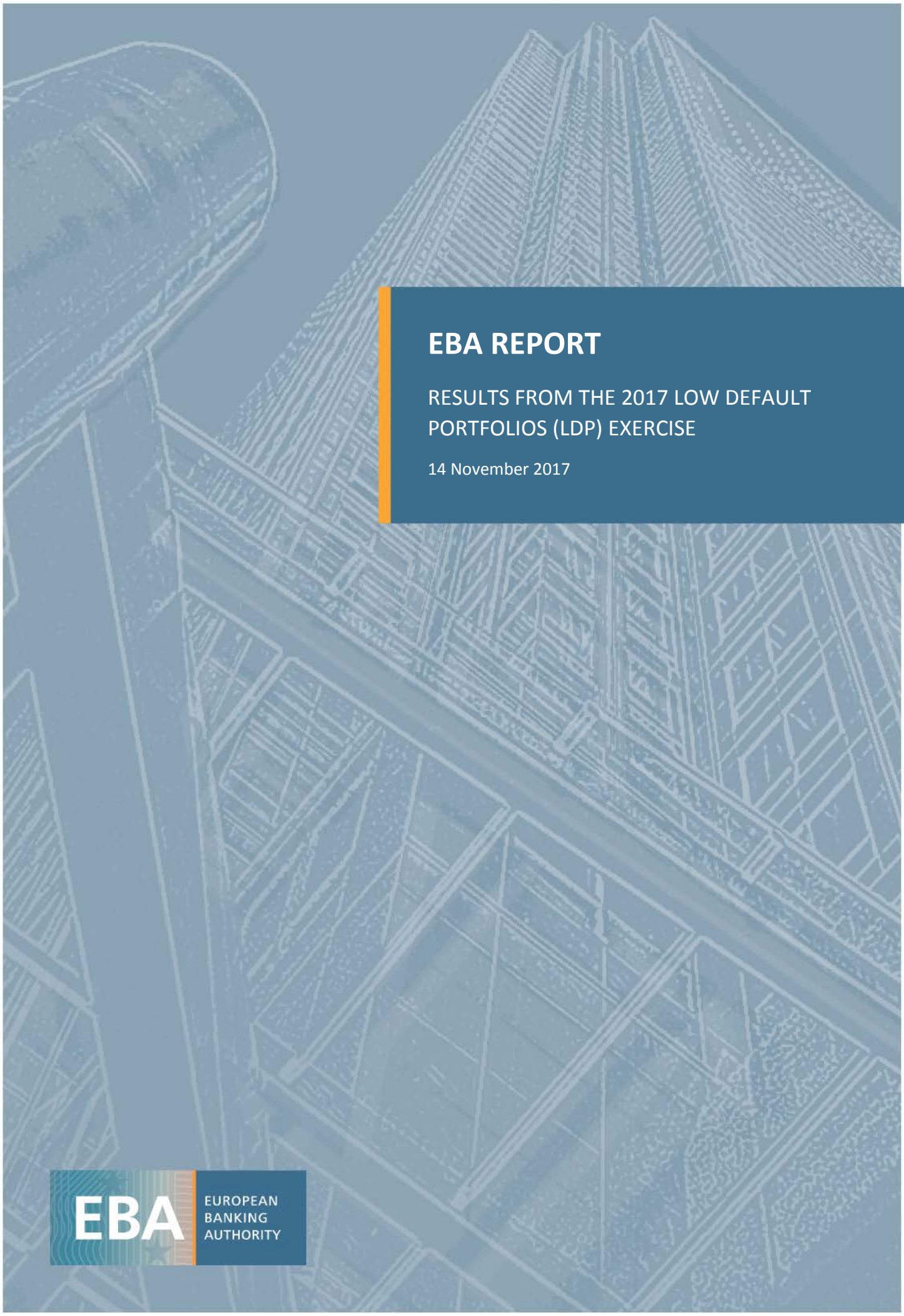

EBA REPORT

RESULTS FROM THE 2017 LOW DEFAULT PORTFOLIOS (LDP) EXERCISE

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EBA EUROPEAN BANKING AUTHORITY

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Abbreviations

AIRB	advanced internal ratings-based
CA	competent authority
CCF	credit conversion factor
COREP	common supervisory reporting
CR	credit risk
CT	counterparty credit risk
CRD	Capital Requirements Directive
CRM	credit risk mitigation
CRR	Capital Requirements Regulation
EAD	exposure at default
EBA	European Banking Authority
ECB	European Central Bank
EL	expected loss
EU	European Union
FIRB	foundation internal ratings-based
GC	global charge
GG	sovereign portfolios
HDP	high default portfolio
IN	institutions portfolios
IRB	internal ratings-based
ITS	implementing technical standards
LC	large corporate
LDP	low default portfolio
LEI	Legal Entity Identifier
LGD	loss given default
LHS	left-hand side
M	maturity
PD	probability of default
RHS	right-hand side

RW	risk weight
RWA	risk-weighted asset(s)
SA	standardised approach
STD	standard deviation
UL	unexpected loss

1. Executive summary

This report presents the results of the supervisory benchmarking exercise for large corporate, sovereign and institutions portfolios (collectively referred to as 'low default portfolios' (LDPs)). The main purpose is to provide an overview of risk weight (RW) variability and its drivers. The analysis is based on data reported at the highest level of consolidation and the reference date is 31 December 2016. This study covers the entire population of institutions that use credit risk internal models for calculating own funds requirements for LDPs. More than 100 institutions across 17 EU countries participated in the exercise, a significant increase in comparison with the number in previous EBA LDP reports. Qualitative information on specific aspects was collected through the individual assessments of competent authorities (CAs) across all participating institutions and interviews with a sample of eight institutions.

Two main indicators are employed: the average RW and the global charge (GC).[1] To quantify the variability, the standard deviation of the indicators observed at bank level is computed. Complementary metrics of the variability are the interquartile range and the maximum versus minimum distance. Given the limitations and assumptions of the different indicators, and data quality issues, the main findings and conclusions should be interpreted with caution.

Main findings of the benchmarking analysis

The indicators RW and GC show, on average, slightly higher values than in the previous exercise. The EAD-weighted average RW was 28% (versus 26% in the last LDP exercise), ranging from 8% to 125%. The weighted average GC was 36% (33% in the last LDP exercise) ranging from 8% to 147%.

Differences in (i) the share of the defaulted assets, (ii) geography and associated macroeconomic conditions and (iii) the portfolio mix effect explain around 61% of GC variability observed in the data. The remaining 39% may be due to differences in bank-specific factors, such as risk management practices. The last LDP exercise pointed towards 75% of the GC deviation being explained by the same drivers. However, differences in the reporting sample due to the significant increase in the number of participating institutions, compared with previous exercises, make direct comparisons between the exercises difficult.

For this reason, a subsample of banks that participated in both the 2015 and this exercise was used for comparison purposes regarding GC dispersion. There has been a decrease in explained GC variability from 67% to 61%, a difference that is not material given the assumptions used for this comparative analysis.

As in the past exercise, the share of defaulted exposures plays a role in explaining the GC dispersion. Indeed, the differences across participating institutions are significant, with the share of defaulted exposures in the large corporate portfolios ranging from 0% to 8%. This is also the result of differences in credit policies, frequency of risk assessments, treatment of defaulted assets and workout processes across banks, as well as of different economic conditions in EU

[1] The global charge (GC) provides the information for both expected loss (EL) and unexpected loss (UL) for IRB exposures. For IRB exposures, it is computed as (12.5 × EL + RWA) ÷ EAD. For IRB, the RWA provides information only for UL. The importance of EL is high for many participating institutions and is influenced by IRB risk parameters; therefore, the analysis of both components (EL and UL) provides useful information.

countries. From the interviews with banks, it would appear that the change to a default status has been driven mainly by the 'unlikely to pay' criterion, which may be assessed differently as a result of non-identical information or different default policies. As for the geographical mix, the median of the interquartile difference (Q3–Q1)[2] for the RW in some countries is particularly high (e.g. up to 35% for the large corporate portfolios). This indicates that the country of the counterparty could be a driver for GC dispersion. Regarding the portfolio mix between large corporate, sovereign and institutions exposures, the different compositions affect the overall GC dispersion. The benchmark median RW is 48% for large corporate portfolios, 22% for institutions and 11% for sovereign.

Moving to risk parameters, PDs for institutions portfolios show a reduction in interquartile range from 0.13% to 0.07% (in 2015 and in this exercise, respectively). For the sovereign portfolios, a significant decrease in the interquartile range for the LGD could be observed, from 23% to 15%.

Concerning the regulatory approach, for AIRB banks, the negative RW deviation (i.e. lower RW than the benchmark) seems to be driven by the LGD, whereas the positive deviations (i.e. higher RW than the benchmark) appear to be due to PD. When the PD causes a positive deviation (higher RW than the benchmark) it is often compensated for by a negative deviation of the LGD. Methodological aspects and assumptions in internal models are possible reasons for these effects.

Impact analysis using benchmarking parameters

An analysis was performed to quantify the impact on RWs for banks with RW below the RW benchmark. If banks' parameters were replaced by benchmarking parameters, RW would increase by 7.9 percentage points (7.5 percentage points in the 2015 LDP exercise).

CAs' assessments based on supervisory benchmarks

There are some areas that require follow-up actions on the part of specific institutions whose internal models were flagged as outliers in this exercise. The interviews with banks confirmed several aspects mentioned in the CAs' assessments, and also provided important information on institutions' plans to address the conclusions of the benchmarking results. Regarding the level of priority for the assessments, the large corporate and institutions portfolios are the most important exposures for possible supervisory actions. In general, the benchmarks calculated and shared by the EBA are a useful regular monitoring tool to support the CAs' assessments of internal models.

The EBA roadmap on the future of the IRB approach, published in 2016, focuses on three key areas: review of the IRB regulatory framework, supervisory consistency and increased transparency. The regulatory review is in its final phases and includes, among other products, the RTS on IRB assessment methodology, Guidelines on the definition of default, and Guidelines on PD and LGD estimations and defaulted assets, providing a substantially improved and clearer regulatory framework. The benchmarking exercises naturally supplement regulatory work with contributions to the two remaining areas of the IRB roadmap, namely supervisory consistency and

[2] This refers to two distributions: firstly, a distribution on which an interquartile range is calculated and secondly the distribution of several interquartile ranges, of which the median is determined.

transparency. The benchmarking studies will be crucial in assessing the implementation of the regulatory review, and in enabling effective supervisory actions and monitoring. This will be important as regards key aspects of the definition of default, such as the days past due criterion for default identification, indications of unlikeliness to pay, conditions for the return to non-defaulted status and treatment of defaulted assets. Benchmarking studies will therefore continue to be an important part of the supervisory agenda and the EBA's efforts to reduce RWA variability.

2. Introduction and legal background

This report presents the results of a supervisory benchmarking exercise of the internal models used for LDPs across a sample of EU institutions. LDPs consist of sovereigns, institutions and large corporates, as these portfolios generally contain few defaults relative to the total number of obligors. Previous studies on the topic of LDPs were published in 2013 and 2015 as part of the EBA's programme that investigates RWA variability across banks at the levels of both portfolios and obligors,[3] and drivers of differences. Other reports within the same project regarding the consistency of RWA but focused on high default portfolios (HDPs) were published in 2013, 2014 and 2017.[4]

From 2016, these studies have formed part of yearly benchmarking exercises which are prescribed by Article 78 of the CRD, which establishes requirements for institutions, CAs and the EBA concerning the establishment of a regular benchmarking process to assess the internal models used to compute own funds requirements (with the exception of operational risk). Technical standards produced by the EBA establish requirements for the assessments to be conducted by CAs of institutions' internal approaches used for the calculation of own funds requirements. They also establish standards for the submission of relevant information by institutions, and the procedures for sharing CAs' assessments between CAs and the EBA.

The main objectives of this report can hence be summarised as (i) providing an overview of the existing RWA variability and drivers of differences; (ii) summarising the results of the supervisory assessment of the quality of the internal approaches in use, and of the measures currently under consideration for their improvements both by banks and supervisors; and (iii) providing evidence to policymakers for future activities relating to RWA differences.

[3] The EBA has established the Task Force on Supervisory Benchmarking (TFSB) with members from the EBA, the ECB and European national CAs to perform the analysis.

[4] All reports on RWA consistency are available on the EBA website (http://www.eba.europa.eu/risk-analysis-and-data/review-of-consistency-of-risk-weighted-assets/-/topic-documents/Dj0TmcAgAa0J/more).

3. Dataset and assessment methodology

Altogether, 118 institutions[5] from 17 EU countries have approval for the use of credit risk internal models and participated in the 2017 LDP exercise. The reference date for the data of this report is 31 December 2016.

Template C 102 provides the information on the various portfolios and was used for the analysis of portfolio composition (Chapter 4) and top-down analysis (Chapter 5).[6] Template C 101 provides the information at counterparty level ('common sample') and was used for the analysis of the IRB parameters (Chapter 6) and impact analysis (Chapter 7).[7]

The data was used to perform two main types of analyses: a top-down analysis of institutions' actual portfolios and an analysis of IRB parameters for common portfolios. In comparison with the current 2017 LDP exercise, there are 37 institutions (out of those 118) that also participated in the previous 2015 LDP exercise. Given the significant increase in the number of participating banks, making comparisons between the 2015 and 2017 LDP exercises is difficult.

Information sources

The data used for top-down analysis includes information on the institution's actual exposure values and IRB parameters, broken down by type of facility, and including various types of collateral and regulatory approach (FIRB and AIRB). Similarly to the 2015 LDP exercise, and in contrast to previous LDP studies, there is no information on SA exposures (either on a roll-out plan or under the permanent partial use allowance), or on portfolios other than the LDPs.

The common sample of counterparties was defined by the EBA, and participating institutions were requested to provide the PDs and LGDs, as well as the hypothetical senior unsecured LGDs, for those counterparties included in the 'common portfolio' on which they had an exposure or a valid rating at the reference date.[8]

Other important information was collected via templates C 105.01, C 105.02 and C 105.03, which contain details on the internal models and were also used in the benchmarking tool for the CAs.

As required in Article 178 of the CRD, the EBA computed benchmarks on risk parameters and provided detailed feedback and institution-specific reports to the CAs. The benchmarking exercise

[5] At the EU level, 126 institutions have approval for use of an internal model, of which 118 institutions have approval for the use of credit risk models. Of the 118 institutions that have approval for the use of credit risk internal models and that participated in this exercise, across 17 EU countries, 109 submitted the template with the information at total level (103 submitted at least one portfolio with the EAD greater than zero), and 104 submitted the template containing the information at counterparties level (89 with at least one counterparty with EAD greater than zero). The previous reports on LDPs were published by the EBA in 2013 and 2015. In 2015, 41 banks in 14 EU countries participated in the exercise, as in previous exercises, on a voluntary basis.

[6] In total, 109 institutions submitted the template, but only 103 had at least one portfolio with EAD greater than zero. Institutions with an IRB approval, but no exposure in the LDPs, were requested to deliver an empty data submission.

[7] In total, 104 institutions submitted the template. Only 89 institutions submitted at least one counterparty with the EAD greater than zero, 15 submitted an empty template (i.e. without counterparties in the 'common sample'), and 14 institutions did not submit the template.

[8] Since the end of 2016, some of the models under review have been updated/replaced, so the analysis is a point-in-time assessment, and some of the findings have since been mitigated. Only records with an exposure greater than zero were used for the analysis.

allowed CAs to assess the outcomes of institutions' internal models compared with those of other institutions. The benchmarks, in combination with bank-specific additional information, helped to identify potential non-risk-based variability across firms. CAs' assessments of the individual institutions in their respective jurisdictions were shared with the EBA and key findings of these assessments were used to confirm or explain the findings of specific analyses throughout the report. CAs will share any evidence within colleges of supervisors as appropriate and take appropriate corrective actions to overcome drawbacks when deemed necessary.

Moreover, interviews were carried out with a subsample of eight institutions to gather qualitative information. The aim of those interviews was to better understand the approaches used by individual institutions to calculate own funds requirements, and to identify key factors and drivers that can explain observed differences.

Data quality

The data collection for this exercise was based on a larger sample than in previous LDP exercises, and on new technical standards and definitions. The ways in which different banks interpreted some of the data fields (e.g. facility types, permanent partial use allowance; specialised lending) was noted during the interviews with banks, as this also has an impact on data quality. For instance, the new definitions for the classification by regulatory approach (FIRB and AIRB) improved the accuracy of the analyses but hampered comparisons with previous exercises. While not strictly data errors, different interpretations could explain some outlier values. The data quality issues suggest that the results of the analysis should be interpreted with caution.

Assessment methodology

With the information gathered in this LDP exercise and regular COREP submissions, the EBA performed a top-down analysis on the LDPs.[9] This method disentangles the impact of some key determinants of the GC on variability. Similarly to the 2015 LDP report, and in contrast to previous studies, it was not possible to disentangle the share of partial use of the SA exposures[10] (permanent and roll-out) or the difference in the GC for exposures under the SA, because of the use of different data collections.

The most challenging part in comparative RWA studies is to distinguish the influence of risk-based and practice-based drivers. For statistical models, historical data on defaulted exposures are an important source of information on the portfolio risk, since they allow back-testing. However, sovereign, credit institutions and large corporate[11] portfolios generally show so few defaults that historical data may not provide statistically significant differentiation between different portfolio credit risks.[12] Instead, for these LDPs, IRB parameters and RWs can be compared for identical obligors to whom the participating institutions have real exposures. This allows a PD comparison on an individual obligor basis. Assuming that the exposures are senior unsecured loans (regardless

[9] As explained in the report *Interim results of the EBA review of the consistency of risk-weighted assets*, published on the EBA website (http://www.eba.europa.eu/documents/10180/15947/EBA+Report+-+Interim+results+update+of+the+EBA+review+of+the+consistency+of+risk+weighted+assets.pdf).
[10] Difference in the proportions of exposure classes treated under the SA and IRB approaches.
[11] For the LDP exercises, large corporates are defined as firms with annual sales exceeding EUR 200 million.
[12] Owing to low PD estimates in LDPs for non-defaulted assets, the influence of every default on the GC could be relatively large.

of the nature of the actual exposures) also allows a comparison of LGD. This way, the exposures are as comparable as possible with respect to their credit risk.

However, since the LDPs, and in particular the subset of common obligors used in Chapter 6, is not fully representative of the total IRB portfolio of the individual institutions, the results of this exercise may not be transferable to the total IRB portfolios and should, therefore, be interpreted with care.

4. Portfolio composition and characteristics of participating institutions

This chapter describes several characteristics of the participating institutions and should be read in conjunction with the remaining sections, as portfolio composition and other characteristics might explain GC and RWA differences.

Use of regulatory approaches

Institutions participated in this exercise if they were authorised to use the IRB approach for at least one of the LDPs, with a reference date of 31 December 2016. Figure 1 provides an overview of the usage of regulatory approaches to calculate capital requirements for the portfolios under analysis. Compared with previous studies, the number of participating institutions doubled. The figures presented in this report are at consolidated level. Although 118 participating institutions have the authorisation for the credit risk internal models, only 109 banks submitted data at total level.[13]

For large corporate portfolios, there is a more widespread usage of the AIRB approach than of the FIRB approach, whereas for sovereign portfolios and institutions portfolios the numbers do not differ regarding the use of regulatory approaches. Participating institutions show a lower use of IRB approaches for sovereign portfolios. Some participating institutions use different approaches (e.g. among different subsidiaries) within a given portfolio.[14]

Figure 1: Overview of the number of participating institutions,[15] by portfolio and by regulatory approach

	Regulatory approach		Number of participating institutions (banks)
Exposure class	AIRB	FIRB	
Large corporate	60	44	88
Institutions	35	42	66
Sovereign	28	25	47

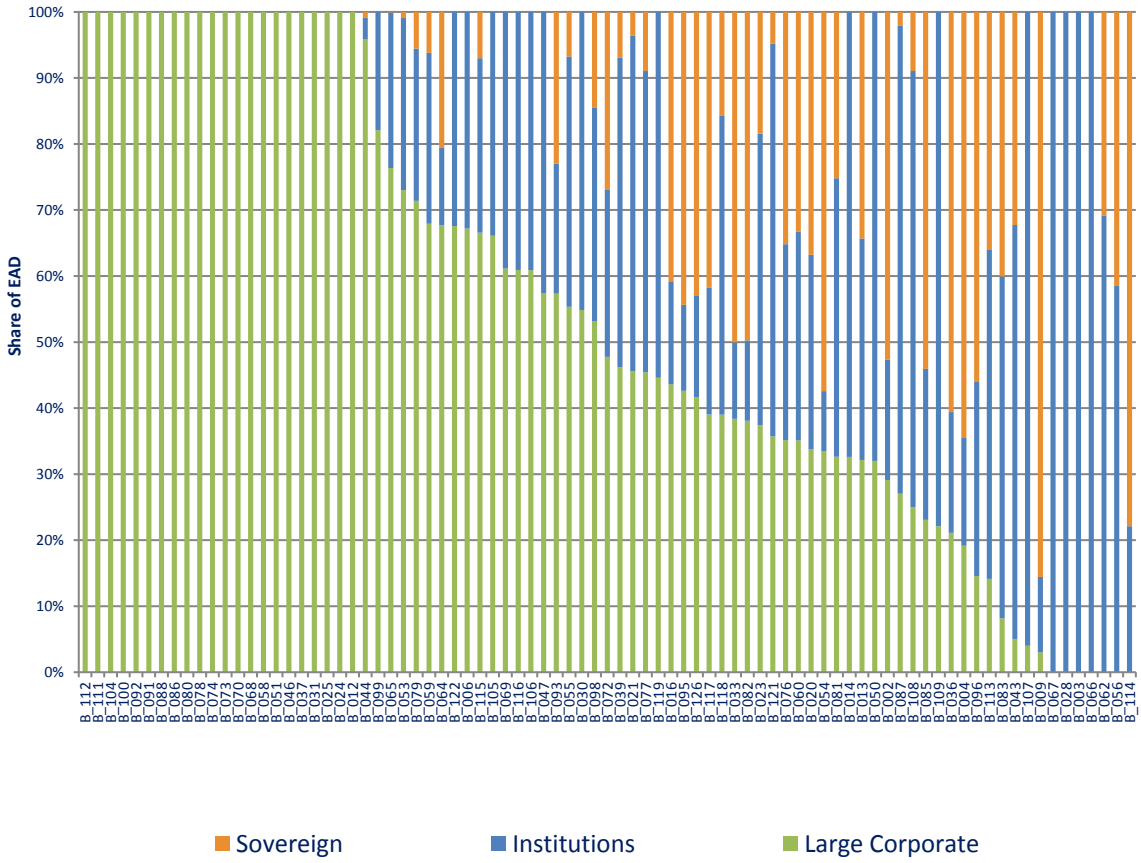
Portfolio composition and representativeness

There are significant differences in portfolio composition among the participating institutions, with several institutions submitting figures for only their corporate portfolio. This reflects the different use of IRB approaches across institutions, as seen in Figure 1.

