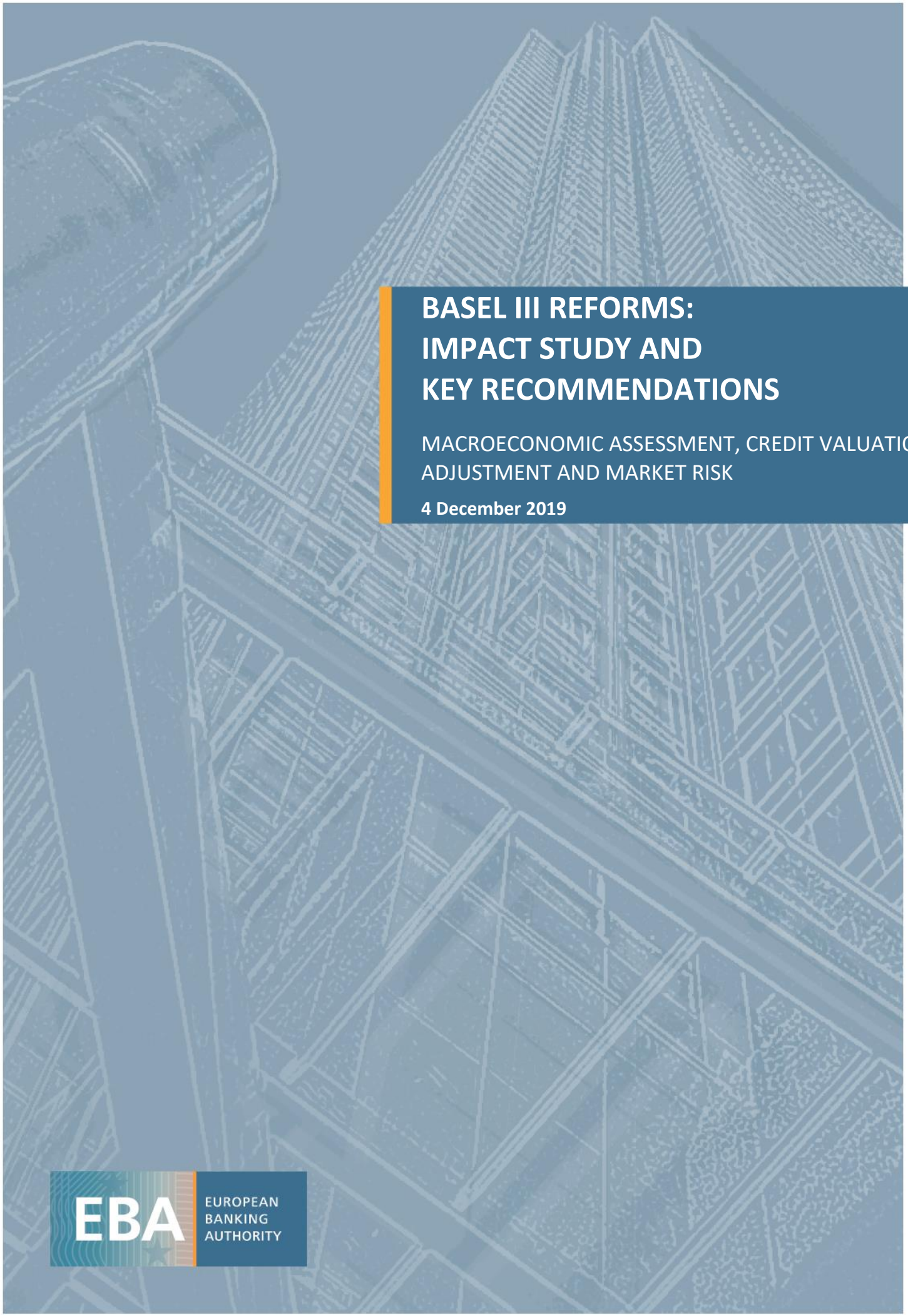

BASEL III REFORMS: IMPACT STUDY AND KEY RECOMMENDATIONS

MACROECONOMIC ASSESSMENT, CREDIT VALUATION ADJUSTMENT AND MARKET RISK

4 December 2019

EBA EUROPEAN BANKING AUTHORITY

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Abbreviations

AUROC	area under the receiver operating characteristic curve
BA-CVA	basic approach to CVA
BCBS	Basel Committee on Banking Supervision
CCP	central counterparty
CCR	counterparty credit risk
CET1	Common Equity Tier 1
CfA	call for advice
COREP	common reporting
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
CRR2	revised Capital Requirements Regulation
CSR	credit spread risk
CVA	credit valuation adjustment
DRC	default risk charge
ECB	European Central Bank
ESRB	European Systemic Risk Board
EU	European Union
FINREP	financial reporting framework
FRTB	fundamental review of the trading book
FX	foreign exchange
GaR	growth-at-risk
GDP	gross domestic product
GHOS	Group of Governors and Heads of Supervision
GIRR	general interest rate risk
G-SIIs	global systemically important institution
IMA	internal models approach
IRB	internal ratings-based approach to credit risk
LEI	long-term economic impact
LR	leverage ratio
MAG	Macroeconomic Assessment Group
MDA	minimum distributable amount
MIR	monetary financial institution interest rate
MKT	market risk
MRC	minimum required capital
NMRF	non-modellable risk factors
OF	output floor
OP	operational risk
O-SII	other systemically important institution
p.p.	percentage points
RW	risk weight
RWA	risk-weighted asset
QIS	quantitative impact study
SA	standardised approach
SA-CCR	standardised approach to counterparty credit risk
SA-CVA	standardised approach to credit valuation adjustment

SEC	securitisation
SFT	securities financing transaction
SMEs	small and medium-sized enterprises
SSM	Single Supervisory Mechanism
T1	tier 1 capital
T2	tier 2 capital
TC	total capital

Country codes

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czechia
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GB	United Kingdom
GR	Greece
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherland
NO	Norway
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia

Business model codes

Auto & Cons	automotive and consumer credit banks
Building Soc	building societies
CCP	central counterparties
Cross-border U	cross-border universal banks
Custody	custody banks
Leasing	leasing and factoring banks
Local U	local universal banks

Merchant	merchant banks
Mortgage	mortgage banks (including pass-through financing models)
Other special	other specialised banks
Private	private banks
Public Dev	public development banks
S&L Coop	locally active savings and loan associations/cooperative banks

1. Executive summary

In December 2017, the BCBS finalised the post-crisis Basel III reforms addressing the excessive variability of risk-weighted asset (RWA).

In December 2017, the Basel Committee on Banking Supervision (BCBS) finalised the so-called Basel III framework,[1] completing the global reform of the regulatory framework. The objectives of the final Basel III reforms are to reduce excessive variability of risk-weighted assets and improve the comparability of banks' capital ratios. The reforms cover the areas of credit risk, operational risk, credit valuation adjustment (CVA) risk, leverage ratio and output floor. The implementation date of the December 2017 package is 1 January 2022. Only for the output floor is a phase-in period, from 2022 to 2027, prescribed.

In January 2016, the BCBS published the revised framework for market risk (FRTB), which was further amended in January 2019.

The BCBS published in January 2016 the revised framework for market risk (the fundamental review of the trading book — FRTB), a comprehensive review of the prudential rules for market risk. The revisions seek to address the deficiencies in the design and calibration of the market risk internal models and standardised approach. In January 2019, the BCBS made targeted amendments to the revised market risk standards, which are intended to be applied from 1 January 2022, together with the Basel III reforms in the other regulatory areas.

In November 2019, the BCBS issued a consultative document on a set of limited, targeted and final adjustments to the CVA risk framework.

In November 2019, the BCBS issued a consultative document on a set of targeted adjustments to the CVA risk framework. These include revisions to align the CVA framework with the 2019 FRTB standards as well as the capital requirements for bank exposures to central counterparties .[2] In addition, BCBS seeks feedback on a possible adjustment to the overall calibration of capital requirements calculated under the CVA standardised and basic approaches.

In May 2018, the European Commission requested technical advice from the EBA on the impact of these revisions.

In May 2018, the European Commission requested advice[3] from the European Banking Authority (EBA) on (i) the impact of the overall package of reforms and its various components; (ii) the implementation of several building blocks of the reform; and (iii) any information necessary to identify implementation challenges, and to address inconsistencies in both the current and the revised regulatory frameworks.

[1] BCBS (2017) Basel III: Finalising post-crisis reforms.

[2] BCBS (2014) Capital requirements for bank exposures to central counterparties.

[3] European Commission (2018) Call for advice to the EBA for the purpose of revising the own fund requirement for credit, operational, market and credit valuation adjustment risk.

The EBA delivered the first part of its advice in August 2019.

The EBA delivered the first part of its advice on 5 August 2019, which includes a quantitative analysis of the estimated impact, and a set of policy recommendations in the areas of credit risk, operational risk, output floor and securities financing transactions.[4] In line with the requests and different deadlines envisaged in the call for advice (CfA), the first part of the advice did not cover the reforms on CVA risk and market risk to take into account the international developments in these regulatory areas.

This report presents the quantitative impact assessment and main policy recommendations on CVA and market risks, along with the macroeconomic impact assessment of the final Basel III reforms.

This report provides a detailed impact assessment and the key policy recommendations on the CVA and market risk reforms, as well as a macroeconomic impact assessment, and therefore completes the EBA's advice on the implementation of the final Basel III framework in the EU.[5] The results are based on a sample of 189 banks[6] from 19 EU countries.

This report should be read alongside the policy report on CVA risk and market risk, and also they address also the mandate under Article 519b(1) of the revised Capital Requirements Regulation (CRR2).

This impact assessment report should be read alongside the policy report developed for the purposes of addressing the CfA on the implementation of the Basel III reforms in the areas of CVA risk and market risk. In addition, this report and the policy report also address the mandate under Article 519b(1) of CRR2, which requires the EBA to report on the impact on EU institutions of international standards to calculate the own funds requirements for market risk.

1.1 Overall impact

Accounting for the 2019 FRTB revisions, minimum required total capital increases by 23.6% including Pillar 2 and macroprudential buffers.

When accounting for the 2019 FRTB revisions, the overall reform at its steady-state implementation scheduled for 2027 could increase the tier 1 (T1) minimum required capital (MRC) amount, which includes Pillar 2 requirements and EU-specific buffers, by 23.6% with respect to the June 2018 baseline. The impact is lower than that set out in the August 2019 report (24.4%) because of a reduction in the impact of market risk (+2.2%) compared with the 2016 FRTB standards reported in August 2019 (+2.5%) and the lower impact of the output floor (+8.6%, compared with 9.1% reported in

[4] EBA (2019) EBA advises the European Commission on the implementation of the final Basel III framework.

[5] On 15 July 2019, the EBA received a letter from the European Commission asking to provide additional analysis to inform their decision-making in a few areas of the final Basel III framework. This report does not address the additional analysis requested in this letter.

[6] In this report, the terms 'banks' and 'institutions' are used interchangeably.

August 2019).[7] The impacts for all other risk categories remained unchanged.

The resulting total capital shortfall would be EUR 124.8 billion, of which EUR 83.0 billion of CET1.

The impact would reduce the average total capital ratio of the banks in the sample from 17.9% to 14.4% and trigger a shortfall in total capital of EUR 124.8 billion, of which EUR 83.0 billion Common Equity Tier 1 (CET1). This compares with the EUR 135.1 billion shortfall in total capital (EUR 91.1 billion in CET1) quoted in the August 2019 report, which applied the 2016 FRTB.

When excluding Pillar 2 and EU-specific buffers are excluded, results are comparable with the EBA regular Basel monitoring exercise: T1 MRC will be around 18% and the total capital shortfall around EUR 32 billion.

Crucially, the inclusion of Pillar 2 and EU-specific buffers makes the findings of this report incomparable with (and more conservative than) those of the regular Basel III monitoring exercises carried out by the EBA. When Pillar 2 and EU-specific buffers are excluded from the computation of the capital requirement, the overall impact of the reform on the sample considered in this report is substantially lower. In this case, the average increase in T1 MRC will drop to 17.7% and the total capital shortfall will be EUR 32.4 billion. Overall, those results are consistent with those published by the EBA in the context of the regular EBA Basel III monitoring exercise.

1.2 Impact by risk type

The removal of the CVA exemptions will result in an increase in capital requirements; however, the additional revisions proposed in November 2019 are expected to reduce part of the impact.

As regards CVA risk, discontinuing the EU-specific CVA exemptions would result in a material increase in capital requirements once the final Basel III framework comes into place. The adjustments proposed by the BCBS in November 2019, if eventually implemented, may result in changes to the capital impact. In the absence of concrete figures for the re-calibration, the EBA has, consequently, in this report provided a sensitivity analysis of the potential changes. Under a 10% downwards calibration adjustment scenario, the impact of CVA risk would move from 3.9% to 3.4%.[8]

Impact on market risk impact is heterogeneous across banks and is driven mostly by a few large banks.

In the area of market risk, the impact is very heterogeneous across banks and is to a large extent driven by a few large banks. Most medium-sized and small banks in the sample do not have market risk exposures and are thus not affected by the reform. The EBA expects that the results are subject to some uncertainty, given the various implementation assumptions that the banks had to make in their capital requirements calculation.

[7] Only a subset of institutions in the sample, which have a market risk portfolio, are also bound by the output floor. For a few large institutions in this subset, the gap between modelable and non-modellable RWA for market risk decreases with the FRTB 2019 amendments, which drives the lower impact on the average output floor.

[8] This analysis is indicative only of the direction of impact, as the extent of the changes proposed by the BCBS is not known and currently subject to consultation. The impact of a potential recalibration is almost linear and thus the impact of different calibration adjustments can be proxied from the present results. For example, under a 20% downward adjustment, which corresponds to setting mcva to 1 (the lower bound proposed in the November 2019 BCBS Consultative Document), the impact of CVA risk would stand at around 2.9%.

1.3 Macroeconomic impact assessment

The macroeconomic impact assessment looks at the costs and benefits of the Basel III framework on the EU's output, in both the short and the long run.

The assessment of the macroeconomic costs and benefits of the finalisation of the Basel III framework was carried out in cooperation with the European Central Bank (ECB). The analysis is performed using two distinct approaches: (i) the growth-at-risk (GaR) model and (ii) an approach following the long-term economic impact (LEI) study of the BCBS (2010).

Finalisation of the Basel III post-crisis reforms will have net benefits for EU economies: modest transitional costs are outweighed by longer-run benefits.

According to a macroeconomic model developed by the ECB, the implementation of the final Basel III reforms will result in modest transitional costs, which will fade over time. In particular, the higher capital requirements under Basel III would have an adverse impact on bank lending in the short run, as banks adjust their balance sheets to meet the new requirements. Such contraction in loan supply would lead to a moderate and transitory slowdown in gross domestic product (GDP) growth, with the average annual GDP growth being 0.2 percentage points lower in the first 4 years after implementation. However, after the fourth year, the effect on the GDP growth rate turns positive and converges to zero at the end of the transition period, as higher capitalisation allows banks to reduce their funding costs, improve their profitability and expand their balance sheet. The impact of Basel III on GDP growth translates into a level of GDP that is 0.2% lower than the level of GDP in the scenario without the Basel III implementation 10 years after the implementation, but this gap gradually closes over time.

On the other hand, the long-term benefits of Basel III are substantial and outweigh the modest transitory costs. First, according to the GaR approach, the Basel III finalisation would reduce the severity of future economic downturns through a reduction in both the probability and the intensity of future banking crises. This is because better capitalised banks are able to continue lending even in severe macroeconomic downturns, thus avoiding the downwards spiral in GDP growth that a collapse in bank lending could trigger in a period of recession. Second, according to the LEI approach, the Basel III reform would reduce the probability of a crisis by about 1.2 percentage points at the end of the 10-year horizon. Given that crises can have large negative macroeconomic effects in terms of forgone output, the LEI estimates imply that Basel III will have sizeable long-term net benefits, amounting to around 0.6% of annual GDP level.

1.4 Main policy recommendations

While the finalisation of Basel III is an important milestone, its loyal implementation remains

The finalisation of Basel III is an important milestone, marking the completion of the post-crisis reforms to the global regulatory framework. The EBA supports a full, timely and consistent implementation of these reforms. The EBA's assessment shows that

fundamental to building a resilient and credible EU banking sector.

the long-term benefits of the reforms largely outweigh the possible short-term adjustment costs. To mitigate these costs, it is important to ensure that the reforms are implemented in a smooth and gradual manner. Overall, the loyal implementation of Basel III is fundamental to building a resilient financial system and restoring trust in the EU banking sector. It will also bring substantial long-run benefits in terms of higher long-term growth and a lower probability of financial crisis.

In the area of CVA risk, the EBA recommends the full removal of EU CVA exemptions subject to phase-in measures, and in the area of proportionality recommends employing thresholds for the simplified SA-CCR to determine the eligibility for using the simplified treatment for CVA risk.

In light of ongoing international developments, the EBA has, where relevant, taken into account when forming its policy stance the proposed revisions to the CVA risk framework put forward by the BCBS in November 2019.

With regard to the EU CVA exemptions, the EBA's analysis finds that the CVA risk generated can be substantial and should be captured prudentially, consistent with a risk-based capital requirement framework. The EBA recommends fully removing the CVA exemptions, subject to phase-in measures commensurate with the expected impact of the revisions to the CVA risk framework, and thus aligning with the international standards on CVA risk.

In the area of proportionality, the EBA supports aligning the eligibility thresholds for the use of the simplified treatment for CVA risk with those provided in CRR2 for the simplified standardised approach to counterparty credit risk (SA-CCR).

Other EBA policy considerations on CVA risk are included in the policy advice report, and the EBA also continues to support the policy recommendations it put forward in its 2015 report on CVA.

In the area of market risk, the EBA recommends clarifying the treatment for unrated covered bonds and using a recalibrated Basel II SA as a simplified standardised approach for market risk, and calls for a number of targeted clarifications and/or amendments to the CRR/CRR2, as explained in the policy advice report.

With regard to the treatment for covered bonds under the FRTB, which the EBA was asked in the CfA to address, the EBA recommends clarifying that unrated covered bonds should attract the risk weight corresponding to the credit quality of the issuing credit institution. The EBA also recommends using a recalibrated Basel II standardised approach (SA) as a simplified standardised approach for market risk, as it recommended in its November 2016 response to the CfA on the implementation of the SA-CCR and FRTB in the EU.

The EBA also calls for a number of targeted clarifications and/or amendments to the CRR/CRR2 in the area of market risk, as explained in the policy advice report. The EBA will continue to support the smooth and timely implementation of the FRTB standards in the EU and to deliver on the numerous technical standards in the area of market risk mandated in CRR2.

2. General remarks

2.1 Background and mandate

1. On 7 December 2017, the Group of Governors and Heads of Supervision (GHOS) endorsed the final Basel III framework, completing the global reform of the regulatory framework, which began following the onset of the financial crisis. The objectives of the final Basel III reforms are to reduce excessive variability of RWAs and improve the comparability of banks' capital ratios.

2. In January 2016, the BCBS published the revised framework for market risk (FRTB), a comprehensive review of the prudential rules for market risk. These revisions seek to address the deficiencies in the design and calibration of the market risk internal models and standardised approach. In January 2019, the BCBS made targeted amendments to the revised market risk standards, which are intended to be applied from 1 January 2022, together with the Basel III post-crisis reforms in other regulatory areas.

3. In November 2019, the BCBS issued a Consultation Paper on a set of limited, targeted and final adjustments to the CVA risk framework. These include revisions to align the CVA framework with the 2019 FRTB standards as well as the Capital requirements for bank exposures to central counterparties.[9] In addition, the BCBS seek feedback on a possible adjustment to the overall calibration of capital requirements calculated under the CVA standardised and basic approaches. These adjustments, if eventually implemented, may result in changes to the capital impact. In the absence of a concrete re-calibration, the EBA has, consequently, in this report provided a sensitivity analysis of the potential changes.

4. In May 2018, the European Commission requested technical advice from the EBA[10] on the implementation of Basel III reforms in the EU. The EBA delivered the first part of its advice on 5 August 2019, which includes a quantitative analysis of the estimated impact and a set of policy recommendations.[11] The advice covered the final Basel III reforms in the areas of credit risk, operational risk, output floor and securities financing transactions (SFTs). The reforms on market risk and credit adjustment risk were not covered in the first part of its advice, in line with the requests and different deadlines envisaged in the CfA on these areas, to take into account developments at international level.

5. This report provides a detailed impact assessment and the key policy recommendations on the CVA risk and market risk reforms and represents the second part of the EBA's advice on the implementation of the final Basel III framework in the EU. As with the impact assessment developed for the first part of the EBA's advice published in August 2019, this impact assessment

[9] BCBS (2014), op cit.

[10] European Commission (2018) Call for advice to the EBA for the purpose of revising the own fund requirement for credit, operational, market and credit valuation adjustment risk.

[11] EBA (2019) EBA advises the European Commission on the implementation of the final Basel III framework.

report is published alongside a policy report (which relates to CVA risk and market risk), which should be read alongside this document.

6. It should also be noted that, in November 2016, the EBA delivered advice on the implementation of the SA-CCR and 2016 FRTB standards in the EU to the European Commission, which was taken into account for the purposes of CRR2.[12] The present report together with the policy report developed for the purposes of the Basel III reforms on CVA risk and market risk complement that advice by assessing relevant aspects of the 2019 FRTB revisions.

7. Moreover, the EBA committed to monitoring on an annual basis the impact of transactions exempted from the CVA risk charge as part of a monitoring exercise. As a result, the EBA has published monitoring reports on 21 June 2017 (based on 2015 data)[13] and 4 May 2018 (based on 2016 data)[14] respectively. This report represents a further contribution to CVA risk monitoring (based on end-June 2018 data). Given the ongoing developments on CVA framework at the international level and the policy recommendations on the CVA exemptions put forward in this response, the EBA will not further monitor the impact of CVA exemptions, at least until clarity is obtained on the EU implementation of the CVA framework.

8. Finally, this report and the policy report also address the mandate under Article 519b(1) of CRR2, which requires the EBA to report on the impact, on institutions in the Union, of international standards for calculating the own funds requirements for market risk.

[12] EBA (2016) Response to the European Commission's CfA on standardised approach for counterparty credit risk and own funds requirements for market risk.

[13] EBA (2017) EBA 2015 CVA risk monitoring exercise.

[14] EBA (2018) EBA 2016 CVA risk monitoring exercise.

2.2 Data collection process governance

9. The impact assessment in this report is based on quantitative impact study (QIS) data and qualitative survey evidence that institutions provided on a voluntary basis.

10. With the purpose of reducing the burden for participating institutions, the QIS data collection was carried out as part of the Basel III monitoring exercise, which is conducted by the EBA on a semi-annual basis. In order to gather the information necessary to address the European Commission's CfA, the Basel III monitoring exercise templates were expanded and supplemented, as necessary.

11. All institutions regularly participating in the Basel III monitoring exercise and all additional institutions that volunteered to participate in the CfA data collection and were classified as 'large'[15] were requested to submit a comprehensive set of templates (full template).

12. In order to make the data collection proportionate for smaller banks, small banks not participating in the Basel III monitoring exercise were requested to submit a simplified set of templates (reduced template).

13. In addition, all participating banks irrespective of their size were requested to complete and submit a qualitative questionnaire.

14. Given that the reforms on market risk were still under development when the EBA launched its data collection for the purpose of the CfA in August 2018, the data for the market risk analysis were collected as part of the subsequent Basel III monitoring exercise, including a supplementary qualitative questionnaire on market risk (Table 1).

Table 1 Timeline for the data collection process

Reference date June 2018	
August 2018-December 2018	Data collection and submission of full and reduced templates
November 2018-January 2019	Launch of the qualitative questionnaire and data collection
Reference date December 2018	
January 2019	Distribution of **templates to institutions** Publication of templates on the EBA website
April 2019-June 2019	**Deadline for submission** – institutions submitting the **template**
May 2019	**Launch of the 2019 FRTB qualitative questionnaire**

[15] Institutions with an amount of T1 capital higher than EUR 1.5 billion.

June 2019	**Deadline for submission of 2019 FRTB qualitative questionnaire**

15. Because of the different data collection processes described above, the report uses QIS data from two different reporting dates: (i) end-June 2018 and (ii) end-December 2018. In particular, the impact figures for CVA risk are calcuted using end-June 2018 QIS data, while the impact figures for market risk are calculated using end-December 2018 data. The total impact is calculated using end-June 2018 QIS data for all risk categories, except for the market risk impact, which is computed based on end-December 2018 QIS data (Table 2).

Table 2 Summary of data used for each chapter

Analysis	Reporting date
Main findings (Chapter 3)	End-June 2018 for all risk categories except for market risk impact, which is computed based on end-December 2018 data
CVA risk (Chapter 4)	End-June 2018
Market risk (Chapter 5)	End-December 2018

2.3 Sample

2.3.1 Classification criteria

16. The Basel framework is designed to apply to large and internationally active institutions. Several jurisdictions, including the EU, traditionally choose to apply the international standards to a wider set of entities.

17. As part of its impact analysis on the revisions to international standards agreed by the BCBS in December 2017, the EBA significantly enlarged the sample of institutions used in the regular monitoring of the implementation of the Basel framework to improve the coverage of smaller and less complex institutions. Taking into account the size and complexity of institutions is a crucial step in any policy-making process that aims to establish a proportionate regulatory framework.

18. Any impact analysis related to a major regulatory reform should assess its impact for institutions operating under different business models. For a jurisdiction such as the EU, where different banking system and financial market specificities traditionally coexist, it is particularly important not to limit the impact analysis to a population of universal banks.

19. For this reason, the EBA also strived to improve the sample coverage in terms of business models other than the universal bank.

20. The classification of institutions by size and by business model are explained in sections 2.3.1 and 2.3.2 of the first report, *Basel III reforms: impact study and key recommendations*, published in August 2019.[16]

2.3.2 Consolidation

21. Institutions participating in the data collection exercise were asked to report data at the highest level of EU consolidation to ensure that no double-counting of impact occurs.

22. Furthermore, in order to improve the representativeness of the sample in terms of business models and geography, subsidiary institutions designated as other systemically important institutions (O-SIIs) in jurisdictions other than their parent company's jurisdiction were encouraged to submit QIS data at the highest level of consolidation in the country where they are located.[17]

23. Unless stated otherwise, subsidiaries of EU parents are included in the average calculations only when impact results are presented by business model or by country, provided that they do not belong to the same business model or country as their parent company.

2.3.3 Samples based on data quality

24. Depending on data quality criteria, three types of samples are used in this report, as follows:

i. **Cumulative sample:** the cumulative sample is the one used to assess the cumulative impact of the reform and highlights the contribution of each risk category to the total impact.

ii. **Risk-specific samples:** risk-specific samples are used to assess the impact of the reform within each risk category (CVA risk or market risk), shedding light on the contribution of different portfolios, transactions or regulatory approaches to the total impact assigned to any given risk category.

iii. **Sensitivity analysis samples:** scenario-specific samples are those used to answer questions related to the marginal impact of any given specific policy reform or alternative policy scenarios within a given risk category.

[16] EBA (2019), op cit.

[17] Data submissions were also accepted from three subsidiaries of EU parents that are not designated as O-SIIs in the jurisdiction where they are located but represent specialised business models that otherwise would not have been covered to a sufficient extent based on submissions at the highest level of EU consolidation.

