BASEL III MONITORING EXERCISE – RESULTS BASED ON DATA AS OF 31 DECEMBER 2019

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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	interquartile 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

This latest Basel III monitoring exercise report is based on December 2019 data and it provides an assessment of the impact of the full implementation of final Basel III reforms on EU banks. The reforms mostly affect the frameworks for credit risk, operational risk (OpRisk) and leverage ratio (LR). Importantly, they also introduce the aggregate output floor. In the report, the credit risk impact is separately attributed to the standardised approach (SA) and the internal ratings-based (IRB) approach. The report also quantifies the impact of the new version of the standards for the market risk (the fundamental review of the trading book, FRTB), as set out in January 2019[1]. The changes in credit valuation adjustment (CVA) are also assessed. In addition, in conjunction with the Basel Committee on Banking Supervision (BCBS) Basel III regular monitoring exercise, the report also provides an update on the progress of the European banks in converging towards the new capital requirements.

Beyond the results of the present report, **the EBA will also publish, on 15 December 2020, a more detailed ad hoc report, which will respond to the European Commission's Call for Advice (CfA) on Basel III**, based on the same reference date (December 2019). The cumulative results of the present report are not directly comparable to those of the CfA report, as they are based on slightly different samples (composition and size) and two key methodological differences. The more important methodological difference relates to the application of different buffers[2]. Another, less significant, difference is the sequence of estimating the capital requirements for the output floor and the LR, respectively. The latter difference has an impact on the minimum required capital assigned to these two categories, but not on the cumulative impact[3].

The present report also shows the evolution of the Common Equity Tier 1 (CET1), Tier 1 (T1) and additional T1 minimum required capital impact. The evolution is shown from the reference dates for which the EBA has collected data with comparable breakdown of risk categories (e.g. credit risk split into standardised approach and IRB approach), for a sample of banks that have been consistently submitting data over the same period ('constant sample').

The baseline impact assessment methodology quantifies the differences in the Pillar 1 minimum required capital between the current EU implementation of the Basel standards (Capital Requirements Regulation (CRR)/Capital Requirements Directive (CRD) IV) and the full Basel III implementation.

The cumulative impact analysis of the present report uses a sample of 106 banks, split between

[1] BCBS (2019), Explanatory note on the minimum capital for market risk.

[2] The present report applies Pillar 1 minimum capital requirement, the capital conservation buffer (CCB) and the global systemically important institutions (G-SIIs) surcharge, where applicable. In addition to these requirements, the CfA report applies Pillar 2 minimum capital requirements and EU capital buffers. This difference has a meaningful effect on the level of capital shortfalls, i.e. the shortfalls presented in the current report are generally lower than the shortfalls reported in the CfA report.

[3] The present report estimates the output floor impact as part of the risk-based capital requirements. The additional LR-based requirement is subsequently calculated as the incremental increase compared with the risk-based capital requirement (including output floor).

40 Group 1 banks and 66 Group 2 banks[4,5]. The key figures are expressed for two separate samples, owing to the submission of overly conservative data for market risk by three global systemically important institutions (G-SIIs). To reduce the reported bias the **baseline scenario** analysis sets the market risk impact for the three G-SIIs in question equal to zero, thus resulting in the reduced estimation bias sample. The conservative estimation results are based on the originally reported, but overly conservative, market risk data[6].

The weighted average change of total T1 minimum required capital (MRC) after full implementation of the reform is 15.4% (for the reduced estimation bias sample) across all 106 banks, 16.2% for the large and internationally active banks (Group 1) and 11.1% for the other banks (Group 2) (see Table 1). The impact on the MRC of the individual risk-based reforms, for all participating banks, is an increase of 18.3%. The output floor and the credit risk are the two major drivers of the MRC increase, accounting for 6.2% and 5.0%, respectively. For Group 1 banks, the output floor and the credit risk are the key drivers, accounting for increases of 7.0% and 4.5% in MRC, respectively. The same drivers are also responsible for the bulk of the MRC impact among the G-SIIs, with increases of 6.8% and 6.2%, respectively. In addition, for this group of banks, operational risk contributes an equal amount (6.2%). For Group 2 banks, on the other hand, the major driver of the MRC impact is credit risk (an increase of 7.7%), followed by operational risk (an increase of 2.3%).

Table 1, Table 2, Table 5 and Table 6 provide separate results for the reduced estimation bias sample and the conservative estimation sample.

For the full sample, the risk-based impact, under the reduced estimation bias scenario, is offset (-2.8%) by the LR impact. This offset reflects the fact that some banks, which are constrained by the LR in the current framework, will be less constrained by the LR in the revised framework. In the revised framework, the high impact on the risk-based requirements means that the LR add-on requirement is lower than the current add-on, resulting in the LR requirement being less constraining for the banks on average. Specifically, 40 banks are constrained by the LR requirement under the CRR/CRD IV, which represent 33.1% of the total risk-weighted assets (RWA) of the sample; under the final Basel III framework, only 13 banks remain constrained, which represent 5.1% of the

[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 LR 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] The difference in the market risk impact between the reduced estimation bias and the conservative estimation bias is 1.7 percentage points (0.6% for reduced estimation bias vs 2.3% for conservative estimation) and the corresponding difference in the total impact on Tier 1 MRC is 1.3 percentage points (15.4% for reduced estimation bias vs 16.7% for conservative estimation). The three G-SIIs applied a sequence of conservative assumptions, namely the treatment of all trading book positions in equity investment in funds, that may no longer be allowed to be modelled, using the most conservative standardised approach, i.e. the 'other bucket' treatment subject to the highest applicable risk weights. This implies that they are unable to use other treatments, such as the index treatment or the mandate-based approach as set out in MAR21.36 (Standardised approach: sensitivities-based method – ways for calculating capital requirements for equity investments in funds that cannot be looked through), which these G-SIIs are expected to be able to apply before the implementation of the framework.

total RWA of the sample[7]. Nevertheless, note that the contribution of LR is overestimated, since Pillar 2 requirements, other systemically important institutions (O-SIIs) capital requirement and countercyclical capital buffers are disregarded in this analysis.

For G-SIIs, there is no offset by the LR requirement because of the inclusion of the G-SIIs surcharge in the calculation of the final Basel III LR requirements for this group of institutions. Instead, there is a minor positive contribution (+0.4%) of the LR-based requirement to the joint Tier 1 MRC.

Table 1: Change in total T1 MRC, as a percentage of the overall current T1 MRC, due to the full implementation of Basel III (2028) (weighted averages, in %)

Part 1: Reduced estimation bias

Bank group	Credit risk				Market Risk	CVA	OpRisk	Other Pillar 1	Output floor	Total risk-based	Revised LR	Total
	SA	IRB	Securitisation	CCPs[8]								
All banks	2.2	2.4	0.4	0.0	0.6	3.0	3.8	-0.3	6.2	18.3	-2.8	15.4
Group 1	1.9	2.2	0.4	0.0	0.7	3.2	4.1	-0.4	7.0	19.1	-2.9	16.2
Of which: G-SIIs	2.1	3.5	0.6	0.0	0.5	3.1	6.2	-0.2	6.8	22.6	0.4	23.0
Group 2	4.4	3.3	0.0	0.0	0.4	1.5	2.3	0.0	1.9	13.8	-2.7	11.1

Part 2: Conservative estimation

Bank group	Credit risk				Market Risk	CVA	OpRisk	Other Pillar 1	Output floor	Total risk-based	Revised LR	Total
	SA	IRB	Securitisation	CCPs[9]								
All banks	2.2	2.4	0.4	0.0	2.3	3.0	3.8	-0.3	6.0	19.7	-3.1	16.7
Group 1	1.9	2.2	0.4	0.0	2.6	3.2	4.1	-0.4	6.7	20.8	-3.1	17.7
Of which: G-SIIs	2.1	3.5	0.6	0.0	4.0	3.1	6.2	-0.2	6.3	25.7	-0.1	25.6
Group 2	4.4	3.3	0.0	0.0	0.4	1.5	2.3	0.0	1.9	13.8	-2.7	11.1

Source: EBA Quantitative Impact Study (QIS) data (December 2019), sample: 106 banks

Based on the constant sample of 87 banks that have been consistently submitting data from December 2018 to December 2019, and applying the latest methodology (as of December 2019), **the results show that the impact in December 2019 is slightly reduced compared with the previous references dates**. The impact on total T1 MRC shows minor variations across time, (16.8% in December 2018, 16.9% in June 2019 and 16.1% in December 2019). The reporting of less granular data in the December 2018 exercise necessitated the estimation of the impact after making some operational assumptions for the estimation of some missing data. If originally submitted data for the three banks that reported overly conservative market risk numbers are included throughout the available reference dates, there is an 18.8% increase in T1 MRC in December 2018, compared with

[7] See Annex (section 10.1.6) for more details on the interpretation of the impact of the LR.

[8] Rounded to the first decimal point.

[9] Rounded to the first decimal point.

the 17.4% increase in December 2019.

Compared with the current fully phased-in CRR/CRD IV rules, under Basel III full implementation the T1 capital shortfall increases for all banks, but particularly for G-SIIs (Table 2). All types of capital shortfalls in this report are computed vis-à-vis Pillar 1 capital requirements only (including the capital conservation buffer (CCB) and the capital buffer for G-SIIs). Calculated in this way, the total shortfall due to the implementation of the final Basel III minimum CET1-required capital is EUR 4.6 billion (of which EUR 3.1 billion is attributed to G-SIIs). The T1 capital shortfall due to the risk-based capital requirements is approximately EUR 9.4 billion, while there is a small additional T1 shortfall, from the implementation of the revised LR framework, of EUR 0.2 billion (on top of the risk-based capital requirements). Note that, even if the three G-SIIs that reported overly conservative market risk numbers are included, the shortfall will not change in December 2019. The analysis showed that the application of the conservative estimation scenario does not produce any additional capital shortfall for any capital categories; thus, the shortfalls coincide under both scenarios in Table 2.

Table 2: Shortfall of current available capital, due to the full implementation of CRR/CRD IV and Basel III (2028) (EUR billion), reduced estimation bias and conservative estimation scenarios

Bank group	Capital shortfalls — CRR/CRD IV (fully phased in)			Capital shortfalls — Basel III framework (2028)		
	CET1	Risk-based T1	Additional LR T1	CET1	Risk-based T1	Additional LR T1
All banks	0.0	0.2	0.9	4.6	9.4	0.2
Group 1	0.0	0.0	0.0	3.1	7.1	0.0
Of which: G-SIIs	0.0	0.0	0.0	3.1	7.1	0.0
Group 2	0.0	0.2	0.9	1.5	2.3	0.2

Source: EBA QIS data (December 2019), sample: 106 banks

When considering the entire sample of banks, the risk-based capital ratios, namely the CET1, T1 and total capital ratios, decline by 240, 260 and 290 basis points, respectively, following the implementation of the reform (Table 3). The LR is slightly higher under the current regime (CRR/CRD IV), than under the revised (final Basel III) framework (5.4% vs 5.3%, respectively), when the entire sample is considered. The decline in risk-based ratios is slightly larger for Group 1 banks than for Group 2 banks.

Table 3: Capital ratios: fully phased-in CRR/CRD IV and final Basel III framework (2028) (weighed averages, in %)

Bank group	Capital ratios — CRR/CRD IV (fully phased in)				Capital ratios — Basel III framework (2028)			
	CET1	T1	Total capital	LR	CET1	T1	Total capital	LR
All banks	14.6	15.7	18.2	5.4	12.2	13.1	15.3	5.3
Group 1	14.5	15.7	18.2	5.4	12.0	13.0	15.2	5.3
Of which: G-SIIs	13.6	14.7	17.1	4.9	11.0	11.9	13.9	4.7
Group 2	15.1	15.8	17.9	5.7	13.0	13.7	15.5	5.6

Source: EBA QIS data (December 2019), sample: 106 banks

Net stable funding ratio (NSFR) impact

In addition to the estimation of the impact of the implementation of the Basel III reforms, as finalised in December 2017, the current monitoring exercise report also assesses the impact of implementing the net stable funding ratio (NSFR) framework. The results show that, in December 2019, EU banks required additional stable funding of EUR 24.3 billion to fulfil the minimum NSFR

requirement of 100% (see Table 166). Compared with the June 2019 exercise, the shortfall of stable funding decreased by EUR 9.4 billion. The improvement is mainly attributable to Group 1 banks (EUR 16.4 billion vs EUR 29.3 billion in previous report), which compensate for a slight worsening for Group 2 banks (EUR 8 billion vs EUR 4.3 billion).

Taking a longer-term perspective, for the constant sample of banks over time, it can be observed that the compliance with the NSFR has steadily improved since the start of the monitoring exercise in June 2011. This is reflected in the reduction in the banks' shortfall of stable funding, i.e. the type of funding that counts for the minimum requirement. Indeed, between June 2011 and December 2019 this shortfall decreased by 99.7% (from EUR 924 billion to EUR 2.9 billion) for Group 1 banks and by 100% (from EUR 155 billion to zero) for Group 2 banks based on constant samples.

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 IRB approach[10], the standardised approach to credit risk (SA)[11] and the standardised approach to operational risk[12], as well as the revisions to the Basel III LR framework[13], securitisation[14] and counterparty credit risk frameworks[14]. In addition, it includes the impact of the FRTB[15] agreed in 2019 and the CVA, as well as changes resulting from the revised securitisation framework[16].

1.1 Data and sampling

The data submitted for the cumulative impact assessment, as of December 2019, cover a total of 114 banks from 18 European Economic Area countries, including 40 Group 1 and 74 Group 2 banks. Only banks that submitted data for at least one of (a) the credit risk components (IRB or SA), (b) the operational risk and (c) the LR were included in the sample for the cumulative analysis. Based on these criteria and following data cleansing, 106 banks were finally included in the cumulative results of the point-in-time analysis for December 2019: 40 Group 1 banks and 66 Group 2 banks (see Table 4).

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

[10] 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;* BCBS (2019), *Explanatory note on the minimum capital for market risk.*

[11] 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*.