[13] Template C 102.00. More details in the annexes ('List of participating institutions' in Annex 1).
[14] Some institutions (highest level of consolidation) apply different approaches to exposures to the same obligor (e.g. in the case of subsidiaries with different permissions to use internal approaches in different countries).
[15] Some institutions are counted under AIRB and under FIRB if they have exposures under both regulatory approaches.

Figure 2 shows the EAD-weighted shares of the different portfolio types as reported, for this LDP exercise, by the 83 participating institutions that provided supervisory benchmarking[16] data and were not excluded after quality checks. It shows that the majority of institutions use the IRB approach for large corporate portfolios and that several institutions use the IRB approach exclusively for large corporates portfolios. Very few institutions use the IRB approach only for institutions portfolios, and none of them use the IRB approach only for sovereign portfolios.

Figure 2: Portfolio composition of the LDPs of participating institutions

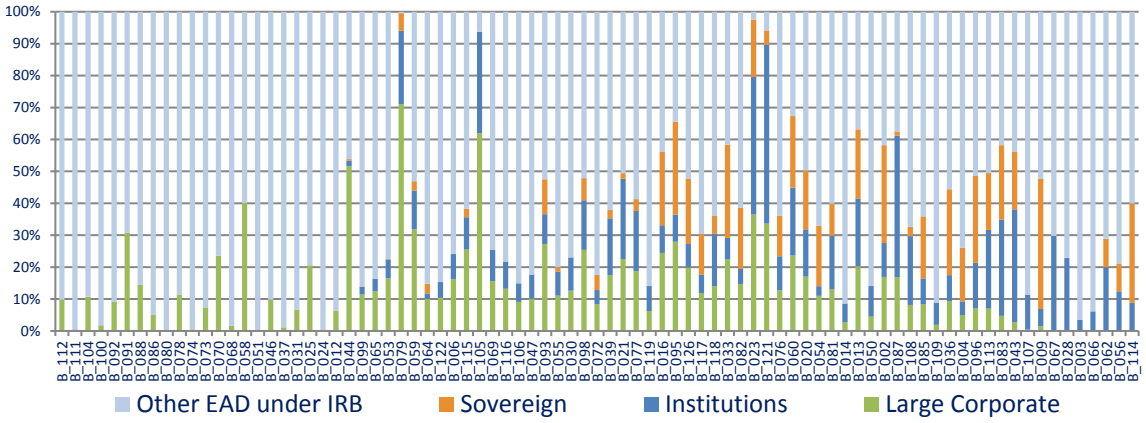


The EAD-weighted average portfolio[17] consists of 44% large corporates, 24% institutions and 32% sovereign exposures. The findings of this report are valid for LDPs only and cannot be generalised to other portfolios. Therefore, it is important to assess the representativeness of LDPs as a share of the institutions' total IRB credit portfolios. In addition, it is worth noting that for some institutions IRB exposures may only represent a small portion of the total LDP exposures (i.e. compared with the SA), as is often the case for sovereign exposures.

Figure 3 shows the shares of the EAD for the different portfolio types in the sample, comparing data submitted for the LDP exercise with COREP data as of 31 December 2016. Exposures not submitted for this LDP exercise include retail exposures and corporate exposures other than large corporate exposures.

[16] See Annex 3, 'Data cleansing'.
[17] This means that the EAD from all institutions was pooled as if there were only one single institution.

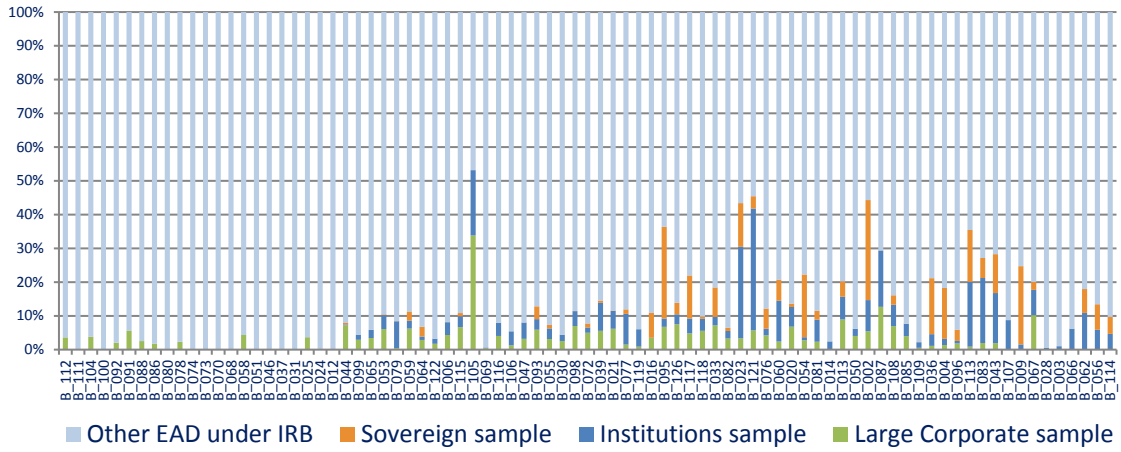
Figure 3: LDP compared with total IRB portfolio from COREP data



The share of the overall IRB LDP (large corporate, sovereign, institutions) compared with the total IRB credit risk portfolios differs considerably among participating institutions (ranging from insignificant values to 99.6%). Around 38% (EAD-weighted average) of the total IRB portfolios are represented.

In addition to the total sample, and for the analysis of IRB parameters, a different dataset of common counterparties is used, representing exposures towards a predefined list of 1 914 counterparties. Data used for the common counterparties' analysis represent 10.4% in terms of the simple average EAD, and a weighted average of 12.7%[18] of the total IRB portfolios (in the 2015 LDP exercise, the weighted average EAD was 9%). With regard to common counterparties, Figure 4 shows that differences among participating institutions are significant, ranging from zero to 53% of the overall IRB LDP credit risk portfolio.

Figure 4: LDP common counterparties compared with total IRB portfolio from COREP data



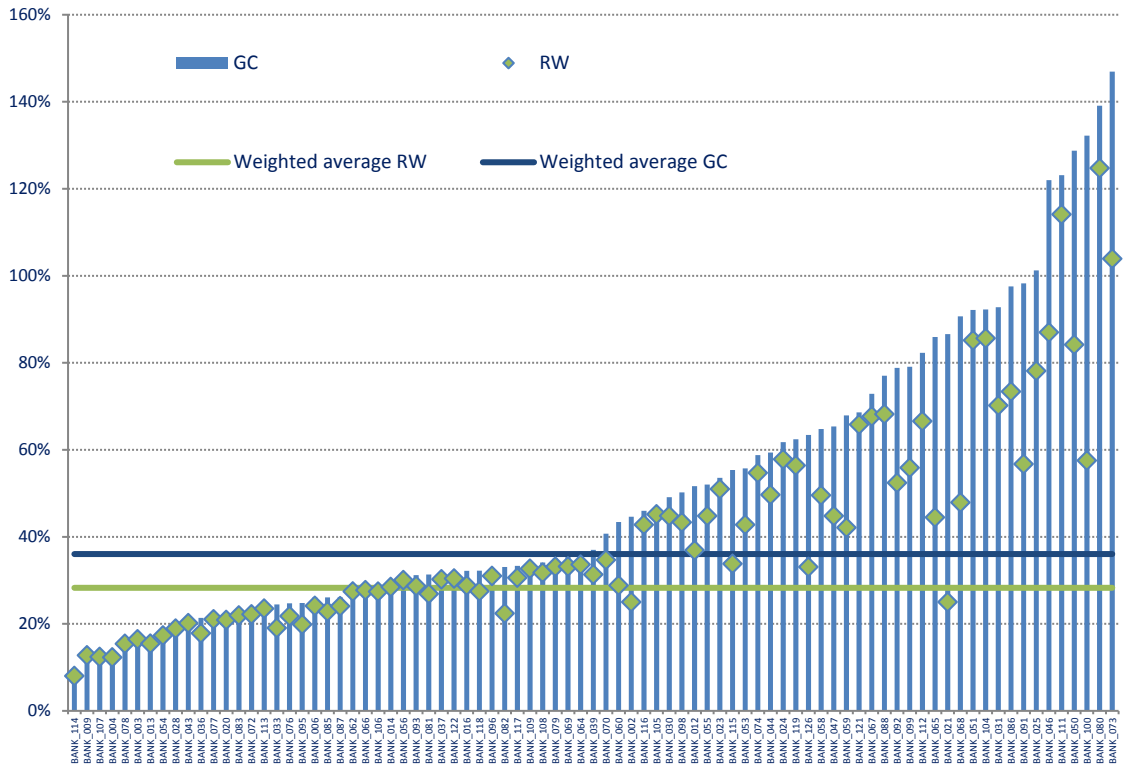
[18] Reported by banks in template C 102.00, at total level.

5. Top-down analysis

This chapter aims to determine and analyse the drivers behind RW variability across the participating institutions. In the top-down approach, two indicators are used to summarise the results of the variability: the GC,[19] taking into account both EL and UL, and the RW (for the UL). EL is important for many participating institutions and is influenced by IRB risk parameters, therefore the analysis of both components (EL and UL) provides useful information regarding the drivers of variability. The top-down approach shows the extent to which the riskiness of portfolios as well as portfolio composition contribute to differences in RW. However, a top-down approach cannot fully clarify how many of those differences stem from individual practices, interpretations of regulatory requirements, business strategies or modelling choices.

Figure 5 shows the GC and RW for the total LDP.[20] The EAD-weighted average RW varies from 8% to 125%, with an exposure-weighted average RW of 28% and a simple average RW of 41%. This compares with a weighted average RW of 26% and a simple average RW of 36% identified in the 2015 LDP exercise (based on figures as of December 2014).

Figure 5: GC and RW, for defaulted and non-defaulted exposures, per bank

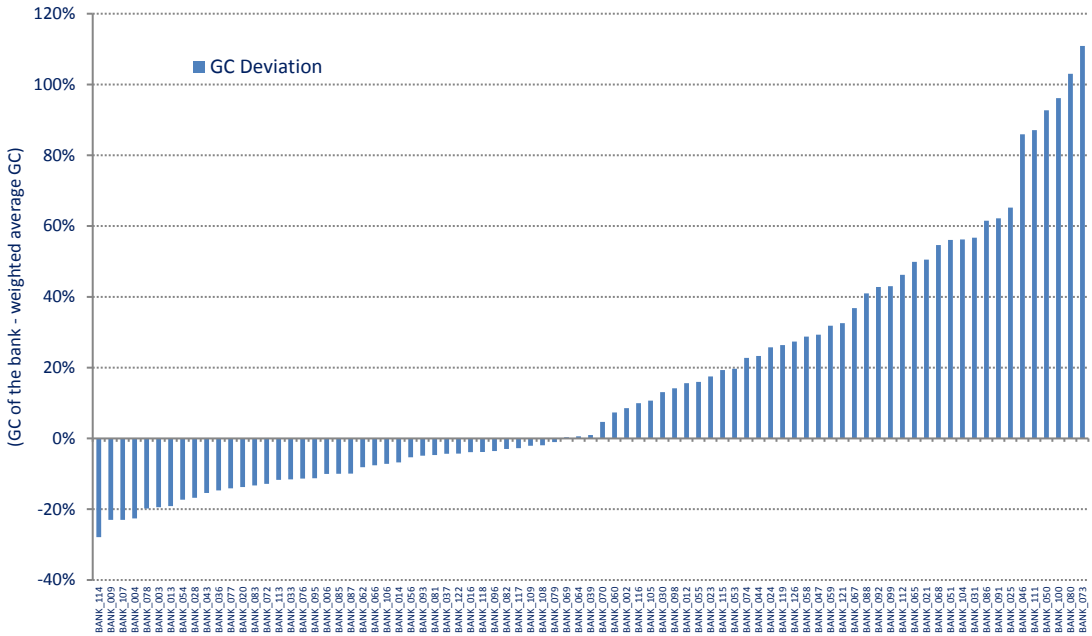


[19] The GC provides the information for both EL and UL for IRB exposures. For IRB exposures, it is computed as (12.5 × EL + RWA) ÷ EAD. For IRB, the RWA provides information only for UL. For SA defaulted exposures, it is computed as (12.5 × provisions + RWA) ÷ (exposure value + provision). For SA non-defaulted exposures, it is computed as (RWA ÷ exposure value).

[20] In total, 83 banks (see Annexes 2 and 3 for details on the portfolios used and data cleansing).

The weighted average GC is 36% for the participating institutions, ranging from 8% to 147% across participating institutions. This compares with a weighted average GC of 33% reported in the last LDP exercise. The standard deviation of the GC is 33% (similar to the 36% from the 2015 LDP exercise).

Figure 6: GC range compared to the weighted average GC, for defaulted and non-defaulted exposures, per bank



Methodology and assumptions

The methodology for presenting the percentage of total GC variability that can be explained once its main drivers are controlled for is based on the standard deviation (percentage total GC standard deviation). As a starting point, the total GC for each participating bank is computed as:

$$\%\ \text{total GC bank}_i = (12.5 \times \text{EL}_{\text{bank } i} + \text{RWA}_{\text{bank } i}) \div \text{EAD}_{\text{bank } i}$$

The standard deviation of the total GC is:

$$Standard\ deviation\ of\ \%\ total\ GC\ = \sqrt{\frac{\sum \left(\%\ total\ GC\ bank_{\ i} - \%\ total\ GC\ average\right)^2}{N}}$$

Where total GC bank $_i$ represents each bank's GC (as a percentage), total GC average is the mean of the GC in the sample and *N* is the number of participating banks in the sample.

The standard deviation of the total GC is then broken down successively to control for the characteristics of the exposures. As a first step, the GC standard deviation is computed separately

for defaulted exposures and non-defaulted exposures. In this exercise, and in previous exercises, the RW variability is much greater for defaulted exposures than for non-defaulted exposures, thus justifying the first breakdown.

For defaulted exposures, a percentage GC at the bank level is calculated (% GC bank $_{i, DEF}$). The GC of each bank is then weighted by the proportion[21] of EADs that was reported as defaulted exposures in the sample:

$$\%\ GC\ bank_{i, DEF} = [(12.5 \times EL_{bank\ i, DEF} + RWA_{bank\ i, DEF}) \div EAD_{bank\ i, DEF}] \times \%\ EAD_{DEF}$$

For non-defaulted exposures, a similar calculation at the bank level is carried out:

$$\%\ GC\ bank_{i, NONDEF} = [(12.5 \times EL_{bank\ i, NONDEF} + RWA_{bank\ i, NONDEF}) \div EAD_{bank\ i, NONDEF}] \times \%\ EAD_{NONDEF}$$

A weighted average (but based on the average proportion of EAD_{DEF} and EAD_{NONDEF} for the sample) is then calculated, assuming that the percentage of defaulted and non-defaulted assets is the same across banks and equal to the sample averages:

$$\%\ GC\ bank_{i, DEF, NONDEF} = \%\ GC\ bank_{i, DEF} + \%\ GC_{bank\ i, NONDEF}$$

This approach allows a GC to be computed for each bank, based on its own estimates of the risk parameters, but assuming that the percentage of defaulted and non-defaulted assets is the same across banks and equal to the sample averages.

The new GC standard deviation (percentage GC standard deviation $_{DEF, NONDEF}$), after controlling for defaulted and non-defaulted exposures, is the following:

$$Standard\ deviation\ of\ \%\ GC\ (DEF, NONDEF) = \sqrt{\frac{\sum\left(\%\ GC\ bank_{i,DEF,NONDEF} - \%\ GC\ average\right)^2}{N}}$$

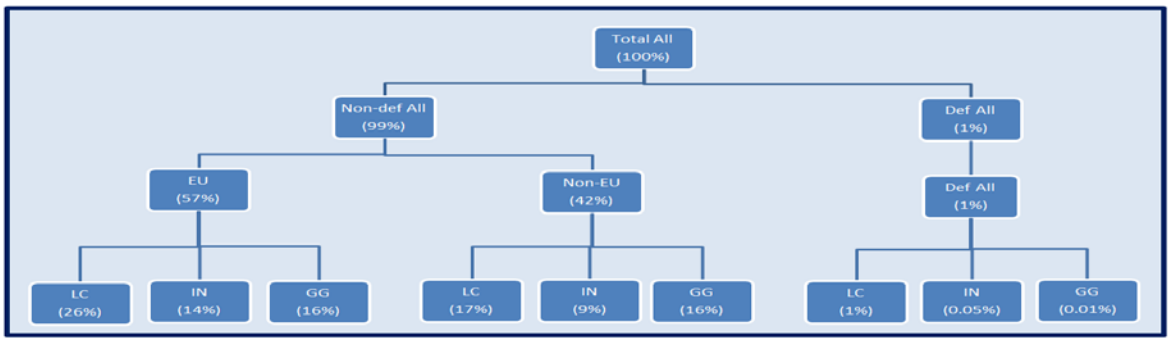
The difference between the standard deviation of the percentage total GC and the standard deviation of the percentage GC standard deviation $_{(DEF, NONDEF)}$ gives the impact of the contribution of defaulted and non-defaulted exposures to the total GC variability.

[21] This is the percentage of the EAD in default from all institutions, pooled as if they were a single institution (weighted average EAD in default in the sample).

As a second step, exposures are further broken down based on the region of the counterparty into two groups: EU countries and non-EU countries.

The same methodology is repeated for controlling for additional dimensions seen as drivers of GC variability, namely all portfolios asset classes: large corporate, institutions and sovereigns. These are shown in Figure 7. The methodology provides the general contribution of the main drivers as a whole, i.e. the total GC variability.

Figure 7: Breakdown of the sample according to main characteristics



GG, sovereigns; IN, institutions; LC, large corporate.

The total EAD and the number of banks are maintained across the breakdowns (EAD 100% in Figure 7). This allows the same basis of the initial total GC standard deviation to be maintained, and then a subsequent and more direct split of such variation in different clusters of each breakdown (e.g. defaulted exposures and non-defaulted exposures, etc.).

However, to maintain the same sample of the initial total GC standard deviation in the case of participating banks that have a value of zero for a specific cluster (e.g. no exposures for the large corporates), those banks are assumed to have the median of the GC for the bucket. This assumption may underestimate possible variability. On the other hand, this assumption is mainly used at lower levels of the breakdown, namely by type of portfolio (i.e. not all banks, especially smaller ones, have exposures in sovereign portfolios for EU countries and non-EU countries). A summary of the number of banks reporting clusters with values of zero for specific clusters (and for the percentage total EAD for the cluster) is provided (see Figure 8). The highest number of missing buckets is found for the lower percentages of EADs (weighted average) and, therefore, this does not significantly influence the main buckets (step 1 non-defaults, step 2 non-defaults for EU and non-EU, and step 3 non-defaults for different portfolios).[22]

[22] Other assumptions were also tested, namely using a GC value of zero instead of the median of the bucket and assuming 50% of the maximum variation (i.e. GC variability for a bank = 50% × (GC average – 0) = 50% × GC average). To maintain a stable EAD and the same number of banks for comparison purposes, such banks were not excluded. No significant differences were found in the final figures for the GC standard deviation when using different assumptions for banks with values of zero for a specific cluster.