2.3.4 Cumulative sample: summary statistics

25. The cumulative analysis published in the first report of the impact study[18] includes 189 institutions reporting data at the highest level of consolidation. They reported data with sufficient quality to be included in the cumulative analysis. In addition, the cumulative analysis includes 15 subsidiaries of EU parents, which reported sufficient data to be included in the cumulative analysis, of which 12 are designated as O-SIIs in the jurisdictions where they are located. The sample for the cumulative analysis in section 3 of this report remains the same as in the first report. Section 2.3.5 in the report *Basel III reforms: impact study and key recommendations*[18] presents further detail on the sample breakdown by size, by business model and by country, as well as on the subsidiaries sample.

26. The sample of the cumulative analysis covers approximately 85% of the total assets of EU domestic banking groups and stand-alone banks. The level of coverage varies across jurisdictions (Annex 1). It is lowest for Malta and Estonia (12% and 15%, respectively) and varies from 73% to 126% for the remaining jurisdictions. The coverage exceeds 100% in those jurisdictions where some QIS participants are EU-located subsidiaries of non-EU-controlled (e.g. US) groups and are therefore not included in the denominator of the coverage ratio.

27. The number of institutions participating in the end-December 2018 data collection differs from the the number of banks participating in the end-June 2018 data collection. The same market risk inclusion criteria and data quality adjustments apply across the two data submissions.

2.3.5 Qualitative questionnaires sample: summary statistics

28. In order to gather qualitative information on policy aspects whose impact cannot be quantified, the EBA circulated two qualitative questionnaires among a sample of EU institutions and associations. The first qualitative questionnaire (CfA qualitative questionnaire) covers the overall reforms (see section 2.3.6 in *Basel III reforms: impact study and key recommendations)*[18]. The second qualitative questionnaire (FRTB qualitative questionnaire) covers the market risk reforms and has been completed by 106 institutions (Table 3 and Table 4).

[18] EBA (2019) Basel III reforms: impact study and key recommendations.

Table 3 FRTB qualitative questionnaire sample, by country

Country	FRTB qualitative questionnaire Number of banks
AT	8
BE	0
DE	22
DK	3
EE	0
ES	6
FI	1
FR	4
GR	4
HR	0
HU	1
IE	12
IT	6
LU	2
LV	1
NL	11
PL	12
PT	3
SE	10
Total	**106**

Table 4 FRTB qualitative questionnaire sample, by business model

Business model	FRTB qualitative questionnaire Number of banks
Cross-border U	32
Local U	36
Auto & Cons	3
Building Soc	1
S&L Coop	10
Private	3
Custody	3
Merchant	4
Leasing	0
Public Dev	5
Mortgage	5
Other special	4
Total	**106**

2.4 Methodology

2.4.1 Aggregation

29. Unless otherwise stated in the report:

- all averages are weighted (e.g. average RWA in the EU is weighted by country RWA);
- averages by country or by business model include institutions that are subsidiaries of EU parents, unless they belong to the same country or business model as their parent company.

2.4.2 Impact assessment scenarios

30. Unless stated otherwise, the **baseline scenario** of any impact calculation presented in the report is the fully loaded national implementation of the Basel III standards, i.e. the CRR/Capital Requirements Directive (CRD) framework as currently applied in each Member State.

31. The final Basel III framework is implemented in accordance with a **central reform scenario** based on the full implementation of the December 2017 agreement and removing any major EU-specific treatments applicable in the current framework. This implementation scenario is the closest to an implementation of the 'pure' Basel III framework, applying FRTB standards as per the 2019 BCBS publication and removing CRR CVA exemptions (for details, see Table 11 in *Basel III reforms: impact study and key recommendations*[18]).

32. Specific chapters of the report compare the impact of **alternative scenarios** with the impact of the **central scenario** to provide advice on the marginal impact of specific policy reforms and/or the implementation of alternative policy proposals.

2.4.3 Impact metrics

33. The methodologies for computing results shown in terms of MRC and regulatory capital ratios and shortfalls are the same as those used for the first report, in which they are explained in section 2.4.2.

2.4.4 Main differences with respect to the EBA Basel III monitoring analysis

34. The impact assessment methodology broadly follows the methodology used in regular EBA reports on the monitoring of the Basel III reforms, published in March 2019 and October 2019.[19]

35. The most relevant methodological differences between the two analyses are:

i. **Sample:** compared with the Basel III monitoring sample, the sample used in this report includes a larger number of institutions, covering more jurisdictions, more

[19] See for instance the EBA Basel III monitoring report published in March 2019 (reference date: as of June 2018) and EBA Basel III monitoring report published in October 2019 (reference date: as of December 2018).

specialised business models and a larger share of small institutions, and excludes UK institutions.

ii. **Calculation of the MRC:** whereas the Basel III monitoring reports compute MRC based on Pillar 1 minimum requirements augmented only by the capital conservation buffer and (where applicable) the global systemically important institution (G-SII) buffer, in the current report MRC is computed taking into account the full combined buffer requirement as well as the Pillar 2 requirement.

iii. **Presentation of the output floor and leverage ratio impact within the cumulative impact:** the order in which the leverage ratio and output floor are included in the calculation of the total revised T1 MRC matters for determining the marginal contribution of each of the two elements to the total average change in MRC (which instead is not sensitive to the order). A given policy requirement tends to make less of a contribution to the total change in MRC when it is implemented last in the calculation of total MRC, as it adds on a relatively higher cumulative requirement. Its marginal contribution is instead higher when it is implemented before the other requirement. The present analysis implements the output floor as the last element of the regulatory framework, as the leverage ratio was agreed upon prior to the finalisation of the December 2017 package. The main results presented in the Basel III monitoring analysis, instead, implement the leverage ratio last in the calculation of total MRC. Nevertheless, the methodology used in this report is also presented as an alternative approach in the Basel III monitoring analysis.

36. Other elements of difference in methodology between the two analyses relate to the treatment of the internal ratings-based (IRB) shortfall/excess, the treatment of IRB provisions, data quality criteria related to CVA and more general adjustments for data quality (Table 5).

Table 5 Other differences in methodology between the EBA Basel III monitoring report and this report

	EBA Basel III monitoring report	This report
Adjustment for IRB shortfall	The IRB shortfall is converted into minimum required capital only in the case of the RWA-based requirement and includes an additional adjustment due to the removal of the exemption to risk weight equity exposures under Article 49 of the CRR[20]	The IRB shortfall is converted into minimum required capital in the case of both the RWA-based and the leverage ratio-based requirements
Calculation of revised provisions (IRB banks)	Provisions applicable in the revised framework are obtained as a proportion of the current provisions based on the expected loss change	Provisions applicable in the revised framework are obtained as a proportion of the current provisions based on the exposure change
CVA risk data quality	Figures reported in June 2018 COREP and this report are not compared	Figures reported in this report are scaled on the basis of figures reported in June 2018 COREP. Data based on the EU-specific template
Data quality adjustments		Additional data adjustments and fall back approaches are applied: - non-modelled RWA are equalised to the revised RWA when the data are not available Fall back approach to select the amount of actual capital

37. The impact of the market risk reform is also calculated using a methodology different from that used in the EBA Basel monitoring report, published in October 2019, which is based on the same data collection.[19]

2.5 Data quality and interpretation of the results

38. The results should be interpreted with caution, taking into account data quality and several simplifying assumptions.

39. Given the complexity of the exercise, banks were asked to report very granular and specific data implementing standards that are not yet in place. In order to provide these data, it is likely that banks themselves used a number of approximations, assumptions and shortcuts. The expectation is that, when in doubt about specific elements of the revised standards or the interpretation of the instructions, institutions may have made conservative reporting choices, leading to an overestimation of the impact.

40. In addition, a number of simplifying and conservative assumptions were taken that may result in an overestimation of the capital impact, as follows:

[20] Because of data quality issues found in the equity data within the QIS analysis, this adjustment has not been included in the results shown in this report.

- **Static balance sheet assumption**: institutions do not react to the revised requirements by adjusting their business and/or managing the regulatory capital costs.

- **Static requirements assumption:** which results in Pillar 2 and combined buffer requirements as of June 2018 to be used for both the baseline and the 2027 reform scenarios. Higher RWA resulting from the implementation of the revised framework may lead — in some cases — to a revision and, possibly, re-calibration of the Pillar 2 and buffer requirements.

- **Profit retention to cover capital shortfall:** the cumulative impact analysis assumes no role for profit retention in rebuilding the capital base. An exercise based on 2014-2018 average profits for the QIS sample shows that the resulting 2027 total capital shortfall could more than halve if banks retained generated profits.

41. In comparison with the cumulative results presented in *Basel III reforms: impact study and key recommendations*,[18] the results shown in this report are based on the final FRTB framework including the January 2019 amendments (2019 FRTB).

2.6 Structure of the report

42. This report is structured as follows:

- **Chapter 3** provides an overview of the impact of the reform focusing on a 'central reform scenario'.

- **Chapters 4 and 5** elaborate on the impact of the final Basel III framework in risk-specific areas, covered in the following order: CVA risk and market risk; the **Annexes** include (i) additional information on the sample and methodology, (ii) additional impact assessment results, and (iii) an overview of the composition of current (i.e. CRR baseline) capital requirements for the sample.

- **Chapter 6** provides the macroeconomic impact assessment of the reform, which is carried out in cooperation with the ECB.

3. Main findings

3.1 Changes in minimum required capital (Tier 1)

43. This section presents the findings of the EBA's impact assessment analysis on the various components of the revised Basel III framework. In comparison with the cumulative analysis presented in the first CfA report, the impact results presented here cover the final Basel III reforms in all areas, i.e. including the application of the amended framework for market risk (2019 FRTB).

44. The results in the areas of credit risk, operational risk, SFTs and credit risk adjustment are based on data for the end-June 2018 reporting period and remain unchanged from those in the first CfA report. The results in the market risk area and the calculations of the FRTB framework's impact on the output floor are based on the end-December 2018 data collection. References to the same results without the FRTB adjustments are presented in the first CfA report and are based on data for the end-June 2018 reporting period.

45. The overall conclusion drawn in the cumulative analysis of the first report remains valid. Under conservative assumptions, at its steady-state implementation scheduled for 2027, the final Basel III reform could increase the T1 MRC amount, which includes Pillar 2 requirements and EU-specific buffers, by 23.6% with respect to the June 2018 baseline. The amended market risk and CVA reform contribute 2.2% and 3.9% to the increase, respectively. The CVA reform is the second highest driver of the impact.

46. In comparison with the results based on the Basel III reform, including the 2016 FRTB framework, which are presented in the first CfA report, the FRTB amendments introduced in 2019 are expected to reduce the overall impact of Basel III reforms by 0.8% (24.4%[21] under 2016 FRTB vs 23.6% under 2019 FRTB).[22] This decrease is driven by both the change in market risk reform (2.5%[21] vs 2.2%) and the impact of the amended reform on the output floor (9.1%[21] vs 8.6%) (Table 6).

47. The output floor remains the main driver of the impact (+8.6%); however, it is less binding compared with the impact of the output floor when the 2016 FRTB is applied. Only a subset of institutions in the sample, which have a market risk portfolio, are also bound by the output floor. For a few large institutions in this subset, the gap between modellable and non-modellable RWA for market risk decreases with the FRTB 2019 amendments, which drives the impact on the average output floor. At the steady-state implementation of the reform, the output floor is expected to constrain 40 out of 79 internal model banks, which account for 64% of internally modelled RWA in the sample. When adopting the 2019 FRTB amendments, one additional

[21] See Table 1 in EBA (2019) Basel III reforms: impact study and key recommendations.

[22] The market risk sample between the two data collections differs. For institutions reporting only one of the two data collections, the 2016 FRTB impact is assumed.

institution becomes constrained by the output floor, while at the same time another institution is not constrained any more.

48. The revised Basel III reform has a materially higher impact on large and systemically important institutions than on medium-sized and small ones. The amended market risk and the CVA reforms are also mainly affecting large and systemically important institutions.

49. The lower impact coming from the output floor is almost entirely driven by a few large G-SIIs (7.6%[21] vs 6.4%) (Table 6).

Table 6 Percentage change in T1 MRC (relative to current T1 MRC), by bank size

Bank size	Δ SA	Δ IRB	Δ CCP	Δ SEC	Δ MKT	Δ OP	Δ CVA	RW	Δ LR	Δ OF	Δ Total
All banks	**2.7**	**2.7**	**0.1**	**0.6**	**2.2**	**3.3**	**3.9**	**15.4**	**-0.5**	**8.6**	**23.6**
Large	2.3	2.8	0.1	0.7	2.2	3.4	4.1	15.6	-0.5	9.0	24.1
of which: G-SIIs	1.7	3.5	-0.1	1.2	3.9	5.5	5.1	20.7	0.0	6.4	27.2
of which: O-SIIs	2.3	1.7	0.2	0.3	1.2	2.1	3.7	11.5	-0.5	12.0	23.0
Medium	9.7	0.1	0.0	0.0	0.9	0.3	0.5	11.5	-1.1	0.9	11.3
Small	10.7	0.0	0.2	-1.9	0.0	-3.7	0.3	5.6	-0.1	0.0	5.5

Sources: EBA 2018-Q2 QIS data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 189 banks: large (104), of which G-SIIs (8), of which O-SIIs (67); medium (61); small (24). SA, standardised approach to credit risk; IRB, internal ratings-based approach to credit risk; CCP, central counterparty; SEC, securitisation; MKT, market risk; OP, operational risk; CVA, credit valuation adjustment; LR, leverage ratio; OF, output floor.

50. The application of Pillar 2 and combined buffer requirements[23] in the calculation of the MRC is likely to overestimate the impact of the reform. When Pillar 2 and EU-specific buffer requirements are excluded from the impact calculation, the average change in T1 MRC for the EU sample amounts to 17.7%. Taking into account the different sample and other methodological differences, this impact figure is, overall, in line with the impact results published by the EBA in the context of the regular Basel III monitoring report (see Annex 2).

Table 7 Distribution of percentage change in T1 MRC (relative to current T1 MRC), all banks

Percentile	Percentage (%)
5th percentile	-6.6
25th percentile	0.0
Median	10.6
75th percentile	21.5
95th percentile	49.9

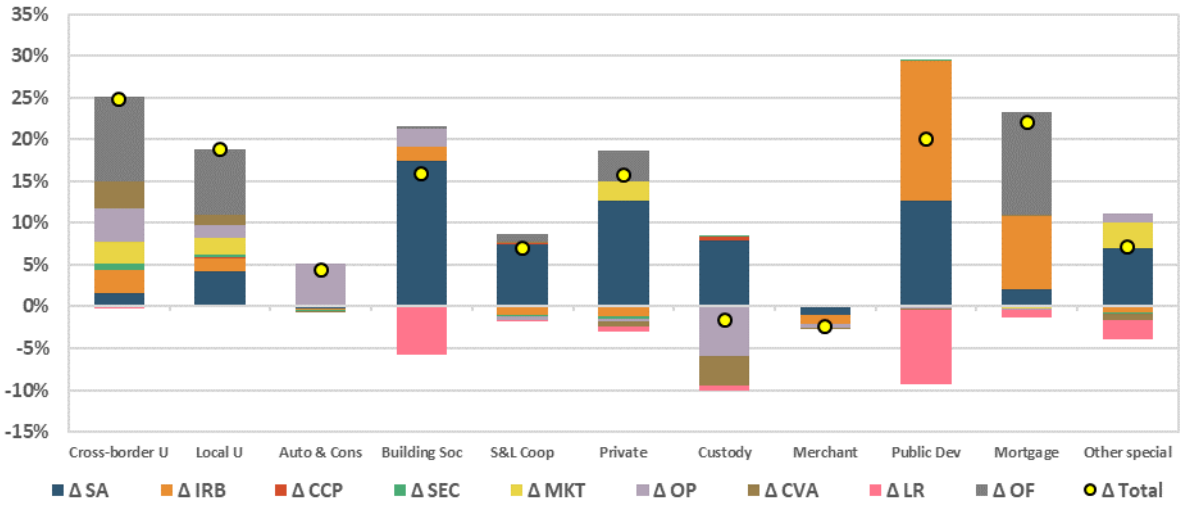
Sources: EBA 2018-Q2 quantitative impact study (QIS) data, EBA 2018-Q4 QIS data and EBA calculations.
Note: Based on a sample of 189 banks.

[23] The combined buffer requirement is computed in accordance with EBA Q&A 2015_1079, which describes how the combined buffer requirement is to be computed and reported. This entails different formulae depending on whether Article 131(14) or (15) of Directive 2013/36/EU (CRD) applies. The combined buffer requirement is different from the buffer requirement used in the regular Basel monitoring, in which only Basel-specific buffers — capital conservation buffer and GSIIs buffers — are included, while EU-specific buffer requirements are excluded.

51. Cross-border universal and local universal banks are the most affected by the amended market risk and CVA reforms. For custody banks, the CVA reform decreases the minimum required capital by 3.0% (Figure 1).

52. For private banks and other specialised banks, the 2019 FRTB amendments result in a slight increase in MRC compared with applying the market risk reform prior to the 2019 revision. For all other institutions, the impact is lower.

Figure 1 Percentage change in T1 MRC (relative to current T1 MRC), by business model



Sources: EBA 2018-Q2 quantitative impact study (QIS) data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 204 banks: Cross-border U (41); Leasing* (2); Public Dev (10); Mortgage (8); Other special (11); Local U (63); Auto and Cons (8); Building Soc (6); S&L Coop (34); Private (8); Custody (7); Merchant (5); CCP* (1).
SA, standardised approach to credit risk; IRB, internal ratings-based approach to credit risk; CCP, central counterparty; SEC, securitisation; MKT, market risk; OP, operational risk; CVA, credit valuation adjustment; LR, leverage ratio; OF, output floor.
*Not shown in the chart because fewer than three entities in the cluster.

3.2 Changes in risk-weighted assets

53. The impact of the reform in terms of RWA closely mimics the impact measured in terms of T1 MRC (Table 8).

Table 8 Percentage change in RWA (relative to current RWA), by bank size

Bank size	Δ SA	Δ IRB	Δ CCP	Δ SEC	Δ MKT	Δ OP	Δ CVA	Δ OF	Δ Total
All banks	**2.9**	**2.5**	**0.1**	**0.6**	**2.2**	**3.5**	**3.9**	**8.0**	**23.7**
Large	2.5	2.6	0.1	0.7	2.3	3.7	4.1	8.3	24.2
of which: G-SIIs	1.8	3.2	-0.1	1.1	3.8	5.5	5.0	6.0	26.5
of which: O-SIIs	2.5	1.2	0.2	0.3	1.2	2.3	3.7	10.9	22.4
Medium	11.1	0.3	0.0	0.0	0.8	0.2	0.5	1.2	13.9
Small	11.6	0.0	0.3	-2.1	0.0	-3.6	0.4	0.0	6.6

Sources: EBA 2018-Q2 quantitative impact study (QIS) data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 189 banks: large (104), of which G-SIIs (8), of which O-SIIs (67); medium (61); small (24). SA, standardised approach to credit risk; IRB, internal ratings-based approach to credit risk; CCP, central counterparty; SEC, securitisation; MKT, market risk; OP, operational risk; CVA, credit valuation adjustment; LR, leverage ratio; OF, output floor.

54. RWA and T1 MRC changes do not fully correspond for the following reasons:

- the T1 MRC calculation takes into account the leverage ratio T1 MRC requirement for those institutions that are constrained by the leverage ratio in either the baseline or the reform scenario;
- the T1 MRC calculation takes into account the IRB shortfall (of provisions vs expected losses) for institutions using the IRB approach to credit risk.[24]

3.3 Impact on capital ratios and capital shortfalls

55. The impact of the final Basel III framework, including the 2019 FRTB amendments, would reduce the average total capital ratio of the banks in the sample from 17.9% to 14.4% and determine a shortfall in total capital of EUR 124.8 billion, of which EUR 83.0 billion is CET1 (Table 9).

56. In comparison to the results based on the Basel III reforms including the 2016 FRTB framework shown in the first report, the 2019 FRTB amendments reduce the impact of the reforms. The shortfall in total capital reduces by EUR 10.3 billion from EUR 135.1 billion[25] to EUR 124.8 billion, with the benefit being carried entirely by large institutions. The capital shortfalls for small and medium-sized institutions stay unchanged.

Table 9 Capital ratios and shortfalls, by bank size

Bank size	CET1			T1			TC		
	Current ratio (%)	Revised ratio (%)	Shortfall (EUR bn)	Current ratio (%)	Revised ratio (%)	Shortfall (EUR bn)	Current ratio (%)	Revised ratio (%)	Shortfall (EUR bn)
All banks	**14.4**	**11.6**	**83.0**	**15.3**	**12.4**	**119.0**	**17.9**	**14.4**	**124.8**
Large	14.2	11.4	82.9	15.2	12.2	118.2	17.8	14.3	123.8
of which: G-SIIs	12.7	10.1	46.8	13.8	10.9	62.6	16.2	12.8	75.3
of which: O-SIIs	15.4	12.5	32.2	16.3	13.3	49.5	19.2	15.6	41.1
Medium	17.3	15.2	0.1	17.5	15.4	0.8	18.9	16.6	0.9
Small	17.0	16.0	0.0	17.2	16.1	0.0	18.3	17.1	0.1

Sources: EBA 2018-Q2 QIS data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 189 banks: large (104), of which G-SIIs (8), of which O-SIIs (67); medium (61); small (24). T1 and total capital (TC) shortfalls include the shortfall incurred by institutions constrained by the leverage ratio in the revised framework.

[24] Excess provisions with respect to expected losses are reflected only in total capital (TC) MRC, as they take the form of T2 capital.

[25] See Table 2 in EBA (2019) Basel III reforms: Impact study and key recommendations.

4. CVA risk

57. The final Basel III standards aim to enhance the risk sensitivity of the CVA framework, strengthen its robustness and improve its consistency with the revised market risk framework and industry practices for accounting purposes.

58. The reform replaces all existing approaches to calculate CVA risk capital requirement with two new approaches: the standardised approach for CVA risk (SA-CVA) and the basic approach for CVA risk (BA-CVA). The BA-CVA envisages two alternatives: one that recognises eligible CVA hedges (full BA-CVA) and the other that does not recognise CVA hedges (reduced BA-CVA). The revised CVA risk framework also allows banks with a small derivative business to calculate their CVA capital charge as 100% of the capital requirement for counterparty credit risk (CCR) (hereafter referred to as the 'simplified treatment').

59. In November 2019, the BCBS published a Consultation Paper on a final set of limited and targeted adjustment to the CVA risk framework. These include a first set of revisions to align the CVA framework with the recent amendments in the market risk framework (i.e. the 2019 FRTB standards) and a second set of revisions to facilitate its full, timely and consistent implementation.

60. In the EU, a series of transactions are currently exempted from the scope of the CVA capital requirement under Article 382(3) and 382(4) of the CRR, and are referred as 'EU CVA exemptions'. These include transactions between clearing members and clients in the context of indirect clearing when the clearing member is acting as an intermediary between the client and a qualifying central counterparty, transactions with non-financial counterparties, transactions with intragroup counterparties, transactions with pension fund counterparties and transactions with sovereign counterparties.

61. The impact results presented below include the impact of removing the EU CVA exemptions, along with all other reforms introduced in the December 2017 CVA framework.

62. The EBA expects that the impact figures presented below overestimate the ultimate impact of the revised CVA risk framework as a result of several caveats and limitations, including:

- the estimated impacts are based on a static balance sheet assumption and ignore any behavioural responses and/or balance sheet/business adjustments by banks;
- the impact of the CVA exemptions may be biased upwards, as it is likely that banks have not anticipated the revisions in their hedging strategies and/or collateral arrangements with exempted counterparties — in addition, some of the exempted transactions could be moved to central clearing, further diminishing the impact of removing the CVA exemptions;

- banks' infrastructure and systems may not be ready to produce precise calculations (e.g. some banks may have not yet have been able to produce numbers on more advanced methods despite their intention to use them);
- data submitted by banks err on the conservative side, particularly when asked to estimate the impact of new pieces of regulation.
- the ongoing revisions to the CVA risk standards at international level are expected to reduce the overall capital impact of the revised CVA risk framework.

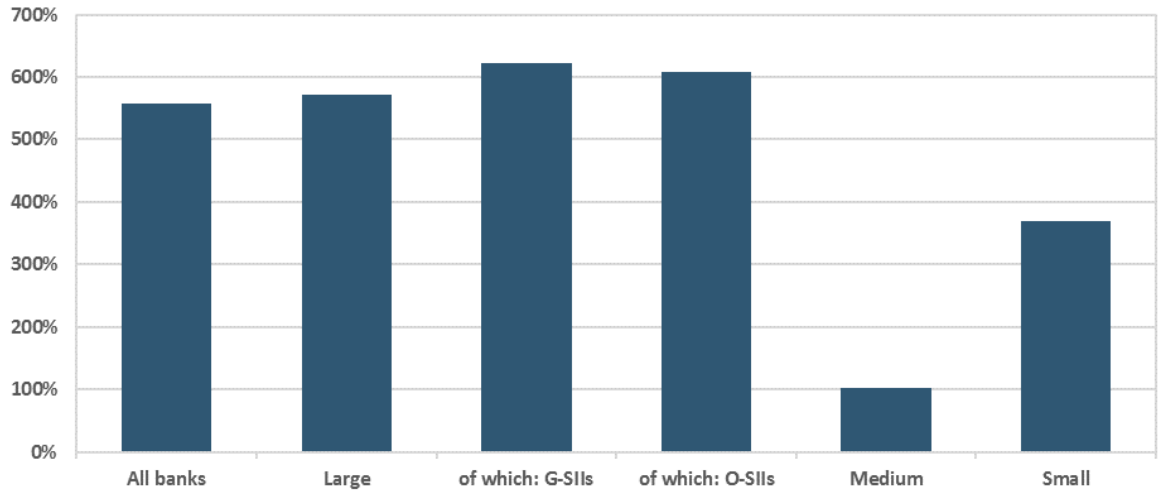
Thus, the results of this section should be interpreted with caution.

4.1 Impact of overall reform

63. The average impact of moving from the current to the revised framework on the CVA RWA is 558% (Figure 2), driven by large institutions.[26] The total impact on CVA RWA is the combined result of (i) the revised methods to calculate CVA capital requirements, and (ii) the changes in the scope of transactions subject to CVA capital requirements (see section 4.2.1 for the impact of EU CVA exemptions). The seemingly large magnitude of the relative increase can be partly explained by the low baseline, i.e. low current CVA requirement.

64. Large institutions are more affected than medium-sized and smaller institutions (average impact of 390% for large banks in comparison with 102% and 369% for medium-sized and small banks, respectively). The G-SIIs appear to be the most affected, with the average impact reaching 622%.

Figure 2 Percentage change in CVA RWA (relative to total current CVA RWA), by bank size



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 105 banks: large (68), of which G-SIIs (8), of which O-SIIs (38); medium (32); small (5).

[26] For institutions that are eligible to use the simplified treatment and have indicated that they intend to do so, the revised capital requirements for CVA risk are set to be equal to the CCR capital requirements for transactions within the scope of CVA risk.

65. The median bank experiences a much lower impact, at 208% (Table 10). For most banks (more than 75% of sample banks), the revised CVA framework leads to higher capital requirements; only for some banks can a decrease in capital requirements be observed under the revised framework relative to the current framework.

