

**BASEL III MONITORING EXERCISE –
RESULTS BASED ON DATA AS OF 30 June 2018**

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Abbreviations

AMA	advanced measurement approach
ASF	available stable funding
BCBS	Basel Committee on Banking Supervision
BI	business indicator
BIC	business indicator component
CCB	capital conservation buffer
CCP	central counterparty
CET1	Common Equity Tier 1
CfA	call for advice
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
CVA	credit valuation adjustment
EBA	European Banking Authority
FRTB	fundamental review of the trading book
G-SII	global systemically important institution
HQLA	high quality liquid assets
ILM	internal loss multiplier
IMA	internal model approach
IQR	inter-quartile range
IRB	internal ratings-based
LC	loss component
LCR	liquidity coverage ratio
LR	leverage ratio
LRE	leverage ratio exposure
MRC	minimum required capital
N/A	not applicable
NSFR	net stable funding ratio
O-SII	other systemically important institution
OBS	off-balance sheet exposures
OpRisk	operational risk
QIS	quantitative impact study
RSF	required stable funding
RWA	risk-weighted assets
SA	standardised approach
SMA	standardised measurement approach
T1	Tier 1

Executive summary

The present report is based on June 2018 data of the Basel III monitoring exercise and provides a more detailed assessment than the December 2017 preliminary report of the impact on EU banks of the final Basel III revisions of credit risk, operational risk (OpRisk) and leverage ratio (LR) frameworks, as well as the impact of the introduction of the aggregate output floor. **For the first time, the impact is separately attributed to the standardised approach and internal ratings-based approach to credit risk.** 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)¹. 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 **high-level assessment** 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 (CfA)² and be based on an expanded sample and analysis, based on the same reference date. In addition, not all findings of the current report should be directly compared with those of the December 2017 monitoring exercise report³, due to differences in the composition and size of the sample.

Being part of the regular Basel III monitoring exercises, the methodology used for assessing the impact of the output floor on banks' capital requirement is based on the baseline scenario adopted by the final Basel III regulatory framework, the BIS Secretariat and past Basel III monitoring exercises. The CfA report, on the other hand, will offer a more in-depth analysis of the impact of the output floor, by examining more scenarios for its application.

The analysis of the present report uses a sample of 44 Group 1 banks and 79 Group 2 banks (123 in total)⁴ for the cumulative impact⁵. It assesses the impact on the total Tier 1 minimum required capital (T1 MRC)⁶, i.e. it assumes compliance with the higher of the risk-based capital requirements

¹ It should be noted that the results presented in this report do not necessarily coincide with the final impact expected from the FRTB reform. This is because the FRTB framework was finalised in January 2019, whereas banks provided June 2018 data, which took into consideration the FRTB at that time.

² <https://www.eba.europa.eu/-/eba-will-support-the-commission-in-the-implementation-of-the-basel-iii-framework-in-the-eu>

³ Published on 4 October 2018,

<https://eba.europa.eu/documents/10180/2380948/2018+Basel+III+Monitoring+Exercise+Report.pdf>

⁴ Group 1 banks are banks that have Tier 1 capital in excess of EUR 3 billion and are internationally active. All other banks are labelled as Group 2 banks.

⁵ Only the banks that submitted data for at least one of the credit risk components (IRB approach or SA) and the leverage ratio were included in the sample of the cumulative analysis. If these banks did not submit data for any of the remaining components of the exercise, i.e. market risk, CVA and operational risk, the cumulative analysis assumed that there is no impact arising from the revisions to those components.

⁶ 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

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

The weighted average change of total T1 MRC is 19.1% across all 123 banks, 20.3% for the large and internationally active banks (Group 1) and 11.8% for the other banks (Group 2) (Table 1). The impact of the risk-based reforms across the entire sample (25.4%) is partially offset by the fact that some banks are constrained by the leverage ratio in the current framework, while they will be less constrained under the revised framework. This offset reflects the fact that the leverage ratio is becoming less constraining, i.e. under the revised framework the leverage ratio is no longer the highest requirement. Specifically, 56 banks are constrained under the CRR/CRD IV, which represent 38.2% of the total risk-weighted assets (RWA) of the sample; 38 are constrained under the final Basel III framework, which represent 21.4% of the total RWA of the sample⁷.

The output floor and operational risk frameworks are the two major drivers of MRC increases across the group of all banks, accounting for 8.0% and 5.5%, respectively. For Group 1 banks, the same factors are the major drivers, accounting for 8.5% and 6.1%, respectively, while global systemically important institutions (G-SIIs) are predominantly affected by operational risk, with an impact of 7.4%, and output floor, with an impact of 7.3%. The major driver for the impact on Group 2 banks is credit risk, with an impact of 8.1%, followed by the output floor, with an impact of 5.1%.

The offset arising from the leverage ratio is particularly important for all groups of banks except for G-SIIs, where the offsetting effect is rather mild (-0.3%) due to the implementation of the G-SIIs surcharge in the estimation of the leverage ratio requirements, which increases the MRC for the leverage ratio and reduces its offsetting impact.

Table 1: Change in total T1 MRC, as a percentage of the overall current Tier 1 MRC, due to the full implementation of Basel III (2027) (weighted averages, in %)

Bank group	Credit risk				Market risk	CVA	Op Risk	Output floor	Total risk-based	Revised LR	Total
	SA	IRB	Securitisation	CCPs ⁸							
All banks	2.2	2.0	0.7	0.0	2.3	4.7	5.5	8.0	25.4	-6.2	19.1
Group 1	1.8	1.7	0.8	0.0	2.5	4.9	6.1	8.5	26.3	-6.0	20.3
Of which: G-SIIs	2.2	2.1	1.1	0.0	3.3	5.4	7.4	7.3	28.8	-0.3	28.4
Group 2	4.3	3.7	0.1	0.0	0.9	3.6	1.7	5.1	19.4	-7.7	11.8

Source: EBA Quantitative Impact Study (QIS) data (June 2018)

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**

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

⁷ See Annex (section 10.1.6) for more details on the interpretation of the impact of the leverage ratio.

⁸ Rounded to the first decimal point.

(Table 2). The total shortfall due to the implementation of the final Basel III minimum common equity tier 1 (CET1)-required capital is EUR 9 billion (of which for G-SIIs it is EUR 6.9 billion). The Tier 1 capital shortfall due to the risk-based capital requirements is approximately EUR 23.5 billion, while the additional Tier 1 shortfall due to the implementation of the revised LR framework, on top of the risk-based capital requirements, is limited to EUR 0.7 billion.

Since the actual capital held by banks also covers Pillar 2 requirements, O-SIIs surcharges, countercyclical capital buffer and systemic risk buffer, the figures underestimate the actual increase of MRC and 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 June 2018 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) (EUR billion)

Bank group	Capital shortfalls — CRR/CRD IV (fully phased in)			Capital shortfalls — Basel III framework (2027)		
	CET1	Risk-based Tier 1	Additional LR Tier 1	CET1	Risk-based Tier 1	Additional LR Tier 1
All banks	0.0	0.0	1.5	9.0	23.5	0.7
Group 1	0.0	0.0	0.0	6.9	19.6	0.0
Of which: G-SIIs	0.0	0.0	0.0	6.9	19.0	0.0
Group 2	0.0	0.0	1.5	2.2	3.9	0.7

Source: EBA QIS data (June 2018)

When considering the entire sample, the risk-based capital ratios, namely the CET1, T1 and total capital ratios, fall by 310, 330 and 400 basis points, respectively (Table 3). The leverage ratio remains fairly stable when examining the entire sample (at 5.0%). The drop in risk-based ratios is greater for Group 2 banks than for Group 1 banks.

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

Bank group	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
All banks	14.2	15.5	18.4	5.0	11.1	12.2	14.4	5.0
Group 1	13.9	15.3	18.3	4.9	10.8	11.9	14.3	4.9
Of which: G-SIIs	13.2	14.7	17.5	4.6	10.2	11.4	13.6	4.6
Group 2	16.1	16.8	18.8	5.6	13.0	13.5	15.2	5.6

Source: EBA QIS data (June 2018)

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 49.1 billion to fulfil the minimum requirement of 100% (Table 15). The slight increase in the shortfall of stable funding compared with the previous exercise is attributed to Group 1 banks. 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 99.8% (from EUR 1279 billion to EUR 2.7 billion) for Group 1 banks and by 98% (from EUR 158 billion to EUR 2 billion) for Group 2 banks.

1. Introduction

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. The assessment of the final package includes the revisions to the internal ratings-based (IRB) approach⁹, the standardised approach to credit risk (SA)¹⁰ and the standardised approach to operational risk¹¹, as well as the revisions to the Basel III leverage ratio framework¹². In addition, it includes the impact of the fundamental review of the trading book (FRTB)¹³ and credit valuation adjustment (CVA) standards agreed in 2016, as well as changes resulting from the revised securitisation framework¹⁴. However, the analysis does not take into account the impact of the latest version of the Basel Committee of Banking Supervision (BCBS) FRTB framework.

1.1 Data and sampling

The data submitted for the cumulative impact assessment, as of June 2018, cover a total of 133 banks from 18 European Economic Area countries, including 45 Group 1 and 87 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 for the cumulative analysis. Based on this criterion and following data cleansing, 123 banks were included in the cumulative analysis: 44 Group 1 banks and 79 Group 2 banks (see Table 4).

The subsamples used for analysing the impact of Basel III revisions on individual risk categories is larger than the sample used for the overall cumulative analysis (see shaded column in Table 4). As a result, the impact relating to credit risk, operational risk and the leverage ratio presented in the individual sections of the report may differ from those reported in the overall cumulative analysis.

⁹ 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*.

¹⁰ 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*.

¹¹ 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*.

¹² See BCBS (2016), *Revisions to the Basel III leverage ratio framework: Consultative document*.

¹³ See BCBS (2016), *Minimum capital requirements for market risk: Standards*.

¹⁴ See BCBS (2016), *Basel III document: Revisions to the securitisation framework, amended to include the alternative capital treatment for 'simple, transparent and comparable' securitisations*, www.bis.org/bcbs/publ/d374.htm; BCBS and Board of the International Organization of Securities Commissions (2015), *Criteria for identifying simple, transparent and comparable securitisations*, www.bis.org/bcbs/publ/d332.htm

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

Country (1)	Included Cumulative analysis of the impact on MRC (2)	Submitted					
		Credit risk	Market risk	CVA	OpRisk	LR	NSFR
AT	9	10	7	9	10	10	9
BE	4	4	3	4	4	4	4
DE	32	32	10	23	31	33	34
DK	4	4	4	4	4	4	3
EL	3	4	4	4	4	4	4
ES	6	6	5	6	7	7	7
FR	7	7	6	7	7	7	7
IE	7	12	1	11	12	12	12
IT	13	13	11	13	13	13	13
LU	2	2	2	2	2	2	2
MT	1	2	1	2	2	2	2
NL	8	8	3	8	8	8	8
NO	2	2	1	2	2	2	2
PL	5	5	4	5	5	5	5
PT	4	4	3	3	4	4	3
SE	7	7	4	7	7	7	7
UK	9	9	5	5	8	8	8
All banks	123	131	74	115	130	132	130
Group 1	44	47	42	44	46	46	45
of which G-SIIs	11	11	11	11	11	11	10
Group 2	79	84	32	71	84	86	85

Source: EBA QIS data (June 2018)

1.2 Methodology for impact estimation: aggregation and metrics

1.2.1 Minimum required capital 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 with 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 Tier 1 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), 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’¹⁵, used by some EU jurisdictions, because 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 standardised approach RWA 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 G-SIIs surcharge¹⁶, where applicable¹⁷.