Figure 8: Summary of the number of banks reporting clusters with values of zero for specific clusters

Step	Default status	Geographical Area	Exposure class	% Weighted Average EAD	N Banks with missing own GC
Step 1	Defaulted			0.98%	22
	Non-defaulted			99%	-
Step 2	Defaulted	All		0.98%	22
	Non-defaulted	European Union		57%	5
	Non-defaulted	Non-European Union		42%	8
Step 3	Defaulted	All	LC	0.92%	23
	Defaulted	All	IN	0.05%	49
	Defaulted	All	GG	0.01%	64
	Non-defaulted	European Union	LC	26%	10
	Non-defaulted	European Union	IN	14%	22
	Non-defaulted	European Union	GG	16%	39
	Non-defaulted	Non-European Union	LC	17%	17
	Non-defaulted	Non-European Union	IN	9%	22
	Non-defaulted	Non-European Union	GG	16%	43

For the common sample in both exercises (2015 and this exercise), only a few participating institutions do not have reported figures for two types of portfolios (only five banks for sovereign and institutions portfolios), and all participating institutions reported figures for large corporate portfolios (the most important in terms of total EAD). Therefore, the missing buckets and the respective assumption are not expected to significantly influence the calculations of the GC for the common sample.

Drivers of differences in GC and RW

For the purpose of analysing drivers of differences in GC levels, a standard deviation index is calculated where the initial GC standard deviation (33% as reported above) is set at 100.

A-type differences include the following:

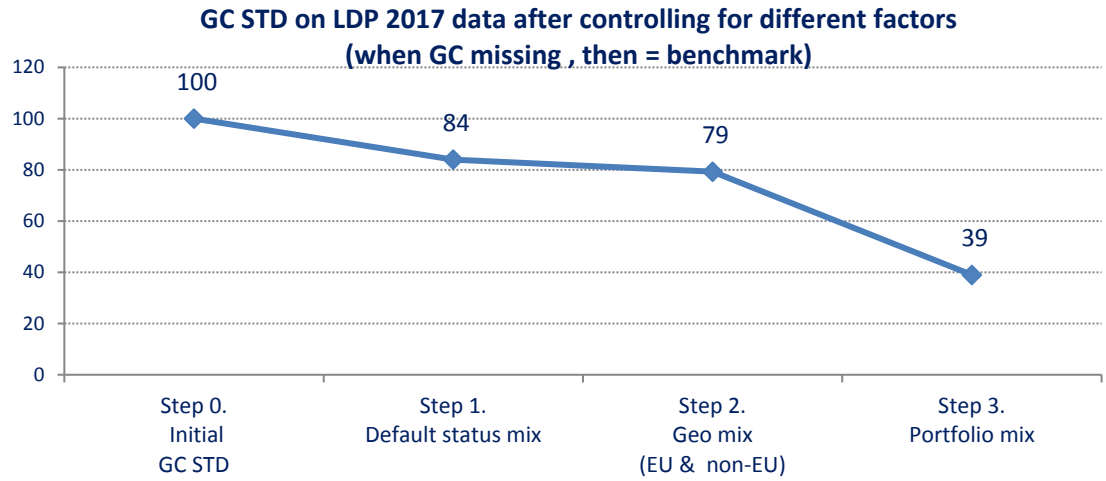
- different shares of defaulted exposures;
- different shares of countries of counterparties ('geographical mix effect');
- different relative shares of exposure classes ('portfolio mix effect').

The remaining differences for non-defaulted IRB assets, the so-called B-type differences, are caused by other effects, such as idiosyncratic variations in the riskiness within an exposure class, CRM (i.e. the business and risk strategy of the institutions), and the IRB risk parameters estimation (e.g. institutional[23] and supervisory practices).

Figure 9 shows that A-type drivers explain around 61% of GC variability observed in the data (i.e. 39% are not explained), which can be explained mainly by the different share of the defaulted assets, and by the geographical and portfolio mix effect.

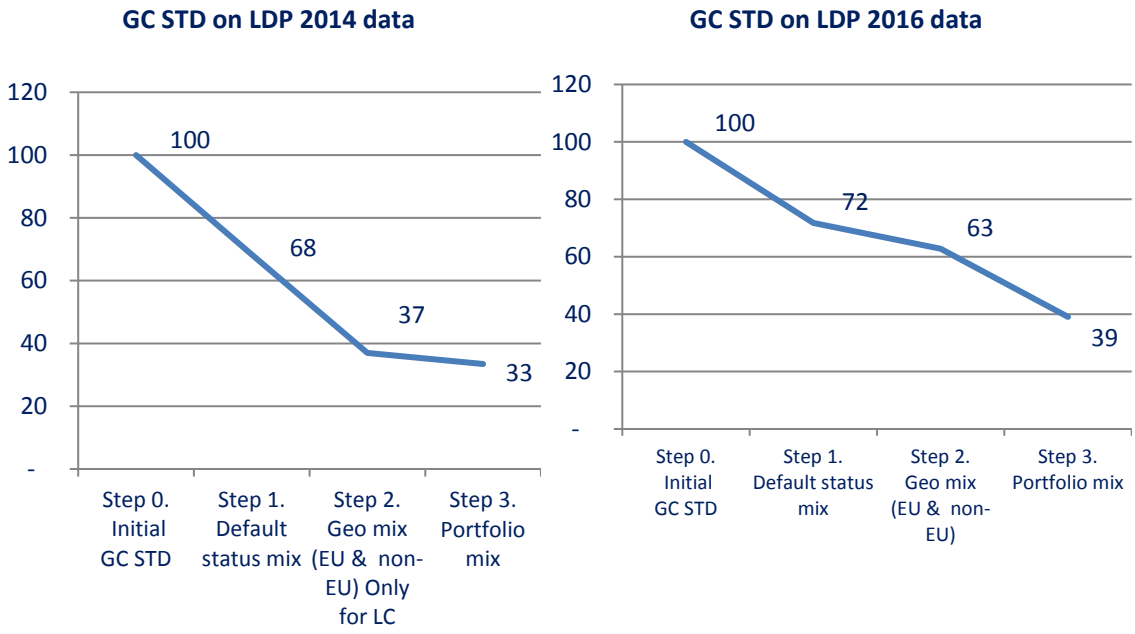
[23] For example, some banks mentioned during the interviews that they update the ratings of their counterparties on an annual basis, while others update the ratings more frequently (e.g. three times a year); some banks have a fixed period during the year for performing the updates (e.g. at the end of the first quarter of the year), whereas other banks update the ratings during the year without a fixed period (e.g. because of time-consuming issues); some have semi-automatic procedures for downloading the financial statements of the counterparties, while other banks perform the updates manually, and some outsource these updates.

Figure 9: Decomposition of the GC standard deviation index



This result is lower than for previous findings, which pointed towards 75% of the GC deviation being explained by A-type drivers. However, as previously noted, differences in the reporting sample (more small banks are now included) and in the methodologies compared with the previous LDP exercises make direct comparisons between the exercises difficult. For this reason, a subsample with banks that participated in both the 2015 LDP exercise and in this exercise was used for comparison purposes. Regarding the GC, the same evolution is observed, with a decrease in explained GC variability from 67% to 61% (see Figure 10). However, the difference does not seem material given the assumptions used for this analysis.

Figure 10: Decomposition of the GC standard deviation index – common sample (2015 exercise and 2017 exercise)



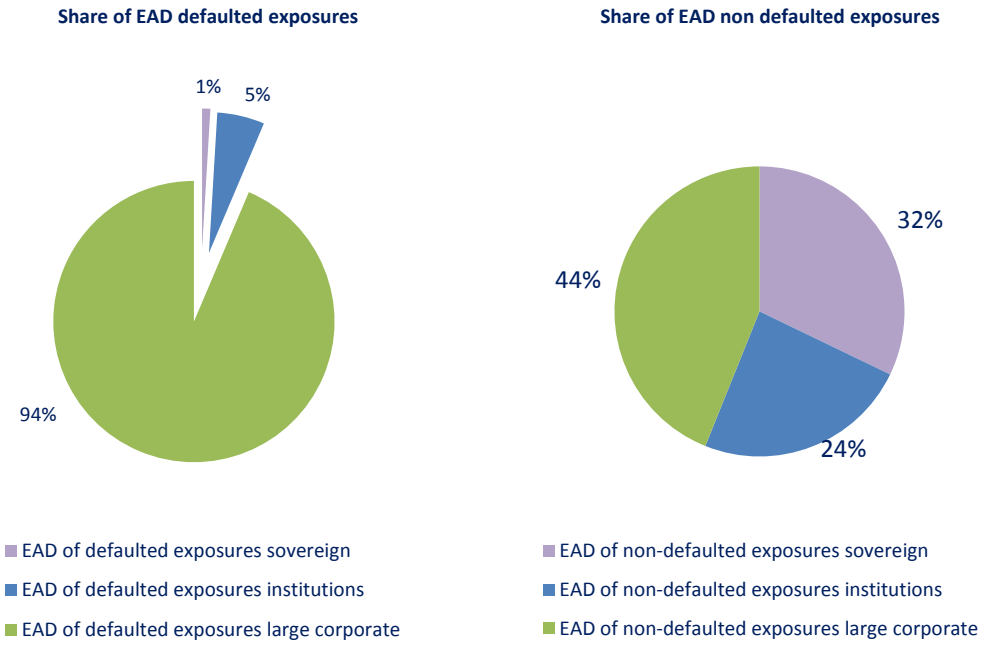
Both analyses show that the combined effect (default, geographical mix and portfolio mix) can explain 61% of GC variability, for both the total sample of participating banks in 2017 and for a common sample of banks (which also participated in the 2015 LDP exercise). The remaining GC variability not explained (39%) may be due to differences in bank-specific factors that change through time, such as portfolio riskiness, risk management practices or the IRB risk parameters.[24]

Defaulted exposures

One of the A-type drivers of GC variation shown in Figure 9 is the differences in defaulted exposures within each institution's portfolio. Hence, this section explains the extent and impact of defaulted exposures across the participating institutions, and why defaulted exposures need to be excluded from in-depth analysis of IRB parameters (as performed in Chapter 6).

Across the sample, on average 2.1% (simple average) of the total EAD is in default (1% using an exposure-weighted average). Figure 11 shows that most of the defaulted exposures (94% of total defaulted exposures) stem as expected from the large corporate portfolios. The differences among participating institutions, however, are significant, with the share of defaulted exposures within the large corporate portfolio ranging from 0% to 8% (with one outlier at 22%), indicating potential differences in credit policies and workout processes, as well as different macroeconomic conditions. This also suggests that the definition of large corporate used for these exercises might require some fine-tuning.

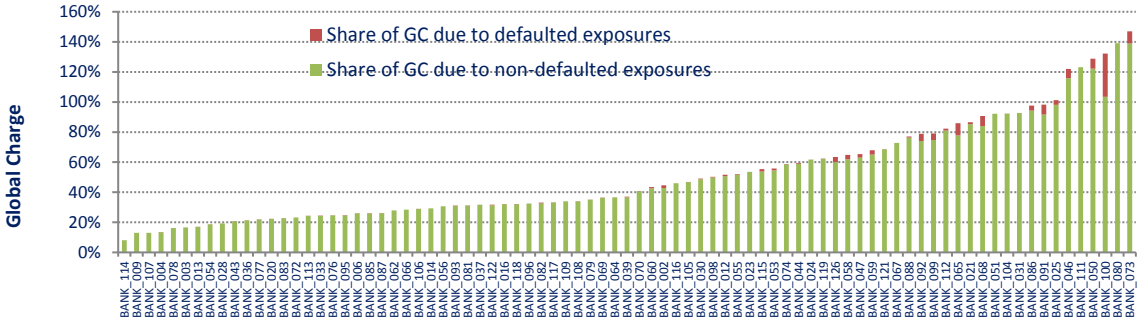
Figure 11: Defaulted and non-defaulted exposures by exposure class



[24] For instance, the EU versus non-EU component was reported by the banks in the 2015 exercise and computed as an aggregation of the country buckets in the 2017 exercise.

Figure 12 shows the impact of defaulted exposures on GC levels, and highlights significant differences across participating institutions and respective contributions of defaulted exposures to the overall GC.

Figure 12: GC contribution from defaulted exposures



As highlighted in previous LDP exercises, and confirmed in the interviews with several institutions, there is a wide range of practices as regards the definition of default. The limit of 90 days past due seems to be the general practice, but LDPs are characterised by the greater importance of the 'unlikely to pay' criterion and close monitoring of the obligors belonging to a warning list, which may create greater dispersion (in comparison with HDPs). In addition, in the LDP, the unlikely to pay criterion might be assessed differently for a pure trading book portfolio (e.g. for short-term swaps) than for a banking book portfolio (e.g. for long-term loans). The analysis of which risk type these obligors have been reported (CR or CT), and if there are differences, was not developed. In 2016, the EBA published Guidelines on the application of the definition of default.[25] These Guidelines harmonise the definition of default across the EU prudential framework and should improve consistency in the way EU banks apply regulatory requirements to their capital positions. A detailed clarification of the definition of default and its application is provided, which covers key aspects, such as the days past due criterion for default identification, indications of unlikeliness to pay, conditions for the return to non-defaulted status, treatment of the definition of default in external data, application of the default definition in a banking group and specific aspects related to retail exposures.

In addition, from the interviews with banks and CAs' assessments, discrepancies emerged in the treatment of defaulted assets, mostly around the estimation of LGD in-default and best estimate of expected loss. Some participating institutions mentioned during the interviews that the downturn add-on to the LGD is negligible. In that regard, different countries are currently experiencing different economic conditions, which would explain different best estimates of loss levels and in turn partly explain the differences in downturn add-ons across the participating institutions. Notwithstanding this consideration, these different practices in relation to downturn estimation may lead to different capital metrics, and more transparency on the existing differences and drivers between the LGD on performing and defaulted assets would help in understanding the RWA framework. Additionally, note that FIRB institutions do not compute RWAs on defaulted assets, in accordance with Article 153(1)(ii) of the CRR.

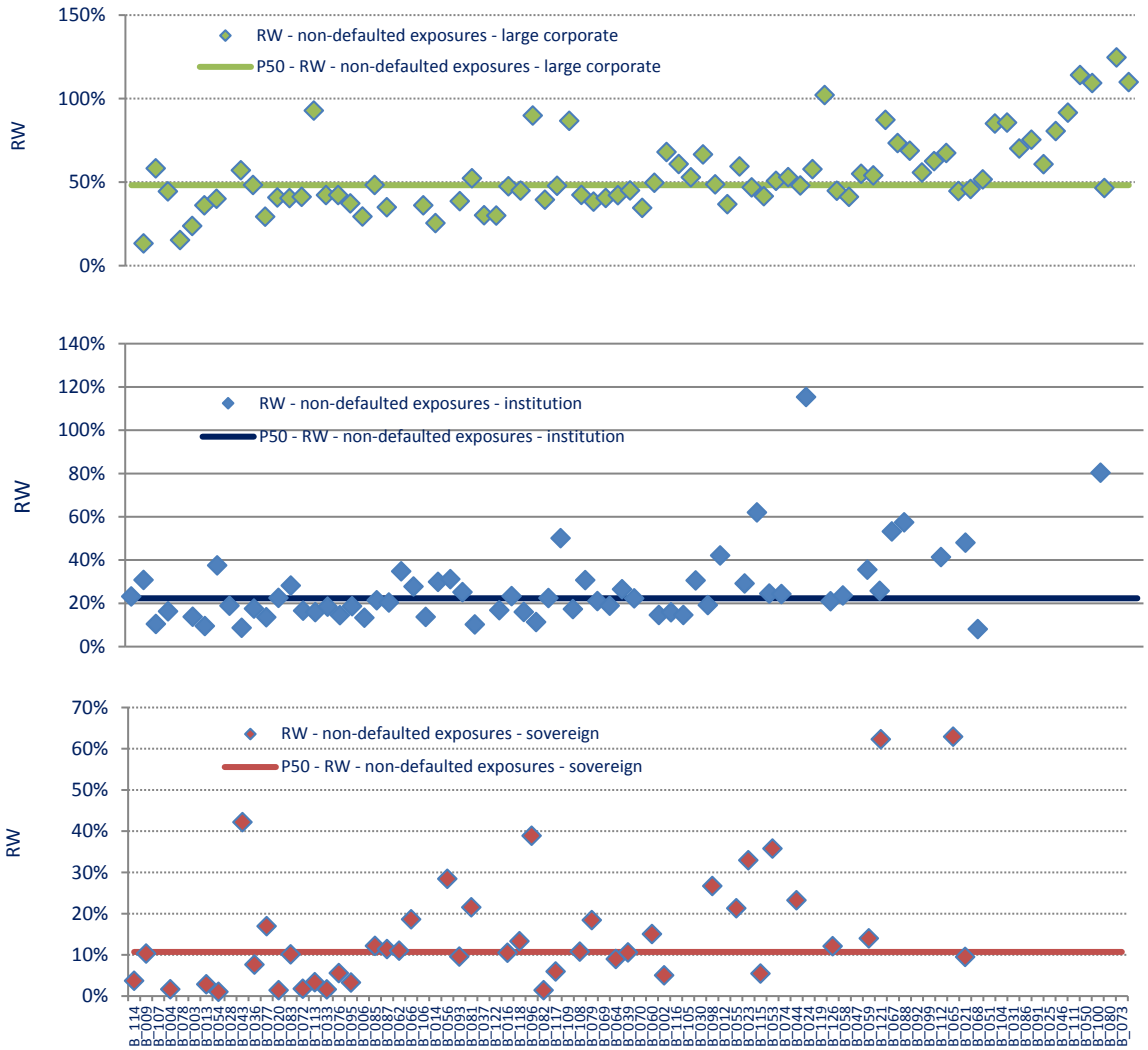
[25] EBA Guidelines on the application of the definition of default: https://www.eba.europa.eu/regulation-and-policy/credit-risk/guidelines-on-the-application-of-the-definition-of-default

Portfolio composition of non-defaulted exposures

After controlling for differences caused by defaulted exposures in the LDP, the next A-type difference shown in Figure 9 above is portfolio composition. Figure 13 shows the average RW for each participating institution and each portfolio, for non-defaulted exposures. It shows that the benchmark median RW for the non-defaulted large corporate portfolio is 48%, for the non-defaulted institutions portfolio 22%, and for the non-defaulted sovereign portfolio 11%. This means that participating institutions, with various compositions of their respective overall portfolios, will necessarily calculate different overall RWs according to their portfolio mix.

Note that because EL and RW are functions of the same main risk parameters (i.e. PD, LGD and CCF), the subsequent sections focus on RW variation, rather than GC variation. At this stage it is worth noting that in some cases the supervisory corrective actions (aimed at the increasing the RW to correct any model deficiencies) is included and could not be disentangled.

Figure 13: Average RW by portfolio for non-defaulted exposures



6. Analysis of IRB parameters for common counterparties

The purpose of this analysis is to compare institutions' IRB parameters for a common set of counterparties, and to try to explain the remaining B-type differences. This analysis was performed in the 2015 report on LDP exposures, and the methodology remained unchanged.

Participating institutions were instructed to provide risk parameters for a predefined list of obligors. The list is composed of 63 sovereigns (central governments), 143 institutions and 1 708 large corporates.[26] Obligors were identified in most cases[27] using the Legal Entity Identifier (LEI)[28] as a unique and internationally accepted identifier. The list of counterparties has been updated (see Figure 14) in comparison with that used in the 2015 LDP exercise, and the main changes were the deletion of counterparties that were obsolete and the addition of new counterparties, to increase representativeness at country level.[29]

Figure 14: Sample of common counterparties

Exposure Class	N counterparties under AIRB	N counterparties under FIRB
Sovereign	48	27
Institutions	130	116
Large Corporate	850	248

This allowed a direct comparison of the IRB parameters and resulting RW on a set of identical common counterparties, even if real exposures might differ as a result of different CRM techniques and/or collateralisation schemes. The RW deviation for each participating institution was compared with a benchmark to better understand the effects and importance of the various drivers. The benchmark used was the median of the RW for the group of participating institutions that apply the same regulatory approach to a specific common counterparty. An obligor under FIRB is therefore compared with the FIRB benchmark, and an obligor under AIRB with the AIRB benchmark. For each institution and each of its obligors, the deviation from the benchmark is computed and the findings for each participating institution are summarised, computing the median of the deviations for all obligors reported by a given institution.

To isolate the impact of each IRB parameter, the RWs are recalculated, at obligor level, using various combinations of actual and benchmark parameters. By replacing a given institution's risk parameter with a benchmark parameter (median risk parameter), it is possible to disentangle the different effects of each parameter.

[26] The 2015 LDP exercise included 61 sovereigns, 102 institutions and 1 647 large corporates.
[27] Around 11% of the counterparties (and all but two sovereigns) do not have an LEI.
[28] The LEI is a 20-character alphanumeric code that connects to key reference information that enables clear and unique identification of companies participating in global financial markets.
[29] The analysis was carried out excluding (i) the obligors that were reported as defaulted by at least one participating institution (which have been studied only for the large corporate portfolios – see specific section; only five central governments and one credit institution, in the C 101 template, were assessed as in default by at least one bank); or (ii) those obligors with fewer than five participating institutions reporting exposure values. Furthermore, the records with LGD greater than 150% and RW greater than 500% (and PD values not plausible) have also been excluded. The benchmark values were computed taking into account the remaining obligors; RW deviations were calculated only for those institutions that reported actual exposures for at least 10 obligors.

One limitation of this approach is that it does not take into account regulatory measures (such as add-ons) currently in place at RWA level. Hence, for some institutions in jurisdictions where such supervisory measures are in place, the recomputed RWAs are not directly comparable with the RWAs actually held and/or reported by the institutions. There are also additional factors that limit such comparisons (e.g. point-in-time, PIT versus through-the-cycle, TTC; default definition; last update of the ratings; scope of the rating system).