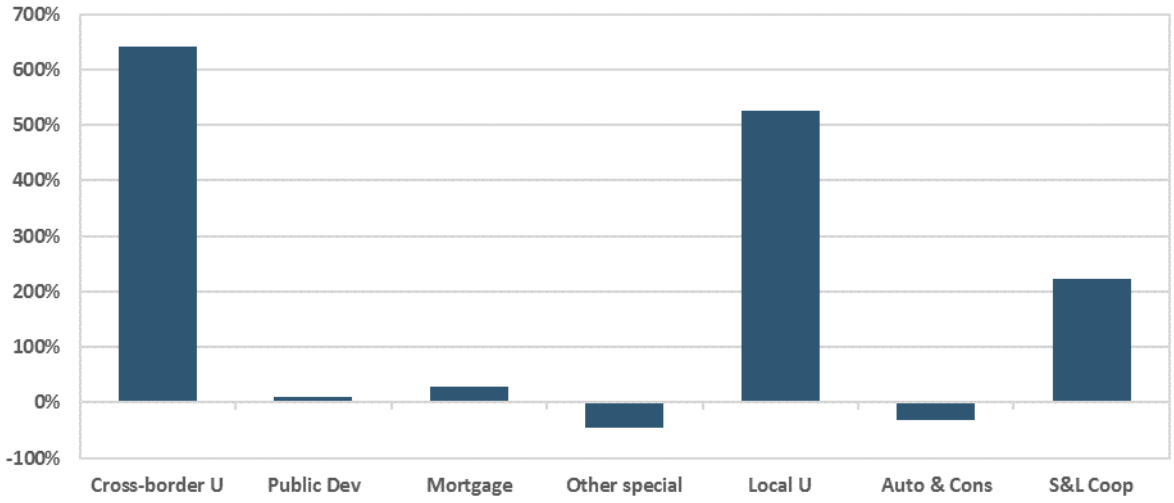
Table 10 Distribution of percentage change in CVA RWA (relative to total current CVA RWA), all banks

Percentile	Percentage (%)
5th percentile	-84
25th percentile	0
Median	208
75th percentile	671
95th percentile	2588

Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 105 banks.

66. The impact is heterogeneous across business models. Most business models have a positive impact on RWA, while a decrease in capital requirements is observed for other specialised banks, automotive and consumer banks, private banks and custody banks (Figure 3).

Figure 3 Percentage change in CVA RWA (relative to total current CVA RWA), by business model

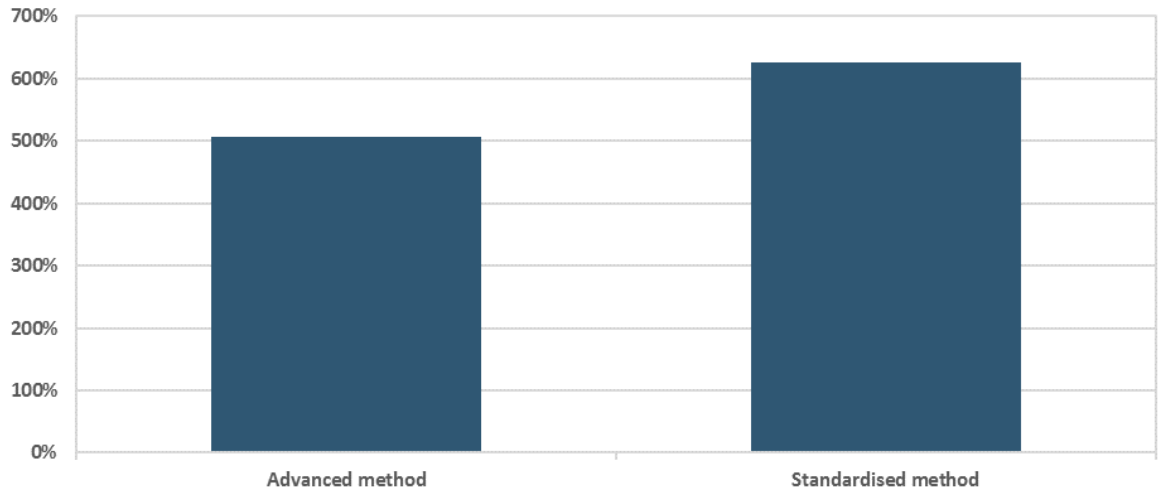


Sources: EBA 2018-Q2 QIS data and EBA calculations.
Notes: Based on a sample of 112 banks: Cross-border U (34); Leasing* (1); Public Dev (5); Mortgage (5); Other Special (8); Local U (32); Auto & Cons (5); Building Soc* (1); S&L Coop (15); Private* (2); Custody* (2); Merchant* (2).
*Not shown in the chart because fewer than three entities in the cluster.

67. A comparison of the impact by current approach (Figure 4) shows that banks currently using the standardised method experience a higher impact than banks using the advanced method. Almost all banks that are currently using the advanced method move to the SA-CVA under the revised framework, although many of them carve out part of their portfolio for the full or reduced BA-CVA. On the other hand, the majority of standardised banks move to the reduced BA-CVA; a

significant share (in terms of number of banks) uses the simplified treatment for CVA risk, while only a few banks use the full BA-CVA and SA-CVA (see Figure 23 in Annex 2 for a breakdown of revised CVA RWA by current and revised approach).

Figure 4 Percentage change in CVA RWA (relative to total current CVA RWA), by current approach



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Notes: Based on a sample of 105 banks: advanced method (11); standardised method (93); alternative method (Art. 385 of the CRR)* (1).
*Not shown in the chart because fewer than three entities in the cluster.

4.2 Individual reforms and scenario analysis

4.2.1 EU CVA exemptions and fair-valued SFTs

68. The baseline scenario considered in this report takes into account the EU CVA exemptions, as they are part of the current national implementation of the CRR/CRD framework, i.e. no CVA prudential capital charge is computed on these transactions (Table 11). However, the EU CVA exemptions are not envisaged in the final Basel III standards and hence are reintegrated in the Basel III central reform scenario.

69. In addition, the final Basel III standards bring fair-valued SFTs into the scope of CVA capital requirements, whereas under the current framework SFTs are in scope only if the CVA risk stemming from them is deemed material by the competent authority.

Table 11 Scope of transactions subject to CVA capital requirement: CRR and final Basel III framework

Transactions	CRR (baseline scenario)	Final Basel III framework
Derivatives	Derivatives not cleared through a QCCP	Derivatives not cleared through a QCCP
SFTs	SFTs are included in the scope of CVA risk if the competent authority determines that the CVA risk arising from SFTs is material	SFTs fair valued for accounting purposes
Exemptions	The EU CVA exemptions envisaged in Article 382(3) and (4) of the CRR are excluded from the scope of CVA risk	The EU CVA exemptions are reintegrated in the scope of CVA risk

70. This section looks at the impact of the changes in the CVA scope by comparing the central Basel III scenario, with an alternative scenario, in which the scope of transactions subject to CVA capital requirements is assumed to remain the same as in the current framework, i.e. the CRR scope (Table 12).

Table 12 Scenario specification — CVA scope

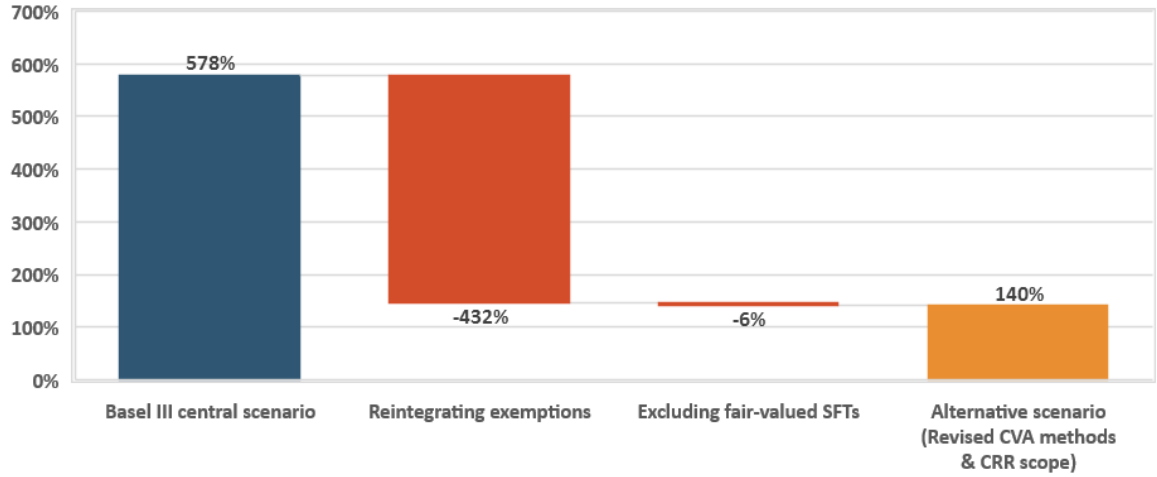
Scenario	Description
Central Basel III scenario	**Scope of CVA**: Based on the final Basel III framework (i.e. reintegrating EU CVA exemptions in the CVA scope and including fair-valued SFTs) **CVA methods**: Based on the final Basel III framework (i.e. reduced and full BA-CVA, SA-CVA and the simplified treatment based on CCR)
Alternative scenario (CRR scope)	**Scope of CVA**: Based on Article 382 of the CRR (i.e. no CVA capital charge is computed for EU CVA exemptions; and for SFTs a CVA capital charge is computed if the CVA risk arising from them is deemed material by the national competent authority) **CVA methods**: Based on the final Basel III framework (i.e. reduced and full BA-CVA, SA-CVA and the simplified treatment based on CCR)

71. Under the alternative scenario, the impact is significantly lower, suggesting that the overall impact under the Basel III central scenario is primarily driven by the changes in the CVA scope and in particular the removal of EU CVA exemptions (Figure 5).[27] On the other hand, the impact of fair-valued SFTs appears to be minimal. The pattern is consistent across all size clusters (Figure 6).

[27] The implementation of EU CVA exemptions in the Basel III framework will decrease the contribution of CVA risk to the total MRC change by almost 3 p.p. The overall capital impact of the removal of the CVA exemptions is partially offset by its effect on the output floor, resulting in a lower total T1 MRC change of 2.5 p.p. See Annex 2 for the full results. The effect of the reduction in the output floor requirement should be taken into account when assessing the impact of the removal of the CVA exemptions.

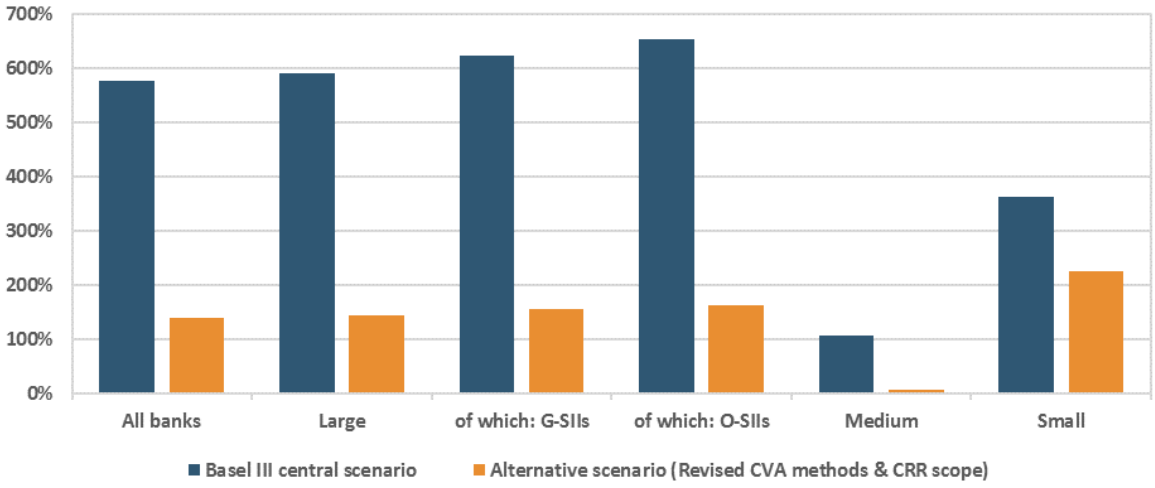
However, small banks experience a more subtle reduction, as they appear to hold fewer transactions with exempted counterparties.

Figure 5 Percentage change in CVA RWA (relative to total current CVA RWA) due to changes in the scope of the CVA capital requirements, all banks



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 92 banks.

Figure 6 Percentage change in CVA RWA (relative to total current CVA RWA) due to changes in the scope of the CVA capital requirements, by bank size

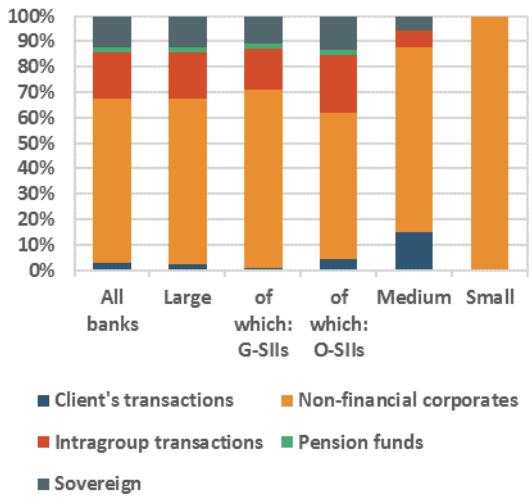


Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 92 banks: large (58), of which G-SIIs (8), of which O-SIIs (30); medium (30); small (4).

72. Exemptions towards non-financial corporates appear to be the main driver of the impact of the EU CVA exemptions, followed by intra-group transactions and sovereign counterparties (Figure 7). This holds true across all size clusters, with the exemption of medium-sized banks, for which

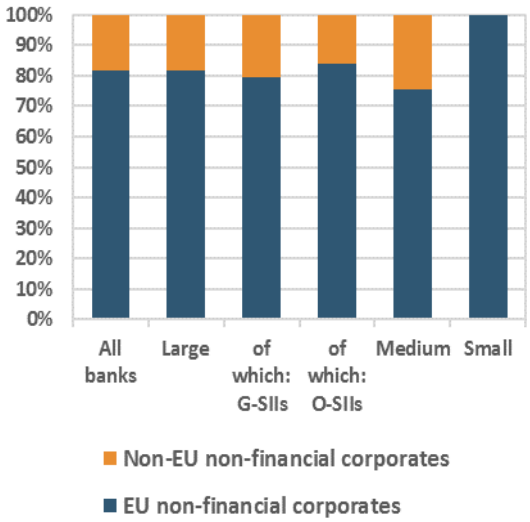
client's transactions also contribute to the impact. The majority of exempted transactions with non-financial corporates are with EU counterparties (around 80% of the total, see Figure 8).

Figure 7 Breakdown of revised CVA RWA for EU CVA exempted transactions by type of counterparty, by bank size



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 92 banks: large (58), of which G-SIIs (8), of which O-SIIs (30); medium (30); small (4).

Figure 8 Breakdown of revised CVA RWA for exempted transactions to non-financial corporates by geography, by bank size



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 92 banks: large (58), of which G-SIIs (8), of which O-SIIs (30); medium (30); small (4).

4.2.2 Proportionality in the CVA framework

73. The revised CVA risk framework provides for a simplified treatment to calculate capital requirements for CVA risk based on 100% of banks' capital requirements for CCR. Under the Basel standards, this simplified treatment can be used only by banks whose aggregate notional amount of non-centrally cleared derivatives is less than or equal to EUR 100 billion.

74. The CfA requests the EBA to assess the suitability of the simplified treatment for CVA risk, including an assessment of whether the aforementioned threshold is appropriate and whether alternative thresholds could be considered instead. The quantitative analysis and the policy considerations in this regard are discussed in the policy report on CVA and market risk, which has been developed together with — and should be read alongside — this report.

4.2.3 November 2019 BCBS consultative document on CVA risk framework

75. The BCBS consultative document published in November 2019 proposes a set of limited, targeted and final adjustments to the CVA framework. These comprises two types of revisions. First, the BCBS is proposing to align the CVA framework to the 2019 FRTB standards. Second, the BCBS is considering to adjust the scope of portfolios subject to CVA risk capital requirements by excluding some securities financing transactions (SFTs) where the CVA risks stemming from such positions are not material, and exempting certain client-cleared derivatives. Moreover, the BCBS is

considering reducing the margin period of risk for some centrally-cleared client derivatives in the SA-CVA, which would bring the CVA requirement more in line with the CCR framework and further incentivise banks to centrally clear over-the-counter derivatives. Finally, the BCBS is considering adjusting the value of the existing 1.25 multiplier (m_{CVA}) applied to the capital requirements calculated under SA-CVA, which scales the total SA-CVA capital requirements. To maintain an appropriate relative calibration between the SA-CVA and the BA-CVA, the BCBS will consider a revised scaling of the overall capital requirements calculated under both the reduced BA-CVA and full BA-CVA approaches. This section assesses, separately, the impact of aligning the CVA framework with the revised market risk framework and the impact of a potential recalibration of the SA-CVA and BA-CVA as proposed in the November 2019 Consultative Document (Table 13). This analysis is indicative only of the direction of the impact, as the extent of the changes proposed by the BCBS is not known and currently subject to consultation.

76. Nonetheless, in order to gauge the potential impact, this section provides a sensitivity analysis, which gives an indication of the potential impact. As explained below, the impact of a potential recalibration is almost linear, and thus the impact of different calibration adjustments can be proxied from the results below. The sensitivity to changes in the multiplier is assessed by considering the impact of the potential recalibration being based on a marginal analysis in which a 10% reduction in the existing 1.25 multiplier (m_{CVA}) applied to the capital requirements calculated under SA-CVA and an equivalent 10% reduction in BA-CVA capital requirements are considered.

77. In addition to this sensitivity analysis related to the changes in the BA-CVA and SA-CVA, the adjustments to the risk weights (RWs) related to the general interest rate risk (GIRR) and foreign exchange (FX) delta have also been taken into account in the alternative scenario. The differences between the main scenario and the alternative scenario indicate the sensitivity of the capital impact to the changes.

Table 13 Scenario specification — November 2019 BCBS consultative document on CVA risk framework

Scenario	Description
Central Basel III scenario	GIRR delta RW: as per final Basel III framework FX delta RW: as per final Basel III framework Other risk classes RW: as per final Basel III framework m_{CVA} = 1.25 BA-CVA capital requirements: as per final Basel III framework
Alternative scenario (GIRR RW, FX RW and 10% calibration adjustment)	GIRR delta RW: reduction of 30% FX delta RW: reduction of 50% Other risk classes RW: as per final Basel III framework m_{CVA} = 1.125 (= 1.25 × 90%) BA-CVA capital requirements: 10% reduction in the BA-CVA capital requirements of the final Basel III framework

78. It should be noted that the remaining proposed revisions in the November 2019 Consultative Document could not be quantified because of data limitations — the unquantified revisions are expected to result in an even greater reduction in capital requirements for CVA risk.

79. The impact under the alternative scenario is considerably lower than the central Basel III scenario, standing at around 479% (Figure 6) compared with 558% under the central scenario. The revisions in GIRR and FX RW account for around one fifth of the impact reduction, whereas the remaining four fifths comes from the SA-CVA and BA-CVA calibration adjustment.

80. The relatively small impact of the GIRR and FX RW revisions is explained by the fact that GIRR and FX delta risks constitute a small share of SA-CVA RWAs; roughly 12% of total SA-CVA RWAs are due to GIRR delta risks and 4% due to FX delta risks (Figure 10). The vast majority of SA-CVA RWAs are due to counterparty credit spread (CCS) delta risks (72%).

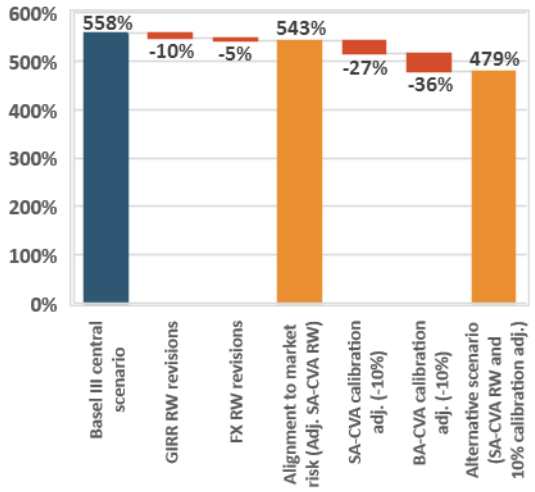
81. In terms of the impact due to the calibration adjustment, most of the reduction arises from the BA-CVA calibration adjustment. While the recalibration adjustment is the same for SA-CVA and BA-CVA in terms of percentage reduction, BA-CVA represents around 55% of total revised CVA RWA, whereas SA-CVA covers around 45% (see Figure 22 in Annex 2); hence, the impact is uneven between BA-CVA and SA-CVA and the outcome reflects these proportions.[28]

82. It should be noted that, once the revisions to SA-CVA RW are taken into account, alternative calibration levels are expected to have an almost linear effect on the final impact, as the share of revised RWA subject to the simplified treatment and thus not benefiting from the adjustment is negligible. For example, if a 20% calibration adjustment were to be proposed – which corresponds to a mcva = 1 (the lowest bound proposed in the BCBS consultative document) – for both SA-CVA and BA-CVA, the final impact would be around 415% (= 543% – 2 × [27% + 36%]).

83. The impact of this alternative scenario in cumulative terms is presented in Annex 2 (see Table 24 and Table 25). Under this scenario, which for simplicity assumes a 10% calibration adjustment, the impact of CVA risk declines from 3.9% to 3.4%. This change in impact results in a total impact of 23.1% (from 23.6%) due to the CVA adjustment alone, which is partly offset by a 0.1% move in the opposite direction coming from the output floor. Considering the almost linear effect of the calibration adjustment, under a 20% calibration adjustment the CVA impact would decline further to around 2.9%.

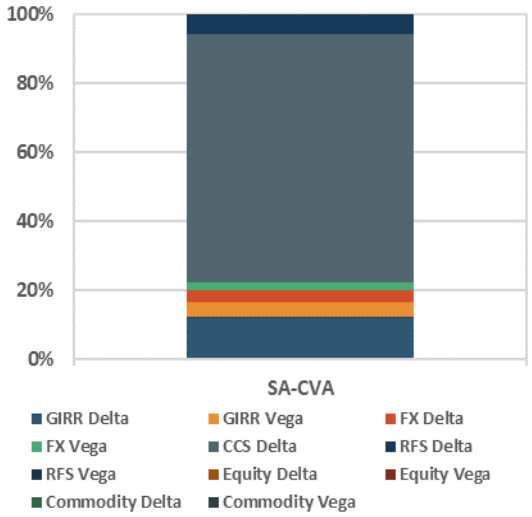
[28] In reality, the contribution of each method to the total reduction could be different. For example, some banks may have used the BA-CVA approach for the purposes of the QIS, as their infrastructure and systems are not yet ready to calculate capital requirements with SA-CVA, despite their intention to use this method once the CVA framework is implemented. This may lead to an underestimation of the contribution of SA-CVA relative to BA-CVA.

Figure 9 Percentage change in CVA RWA (relative to total current CVA RWA) due to November 2019 BCBS revisions to CVA framework and calibration adjustment



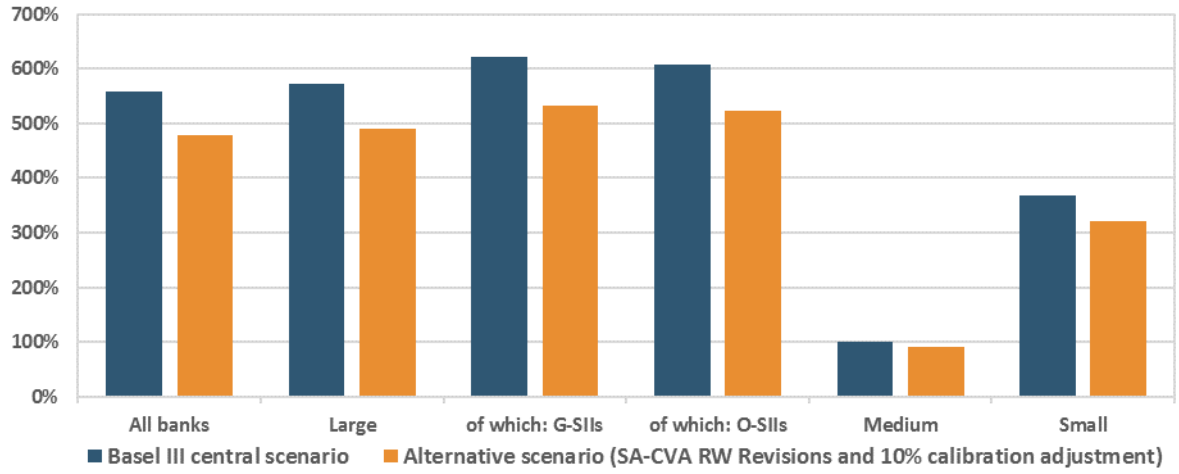
Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 105 banks.

Figure 10 Breakdown of SA-CVA RWA (Basel scope) by risk class, SA-CVA banks only



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Notes: Based on a sample of 13 banks. GIRR, general interest rate risk; FX, foreign exchange; CCS, counterparty credit spread; RFS, reference credit spread.

Figure 11 Percentage change in CVA RWA (relative to total current CVA RWA) due to 2019 November BCBS revisions to CVA framework and calibration adjustment, by bank size



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 105 banks: large (68), of which G-SIIs (8), of which O-SIIs (38); medium (32); small (5).

4.3 Implementation and policy recommendations

IMPORTANT NOTE: This section includes the main policy recommendations on the CVA risk framework for which QIS data was collected. Additional considerations on the CVA framework, and more detailed policy rationale, can be found in the EBA report *Policy advice on the Basel III reforms: credit value adjustment (CVA) and market risk* accompanying this publication. **The numbering of the recommendations in this section is aligned with the numbering used in that accompanying report.**

84. In light of the results from the quantitative assessment presented in this report, and on the basis of the policy considerations included in the policy report on CVA and market risk developed alongside this document, the EBA puts forward the following main policy recommendations in the area of CVA risk in response to the CfA. The reader is invited to refer to the policy report on CVA and market risk with regard to the rationale for these recommendations.

4.3.1 CVA framework

Recommendation CVA 1: General position related to the CfA on CVA

Considering the ongoing targeted revisions to the CVA risk framework at international level, as proposed in the BCBS consultative document on targeted final revisions to the CVA risk standards, at this stage the EBA refrains from providing policy recommendations in this regulatory area, except where these were considered relevant at the time of producing this advice, irrespective of the ongoing revisions to the CVA risk standards. At the same time, the EBA continues to support the policy recommendations that it put forward in its report on CVA, which are recalled in the context of this response to the CfA.

4.3.2 CVA exemptions

Recommendation CVA 2: CVA exemptions

Consistent with its previous positions, the EBA considers that the CVA risk generated by the CVA exemptions can be substantial and should be captured prudentially. In particular, it is noted that institutions in the EU are not required to hold capital for CVA risk stemming from the transactions currently exempt, which is inconsistent with a risk-based capital requirements framework.

Therefore, while also recalling the importance of the alignment with international standards for CVA risk, the EBA recommends that the CVA exemptions should be fully removed, subject to phasing-in measures that are commensurate with the expected impact of the revisions to the CVA risk framework, when the impact of such revisions can be more accurately assessed.