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 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) 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.
- ‘*Revised LR*’ shows the change in LR-based T1 MRC add-ons (i.e. the additional MRC on top of the risk-based MRC) due to the implementation of the revised LR framework. A positive change

¹⁵ 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.

¹⁶ For example, for a bank with a G-SIIs buffer of 1% the minimum LR T1 MRC would be 3.5% of the total exposure measure.

¹⁷ See also BCBS (2013), ‘Global systemically important banks: Updated assessment methodology and the higher loss absorbency requirement’; Financial Stability Board (November 2018), ‘2018 list of global systemically important banks (G-SIBs)’, <http://www.fsb.org/wp-content/uploads/P161118-1.pdf>

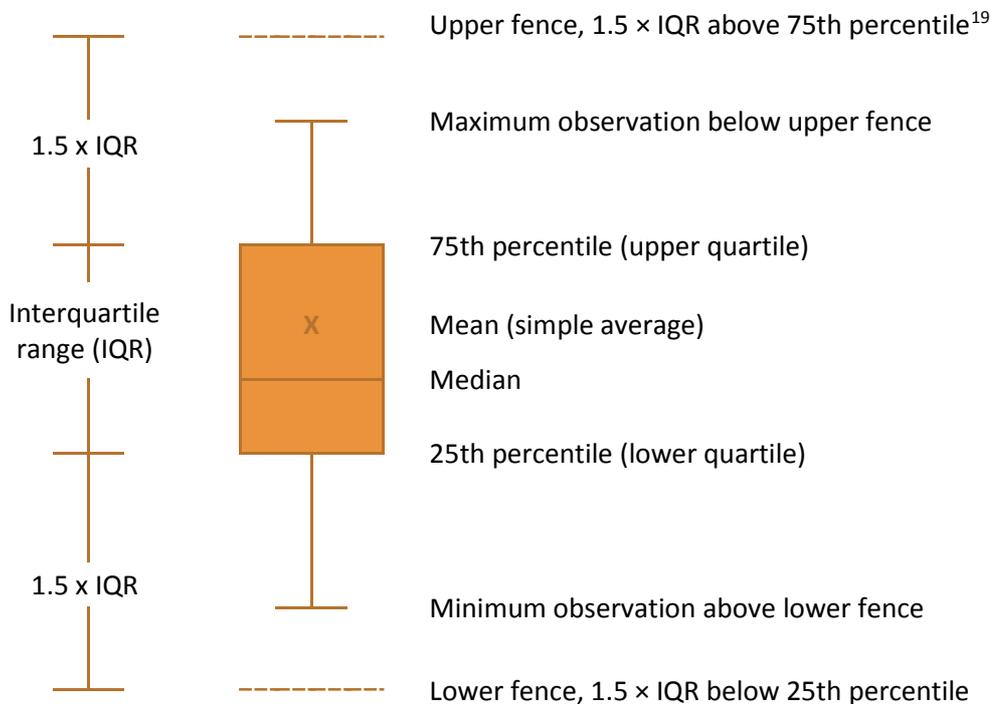
shows that the LR requirement¹⁸ becomes more constraining under the new framework, i.e. the final Basel III LR framework increases the T1 capital add-on in relation to the CRR/CRD IV add-on. A negative change shows that the final Basel III LR T1 add-on becomes less constraining than the CRR/CRD IV add-on, 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 difference 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 (CET1, T1, total capital) covers also Pillar 2 capital requirements, as well as EU-specific macroprudential buffers imposed by the relevant supervisor, the estimated shortfall is probably an underestimation of the actual shortfall.

1.3 Distribution metrics

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:



¹⁸ Currently, leverage ratio requirements are not yet binding in the EU; the proposed CRR II/CRD V will render the leverage ratio requirements binding.

¹⁹ To calculate the upper and lower fences, 1.5 times the IQR is added to the 75th percentile and deducted from the 25th percentile.

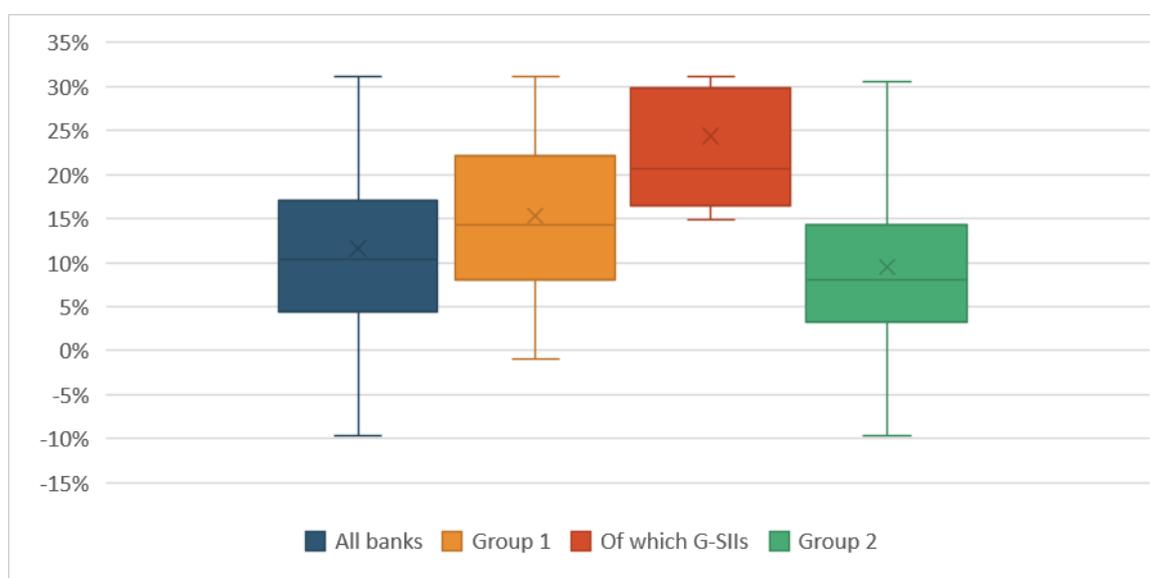
2. Regulatory capital ratios, capital shortfalls and impact on T1 MRC

This section presents several metrics to assess the impact of the full implementation of the Basel III reform package. These metrics are the level of risk-based and LR-based capital, 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).

2.1 Cumulative impact analysis of the final Basel III reform

The analysis in the present section focuses on the impact of the Basel III package on the fully phased-in CRR/CRD IV T1 MRC. The advantage of the MRC measure is that it is common across all jurisdictions and is not affected by Pillar 2 capital requirements, which may vary across EU countries and may not be stable over time.

Figure 1: Distribution of changes in total T1 MRC



Note: the mean value ('X') is the simple average.

Source: EBA QIS data (June 2018)

Figure 1 shows the distribution of T1 MRC across all banks, Group 1 banks, Group 2 banks and G-SIIs. Group 1 and Group 2 banks exhibit median values close to their respective averages but consistently lower, indicating that positive outliers affect the average impact moderately. The dispersion of changes in T1 MRC, measured as the interquartile range, is broader for Group 1 banks than for Group 2 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-SIIs surcharge, is 19.1% across all 123 banks in the sample, 20.3% for the large and internationally active banks (Group 1) and 11.8% for the other banks (Group 2).

For Group 1 banks, the overall increase in T1 MRC consists of a 26.3% increase in the risk-based components, mainly driven by the output floor (8.5%). The impact of the risk-based components on T1 MRC is partially offset by a 6.2% reduction in the add-on attributed to leverage ratio T1 MRC. This reduction reflects the fact that the revised Basel III LR becomes less constraining in the presence of the output floor on RWA, which increases the risk-based T1 MRC. The results are different for the G-SIIs sample, where the LR requirement reduces the risk-based MRC by only 0.3%. For Group 2 banks, the overall 11.8% increase in T1 MRC is again driven by the 19.4% increase in the risk-based measure, consisting of an increase of 8.1% due to credit risk revisions, followed by a 5.1% increase assigned to the output floor. This increase is partially offset by a 7.7% reduction in the leverage ratio impact (see Annex, section 10.1.6 for the detailed methodology).

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

Bank group	Credit risk				Market risk	CVA	Op Risk	Output floor	Total risk-based	Revised LR	Total
	SA	IRB	Securitisation	CCPs							
All banks	2.2	2.0	0.7	0.0	2.3	4.7	5.5	8.0	25.4	-6.2	19.1
Group 1	1.8	1.7	0.8	0.0	2.5	4.9	6.1	8.5	26.3	-6.0	20.3
Of which: G-SIIs	2.2	2.1	1.1	0.0	3.3	5.4	7.4	7.3	28.8	-0.3	28.4
Group 2	4.3	3.7	0.1	0.0	0.9	3.6	1.7	5.1	19.4	-7.7	11.8

Source: EBA QIS data (June 2018)

When looking at the entire sample, the CVA risk capital charge increases by 4.7% between the Basel III and the CRR/CRD IV frameworks. The significant CVA impact is primarily attributed to changes in the scope of CVA risk capital charge, but also to the differences in the modelling of the current standardised approach and the new approach. The changes in the scope relate to 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. These exemptions could be included in future reports, depending on the specificities of the implementation of Basel III into the EU regulation.