The starting point for the analysis is the initial RW deviation, which provides an overall estimated deviation from the institution's peers:

- Deviation 1 represents the **initial RW deviation**: RW computed with the real parameters provided by the institutions (real maturity, real PD, real LGD) are compared with RW computed with the benchmark values (median PD of peers' reported PD and median LGD of peers' reported LGD) and the maturity fixed at 2.5 years [Dev1 = RiskWeight(M, PD, LGD) − RiskWeight(M = 2.5, b_PD, b_LGD)[30]]. This effect is calculated on the assumption that the changed parameters will not result in a shift of collateral.

By way of isolating the impact of the individual parameters, the following effects can be identified:

- Deviation 1.2 represents the **PD effect**. RWs for a specific bank are computed with the benchmark values for all the parameters, excluding the PD, and these are compared with RWs computed with the benchmark values (median PD of peers' reported PD) [Dev1.2 = RiskWeight(2.5, PD, b_LGD) − RiskWeight(2.5, b_PD ,b_LGD)].
- Deviation 1.3 represents the **LGD effect**. The RWs are computed with all the benchmark values, excluding the LGD, and are compared with RWs computed with the benchmark values reported by the institution [Dev1.3 = RiskWeight(2.5, b_PD, LGD) − RiskWeight(2.5, b_PD , b_LGD)].
- Deviation 1.4 represents the **maturity effect**. The RWs are computed with all the benchmark values, excluding the maturity, and they are compared with RWs computed with the benchmarking values reported by the institution [Dev14 = RiskWeight(M, b_PD, b_LGD) − RiskWeight(2.5, b_PD, b_LGD)].

Since the regulatory LGD estimated by the bank is used in the computation of these differences, the LGD effect also includes the impact of CRM. Therefore, the analysis has been repeated using the hypothetical senior unsecured LGD (without negative pledge) for the AIRB banks only, where the values were provided assuming that the exposure to a given obligor was a senior unsecured exposure.

- Deviation 5 represents the **hypothetical LGD effect**. RWs are computed with maturity fixed at 2.5 and PD fixed at benchmark values [Dev5 = RiskWeight(M = 2.5, b_PD, Hyp_LGD_ unsec) − RiskWeight(M = 2.5, b_PD, b_Hyp_LGD_unsec)]. This is the hypothetical LGD effect, not taking into account the underlying collateral to achieve a uniform comparison.

[30] The prefix 'b_' indicates that benchmarking values were used.

The PD effect and maturity effect are analysed for obligors under both approaches (AIRB and FIRB), while the LGD effect and the hypothetical LGD effect are only analysed for obligors under AIRB, as the FIRB approach defines a regulatory LGD of 45% for senior unsecured exposures and hence no deviation from this level may be expected. Analysis of obligors under the FIRB approach separate from obligors under the AIRB approach ensures that findings, in particular as regards PD and LGD, are not affected by differences in underlying approaches.

Large corporate portfolio

Non-defaulted exposures

The analysis of the volatility of the different deviations (see Figure 15) reveals different features compared with the 2015 LDP exercise. The interquartile differences under the AIRB approach are greater than those under the FIRB approach. For those under AIRB, the negative deviations (i.e. those lower than the benchmark) seem to be driven by the LGD, whereas the positive deviations appear to be driven by the PD. Maturity seems not to be an important driver for deviations.

The reduction of the variability of PD within the FIRB banks (interquartile range decreased from 20% to about 8%) is significant, taking into account that the FIRB banks sample has doubled compared with the 2015 LDP exercise.

Figure 15: RW deviations for large corporate obligors (AIRB and FIRB)

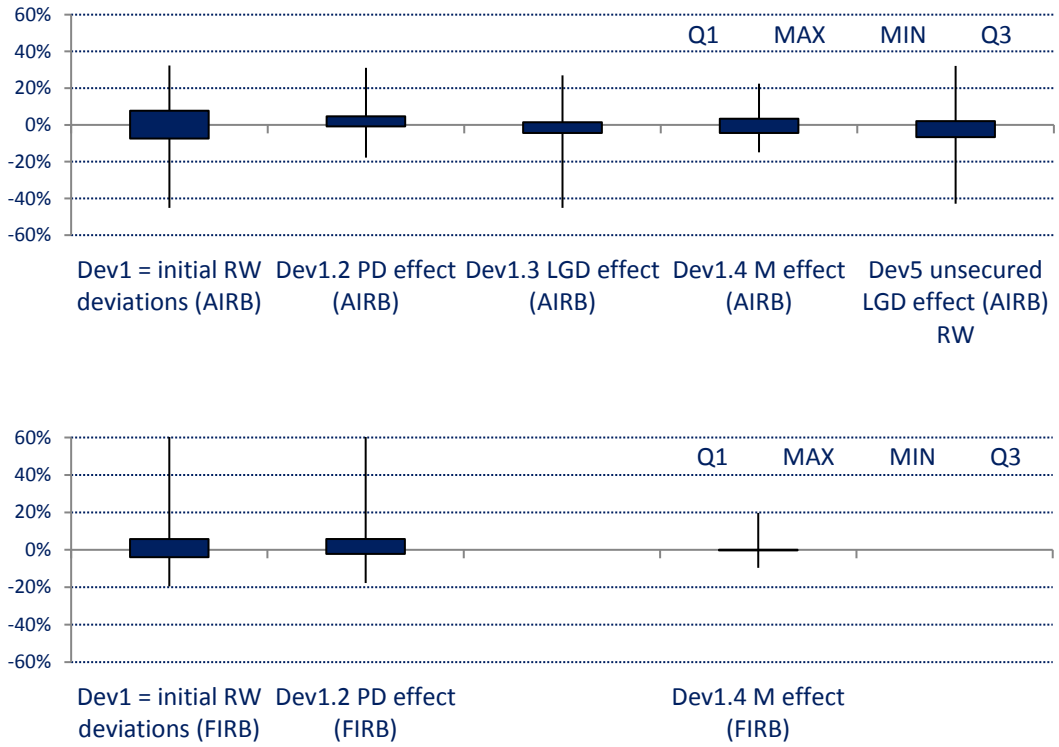


Figure 16 details the impact of the different parameters for each bank in the sample. For AIRB banks, 24 banks have an initial negative deviation (RWs higher than the benchmark), and this number decreases to 13 as a result of the PD effect, whereas it increases to 26 as a result of the

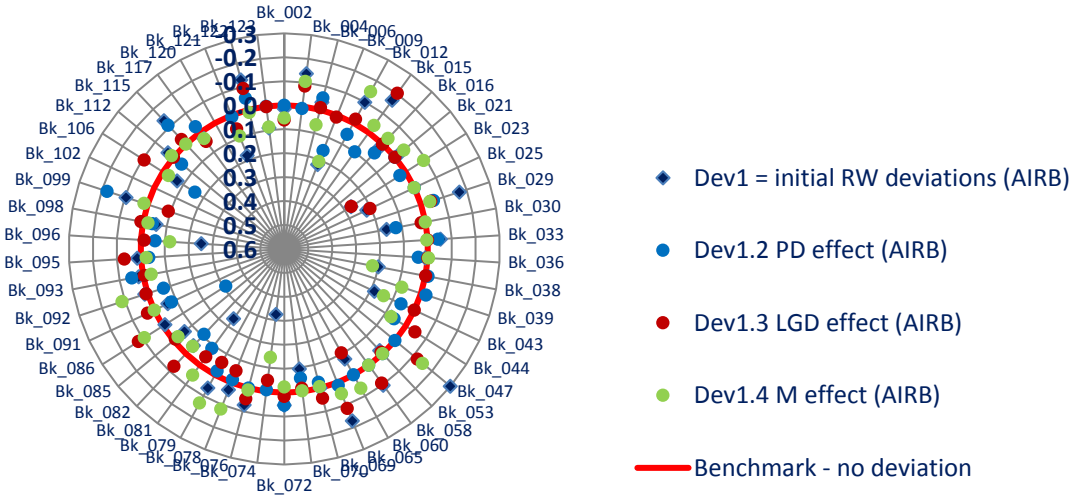
LGD effect. The positive RW deviation (i.e. RWs higher than the benchmark) seems to be driven by the PD. Nevertheless, the variability of RW is driven by PD and LGD. This result is in line with the 2015 LDP exercise, in which the LGD seemed to be the main driver for negative RW deviations.

The maturity effect, as in the previous LDP exercises, is in general very small (28 out of the 50 AIRB banks having a maturity effect within the range [−5%, 5%]).

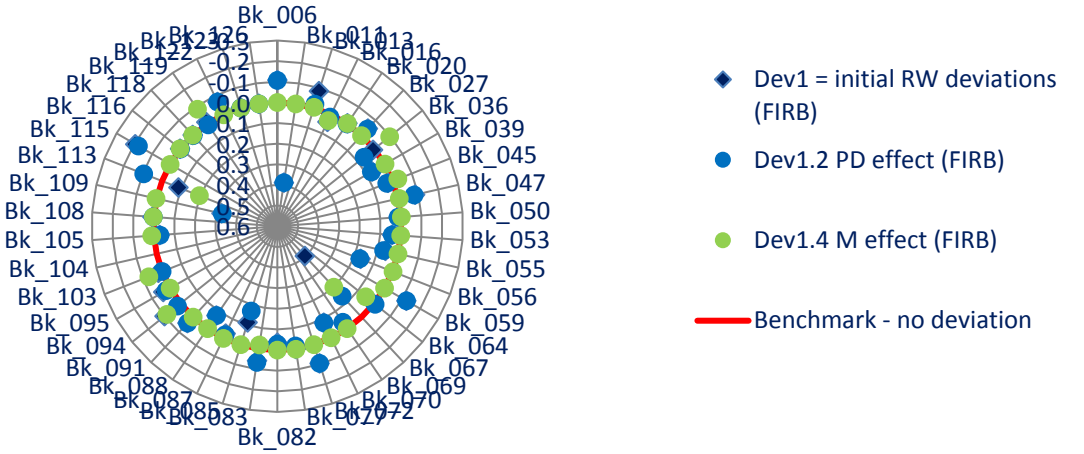
Furthermore, it seems that when the PD has a positive deviation (higher RWs), it is often compensated for by a negative deviation of the LGD (13 cases out of the 28 examples of positive deviation due to PD effects), whereas a positive deviation due to LGD is rarely compensated for by a negative PD deviation (three out of the 20 cases of positive deviation due to LGD effects). This feature could be explained by the use of external information (e.g. from credit rating agencies) for PD models, whereas LGD models are tailor made by each bank to a greater degree. However, the LGD deviation also includes the various levels and types of collateral held by the bank. The analysis using the unsecured LGD (deviations 3 to 5) provides better comparability, as the collateral policy is excluded *de facto*.

For FIRB banks, the deviation from the benchmark is rather small, with the variation being driven by the PD, and is consistent with the 2015 LDP exercise.

Figure 16: RW deviation (percentage points) by bank for large corporate obligors (AIRB and FIRB)[31]



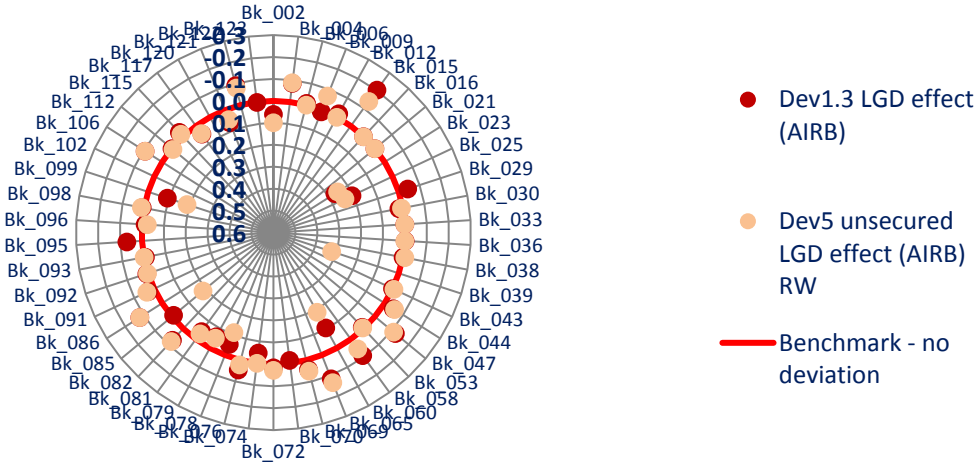
[31] Out-of-range values (outside [−30%; 60%]) are not displayed, to improve readability. As for the 2015 LDP exercise, some banks provided data for a single obligor under both AIRB and FIRB approaches. In total, 16 banks provided the values for at least one counterparty under AIRB and FIRB; 812 counterparties have received a double rating (AIRB and FIRB) from at least one bank; 10 of the 16 banks provided different values for PD under the two regulatory approaches (AIRB and FIRB) for at least one counterparty; and 283 counterparties have received a different PD under the two regulatory approaches from at least one bank (Bank1, counterparty1, PD_AIRB = x, PD_FIRB = x ± y).



The next analysis describes the LGD effects comparing the deviation to the benchmark using the current LGD and the unsecured LGD (see Figure 17). The difference between the two impacts is therefore the impact of the collateral (type and level).

For most banks, it can be found that where the LGD effect shows a negative deviation, the unsecured LGD effect does so too (21 AIRB banks having only negative deviations and 20 having only positive deviations). However, for five banks the negative real LGD effect (RWs lower than the benchmark) shows a parallel positive unsecured LGD effect, meaning that the higher level/quality of collateral may explain the negative deviation of the real LGD. In contrast, for four banks the negative unsecured LGD effect shows a positive LGD effect, which may be explained by a lower level/quality of collateral.

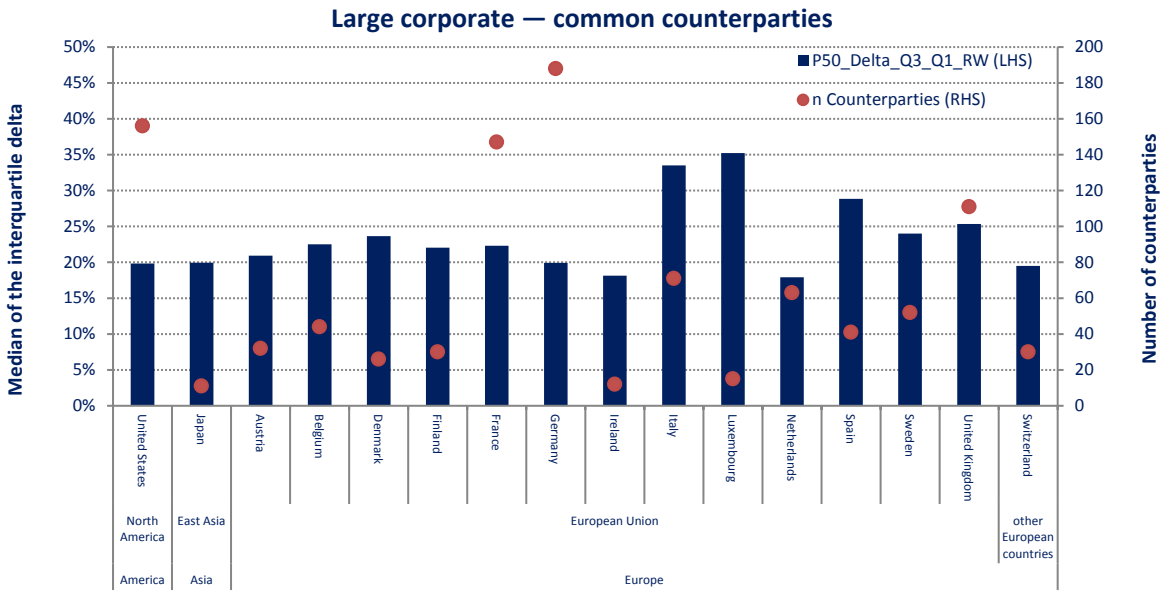
Figure 17: RW deviation (percentage points) by bank for large corporate obligors (AIRB banks) – LGD effects



Restricting the analysis for the countries of counterparties with at least 10 counterparties in the common sample, it is possible to observe (see Figure 18 in conjunction) that the median of the interquartile difference (Q3–Q1) for the RW in some countries is significant (higher than 30%). These significant interquartile differences indicate that the country of the counterparty could be a driver for differences in the width of distributions of RW among participating institutions.

However, these results might also be driven by a different distribution of the risk grades, or by the small number of common counterparties, as well as by different economic environments experienced by participating institutions. This finding is therefore tentative, lacking useful data on the historical riskiness of counterparties across countries.

Figure 18: Distribution of the median of the delta interquartile (Q3–Q1) for the RWs by country of the common counterparties for the large corporate portfolios



Defaulted exposures

The large corporate portfolios show a significant level of defaulted exposures, so a more detailed analysis was undertaken by making use of the sample of common counterparties. This section focuses on the obligors, reported by at least two banks, that have been assessed as in default by at least one bank. The dates of the beginning of default status by different banks for the same counterparties are compared to observe the differences.

Figure 19 represents 55 large corporate obligors[32] and the date of the first default event (x-axis) attributed by one of the banks,i.e. when several banks have assessed the same counterparty in default – red columns – the oldest date (on the x-axis) is taken into account. It is observed that when the default assessment is recent (within 1 year of the reference date of this report, i.e. December 2016), very few banks assessed the obligor as in default (columns in green). For less recent assessments, greater homogeneity in the default assessment is noted (columns in red). This may be explained by a lack of responsiveness in the default assessment by some banks for more recent default events (with reference to December 2016), but could be also related to

[32] For 10 participating institutions, the date of the default has not been filled in by the only bank that assessed an obligor as in default; therefore, those obligors are excluded (as the absence of a date may indicate a lack of data quality).

different assessments resulting from different information, obligor's behaviours or obligor's knowledge.

Figure 19: Obligors assessed as in default by at least one bank and date of the first default assessment

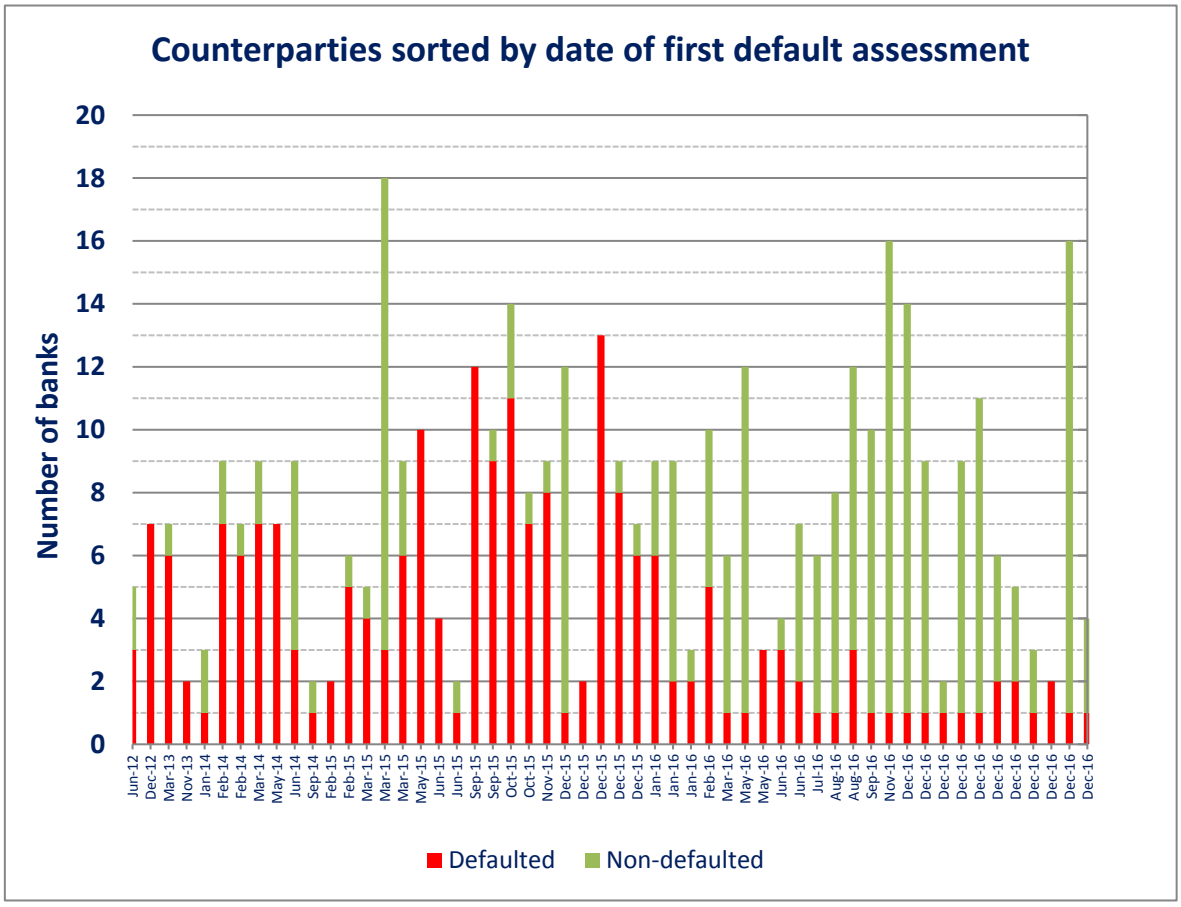
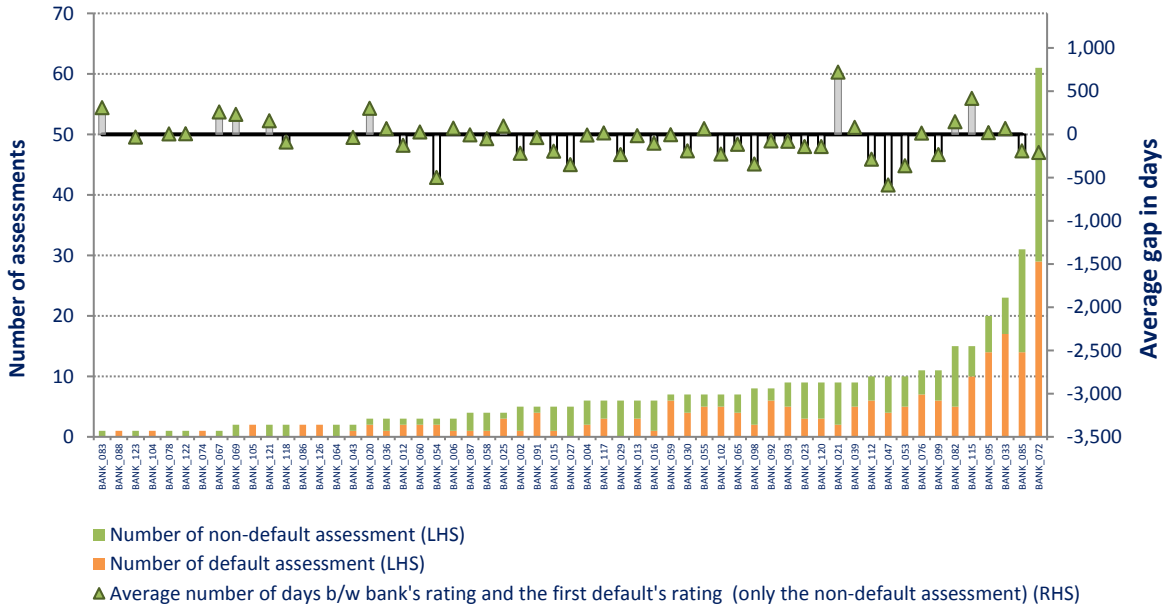


Figure 20 displays the same information as Figure 19, but by bank. The right-hand scale represents the average gap between the assessment dates of banks compared with the respective first default assessment dates. This average is calculated only for the obligors for whom banks had non-default assessments, whereas at least one other bank considered the obligor as in default.