4.3.1 Proportionality treatment for CVA risk

Recommendation CVA 3: Proportionality treatment for CVA risk

By building on the proportionality framework for CCR already envisaged in the CRR2 as well as exploiting the consistency in the treatment of CCR and CVA risk that would provide its usage, the EBA recommends that, if the simplified treatment for CVA risk envisaged in the Basel III post-crisis reforms were included in the CRR, the thresholds for its usage should be based on the market value of the on- and off-balance sheet derivative business, as defined in Article 273a(3) of the CRR2, while the level for the thresholds should be set so that it is consistent with that established for the use of the simplified SA-CCR, as specified in Article 273a(1) of the CRR2.

In addition, consistent with policy recommendation 13 put forward by the EBA in its report on CVA, and in light of the very low number of institutions that currently apply Article 385 of the CRR and the availability of the simplified treatment under the revised CVA framework, the EBA suggests removing the treatment under Article 385 of the CRR and replacing it with the simplified treatment.

5. Market risk

85. The market risk framework aims to ensure that banks maintain a minimum level of regulatory capital to absorb losses arising from movements in market prices of instruments held in the trading book. The 2016 FRTB addresses the structural shortcomings of the framework that came to light during the crisis. Its objectives are to:

- specify stricter criteria for the assignment of instruments to the trading book;
- overhaul the internal models approach to better address risks that were observed during the crisis;
- reinforce the supervisory approval processes for the use of internal models; and
- introduce a new, more risk-sensitive standardised approach.

86. In the course of monitoring the implementation of the market risk framework, the BCBS identified a number of issues in the 2016 FRTB framework. To address them, the BCBS published in March 2018 a consultative document including targeted revisions to the FRTB framework. Taking into account the feedback received on the consultative document, the BCBS published the final FRTB standards in January 2019.

87. This section presents the impact of the market risk standards published in January 2019. The results are based on data for the end-December 2018 reporting period. The EBA expects that the results are subject to a high level of data uncertainty, as banks may have used different underlying assumptions in their capital requirements calculation.[29] Thus, the results in this section should be interpreted with caution.

5.1 Impact of overall reform

88. The impact of the 2019 FRTB standards is, on average, 105% (Figure 12) relative to current levels.[30] The impact is heterogeneous between bank sizes, with a few outlier banks driving the average results; excluding the outliers, the average impact will drop to 73%. The average increase for medium-sized institutions and G-SIIs is somewhat higher than the average, standing at around 128% and 121%, respectively. However, O-SIIs experience a subtler impact (62%).

[29] In addition, it should be noted that the impacts of the implementation of the revised market risk framework are expected to also be affected by the change in treatment of eligible external hedges that are included in the CVA capital requirement, which must be removed from banks' market risk capital requirement calculation. In particular, some of those hedges are not removed from current calculations of banks' market risk capital requirements, which is hence expected to contribute to the impacts of the revised market risk framework.

[30] The results assume the current model's approval status. The final impacts will depend on the new model's review and approval by supervisors.

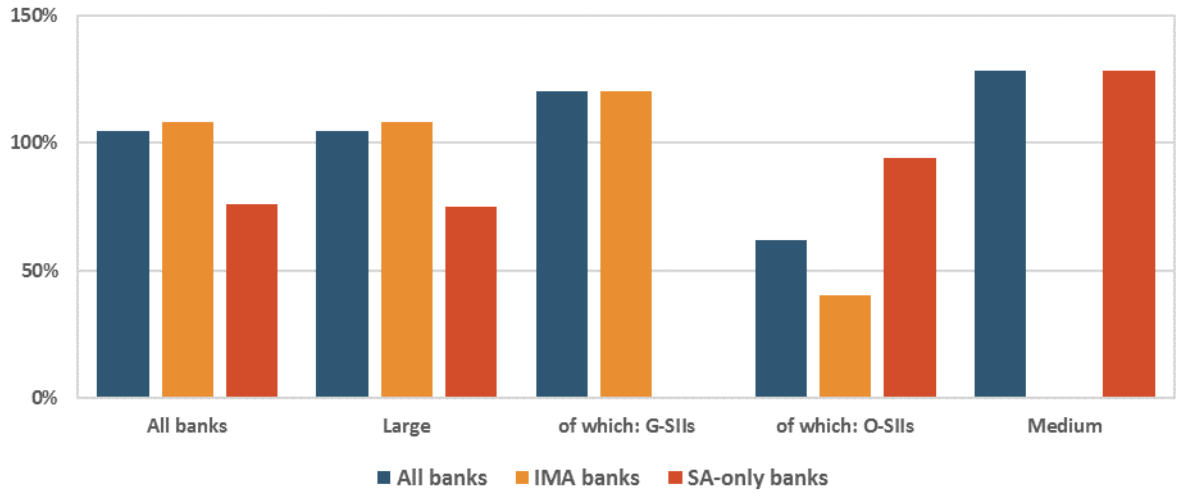
89. The average impact masks significant heterogeneity across banks (Table 14), with the impact of the median bank standing at significantly lower levels (40%), i.e. 50% of the sample will experience an impact below 40%. The interquartile range spans from an increase of 7% to 122%, with some institutions experiencing a negative impact.

90. The drivers of the impact differ across banks and are specific to the compositions of the banks' trading portfolio. Overall, a meaningful share of the revised capital requirements is attributed to (see Figure 24-Figure 30):

- GIIR and credit spread risk under the standardised approach;
- default risk charge (DRC);
- non-modellable risk factors (NMRFs).

91. On average, SA-only institutions experience a lower impact (76%) than internal models approach (IMA) institutions (108%). This holds true for all size clusters except medium-sized banks. The higher impact for IMA banks arises from a few large banks, which are adversely impacted due to positions in derivative funds in which the look-through could not be applied. These positions are currently treated under the IMA approach but have been shifted to the FRTB-SA approach under the revised framework, as the 2019 FRTB standards specify that banks must use the standardised approach to calculate market risk capital requirements for equity investments in funds that cannot be looked through but are assigned to the trading book. However, the median impact for IMA and SA-only banks stands at comparable levels.

Figure 12 Percentage change in total market risk RWA (relative to total current market RWA), by size and bank type



Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 44 banks: large (39), of which G-SIIs (7), of which O-SIIs (27); medium (4); small* (1). SA-only banks refers to banks using solely the SA. IMA banks refers to banks using the IMA for all or part of their portfolios. There are no SA-only banks in the G-SII cluster, nor any IMA banks in the medium cluster.
*Not shown in the chart because fewer than three entities in the cluster.

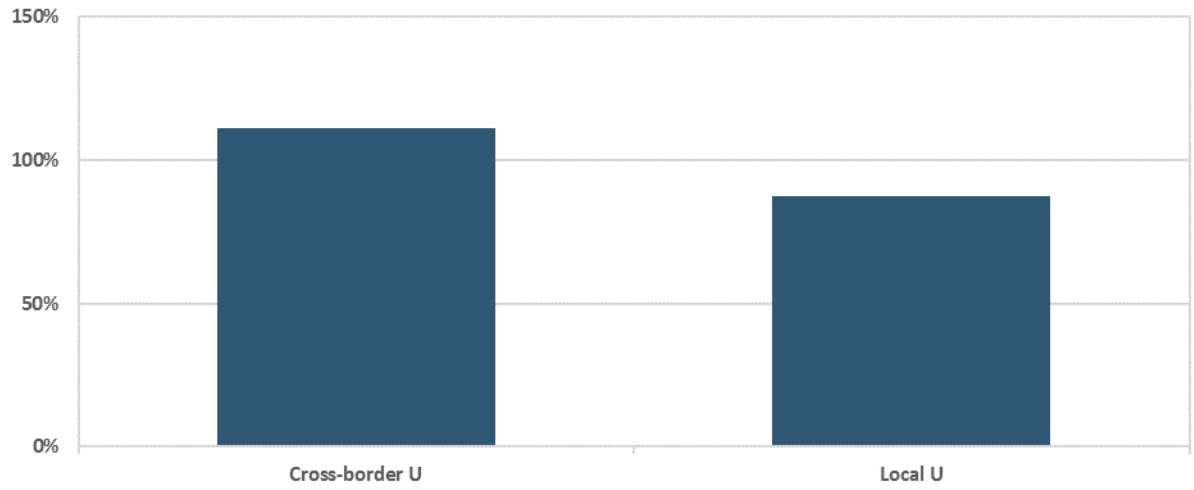
Table 14 Distribution of percentage change in market risk RWA (relative to total current market risk RWA), all banks

	Percentage		
Percentile	**Total**	**IMA banks**	**SA-only banks**
5th percentile	-79.1	-82.3	-79.1
25th percentile	7.3	9.3	5.2
Median	43.2	39.9	51.7
75th percentile	122.0	126.1	117.9
95th percentile	229.7	305.9	229.7

Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 46 banks. SA-only banks refers to banks using solely the SA. IMA banks refers to banks using the IMA for all or part of their portfolios.

92. As regards the impact across business models, Figure 13 shows that cross-border universal banks exhibit a higher impact than local universal banks.

Figure 13 Percentage change in total market risk RWA (relative to total current market RWA), by business model



Sources: EBA 2018-Q4 QIS data and EBA calculations.
Note: Based on a sample of 49 banks: Cross-border U (20); Mortgage* (1); Other special* (1); Local U (23); S&L Coop* (1); Private* (1); Custody* (1); Merchant* (1).
*Not shown in the chart because fewer than three entities in the cluster.

5.2 Individual reforms and scenario analysis

5.2.1 Treatment of covered bonds

93. The CfA requested the EBA to consider whether the final calibration of the FRTB is suitable for covered bonds issued in the EU.

94. The 2019 FRTB standards specify that for investment grade covered bonds the risk weight for the credit spread risk under the standardised approach is 2.5%. For covered bonds rated AA- or higher,

the applicable risk weight may at the discretion of the bank be 1.5%. These risk weights have been reduced compared with the 2016 FRTB standards, which initially prescribed a risk weight of 4% for investment grade covered bonds.

95. In particular, in the policy report developed for the purposes of the CfA and accompanying this document, the EBA made policy considerations on the risk weights applicable for covered bonds under the FRTB and in CRR2, which depend on the credit quality of the covered bonds.

96. In this context, the EBA analysed the credit quality of covered bonds held by the EU institutions. Table 15 shows that the majority of covered bonds is issued by institutions located in an EU Member State (86% of the total covered bonds). Almost 90% of the total covered bonds are high-quality covered bonds (step 3 or higher). The remaining covered bonds are primarily unrated (11%); of these, 3% are from an issuing institution with a credit quality of step 1 and 2% from an institution with a credit quality of steps 2 to 3. Only a negligible amount fall within credit steps 2 to 6.

Table 15 Breakdown of nominal amounts of covered bonds in the trading book by rating and geography of issuing institution (absolute amount and percentage of total covered bonds in the trading book)

Credit quality	Issued by EU institutions (EUR bn)	Total covered bonds (%)	Issued by non-EU institutions (EUR bn)	Total covered bonds (%)	Total (EUR bn)	Total covered bonds (%)
Step 1	11.2	69	1.5	9	12.6	79
Step 2	0.9	6	0.2	1	1.1	7
Step 3	0.5	3	0.0	0	0.5	3
Steps 4 to 6	0.1	0	0.0	0	0.1	0
Unrated	1.3	8	0.5	3	1.7	11
of which: issuing institution of credit quality step 1	0.9	6	0.5	3	1.4	8
of which: issuing institution of credit quality step 2	0.3	2	0.0	0	0.3	2
Total	**13.9**	**87**	**2.1**	**13**	**16.0**	**100**

Sources: EBA 2018-Q4 QIS data and EBA calculations.
Note: Based on a sample of 31 banks.

97. Given that the data collection was launched before the Delegated Act that the European Commission is requested to adopt under Article 461a of CRR2, the EBA has collected data on a scenario that is different from that proposed in the Delegated Act. Therefore, the EBA refrains from showing those results, as they are no longer applicable considering the ongoing proposals.

5.2.2 Simplified alternative to the standardised approach

98. The 2019 FRTB standards allows the use of a simplified standardised approach by banks that have small or non-complex trading portfolios. Using the criteria provided under Article 325a of CRR2, only 7 out of 30 banks that reported sufficient data will be eligible for the simplified standardised approach. It should be kept in mind that the sample mainly covers large and medium-sized banks

and, if the full population of the EU were to be considered, many more banks would be expected to be eligible.

99. For the sample of eligible banks, the simplified standardised approach would, on average be more conservative than the FRTB-SA. If the full sample of SA-only banks is considered, the simplified standardised approach is, on average, slightly less conservative than the FRTB-SA. The exact impact figures are not displayed, because of the very limited number of banks contributing to this analysis.

5.3 Implementation and policy recommendations

IMPORTANT NOTE: This section includes the main policy recommendations on the market risk framework for which QIS data was collected. Additional recommendations on the market risk framework, and more detailed policy rationale, can be found in the EBA report *Policy advice on the Basel III reforms: credit valuation adjustment (CVA) and market risk* accompanying this publication. **The numbering of the recommendations in this section is aligned with the numbering used in that accompanying report.**

100. In light of the results from the quantitative assessment presented in this report, and on the basis of the policy considerations included in the policy report on CVA and market risk developed alongside this document, the EBA puts forward the following main policy recommendations in the area of market risk in response to the CfA. The reader is invited to refer to the policy report on CVA and market risk with regard to the rationale for these recommendations. The policy report also includes further recommendations aiming to address identified policy issues related to the market risk standards as implemented in the CRR/CRR2.

5.3.1 Treatment of covered bonds

Recommendation MR 1: Treatment of unrated covered bonds

The EBA recommends clarifying that unrated covered bonds should, for the purposes of the FRTB-SA, be considered rated using — as a proxy — the credit quality of the issuing institution and should therefore attract the risk weight corresponding to such credit quality.

5.3.2 Simplified alternative to the standardised approach

Recommendation MR 2: Use of the recalibrated Basel II SA as a simplified approach

Consistent with its response to the CfA on the implementation of the SA-CCR and FRTB in the EU published in November 2016, the EBA supports the use of the recalibrated SA as a simplified standardised approach for institutions that do not exceed the thresholds referred to in Article 325a(1) of the CRR2.

6. Macroeconomic impact assessment

101. The CfA included a request to assess the economic impact of the final Basel III framework. This section was developed in collaboration with the ECB. [31]

6.1 Summary of the results

102. This section analyses the macroeconomic costs and benefits of the finalisation of the Basel III framework. The analysis is performed using two alternative approaches: (i) a new approach relying on the GaR concept; and (ii) the methodology used in the LEI study of the BCBS (2010). The main conclusions of the analysis can be summarised as follows:

- The results suggest that there are modest transitional costs incurred in the final Basel III implementation, which fade over time: average annual GDP growth in 24 EU countries[32] and Norway falls by less than 0.2 percentage points in the first 4 years after implementation of the reform (2018-2022), but the effect becomes positive in the subsequent 4 years (2022-2026) and amounts to zero at the end of the transition period in 2027. To demonstrate the advantage of the transitional arrangements, the analysis shows that the short-run costs in terms of lower GDP growth are slightly higher (slightly above 0.2 percentage points) under the more conservative assumption of an immediate front-loading of the output floor reform. These differences in GDP growth translate into a level of GDP in the scenario with Basel III implementation that is 0.2% below the level of GDP in the scenario without Basel III implementation at the end of the transition period in 2027. The costs of the reforms should be assessed against the background that the analysis employs a number of conservative assumptions.

- The longer-run benefits of the Basel III package are substantial. First, according to the GaR approach, the Basel III finalisation is found to reduce the severity of economic downturns whereby adverse annual GDP growth outcomes for the aforementioned 24 EU countries and Norway improve by around 0.2 percentage points, indicating a reduction in both the probability and impact of future banking crises. As this would be a permanent feature, over the medium term the benefits measured in this way will materially exceed the modest transitional costs of the reform.

[31] The macroeconomic impact presented in this section considers the 2017 December CVA framework. The scenarios presented in section 4.3.2 for the November 2019 CVA revisions are insufficient/too minor to yield discernible changes in the macro impact assessment analysis.

[32] The EU aggregate excludes Bulgaria, Hungary, Romania and the United Kingdom because of the unavailability of sufficient bank-level information to run the GaR-based model analysis.

- Second, according to the LEI approach, the higher levels of capital associated with the Basel III implementation for a narrower set of countries[33] are estimated to lead to a reduction in crisis probabilities of about 1.2 percentage points at the end of the 10-year horizon in 2027. Compared with modest economic costs, these estimates imply sizeable long-term net benefits from the reform, amounting to around 0.6% of annual GDP level.

- The estimates presented here remain within ranges reported in earlier studies. Specifically, the estimates for the cost of the reforms are similar to those reported in the original LEI study and in the final report of the Macroeconomic Assessment Group (MAG). The reduction in crisis probabilities and the corresponding net benefits of the reform tend to be at the lower end of the numbers reported in the original LEI study, which is not surprising given that the effect of higher capital ratios on crisis probability is usually estimated to be negative but diminishing in the level of initial capital ratios.

6.2 Introduction

103. The analysis included in this section is performed at the aggregate level for 24 EU countries and Norway using two alternative approaches: an approach following the methodology used in the LEI study of the Basel Committee on Banking Supervision (2010), and a more innovative approach relying on the GaR concept. Both approaches rely on a number of assumptions and design choices impacting the analysis. In both approaches, the same semi-structural model to quantify the potential costs of the Basel III implementation, which are derived as the loss in GDP growth as a result of the reduction in lending that occurs in the initial years following reform implementation (section 6.3). The GaR approach then estimates the long-term benefits of the latest reforms as the difference in GDP growth under adverse economic conditions with and without the implementation of the reform (section 6.4.1), whereas the LEI approach derives them as the product of the associated reduction in crisis probabilities and the average costs of a banking crisis (section 6.4.2). The estimates of both costs and benefits remain within the range of estimates reported in earlier studies (section 6.5).

6.3 The economic costs of introducing the Basel III finalisation reforms

104. To assess the macroeconomic costs of the Basel III implementation, this section uses a large-scale multi-bank and multi-country, semi-structural model (see Box 1). The analysis is conducted in two steps: first, the model is simulated with the current regulatory framework for a few thousand positive and adverse scenarios constructed on the basis of the historical distribution of macroeconomic outcomes;[34] second, the model is simulated with the same set of positive and adverse scenarios but assuming that banks adopt the Basel III finalisation package. In the latter

[33] The LEI assessment is based on the 15 EU countries for which country-level data are available and Norway. Given the capital impact in this set of countries relative to the impact for the set of all countries, the outcomes should not be significantly different.

[34] The repeated simulation of the model under different economic scenarios is particularly important for the benefit calculation under the GaR approach, as will be explained in section 6.4.2.

case, the new rules affect the banks' response to economic scenarios, and therefore the distribution of macroeconomic variables may differ.

105. The impact of the finalisation of Basel III is the difference between the simulations with Basel III and the simulations in which banks do not adopt the Basel III finalisation package. In particular, the means of the two distributions show the GDP growth rate under normal economic conditions. Therefore, a negative difference between the averages with and without the Basel III finalisation reforms would imply a macroeconomic cost resulting from the introduction of the package (i.e. lower average GDP growth).

Box 1 Model description

(a) Model setup

The model used in the analysis captures the heterogeneous behaviour of individual banks and includes interactions between the financial sector and the real economy.[35] It covers over 100 of the largest European banks and 24 EU economies and Norway. It features a high degree of granularity of banks' balance sheets and profit and loss statements, which enables the analysis of the complex impact of Basel III directly within a unified setup. It also accounts for the heterogeneity of banks in European jurisdictions and differences in supervisory and macroprudential policies (such as existing Pillar 2 requirements and macroprudential buffers).

The model accounts for individual banks' banking book structure, distinguishing between banks' exposures to sovereigns, to the financial sector, to the non-financial corporate sector, to households backed by real estate and to households for consumption purposes. For lending to the non-financial private sector the model separates exposures by country of exposure. For each of these portfolios the model replicates the dynamics of three International Financial Reporting Standard 9 asset groups (stages 1 to 3) with endogenous transition rates that depend on the macroeconomic developments. This is also the level of granularity for credit risk weights. Banks are also allowed to adjust their loan volumes within these sub-segments in response to loan demand conditions and, depending on their own capital position, profitability or the quality of assets.

On the liability side, the model distinguishes between deposits from sovereigns, from other financial institutions, term deposits from households, term deposits from non-financial corporations, sight deposits from households, sight deposits from non-financial corporations and wholesale funding. It extrapolates the maturity structure of assets and liabilities, as observed in 2017, with the exception of wholesale funding, in which banks can adjust the average maturity.

Regarding profits and losses, the framework dynamically models net interest income, loan-loss provisioning and net fee and commission income. Bank-level interest rates on new lending and deposit rates depend on economic conditions, banks' situation and monetary policy rates,

[35] For more detailed description of the model and an earlier example of its use, see Budnik et al. (2019) Macroprudential stress test of the euro area banking system, ECB Occasional Paper No 226.

although the last evolve endogenously and are subject to the zero lower bound. Other components of profit and loss, such as dividend income, follow simple dynamic rules linking them for instance to the evolution of banks' total assets. The dynamics of trading book assets and market risk capital surcharge, dividend holdings of banks and operational risk capital charge follow similar simplified dynamics. Finally, banks adjust their profit distribution policies to retain their management buffer over regulatory requirements including Pillar 2 requirements (and, for Single Supervisory Mechanism (SSM) banks, also Pillar 2 guidance).

(b) Data sources

The semi-structural model employs three main data sources. The structure of banks' balance sheets is sourced from the stress test templates of the 2018 EU-wide exercise. They are available for 101 European banks and reflect the structure of banks' balance sheets as of end-2017. Additional bank-level information is sourced from COREP, financial reporting (FINREP) and balance sheet items (BSI) and monetary financial institution (MFI) interest rate (MIR) statistics collected by central banks for monetary policy purposes. These data sets are used for the purpose of estimating banks' behavioural equations (e.g. loan supply). The macroeconomic data set consists of the aggregate information from Eurostat on national accounts, price indices and interest rates. Selected model equations such as the wholesale funding cost function are estimated based on market data.

(c) Modelling the implementation of the Basel III finalisation reforms

Contrary to most macro-models, this model has a sufficiently detailed description of banks to introduce features of the Basel III finalisation package individually. A number of assumptions are used to map the features of the final Basel III rules in the model. Some of them follow directly from the application of the new standards, while others are calibrated using the data collected by the EBA for the purpose of the QIS. The first set of assumptions includes: (i) modified maximum distributable amount rules to account for the binding 3% leverage ratio and G-SII leverage buffer; (ii) new standardised risk weights for real estate exposures that are closely linked to the evolution of house prices; (iii) input floors for the probability of default and loss-given-default parameters used in the calculation of IRB risk weights; (iv) an occasionally binding output floor; (v) the new standardised approach to operational risk; and (vi) the removal of the advanced IRB approach for the calculation of credit risk weights for certain asset classes.

In addition, some of the effects of Basel III finalisation are calibrated on the basis of the QIS data, in particular the rescaling of the market risk capital charges and the rescaling of the standardised credit risk weights for exposures not backed by real estate.

The effects of the Basel III finalisation package are tracked over a period of 10 years. It is assumed that the package enters into force in the first quarter of 2018 (although the actual implementation date is 2022, this technical assumption is made ,as bank balance sheet information is based on end-2017 data) and that all standards become binding in 2018, with the exception of the output floor. For the latter, two options are considered. The first option assumes a gradual phase-in over

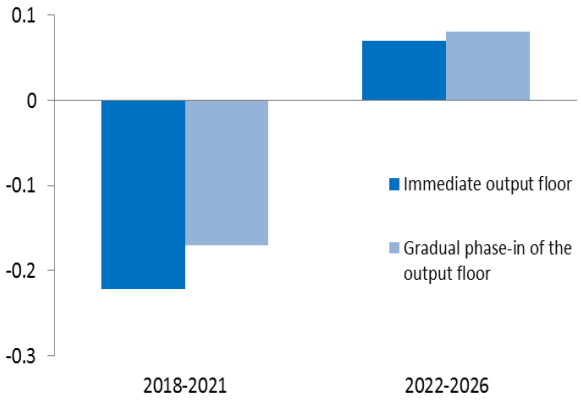
the period of 5 years envisaged in the Basel agreement (for the purpose of this analysis, this period is 2018-2022, whereas the actual phase-in period is planned for 2022-2027). It is contrasted with the scenario with the immediate front-loading of the output floor to illustrate the advantages of transitional arrangements.

The output floor is assumed to be binding on a consolidated level. The analysis is conducted without regard to available national discretionary measures and assuming that capital requirements and buffers remain unchanged. All of these three assumptions are conservative.

106. The semi-structural model predicts only a moderate and transitory impact on average GDP growth (Figure 14). Under the envisaged phase-in of requirements, the impact on average annual GDP growth is negative for the first 4 years after the implementation, amounting to an average of less than a 0.2-percentage-point reduction in the annual growth rate of GDP. After the fourth year, the effect on the GDP growth rate becomes positive and converges to zero at the end of the transition period in 2027. The short-run costs are slightly higher (slightly above 0.2 percentage points) under the more conservative assumption of banks applying an immediate front-loading of the output floor reform, demonstrating the advantage of the Basel III transitional arrangements.

Figure 14 Average effect of Basel III finalisation on GDP annual growth rate in the 24 EU Member States plus Norway)

(percentage points)



Source: ECB calculations.

107. These differences in GDP growth translate into a level of GDP in the scenario with Basel III implementation that is 0.2% below the level of GDP in the scenario without Basel III implementation at the end of the transition period in 2027. In the period after 2027, the model predicts further convergence in the level of GDP as a result of slightly higher average growth in the scenario with Basel III implementation.

108. The initial drop in average GDP growth following the Basel III implementation is caused by a transitory reduction of bank lending to the non-financial private sector that is predicted by the

model.[36] In particular, the new framework results in revised RWAs, which will imply a decrease in CET1 capital ratios for a share of European banks.[37] The model assumes that banks will restore their regulatory and management CET1 buffers by a combination of retaining a higher share of earnings and reducing total exposures, leading to a contraction of loan supply.[38]

109. The slowdown of GDP growth relates to a moderate reduction in the dynamics of lending. At the EU aggregate level, the annual growth in lending to the non-financial private sector is weakened the most in the third and fourth year following the introduction of the package, amounting to a reduction in growth of 1.2 and 1.1 percentage points, respectively. Thereafter the effect gradually fades out. Beyond the 10-year horizon, the model predicts that the annual growth in lending becomes positive due to an increased profitability of banks that results from a sustainable reduction in funding costs linked to higher bank capitalisation.

110. Overall, the findings on lending and GDP reported here are in line with estimates from previous studies, such as those reported by the MAG in its report on the impact of the original Basel III reforms in 2010 (see section 6.5 for a more detailed comparison with previous studies).[39]

111. The assumptions underlying the cost estimations are conservative and are expected to overstate the reduction especially in lending. First, it is assumed that banks do not anticipate changes in the regulation. This leaves them with less time to adjust to the new standards and will tend to amplify the contraction in lending. In reality, banks have several years to prepare and adjust before the new rules come into force. Second, banks are assumed to have no access to capital markets and cannot raise capital by issuing new shares. Third, the model incorporates the dynamics of the largest European banks only, extrapolating their behaviour to the rest of the sector. As the largest banks are expected to be the most impacted by the final Basel III rules, this assumption overstates the cost estimates. In addition, capital requirements and buffers set by regulators are assumed to remain unchanged. Finally, the analysis does not fully reflect the possibility of substitution of bank loans by other financial entities.