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

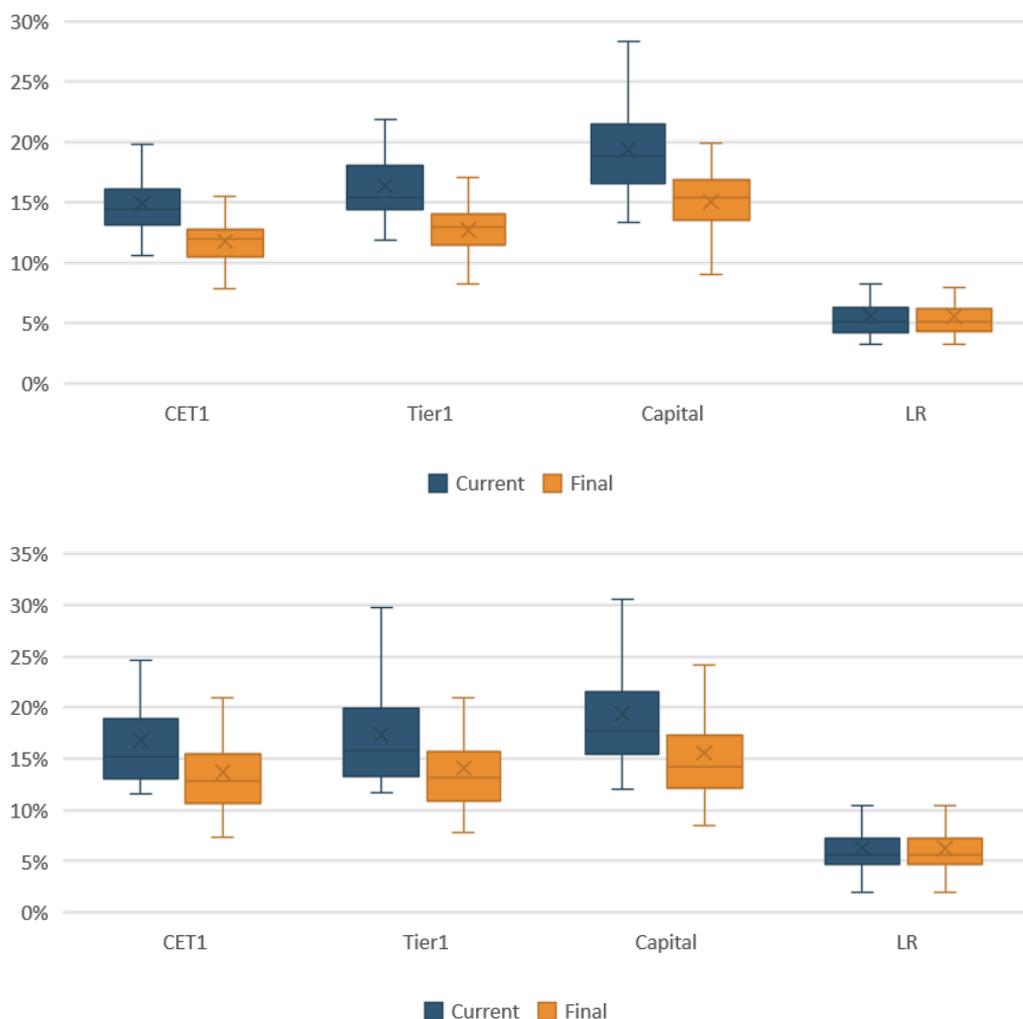
Table 6 shows the results of the calculations for CET1, T1 and total capital ratios. It also shows the result of the calculations of the leverage ratio, assuming that the actual capital measure remains the same under the final Basel III and the impact on the leverage ratio is entirely attributed to changes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

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

Bank group	CET1			Tier 1			Total capital			Leverage ratio	
	Fully phased-in CRR/CRD IV	Transitional Basel III (2022) ²⁰	Final Basel III (2027)	Fully phased-in CRR/CRD IV	Transitional Basel III (2022)	Final Basel III (2027)	Fully phased-in CRR/CRD IV	Transitional Basel III (2022)	Final Basel III (2027)	Fully phased-in CRR/CRD IV	Final Basel III (2027)
All banks	14.2	11.9	11.1	15.5	13.0	12.2	18.4	15.4	14.4	5.0	5.0
Group 1	13.9	11.7	10.8	15.3	12.8	11.9	18.3	15.4	14.3	4.9	4.9
Of which: G-SIIs	13.2	10.8	10.2	14.7	12.0	11.4	17.5	14.4	13.6	4.6	4.6
Group 2	16.1	13.6	13.0	16.8	14.1	13.5	18.8	15.8	15.2	5.6	5.6

Source: EBA QIS data (June 2018)

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



Note: the mean value ('X') is the simple average.

Source: EBA QIS data (June 2018)

²⁰ The transitional implementation (2022) includes the impact of applying the transitional output floor rate of 50%; all other provisions of final Basel III are fully implemented.

On average, the impact on capital ratios is similar across all bank groups. Nonetheless, the dispersion changes across the different types of capital ratios (Figure 2). The dispersion of CET1 ratios remains almost unchanged, showing almost the same width between CRR/CRD IV and Basel III. On the other hand, the dispersion of Tier 1 and total capital ratios becomes narrower, i.e. exhibiting the highest concentration around the mean, under the Basel III framework. The dispersion of LR remains almost unchanged.

2.2.2 Capital shortfalls

The capital shortfall compares the actual level of capital (CET1, Tier 1 and total capital) in June 2018 with the fully implemented MRC, after taking into account the CCB and G-SIIs surcharge, where applicable²¹. The capital shortfall under the current fully phased-in CRR/CRD IV is negligible and observed only in the Group 2 sample for the LR-based requirements. The combined²² Tier 1 capital shortfall under the full implementation of the final Basel III is mainly driven by G-SIIs. The Tier 1 capital shortfalls for all banks, Group 1 banks, their subset of G-SIIs, and Group 2 banks amount to EUR 24.2 billion, EUR 19.6 billion, EUR 19 billion and EUR 4.6 billion, respectively (Table 7).

Table 7: Capital shortfalls by bank group under full implementation of CRR/CRD IV and final Basel III (EUR billion)

Bank group	CET1	Tier 1			Total capital	
		Risk-based ²³	Stand-alone LR-based	Risk-based and LR-based Tier 1 ²⁴	Risk-based ²⁵	Risk-based total capital and LR-based Tier 1 ²⁶
All banks	0.0	0.0	1.5	1.5	0.0	1.5
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	1.5	1.5	0.0	1.5

Bank group	CET1	Tier 1			Total capital	
		Risk-based	Stand-alone LR-based	Risk-based and LR-based Tier 1	Risk-based	Risk-based total capital and LR-based Tier 1
All banks	9.0	23.5	2.8	24.2	38.3	39.0
Group 1	6.9	19.6	1.4	19.6	32.2	32.2
Of which: G-SIIs	6.9	19.0	1.4	19.0	31.4	31.4
Group 2	2.2	3.9	1.4	4.6	6.1	6.8

Note: upper part, full implementation of CRR/CRD IV; lower part, full implementation of final Basel III.

Source: EBA QIS data (June 2018)

The final Basel III revisions to the risk-based capital requirements result in a CET1 capital shortfall of EUR 9 billion. For Tier 1 risk-based requirements, this shortfall increases to more than twice as

²¹ This metric takes into account the deficit of capital on an individual basis without it being offset by the surpluses of other banks.

²² Assuming joint implementation of the risk-based and leverage ratio requirements.

²³ 8.5% (= minimum Tier 1 (6%) + capital conservation buffer (2.5%)).

²⁴ The results presented in this column are estimated as follows: $\sum \max(LR_based_MRC - Risk_based_MRC, 0)$.

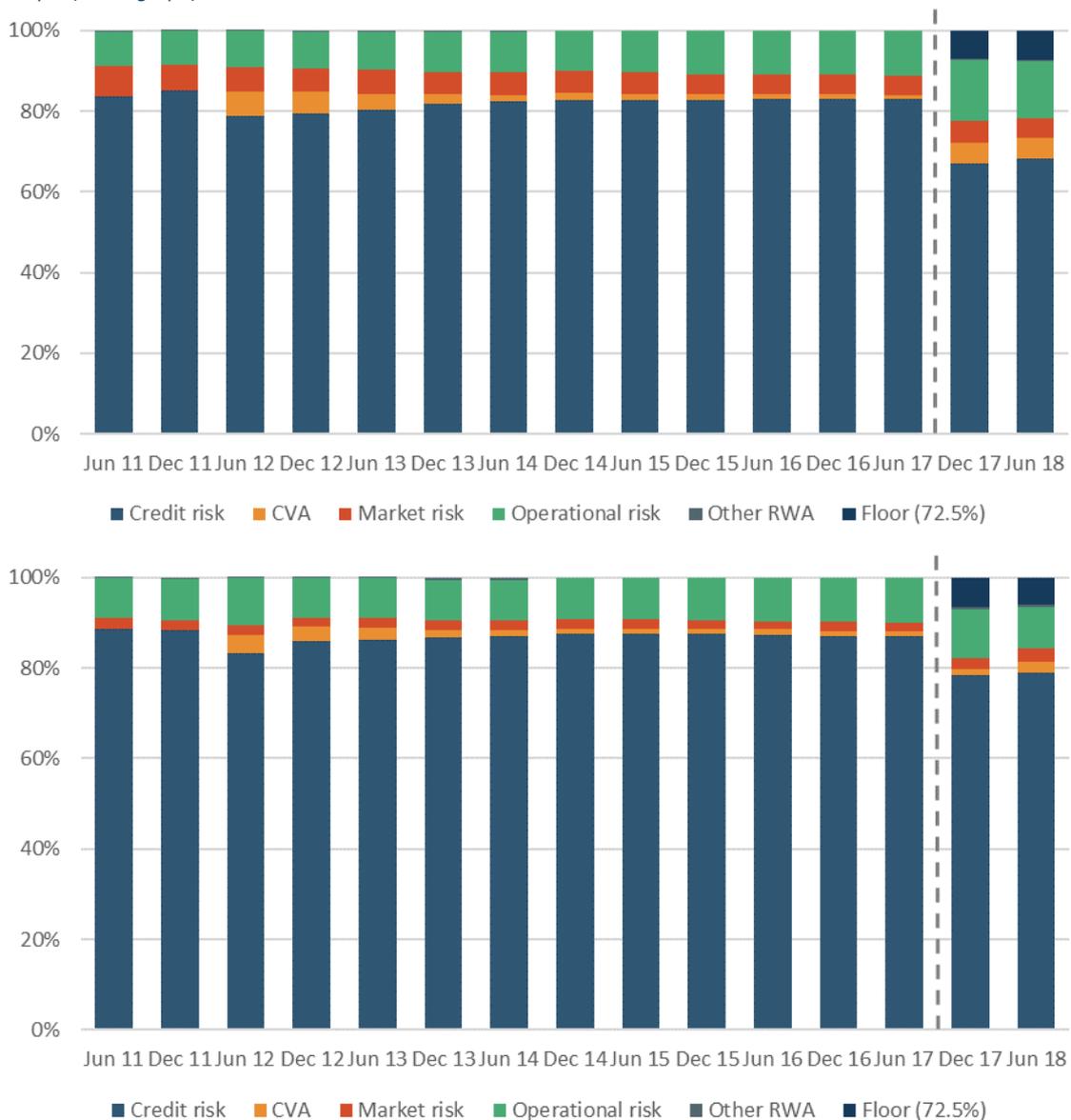
²⁵ Assuming compliance with the risk-based capital ratio requirements only.

²⁶ Assuming compliance with both the risk-based capital ratio and leverage ratio requirements.

much (EUR 23.5 billion). The stand-alone LR-based Tier 1 MRC is EUR 2.8 billion, of which EUR 1.3 billion arises from the revisions of LR under Basel III. The application of both risk-based and LR-based requirements increases the Tier 1 capital shortfall further to EUR 24.2 billion.