[12] 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*.

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

[14] See BCBS (2019), *CRE – Calculation of RWA for credit risk*, available at: https://www.bis.org/basel_framework/standard/CRE.htm

[15] See BCBS (2016), *Minimum capital requirements for market risk: Standards*; BCBS (2019), Explanatory note on the minimum capital for market risk.

[16] See BCBS (2016), *Basel III document: Revisions to the securitisation framework, amended to include the alternative capital treatment for 'simple, transparent and comparable' securitisations*, available at: 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*, available at: www.bis.org/bcbs/publ/d332.htm

Table 4: Number of banks included in the cumulative analysis, per country

	Included	Included					
Country (1)	**Cumulative analysis of the impact on MRC (2)**	Credit risk	Market risk	CVA	OpRisk	LR	NSFR
AT	5	5	1	3	5	5	3
BE	4	4	2	4	4	4	4
DE	26	26	5	15	27	27	26
DK	4	4	4	3	4	4	3
ES	7	7	4	4	7	7	7
FI	1	1	1	1	1	1	1
FR	7	7	2	2	7	7	7
GR	4	4	4	3	4	4	4
HU	1	1	1	0	1	1	1
IE	10	10	5	7	10	10	10
IT	10	11	5	8	11	12	12
LU	2	2	2	1	2	2	2
MT	1	1	0	0	1	1	1
NL	8	8	2	6	8	8	8
NO	2	2	1	1	2	2	2
PL	4	4	1	2	4	4	4
PT	4	4	1	1	4	4	3
SE	6	6	3	5	6	6	6
All banks	106	107	44	66	108	109	104
Group 1	40	40	25	30	40	40	39
Of which: G-SIIs	8	8	4	5	8	8	8
Group 2	66	67	19	36	68	69	65

Source: EBA QIS data (December 2019)

1.2 Methodology for impact estimation

General methodological remarks

- **The methodology predominantly assesses the impact in terms of Pillar 1 T1 minimum required capital (T1 MRC).** The T1 MRC in this report includes the CCB and the capital buffer for G-SIIs, where applicable. It does not incorporate any Pillar 2 requirements, nor does it consider any higher loss absorbency requirements for O-SIIs and countercyclical capital buffer requirements. This methodology is in line with the approach followed by the BCBS Basel III quantitative impact study for the global banking system. For details on the methodology, see Annex.
- **The T1 MRC includes both risk-based capital requirements and LR capital requirement.** The methodology assumes compliance with the higher of the risk-based capital requirements (i.e. those based on RWA, including the effect of the output floor) and the LR requirement, under the CRR/CRD IV and Basel III frameworks (both fully phased in).

- **The impact on T1 MRC is the ratio of the difference between the Basel III and CRR/CRD IV Pillar 1 T1 MRC and the CRR/CRD IV Pillar 1 T1 MRC.**
- **The impact assessment assumes a static balance sheet approach**, i.e. it does not consider any scheduled measures that banks might undertake to comply with the revised framework between December 2019 and the Basel III full implementation date.
- **The impact assessment methodology disentangles, where data allows, the impact of IFRS 9 from the pure impact of the Basel III package.**
- **The estimated results are weighted averages, unless stated otherwise.**
- **The monitoring exercise reports from December 2018 to December 2019 assess the impact of the January 2019 FRTB framework.**
- **The sample of the point-in-time analysis (December 2019 reference date only) consists of 106 banks, while the sample of the time series analysis (December 2018 to December 2019) consists of 87 banks, to allow comparisons over time of a constant sample.**
- **Where applicable in the report, the estimation of the T1 MRC impact that feeds the time series analyses assumes the application of the most recent rules retroactively, where the granularity and quality of past data allow.**
- **The reduced estimation bias sets the market risk impact to zero for those banks that apply overly conservative standardised approaches (see Executive summary, p.** Error! Bookmark not defined.**, footnote** Error! Bookmark not defined.**), for the estimation of FRTB capital requirements; the conservative estimation uses the originally submitted, but overly conservative, data. The analysis lists both sets of results to provide the reader with an approximation of the difference between the two alternatives**

1.2.1 Minimum required capital and differences with respect to methodology used by the Basel Committee on Banking Supervision

The report presents the impact of the reforms in terms of changes in T1 MRC, comparing the fully implemented revised Basel III requirements with the current fully phased-in CRR/CRD IV requirements. The definition of the current T1 MRC is the higher of the current risk-based T1 MRC and the current LR-based T1 MRC, while the T1 MRC under the Basel III reform scenario is the higher of the revised risk-based T1 MRC and the revised LR-based T1 MRC. The advantage of the MRC measure is that it is common across all jurisdictions and not affected by Pillar 2 capital requirements, which may vary across EU countries and may not be stable over time. Where explicitly indicated, the report provides evidence of the impact on other metrics, such as capital shortfalls of the current actual capital (CET1, T1, total capital) vis-à-vis the CRR/CRD IV MRC metric and final Basel MRC metric.

The current 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'[17] that was applied by some EU jurisdictions, because it ceased to exist in the EU as of 1 January 2018. As to the revised framework, the exercise assumes full implementation (as of 2028) of the output floor calibrated at 72.5% of the standardised approach RWA of the revised framework, while the estimation of the LR-based T1 MRC consists of the existing minimum requirement (3%) plus 50% of the risk-based G-SIIs surcharge[18], where applicable[19]. 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 impact on T1 MRC, when moving from the current to the revised framework and after considering 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 the impact on the risk-based T1 MRC, i.e. without including the impact of the revisions in the revised Basel LR T1 MRC.
- 'Credit risk' shows the impact on T1 MRC assigned to the revisions of the SA and IRB approach for credit risk, as well as the changes arising from the revisions in the securitisation and central counterparties (CCPs).
- 'Market risk' shows the impact on T1 MRC assigned to the revisions to the SA and internal model approach (IMA) for market risk (FRTB).
- 'CVA' shows the impact on 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 impact on 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 (i.e. loss history is considered for all banks except for small banks, with loss materiality threshold of EUR 20 000).
- 'Other P1 RWA' shows the impact on T1 MRC assigned to the revisions from the Basel III framework the directly or indirectly affect the level of Other Pillar 1 RWA.
- 'Output floor' presents the impact on the level of T1 MRC due to the application of the aggregate output floor on the total RWA. The output floor impact is the difference between 72.5% of the total SA-equivalent RWA and the model-based RWA.
- 'Revised LR' shows the impact on LR-based T1 MRC add-ons (i.e. the additional MRC on top of the risk-based MRC) assigned to the implementation of the revised LR framework. A positive change

[17] 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.

[18] 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.

[19] 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

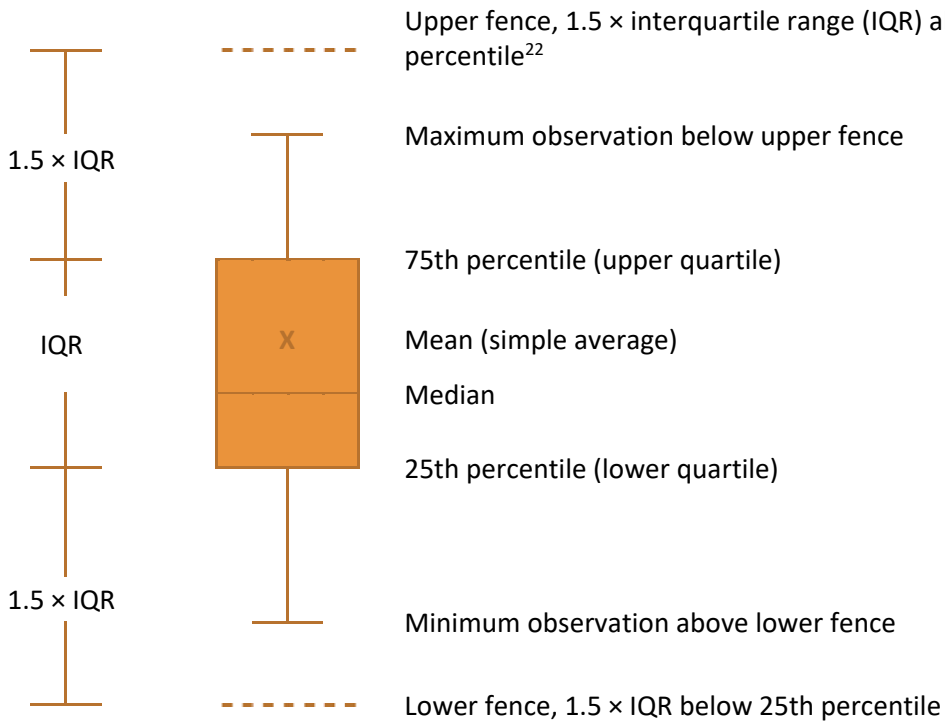
shows that the LR requirement[20] becomes more constraining under the new framework, i.e. the final Basel III LR framework increases the T1 capital add-on in relation to the CRR/CRD IV add-on. A negative change shows that the final Basel III LR T1 add-on becomes less constraining than the CRR/CRD IV 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) also covers Pillar 2 capital requirements, as well as EU-specific macroprudential buffers imposed by the relevant supervisor, the estimated shortfall should, in most cases, be an underestimation of the actual shortfall[21].

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:



[20] Currently, LR requirements are not yet binding in the EU; the proposed CRR2/CRD V will render the LR requirements binding.

[21] In the Basel III CfA report, all the requirements are taken into account and the shortfalls are consequently considerably higher.

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

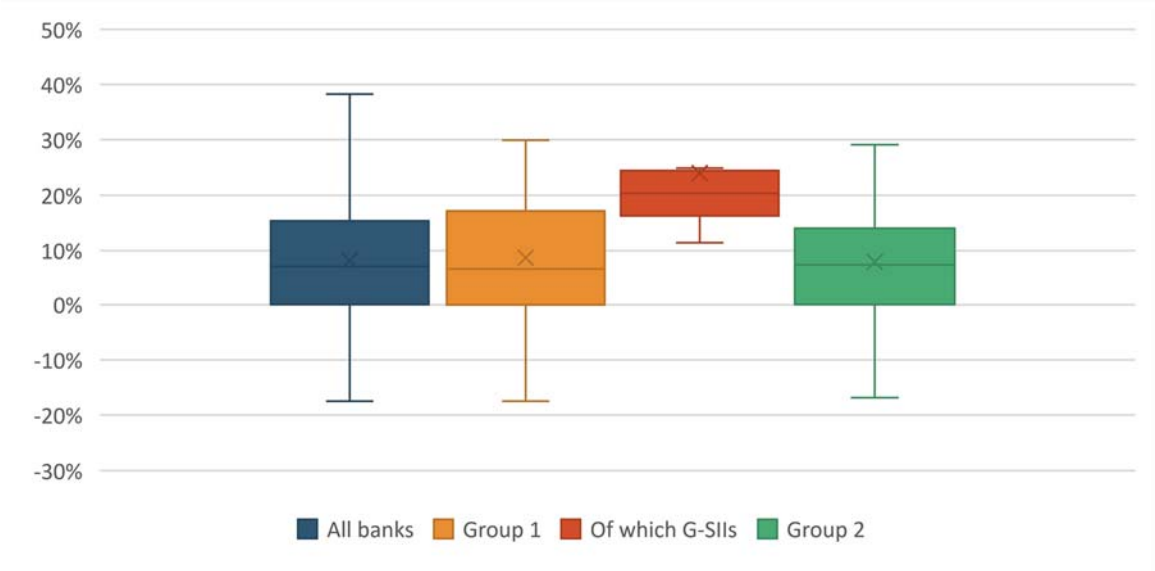
2. Regulatory capital ratios, capital shortfalls and impact on Tier 1 minimum required capital

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 LR framework (section 2.3).

2.1 Cumulative impact analysis of the final Basel III reform: point-in-time analysis (December 2019 only)

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. As mentioned in section 1.2.1, 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 (December 2019), sample: 106 banks

Figure 1: Distribution of changes in total T1 MRC **shows the distribution of T1 MRC across all banks: Group 1 banks (large, internationally active banks), Group 2 banks (other banks), and G-SIIs.** Group 1 and Group 2 banks exhibit median values which are close to their respective averages but are lower. The dispersion of changes in T1 MRC, measured as the IQR, is slightly wider for Group 1 banks than for Group 2 banks.

The weighted average increase in T1 MRC, after including the CCB and G-SIIs surcharge, is 15.4% across all 106 banks in the sample: 16.2% for Group 1 banks and 11.1% for Group 2 banks. Table 5 shows the impact of the Basel reform package, assuming its full implementation. Table 5 presents the baseline estimation ('reduced estimation bias') by setting the market risk impact for three G-SIIs equal to zero, because of the overly conservative assumptions for the reported market risk data, while the alternative estimation ('conservative estimation') is based on the originally reported market risk data. Thus, the difference in the market risk impact of these two alternative estimations (1.7%) results in a respective difference in the total impact on T1 MRC of 1.3% (15.4% for reduced estimation bias vs 16.7% for conservative estimation).

For Group 1 banks, the overall increase in T1 MRC consists of a 16.2% increase in the risk-based components, mainly driven by the 7.0% increase due to output floor implementation, while the new LR requirement offsets the risk-based T1 MRC by 2.9%. This offset reflects the fact that the revised Basel III LR becomes less constraining. Nevertheless, note that this offsetting of LR is overestimated since Pillar 2 requirements, O-SIIs capital requirement and countercyclical capital buffers are disregarded in the risk-based component. For the G-SIIs, the LR requirement does not offset the risk-based MRC, mainly because of the introduction of the G-SIIs surcharge in the estimation of the LR requirement.