[36] The model does not capture the fact that the reduction in bank lending may be at least partially offset by the non-bank sector. In particular, the fast growth in the size of euro area non-banks has been accompanied by their increasing role in financing the euro area economy. Note that the share of loans to non-financial corporations (NFCs) from the euro area financial sector provided by non-banks reached 28%, double the figure of 10 years ago. NFCs also increasingly finance themselves in the market through the issuance of debt securities, which are primarily held by non-bank financial institutions and investment funds in particular. The increasing role of non-bank financing for the real economy is also illustrated in the Financial Stability Board's 2018 Evaluation of the effects of financial regulatory reforms on infrastructure finance.

[37] Specifically, CET1 ratios are expected to decline from 14.4% to 11.5%. See Table 20 of the EBA (2019) Basel III reforms: impact study and key recommendations.

[38] In the model, it is assumed that banks can be in one of three states: (i) if their actual capital ratio is above broadly defined regulatory capital ratios (i.e. Pillar 1, Pillar 2 requirements, macroprudential buffers and, for SSM countries, also Pillar 2 guidance) banks will moderately reduce their lending but continue paying out dividends proportionate to their profits, maintaining their management buffer; (ii) if banks' actual capital ratio falls below Pillar 2 guidance, they would start to sharply reduce their lending; (iii) when they reach their prudential capital buffers their profit distribution policy is additionally bounded by MDA regulations.

[39] BCBS MAG (2010) Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements — Final report.

6.4 The economic benefits of introducing the Basel III finalisation

112. To compare the costs described in the previous section with the economic benefits of the Basel III implementation, this section makes use of two alternative approaches: (i) a new approach using the GaR concept; and (ii) a more traditional approach following the methodology used in the LEI study of the Basel Committee on Banking Supervision.

6.4.1 The growth-at-risk approach

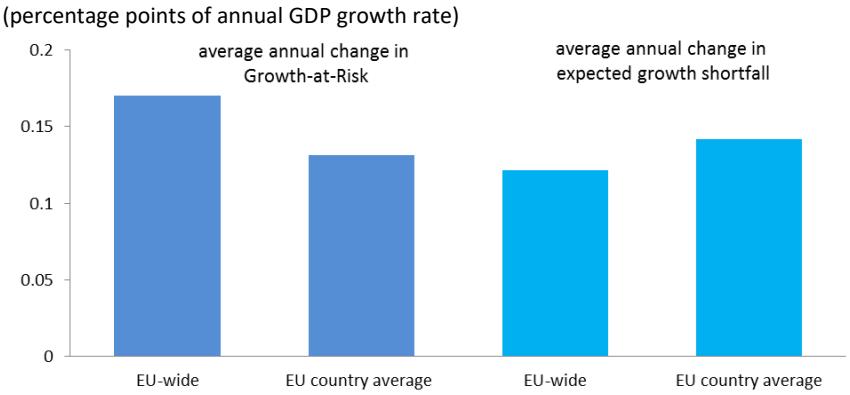
113. The GaR approach uses the simulations from the semi-structural model described in section 6.4. Specifically, the benefits are estimated as the impact of the Basel III implementation on GDP growth under adverse economic conditions. Intuitively, they depend on the ability of the financial sector to uphold its financial intermediation function, thereby supporting growth, even in adverse economic circumstances.

114. The lower percentiles of the distributions provide information on the GDP growth rate in adverse circumstances. A positive difference between the same (low) percentile of the distribution with and without the Basel III implementation implies macroeconomic benefits due to the introduction of the package. It is precisely this attention to the lower percentiles of the distribution of economic variables that relates the analysis to the GaR concept. The analysis focuses on the developments in the most adverse scenarios in the 10th percentile, as it represents sufficiently adverse circumstances while maintaining sufficient accuracy.

115. The effects of the Basel III finalisation on GDP growth under adverse economic scenarios can be summarised using two alternative metrics. The first metric is the GaR measure of the annual EU growth rate distribution, which compares the estimated GDP growth rates with and without the final Basel III rules at exactly the 10th percentile of the annual EU growth rate distribution (i.e. it compares the GDP growth rates under the 'best outcome' among the adverse economic conditions). The second metric is based on the expected shortfall at the GaR, and compares the estimated GDP growth rates with and without the final Basel III rules using the average GDP growth rate within the 10th percentile (i.e. it focuses on the 'average' adverse conditions).

116. Figure 15 shows an increase in these two metrics following the introduction of the Basel III finalisation package, which implies higher GDP growth in adverse economic circumstances under the new Basel III rules, as banks would be more resilient and better able to support the real economy, even in severe downturns. Under the envisaged phase-in of the new rules, the annual GDP growth rate under adverse economic conditions is almost 0.2 percentage points higher. The mean expected annual GDP growth rate in 10% of the worst scenario outcomes increases by over 0.1 percentage points. This effect on the growth distribution is persistent and extends beyond the 10-year horizon.

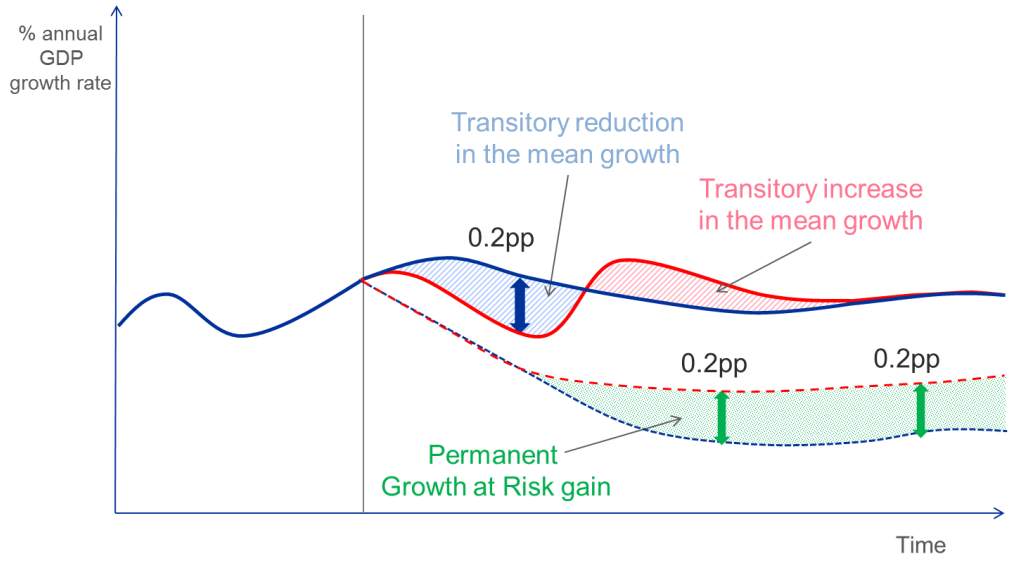
Figure 15 Average annual increase in GDP growth in adverse circumstances in the 24 EU Member States plus Norway)



Source: ECB calculations.
Note: The effect is calculated by averaging the GaR and expected growth shortfall differences for 2024-2027 for scenarios assuming the gradual introduction of the output floor. The difference also stabilises around those values following 2027.

117. To summarise, the cost and benefit estimates produced by the GaR approach point to lasting net benefits (see Figure 16). In the first 4 years after the introduction of the Basel III package, costs outweigh benefits, reducing the growth rate of the EU economy by 0.2 percentage points for 4 years (see section 6.3). In the following 4 years, the transitory negative effect on GDP growth gradually dies out, whereas the gains in terms of resilience build up with the increasing capitalisation of the banking sector. In the long run, only the latter effect prevails, amounting to a permanent increase of around 0.2 percentage points of the increase in the GaR measure.

Figure 16 Summary of GaR-based cost-benefit assessment



Source: ECB.
Note: Stylised representation.

6.4.2 The long-term economic impact approach

118. The second approach for quantifying the benefits of the Basel III finalisation package closely follows the approach taken by the Basel Committee on Banking Supervision in its LEI study published in 2010.[40] The approach compares the benefits of the Basel III finalisation in terms of reduced crisis probabilities with potential costs related to the possibility that a reduction in lending may lead to a downwards adjustment in the level of GDP (as opposed to the GDP growth, as was the case in the GaR approach above). Specifically, within this approach the net benefits of Basel III finalisation can be expressed as follows:

$$net\ benefit = \underbrace{-\Delta p(crisis) \times crisis\ cost}_{benefit} - cost \quad (1)$$

where the 'benefit' part is the product of the reduction in crisis probabilities associated with the finalisation of Basel III and the cost of a banking crisis in terms of loss in GDP level, and the 'cost' part is the loss in GDP level that may be associated with a reduction in lending following implementation of reform, as described above in paragraph 107. There, the level of GDP in the scenario with Basel III implementation was found to be 0.2% below the level of GDP in the scenario without Basel III implementation at the end of the transition period in 2027.

119. To quantify the benefits in equation (1), the LEI study approach estimates the impact of higher capital requirements implied by the implementation of the final Basel III rules on the probability of an economy residing in a vulnerable state that could lead to a systemic banking crisis. This is done by making use of a discrete choice multiple logit regression model, which exploits historical relationships between the occurrence of banking sector crises and the evolution of a number of macro-financial indicators (see Box 2 for a more detailed description of the modelling approach), and projections on the evolution of a number of macro-financial variables obtained from the semi-structural model described in section 6.3. [41] The resulting decrease in crisis probabilities associated with the Basel III implementation is then multiplied by estimates of the cost of a crisis that are taken from the literature.

Box 2 Modelling approach for the benefit part

The dependent variable in this model is a dummy variable that indicates vulnerable states of the economy that can lead to a systemic banking crisis.[42] The definition of systemic banking crises and associated vulnerability periods is taken from the ECB/European Systemic Risk Board (ESRB)

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

[41] The modelling approach of combining a logit model predicting the probability of banking sector crises with a macro-model projecting the evolution of key macro-financial variables is similar to that taken in Behn, M., Gross, M., Peltonen, T. (2016) Assessing the costs and benefits of capital-based macroprudential policy, ECB Working Paper No 1935.

[42] Early-warning models are generally concerned with identifying vulnerable states prior to financial crises rather than predicting the exact timing of a crisis, as the latter cannot be done with much statistical precision. For a discussion, see Lang, J.H., Peltonen, T.A., Sarlin, P. (2018) A framework for early-warning modelling with an application to banks, ECB Working Paper No 2182.

Financial Crisis Database.[43] The explanatory variables consist of indicators that have proven to be useful predictors of vulnerable states in the economy ultimately preceding a systemic banking crisis. Specifically, in the baseline model used here, the set of explanatory variables consists of annual changes in the ratio of bank credit provided to the non-financial private sector relative to GDP, annual growth rates of residential real estate prices and of equity prices, and the level of banking sector capitalisation.

To estimate the impact of the finalisation of the Basel III implementation on crisis probabilities the evolution of the model's explanatory variables with and without the final Basel III rules needs to be projected. To predict the evolution of capital levels it is assumed that banks fully compensate the drop in capital ratios implied by the final Basel III rules and readjust their capital ratios back to current levels by the end of the 10-year horizon in 2027. This implies a significant increase in capital levels, corresponding to an increase in banks' resilience and thus a dampening effect on crisis probabilities. In contrast, capital ratios are assumed to remain constant in the absence of the Basel III implementation. Moreover, the model described in the previous section is used to derive projections at country level on the evolution of the other macro-financial indicators in the early warning model, both with and without the implementation of the final Basel III rules.

The projections for the paths of the explanatory variables are plugged into the estimated logit model in order to obtain predicted crisis probabilities with and without the Basel III implementation. The difference between these predicted crisis probabilities for the two policy scenarios constitute the first term of the benefit component in equation (1). In a final step, the probability difference needs to be multiplied by an estimate of the cost of a banking crisis, which is taken from the original LEI study published by the Basel Committee on Banking Supervision (2010). The benefit estimates are obtained at country level and then aggregated to provide the impact for the sample countries as a whole.[44]

The logit model is estimated on fairly standard macroeconomic data at quarterly frequency covering at maximum the period 1970 to 2018, but data availability is heterogeneous across countries and indicators. The main data source is the macroprudential database of the ECB, which in turn has compiled data from national accounts, ECB BSI statistics, MRI, consolidated banking data, and the Organisation for Economic Cooperation and Development, partly for non-euro area countries. As expected, the model predicts that higher banking sector capitalisation is associated with lower crisis probabilities. In addition, the coefficients for the other macro-financial variables are significant and have the expected sign. Moreover, the model has good early warning properties.[45]

[43] See Lo Duca, M., Koban, A., Basten, M., Bengtsson, E., Klaus, B., Kusmierczyk, P., Lang, J.H. (2017) A new database for financial crises in European countries, ECB/ESRB EU crises database, ECB Occasional Paper No 194.

[44] This is different from the first approach, in which benefits are derived directly at EU level, and implies that the estimates under the two approaches are not easily comparable (given differences in volatility at EU vs country level). The sample used here includes AT, BE, DE, DK, ES, FI, FR, GR, IE, IT, LU, NL, NO, PL, PT, SE. These are countries for which bank-level results for more than three banks are available.

[45] The baseline model displays similar in-sample evaluation performance as the range of models shown in Lo Duca et al. (2017), op cit. Specifically, the model has an AUROC of 0.81, a conditional probability of 0.27 (the share of true signals of a coming crisis whenever the model issues a warning signal) and a type I error rate of 0.31.

120. The results of the benefit estimation obtained from the model are shown in Table 16. The first column shows the difference in predicted crisis probabilities at end-2027 between scenarios with and without the Basel III implementation. For the average country in the sample (weighted by GDP), the policy change implies a reduction in crisis probabilities of over 1.2 percentage points.

121. To obtain estimates for the benefits, this reduction in crisis probabilities must be multiplied with estimates for the cost of a crisis. The three estimates that are considered for the cost of a crisis are shown in column 2 of Table 16. They are obtained from the original LEI study of the Basel Committee on Banking Supervision and are derived under the assumptions that banking sector crises have (i) no permanent effects on the level of GDP, (ii) long-lasting or small permanent effects on the level of GDP, or (iii) large permanent effects on the level of GDP.[46] As noted in a recent update by the Basel Committee on Banking Supervision, the median estimate of 63% of the level of GDP is roughly in the middle of the range of cost estimates from studies published since 2010 and may hence be regarded as a baseline estimate.[47] Moreover — and similar to the original LEI study — this impact assessment assumes that the cost of banking sector crises are exogenously given and not affected by the level of banking sector capitalisation. This assumption contrasts with an analysis by Jorda, Richter, Schularick and Taylor (2017), showing that the most important stability benefit of bank capital may be to mitigate the cost of crises, which implies that the benefits of higher bank capital are likely to be underestimated in this study.

Table 16 Crisis probability reduction, cost of systemic banking crises and gross benefit

Crisis cost definition	**(1) Weighted average reduction in crisis probability by 2027** (percentage points)	**(2) Cost of a crisis** (percentage of annual GDP)	**(3) Total benefit in 2027 (product of (1) and (2))** (percentage of annual 2018 GDP)
No permanent effects	-1.2	19	0.2
Long-lasting or small permanent effects	**-1.2**	**63**	**0.8**
Large permanent effect on GDP	-1.2	158	2.0

Sources: BCBS (2010), ECB computations.
Note: GDP-weighted averages across countries based on country-level effects for AT, BE, DE, DK, ES, FI, FR, GR, IE, IT, LU, NL, NO, PL, PT, SE.

122. The gross benefits shown in Table 16 are derived from multiplying the country-specific probability difference with the estimates for the cost of crisis. They stay between 0.2% and 2% of

[46] As explained in the original LEI study, the magnitude of the costs of a crisis depends on the time horizon used for comparing the GDP evolution with and without a crisis, on the methodology used to measure the costs of a crisis (i.e. whether levels of GDP are compared or losses are accumulated over the crisis horizon), and on the extent to which any long-lasting or permanent effects of a crisis on GDP are considered (see BCBS, 2010, op. cit). As an alternative to the crisis cost reported in the original LEI study, the analysis also used estimates included in the seminal paper by Laeven and Valencia (2008), amounting to 38% of GDP on average for EU countries. In this case, the estimated total benefits are between those reported in rows 1 and 2 of Table 16.

[47] See BCBS (2019) The costs and benefits of bank capital — a review of the literature.

the level of GDP, depending on the estimate that is used for the cost of a crisis. The baseline estimate corresponding to the most plausible scenario suggests gross benefits of 0.8% of GDP.[48]

123. To calculate the net benefits under the LEI approach, the benefits described in Table 16 need to be compared with potential long-term costs of the reform that could be associated with a shift in the steady state level of GDP. As described in section 6.3, the difference in the level of GDP at the end of the 10-year horizon in 2027 between the two scenarios with and without the final Basel III implementation amounts to 0.2%, which is taken as an approximation of the reduction in the steady-state level of GDP. As the model predicts further convergence in the level of GDP under the two scenarios in the period after 2027, this estimate may be seen as an upper bound for the possible long-term costs associated with the Basel III implementation, thus adding to the conservativeness of the modelling assumptions.[49]

124. Table 17 compares the long-term benefits and costs of the Basel III implementation. The table shows positive net benefits for all three definitions for the costs of a banking crisis, ranging from 3 basis points to 1.8%. As noted before, the most plausible estimate is the one in the second row, which uses 63% of GDP as the cost of a banking crisis and estimates the net benefits of the Basel III implementation to be 0.6% of GDP.

Table 17 Net benefits

Crisis cost definition	(1) Benefit	(2) Cost	(3) Net benefit
		(percentage of annual 2018 GDP)	
No permanent effects	0.2	0.2	0.03
Long-lasting or small permanent effects	**0.8**	**0.2**	**0.6**
Large permanent effect on GDP	2.0	0.2	1.8

Sources: ECB, ECB computations.
Note: Costs and benefits of the Basel III measures materialise at different points in time, with the costs preceding the benefits.

125. The net benefits shown in Table 17 can be interpreted as the expected long-term differences in the level of GDP per year between scenarios with and without the Basel III implementation. As explained in the original LEI study, the estimates are of course subject to model uncertainty and there are a number of factors that could either increase or decrease them.

[48] The average reduction in crisis probabilities in 2027 corresponds to the macro-scenario with gradual implementation of the output floor. The reduction in crisis probabilities (and thus the total benefits) in the scenario with immediate implementation of the output floor are only marginally different, given that the macro-projections in the two scenarios converge towards the end of the implementation period.

[49] To note, the 0.2% reduction in the level of GDP derived in section 6.3 refers to the entire sample of 25 countries, whereas the benefits presented in this section represent aggregates for a sample of 16 countries (see Box 2). The weighted average reduction in the level of GDP at the end of the transition period in 2027 for the reduced sample of 16 countries amounts to between 4 basis points and over 0.1% (depending on whether gradual or immediate implementation of the output floor is assumed). That is, the impact in the reduced sample is lower on average, so that using the higher number from the aggregate sample further adds to the conservativeness of the cost assumptions.

6.5 Comparison with other studies

126. The findings presented in this section are consistent with previous estimates in the literature. A comparison with previous studies is not straightforward for the GaR approach, given the relative novelty of this approach. In particular, GaR benefits relate to a decrease in economic vulnerabilities, measured in terms of reduced credit and GDP growth contractions in adverse circumstances, while the traditional literature referenced above measured the benefits as an explicit reduction in the probability of a systemic crisis. The transitional costs are more easily compared, although the estimates shown here need to be divided by three in order to make them roughly comparable with previous estimates that usually correspond to the effect of a 1 percentage point increase in capital ratios.[50]

127. Thus, the transitional costs described in section 6.3 would amount to up to around 6 basis points of average annual GDP growth in the first 4 years of the implementation period, become positive in the subsequent 4 years and amount to zero after 10 years. In comparison, the final report of the MAG[51] — which focuses on the transition costs of the original Basel III standards — estimates a 3-basis-point decline in annual GDP growth during the first 8 years and 9 months following the start of implementation and a subsequent increase of 3 basis points to the end of the simulation period (12 years). Thus, the estimates in the two studies are roughly similar.

128. The estimates of the second approach are more easily comparable with those of the LEI study, as they have a similar methodology. Basel Committee on Banking Supervision (2019)[52] provides a summary of the findings of the LEI study as well as eight follow-up studies, which use a similar rationale to estimate the trade-off between capital levels. The effects shown in the LEI study are comparable to those in this analysis, while the results of the latter should be again divided by three to arrive at the effects of a 1-percentage-point increase in the capital ratio.

129. The aggregate reduction in crisis probabilities of 1.2 percentage points corresponds to a 0.4-percentage-point reduction per percentage point increase in capital ratio. This number sits at the lower end of the range of findings summarised by the Basel Committee on Banking Supervision (2019), which fluctuate between 3 basis points and 2.6 percentage points. This is not surprising, as the effect of higher capital ratios on crisis probability is usually estimated to be negative but diminishing in the level of initial capital ratios. Therefore, studies using a higher level of capital as a starting point tend to find a smaller reduction in the probability of a crisis. On the cost side, the drag on the long-term level of GDP of around 7 basis points per unit increase in the capital ratio

[50] The existing literature usually expresses the effects of changes in regulatory requirements in units corresponding to a 1-percentage-point increase in capital requirements. In contrast, the finalisation of Basel III leaves the capital requirements unchanged but changes the way the RWAs are calculated (i.e. a change in the denominator of the risk-weighted capital ratio). The resulting increase in RWAs implies a drop in capital ratios of roughly 3 percentage points across the sample, and the methodologies used here assume that banks react to this drop by increasing capital ratios such that they rebound to previous levels. Therefore, the effects shown in this paper correspond to an increase of 3 percentage points in capital ratios, and they need to be divided by three to make them roughly comparable with previous estimates.

[51] BCBS MAG (2010) Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements — Final report.

[52] BCBS (2019), op cit.

is almost identical to the 9-basis-point estimate in the 2010 LEI study and is roughly in the middle of the range of estimates reported by the Basel Committee on Banking Supervision (2019).

6.6 Conclusions

130. The analysis presented in this section implies that the finalisation of the post-crisis Basel III reform will have net benefits for EU economies. The benefits derive from the strengthened capital framework, which addresses existing shortcomings in the calculation of RWAs under the current rules, enhancing the resilience of the banking sector. In the long term this strengthened resilience translates into a reduced probability of a systemic banking crisis occurring and in lower associated economic costs due to less severe economic downturns.

131. Specifically, this analysis estimates transitory short-term costs due to the revised capital framework to be around a 0.2-percentage-point reduction in the average annual GDP growth in the first 4 years after implementation of the reform, but this effect becomes positive in the subsequent 4 years and amounts to zero at the end of the transition period in 2027. These differences in GDP growth translate into a level of GDP in the scenario with Basel III implementation that is 0.2% below the level of GDP in the scenario without Basel III implementation at the end of the transition period in 2027. To demonstrate the advantage of the transitional arrangements, it is shown that the short-run costs are slightly higher under the more conservative assumption of banks applying an immediate front-loading of the output floor reform.

132. This analysis also finds that the reform is estimated to have significant long-term benefits. First, the revised capital requirements are expected to reduce the probability of a systemic banking crisis by on average 1.2 percentage points. Based on a wide range of established estimates of the real economic cost associated with a recession following a systemic banking crisis, this would provide a gross benefit of around 0.8% of annual real GDP level using a median measure of crisis cost.[53] Accounting for the estimated long-term cost of up to 0.2% of annual GDP level, the long-term net benefits of the finalisation of Basel III are positive and amount to around 0.6% of annual GDP level. Furthermore, an alternative approach to estimating the benefits of the reform finds that, under Basel III, GDP growth should be less impacted by adverse economic conditions. In particular, adverse GDP growth outcomes, falling into the 10th percentile of the historical GDP growth density, are around 0.2 percentage points higher reflecting a combination of both a lower likelihood of very deep recessions occurring and milder recession outcomes.

133. The analysis is carried out mostly in the period until 2027, which in principle could still be seen as a transitional period, as the final step increase in the output floor requirements becomes binding only from January 2027. Over a longer horizon any costs of adjusting to the regulatory reform are expected to vanish as suggested by the fact that the trend in the effect on annual GDP growth starts reversing after only 4 years. Hence, the cost effect is of a transitional nature, while the benefits are expected to last. In that sense the net benefits presented here might be on the low side.

[53] Depending on the economic cost of a crisis estimate, this benefit can vary from 0.2 to 2%.

Annex 1: Sample and methodology

Business models

Table 18 List and description of business models

	Business model name	Description
1	**Cross-border universal banks**	**Activity**:
		- Engaged in several banking activities, including retail, corporate and capital market operations.
		- Operating cross-border.
		Funding:
		- Diversified source of funding, including deposits from clients, wholesale funding and derivatives liabilities.
		- Significant part of the funding can come from foreign investors.
		Ownership/statute: no specification (can be cooperative banks)
2	**Local universal banks**	**Activity:**
		- Engaged in diversified banking activities, including retail, corporate and capital market operations.
		- Operating predominantly in their domestic market.
		Funding:
		- Diversified source of funding, including deposits from clients, wholesale funding and possibly derivatives liabilities.
		- Predominantly funded in their domestic market.
		Ownership/statute: no specification (can be cooperative banks)
3	**Automotive and consumer credit banks**	**Activity**:
		- Specialised in originating and/or servicing consumer loans to retail clients.
		Funding: no specification
		Ownership/statute: no specification (may be owned in a form of 'captive bank' by the corporate company that provides the consumer good for which the loan is granted).
4	**Building societies**	**Activity:**
		- Mainly specialised in the provision of residential loans to retail clients.
		Funding:
		- Mainly funded through deposits.
		Ownership/statute:
		- Subject to specific statutory requirements.
5	**Locally active savings and loan associations/cooperative banks**	**Activity:**
		- Focusing on retail banking and SMEs (payments, savings products, credits and insurance).
		- Operating locally through a decentralised distribution network.
		Funding:
		- Mainly funded through deposits.
		Ownership/statute: no specification (can be cooperative banks).
6	**Private banks**	**Activity:**
		- Providing predominantly wealth management services to high net worth individuals and families.
		Funding:
		- Mainly funded through deposits.