In general, after the first default assessment by one of the banks for the same counterparty (negative average gap), the remaining banks have not reassessed the obligor. For some banks, assessments *ex post* the default assessment by the first bank are also observed, but are less frequent (positive gap). This underlines that, for large corporate, the date of the assessment is not the only explanation for a default assessment. Indeed, the default assessment is driven mainly by the 'unlikely to pay' criterion, which may be assessed differently by the bank because of different information or different default policy.

Figure 20: Obligors assessed as in default by at least one bank and date of the first default assessment



Sovereign portfolio

Similarly to the analysis undertaken for the large corporate sample to assess B-type differences in GC, this section considers B-type differences in the sovereign portfolio.

The analysis must be treated carefully because of the application of Article 150 of the CRR, which allows IRB institutions to apply for a standardised exemption for their local sovereigns (i.e. applying a 0% RW instead of applying their internal model). As a result, some of the benchmarks and comparisons are biased for those typically large exposures.

The AIRB banks show (see Figure 21) that the RW interquartile range has decreased since the 2015 LDP exercise (from 11.4 to 10.5 percentage points), which may be explained by the increased number of reporting banks[33] and more accurate classification of the regulatory approach. The PD, the LGD and maturity effects have positive or negative effects, but the interquartile range for sovereign portfolios is slightly smaller than for the large corporate portfolios.

For the FIRB banks, the dispersion of the RW is slightly smaller, with an interquartile range of 6.8 percentage points (7 percentage points for the 2015 LDP exercise).

[33] From 11 to 28 participating institutions. Bank_098 has been excluded from the analysis because of out-of-range data. In the 2015 LDP exercise, for an overall classification under AIRB, it was required that at least 50% of the exposure was under AIRB, whereas for the 2017 LDP exercise the classification is more accurate.

Figure 21: Dispersion of RW deviations, by regulatory approach – sovereign

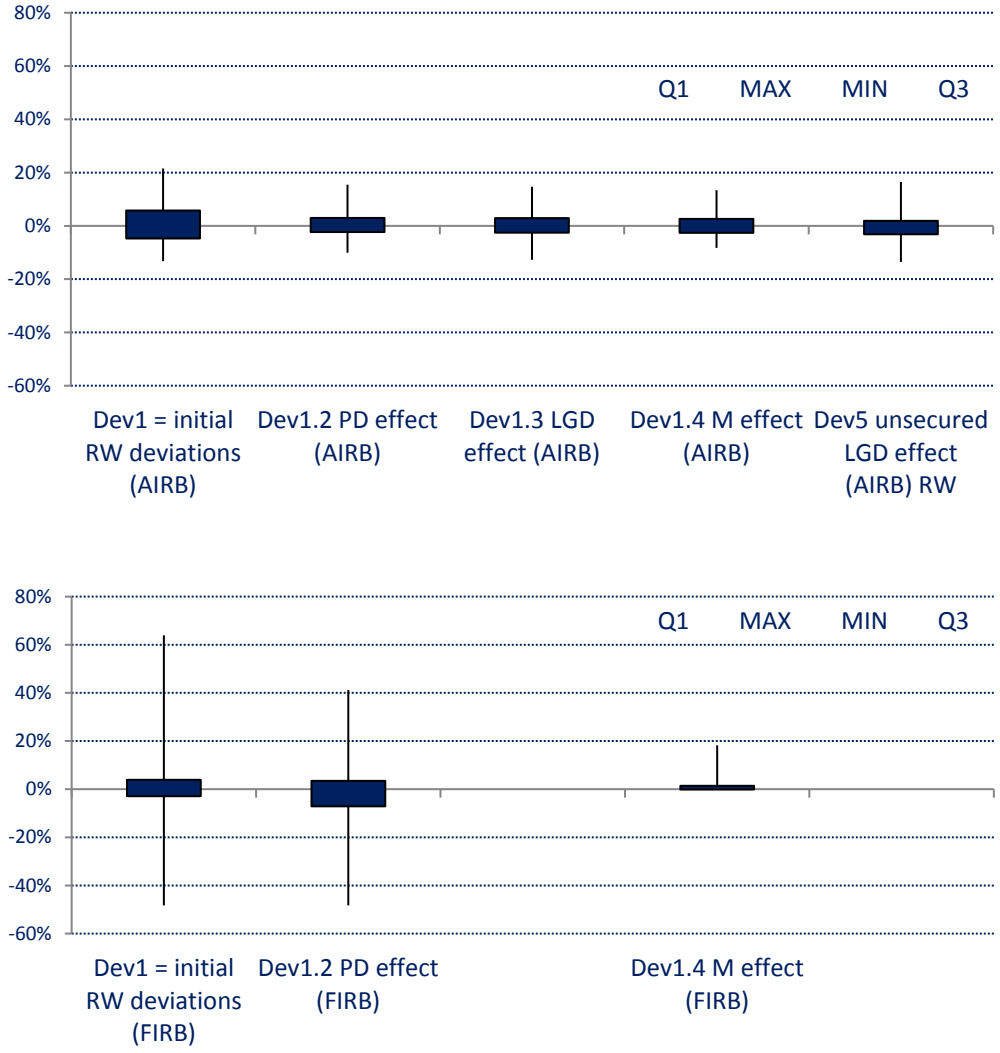
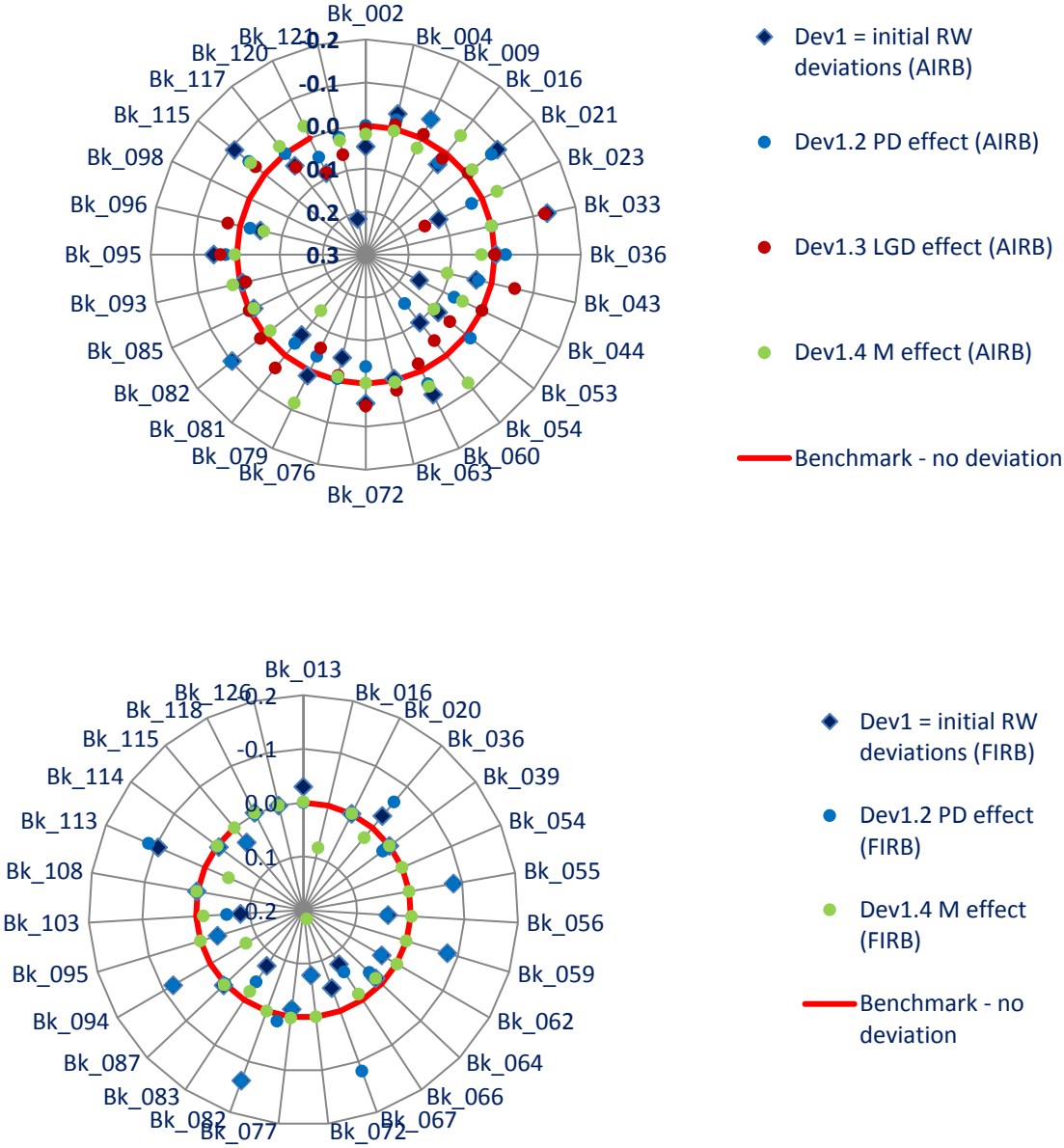


Figure 22 shows the RW deviation for each participating institution, by regulatory approach.[34] For AIRB banks, the impacts of the PD, LGD or maturity on the RW deviations are not clear even, if the PD seems to have slightly more frequent positive effects (13 AIRB banks have a positive PD effect, compared with 12 positive effects due to LGD). The deviation due to risk parameters is smaller than for large corporate portfolios, with almost half of the sample having a deviation within the [−5%, 5%] range (19 AIRB banks for PD, 17 for LGD, and 19 for the maturity effect).

Compensation effects between PD and LGD are observed in six banks. For instance, there are compensation effects between PD and LGD for banks 043 and 081.

[34] Information for bank_098 is not displayed, as the values are out of range (103% initial deviation).

Figure 22: RW deviations 1 to 3 for sovereigns (AIRB[35] and FIRB)

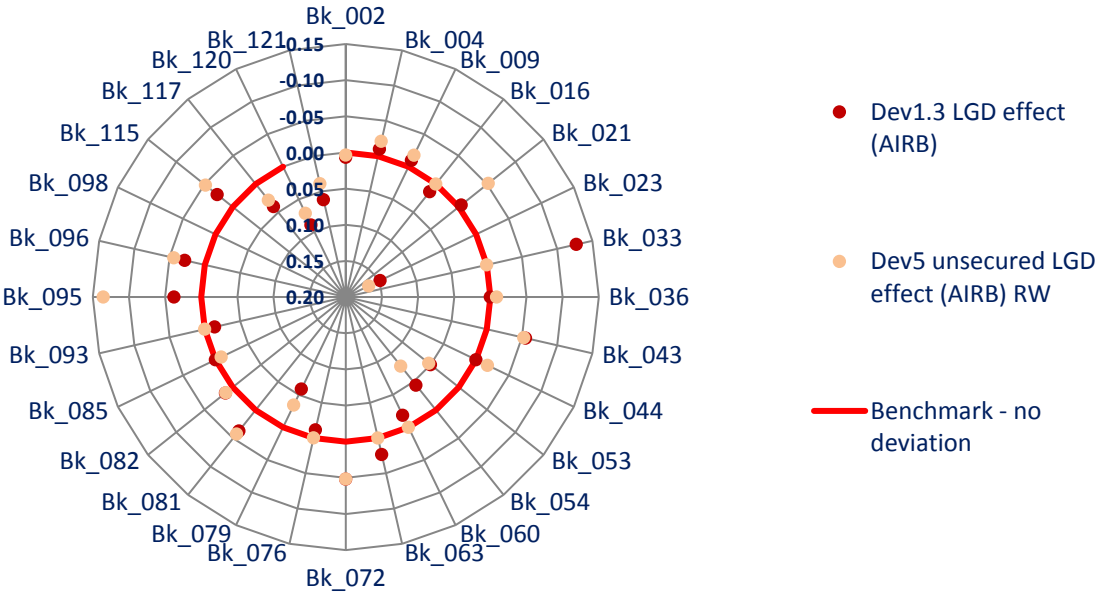


The impact of the collateral level for the LGD is analysed by using the comparison of the obligor's real LGD and the unsecured LGD for the same obligor (see Figure 23). For most of the AIRB banks[36] that participate in the analysis, the two LGD effects are similar (10 AIRB banks have only negative LGD effects, 13 banks have only positive LGD effects). For a very few AIRB banks, the

[35] No data is displayed for Bank_098 as it is out of the range (Dev1 initial deviation equal to 103%; Dev1.2 PD effect 20.8%; Dev1.3 LGD effect 85.0%; Dev1.4 M effect −11.6%).
[36] In total, 23 AIRB banks out of 28.

collateral induces a transition from a positive or null deviation (higher RW with unsecured LGD) to a negative LGD effect with the real LGD (Dev1.3). This may be explained by a higher level/quality of collateral. In contrast, and also for very few banks, the analysis shows a negative impact of the collateral (i.e. negative unsecured LGD deviation but positive real LGD deviation (Dev1.3)).

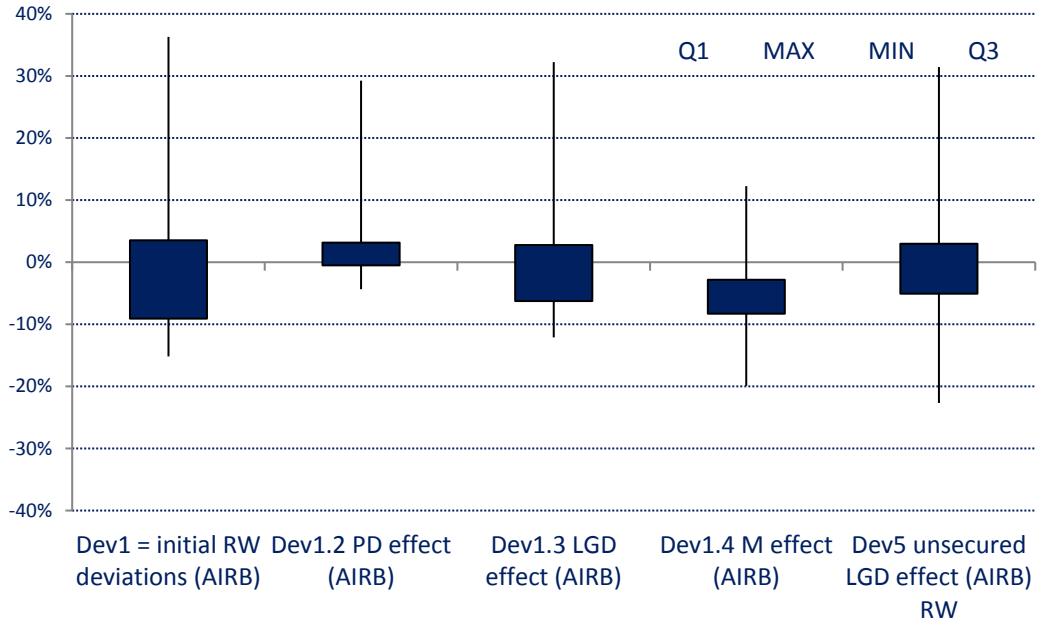
Figure 23: RW deviation by bank for large corporate obligors (AIRB banks) – LGD effects

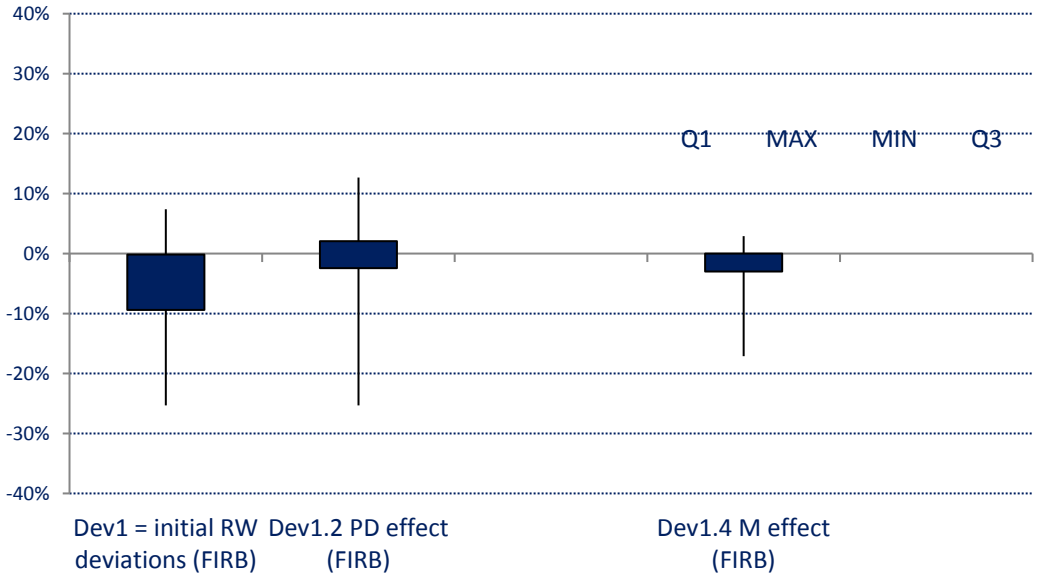


Institutions portfolio

This section considers B-type differences in GC in the institutions portfolio. Figure 24 shows that the interquartile range is slightly wider for AIRB banks than for FIRB banks (13 percentage points versus 9 percentage points), with the PD having in general a positive effect (RW higher than the benchmark) for both AIRB and FIRB banks. In contrast, a negative effect (RW lower than the benchmark) is due to the maturity parameter for AIRB banks.