For Group 2 banks, the overall 11.1% increase in T1 MRC is driven by the 13.8% increase in the risk-based measure, which is mainly driven by an increase of 7.7% due to the credit risk revisions and an increase of 2.3% due to the operational risk revision. This increase is offset by a 2.7% reduction in the LR 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 (2028) (weighted averages, in %)

Part 1: Reduced estimation bias

Bank group	Credit risk				Market Risk	CVA	Op Risk	Other Pillar 1	Output floor	Total risk-based	Revised LR	Total
	SA	IRB	Securitisation	CCPs								
All banks	2.2	2.4	0.4	0.0	0.6	3.0	3.8	-0.3	6.2	18.3	-2.8	15.4
Group 1	1.9	2.2	0.4	0.0	0.7	3.2	4.1	-0.4	7.0	19.1	-2.9	16.2
Of which: G-SIIs	2.1	3.5	0.6	0.0	0.5	3.1	6.2	-0.2	6.8	22.6	0.4	23.0
Group 2	4.4	3.3	0.0	0.0	0.4	1.5	2.3	0.0	1.9	13.8	-2.7	11.1

Part 2: Conservative estimation

Bank group	Credit risk				Market Risk	CVA	Op Risk	Other Pillar 1	Output floor	Total risk-based	Revised LR	Total
	SA	IRB	Securitisation	CCPs								
All banks	2.2	2.4	0.4	0.0	2.3	3.0	3.8	-0.3	6.0	19.7	-3.1	16.7
Group 1	1.9	2.2	0.4	0.0	2.6	3.2	4.1	-0.4	6.7	20.8	-3.1	17.7
Of which: G-SIIs	2.1	3.5	0.6	0.0	4.0	3.1	6.2	-0.2	6.3	25.7	-0.1	25.6

Bank group	Credit risk				Market Risk	CVA	Op Risk	Other Pillar 1	Output floor	Total risk-based	Revised LR	Total
Group 2	4.4	3.3	0.0	0.0	0.4	1.5	2.3	0.0	1.9	13.8	-2.7	11.1

Source: EBA QIS data (December 2019), sample: 106 banks

When looking at the entire sample, the final Basel III CVA risk capital charge contributes with 3.0% in the total impact when compared with the CRR/CRD IV framework. The significant CVA impact is primarily attributed to the removal of the European 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. The removal of the possibility to model CVA (replaced by the SA) also contributes to the CVA impact.

2.2 Evolution of the cumulative impact analysis of the final Basel III reform (December 2018 to December 2019)

Based on the constant sample of banks (87 banks), i.e. those which have been consistently submitting data from December 2018 to December 2019, and after applying the latest methodology (December 2019) for assessing the impact of the Basel III reforms, the impact on the total T1 MRC shows insignificant variations (see Table 6). The nature of the collected data did not allow the consistent application of methodologies for credit risk. The market risk impact remains stable when looking at the "reduced-bias estimation" (0.6% apiece) and increases from 2.3% in December 2018 to 2.8% in December 2019 when looking at the conservative estimation. The total credit risk impact slightly decreased from 5.6% in December 2018 to 5.4% in December 2019, while it reached its lower level in June 2019 (5.3%). Moreover, the methodology for estimating the impact for the constant sample made some additional operational assumptions to cope with the reporting of less granular or missing data in previous exercises.

Table 6: Changes in T1 MRC, using the December 2019 methodology for all reference dates for a constant sample of banks, due to the implementation of the final Basel III framework (2028) (weighted averages, in %)

Part 1: Reduced estimation bias

Reference date	Credit risk	Market risk	CVA [23]	OpRisk	Other Pillar 1	Output floor	Total risk-based	Revised LR	Total
31.12.2018	5.6	0.6	3.5	3.9	-0.2	5.9	19.3	-2.5	16.8
30.06.2019	5.3	0.5	3.9	3.7	-0.3	6.8	19.9	-3.0	16.9
31.12.2019	5.4	0.6	2.8	4.0	-0.3	6.0	18.4	-2.3	16.1

Part 2: Conservative estimation

Reference date	Credit risk	Market risk	CVA	OpRisk	Other Pillar 1	Output floor	Total risk-based	Revised LR	Total
31.12.2018	5.6	2.8	3.5	3.9	-0.2	5.8	21.3	-2.5	18.8
30.06.2019	5.3	2.0	3.9	3.7	-0.3	6.8	21.4	-3.2	18.2
31.12.2019	5.4	2.3	2.8	4.0	-0.3	5.8	20.0	-2.6	17.4

Source: EBA QIS data (December 2019), sample: 87 banks

[23] The drop in the CVA impact in December 2019 (~-1.1% compared with June 2019) is predominantly (~69% of the total reduction) attributed to the exclusion of few large banks, from the specific risk category, due to insufficient data submissions. The remaining part of the drop (~31% of the total reduction) is considered as a natural consequence of banks' adjustments in CVA exposures that result in enhanced compliance with the full Basel III framework.

2.3 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.

2.3.1 Capital ratios

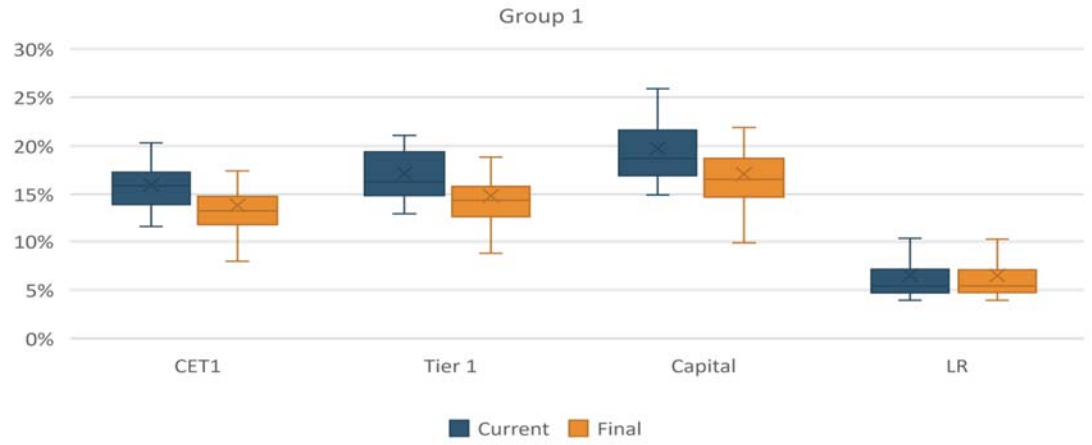
Table 7 shows the results of the calculations for CET1, T1 and total capital ratios and the LR. For the latter, it is assumed that the actual capital measure under the final Basel III remains unchanged from CRR/CRD IV and that the impact on the LR is therefore entirely attributed to changes in the LR exposures.

Table 7: Comparison of risk-based capital ratios and LRs under different states of implementation (weighted averages, in %)

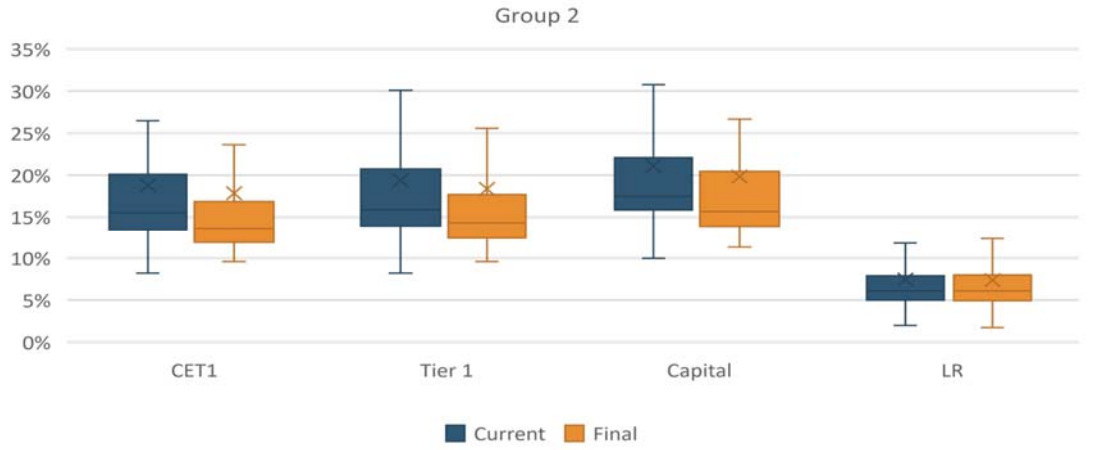
Bank group	CET1			T1			Total capital			LR	
	Fully phased-in CRR/CRD IV	Transitional Basel III (2022)[24]	Final Basel III (2028)	Fully phased-in CRR/CRD IV	Transitional Basel III (2022)	Final Basel III (2028)	Fully phased-in CRR/CRD IV	Transitional Basel III (2022)	Final Basel III (2028)	Fully phased-in CRR/CRD IV	Final Basel III (2028)
All banks	14.6	12.9	12.2	15.7	13.9	13.1	18.2	16.2	15.3	5.4	5.3
Group 1	14.5	12.8	12.0	15.7	13.9	13.0	18.2	16.2	15.2	5.4	5.3
Of which: G-SIIs	13.6	11.7	11.0	14.7	12.6	11.9	17.1	14.8	13.9	4.9	4.7
Group 2	15.1	13.3	13.0	15.8	13.9	13.7	17.9	15.8	15.5	5.7	5.6

Source: EBA QIS data (December 2019), sample: 106 banks

Figure 2: Distribution of capital ratios under CRR/CRD IV versus fully phased-in final Basel III framework



[24] 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.



;

Note: the mean value (X) is the simple average. Source: EBA QIS data (December 2019), sample: 106 banks

The average impact on capital ratios is broadly similar across all bank categories. However, the dispersion across the different types of capital ratios is clearly wider for Group 2 banks both before and after the introduction of the reform (Figure 2). Looking at the impact of the reform on distributions, the dispersion of CET1 ratios remains almost unchanged, showing almost the same width between the current CRR/CRD IV and Basel III. On the other hand, the dispersion of T1 and total capital ratios becomes narrower under the Basel III framework. The dispersion of LR remains almost unchanged.

2.3.2 Capital shortfalls

The capital shortfall compares the actual level of capital (CET1, Tier 1 and total capital) in December 2019 with the fully implemented MRC, after taking into account the CCB and G-SIIs surcharge, where applicable[25]. The capital shortfalls under the current fully phased-in CRR/CRD IV are negligible and could be attributed to inaccuracies in the submitted data.

The combined[26] T1 capital shortfall that emerges under the full implementation of the Basel III is mainly driven by G-SIIs. The estimated T1 capital shortfall is EUR 9.6 billion for all banks, of which an amount of EUR 7.1 billion is assigned to Group 1 banks, all belonging to the subset of G-SIIs, and EUR 2.5 billion to Group 2 banks (Table 8).

Table 8: Capital shortfalls by bank group under full implementation of CRR/CRD IV (upper part) and final Basel III (lower part) (EUR billion)

Full implementation of CRR/CRD IV

Bank group	CET1	T1	Total capital

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

[26] Assuming joint implementation of the risk-based and LR requirements.

Full implementation of CRR/CRD IV

		Risk-based[27]	Stand-alone LR-based	Risk-based and LR-based T1[28]	Risk-based[29]	Risk-based total capital and LR-based T1[30]
All banks	0.0	0.2	0.9	1.2	0.0	1.0
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	0.2	0.9	1.2	0.0	1.0

Full implementation of Basel III

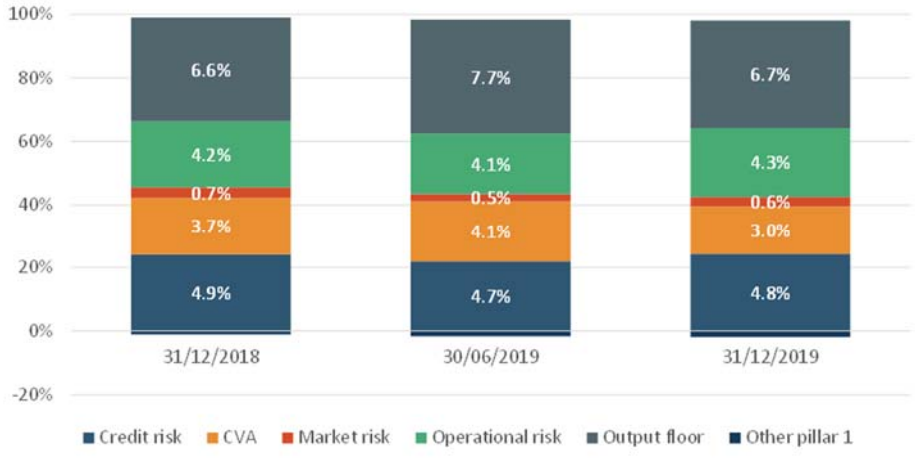
		T1			Total capital	
Bank group	**CET1**	**Risk-based**	**Stand-alone LR-based**	**Risk-based and LR-based T1**	**Risk-based**	**Risk-based total capital and LR-based T1**
All banks	4.6	9.4	1.3	9.6	14.9	15.1
Group 1	3.1	7.1	0.0	7.1	12.0	12.0
Of which: G-SIIs	3.1	7.1	0.0	7.1	12.0	12.0
Group 2	1.5	2.3	1.3	2.5	2.9	3.1

Note: upper part, full implementation of CRR/CRD IV; lower part, full implementation of final Basel III.
Source: EBA QIS data (December 2019), sample 106 banks

The final Basel III revisions to the risk-based capital requirements result in a CET1 capital shortfall of EUR 4.6 billion. For T1 risk-based requirements, this shortfall increases by more than two-fold to EUR 9.4 billion. The stand-alone LR-based T1 MRC is EUR 1.3 billion. The application of both risk-based and LR-based requirements increases the T1 capital shortfall further to EUR 9.6 billion, implying a marginal contribution of the LR-based requirement by EUR 0.2 billion.

