\}
 \end{aligned}$$