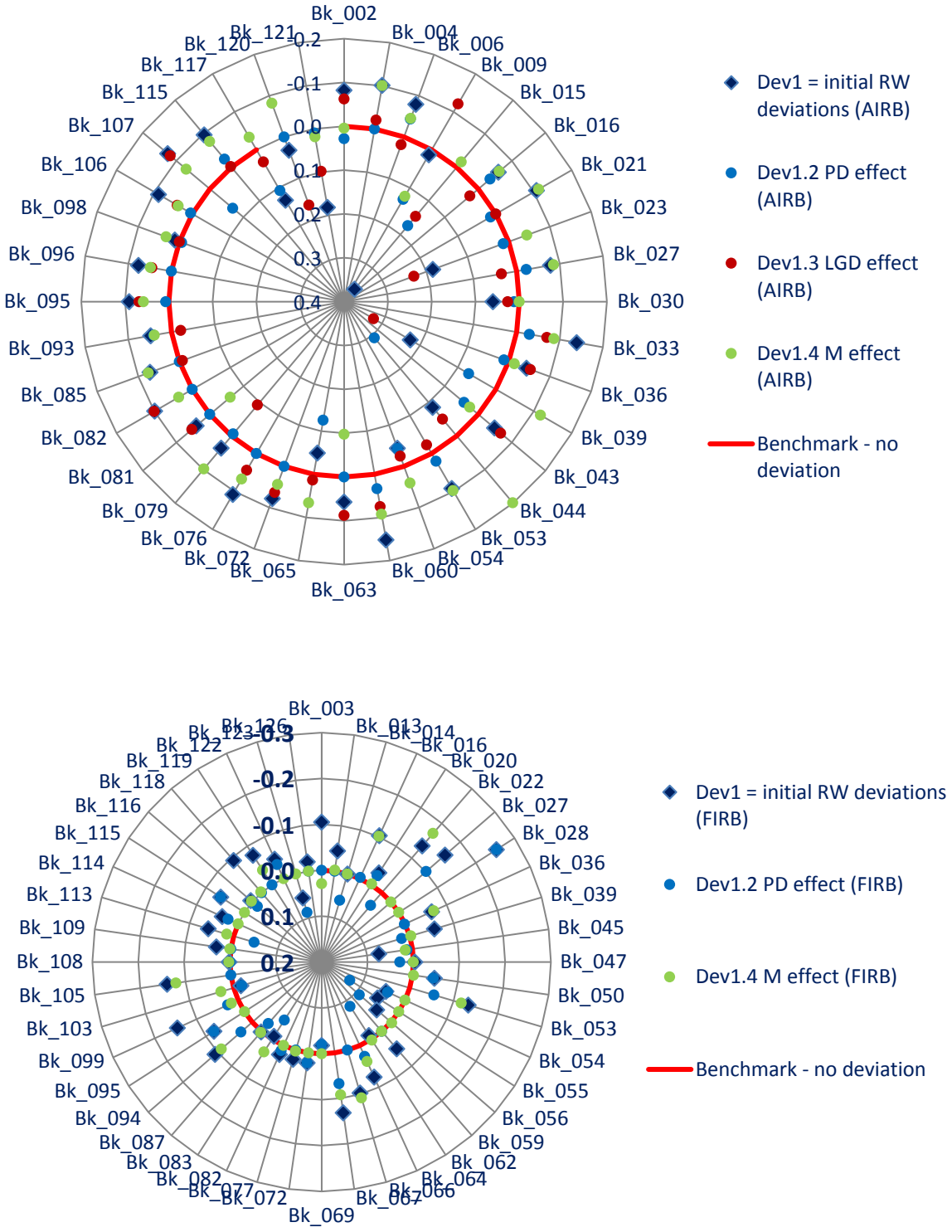
Figure 24: Dispersion of RW deviations, by regulatory approach – institutions





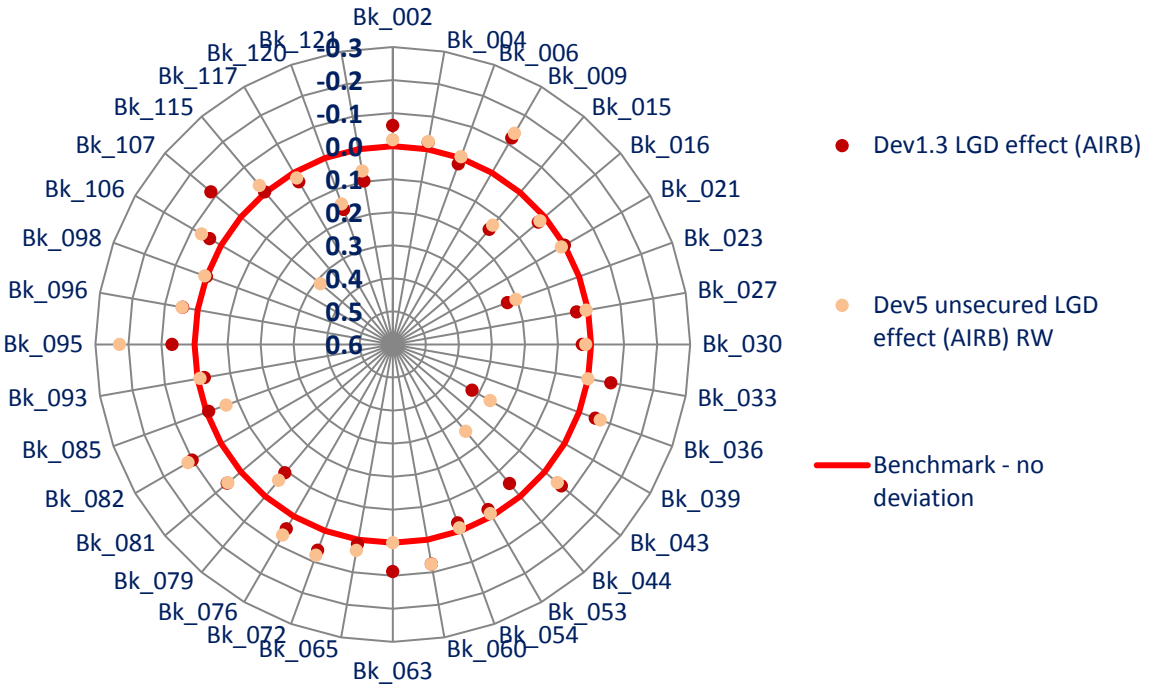
For AIRB banks, PD has a positive effect for 17 (out of 36) banks, whereas LGD and maturity have a negative effect (see Figure 25) for 18 and 30 AIRB banks respectively (RW lower than the benchmark). Regarding compensation effects, for six banks, the positive PD effect is compensated for by a negative LGD effect. In terms of portfolios, large corporate and sovereign portfolios show a higher number of banks with a positive LGD effect, compensated for by a negative PD effect (16 out of 36 AIRB banks with positive LGD effect). In general, the maturity effect has a low effect (for 16 banks the maturity effect is within the range [−5%, 5%]).

Figure 25: RW deviations 1, 1.2, 1.3 and 1.4 for institutions (AIRB and FIRB)



For the AIRB banks, the impact of the collateral on the LGD effect is also studied (see Figure 26). For 31 (out of 36) AIRB banks, the real LGD effect shows an evolution similar to that of the unsecured LGD effect (from both real LGD and unsecured LGD, 15 AIRB banks having only negative LGD effects, 16 AIRB banks having only positive LGD effects). For 15 AIRB banks, the unsecured LGD effect is within the range [−5%, 5%]. For one specific AIRB bank (bank_095), the negative unsecured LGD effect is greater than −22%, and the explanation may rest on different experience or low materiality of the exposure.

Figure 26: RW deviation by bank for institution obligors (AIRB banks) – LGD effects



7. Comparison of common samples between LDP exercises

This chapter describes the outcome of a comparison with the 2015 LDP exercise (based on year-end 2014 data). Owing to significant changes in the sample of participating institutions and changes in the definition of benchmarking portfolios, results from both LDP exercises cannot be compared without creating uncertainties in the interpretation of the outcomes. To overcome this, a common subsample of 33 participating institutions was identified (i.e. institutions that participated in both LDP exercises). The comparison focused on a subset of counterparties that were reported by at least five banks in both LDP exercises.[37]

Figure 27 shows the evolution of the subset of counterparties in terms of EAD and RWA. Even though the EAD of the subset increased by 24%, the portfolio composition did not change significantly. The only noteworthy change in portfolio composition is an increase in exposures towards sovereigns (general governments). In terms of representativeness, the subset represents 55% of the total common counterparty exposures as reported in this 2017 LDP exercise.

Figure 27: Evolution of the common subsample from the 2015 LDP exercise to the 2017 LDP exercise, by exposure class

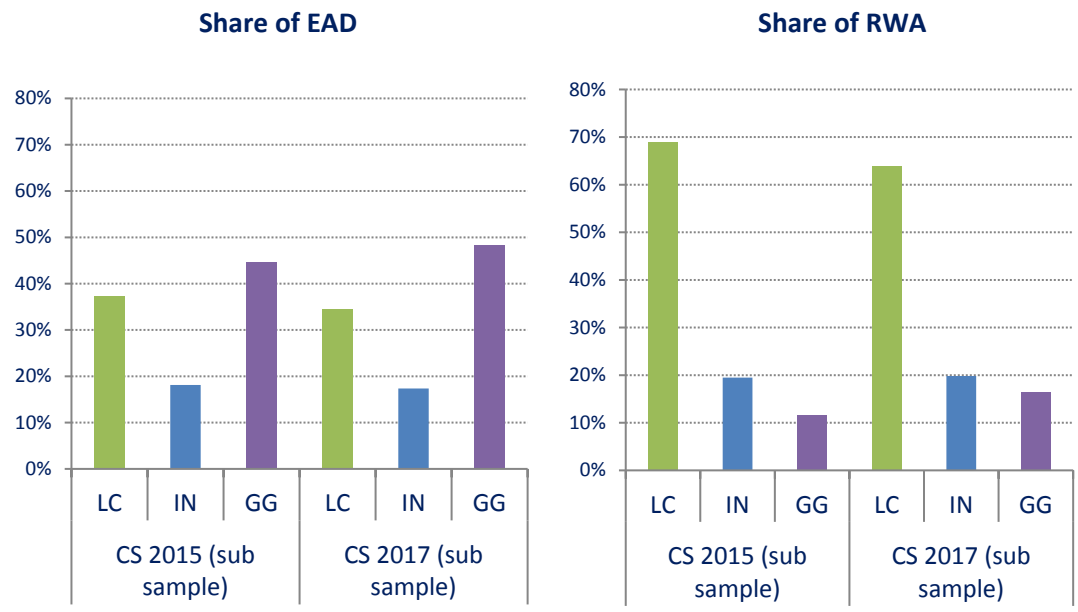


Figure 28 also shows the weighted average RW for the subset of counterparties over time. The decrease from 20.6% to 19.6% can be attributed mainly to the increase in sovereign exposures which contribute with lower RWs to the average.

[37] A simple average of 209 counterparties for banks, of which a simple average of 17 sovereigns, 58 institutions and 141 large corporates.

Figure 28: Share of EAD and RWs for the common subsample

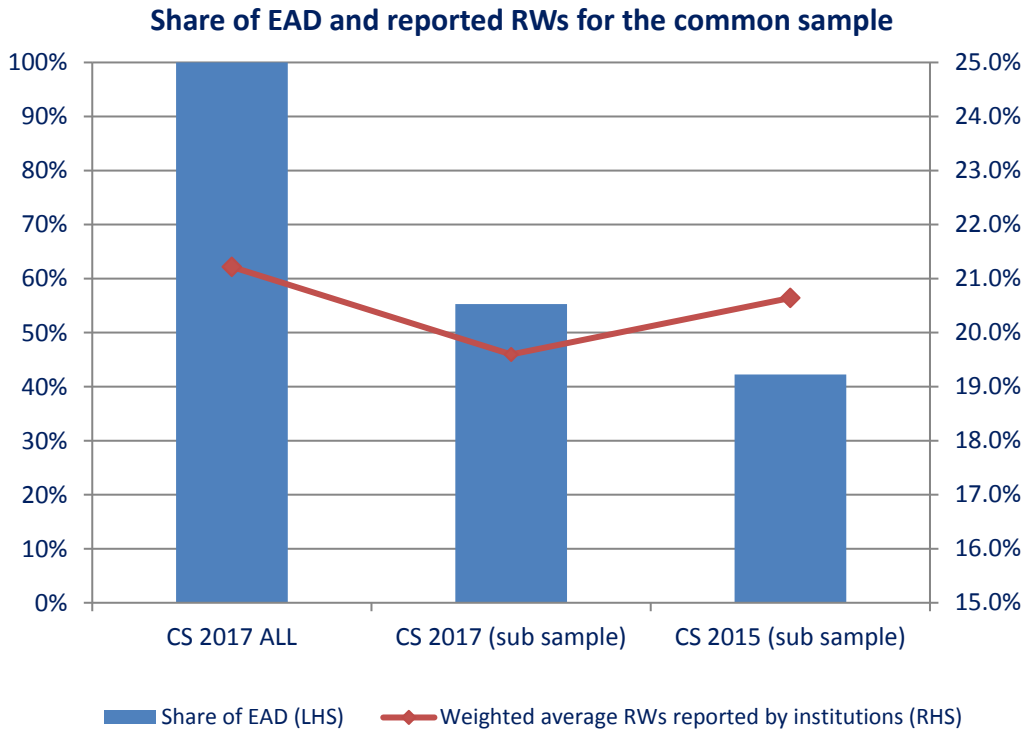
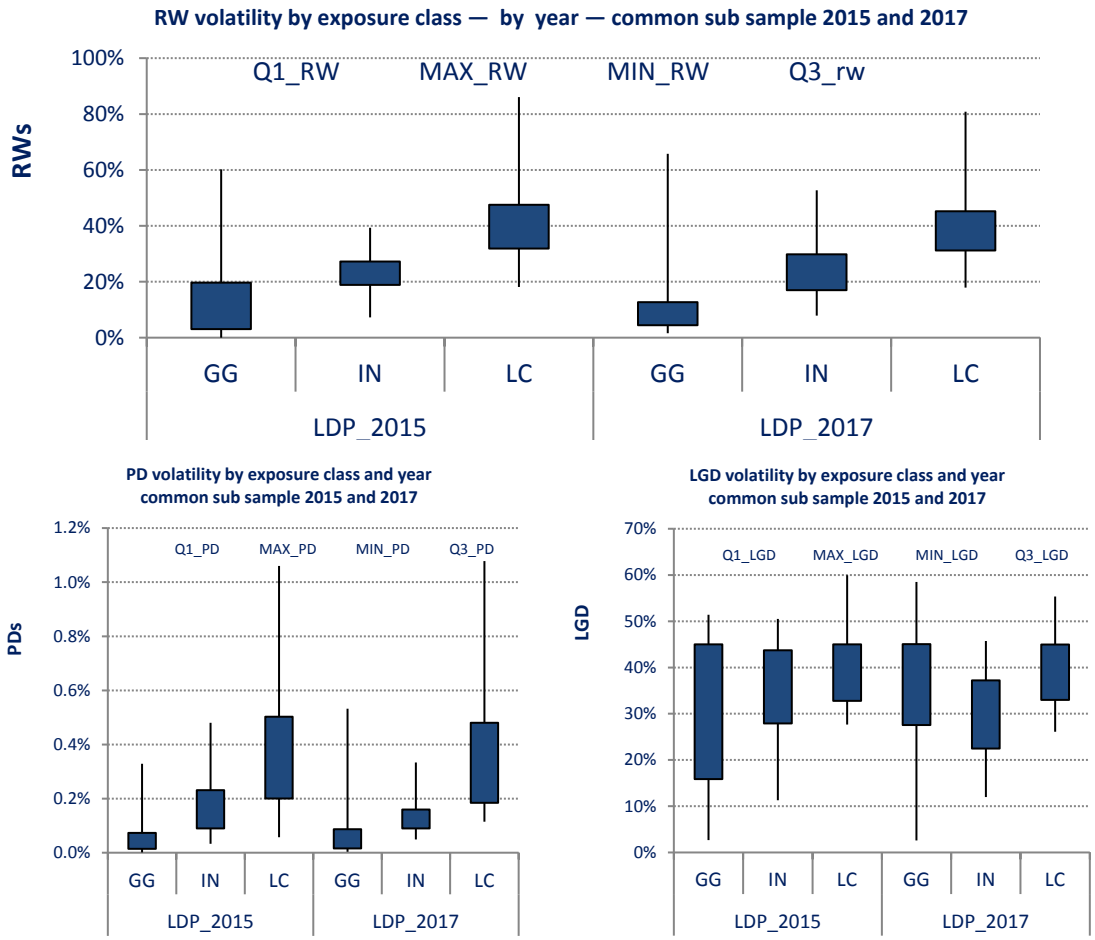


Figure 29 shows the evolution of the volatility for RW, PD and LGD, comparing the 2015 LDP and 2017 LDP exercises. The RW volatility in the sovereign portfolios decreased significantly and increased for institutions portfolios. Given these changes in RW volatility, further analysis of the PD and LGD was performed.

For PD, the large corporates portfolios show an interquartile range of 0.28% and remained unchanged. However, for institutions portfolios, the interquartile range narrowed significantly from 0.13% to 0.07%. The range reported for sovereign portfolios widened from 0.05% to 0.09%.

For LGDs, both the large corporates portfolios and institutions portfolios show that there are no significant changes in terms of interquartile ranges. However, for institutions portfolios, the average LGD value reduced significantly from 33.9% to 29.8%, while for sovereign portfolios the simple average of the LGD increase significantly from 31.9% to 37.1%. For the sovereign portfolios, a significant decrease in the interquartile range for the LGD could be observed, from 23% to 15%.

Figure 29: Evolution of the RW, PD and LGD volatility



To investigate the possible drivers of the evolution of the subsample of the common counterparties, the country of the counterparty was used. The analysis was restricted to banks that reported at least five counterparties for exposure class, in a particular country. The sovereign portfolios reported very few observations and so this portfolio was excluded from this analysis.

In Figure 30, for the institutions portfolios, the EAD increased significantly in CA, GB, and the US, and decreased in CN, DE and IT. For the large corporate portfolios, there is a significant increase in DE, US and GB. For the RW and PD (see Figures 31 and 32), for the institutions portfolios it is possible to observe an increase in the RW interquartile range in DE, AU, US and IT, while for the large corporate portfolio there has been an increase in the RW interquartile range in FI and a decrease in almost all the other countries. For the LGD (see Figure 33), a decrease is observed in the interquartile range and in the values for the institutions portfolios in GB and an increase is observed in the volatility of the large corporate portfolios.

Figure 30: EAD evolution of the common subsample from the 2015 LDP exercise and 2017 LDP exercise, by exposure class and by country of the counterparties

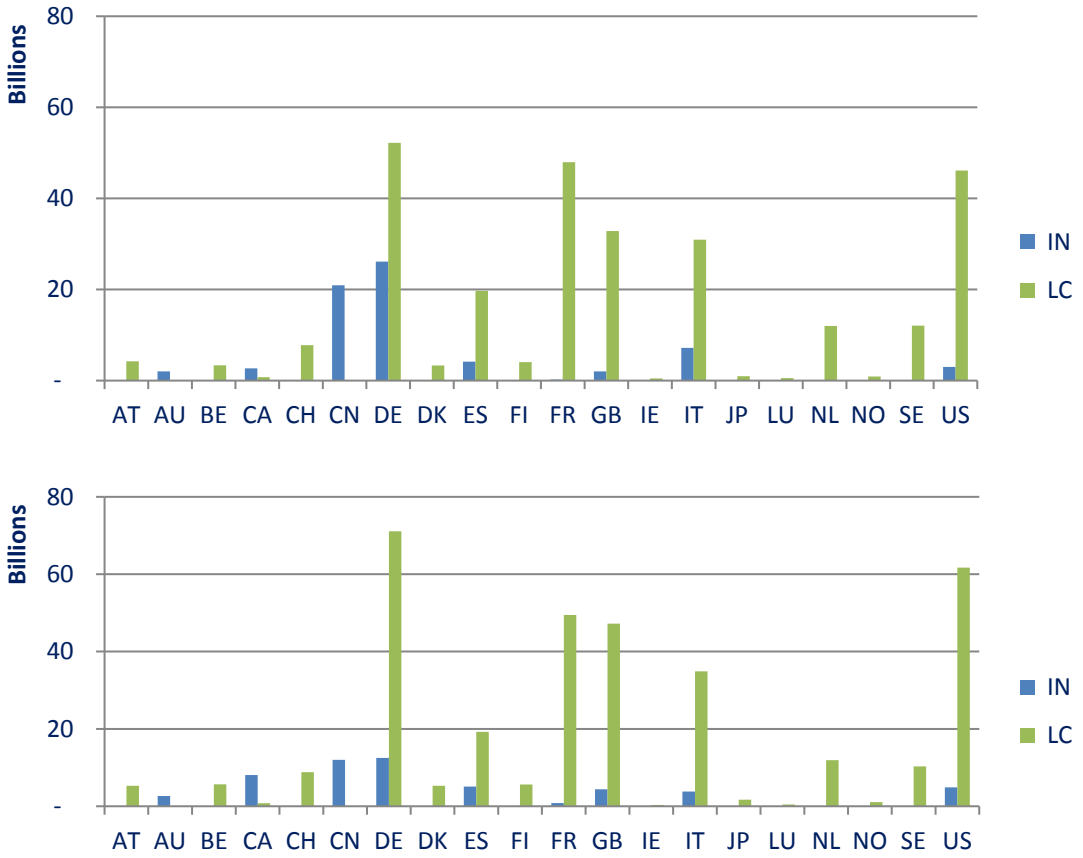


Figure 31: RW evolution of the common subsample from the 2015 LDP exercise and 2017 LDP exercise, by exposure class and by country of the counterparties