2.3.3 Risk category participation in the risk-based T1 MRC over time

Figure 3: Evolution of the composition of T1 MRC by risk category under full implementation of the revised Basel III framework over time (from December 2018 to December 2019), for Group 1 and Group 2 – reduced estimation for market risk

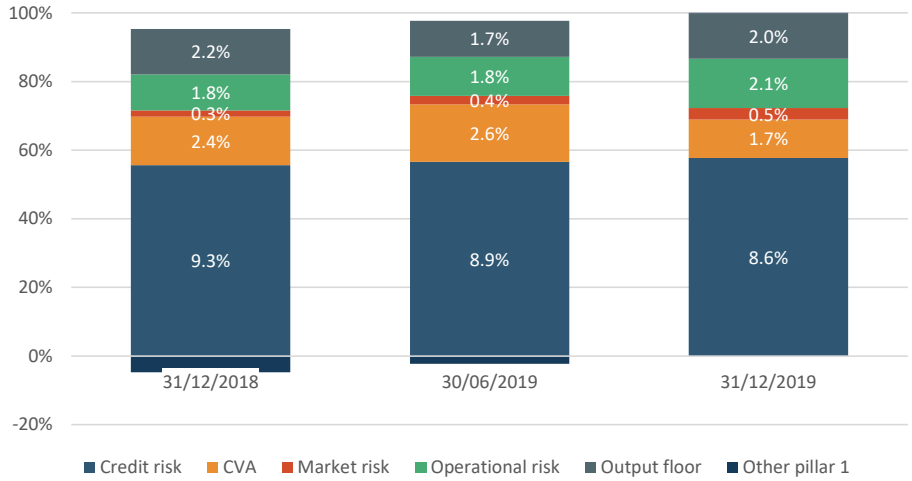


[27] 8.5% (= minimum T1 (6%) + capital conservation buffer (2.5%)).

[28] The results presented in this column are estimated as follows: $\sum \max(LR\_based\_MRC - Risk\_based\_MRC, 0)$.

[29] Assuming compliance with the risk-based capital ratio requirements only.

[30] Assuming compliance with both the risk-based capital ratio and LR requirements.



Source: EBA QIS data (December 2019), constant sample: 87 banks

The full implementation of the Basel III reforms implies an increase in the minimum required capital across all risk categories of the risk-based T1 MRC. However, compared with the prior to December 2017 Basel III package (not shown), the implementation of the output floor changes the relative contributions of all other factors. The contribution of the output floor for Group 1 banks in December 2019 remains roughly the same compared with the December 2018 exercise, while the output floor contribution for Group 2 banks is reduced. Figure 3 exhibits the composition of MRC by risk category from December 2018 to December 2019[31].

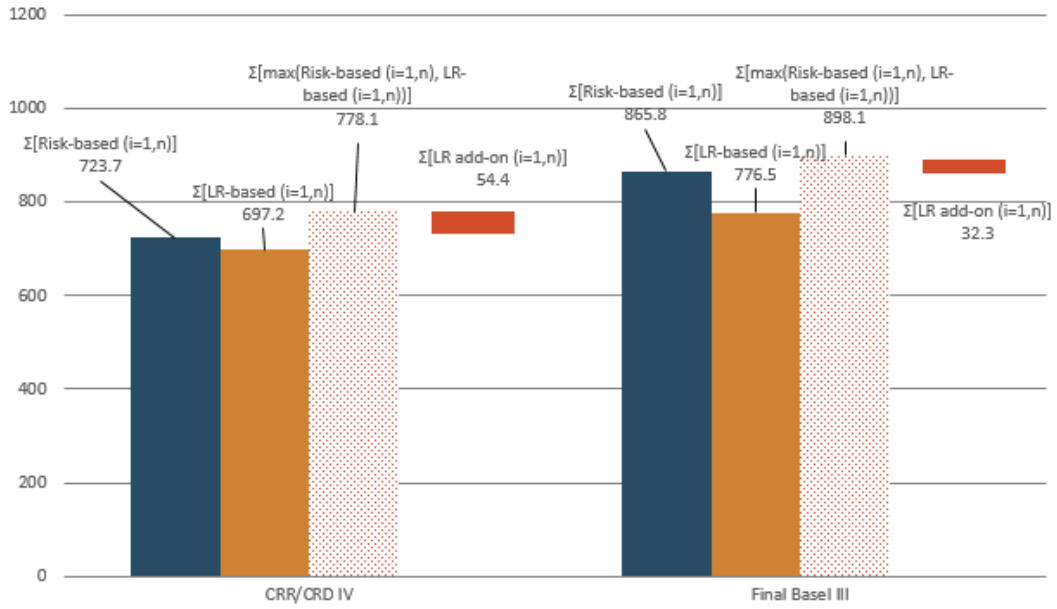
2.4 Interactions between risk-based and leverage ratio capital requirements

This section focuses on analysing whether the Basel III framework renders the LR requirements more or less constraining relative to the CRR/CRD IV requirements. It is notable that the contribution of LR is overestimated since Pillar 2 requirements, O-SIIs capital requirement and countercyclical capital buffers, which would increase risk-based requirements without impacting LR, are disregarded. Figure 4 presents the mechanics for the estimation of the LR impact. Details of the computation can be found in the Annex (section 10.1.6).

The aggregate T1 MRC, consisting of the combined risk-based and LR-based requirements, increases from EUR 778.1 billion under CRR/CRD IV to EUR 898.1 billion under the final Basel III (an increase of 15.4%, see Table 1). The stand-alone risk-based MRC for all banks under the CRR/CRD IV is EUR 723.7 billion, while the stand-alone LR-based MRC is EUR 697.2 billion. The respective values under the final Basel III framework are EUR 865.8 billion and EUR 776.5 billion. The total LR requirement add-on, estimated at the individual bank level, decreases from EUR 54.4 billion under CRR/CRD IV to EUR 32.3 billion under the final Basel III framework.

[31] The constant sample shown in Figure 3 is consistently different, i.e. for all reference dates, compared with the respective figure shown in the previous report (reference date: June 2019) as the current report does not include UK banks.

Figure 4: The mechanics of the calculation of actual LR MRC impact, T1 MRC (EUR billion)



Source: EBA QIS data (December 2019), sample 106 banks

$\sum[\boldsymbol{Risk-based}\ (\boldsymbol{i=1,n})]$, *the aggregate risk-based T1 MRC;*
$\sum[\boldsymbol{LR-based}\ (\boldsymbol{i=1,n})]$, *the aggregate LR-based T1 MRC;*
$\sum[\boldsymbol{max(Risk-based}\ (\boldsymbol{i=1,n}), \boldsymbol{LR-based}(\boldsymbol{i=1,n})]$, *the aggregate total T1 MRC, which ensures compliance, at individual bank level, with both risk-based and LR requirements;*
$\sum[\boldsymbol{LR\ add-on}\ (\boldsymbol{i=1,n})]$, *the aggregate amount of LR add-ons, i.e. the sum of the differences where the LR-based T1 MRC is higher than the risk-based T1 MRC*

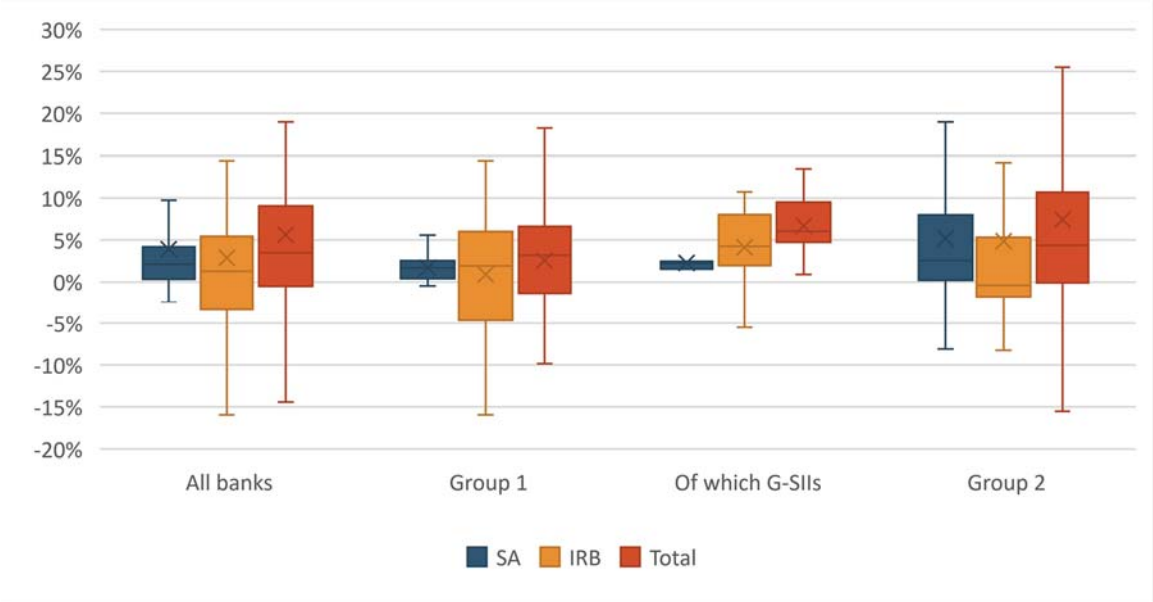
The comparison between the CRR/CRD IV and the final Basel III frameworks therefore indicates that the LR requirement becomes less constraining under the final Basel III framework. This means that part of the additional MRC that was previously attributed to the LR will in the future be attributed to the risk-based Basel III MRC. In percentage terms, this change corresponds to the LR impact of -2.8% shown in Table 1 and Table 5.

3. Credit risk

This section assesses the impact of the Basel III reforms that is 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 approaches. In particular, the final reforms (1) introduce new asset classes, or split the existing asset classes, and (2) revise the eligibility and/or the scope of using the IRB approach for some asset classes[32]. Because of these changes, a direct comparison between the proposed and current frameworks is not possible. Therefore, the estimated impact is an approximation.

The analysis suffered from some data quality issues, arising mainly from difficulties in allocating portfolios according to the revised categorisation of the asset classes as well as from different interpretations of the revised framework. The outcome of data cleansing showed that banks opted to be conservative when providing data for the revised framework, suggesting that the impact shown in this report could be an overestimation of the actual impact. 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 throughout that the loan-splitting approach is adopted[33].

Figure 5: Changes in T1 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 (December 2019), sample: 107 banks

The median impact over all portfolios, i.e. SA and IRB approach portfolios, which is attributed to credit risk only, is approximately 3.5% of the current T1 MRC. Figure 5 shows the distribution of

[32] For more information, please refer to https://www.bis.org/bcbs/publ/d424.htm

[33] Nevertheless, few banks reported data under the whole-loan approach.

changes in T1 MRC assigned to the revisions of the SA and the IRB approaches for credit risk. The median impact for SA portfolios is 2.1% and for IRB portfolios is 1.3%.

For equity exposures currently under the SA, the increase in RWA reflects the rise of the risk weight on 'equity investments in funds', from 100% in the current European framework to 1 250% in the reform scenario of the Basel framework, implemented in the EU through CRR2 entering into application in 2021. Another factor is the increase in the risk weight of 'other equity' from 100% in the current framework (with higher risk weights if specific conditions apply) to 250% in the revised framework within the 'other equity' sub-category. The newly created sub-categories 'speculative equity' (risk weight 400%) and 'equity under national legislated programmes' (risk weight 100%) represent jointly a minor share of the EU equity portfolio under the SA (below 5% in terms of exposure amounts).

The equity exposures currently under IRB are also subject to a material increase in RWA, mainly because the Basel III framework introduces a 1 250% risk weight treatment in cases where information on the fund's underlying assets is not available, whereas in the EU framework a lower risk weight applies. In the opposite direction, the removal of the IRB approach for exposures to 'equity' (i.e. the migration to SA) may cause the RWAs for this exposure class to decrease. The risk weight for 'equity' exposures is expected to decrease to 250%, under the revised SA framework, from the current prevailing risk weight of 370%, under the simple risk weight approach.

4. Fundamental review of the trading book

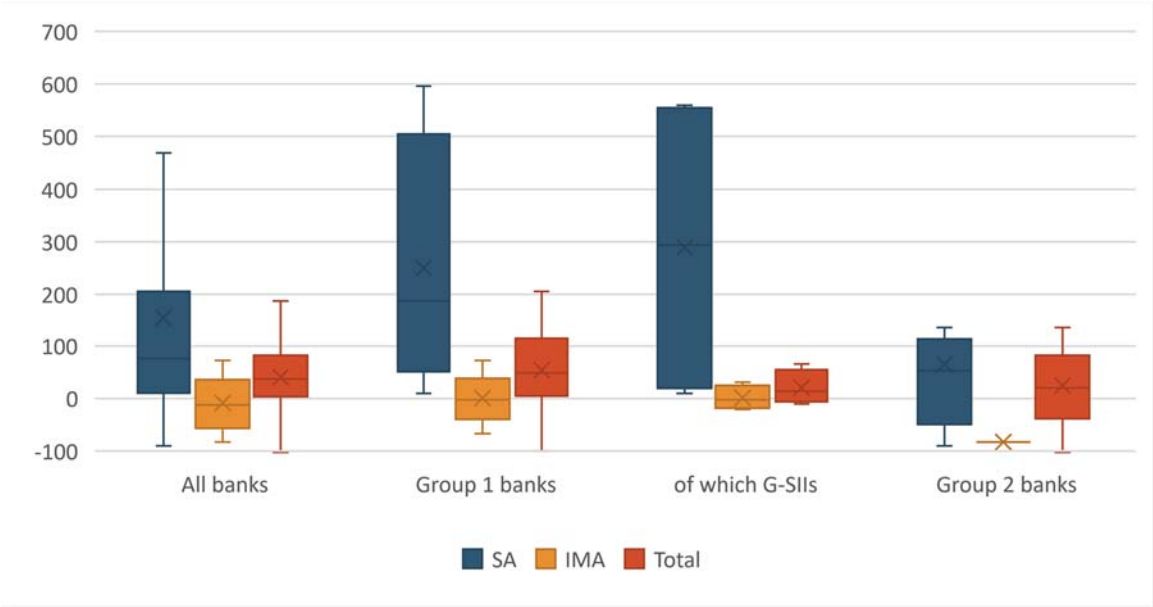
This section assesses the impact – *ceteris paribus* – of the January 2019[34] BCBS reforms related to the capital requirements for market risk. As in other sections, data quality checks revealed some issues and limitations in the information submitted by banks, and the findings should therefore be interpreted with caution. In particular, some outliers affect the summary results, pushing the average values beyond the median values across the majority of risk categories and bank groups. Note that, although the reported figures include the impact of the outliers, they have been eliminated from the graphical presentation in Figure 6.