The full implementation of the Basel III reforms (as of December 2017 and June 2018) implies an increase in the minimum required capital across all risk categories of the risk-based framework. 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 share in 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 (June 2011 to June 2017) and the revised Basel III framework (from December 2017) over time, for Group 1 (upper graph) and Group 2 (lower graph)

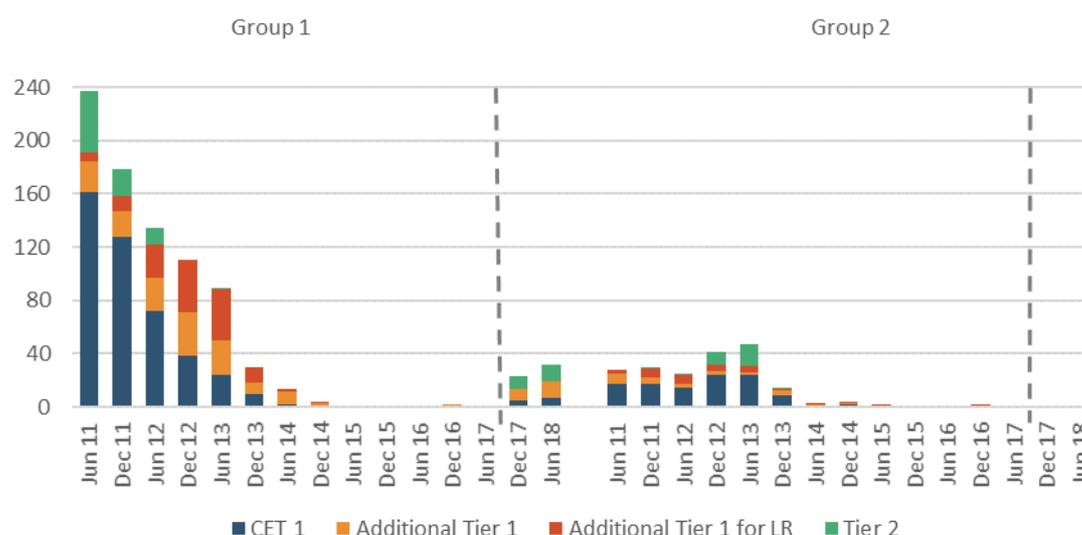


Note: the dashed vertical line shows the start of monitoring of the final Basel III framework.

Source: EBA QIS data (June 2018)

The capital shortfall analysis for the consistent sample of Group 1 banks that participated in all exercises shows a continuous decrease, since the introduction of the initial Basel III proposals (2011) and until the end of December 2017. Thereafter, there was an increase in December 2017, and a further increase in June 2018, because of the assumed final Basel III implementation (Figure 4). For Group 2 banks, there is no shortfall when examining the consistent sample of banks participating in the exercise since June 2011.

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



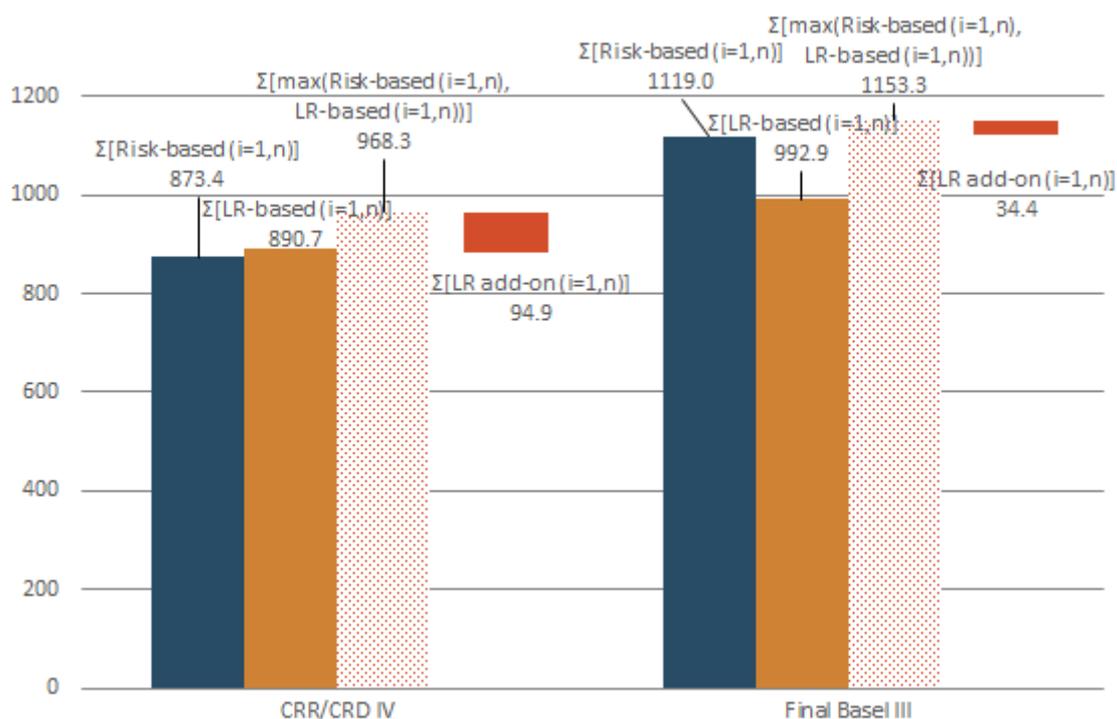
Note: the dashed vertical line shows the start of monitoring of the final Basel III framework.
 Source: EBA QIS data (June 2018)

2.3 Interactions between risk-based and leverage ratio capital requirements

As described in detail in the Annex (section 10.1.6), the analysis assesses whether the Basel III framework renders the leverage ratio requirements more constraining than the CRR/CRD IV requirements. Figure 5 presents the mechanics for the estimation of the leverage ratio impact.

The aggregate Tier 1 MRC, arising from the combined risk-based and LR-based requirements, increases from EUR 968.3 billion under CRR/CRD IV to EUR 1153.3 billion under the final Basel III (19.1% — see Table 1). The stand-alone risk-based MRC, for all banks under the CRR/CRD IV, is EUR 873.4 billion, while the stand-alone LR-based MRC is EUR 890.7 billion. The respective values under the final Basel III framework are EUR 1119.0 billion and EUR 992.9 billion. The total leverage ratio requirement add-on, estimated at bank level, is EUR 94.9 billion under CRR/CRD IV and EUR 34.4 billion under the final Basel III framework.

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



Source: EBA QIS data (June 2018)

$\Sigma[\text{Risk-based}(i=1,n)]$, 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

The sum of LR-based MRC add-ons, under the final Basel III framework, is EUR 34.4 billion. The comparison between the CRR/CRD IV and final Basel III frameworks indicates that the leverage ratio requirements become less constraining by EUR 60.5 billion (EUR 34.4 billion - EUR 94.9 billion) under the final Basel III framework. This is because part of the additional MRC was previously required by the LR whereas now it is required by the risk-based Basel III MRC. In percentage terms, this amount corresponds to the leverage ratio impact of -6.2% shown in Table 1 and Table 5.

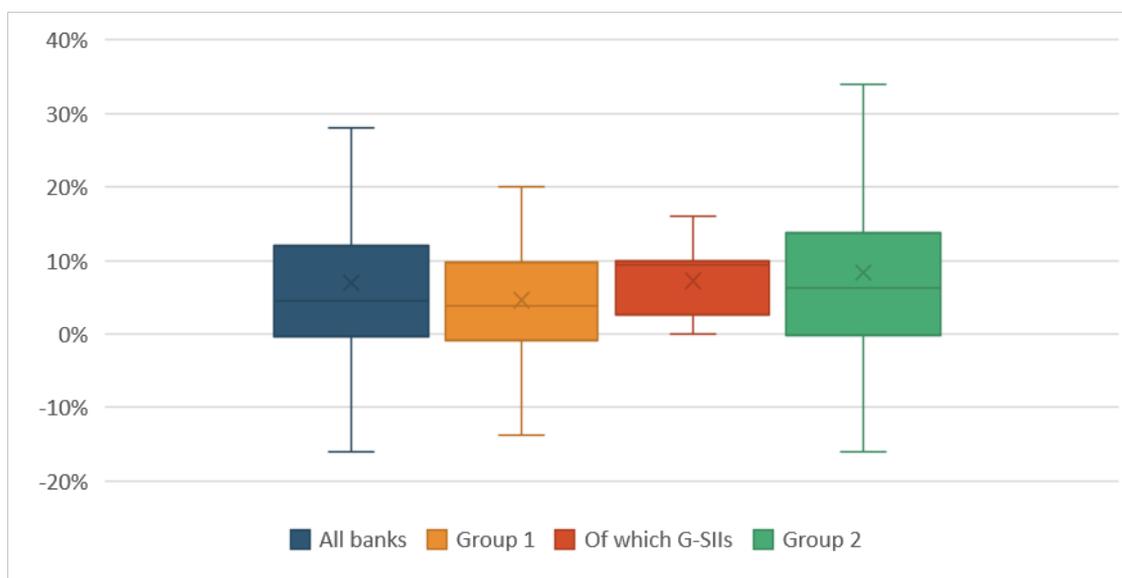
3. Credit risk

This section assesses the impact of the Basel III reforms related to the revisions to the SA and the IRB approach for credit risk.

The changes in the final framework aim, among other things, to increase 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 approach for some asset classes²⁷. These changes do not allow a direct comparison between the proposed and current frameworks. Therefore, the estimated impact is an approximation.

The analysis faced some 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 III framework allows jurisdictions to choose 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 chosen for EU banks.

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



Note: the mean value ('X') is the simple average.

Source: EBA QIS data (June 2018)

²⁷ For more information, please refer to <https://www.bis.org/bcbs/publ/d424.htm>

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 approximately 4.6%.

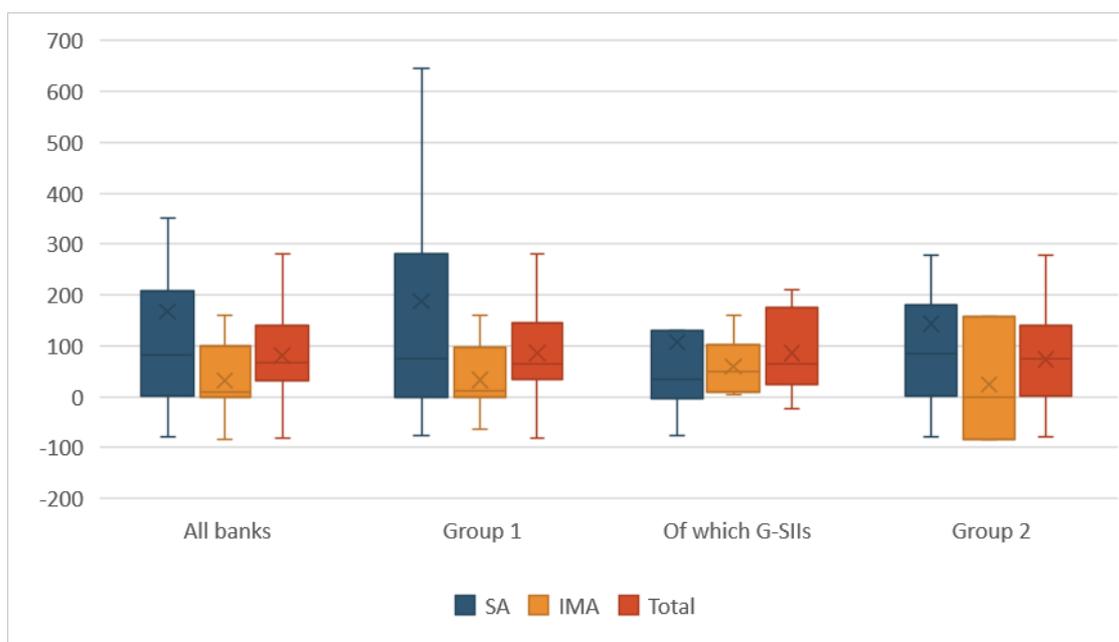
When the overall impact is broken down into asset classes, the largest increases for Group 1 banks are observed for 'equities', 'equity investment in funds' and 'subordinated debt and capital instruments other than equity'.