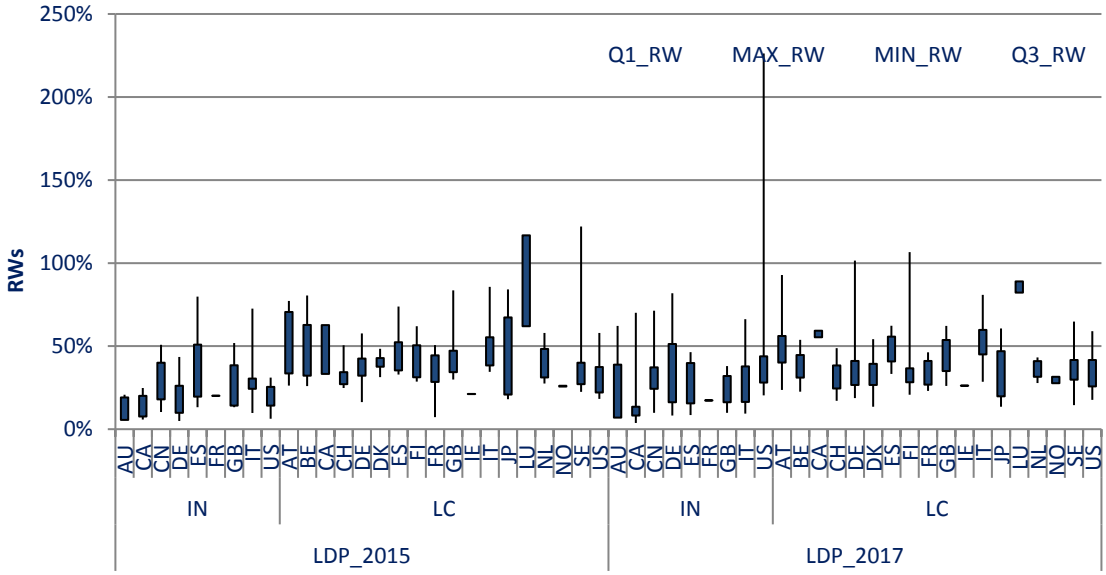


Figure 32: PD evolution of the common subsample from the 2015 LDP exercise to the 2017 LDP exercise, by exposure class and by country of the counterparties

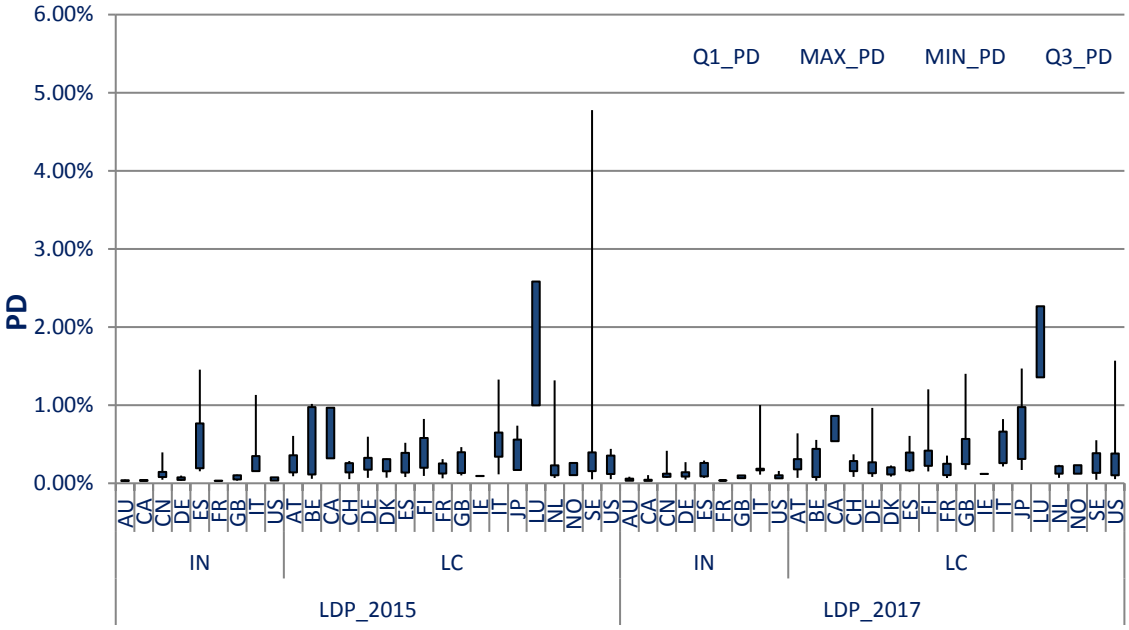
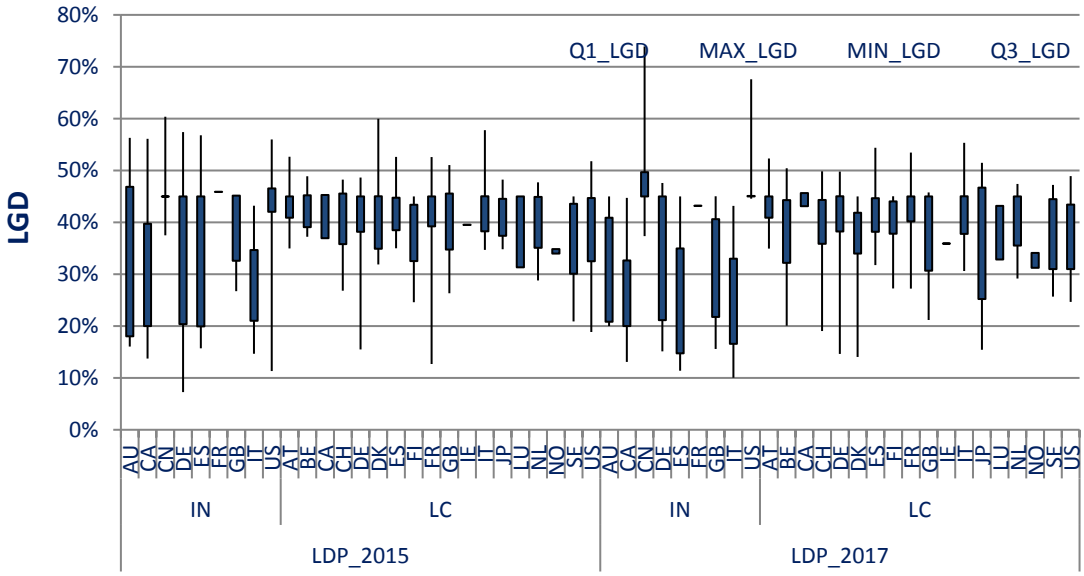


Figure 33: LGD evolution of the common subsample from the 2015 LDP exercise to the 2017 LDP exercise, by exposure class and by country of the counterparties



8. Impact analysis using benchmark parameters

This chapter describes the outcome of an impact analysis assuming a scenario in which all institutions use benchmark IRB parameters for a set of common obligors for all types of LDPs. Thus, this scenario analysis does not try to reflect regulatory measures or corrective actions that affect institutions' capital requirements, nor does it consider institutions' various risk management practices or levels of collateralisation. Instead, it aims to provide an estimate of the potential magnitude of RW changes under a hypothetical scenario. Providing such a reference point should help the reader to understand the potential scale of RW differences.

The methodology applied is to compare the RW computed using the institution's real parameters (maturity, PD and LGD) with the RW obtained using the benchmark parameters (maturity fixed at 2.5, median PD and median LGD parameters of the institution's peers). The regulatory approach is taken into account; hence an obligor under FIRB is compared with its FIRB benchmark, and an obligor under AIRB with its AIRB benchmark. As this analysis is based on the same set of obligors and criteria used for Chapter 6, the results represent a subsample (slightly less than 13% in terms of EAD under IRB) of the institutions' total IRB credit risk portfolio. Extrapolations to the total IRB credit risk portfolio (i.e. taking into account also HDPs) cannot be made, therefore, because of the specific nature of LDP exposures.

The common sample of the counterparties, for 83 participating institutions, represents 32% of the EAD submitted at total level for the LDP[38]. Figure 34 shows the deviation between real RWs for each participating institution and RWs computed using benchmarking parameters from the institution's peers (considering all common obligors in the sample).[39] If benchmark parameters were used by all institutions to compute the overall RW, the RW would increase on average by 3.5 percentage points (4.2 percentage points in the 2015 LDP exercise).

It is also interesting to understand what the impact would be if risk parameters estimated by less conservative institutions were replaced with benchmarking parameters.[40] Considering only those banks with a total RW computed with the respective banks' parameters lower than the total RW computed with the benchmarking parameters (maintaining the remaining banks with their respective RWs), it is possible to observe that RWs increase, on weighted average, 7.9 percentage points (7.5 percentage points in the 2015 LDP exercise).

[38] Using template C 102, at total level (and 12.7% of the EAD submitted in the COREP IRB templates). The common sample has been selected, after some data cleansing, as including the counterparties (i) that have been submitted by at least five institutions; (ii) that have not been classified as in default by any of the institutions; and (iii) that relate only to institutions that submitted at least 10 counterparties. The common sample consists of 1 384 counterparties.
[39] The subset of common obligors used for this analysis consists of 1 914 obligors, all of which were reported by at least five participating institutions.
[40] This allows the impact for institutions with RW below the median (i.e. the benchmark) to be isolated.

Figure 34: RW impact of using benchmarking parameters, by bank

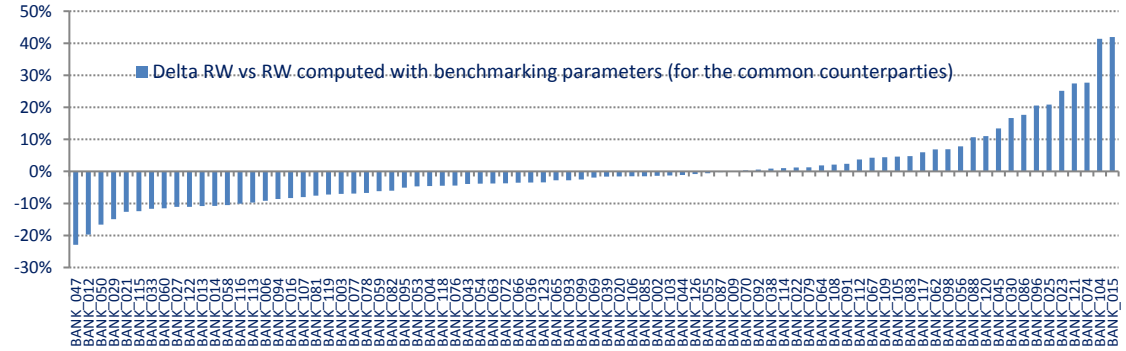
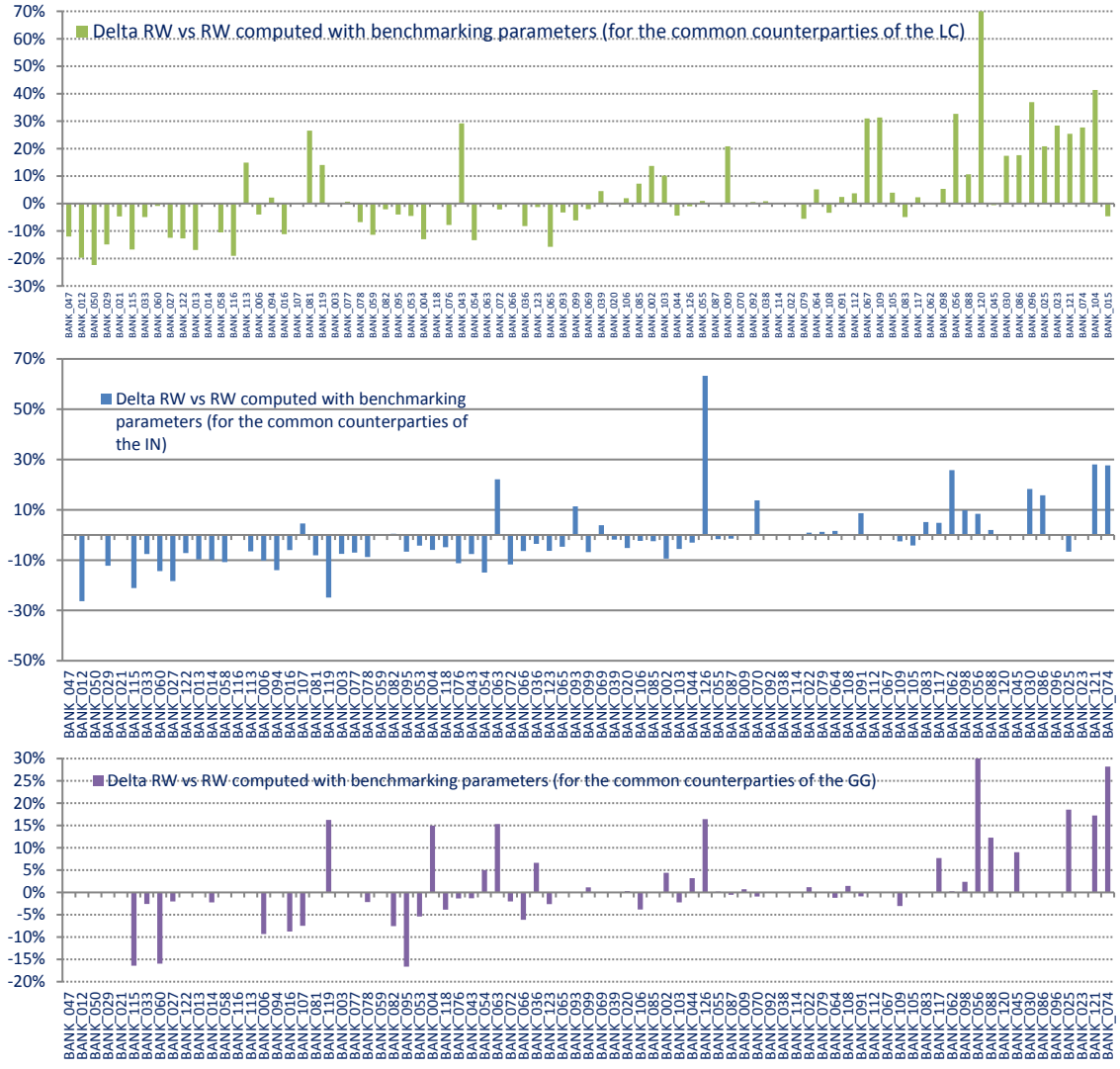


Figure 35 highlights that the deviation from the RW computed with the benchmarks parameter is not linked to a specific exposure class, and that there are some compensation effects among portfolios (see for comparison Figure 34).

Figure 35: RW impact of using BM parameters for large corporates (LC), institutions (IN) and sovereign (GG), by bank

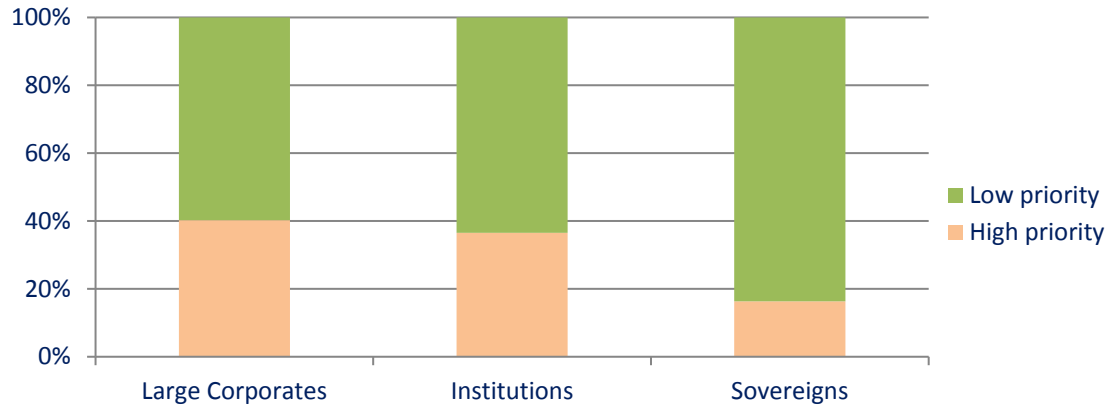


9. Competent authorities' assessments

As part of the LDP 2017 exercise, the CAs provided 103 individual assessments for each participating institution, with a focus on any potential underestimation of the capital requirement, as required by Article 78(4) of Directive 2013/36/EU, and Articles 8 and 9 of the draft RTS on supervisory benchmarking.

This chapter highlights some of the key information derived from these assessments. Regarding the level of priority for the assessments, the CAs considered the large corporate portfolios and institutions portfolios to be the most important portfolios among the LDPs. Among other reasons, CAs referred to: the materiality of the exposures in terms of EAD; the number of situations (risk parameters and other indicators) in which a bank is an outlier when compared with peers (e.g. PDs in the first quartile of the benchmark population, or RWs below the European average); the severity of parameter deviation from the benchmark values; the majority of counterparties being flagged as outliers; the number of models affected; and previous regulatory investigations of the affected exposure class (see Figure 36).

Figure 36: Level of priority for the assessments

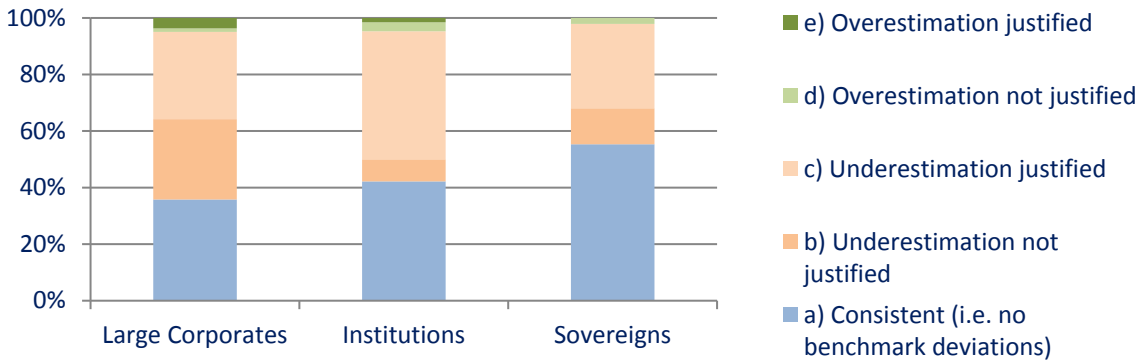


The CAs' own overall assessments of the level of own funds requirements, taking into account benchmark deviations, show that the large corporate portfolios present the highest number of potential underestimations that are not justified, with additional information required to determine the possible reasons for this. In addition, the institutions portfolios show a higher number of banks with potential underestimations that are justified, according to the CAs (see Figure 37).

For example, one CA notes a bank where certain 'not justified' underestimations are known to the bank, which submitted a new LGD model for approval to correct the issue. Regarding the large corporate portfolio at another bank, it was mentioned that the reported PD estimates included an add-on of 5% as margin of conservatism, and that, after a recent risk parameter calibration, the margin of conservatism increased to 25%, which significantly reduced the number of outliers. An example from another bank relates to a recent on-site supervisory inspection that identified many issues concerning LGD, including that the methodology was flawed because (i) the estimates of LGD were not based on data over a minimum of 7 years; (ii) the counterparts with incomplete

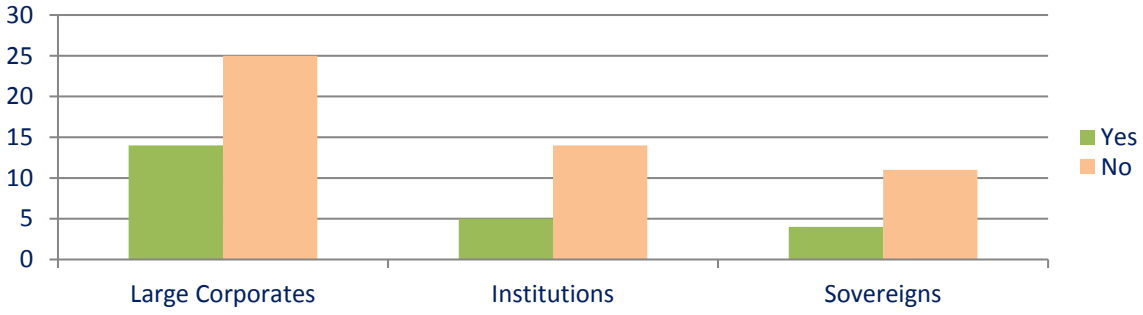
recovery processes shorter than 36 months were not taken into account; and (iii) the downturn LGD was not based on an economic downturn condition identification of all components of the LGD estimates, and particularly on loss rates. In another bank, the main point of concern is the low LGDs, and this has already been addressed for supervisory action. Finally, in one bank, the underestimation had already been identified by observing the outturns and judging the capture of downturn conditions to be insufficient; for those reasons, the CA decided to recalibrate all large corporate LGD models through an increase of 30% during 2017.

Figure 37: CAs' own overall assessments of the level of own funds requirements, taking into account benchmark deviations, by portfolio



The banks' internal validation processes are also an important element to consider. According to the CAs, for most situations banks' internal validations have not identified possible unjustified underestimations of the internal models. This is evident across all types of LDPs, and more details need to be discussed in future assessments (see Figure 38).