	Business model name	Description
		Ownership/statute: no specification (can be cooperative banks).
7	**Custody banks**	**Activity:**
		- Offering predominantly custodian services (i.e. hold customers' securities in electronic or physical form for safekeeping to minimise the risk of loss).
		- May also provide other services, including account administration, transaction settlements, collection of dividends and interest payments, tax support and foreign exchange.
		Funding: no specification.
		Ownership/statute: no specification.
8	**CCPs**	**Activity:**
		- Specialised in settling trading accounts, clearing trades, collecting and maintaining margin monies, regulating delivery and reporting trading data.
		- Providing a guarantee for the obligations under the contract agreed between two counterparties, ensuring the future performance of open contracts.
		Funding: no specification.
		Ownership/statute: no specification.
9	**Merchant banks**	**Activity:**
		- Financing domestically and in international trade.
		- Offering products such as letters of credit, bank guarantees and the collection and discounting of bills.
		Funding: no specification.
		Ownership/statute: no specification.
10	**Leasing and factoring banks**	**Activity:**
		- Specialised in leasing (asset-based financing) and/or factoring activities (i.e. financing method in which the bank pays a company the value of the receivables (invoices) less a discount for commissions and fees).
		Funding: no specification.
		Ownership/statute: no specification.
11	**Public development banks**	**Activity:**
		- Specialised in financing public sector projects and/or the provision of promotional credit or municipal loans.
		Funding: no specification.
		Ownership/statute:
		- Majority-owned by the state/public sector.
		- May be subject to specific statutory requirements.
12	**Mortgage banks including pass-through financing mortgage banks**	**Activity:**
		- Specialised in directly originating and/or servicing mortgage loans.
		Funding:
		- Predominantly funded through the issuance of covered bonds.
		Ownership/statute: no specification.
13	**Other specialised banks**	**Activity:**
		- Banks not included in the above categories included sharia compliant banks and pass-through financing model (not specialised in mortgage lending).
		Funding: no specification.
		Ownership/statute: no specification.

Sample coverage

Table 19 QIS cumulative sample coverage in terms of banking assets — by jurisdiction and total EU

	QIS assets as a percentage of total domestic assets
AT	74
BE	99
DE	63
DK	93
EE	15
ES	84
FI	87
FR	99
GR	74
HU	73
IE	126 (*)
IT	99
LU	103 (*)
MT	12
NL	95
NO	55
PL	88
PT	79
SE	93
Total	**85**

NOTES:

- Total domestic assets are the total assets of domestic banking groups. Source: ECB Statistical Data Warehouse.
- For Norway total domestic assets is total assets of banks (excluding branches of foreign banks), mortgage companies (including branches of foreign companies), finance companies (including branches of foreign companies) and state lending institutions. Source: Nordes Bank 2018 Financial Stability Report.
- QIS assets excludes QIS institutions that are subsidiaries of EU-27 parent companies.
- (*) Percentages higher than 100% are due to the presence of foreign-controlled (non-EU) subsidiaries in the QIS sample of certain EU Member States (e.g. subsidiaries of US institutions located in the EU).

Annex 2: Additional results

Impact of the central reform scenario net of EU-specific CET1 buffers and Pillar 2 requirements

134. The impact of the reform in terms of MRC takes into account all capital requirements applicable in the EU, i.e. Pillar 1 minima, Pillar 2 requirements and the combined CET1 buffer requirement. From a methodological perspective this represents a novelty with respect to the EBA's previously published Basel III monitoring analyses.

135. For the purposes of comparability with previously published analyses on the impact of the Basel III standards, this section reports impact results computed taking into account only Pillar 1 minima, the capital conservation buffer and the G-SII buffer (where applicable).

Table 20 Percentage change in T1 MRC (relative to current T1 MRC), EU average results, only Pillar 1 minima, the capital conservation buffer and the G-SII buffer

	Δ SA	Δ IRB	Δ CCP	Δ SEC	Δ MKT	Δ OP	Δ CVA	RW	Δ LR	Δ OF	Δ Total
All banks	**2.6**	**2.6**	**0.0**	**0.6**	**2.1**	**3.3**	**3.6**	**14.9**	**-0.5**	**3.3**	**17.7**
Large	2.2	2.7	0.0	0.7	2.2	3.5	3.8	15.1	-0.4	3.4	18.1
of which: G-SIIs	1.7	3.3	-0.1	1.1	3.8	5.5	5.0	20.4	3.6	3.6	27.5
of which: O-SIIs	2.2	1.4	0.1	0.3	1.1	2.0	3.2	10.3	-3.8	3.7	10.2
Medium	10.3	0.2	0.0	0.0	0.7	0.2	0.4	11.9	-1.7	0.5	10.6
Small	11.1	0.0	0.3	-2.0	0.0	-3.5	0.4	6.3	0.8	0.0	7.1

Sources: EBA 2018-Q2 QIS data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 189 banks: large (104), of which G-SIIs (8) and of which O-SIIs (67); medium (61); small (24). SA, standardised approach to credit risk; IRB, internal ratings-based approach to credit risk; CCP, central counterparty; SEC, securitisation; MKT, market risk; OP, operational risk; CVA, credit valuation adjustment; LR, leverage ratio; OF, output floor.

Table 21 Capital ratios and shortfalls, by bank size, only Pillar 1 minima, the capital conservation buffer and the G-SII buffer

	CET1 capital			T1 capital			TC capital		
	Current ratio	Revised ratio	Shortfall (EUR bn)	Current ratio	Revised ratio	Shortfall (EUR bn)	Current ratio	Revised ratio	Shortfall (EUR bn)
All banks	**14.4**	**11.6**	**7.5**	**15.3**	**12.4**	**19.5**	**17.9**	**14.4**	**32.4**
Large	14.2	11.4	7.5	15.2	12.2	19.2	17.8	14.3	32.1
of which: G-SIIs	12.7	10.1	4.8	13.8	10.9	14.1	16.2	12.8	25.9
of which: O-SIIs	15.4	12.5	0.3	16.3	13.3	1.2	19.2	15.6	1.3
Medium	17.3	15.2	0.0	17.5	15.4	0.3	18.9	16.6	0.3
Small	17.0	16.0	0.0	17.2	16.1	0.0	18.3	17.1	0.0

Sources: EBA 2018-Q2 quantitative impact study (QIS) data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 189 banks: large (104), of which G-SIIs (8) and of which O-SIIs (67); medium (61); small (24). T1 and total capital shortfalls include the shortfall incurred by institutions constrained by the leverage ratio in the revised framework.

Impact of the alternative scenarios

EU CVA exemptions

Table 22 Percentage change in T1 MRC (relative to current T1 MRC), EU average results, keeping EU CVA exemptions

	Δ SA	Δ IRB	Δ CCP	Δ SEC	Δ MKT	Δ OP	Δ CVA	RW	Δ LR	Δ OF	Δ Total
All banks	**2.7**	**2.7**	**0.1**	**0.6**	**2.2**	**3.3**	**1.1**	**12.6**	**-0.4**	**9.0**	**21.1**
Large	2.3	2.8	0.1	0.7	2.2	3.4	1.1	12.6	-0.4	9.3	21.6
of which: G-SIIs	1.7	3.5	-0.1	1.2	3.9	5.5	1.4	17.0	0.0	7.0	24.0
of which: O-SIIs	2.3	1.7	0.2	0.3	1.2	2.1	1.1	8.9	-0.4	12.3	20.8
Medium	9.7	0.1	0.0	0.0	0.9	0.3	0.1	11.1	-1.1	0.9	10.9
Small	10.7	0.0	0.2	-1.9	0.0	-3.7	0.2	5.5	0.1	0.0	5.5

Sources: EBA 2018-Q2 quantitative impact study (QIS) data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 189 banks: large (104), of which G-SIIs (8) and of which O-SIIs (67); medium (61); small (24). SA, standardised approach to credit risk; IRB, internal ratings-based approach to credit risk; CCP, central counterparty; SEC, securitisation; MKT, market risk; OP, operational risk; CVA, credit valuation adjustment; LR, leverage ratio; OF, output floor.

Table 23 Capital ratios and shortfalls, by bank size, keeping EU CVA exemptions

	CET1 capital			T1 capital			TC capital		
	Current ratio	Revised ratio	Shortfall (bn)	Current ratio	Revised ratio	Shortfall (bn)	Current ratio	Revised ratio	Shortfall (bn)
All banks	**14.4**	**11.8**	**71.3**	**15.3**	**12.6**	**102.3**	**17.9**	**14.7**	**106.6**
Large	14.2	11.7	71.2	15.2	12.5	101.5	17.8	14.6	105.6
of which: G-SIIs	12.7	10.3	38.0	13.8	11.2	50.3	16.2	13.1	61.9
of which: O-SIIs	15.4	12.7	29.2	16.3	13.5	45.2	19.2	15.9	36.4
Medium	17.3	15.2	0.1	17.5	15.4	0.8	18.9	16.6	0.9
Small	17.0	16.0	0.0	17.2	16.1	0.0	18.3	17.2	0.1

Sources: EBA 2018-Q2 quantitative impact study (QIS) data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 189 banks: large (104), of which G-SIIs (8) and of which O-SIIs (67); medium (61); small (24). T1 and total capital shortfalls include the shortfall incurred by institutions constrained by the leverage ratio in the revised framework.

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Table 24 Percentage change in T1 MRC (relative to current T1 MRC), EU average results, BCBS consultation document revisions

	Δ SA	Δ IRB	Δ CCP	Δ SEC	Δ MKT	Δ OP	Δ CVA	RW	Δ LR	Δ OF	Δ Total
All banks	**2.7**	**2.7**	**0.1**	**0.6**	**2.2**	**3.3**	**3.4**	**14.8**	**-0.5**	**8.7**	**23.1**
Large	2.3	2.8	0.1	0.7	2.2	3.4	3.5	15.0	-0.4	9.1	23.6
of which: G-SIIs	1.7	3.5	-0.1	1.2	3.9	5.5	4.4	20.0	0.0	6.6	26.6
of which: O-SIIs	2.3	1.7	0.2	0.3	1.2	2.1	3.2	11.0	-0.5	12.1	22.6
Medium	9.7	0.1	0.0	0.0	0.9	0.3	0.4	11.4	-1.1	0.9	11.2
Small	10.7	0.0	0.2	-1.9	0.0	-3.7	0.3	5.5	0.0	0.0	5.5

Sources: EBA 2018-Q2 quantitative impact study (QIS) data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 189 banks: large (104), of which G-SIIs (8) and of which O-SIIs (67); medium (61); small (24). SA, standardised approach to credit risk; IRB, internal ratings-based approach to credit risk; CCP, central counterparty; SEC, securitisation; MKT, market risk; OP, operational risk; CVA, credit valuation adjustment; LR, leverage ratio; OF, output floor.

Table 25 Capital ratios and shortfalls, by bank size, BCBS consultation document revisions

	CET1 capital			T1 capital			TC capital		
	Current ratio	Revised ratio	Shortfall (bn)	Current ratio	Revised ratio	Shortfall (bn)	Current ratio	Revised ratio	Shortfall (bn)
All banks	**14.4**	**11.6**	**80.9**	**15.3**	**12.4**	**115.5**	**17.9**	**14.5**	**121.1**
Large	14.2	11.5	80.9	15.2	12.3	114.8	17.8	14.4	120.1
of which: G-SIIs	12.7	10.1	45.2	13.8	11.0	60.3	16.2	12.9	72.8
of which: O-SIIs	15.4	12.6	31.6	16.3	13.3	48.4	19.2	15.7	39.8
Medium	17.3	15.2	0.1	17.5	15.4	0.8	18.9	16.6	0.9
Small	17.0	16.0	0.0	17.2	16.1	0.0	18.3	17.1	0.1

Sources: EBA 2018-Q2 quantitative impact study (QIS) data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 189 banks: large (104), of which G-SIIs (8) and of which O-SIIs (67); medium (61); small (24). T1 and total capital shortfalls include the shortfall incurred by institutions constrained by the leverage ratio in the revised framework.

Impact by country

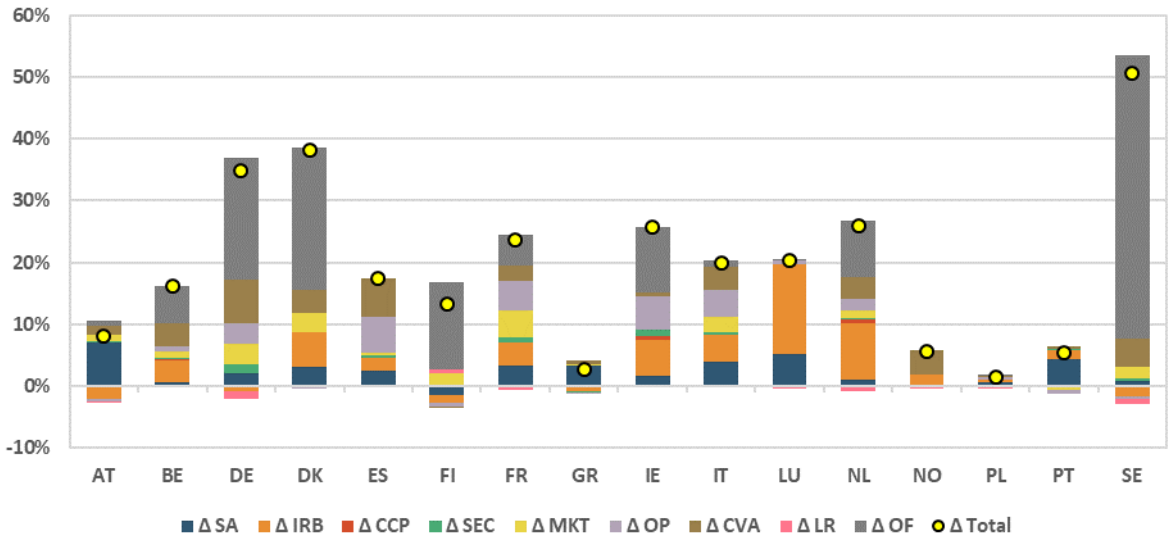
The results should be interpreted with caution, taking into account data quality.

Overall impact

136. For most EU countries, the CVA reform increases the countries' MRC compared with the June 2018 baseline. The highest changes are shown in Germany (7.1%) and Spain (6.3). For market risk, France shows an increase in MRC, which is almost twice as high as the EU average (4.3%). Portugal is the only country in which the reform results in a decrease in MRC (-0.6%).

137. The 2019 FRTB amendments decrease the impact in most countries compared with the 2016 FRTB (not shown in graph). This change is partly mitigated by a higher impact of the output floor, except in Germany, Italy and Sweden. For France, the 2019 FRTB amendments result in a higher market risk impact, which is mitigated by a lower output floor. This change is an important driver behind the lower EU-wide output floor under the 2019 FRTB.

Figure 17 Percentage change in T1 MRC (relative to current T1 MRC), by country

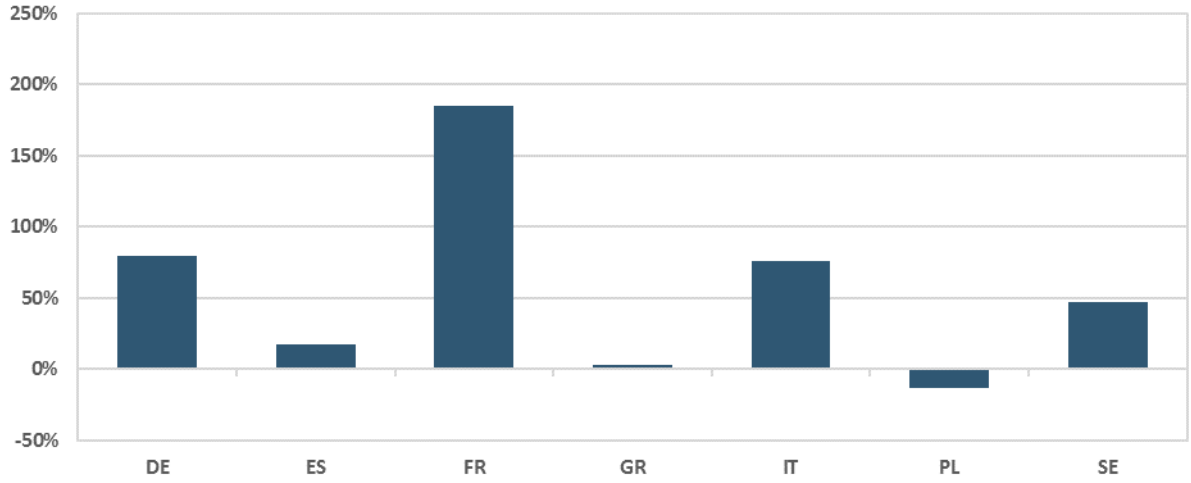


Sources: EBA 2018-Q2 quantitative impact study (QIS) data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 203 banks: AT (15), BE (8), DE (42), DK (8), EE* (2), ES (10), FI (5), FR (14), GR (4), HR* (2), HU* (1), IE (10), IT (24), LU (6), LV* (2), MT* (1), NL (12), NO (6), PL (12), PT(8), SE (11). SA, standardised approach to credit risk; IRB, internal ratings-based approach to credit risk; CCP, central counterparty; SEC, securitisation; MKT, market risk; OP, operational risk; CVA, credit valuation adjustment; OF, output floor.
*Not shown in the chart because there are fewer than three entities in the cluster.

Market risk

138. The impact is heterogeneous across countries. On the one hand, Spain and Greece experience impacts lower than 30%, while Germany, Italy and France observe substantially higher impacts in the range of around 75% to 210%. Poland observes a negative impact (-13%).

Figure 18 Percentage change in total market risk RWA (relative to total current market RWA), by country

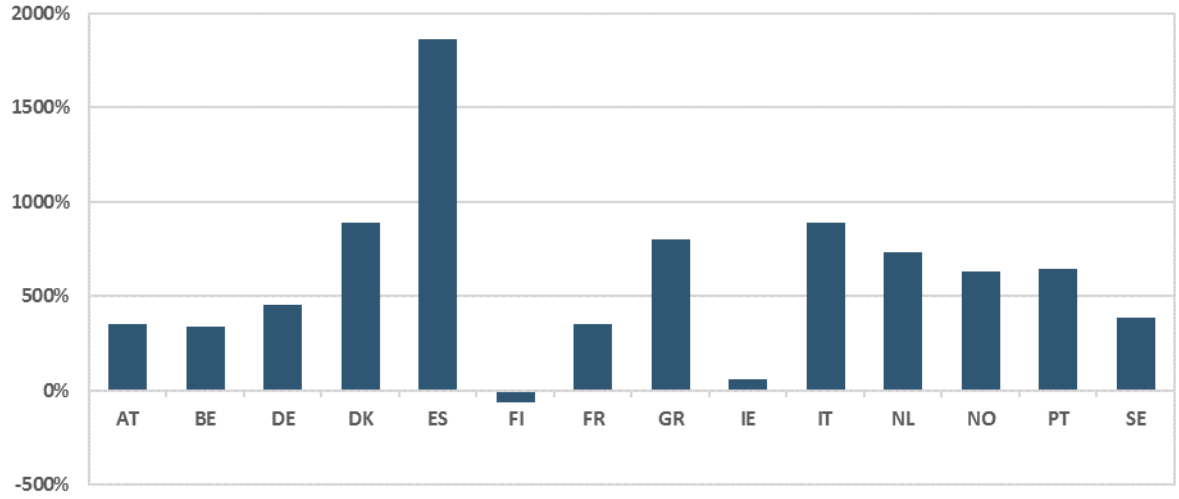


Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 43 banks: AT* (1), BE* (2), DE (7), DK* (2), ES (4), FR (4), GR (4), IE* (2), IT (6), LU* (2), NL* (1), NO* (1), PL (7), PT* (1), SE (3).
*Not shown in the chart because there are fewer than three entities in the cluster.

CVA

139. The impact is heterogeneous across countries. While the majority of countries experience an increase in CVA RWA, the revised framework leads to lower capital requirements for Finland.

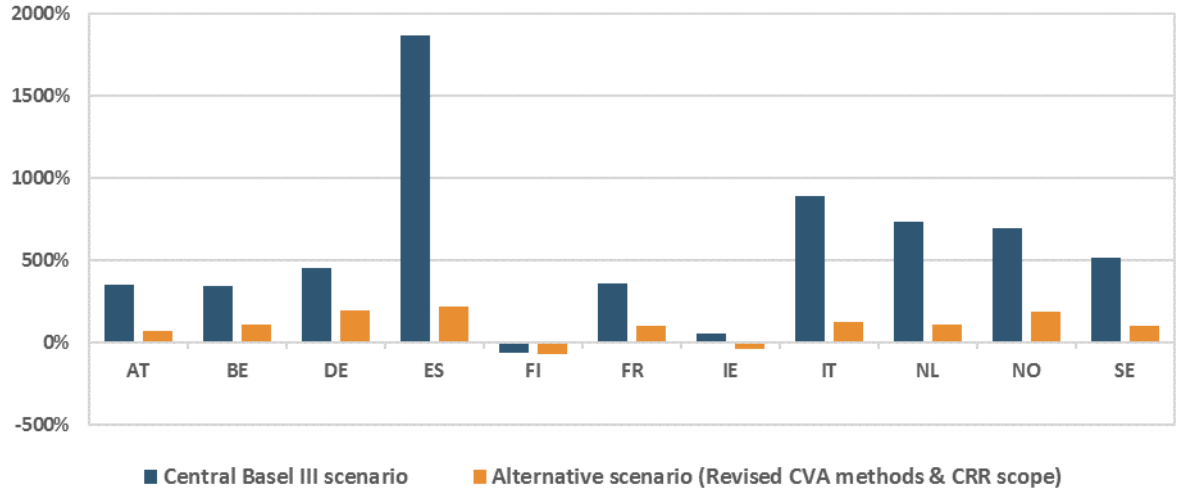
Figure 19 Percentage change in CVA RWA (relative to total current CVA RWA), by country



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Notes: Based on a sample of 112 banks: AT (5), BE (5), DE (17), DK (3), EE* (1), ES (9), FI (3), FR (8), GR* (2), HR* (1), HU* (1), IE (4), IT (18), LU* (2), LV* (2), NL (10), NO (4), PL* (1), PT (4), SE (12).
*Not shown in the chart because there are fewer than three entities in the cluster.

140. Figure 20 shows the impact of the changes in the CVA's scope by comparing the central Basel III scenario with an alternative scenario, in which the scope of transactions subject to CVA capital requirements is assumed to remain the same as in the current framework, i.e. the CRR's scope.

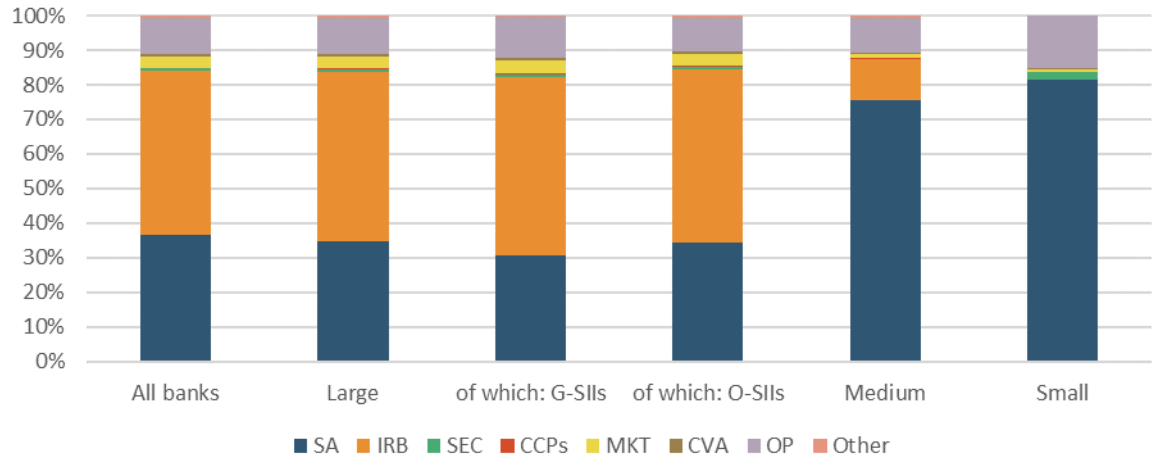
Figure 20 Percentage change in CVA RWA (relative to total current CVA RWA) due to changes in the scope of the CVA capital requirements, by country



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Notes: Based on a sample of 99 banks: AT (4), BE (5), DE (16), DK* (1), EE* (1), ES (9), FI (3), FR (6), GR* (2), HR* (1), IE (4), IT (18), LU* (2), LV* (2), NL (10), NO (3), PL* (1), PT* (2), SE (9).
*Not shown in the chart because there are fewer than three entities in the cluster.

Overview of revised RWA

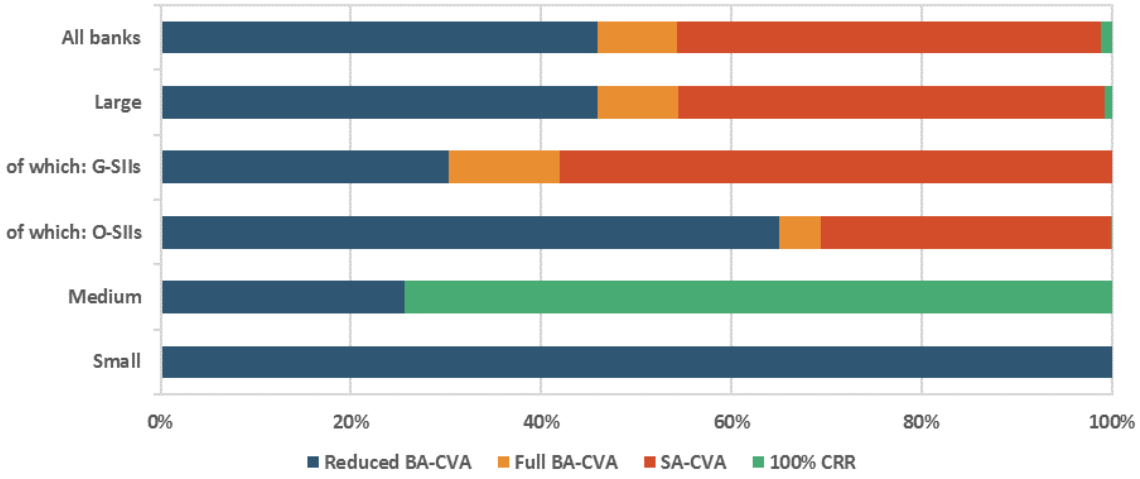
Figure 21 Breakdown of revised RWA by risk and bank size



Sources: EBA 2018-Q2 quantitative impact study (QIS) data, EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 189 banks: large (104), of which G-SIIs (8) and of which O-SIIs (67); medium (61); small (24). SA, standardised approach to credit risk; IRB, internal ratings-based approach to credit risk; CCP, central counterparty; SEC, securitisation; MKT, market risk; OP, operational risk; CVA, credit valuation adjustment.

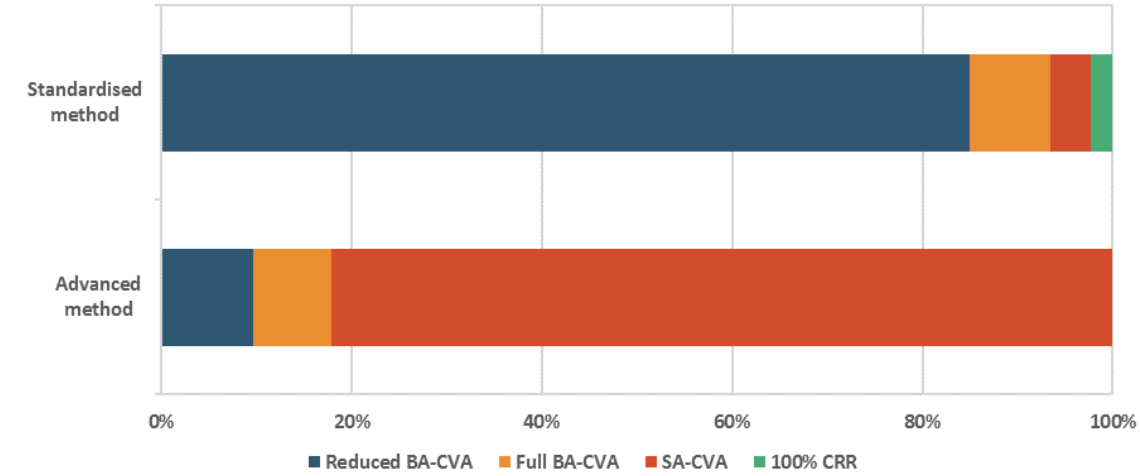
Revised RWA for CVA risk

Figure 22 Composition of revised CVA RWA, by bank size



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 92 banks: large (59), of which G-SIIs (8) and of which O-SIIs (32); medium (29); small (4).