Figure 6 shows the impact of the revised market risk standards on total MRC assigned to market risk. The average impact of the FRTB reform for all banks is 40.8% of current market risk MRC, with an IQR that spans from approximately 4.2% to 82%. The range of changes is slightly higher for Group 1 banks but significantly lower for G-SIIs given that the impact was assumed to be zero for three G-SIIs (see background in the executive summary). For Group 2 banks, there is a range of impacts that is similar to Group 1.

With regard to the individual approaches to measuring market risk, the distribution of the impact, as represented by the IQR, is much wider under the SA than under the IMA. For the SA, the IQR spans from approximately 25.6% to 196.6%, with a weighted average impact of approximately 154%. Figure 7 shows the proportions of market risk capital requirements that are attributable to the approaches under the current rules and under the revised standards.

Figure 6: Change of market risk capital requirements after FRTB implementation, without floor, broken down by approach and bank group (in % of market risk MRC)

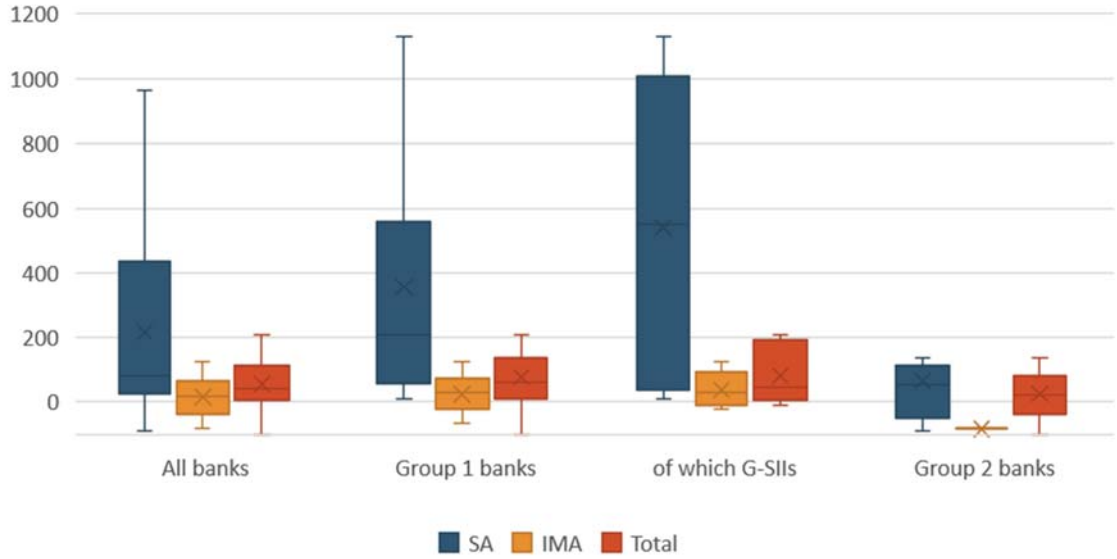
Part 1: Reduced estimation bias



[34] https://www.bis.org/bcbs/publ/d457.htm

Note: the mean value (X) is the simple average. Source: EBA QIS data (December 2019), sample 44 banks

Part 2: Conservative estimation

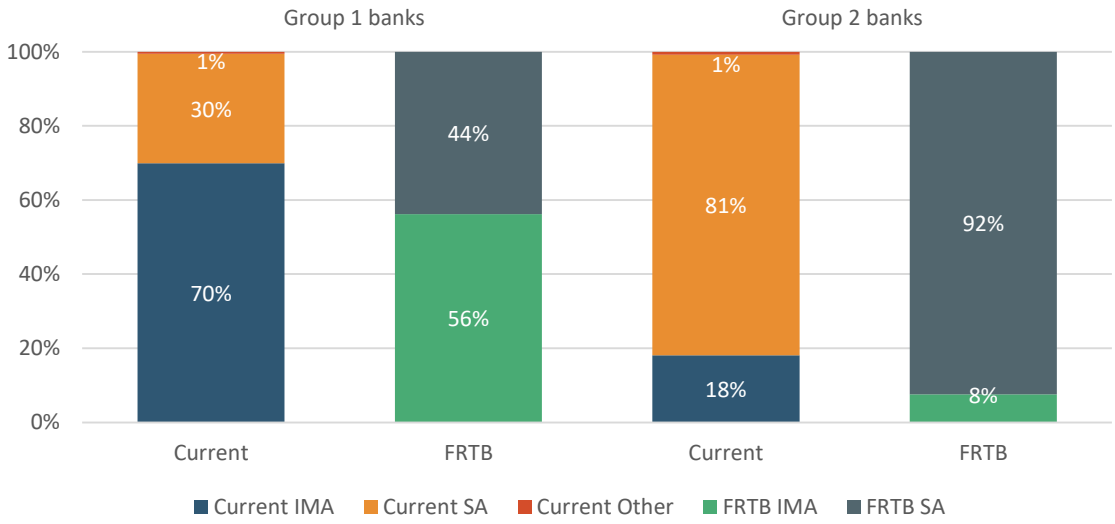


Note: the mean value (X) is the simple average. Source: EBA QIS data (December 2019), sample 44 banks

For Group 1 banks, the key driver under the current rules is the IMA (70%), followed by the SA (30%), while other market risk capital requirements are negligible (< 1%). Under the revised rules, the proportion of minimum capital requirements calculated under IMA decreases to 56% while the SA proportion increases to 44%. In contrast, Group 2 banks currently have most of their minimum capital requirements computed under the SA (81%), with just 18% under the IMA. Under the revised rules, the SA makes up almost the entire minimum capital requirement (92%), with the IMA making up 8%.

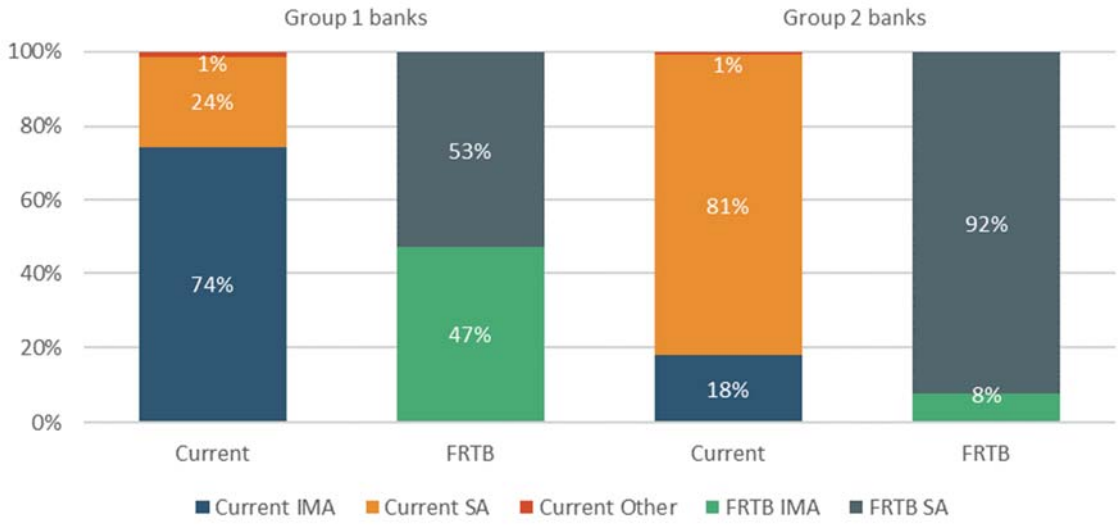
Figure 7: Contribution to the total market risk RWAs by each calculation method before and after FRTB

Part 1: Reduced estimation bias



Source: EBA QIS data (December 2019), sample: 44 banks

Part 2: Conservative estimation



Source: EBA QIS data (December 2019), sample: 44 banks

5. Operational risk

As regards operational risk, the final Basel III framework replaces all existing approaches, including the model-driven advanced measurement approach (AMA), with a new approach, the standardised measurement approach (SMA). Under the new operational risk framework, banks can use only the SMA. Small banks will have to calculate the MRC based only on the business indicator component (BIC), while large banks will also have to calculate the loss component (LC).

According to Table 9, the revisions to the framework generate an aggregate increase in operational risk MRC of approximately 40.9% for Group 1 banks and 28.6% for Group 2 banks. The results show that, on average, the revisions have less effect on Group 1 banks that are migrating from the AMA than on Group 1 banks that are currently using other approaches. However, the average impact on Group 1 non-AMA banks is driven by a couple of outliers. The opposite development can be observed for Group 2 banks; the AMA banks are affected by the new framework more than the non-AMA banks.

When the new operational risk framework was designed, several reasons indicated a higher impact of operational risk on Group 1 than on Group 2. First, from a theoretical perspective, the AMA should have produced lower MRC for OpRisk than the indicator-based approaches. However, banks rarely apply exclusively AMA models at fully consolidated level, which results in the AMA banks applying a mixture of AMA and SA in operational risk, which dilutes the impact of pure AMA. Second, Group 1 banks are mainly large banks with more complex and more fee-driven business models, whereas Group 2 banks tend to provide universal and diversified bank services that do not rely significantly on fees. For the fee-driven business models, the new indicator has been set at more conservative levels to address the higher operational risks that are generally observed for these kinds of business models. Third, the specifications of the revised framework on operational risk designate that large banks belonging to buckets 2 and 3 are also affected by the high marginal coefficients assigned to them (see Annex, section 0). In reality, the large banks applying AMA are also affected by the increased internal loss multiplier (ILM) that is the consequence of higher past losses.

Table 9: Changes in T1 MRC assigned to operational risk only (% of the T1 MRC assigned to operational risk under CRR/CRD IV)

Bank group	Migrating from AMA	Others	Total
All banks	42.2	34.3	39.2
Group 1	42.0	38.6	40.9
Of which: G-SIIs	47.8	83.5	56.2
Group 2	45.8	23.0	28.6

Source: EBA QIS data (December 2019), sample 108 banks

A deeper look into the data shows that, for Group 1 banks, and for G-SIIs in particular, the proportion of operational risk MRC in the total MRC is significantly lower than for Group 2 banks. This is because the business models of the Group 1 banks offer universal services and thus they have relatively homogeneous operational risk characteristics, whereas Group 2 banks follow a variety of business models offering specialised or more diverse kinds of services. Some Group 2 banks are particularly specialised, offering only fee-driven services and no services that would be

exposed to credit or market risk. This makes operational risk the most dominant risk category for them.

Apart from the business model, the use of the AMA approach affects the proportion of operational risk in relation to the total risk. The dominant factor in the operational risk models is the past losses, which tend to drive the risk exposure and therefore the proportion of operational risk. European AMA banks have experienced a wide variety of loss histories in the past 10 years. For example, some of them suffered high past losses due to crystallised conduct risk, which has significantly increased their MRC for the OpRisk category.

The analysis in Table 10 presents the theoretical relationship between the level of past losses and the proportion of OpRisk MRC in the total capital for different types of AMA banks. Type 1 institutions comprises AMA banks with a low proportion of operational risk to total MRC and low past operational losses. These banks show mild capital increases due to the dominant impact of the BIC-driven capital requirements. The low past operational risk losses reduce the LC and, in turn, the ILM, causing the capital requirements (= BIC × ILM) to be the same as or lower than the BIC alone would suggest (see Annex, section 0). 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. Type 3 AMA banks have a high proportion of operational risk and low past losses. This type does not tend to benefit from capital relief because of a dampening effect of BIC and ILM values. Finally, Type 4 AMA banks have a low proportion of operational risk and high past losses. Banks of this type suffer significant capital increases due to the double impact of an increase in both the BIC and the ILM values. The first impact is purely due to the AMA migration to the SA, so that already the BIC increases the MRC. The second impact comes from the fact that the high past operational risk losses increase the LC and, in turn, the ILM, causing the capital requirements (= BIC × ILM) to be even higher than the BIC alone would suggest.

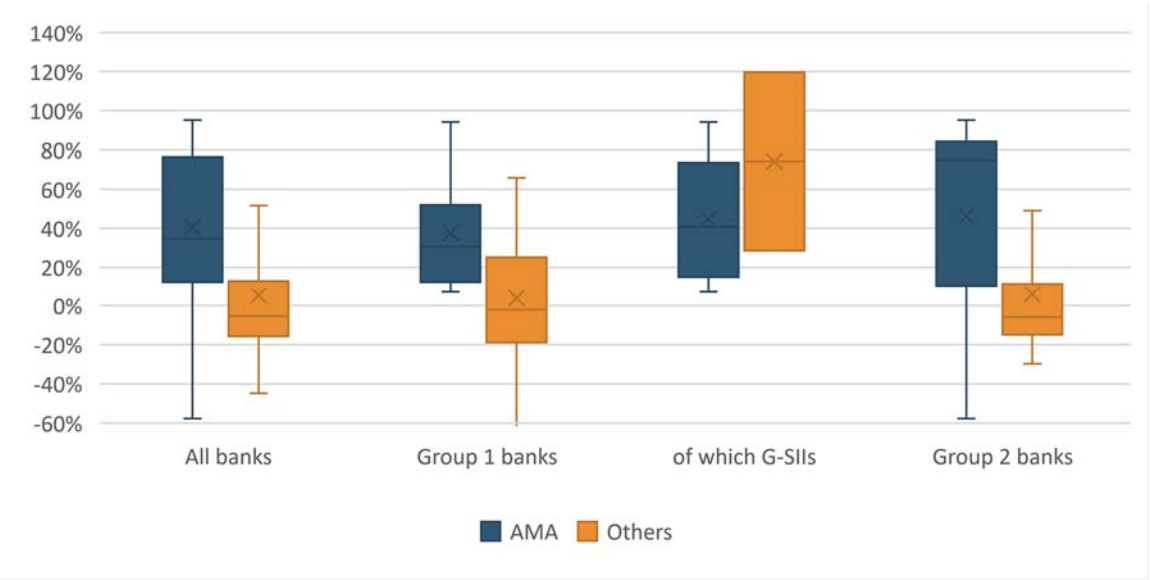
Table 10: Capital impact attributed to certain types of AMA banks

Level of past losses	**Proportion of OpRisk MRC in total MRC**	
	Low	High
Low	Type 1 AMA (normal AMA): • 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): • BIC decreasing impact • LC/ILM decreasing impact → significant reduction in MRC
High	Type 4 AMA (progressive AMA): • BIC increasing impact • LC/ILM increasing impact → significant increase in MRC	Type 2 AMA (normal AMA): • 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 compensate for the dominant effect of the decreasing BIC

The findings in the operational risk section refer only to those banks that belong to the QIS sample. 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 under-represented in the sample. This may create a bias towards a higher overall/average impact. In addition, some of the banks currently have Pillar 2 capital add-ons because of weaknesses in their operational risk management. These add-ons are not considered in the current analysis. As a result, the total impact shown in Table 9 may be an overestimation.