4. FRTB

This section assesses the isolated impact of the January 2016²⁸ BCBS reforms related to the capital requirements for market risk. Since the framework was amended in January 2019²⁹, 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.

The outliers affect the summary results, causing the average values to be above the median values across the majority of risk categories and bank groups. 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 (in %)



Note: the mean value ('X') is the simple average.

Source: EBA QIS data (June 2018)

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 81%, while the interquartile range spans from approximately 32% to 140%, masking significant heterogeneity across banks. This heterogeneity is similar for Group 1 banks but higher for G-SIIs and Group 2 banks.

With regard to individual approaches, the distribution of the impact for all banks under the SA is much wider than under the IMA, ranging from approximately 0% to slightly over than 200%, with

²⁸ <https://www.bis.org/bcbs/publ/d352.htm>

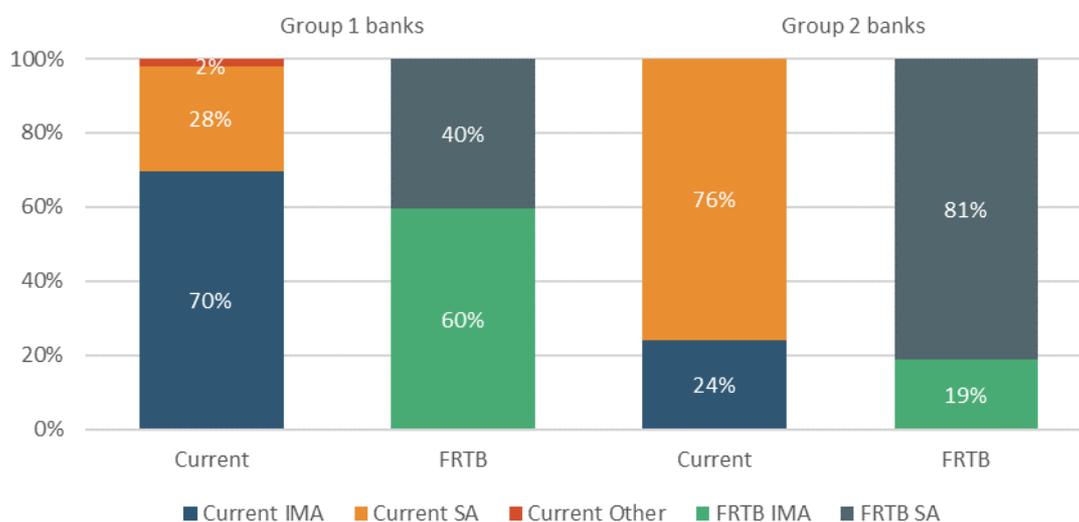
²⁹ <https://www.bis.org/bcbs/publ/d457.htm>

an average of approximately 170%. The distribution of the impact due to the implementation of the IMA remains roughly the same as the total market risk impact³⁰.

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 (70%), followed by the SA (28%), while other market risk capital requirements are negligible. Under the revised rules, the proportion of minimum capital requirements calculated under IMA decreases to 60% while the SA proportion increases to 40%.

In contrast, Group 2 banks currently have most of their minimum capital requirements computed under the SA (76%), with just 24% under the IMA. Under the revised rules, the SA makes up almost the entire minimum capital requirement (81%), with the IMA making up only 19%.

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



Source: EBA QIS data (June 2018)

³⁰ 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.

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 47.4% for Group 1 banks and 25.5% for Group 2 banks. The results show that, on average, the revisions affect Group 1 banks migrating from the AMA less than Group 1 banks currently using other approaches. However, the average impact on Group 1 non-AMA banks is driven by a few Group 1 outlier banks.

The inverse picture is observed for Group 2 banks, where AMA banks are affected by the new framework more than the non-AMA banks. This happens 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 10.1.4). Third, the main driver of this increase is the fact that some of the AMA banks have significantly lower MRC 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)

Bank group	Migrating from AMA	Others	Total
All banks	40.1	52.0	44.7
Group 1	40.3	61.5	47.4
Of which: G-SIIs	43.3	57.7	46.6
Group 2	35.9	22.6	25.5

Source: EBA QIS data (June 2018)

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 the 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 Group 2 banks are particularly specialised, 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

to Group 1 banks, most of which 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 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 have increased their MRC for OpRisk significantly.

Table 9 presents the different findings for AMA banks. Type 1 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 adjust the capital requirements produced by the BIC alone (see Annex, section 10.1.4). Similar capital impacts are also observed for Type 2 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

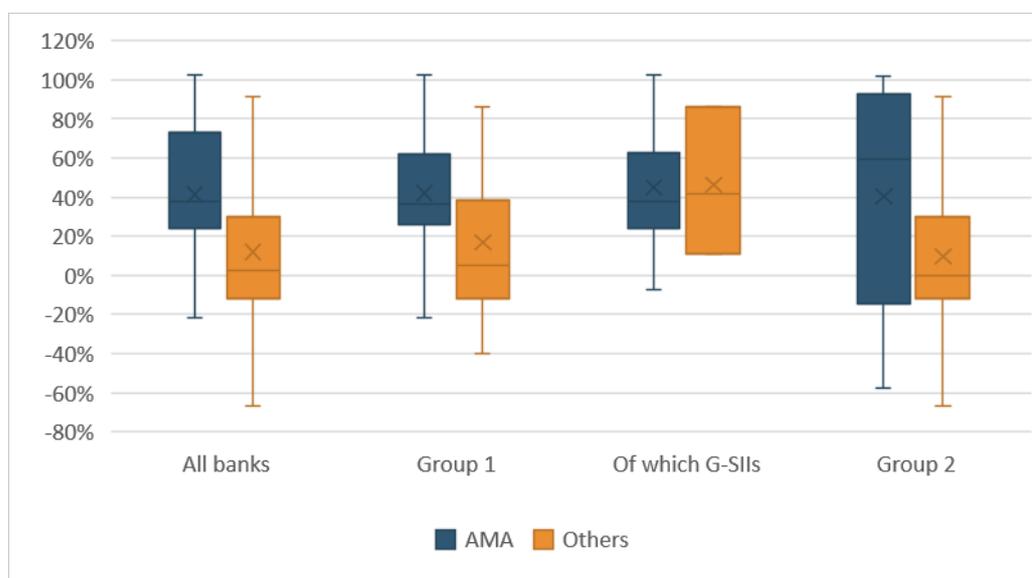
Level of past losses	Proportion of OpRisk MRC in total MRC	
	Low	High
Low	Type 1 AMA (normal AMA): <ul style="list-style-type: none"> • BIC increasing impact • LC/ILM decreasing impact → most likely an increase in MRC due to the higher weight of BIC	Type 3 AMA (conservative AMA): <ul style="list-style-type: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

Type 3 AMA banks have a higher proportion of operational risk in the total MRC and low past losses. This type of AMA banks seldom benefits from capital reductions because of a dampening effect of BIC and ILM values. Type 4 AMA banks have a low proportion of operational risk and high past losses. This type of bank suffers significant capital increase due to the double hit, i.e. increases in the BIC and ILM values. The first hit is purely the 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, by means of 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 75th percentiles of the operational risk capital requirements changes (Figure 9).

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



Note: the mean value ('X') is the simple average.

Source: EBA QIS data (June 2018)

The final Basel III framework provides supervisors with the discretion to set the past-losses threshold at EUR 100 000 or ILM = 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 the ILM with the capital requirements arising when assuming the exercise of the discretion to set the loss materiality threshold at EUR 100 000 for bucket 2 and 3 banks³¹ 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 (i.e. with BI ≤ EUR 1 billion), internal loss data does not affect the capital

³¹ 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)'.

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, paragraph 11).

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 100 000 operational loss materiality threshold for banks with a BI > EUR 1 billion or the equivalent of 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 (123 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 20 000 loss materiality threshold, the discretion to apply a loss materiality threshold of EUR 100 000 for the estimation of ILM (discretion 1) and the discretion to apply ILM = 1 (discretion 2), in %

Bank group	Basel III baseline (loss materiality threshold: EUR 20 000)	Basel III discretion 1 (loss materiality threshold: EUR 100 000)	Basel III discretion 2 (ILM = 1)
All banks	5.5	5.0	2.1
Group 1	6.1	5.6	2.2
Of which: G-SIIs	7.4	6.7	2.6
Group 2	1.7	1.3	1.3

Source: EBA QIS data (June 2018)

6. Output floor

Table 11 shows that the increase in the output floor percentage has an impact on the output floor during the phase-in period. 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 the 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 has a small impact on Group 2 banks (1.6%).

The final Basel III framework provides the national discretion of applying, during the transitional period, a cap on the incremental increase of output floor impact on total RWAs. This transitional period cap is set at 25% increase of a bank's incremental increase in RWAs³². Thus, the exercise of this discretion may limit the year-to-year incremental increase of the output floor impact to 25%³³. The results in Table 11 do not include the effect of this transitional cap. The application of this discretion might reduce the impact in some of the years between 2022 and 2026.

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

Bank group	2022 (50%)	2023 (55%)	2024 (60%)	2025 (65%)	2026 (70%)	2027 (72.5%)
All banks	0.4	0.7	1.4	2.9	5.8	8.0
Group 1	0.2	0.5	1.3	2.9	6.0	8.5
Of which: G-SIIs	0.0	0.0	0.5	1.7	4.4	7.3
Group 2	1.1	1.6	2.2	3.1	4.4	5.1

Source: EBA QIS data (June 2018)

The highest increase in the output floor impact is observed for Group 1 banks in 2026, where the percentage of the output floor rate increases from 65% (2025) to 70% (2026) and the impact increases by approximately 310 basis points (from 2.9% to 6.0%). However, the highest sensitivity of MRC impact, i.e. the difference in the impact per percentage point of the output floor's rate increase, is observed for G-SIIs in 2027, where the impact increases by approximately 116 basis points for each percentage point increase in the output floor rate between 70% and 72.5%³⁴.

³² See BCBS (2017), *Basel III: Finalising post-crisis reforms*, p. 139, paragraph 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...'

³³ For example, if the application of the output floor on total RWAs results in an impact of EUR 10 billion in 2023 (output floor rate = 55%) and EUR 15 billion in 2024 (output floor rate = 60%), the exercise of the discretion implies that the impact in 2024 may be capped at EUR 12.5 billion (= EUR 10 billion + EUR 10 billion × 25%).

³⁴ 290 basis points/2.5% = 116 basis points 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 requirements³⁵. Figure 10 compares the distributions 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 of good quality³⁶.