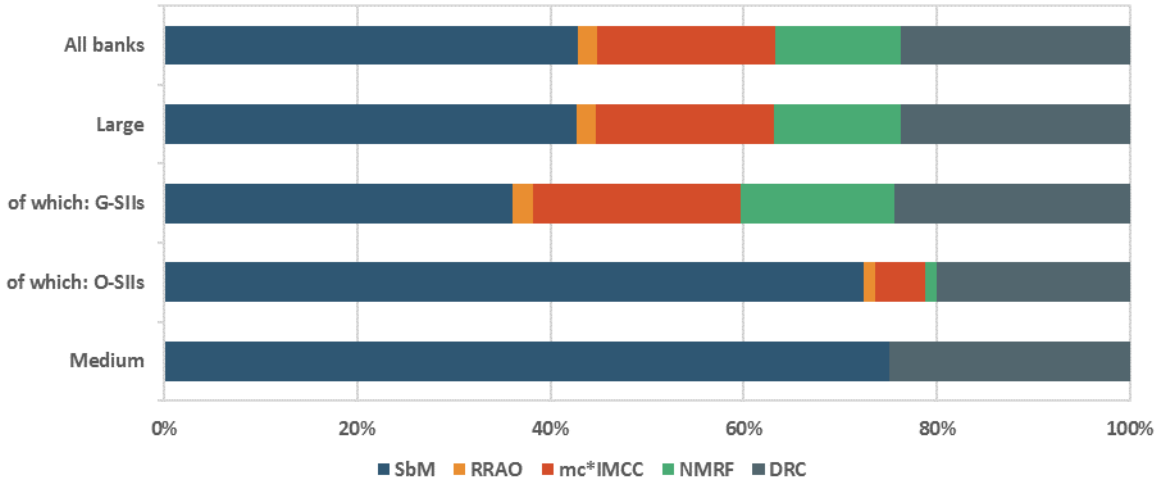
Figure 23 Composition of revised CVA RWA, by current approach



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Notes: Based on a sample of 92 banks: standardised method (80); advanced method (11); alternative method (Art. 385 of the CRR)* (1).
*Not shown in the chart because there are fewer than three entities in the cluster.

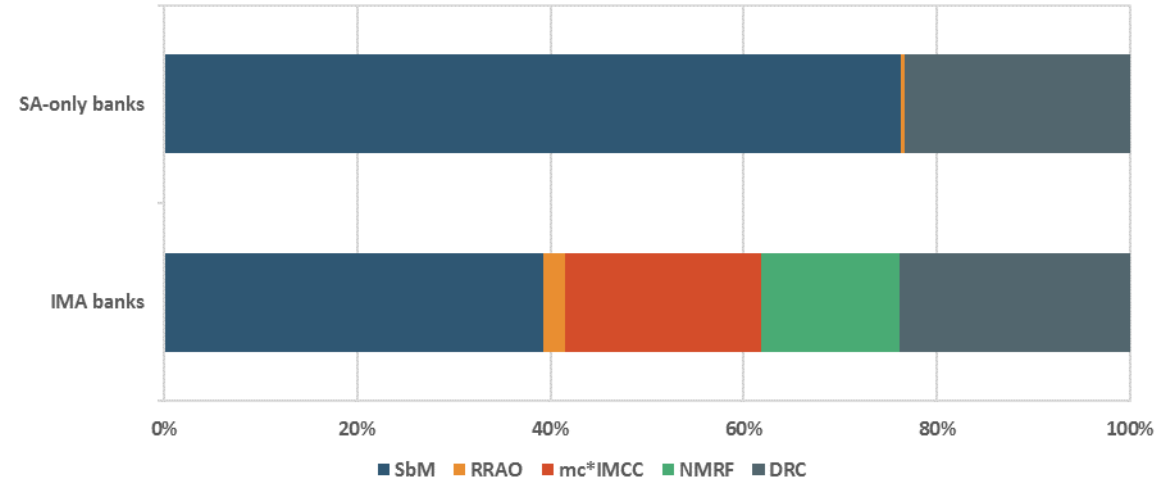
Revised RWA for market risk

Figure 24 Composition of FRTB RWA, by bank size



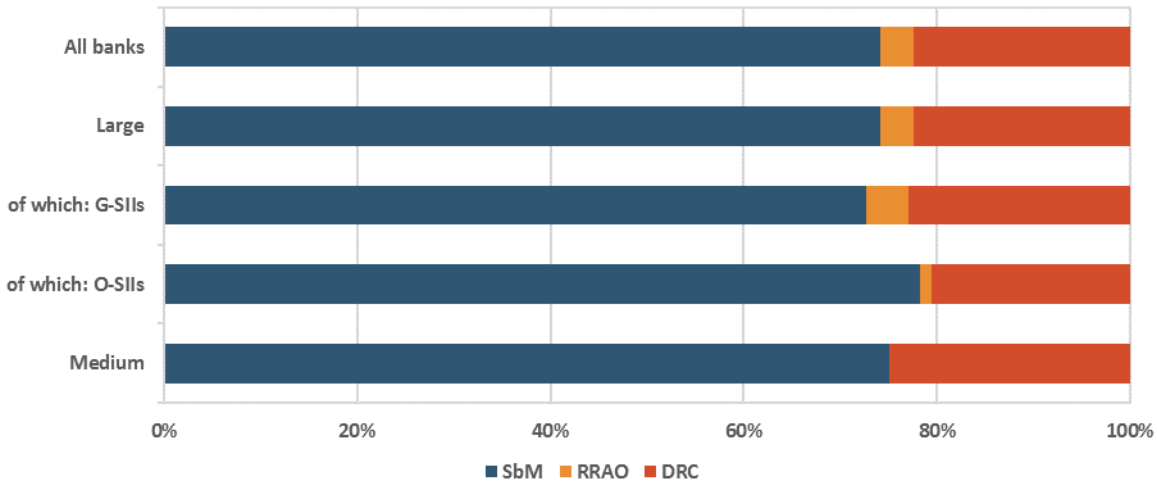
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 44 banks: large (39), of which G-SIIs (7) and of which O-SIIs (27); medium (4); small* (1). SbM, sensitivities-based method; RRAO, residual risk add-on; mc, multiplication factor; IMCC, capital requirement for modellable risk factors; NMRF, capital requirements for non-modellable risk factors; DRC, default risk capital requirement.
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 25 Composition of FRTB RWA, by bank type



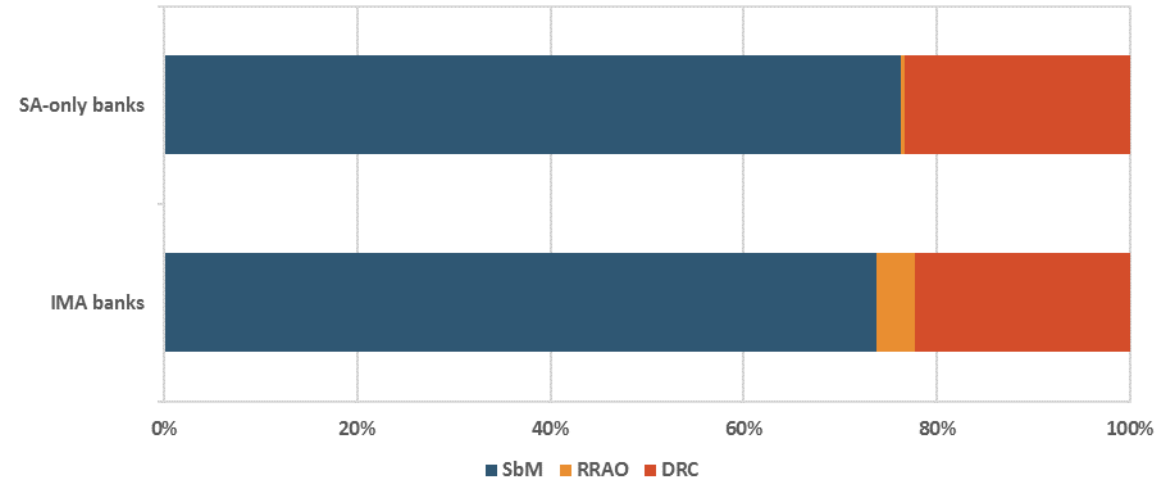
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 44 banks: SA-only banks (25); IMA banks (19). SA-only banks refers to banks using solely the SA. IMA banks refers to banks using the IMA for all or part of their portfolios. SbM, sensitivities-based method; RRAO, residual risk add-on; mc, multiplication factor; IMCC, capital requirement for modellable risk factors; NMRF, capital requirements for non-modellable risk factors; DRC, default risk capital requirement.

Figure 26 Composition of FRTB-SA RWA, by bank size



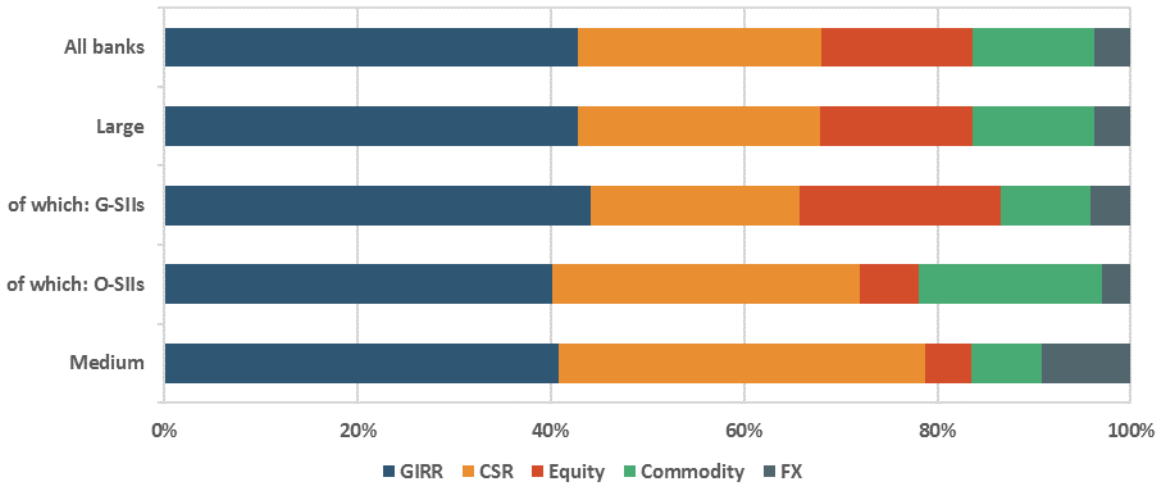
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 44 banks: large (39), of which G-SIIs (7) and of which O-SIIs (27); medium (4); small* (1). SbM, sensitivities-based method; RRAO, residual risk add-on; DRC, default risk capital requirement.
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 27 Composition of FRTB-SA RWA, by bank type



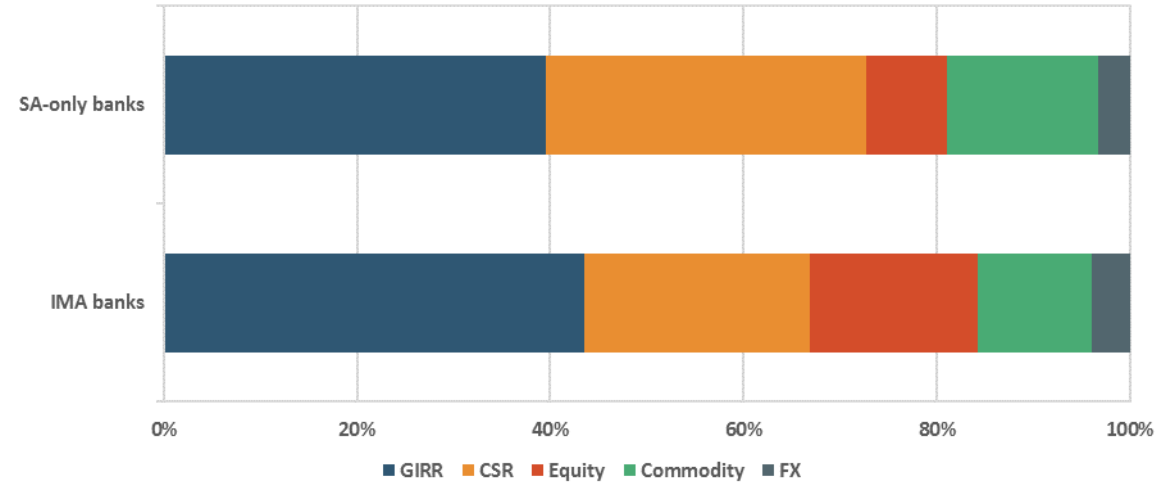
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 44 banks: SA-only banks (25); IMA banks (19). SA-only banks refers to banks using solely the SA. IMA banks refers to banks using the IMA for all or part of their portfolios. SbM, sensitivities-based method; RRAO, residual risk add-on; DRC, default risk capital requirement.

Figure 28 Composition of FRTB-SA SbM RWA, by bank size



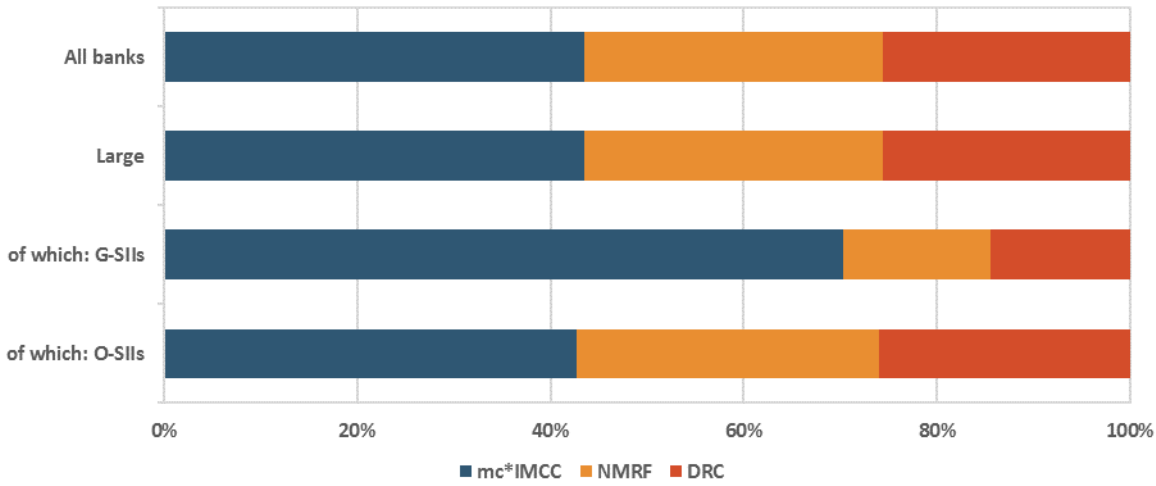
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 44 banks: large (39), of which G-SIIs (7) and of which O-SIIs (27); medium (4); small* (1). GIRR, general interest rate risk; CSR, credit spread risk.
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 29 Composition of FRTB-SA SbM RWA, by bank type



Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 45 banks: SA-only banks (25); IMA banks (21). SA-only banks refers to banks using solely the SA. IMA banks refers to banks using the IMA for all or part of their portfolios. GIRR, general interest rate risk; CSR, credit spread risk.

Figure 30 Composition of FRTB-IMA RWA, by bank size

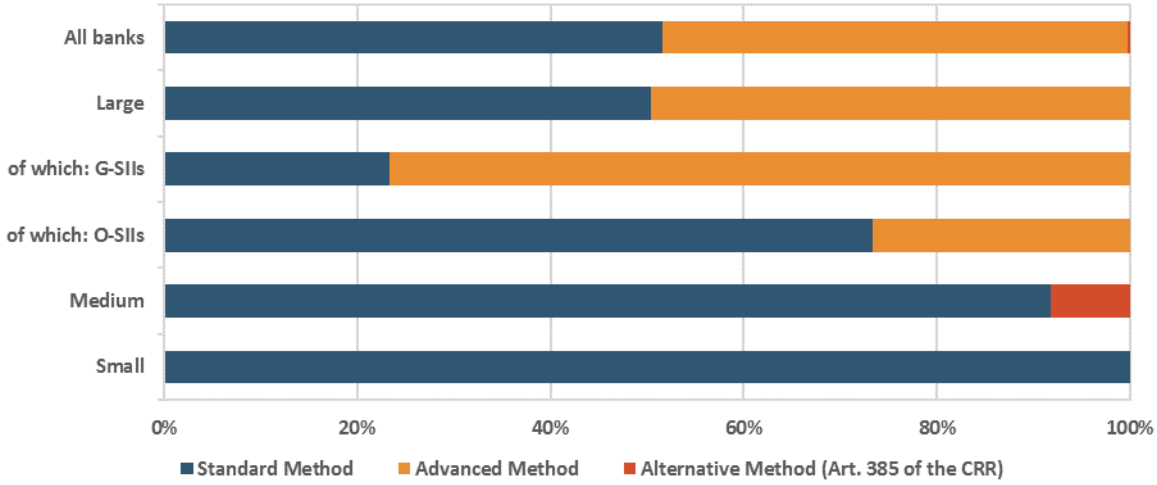


Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 14 banks: large (13), of which G-SIIs (7) and of which O-SIIs (6). mc, multiplication factor; IMCC, capital requirement for modellable risk factors; NMRF, capital requirements for non-modellable risk factors; DRC, default risk capital requirement.
*Not shown in the chart because there are fewer than three entities in the cluster.

Annex 3: Overview of current capital requirements

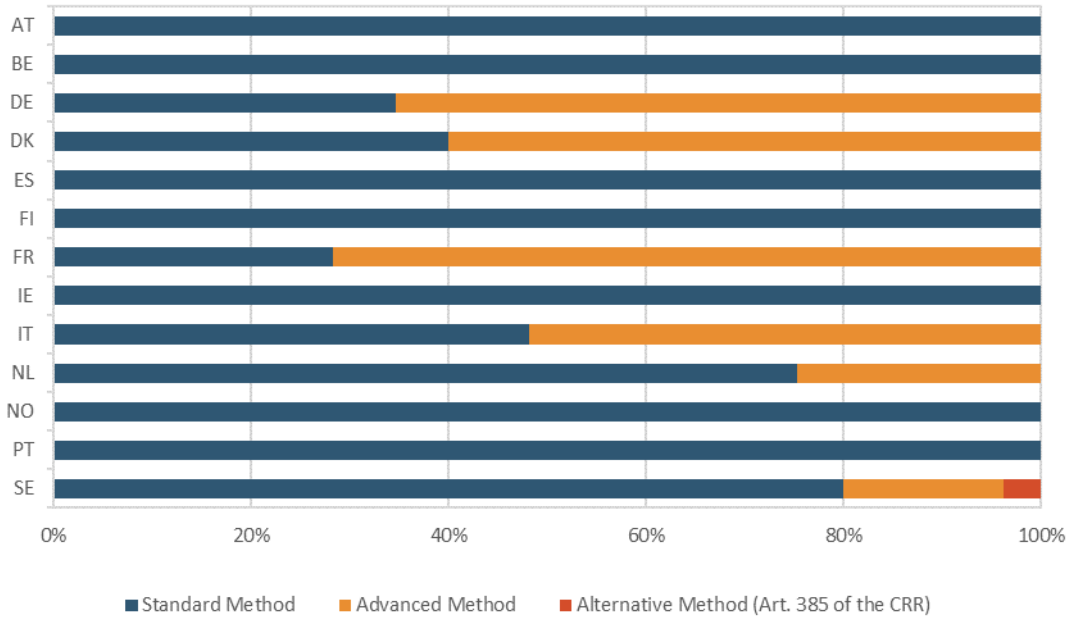
CVA risk

Figure 31 Breakdown of current CVA RWA by current method, by bank size



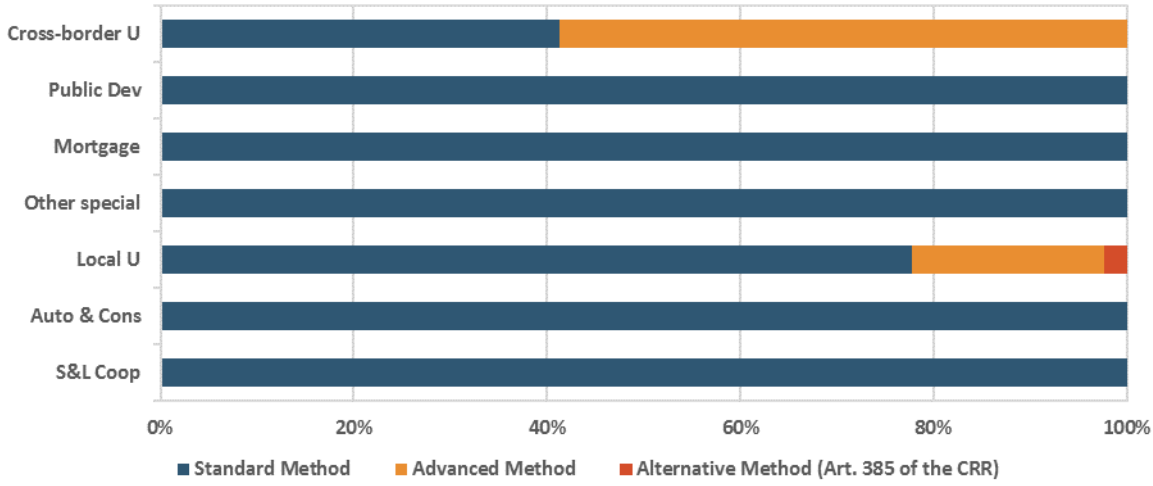
Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 105 banks: large (68), of which G-SIIs (8) and of which O-SIIs (38); medium (32); small (5).

Figure 32 Breakdown of current CVA RWA by current method, by country



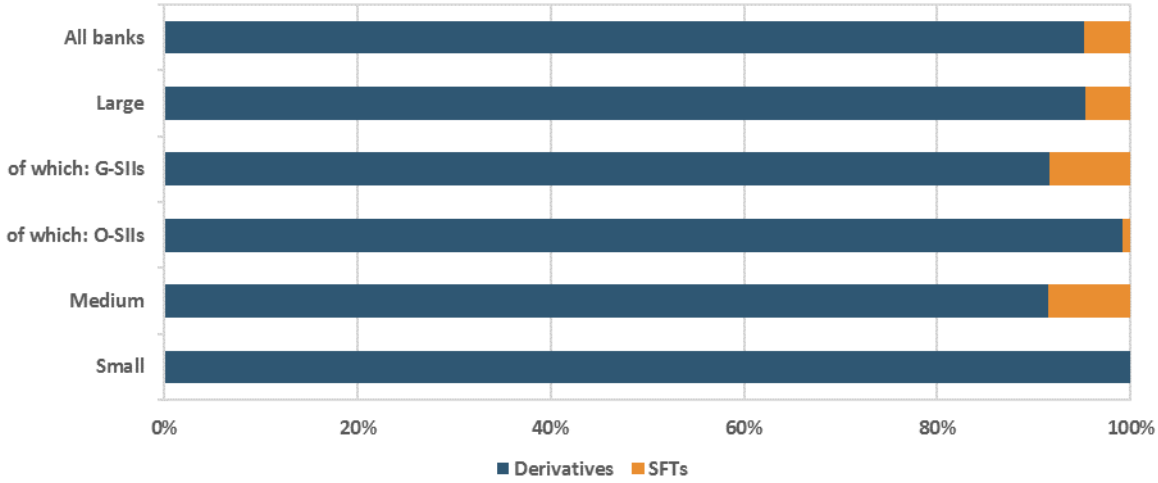
Sources: EBA 2018-Q2 QIS data and EBA calculations.
Notes: Based on a sample of 112 banks: AT (5), BE (5), DE (17), DK (3), EE* (1), ES (9), FI (3), FR (8), GR* (2), HR* (1), HU* (1), IE (4), IT (18), LU* (2), LV* (2), NL (10), NO (4), PL* (1), PT (4), SE (12).
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 33 Breakdown of current CVA RWA by current method, by business model



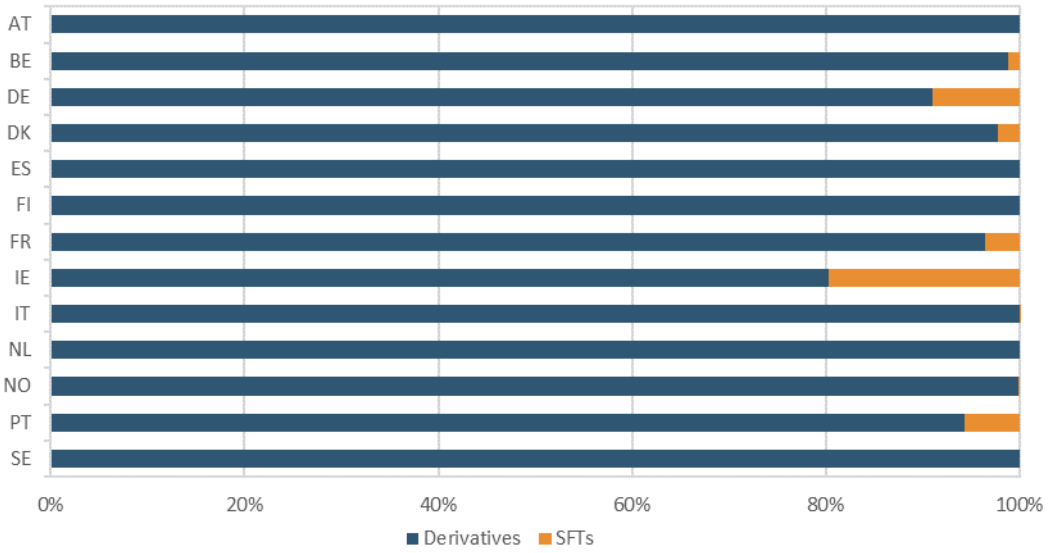
Sources: EBA 2018-Q2 QIS data and EBA calculations.
Notes: Based on a sample of 112 banks: Cross-border U (34), Leasing* (1), Public Dev (5), Mortgage (5), Other special (8), Local U (32), Auto & Cons (5), Building Soc* (1), S&L Coop (15), Private* (2), Custody* (2), Merchant* (2).
*Not shown in the chart because there are fewer than three entities in the cluster

Figure 34 Breakdown of current CVA RWA by instrument, by bank size



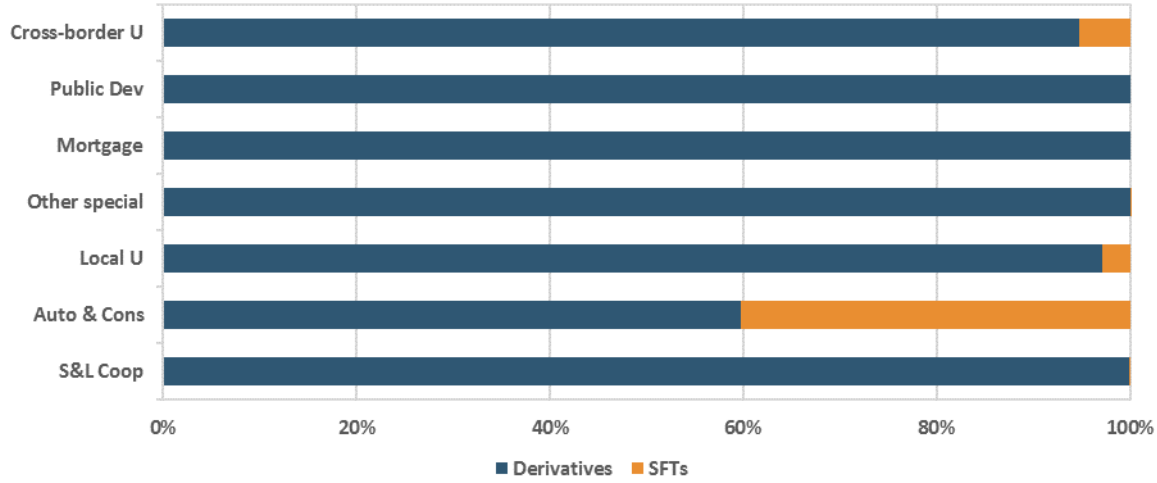
Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 105 banks: large (68), of which G-SIIs (8) and of which O-SIIs (38); medium (32); small (5).