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 changes of the operational risk capital requirements (Figure 8).

Figure 8: Distribution of changes in T1 MRC assigned to operational risk only (in % of operational risk MRC)



Note: the mean value (X) is the simple average. Source: EBA QIS data (December 2019), sample 108 banks

The final Basel III framework provides supervisors with the discretion to set the past-losses threshold at EUR 100 000 and/or to set ILM = 1 for all banks in their jurisdictions. 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 such jurisdictional discretions. To this end, the analysis compares (i) the operational risk capital requirements that arise from the actual calculation of the ILM with (ii) the capital requirements that arise when the discretions to set the loss materiality threshold at EUR 100 000 for bucket 2 and 3 banks[35] and to set ILM = 1 for all banks are exercised.

Table 11 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

[35] *See* BCBS (2017), *Basel III: Finalising post-crisis reforms*, p. 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 [business indicator] is greater than €1 bn)'.

materiality threshold for banks with a business indicator (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 (106 banks), to allow comparisons between the baseline Basel III operational risk framework and the discretions applied.

Table 11: 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 % of total T1 MRC)

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	3.8	3.3	1.6
Group 1	4.1	3.6	1.7
Of which: G-SIIs	6.2	5.6	2.2
Group 2	2.3	1.8	1.0

Source: EBA QIS data (December 2019), sample: 106 banks

6. Output floor

Table 12 shows the evolution of the output floor impact according to the reduced bias estimation scenario. **The gradual elevation of the output floor rate affects the MRC throughout 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 level of the floor, i.e. the percentage of the non-modelled RWA, will gradually increase from 50% in 2023 to the fully phased-in level of 72.5% in 2028. The impact of the output floor on the MRC during the first 2 years of the phase-in period is negligible (0.2% for Group 1 banks and 0.1% for Group 2 banks).

The analysis does not take into account the national discretion to apply a 25% cap during the transitional period. The final Basel III framework provides national discretion to apply, 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% of a bank's incremental increase in RWAs[36]. Thus, the exercise of this discretion may limit the year-to-year incremental increase of the output floor impact to 25%[37]. The application of this discretion (not shown in Table 12) might reduce the impact in some of the years between 2023 and 2027.

Table 12: Cumulative output floor impact during the implementation phase (% of the total CRR/CRD IV T1 MRC)

Bank group	2023 (50%)	2024 (55%)	2025 (60%)	2026 (65%)	2027 (70%)	2028 (72.5%)
All banks	0.0	0.2	0.9	2.2	4.5	6.2
Group 1	0.0	0.2	1.0	2.4	5.1	7.0
Of which: G-SIIs	0.0	0.0	0.8	2.3	4.8	6.8
Group 2	0.1	0.1	0.4	0.8	1.5	1.9

Source: EBA QIS data (December 2019), sample: 106 banks

The highest increase in the output floor impact is observed for Group 1 banks in 2027, where the percentage of the output floor rate increases from 65% (2027) to 70% (2028) and the impact increases by approximately 270 basis points (from 2.4% to 5.1%). However, the highest sensitivity of MRC impact to the introduction of the output floor is observed for G-SIIs in 2028; the impact increases by approximately 80 basis points for each percentage point increase in the output floor rate between 70% and 72.5%[38].

[36] See BCBS (2017), *Basel III: Finalising post-crisis reforms,* p. 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'.

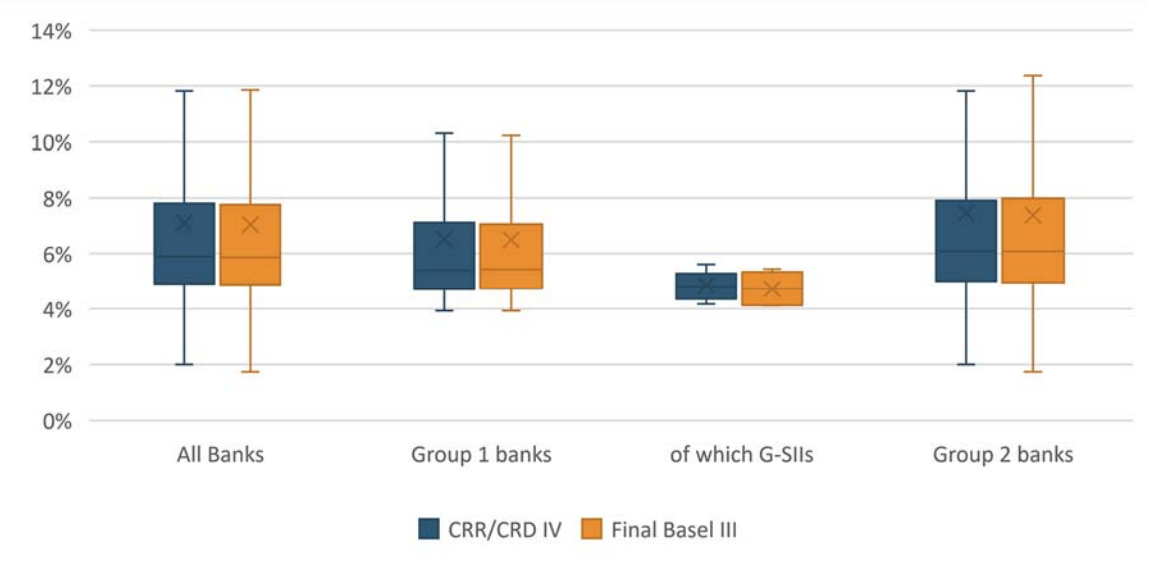
[37] For example, if the application of the output floor on total RWAs results in an impact of EUR 10 billion in 2024 (output floor rate = 55%) and EUR 15 billion in 2025 (output floor rate = 60%), the exercise of the discretion implies that the impact in 2025 may be capped at EUR 12.5 billion (= EUR 10 billion + EUR 10 billion × 25%).

[38] 200 basis points/2.5% = 80 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 requirements[39]. Figure 9 compares the distributions of the LR levels according to the current fully phased-in definition with the final Basel III definition. Results in this section include all banks that submitted LR data that were of sufficiently good quality.

Figure 9: 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 (December 2019), sample: 106 banks

Considered in isolation from the other Basel III risk-based reforms (Table 13), the measure of the leverage ratio exposure (LRE) increases by 1.5% for all banks relative to the current framework. When the 50% of the G-SIIs surcharge is included, the LR T1 MRC rises to 11.4%.

Table 13: Impact of LR, in isolation from the risk-based provisions, due to changes in the definition of leverage ratio exposures (LREs) and changes in the calculation (50% of G-SIIs surcharge) of the LR T1 MRC (%)

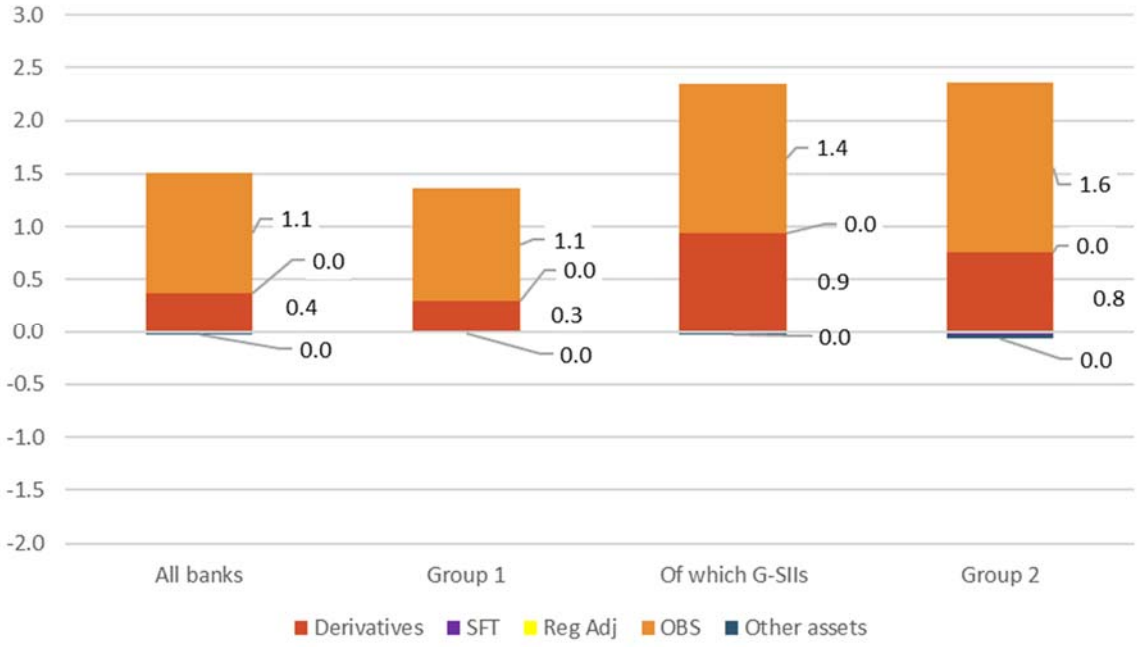
Bank group	Impact due to changes in the definition of LRE only	Impact due to the definition of LRE and inclusion of 50% of G-SIIs surcharge
All banks	1.5	11.4
Group 1	1.3	12.9
Of which: G-SIIs	2.3	22.4
Group 2	2.3	2.8

Source: EBA QIS data (December 2019), sample: 106 banks

[39] The amendments to the current Basel III LR exposure measure, agreed by the BCBS, that are 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.

The implementation of the final Basel reforms will imply only negligible changes in the average LR for all bank categories considered. The comparison of LR levels between the current and revised frameworks (Figure 10) shows that there are small changes in the average and median values, as well as in the distribution of the LR. Approximately 56.6% of the banks showed an increase in the LRE due to the implementation of the 2017 revisions, while approximately 39.6% showed a decrease in the LRE.

Figure 10: Drivers of change in LRE in the final Basel III standards



Source: EBA QIS data (December 2019), sample: 106 banks

In terms of T1 MRC, the impact becomes more prominent when the analysis includes both the changes in the definition of LRE and the implementation of the additional 50% of the G-SIIs surcharge. The G-SII surcharge only affects the averages of the categories 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 LRE.

The main driver of the total change in the LRE values is the increase in off-balance-sheet exposures (OBS) (1.1%), followed by 'derivatives' (0.4%). For Group 1 banks (40 banks), the change in OBS is 1.1%, for its subset of G-SIIs (8 banks) the corresponding change is 1.4%, while for Group 2 (66 banks) the change in OBS is 1.6%. Figure 10 shows the impact of the changes in the definition of final Basel III standards on the main components of the LRE.

8. Interaction between output floor and leverage ratio requirements

The analysis in the current report applies the LR 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 LR capital requirements (11.4%), vis-à-vis the relative LR impact after taking into account the risk-based capital requirements, including the output floor (-2.8%).

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

Scenario 1 assumes the output floor is equal 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.

Note that, in the interaction between LR and output floor, the impact of the LR is overestimated, since Pillar 2 requirements, O-SIIs capital requirement and countercyclical capital buffers are disregarded.

The results in Table 14 show the number of constrained banks under the two scenarios, as well as the difference attributed to the output floor.

Table 14: 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 LR
Risk-based capital requirements without the output floor (scenario 1)	76	-	30
Risk-based capital requirements with the output floor (baseline scenario)	76	17	13

Source: EBA QIS data (December 2019), sample: 106 banks

Under the baseline scenario, 71.7% of the banks in the sample are constrained by the risk-based requirements, before applying the output floor, 16% are constrained by the output floor and 12.3% by the LR requirement (see Table 14). The implementation of Basel III risk-based requirements, without the output floor, and the LR requirements results in 71.7% of the banks being constrained by the risk-based requirements and 28.3% are constrained by the LR requirements (see Table 14). The implementation of the output floor, as part of the risk-based requirements, results in 16% of the banks being constrained by the risk-based requirements.

The impacts of LR and output floor under (a) the baseline scenario are EUR -22.1 billion and 48.1 billion, respectively, (b) scenario 1 are EUR 2.5 billion and zero, respectively, and (c) scenario 2 are EUR 2.5 billion and EUR 23.5 billion, respectively (see also Table 15). The negative LR impact implies a reduction in the add-on of LR from the current CRR/CRD IV regime because the add-on is reduced by EUR 22.1 billion from EUR 54.4 billion to EUR 32.3 billion, owing to the increase in RWA (not shown in Table 15, but presented in section 2.4). This translates into a -2.8% LR impact (see also Table 1) compared with the current T1 MRC (-22.1/776.5).

Under hypothetical scenarios 1 and 2, the LR add-on is EUR 2.5 billion, which implies an overall impact of the LR on MRC of 0.3%. 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 T1 MRC add-on due to the output floor is 3.0%, which is significantly lower than the 6.2% 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 23.5 billion (or 3.0%).