Looking at the leverage ratio impact in isolation from the other Basel III risk-based 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, remained fairly stable (0.1% increase) in relation to the current framework, if taking into account the entire sample of participating banks. However, the inclusion of 50% of the G-SIIs surcharge resulted in an overall increase of the LR Tier 1 MRC of 11.5%.

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 (%)

Bank group	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
All banks	100	0.1	11.5
Group 1	100	-0.1	13.0
Of which: G-SIIs	100	-0.4	21.8
Group 2	100	1.2	1.2

The examination of the leverage ratio levels shows that the average LR for Group 1 banks remains the same, at 5.0%, under the CRR/CRD IV and Basel III frameworks. The same is observed when analysing all other bank groups. Banks are more concentrated in the 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 54.3% of the banks showed an increase in the leverage ratio exposure due to the implementation of the 2017 revisions, while approximately 45.7% displayed lower levels.

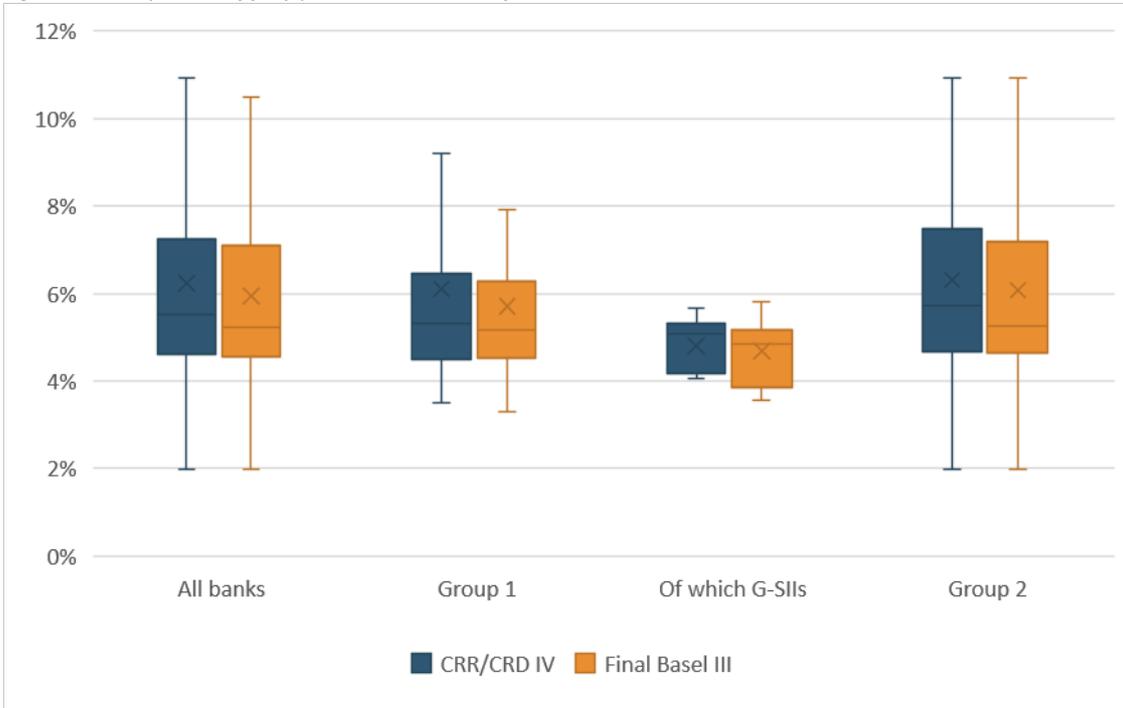
In terms of Tier 1 MRC, the impact of the revisions changes direction when the analysis includes both the changes in the definition of leverage ratio exposure and the implementation of an additional 50% of the G-SIIs surcharge as components of determining the minimum capital requirement. This change of direction appears only in G-SIIs, which in turn affects the averages of

³⁵ 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 a 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.

³⁶ Of the 132 banks that provided leverage ratio data, 130 provided data usable for the analysis in the current section. Table 3 and Table 6 provide LR levels for a sample of 124 banks that are included in the cumulative impact analysis.

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.

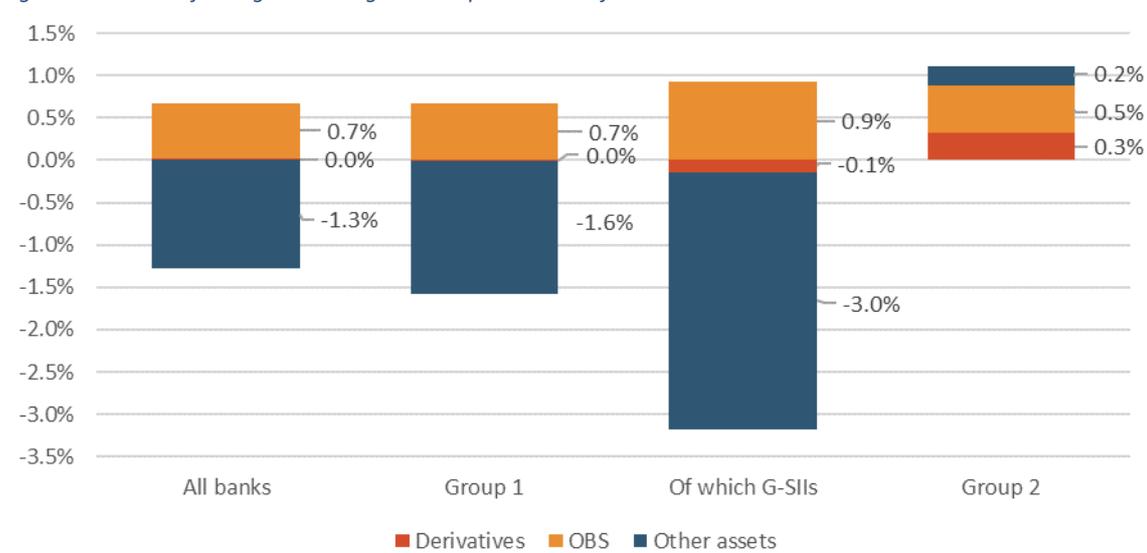
Figure 10: Comparison of fully phased-in EU LR and final Basel III LR



Note: the mean value ('X') is the simple average.

Source: EBA QIS data (June 2018)

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



Source: EBA QIS data (June 2018)

Figure 11 shows the impact of the changes in the definition of final Basel III standards on the main components of leverage ratio exposure. The sample of all banks included in this graph is reduced to 106 banks, as it includes only banks that reported all the necessary information to show the leverage ratio impact by component. The entire sample exhibits a reduction in the leverage ratio

exposure of -0.6%. The main driving factor of the total change in the leverage ratio exposure values is the reduction of other assets (-1.3%). For Group 1 banks (37 banks), and their subset of G-SIIs (8 banks), the direction of total change is also negative (-0.9% and -2.2%, respectively). The change of other assets' leverage ratio exposure in G-SIIs contributes the most to the decrease of total exposure (-3.0%). The total leverage ratio exposure of the reduced Group 2 sample (69 banks) increases by 1.0%, driven by an increase of 0.5% in OBS.

8. Interaction between output floor and leverage ratio requirements

The analysis in the current report applies the leverage ratio requirements following the Basel III provisions, which provide that they act as a backstop to the risk-based requirements and thus are applicable after the risk-based requirements, including the output floor. According to this methodology, the output floor creates an additional capital requirement under the Basel III framework, which smooths out the impact of the LR add-on on the risk-based requirements. This offset of the LR impact is obvious when examining the stand-alone increase in the leverage ratio capital requirements (11.5%), vis-à-vis the relative LR impact after taking into account the risk-based capital requirements, including the output floor (-6.2%).

This chapter aims to calculate the stand-alone impact of the output floor on MRC by assuming that all other requirements, including the LR, are applied before the output floor. The order of the application of the various requirements does not change the final impact on MRC, but it allows the isolation of the impact of the last requirement that is applied. In the case of the output floor, this takes into account the fact that some of the increase in MRC, attributed to the output floor in the cumulative analysis of the present report (Table 1 and Table 5), is, in fact, already required by the LR, but in the final Basel III regime it is ‘taken on’ by the output floor because it is applied before the LR. Therefore, this approach underestimates the stand-alone impact of the LR (indeed, it shows a decrease in MRC) and overestimates the stand-alone impact of the output floor.

To illustrate the case, three scenarios are calculated:

- *Baseline scenario*: application of leverage ratio requirement after applying the output floor requirement, as part of the risk-based requirements (final Basel III regime);
- *Scenario 1*: application of the leverage ratio requirement alone, i.e. without applying the output floor;
- *Scenario 2*: application of the output floor requirement after applying the leverage ratio requirement, i.e. reversed order of application.

Scenario 1 is calculated by setting the output floor to 0%. Scenario 2 is calculated as the difference between the baseline scenario (presented in the cumulative results), where the output floor is set to 72.5%, and Scenario 1.

Table 13: Number of banks constrained by the risk-based capital requirement, with and without the implementation of the output floor

Scenarios	Number of banks constrained by the risk-based requirements	Number of banks constrained by output floor	Number of banks constrained by leverage ratio
Risk-based capital requirements without the output floor (scenario 1)	75	Not applicable	48
Risk-based capital requirements with the output floor (baseline scenario)	75	10	38

Source: EBA QIS data (June 2018)

The results in Table 13 show the number of constrained banks under the two scenarios, as well as the difference attributed to the output floor.

The implementation of Basel III risk-based requirements, without the output floor, and the leverage ratio requirements results in 75 banks being constrained by the risk-based requirements and 48 banks by the leverage ratio. The implementation of the output floor, as part of the risk-based requirements, results in 10 banks being constrained by the risk-based requirements, including the output floor.

Table 14 examines the impact of LR and output floor, in EUR billion, under the three scenarios described above. Under the baseline scenario, the Basel III leverage ratio add-on is EUR 34.4 billion, additional to the Basel III risk-based Tier 1 MRC with the output floor. This implies a reduction in the impact of leverage ratio from the current CRR/CRD IV regime because the add-on is reduced by EUR 60.5 billion from EUR 94.9 billion to EUR 34.4 billion, owing to the introduction of the output floor. This translates into a -6.2% LR impact (see also Table 1) compared with the current Tier 1 MRC (-60.5/968.3).

Under scenarios 1 and 2, the leverage ratio add-on is EUR 70.3 billion, which implies an overall impact of the LR on MRC of -2.5%. Scenario 2 then applies the output floor as the last requirement in the sequence (no output floor is applied under scenario 2). In this case, the Tier 1 MRC add-on due to the output floor is 4.3%, which is significantly lower than the 8% add-on under the baseline scenario. This implies that the isolated impact of the output floor alone, as a new element of the framework, contributes to an increase in MRC of EUR 41.4 billion (a 4.3% increase).