Figure 35 Breakdown of current CVA RWA by instrument, by country



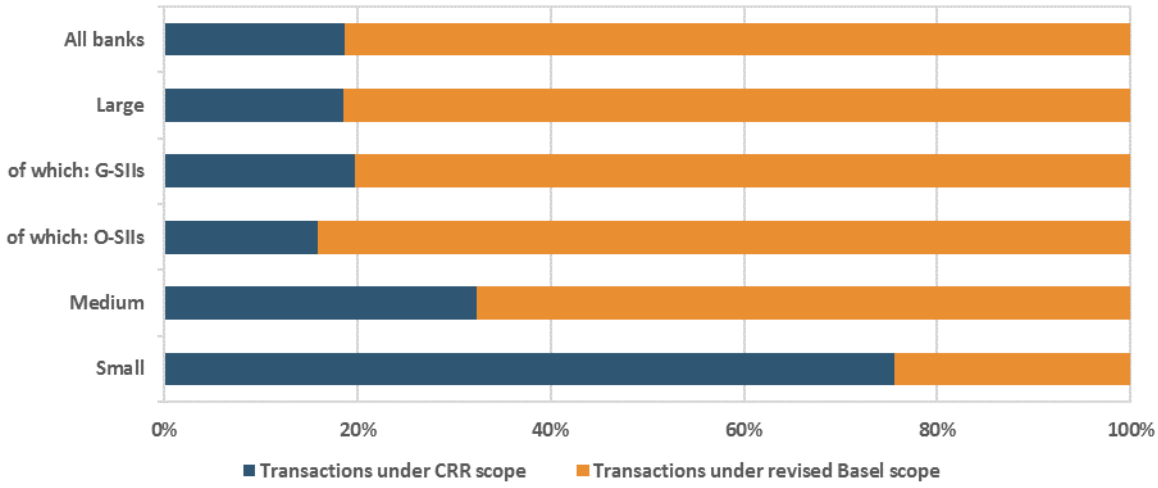
Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 112 banks: AT (5), BE (5), DE (17), DK (3), EE* (1), ES (9), FI (3), FR (8), GR* (2), HR* (1), HU* (1), IE (4), IT (18), LU* (2), LV* (2), NL (10), NO (4), PL* (1), PT (4), SE (12).
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 36 Breakdown of current CVA RWA by instrument, by business model



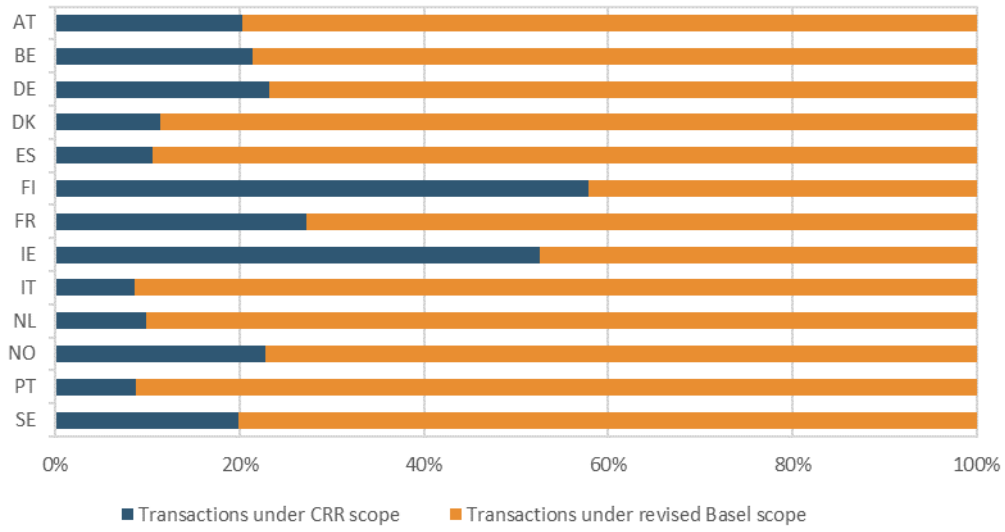
Sources: EBA 2018-Q2 QIS data and EBA calculations.
Notes: Based on a sample of 112 banks: Cross-border U (34), Leasing* (1), Public Dev (5), Mortgage (5), Other special (8), Local U (32), Auto & Cons (5), Building Soc* (1), S&L Coop (15), Private* (2), Custody* (2), Merchant* (2).
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 37 Breakdown of current CVA RWA by CVA scope, by bank size



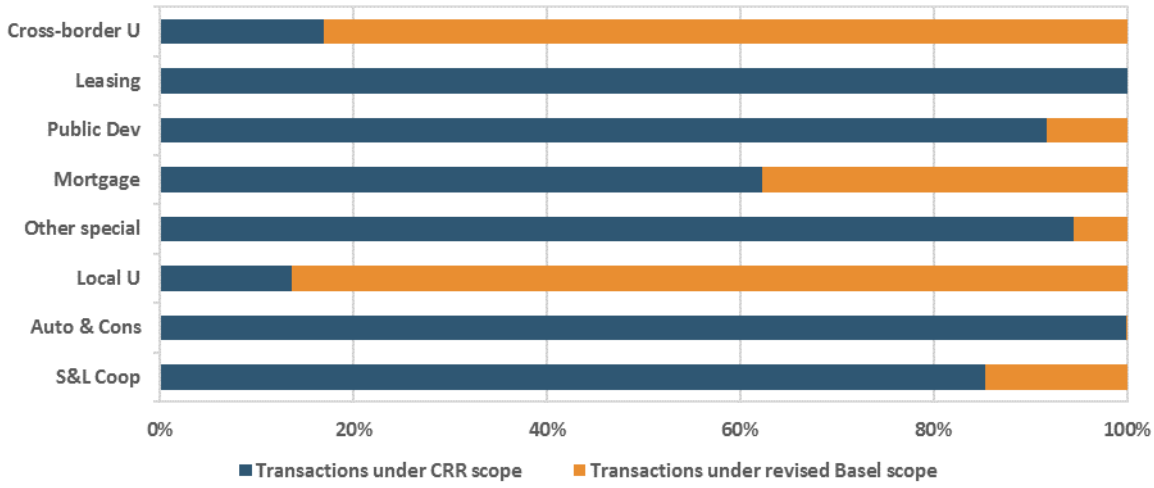
Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 105 banks: large (68), of which G-SIIs (8) and of which O-SIIs (38); medium (32); small (5).

Figure 38 Breakdown of CVA RWA by CVA scope, by country



Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 112 banks: AT (5), BE (5), DE (17), DK (3), EE* (1), ES (9), FI (3), FR (8), GR* (2), HR* (1), HU* (1), IE (4), IT (18), LU* (2), LV* (2), NL (10), NO (4), PL* (1), PT (4), SE (12).
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 39 Breakdown of current CVA RWA by CVA scope, by business model



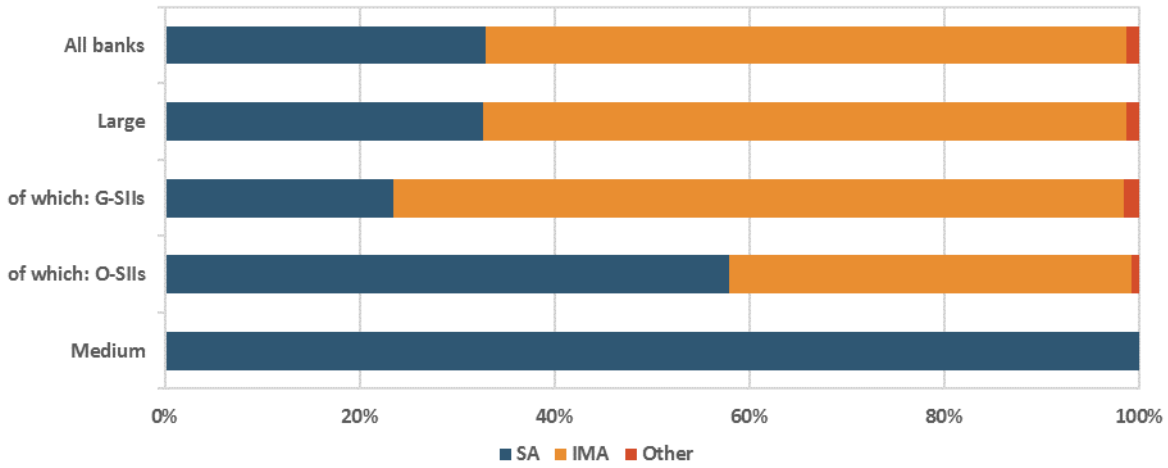
Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 112 banks: Cross-border U (34), Leasing* (1), Public Dev (5), Mortgage (5), Other special (8), Local U (32), Auto & Cons (5), Building Soc* (1), S&L Coop (15), Private* (2), Custody* (2), Merchant* (2).
*Not shown in the chart because fewer than three entities in the cluster.

Figure 40 Regulatory CVA (EUR bn) versus accounting CVA (EUR bn)

Sources: EBA 2018-Q2 QIS data and EBA calculations.
Note: Based on a sample of 31 banks.

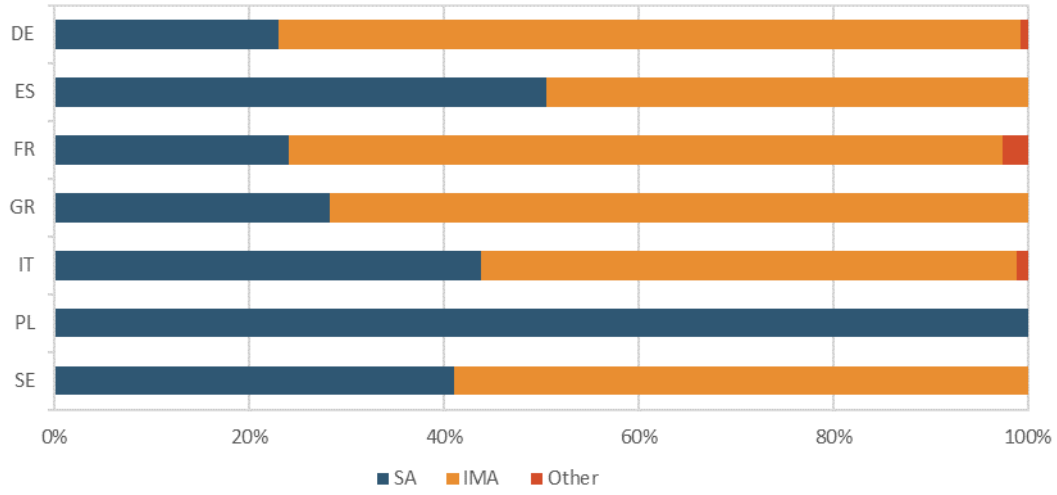
Market risk

Figure 41 Breakdown of current market RWA by current method, by bank size



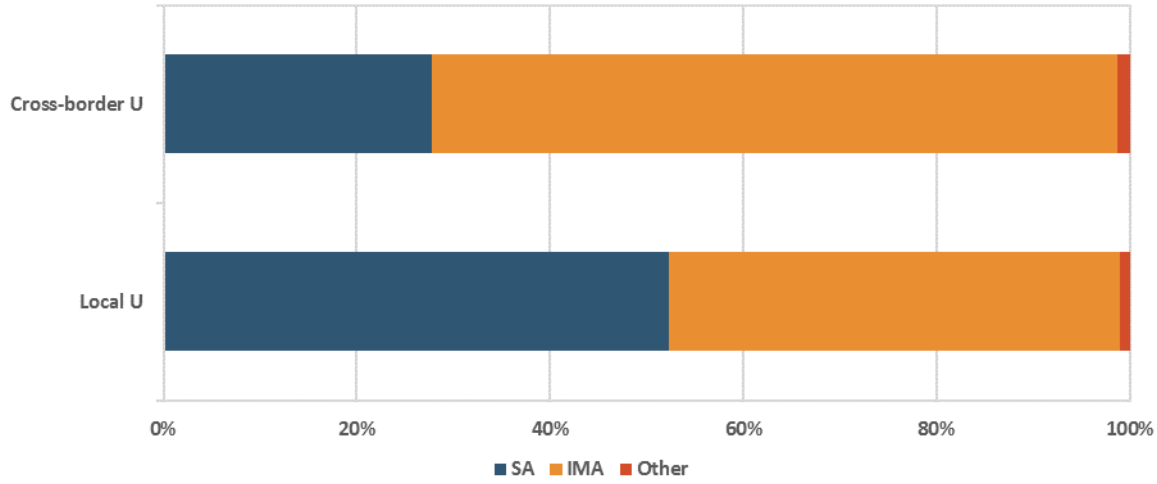
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 44 banks: large (39), of which G-SIIs (7) and of which O-SIIs (27); medium (4); small* (1).
*Not shown in the chart because there are fewer than three entities in the cluster

Figure 42 Breakdown of current market RWA by current method, by country



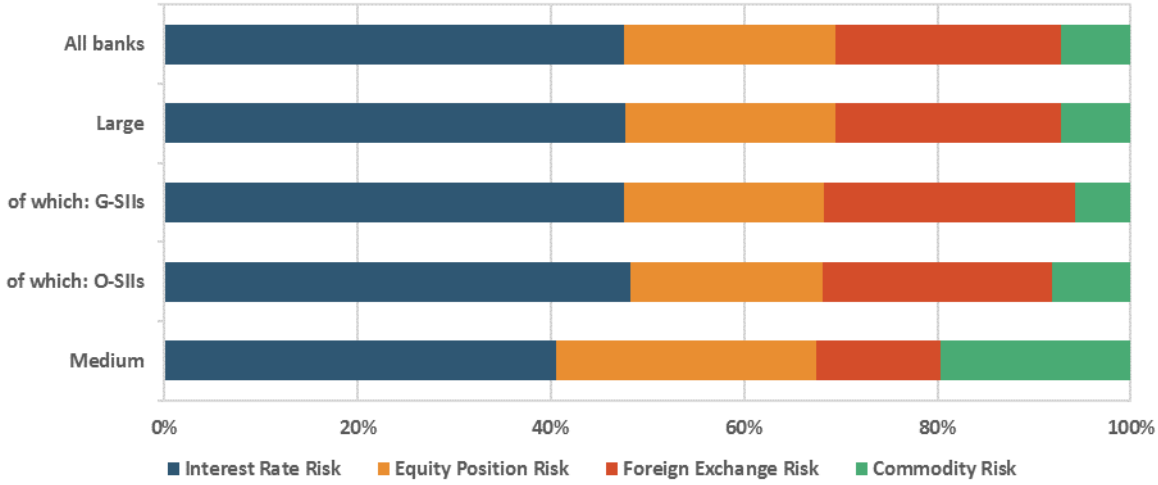
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 49 banks: AT* (1), BE* (2), DE (7), DK* (2), ES (4), FR (6), GR (4), IE* (2), IT (6), LU* (2), NL* (1), NO* (1), PL (7), PT* (1), SE (3).
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 43 Breakdown of current market RWA by current method, by business model



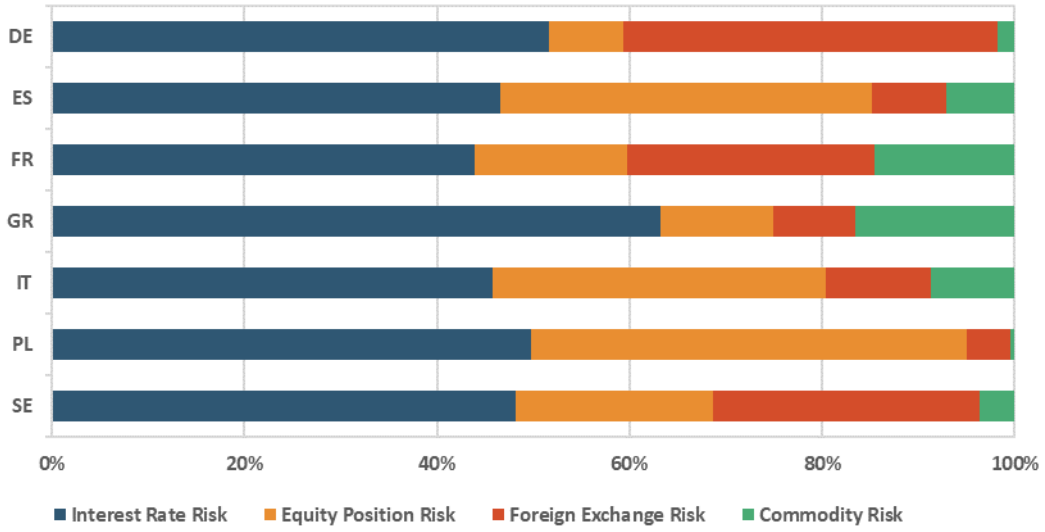
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 49 banks: Cross-border U (20), Mortgage* (1), Other special* (1), Local U (23), S&L Coop* (1), Private* (1), Custody* (1), Merchant* (1).
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 44 Composition of current market SA RWA, by bank size



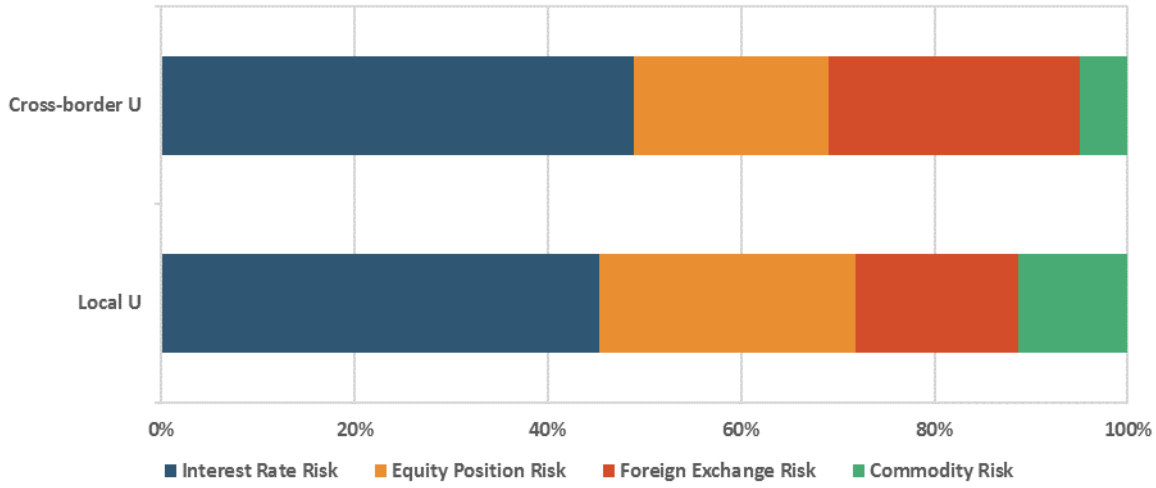
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 43 banks: Large (38), of which G-SIIs (7), of which O-SIIs (26); Medium (4); Small* (1).
* Not shown in the chart because fewer than three entities in the cluster

Figure 45 Composition of current market SA RWA, by country



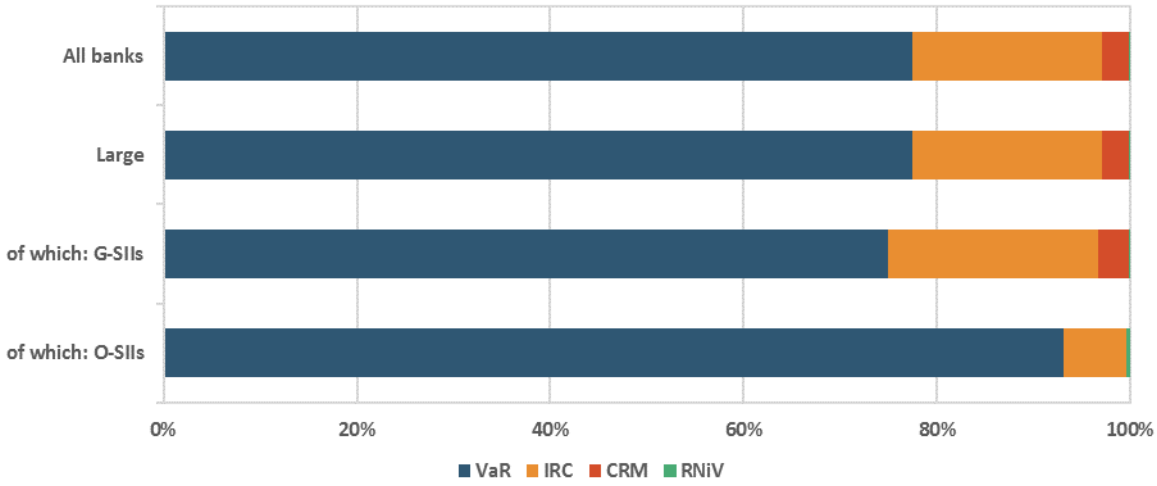
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 48 banks: AT* (1), BE* (2), DE (7), DK* (2), ES (4), FR (5), GR (4), IE* (2), IT (6), LU* (2), NL* (1), NO* (1), PL (7), PT* (1), SE (3).
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 46 Composition of current market SA RWA, by business model



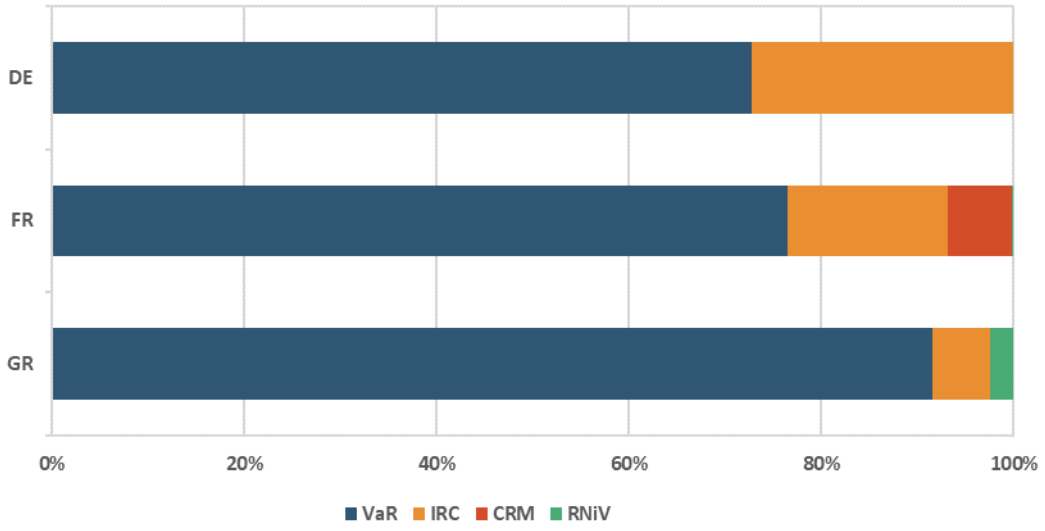
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 48 banks: Cross-border U (20), Mortgage* (1), Other special* (1), Local U (22), S&L Coop* (1), Private* (1), Custody* (1), Merchant* (1).
*Not shown in the chart because there are fewer than three entities in the cluster

Figure 47 Composition of current market IMA RWA, by bank size



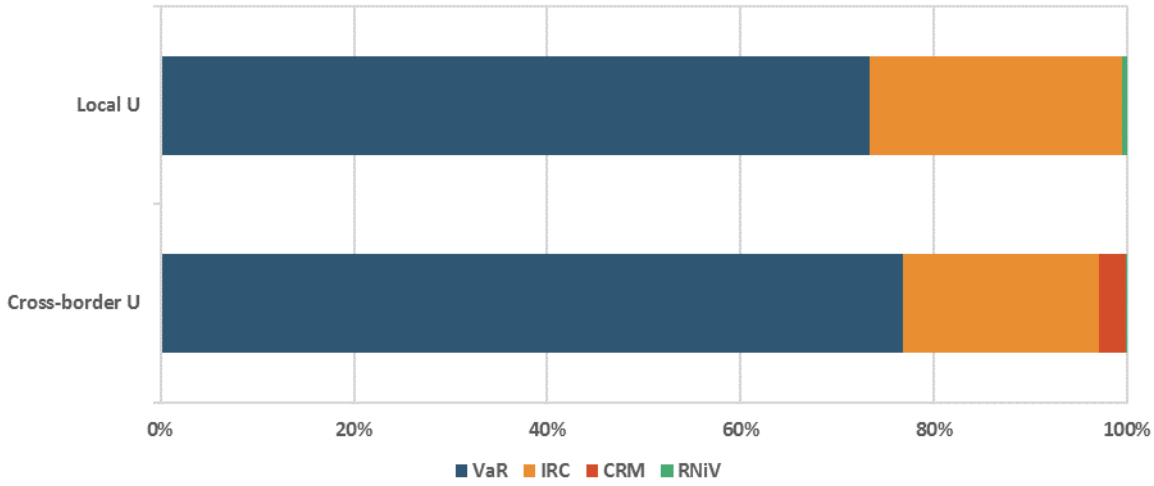
Sources: EBA 2018-Q4 QIS data and EBA calculations.
Note: Based on a sample of 19 banks: large (19), of which G-SIIs (7) and of which O-SIIs (12).

Figure 48 Composition of current market IMA RWA, by country



Sources: EBA 2018-Q4 QIS data and EBA calculations.
Notes: Based on a sample of 20 banks: BE* (1), DE (4), ES* (2), FR (3), GR (3), IT* (2), NL* (1), PT* (1), SE *(2).
*Not shown in the chart because there are fewer than three entities in the cluster.

Figure 49 Composition of current market IMA RWA, by business model



Sources: EBA 2018-Q4 QIS data and EBA calculations.
Note: Based on a sample of 20 banks: Cross-border U (15), Local U (5).

EUROPEAN BANKING AUTHORITY

Floor 27, 20 Av. André Prothin, 92927 Paris La Défense

Tel. +33 1 86 52 70 00
E-mail: info@eba.europa.eu

http://www.eba.europa.eu