Table 15: Impact and implied cumulative impact on T1 MRC of the implementation of risk-based capital requirements, with and without the implementation of the output floor

Scenarios	Risk-based (without output floor) T1 MRC in EUR billion (implied impact in %)	Output floor (before LR) T1 MRC in EUR billion (implied impact in %)	LR T1 MRC in EUR billion	LR add-on in EUR billion (implied impact in %)	Output floor (after LR) T1 MRC in EUR billion (implied impact in %)	Total implied impact (%)
Baseline: with output floor (before LR)	817.7 (12.1%)	48.1 (6.2%)	776.5	-22.1 (-2.8%)	N/A	15.4
Scenario 1: without output floor	817.7 (12.1%)	N/A	776.5	2.5 (0.3%)	N/A	12.4

Scenarios	Risk-based (without output floor) T1 MRC in EUR billion (implied impact in %)	Output floor (before LR) T1 MRC in EUR billion (implied impact in %)	LR T1 MRC in EUR billion	LR add-on in EUR billion (implied impact in %)	Output floor (after LR) T1 MRC in EUR billion (implied impact in %)	Total implied impact (%)
Scenario 2: with output floor (after LR)	817.7 (12.1%)	N/A	776.5	2.5 (0.3%)	23.5 (3.0%)	15.4

Notes: the 'LR implied impact' for the baseline scenario is -3.8% (also shown in Table 1 and Table 5 as 'Revised LR impact') and is calculated as -EUR 36.8 billion (= EUR 32.7 billion – EUR 69.5 billion)/EUR 964.2 billion. EUR 69.5 billion is the CRR/CRD IV LR add-on (Figure 4); EUR 964.2 billion is the combined T1 MRC arising from the implementation of both risk-based and LR-based requirements (see also Figure 4). N/A, not applicable.
Source: EBA QIS data (December 2019), sample: 106 banks

The inclusion of other EU-specific capital requirements (e.g. calculation of the countercyclical buffer, O-SIIs capital requirement, Pillar 2 requirements) would reduce the marginal contribution of the LR[40], which would remain close among all scenarios.

[40] 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 LR framework.

9. Net stable funding ratio

The BCBS standards include two regulatory measures of liquidity risk: the liquidity coverage ratio (LCR) and the NSFR. The LCR requires banks to have a sufficient level of high-quality liquid assets (HQLA) to withstand a stressful funding scenario for 30 days. The LCR has already been implemented in the EU as a binding minimum requirement in October 2015 (followed by a gradual phase-in of the minimum levels starting with 60% in 2015 and reaching 100% in 2018)[41]. The monitoring of the LCR is assessed separately in the EBA's report on liquidity measures under Article 509(1) of the CRR[42]. The NSFR is a longer-term structural ratio that addresses liquidity mismatches and provides incentives for banks to use stable sources to fund their activities. The NSFR has been introduced via the CRR2 and will be applied as a binding minimum requirement as of 28 June 2021. This section aims to monitor the impact of the BCBS 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%[43]. The ASF is defined as the portion of capital and liabilities expected to be reliable over the 1-year time horizon considered by the NSFR. 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 OBS. Table 16 provides an overview of the NSFR levels by groups of banks and the amount of shortfall needed to comply with the 100% requirement set in the Basel III framework.

Table 16: NSFR and NSFR shortfall in stable funding

Bank group	NSFR (%)	Shortfall (EUR billion)
All banks	113.5	24.3
Group 1	111.8	16.4
Of which: G-SIIs	110.2	0.0
Group 2	121.1	8.0
Of which: large Group 2	120.7	7.3
Of which: medium-sized Group 2	120.0	0.0
Of which: small Group 2	126.2	0.6

Source: EBA QIS data (December 2019), sample: 104 banks

Overall, as of December 2019, banks in the sample needed additional stable funding of EUR 24.3 billion (Table 16), equivalent to 2.7% of the total assets (EUR 892 billion) of all these banks that exhibit shortfalls. 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 NFSR above the 100% requirement.

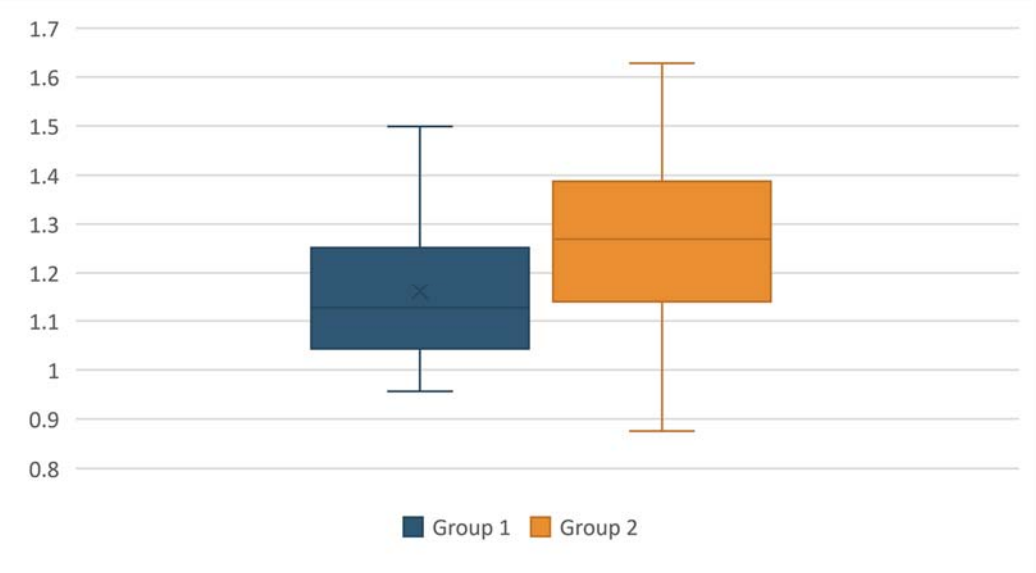
[41] The monitoring of the LCR is assessed separately in the EBA's report on liquidity measures under Article 509(1) of the CRR. The report is published simultaneously with the present report.

[42] OJ L 176, 27.6.2013

[43] Note that the EU implementation of the NSFR will enter into force in June 2021.

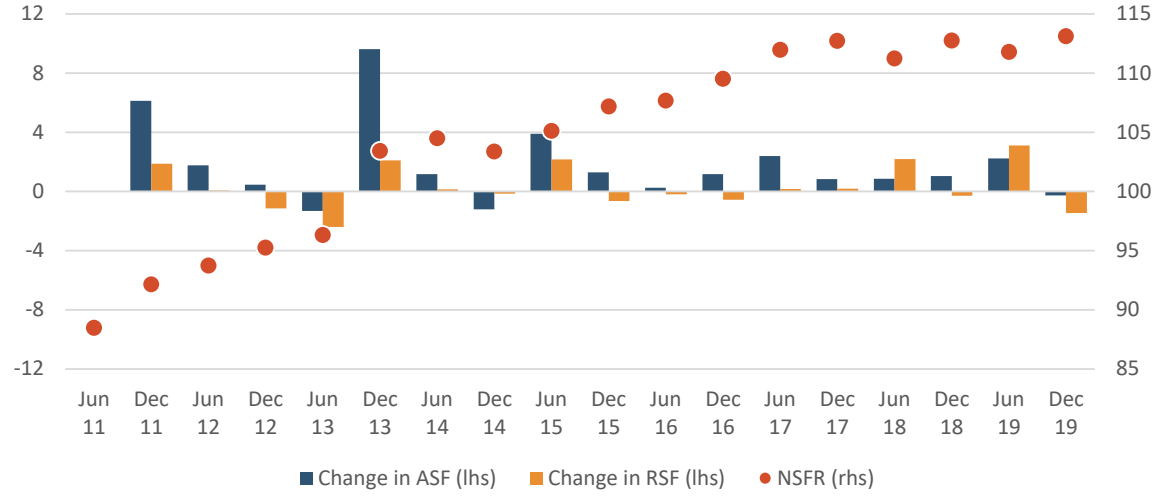
Figure 11 shows the distribution of NSFR by bank group, while Figure 12 illustrates the development of the NSFR over time using a balanced sample of banks. Figure 12 also shows the changes in the NSFR components (ASF and RSF), showing which is the main driver of the NSFR change in each period.

Figure 11: Distribution of NSFR by bank group (NSFR/100, %)



Source: EBA QIS data (December 2019), sample: 104 banks

Figure 12: NSFR (right-hand scale, rhs) (%), and change in its determinants (left-hand scale, lhs) of the balanced sample (%)

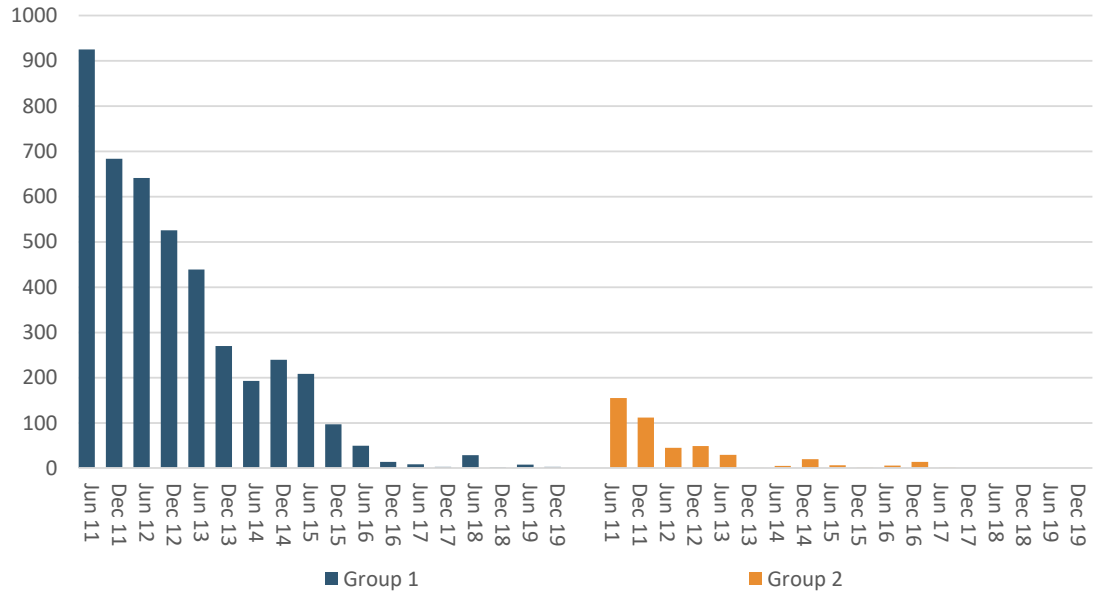


Source: EBA QIS data (December 2019), sample: 104 banks

The collected data shows that between June 2011 and June 2019 the average NSFR followed a positive trend and increased by 278 basis points. The driver of the continuous increase varies between the different periods and has been either an increase in the AFS or a reduction in 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 the data collection referring to December 2013.

The shortfall in stable funding, needed to meet the 100% ratio requirement, is reduced, compared with June 2011, by 99.7% (from EUR 924 billion to EUR 2.9 billion) for Group 1 banks and by 100% (from EUR 155 billion to zero) for Group 2 banks (Figure 13). Banks with shortfalls should become compliant with the NSFR rules by the time the NSFR becomes binding in the EU[44].

Figure 13: Development of the NSFR shortfall of ASF over time, by bank group – balanced sample (EUR billion)



Source: EBA QIS data (December 2019), sample: 49 banks

[44] The implementation of the NSFR in the EU includes some differences from the Basel III definition of the NSFR, such as treatment of EU sovereign bonds.

10. Annex

10.1 Methodology for the estimation of the impact by category

10.1.1 Credit risk impact

$$\%\Delta T1MRC(credit\ risk) = \%\Delta T1MRC(SA) + \%\Delta T1MRC(IRB\ approach) + \%\Delta T1MRC(securitisation) + \%\Delta T1MRC(CCP)$$

%ΔT1MRC(credit risk) is the percentage difference in MRC attributed to credit risk;
%ΔT1MRC(SA) is the percentage difference in MRC attributed to the standardised approach for credit risk;
%ΔT1MRC(IRB approach) is the percentage difference in MRC attributed to the internal ratings-based approach to credit risk;
%ΔT1MRC(securitisation) is the percentage difference in MRC attributed to the revisions in securitisation framework;
%ΔT1MRC(CCP) is the percentage difference in MRC attributed to the central framework.