Table 14: Impact and implied cumulative impact on Tier 1 MRC of the implementation of risk-based capital requirements, with and without the implementation of the output floor

Scenarios	Risk-based (without output floor) Tier 1 MRC in EUR billion (implied impact in %)	Output floor (before LR) Tier 1 MRC in EUR billion (implied impact in %)	Leverage ratio Tier 1 MRC in EUR billion	Leverage ratio add-on in EUR billion (implied impact in %)	Output floor (after LR) Tier 1 MRC in EUR billion (implied impact in %)	Total implied impact (%)
Baseline: with output floor (before LR)	1 041.6 (17.4)	77.4 (8.0)	992.9	34.4 (-6.2) (see note below)	Not applicable	19.1
Scenario 1: without output floor	1 041.6 (17.4)	Not applicable	992.9	70.3 (-2.5)	Not applicable	14.8
Scenario 2: with output floor (after LR)	1 041.6 (17.4)	Not applicable	992.9	70.3 (-2.5)	41.4 (4.3)	19.1

Note: The 'leverage ratio implied impact' for the baseline scenario is -6.2% (also shown in Table 1, Table 5 as 'LR impact') and is calculated as (EUR 34.4 billion – EUR 94.9 billion)/EUR 968.3 billion. EUR 94.9 billion is the CRR/CRD IV leverage ratio add-on (Figure 5), EUR 968.3 billion is the combined Tier 1 MRC arising from the implementation of both risk-based and LR-based requirements (see Figure 5).

Source: EBA QIS data (June 2018)

According to the hypothetical scenario 1, the LR impact, when implementing only the leverage ratio, increases to EUR 70.3 billion, which implies an overall impact of LR of -2.5%. There is no output floor impact under this scenario.

It is worth mentioning that the analysis has been conducted considering the Basel III target requirements only. The inclusion of other EU-specific capital requirements (e.g. calculation of the countercyclical buffer, O-SIIs surcharge, Pillar II requirements) would reduce the marginal contribution of the leverage ratio³⁷, which would remain the same under all scenarios.

³⁷ Higher capital targets, due to the implementation of a higher buffer in the risk-based requirements, would lead to a more binding risk-based framework that, in turn, reduces the overall impact of the leverage ratio framework.

9. 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 CRR³⁸.

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 III framework intends that, from 1 January 2018, this ratio should be equal to or higher than 100%³⁹. 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 the 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 15 provides an overview of the NSFR levels within the groups of banks and the amount of shortfall needed to comply with the 100% requirement set in the Basel III framework.

Table 15: NSFR and NSFR shortfall in stable funding

Bank group	NSFR (%)	Shortfall (EUR billion)
All banks	113.0	49.1
Group 1	111.6	45.7
Of which: G-SIIs	109.6	28.9
Group 2	119.4	3.4
Of which: large Group 2	118.2	3.0
Of which: medium-sized Group 2	122.2	0.2
Of which: small Group 2	120.0	0.2

Source: EBA QIS data (June 2018)

Overall, as of June 2018, banks in the sample needed additional stable funding of EUR 49.1 billion (Table 15), equivalent to 1.7% of total assets (EUR 3 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 - 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.

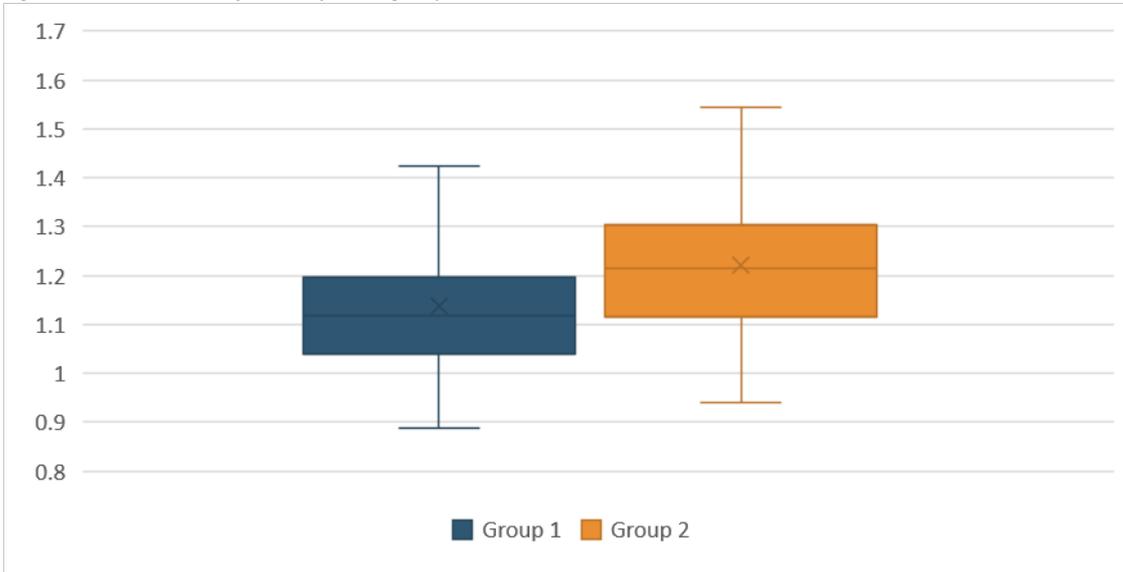
Figure 12 shows the distribution of NSFR per bank group, while Figure 13 illustrates the development of the NSFR over time using a balanced sample of banks. The figure also shows the

³⁸ The report was published on 27 September 2018.

³⁹ Nevertheless, the NSFR ratio is not yet binding in the EU.

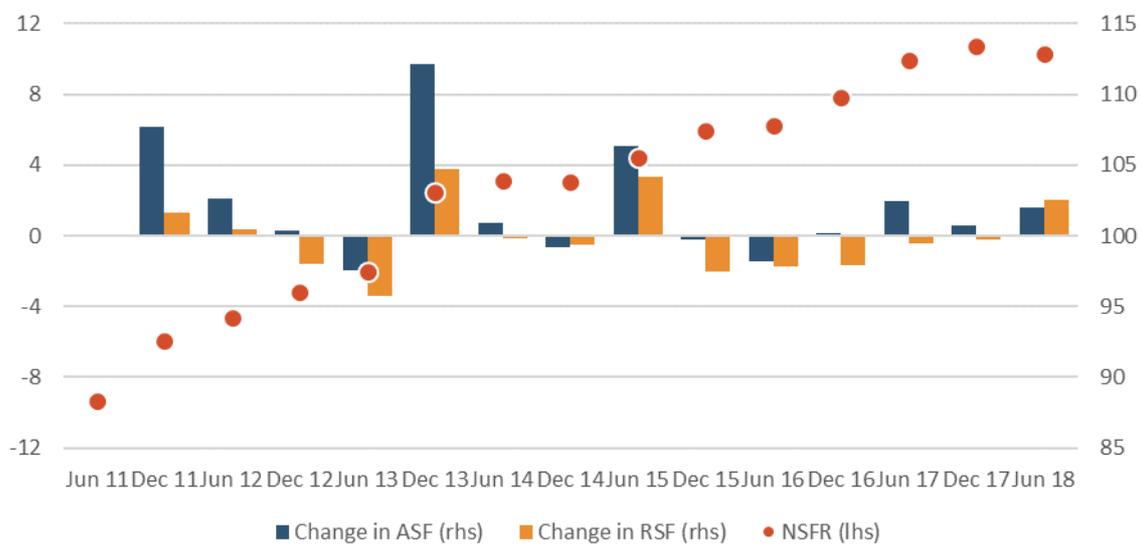
changes in the NSFR components (ASF and RSF), showing which is the main driver of the NSFR change in each period.

Figure 12: Distribution of NSFR by bank group (NSFR/100, %)



Source: EBA QIS data (June 2018)

Figure 13: NSFR (right-hand scale, rhs) (%), and change in its determinants (left-hand scale, lhs) of the balanced sample (%)



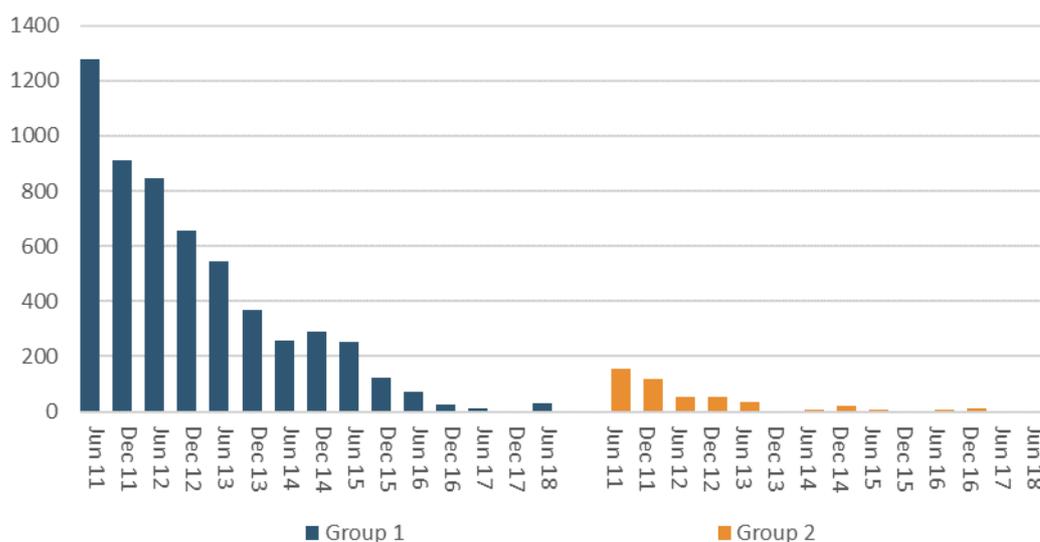
Source: EBA QIS data (June 2018)

The findings show that between June 2011 and June 2018 the average NSFR followed a positive trend and increased by 24.5 percentage points. The driver of the continuous increase varies between the different periods and has been either an increase in the AFS or a reduction of the RSF. The significant increase in banks’ NSFRs in December 2013 was 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 December 2017, the NSFR

has followed the opposite trend, decreasing by 0.5 percentage points because of an increase in RFS that was not offset by the increase in the ASF.

The overall positive trend until December 2017 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 99.8% (from EUR 1 279 billion to EUR 2.7 billion) for Group 1 banks and by 98% (from EUR 158 billion to EUR 2 billion) for Group 2 banks (Figure 14). Nevertheless, in the last reporting period there was an increase in the shortfall for Group 1 banks, which accounts for EUR 29 billion in June 2018. The increase is driven by one bank that had an NSFR ratio of over 100% in December 2017, but reported a EUR 29 billion shortfall in June 2018. The increase in the shortfall for this particular bank is driven by the increase in the RSF that is not being sufficiently offset by an increase in the ASF. The NSFR has not been implemented in the EU regulation yet. Banks with shortfalls should become compliant with the NSFR rules by the time the NSFR becomes binding in the EU⁴⁰.

Figure 14: Development of the NSFR shortfall of ASF over time, by bank group — balanced sample (EUR billion)



Source: EBA QIS data (June 2018)

⁴⁰ The implementation of the NSFR in the EU could include some differences from the Basel III definition of the NSFR. Banks in the EU should become compliant with the applicable definition of the NSFR in the EU once it is implemented.

10. Annex

10.1 Methodology for the estimation of the impact per category

10.1.1 Credit risk impact

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

$\% \Delta T1MRC (Credit\ risk)$ 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

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

$$\frac{\left[\sum_{i=1}^n \left\{ \frac{\text{'Final Basel III } SA_{RWA}'}{\text{'CRR_CRDIV } SA_{RWA}'} \times \left(\text{Tier1}_{MRC} \% \pm \text{capital conservation buffer} \% \pm G_{SII_S} \text{surcharge} \% \right) \right\} - \sum_{i=1}^n \left\{ \left(\text{Tier1}_{MRC} \% \pm \text{capital conservation buffer} \% \pm G_{SII_S} \text{surcharge} \% \right) \right\} \right]}{\sum_{i=1}^n \max\{\text{'CRR_CRDIV total risk_based Tier1 MRC'}, \text{'CRR_CRDIV total LR_based Tier1 MRC'}\}}$$

Where, Tier 1 MRC = 6% and capital conservation buffer = 2.5%

IRB approach for credit risk

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

$$\frac{\left[\sum_{i=1}^n \left\{ \frac{\text{'Final Basel III } IRBA_{RWA}'}{\text{'CRR_CRDIV } IRBA_{RWA}'} \times \left(\text{Tier1}_{MRC} \% + \text{capital conservation buffer} \% + G_{SII_S} \text{surcharge} \% \right) - (\min(\text{Amount of IRB deficit of provisions added to revised T1 MRC}, 0)) + \text{Amount currently risk weighted by art. 49 but deducted to T1 under Basel III} \right\} - \sum_{i=1}^n \left\{ \left(\text{Tier1}_{MRC} \% + \text{capital conservation buffer} \% + G_{SII_S} \text{surcharge} \% \right) - (\min(\text{Amount of IRB deficit of provisions added to current T1 MRC}, 0)) \right\} \right]}{\sum_{i=1}^n \max\{\text{'CRR_CRDIV total risk_based Tier1 MRC'}, \text{'CRR_CRDIV total LR_based Tier1 MRC'}\}}$$

Securitisation

$$\% \Delta T1MRC (Sec.) =$$

$$\frac{\left[\sum_{i=1}^n \left\{ \frac{\text{'Final Basel III } Sec_{RWA}'}{\text{'CRR_CRDIV } Sec_{RWA}'} \times \left(\text{Tier1}_{MRC} \% + \text{capital conservation buffer} \% + G_{SII_S} \text{surcharge} \% \right) \right\} - \sum_{i=1}^n \left\{ \left(\text{Tier1}_{MRC} \% + \text{capital conservation buffer} \% + G_{SII_S} \text{surcharge} \% \right) \right\} \right]}{\sum_{i=1}^n \max\{\text{'CRR_CRDIV total risk_based Tier1 MRC'}, \text{'CRR_CRDIV total LR_based Tier1 MRC'}\}}$$

CCPs

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

$$\frac{\left[\sum_{i=1}^n \left\{ \begin{array}{l} \text{'Final Basel III CCP}_{RWA}' \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \end{array} \right\} - \right. \\ \left. \sum_{i=1}^n \left\{ \begin{array}{l} \text{'CRR_CRDIV CCP}_{RWA}' \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SII_S} \text{surcharge}\%) \end{array} \right\} \right]}{\sum_{i=1}^n \max\{\text{'CRR_CRDIV total risk_based Tier1 MRC'}, \\ \text{'CRR_CRDIV total LR_based Tier1 MRC'}\}}$$

10.1.2 Market risk impact

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

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

10.1.3 CVA impact

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

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

10.1.4 Operational risk impact

$$\% \Delta T1MRC(Op risk) =$$

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

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 components — 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 exponential MRC increases. 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 III 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 from 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 basic indicator approach 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 place⁴¹.

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 $BI = \text{ILDC average} + \text{SC average} + \text{FC average}$ and $\text{ILDC} = \text{interest, lease and dividend component}$, $\text{SC} = \text{services component}$, $\text{FC} = \text{financial component}$.

When $LC < BIC$, then $ILM < 1$; when $LC > BIC$, then $ILM > 1$; when $LC = BIC$, then $ILM = 1$.

⁴¹ See Article 320(a) of the CRR and Article 322(3) of the CRR.

10.1.5 Output floor impact

$$\% \Delta T1MRC(\text{Output Floor}) =$$

$$\frac{\left[\sum_{i=1}^n \max \{0, 'Final Basel III total SA equivalent_{RWA}' \times \text{Output Floor}\% - 'Final Basel III total RWA'\} \right]}{\sum_{i=1}^n \max \{ 'CRR_CRDIV total risk_{based} Tier 1 MRC', 'CRR/CRD IV total LR_based Tier 1 MRC' \}} \times (\text{Tier 1}_{MRC}\% + \text{capital conservation buffer}\% + G_{SII}s \text{ surcharge}\%)$$

where

Final Basel III total SA equivalent 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;

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

10.1.6 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-SII*s surcharge);

CRR/CRD IV total LR-based T1 MRC = *CRR/CRD IV total leverage ratio exposure* × 3%;

n is the number of banks in the sample.

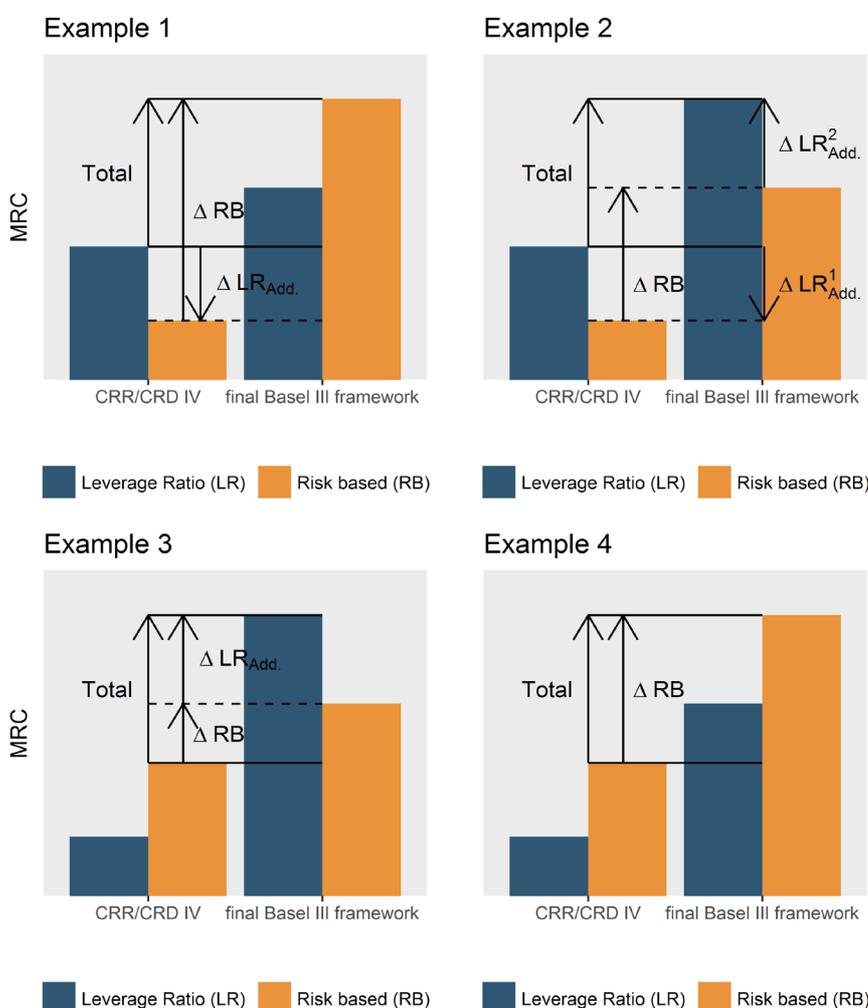
The analysis adopts the BCBS methodology for estimating the leverage ratio impact⁴². This methodology quantifies the impact of the leverage ratio as the change in the LR add-ons between the proposed and current regulatory frameworks, as a metric of the change in the LR's constraining power in determining the total T1 MRC.

⁴² See BCBS (2017), Basel III monitoring report December 2017: Results of the cumulative quantitative impact study.

The leverage ratio impact would be negative (see $\Delta LR_{Add.}$ in 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 under the CRR/CRD IV framework.

The leverage ratio impact would be positive (see $\Delta LR_{Add.}$ in 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.

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



Source: based on the BIS Basel III monitoring report as of December 2017

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 0 (example 4, Figure 15), or the T1 LR add-on remained the same under the CRR/CRD IV and the final Basel III framework (example 2, Figure 15, where $\Delta LR_{Add.}^1 = \Delta LR_{Add.}^2$, then $\Delta LR_{Add.} = 0$). 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.

10.1.7 Capital shortfalls

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

$$\begin{aligned}
 & \mathbf{T1Shortfall}_{CRR_CRDIV} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[\begin{array}{l} \text{Risk_based_Tier1_Shortfall}_{CRR_CRDIV} \\ \text{LR_based_Tier1_Shortfall}_{CRR_CRDIV} \end{array} \right] \right\} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[\begin{array}{l} \max (0, \text{Risk_based_Tier1_MRC}_{CRR_CRDIV} - \text{Actual_Tier1}) \\ \max (0, \text{LR_based_Tier1_MRC}_{CRR_CRDIV} - \text{Actual_Tier1}) \end{array} \right] \right\}
 \end{aligned}$$

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

$$\begin{aligned}
 & \mathbf{T1Shortfall}_{Basel_III} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[\begin{array}{l} \text{Risk_based_Tier1_Shortfall}_{Basel_III} \\ \text{LR_based_Tier1_Shortfall}_{Basel_III} \end{array} \right] \right\} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[\begin{array}{l} \max (0, \text{Risk_based_Tier1_MRC}_{Basel_III} - \text{Actual_Tier1}) \\ \max (0, \text{LR_based_Tier1_MRC}_{Basel_III} - \text{Actual_Tier1}) \end{array} \right] \right\}
 \end{aligned}$$

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

$$\begin{aligned}
 & \mathbf{Add. LR}_{T1Shortfall}_{CRR_CRDIV} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[\begin{array}{l} \max (0, \text{Risk_based_Tier1_MRC}_{CRR_CRDIV} - \text{Actual_Tier1}) \\ \max (0, \text{LR_based_Tier1_MRC}_{CRR_CRDIV} - \text{Actual_Tier1}) \end{array} \right] \right\} \\
 & - \sum_{i=1}^n \left\{ \max [\max (0, \text{Risk_based_Tier1_MRC}_{CRR_CRDIV} - \text{Actual_Tier1})] \right\}
 \end{aligned}$$

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

$$\begin{aligned}
 & \mathbf{Add. LR}_{T1Shortfall}_{Basel_III} \\
 & = \\
 & \sum_{i=1}^n \left\{ \max \left[\begin{array}{l} \max (0, \text{Risk_based_Tier1_MRC}_{Basel_III} - \text{Actual_Tier1}) \\ \max (0, \text{LR_based_Tier1_MRC}_{Basel_III} - \text{Actual_Tier1}) \end{array} \right] \right\} \\
 & - \sum_{i=1}^n \left\{ \max [\max (0, \text{Risk_based_Tier1_MRC}_{Basel_III} - \text{Actual_Tier1})] \right\}
 \end{aligned}$$