Standardised approach for credit risk

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

where Tier 1 MRC = 6% and capital conservation buffer = 2.5%

IRB approach for credit risk

$$\%\Delta T1MRC(IRB) = \frac{\left[\sum_{i=1}^{n}\left\{\begin{array}{c}\text{'}Final\ Basel\ III\ IRBA_{RWA}\text{'} \times \\ (Tier1_{MRC}\% + capital\ conservation\ buffer\% + G_{SIIs}surcharge\%) \\ -(\min(Amount\ of\ IRB\ deficit\ of\ provisions\ added\ to\ revised\ T1\ MRC, 0))\end{array}\right\} - \sum_{i=1}^{n}\left\{\begin{array}{c}\text{'}CRR\_CRDIV\ IRBA_{RWA}\text{'} \times \\ (Tier1_{MRC}\% + capital\ conservation\ buffer\% + G_{SIIs}surcharge\%) \\ -(\min(Amount\ of\ IRB\ deficit\ of\ provisions\ added\ to\ current\ T1\ MRC, 0) \\ +Deductions\ which\ can\ be\ alternatively\ treated\ via\ a\ 1\,250\%\ risk\ weighting\end{array}\right\}\right]}{\sum_{i=1}^{n}\begin{array}{c}\max\{\text{'}CRR_{CRDIV}total\ risk-based\ Tier1\ MRC\text{'}, \\ \text{'}CRR_{CRDIV}total\ LR-based\ Tier1\ MRC\text{'}\}\end{array}}$$

Securitisation

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

$$\frac{\left[\begin{array}{c}\sum_{i=1}^{n}\left\{\begin{array}{c}\text{'Final Basel III } Sec_{RWA}\text{'} \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SIIs}\text{surcharge}\%)\end{array}\right\} - \\ \sum_{i=1}^{n}\left\{\begin{array}{c}\text{'CRR\_CRDIV } Sec_{RWA}\text{'} \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SIIs}\text{surcharge}\%)\end{array}\right\}\end{array}\right]}{\sum_{i=1}^{n}\begin{array}{c}\max\{\text{'}CRR_{CRDIV}\text{total risk} - \text{based Tier1 MRC'}, \\ \text{'}CRR_{CRDIV}\text{total LR} - \text{based Tier1 MRC'}\}\end{array}}$$

CCPs

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

$$\frac{\left[\begin{array}{c}\sum_{i=1}^{n}\left\{\begin{array}{c}\text{'Final Basel III } CCP_{RWA}\text{'} \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SIIs}\text{surcharge}\%)\end{array}\right\} - \\ \sum_{i=1}^{n}\left\{\begin{array}{c}\text{'CRR\_CRDIV } CCP_{RWA}\text{'} \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SIIs}\text{surcharge}\%)\end{array}\right\}\end{array}\right]}{\sum_{i=1}^{n}\begin{array}{c}\max\{\text{'}CRR_{CRDIV}\text{total risk} - \text{based Tier1 MRC'}, \\ \text{'}CRR_{CRDIV}\text{total LR} - \text{based Tier1 MRC'}\}\end{array}}$$

10.1.2 Market risk impact

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

$$\frac{\left[\begin{array}{c}\sum_{i=1}^{n}\left\{\begin{array}{c}\text{'Final Basel III FRTB capital'} \times 12.5 \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SIIs}\text{surcharge}\%)\end{array}\right\} - \\ \sum_{i=1}^{n}\left\{\begin{array}{c}\text{'CRR\_CRDIV market risk capital'} \times 12.5 \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SIIs}\text{surcharge}\%)\end{array}\right\}\end{array}\right]}{\sum_{i=1}^{n}\begin{array}{c}\max\{\text{'CRR\_CRDIV total risk} - \text{based Tier1 MRC'}, \\ \text{'}CRR_{CRDIV}\text{total LR} - \text{based Tier1 MRC'}\}\end{array}}$$

10.1.3 CVA impact

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

$$\frac{\left[\begin{array}{c}\sum_{i=1}^{n}\left\{\begin{array}{c}\text{'Final Basel III CVA capital'} \times 12.5 \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SIIs}\text{surcharge}\%)\end{array}\right\} - \\ \sum_{i=1}^{n}\left\{\begin{array}{c}\text{'}CRR_{CRDIV}\text{CVA capital'} \times 12.5 \times \\ (Tier1_{MRC}\% + \text{capital conservation buffer}\% + G_{SIIs}\text{surcharge}\%)\end{array}\right\}\end{array}\right]}{\sum_{i=1}^{n}\begin{array}{c}\max\{\text{'}CRR_{CRDIV}\text{total risk} - \text{based Tier1 MRC'}, \\ \text{'}CRR_{CRDIV}\text{total LR} - \text{based Tier1 MRC'}\}\end{array}}$$

10.1.4 Operational risk impact

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

$$\frac{\left[\begin{array}{c}\sum_{i=1}^{n}\left\{\begin{array}{c}\text{'}Final\ Basel\ III\ operational\ risk\ capital\text{'}\ \times\ 12.5\ \times \\ (Tier1_{MRC}\% + capital\ conservation\ buffer\% + G_{SIIs}surcharge\%)\end{array}\right\} - \\ \sum_{i=1}^{n}\left\{\begin{array}{c}\text{'}CRR\_CRDIV\ operational\ risk\ RWA\text{'}\ \times \\ (Tier1_{MRC}\% + capital\ conservation\ buffer\% + G_{SIIs}surcharge\%)\end{array}\right\}\end{array}\right]}{\sum_{i=1}^{n}\begin{array}{c}\max\{\text{'}CRR_{CRDIV}total\ risk - based\ Tier1\ MRC\text{'}, \\ \text{'}CRR_{CRDIV}total\ LR - based\ Tier1\ MRC\text{'}\}\end{array}}$$

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 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 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 the 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 place[45].

The formula for the calculation of ILM is:

[45] See Article 320(a) of the CRR and Article 322(3) of the CRR.

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 × BI for BI ≤ EUR 1 billion, BIC = EUR 120 million + 0.15 × (BI – EUR 1 billion) for EUR 1 billion < BI ≤ EUR 30 billion, and BIC = EUR 4470 million + 0.18 × (BI – EUR 30 billion) for BI > EUR 30 billion

where BI = ILDC average + SC average + FC average and ILDC = interest, lease and dividend component, SC = services component, FC = financial component.

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

10.1.5 Output floor impact

$$\%\Delta T1MRC(Output\ Floor) =$$

$$\frac{\left[\sum_{i=1}^{n} \begin{matrix}\max\{0, `Final\ Basel\ III\ total\ SA\ equivalent\ RWA' \times Output\ Floor\% - `Final\ Basel\ III\ total\ RWA'\} \\ \times (Tier1_{MRC}\% + capital\ conservation\ buffer\% + G - SIIs\ \ surcharge\%)\end{matrix}\right]}{\sum_{i=1}^{n} max\{`CRR_{CRDIV}total\ risk - based\ Tier\ 1\ MRC', `CRR\_CRD\ IV\ total\ LR - based\ Tier1\ MRC'\}}$$

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 SAs 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

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

$$\frac{\left[\begin{matrix}\sum_{i=1}^{n} \max\left\{\begin{matrix}0, \\ (`Final\ Basel\ III\ total\ LR - based\ T1\ MRC' - \\ `Final\ Basel\ III\ total\ risk - based\ T1\ MRC')\end{matrix}\right\} - \\ \sum_{i=1}^{n} \max\left\{\begin{matrix}0, \\ (`CRR_{CRDIV}total\ LR - based\ T1\ MRC' - \\ `CRR_{CRDIV}total\ risk - based\ T1\ MRC')\end{matrix}\right\}\end{matrix}\right]}{\sum_{i=1}^{n} \begin{matrix}\max\{`CRR_{CRDIV}total\ risk - based\ T1\ MRC', \\ `CRR_{CRDIV}total\ LR - based\ T1\ MRC'\}\end{matrix}}$$

where

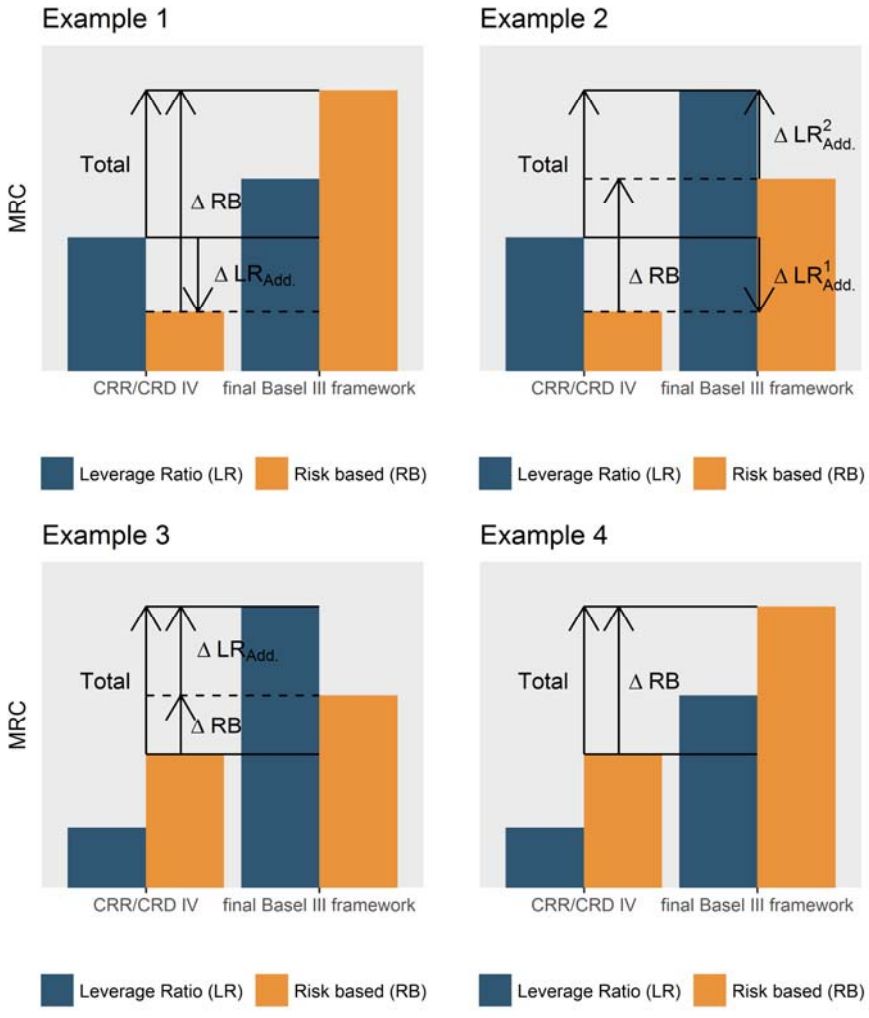
Final Basel III total LR-based T1 MRC = Final Basel III total LRE × (3% + 0.5 × G-SIIs surcharge); and

CRR/CRD IV total LR-based T1 MRC = CRR/CRD IV total LRE × 3%;

n is the number of banks in the sample.

The analysis adopts the BCBS methodology for estimating the LR impact[46]. This methodology quantifies the impact of the LR 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.

Figure 14: Integration of changes in risk-based and LR-based MRC



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

The LR impact would be negative (see $\Delta LR_{Add.}$ in example 1 of Figure 14) if the T1 LR add-on of the full implementation of the final Basel III framework (equal to zero in example 1 of Figure 14) were lower than the T1 LR add-on of the full implementation of the CRR/CRD IV (positive in example 1 of

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

Figure 14). This particular case indicates that the LR is less constraining under the final Basel III framework than under the CRR/CRD IV framework.

The LR impact would be positive (see $\Delta LR_{Add.}$ in example 3 of Figure 14) if the T1 LR add-on of the full implementation of the final Basel III framework (positive in example 3 of Figure 14) were higher than the T1 LR add-on of the full implementation of the CRR/CRD IV (zero in example 3 of Figure 14). This can be interpreted as the LR becoming more constraining under the final Basel III framework than under the CRR/CRD IV framework.

The LR impact would be zero 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 14), or the T1 LR add-on remained the same under the CRR/CRD IV and the final Basel III framework (example 2, Figure 14, where $\Delta LR^{1}_{Add.} = \Delta LR^{2}_{Add.}$, 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 14 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 8 – Part 1 – column 'Risk-based and LR-based T1'

$$\boldsymbol{T1Shortfall_{CRR\_CRD_{IV}}}$$
$$=$$
$$\sum_{i=1}^{n}\left\{max\begin{bmatrix}'Risk-based\_Tier1\_Shortfall_{CRR\_CRDIV}',\\ 'LR-based\_Tier1\_Shortfall_{CRR\_CRDIV}'\end{bmatrix}\right\}$$
$$=$$
$$\sum_{i=1}^{n}\left\{max\begin{bmatrix}max\,(0,'Risk-based\_Tier1\_MRC_{CRR\_CRDIV}'-'Actual\_Tier1'),\\ max\,(0,'LR-based\_Tier1\_MRC_{CRR\_CRDIV}'-'Actual\_Tier1')\end{bmatrix}\right\}$$

Table 8 – Part 2 – column 'Risk-based and LR-based T1'

$$\boldsymbol{T1Shortfall_{Basel_{III}}}$$
$$=$$
$$\sum_{i=1}^{n}\left\{max\begin{bmatrix}'Risk-based\_Tier1\_Shortfall_{Basel\_III}',\\ 'LR-based\_Tier1\_Shortfall_{Basel\_III}'\end{bmatrix}\right\}$$
$$=$$
$$\sum_{i=1}^{n}\left\{max\begin{bmatrix}max\,(0,'Risk-based\_Tier1\_MRC_{Basel\_III}'-'Actual\_Tier1'),\\ max\,(0,'LR-based\_Tier1\_MRC_{Basel\_III}'-'Actual\_Tier1')\end{bmatrix}\right\}$$

Table 2 – column 'Capital shortfalls — CRR/CRD IV (fully phased in)' – 'Additional LR T1'

$$\boldsymbol{Add.LR_{T1Shortfall_{CRR_{CRD_{IV}}}}}$$
$$=$$

$$\sum_{i=1}^{n}\left\{max\begin{bmatrix}max\ (0,'Risk-based\_Tier1\_MRC_{CRR\_CRDIV}'-'Actual\_Tier1'),\\ max\ (0,'LR-based\_Tier1\_MRC_{CRR\_CRDIV}'-'Actual\_Tier1')\end{bmatrix}\right\}$$
$$-\sum_{i=1}^{n}\left\{max\left[max\ (0,'Risk-based\_Tier1\_MRC_{CRR\_CRDIV}'-'Actual\_Tier1')\right]\right\}$$

Table 2 – column 'Capital shortfalls — Basel III framework (2028)' – 'Additional LR T1'

$$\boldsymbol{Add.LR_{T1Shortfall_{Basel_{III}}}}$$
$$\boldsymbol{=}$$
$$\sum_{i=1}^{n}\left\{max\begin{bmatrix}max\ (0,'Risk-based\_Tier1\_MRC_{Basel\_III}'-'Actual\_Tier1'),\\ max\ (0,'LR-based\_Tier1\_MRC_{Basel\_III}'-'Actual\_Tier1')\end{bmatrix}\right\}$$
$$-\sum_{i=1}^{n}\left\{max\left[max\ (0,'Risk-based\_Tier1\_MRC_{Basel\_III}'-'Actual\_Tier1')\right]\right\}$$

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