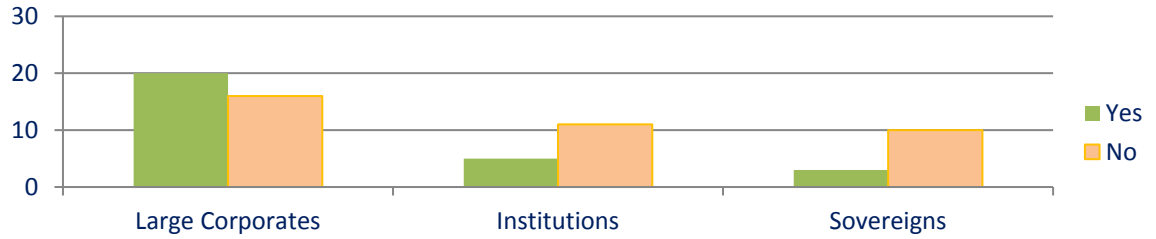
Figure 38: Number of responses to the question 'Has the bank's internal validation identified possible underestimations of the internal models which are connected to the benchmarking portfolios not justified?', by portfolio



Regarding the CAs' monitoring activities, most of the CAs noted that ongoing or on-site monitoring of the internal models had not identified possible non-justified underestimations, in particular for both institutions and sovereign portfolios (72% of the non-justified underestimations went undetected for both institutions and sovereign portfolios). This shows the relevance of benchmarking as an additional supporting tool for ongoing model monitoring. For instance, and linked to possible underestimations, one CA noted that weaknesses in the rating process and in the related credit processes had been identified in past on-site inspections, and that the benchmarking results now provided additional information about possible

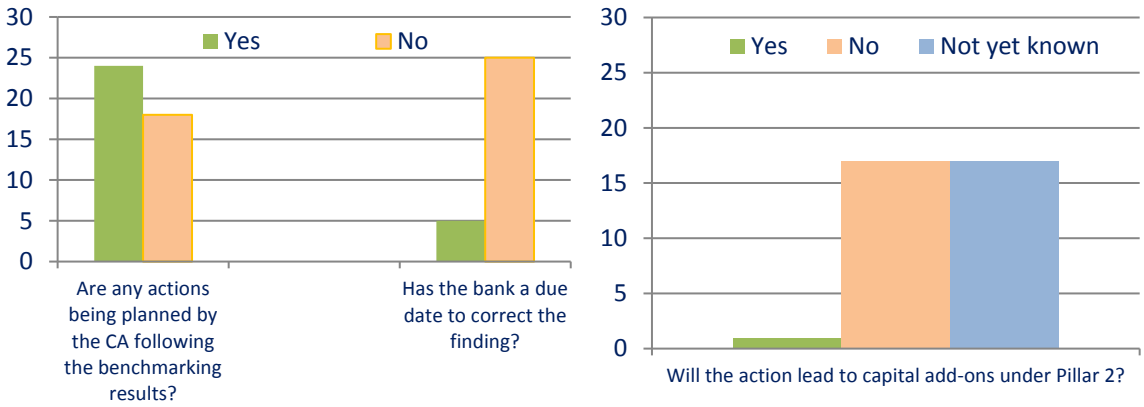
underestimations (which previously had not been easily identifiable). Supervisors will need to conduct further investigations to provide more detail (see Figure 39).

Figure 39: Number of responses to the question 'Have the CA monitoring activities (ongoing or on-site) of the internal models identified the possible underestimations which are connected to the benchmarking portfolios not justified?', by portfolio



The CAs' monitoring activities, with a focus on significant non-justified underestimations, show that in around 57% of the participating banks, CAs are already planning to take action following the benchmarking results. Most of the banks do not have a due date to correct the finding, however. Some issues might need clarification in more detail before imposing a due date for action to correct the finding. Some CAs answered that no action plans were mentioned because the supervisory methods are already in place (e.g. where PD for large corporates is currently under investigation following CA guidance of downturn severity/frequency in estimates). The remaining 'no' answers were given because the flagged counterparties will be clarified with the participating banks, but given the low materiality no actions are planned. As an example, one CA added that a model update is currently under assessment and that the risk weights are expected to increase; until the model update is approved, a capital add-on is held within Pillar 2. For half of the participating banks with possible underestimations not yet justified, the CAs mention that actions will not lead to capital add-ons under Pillar 2. For the remaining participating banks, the CAs do not yet know (see Figure 40).

Figure 40: Number of responses to the questions regarding planned actions



10. Conclusion

This report presents the results of the supervisory benchmarking exercise for large corporate, institutions and sovereign portfolios (collectively referred to as LDPs).[41] The reference date for the data of this report is 31 December 2016, and the analysis shows a slight increase in RW and GC values across institutions in comparison with the 2015 LDP exercise (with reference to end-2014). The EAD-weighted average RW per institution[42] across the entire sample has increased since the 2015 LDP exercise, and varies between 8% and 125% (weighted average RW of 28%, in comparison with a weighted average of 26% in the last LDP exercise). The weighted average GC has also increased, and varies between 8% and 147% (weighted average GC of 36%, in comparison with a weighted average GC of 33% in the last LDP exercise).

The benchmarking results should be interpreted with caution given certain data quality constraints, which hamper attempts to draw definite conclusions. Additional qualitative information was collected through CAs' assessments at bank level, and interviews with a sample of eight banks.

According to the top-down approach, which quantifies the variability of indicators observed at bank level, the key drivers in explaining GC variability are the share of defaulted exposures, the geographical mix and the portfolio mix effect. These drivers combined can explain at least 61% of GC variability. The remaining 39% may be due to the inherent credit risk of the institutions' exposures, and to different practices applied by both institutions and supervisors.

For defaulted exposures, the discrepancy in terms of GC is very high among participating institutions. As highlighted in previous LDP exercises and confirmed in interviews with institutions, discrepancies were found with regard to defaulted exposures, especially when it comes to the best estimate of expected loss models. These differences are particularly important when comparing FIRB institutions (where RW should be zero) with AIRB institutions, where best estimates are used. The share of defaulted exposures within the large corporate portfolios ranges from 0% to 8%, indicating potential differences in credit approval policies and workout processes across participating institutions. These are influenced by varying strategies and risk profiles, as well as different macroeconomic conditions. As also mentioned in some interviews, countries are currently experiencing different economic conditions, which would also explain different best estimates of loss levels.

The analysis based on common counterparties allowed a direct comparison of the IRB parameters and resulting RWs. Concerning the default status of counterparties for large corporate portfolios, the participating institutions show delays in the reassessment of counterparties already in default status by at least one of the participating institutions. This underlines that the date of the assessment of status is important in explaining differences, as the default status is driven mainly by the 'unlikely to pay' criterion, which may be assessed differently by participating institutions because of diverse types of information or default policies.

[41] This is the first LDP exercise based on the new technical standards on supervisory benchmarking pursuant to Article 78 of the CRD. The technical standards are applied for the calculation of RWAs under internal approaches across the EU. They were published by the EBA in January 2015 and adopted by the European Commission in September 2016.
[42] The RW is computed based on figures at total level by portfolio, for defaulted and non-defaulted exposures.

Impact analysis using benchmarking parameters

This analysis to quantify impact in terms of RWs was developed only for those participating institutions with RW below the RW computed with the IRB benchmark's parameters. The analysis found that, if the internal IRB parameters estimated by participating institutions were replaced by benchmarking parameters (from peer distributions), for a subset of common obligors RW would increase, on exposure-weighted average, by 7.9 percentage points (7.5 percentage points in the 2015 LDP exercise) for the total LDPs.

For the majority of the banks' assessments, the RW deviations (both negative and positive) from EU benchmarks were assessed by the CAs as justified and not significant. Regarding the level of priority for the assessments, most of the CAs considered large corporate portfolios and institutions portfolios to be the most important portfolios to follow up on in ongoing supervisory activities. Among other reasons, CAs referred to the materiality of the exposures in terms of EAD; the number of situations (risk parameters and other indicators) in which a bank is an outlier when compared with peers; the severity of parameter deviation from the benchmark values; the majority of counterparties being flagged as outliers; the number of models affected; and previous regulatory investigations of the affected exposure class. The CAs' own overall assessments show that the large corporate portfolios present the highest number of potential non-justified underestimations.

Future work

The EBA roadmap on the future of the IRB approach, published in 2016, was developed to ensure a robust and clear framework for internal models. The policy actions for the improvement of comparability across institutions cover three key areas: review of the IRB regulatory framework; supervisory consistency, which includes the annual benchmarking exercises; and increased transparency based on standardised comparable templates.

The EBA will continue to provide a regular EU overview of existing RWA variability and drivers of differences. The supervisory benchmarking framework has been implemented as an annual supervisory tool, and will continue to support comparison among peer participating institutions and help to summarise the results of the CAs' assessments of the quality of the internal approaches in use, and of the measures currently under consideration for improvement by both banks and supervisors. For future exercises, and with the benefit of a stable sample of participating institutions and clearer reporting definitions, more emphasis on comparisons across time will help to further refine and explain the drivers of differences in GC and RW.

Through supervisory actions, the effective implementation of the definition of default across the EU will continue, in particular with regard to key aspects such as the days past due criterion for default identification, indications of unlikeliness to pay, conditions for the return to non-defaulted status, treatment of the definition of default in external data and application of the default definition in a banking group. The implementation of the Guidelines on the treatment of defaulted assets, mostly around the estimation of LGD in-default and best estimate of expected loss and on the downturn LGD, is a topic that influences RW variability. In addition, more

transparency on the existing differences between the LGD on performing and defaulted assets, and the drivers of those differences, will help in understanding the RWA framework.

Annex 1: List of participating institutions

Country	Name	LEI	Participated in the 2015 LDP exercise?	Template C 101.00	Template C 102.00
AT	Erste Group Bank AG	PQOH26KWDF7CG10L6792	Yes	Y	Y
AT	Promontoria Sacher Holding NV	5299004SNO5GECIBWJ18	No	Y	Y
AT	Raiffeisen Zentralbank Österreich AG	EVOYOND2GGP3UHGGE885	Yes	Y	Y
AT	Volkskredit Verwaltungsgenossenschaft GmbH	529900IQMS1E10HN8V33	No	Y	Y
BE	AXA Bank Europe SA	LSGM84136ACA92XCN876	Yes	Y	Y
BE	Belfius Banque SA	A5GWLFH3KM7YV2SFQL84	Yes	Y	Y
BE	Crelan	549300DYPOFMXOR7XM56	No	Y	Y
BE	Dexia NV	D3K6HXMBBB6SK9OXH394	No	Y	Y
BE	Investar	5493008QOCP58OLEN998	No	Y	Y
BE	KBC Group NV	213800X3Q9LSAKRUWY91	Yes	Y	Y
DE	Aareal Bank AG	EZKODONU5TYHW4PP1R34	No	Y	Y
DE	ALTE LEIPZIGER Bauspar AG	529900EM0ZU25V87GD50	No	N	N
DE	Bayerische Landesbank	VDYMYTQGZZ6DU0912C88	Yes	Y	Y
DE	BHF Bank	529900XLAZ15LYK8XK27	No	N	N
DE	BMW Bank GmbH	D2OIGPB6E66YOBJ9GT20	No	N	Y
DE	Commerzbank AG	851WYGNLUQLFZBSYGB56	Yes	Y	Y
DE	Degussa Bank	MRFNHBHO7AUDKS46SC62	No	N	N
DE	DekaBank Deutsche Girozentrale	0W2PZJM8XOY22M4GG883	No	Y	Y
DE	Deutsche Bank AG	7LTWFZYICNSX8D621K86	Yes	Y	Y
DE	Deutsche Pfandbriefbank AG	DZZ47B9A52ZJ6LT6VV95	No	Y	Y
DE	Deutsche Zentral-Genossenschaftsbank AG	529900HNOAA1KXQJUQ27	Yes	Y	Y
DE	DeutscheApotheker-undÄrztebankeG	5299007S3UH5RKUYDA52	No	Y	Y
DE	Erwerbsgesellschaft der S-Finanzgruppe mbH & Co. KG	391200EEGLNXBBCVKC73	No	Y	Y
DE	HSH Beteiligungs Management GmbH	529900OQ416JMY9LQO42	No	Y	Y
DE	KfW Beteiligungsholding GmbH	5299002GPCR602QYJC04	No	Y	Y
DE	Landesbank Baden-Württemberg	B81CK4ESI35472RHJ606	Yes	Y	Y
DE	Landesbank Hessen-Thüringen Girozentrale	DIZES5CFO5K3I5R58746	No	Y	Y
DE	Landesbank Saar	52990050SU0S4QQ4Z793	No	Y	Y
DE	LBS Bayerische Landesbausparkasse	391200UEWWKBDK12KP84	No	Y	Y
DE	MünchenerHypothekenbankeG	529900GM944JT8YIRL63	No	Y	Y
DE	NORD/LB Norddeutsche Landesbank Girozentrale	DSNHHQ2B9X5N6OUJ1236	No	Y	Y
DE	Oldenburgische Landesbank AG	5299008I0TO44SUINZ71	No	Y	Y
DE	Süd-West-Kreditbank Finanzierung GmbH	529900CLVK38HUKPKF71	No	N	N
DE	TOYOTA Kreditbank GmbH	529900TP68LKVLHKNE55	No	N	Y
DE	Wüstenrot Bank AG Pfandbriefbank	QS0KV71ZZFYPT6POX557	No	Y	Y
DE	Wüstenrot Bausparkasse AG	529900S1KHKOEQL5CK20	No	Y	Y
DK	Danske Bank A/S	MAES062Z21O4RZ2U7M96	Yes	Y	Y
DK	DLR Kredit A/S	529900PR2ELW8QI1B775	No	N	N
DK	Jyske Bank A/S	3M5E1GQGKL17HI6CPN30	Yes	Y	Y
DK	Lån og Spar Bank A/S	213800UYAHIRLZ4NSN67	No	N	N

DK	Nykredit Realkredit A/S	LIU16F6VZJSD6UKHD557	No	Y	Y
DK	Sydbank A/S	GP5DT10VX1QRQUKVBK64	Yes	Y	Y
ES	Banco Bilbao Vizcaya Argentaria, SA	K8MS7FD7N5Z2WQ51AZ71	Yes	Y	Y
ES	Banco de Sabadell, SA	SI5RG2M0WQQLZCXKRM20	No	Y	Y
ES	Banco Popular Español SA	80H66LPTVDLM0P28XF25	No	Y	Y
ES	Banco Santander SA	5493006QMFDDMYWIAM13	Yes	Y	Y
ES	Bankinter SA	VWMYAEQSTOPNV0SUGU82	No	Y	Y
ES	BFA Tenedora De Acciones, SA	549300TJUHHEE8YXKI59	No	Y	Y
ES	Criteria Caixa Holding, SA	959800DQQUAMV0K08004	No	Y	Y
FI	Aktia Bank	743700GC62JLHFBUND16	No	Y	Y
FI	Ålandsbanken Plc	7437006WYM821IJ3MN73	No	Y	Y
FI	OP Osuuskunta	7437003B5WFBOIEFY714	Yes	Y	Y
FR	BNP Paribas SA	R0MUWSFPU8MPRO8K5P83	Yes	Y	Y
FR	CARREFOUR BANQUE	969500GVS02SJYG9S632	No	Y	Y
FR	GCM Group	9695000CG7B84NLR5984	No	Y	Y
FR	GOLDMAN SACHS PARIS INC ET CIE	ZSLF02UC3X1JFV1UX676	No	Y	Y
FR	Groupe BPCE	FR9695005MSX1OYEMGDF	No	Y	Y
FR	Groupe Credit Agricole	FR969500TJ5KRTCJQWXH	No	Y	Y
FR	ONEY Bank	969500E07BR6468F5910	No	Y	Y
FR	RCI banque (Renault Crédit Industriel)	96950001WI712W7PQG45	No	Y	Y
FR	SFIL (Société de Financement Local)	549300HFEHJOXGE4ZE63	No	Y	Y
FR	Société Générale SA	O2RNE8IBXP4R0TD8PU41	Yes	Y	Y
GB	Barclays Plc	G5GSEF7VJP5I7OUK5573	Yes	Y	Y
GB	Citigroup Global Markets Europe Limited	5493004FUULDQTMX0W20	No	N	N
GB	Coventry Building Society	2138004G59FXEAZ6IO10	No	N	N
GB	Credit Suisse International	E58DKGMJYYYJLN8C3868	No	Y	Y
GB	Credit Suisse Investments (UK)	549300FK5LWVMQ9QY386	No	Y	Y
GB	Goldman Sachs Group UK Limited	549300RQT6K4WXZL3083	No	Y	Y
GB	HSBC Holdings Plc	MLU0ZO3ML4LN2LL2TL39	Yes	Y	Y
GB	ICBC Standard Bank Plc (was Standard Bank Plc)	F01VVKN4DRF2NWKGQ283	No		
GB	Lloyds Banking Group Plc	549300PPXHEU2JF0AM85	Yes	Y	Y
GB	Merrill Lynch UK Holdings Ltd	5493004I1J5XW2WFNE95	No	N	N
GB	Mitsubishi UFJ Securities International Plc	U7M81AY481YLIOR75625	No	N	N
GB	Morgan Stanley International Ltd	LSMWH68Y2RHEDP8W5261	No	Y	Y
GB	Nationwide Building Society	549300XFX12G42QIKN82	No	Y	Y
GB	Nomura Europe Holdings Plc	549300IU15NXFPV2FC82	No	N	N
GB	Principality Building Society	2138003CSNVJEPFZ3U52	No	N	Y
GB	Standard Chartered Plc	U4LOSYZ7YG4W3S5F2G91	No	Y	Y
GB	Sumitomo Mitsui Banking Corporation Europe Limited	NT7C58H5HPZYKZDPOO64	No	Y	Y
GB	The Co-operative Bank Plc	213800TLZ6PCLYPSR448	No	Y	Y
GB	The Royal Bank of Scotland Group Plc	2138005O9XJIJN4JPN90	Yes	Y	Y
GB	Virgin Money Plc	213800TAU9ZX2WZNCO64	No		
GR	Alpha Bank SA	5299009N55YRQC69CN08	No	N	N

GR	Eurobank Ergasias SA	JEUVK5RWVJEN8W0C9M24	No	Y	Y
GR	National Bank of Greece SA	5UMCZOEYKCVFAW8ZLO05	No	Y	Y
HU	Group of Magyar Takarékszövetkezeti Bank Zrt.	2594004MC7VOKSK7Z633	No	Y	Y
IE	Allied Irish Banks, Plc	3U8WV1YX2VMUHH7Z1Q21	Yes	Y	Y
IE	Bank of Ireland	Q2GQA2KF6XJ24W42G291	Yes	Y	Y
IE	Permanent TSB Group Holdings Plc	635400DTNHVYGZODKQ93	Yes	Y	Y
IT	Banca Monte dei Paschi di Siena SpA	J4CP7MHCXR8DAQMKIL78	Yes	Y	Y
IT	Banca popolare dell'Emilia Romagna SC	N747OI7JINV7RUUH6190	No	Y	Y
IT	Banca Popolare di Milano Scarl	8156009BC82130E7FC43	No	N	N
IT	Banco Popolare Società Cooperativa	5493006P8PDBI8LC0O96	Yes	Y	Y
IT	Credito Emiliano Holding SpA	815600AD83B2B6317788	No	Y	Y
IT	Intesa Sanpaolo SpA	2W8N8UU78PMDQKZENC08	Yes	Y	Y
IT	UniCredit SpA	549300TRUWO2CD2G5692	Yes	Y	Y
IT	Unione di Banche Italiane SCpA	81560097964CBDAED282	Yes	Y	Y
LU	Banque et Caisse d'Epargne de l'Etat, Luxembourg	R7CQUF1DQM73HUTV1078	No	Y	Y
LU	Precision Capital SA	549300AUUQG072ATL746	No	Y	Y
NL	ABN AMRO Groep NV	724500DWE10NNL1AXZ52	No	Y	Y
NL	Coöperatieve Rabobank UA	DG3RU1DBUFHT4ZF9WN62	Yes	Y	Y
NL	de Volksholding BV	724500VLXQUMMD5BJB61	No	N	N
NL	GarantiBank International NV	L35YSDFOIH056VDJ2557	No	Y	Y
NL	ING Groep NV	549300NYKK9MWM7GGW15	No	Y	Y
NL	LP Group BV	72450088V7QLGDPY6W41	No	Y	Y
NL	NIBC Holding NV	7245006WQ4T1GV2W4C98	No	Y	Y
NL	Van Lanschot NV	724500ZM85SCL0RS8L71	No	N	Y
NO	Bank 1 Oslo Akershus AS	5967007LIEEXZX5I4888	No	Y	Y
NO	DNB BANK ASA	549300GKFG0RYRRQ1414	Yes	Y	Y
NO	SpareBank 1 Nord-Norge	549300SXM92LQ05OJQ76	No	Y	Y
NO	SpareBank 1 SMN	7V6Z97IO7R1SEAO84Q32	No	Y	Y
NO	SPAREBANK 1 SR-BANK ASA	549300Q3OIWRHQUQM052	No	Y	Y
NO	Sparebanken Hedmark SPA	549300VRM6G42M8OWN49	No	Y	Y
NO	Sparebanken Møre SPA	5967007LIEEXZX5PU005	No	Y	Y
NO	SPAREBANKEN VEST	213800M7T3CYVZ3ZRT12	No	Y	Y
PT	Banco Comercial Português SA	JU1U6S0DG9YLT7N8ZV32	Yes	Y	Y
PT	Novo Banco	5493009W2E2YDCXY6S81	No	Y	Y
SE	AB Svensk Exportkredit – group	1FOLRR5RWTWWI397R131	No	Y	Y
SE	Landshypotek Bank AB (publ)	5493004WUGGU2BQI7F14	No	N	N
SE	Länförsäkringar Bank AB (publ)	549300C6TUMDXNOVXS82	No	N	Y
SE	Nordea Bank – group	6SCPQ280AIY8EP3XFW53	Yes	Y	Y
SE	SBAB Bank AB – group	H0YX5LBGKDVOWCXBZ594	No	Y	Y
SE	Skandinaviska Enskilda Banken – group	F3JS33DEI6XQ4ZBPTN86	Yes	Y	Y
SE	Svenska Handelsbanken – group	NHBDILHZTYCNBV5UYZ31	Yes	Y	Y
SE	Swedbank – group	M312WZV08Y7LYUC71685	Yes	Y	Y
SE	Volvofinans Bank AB (publ)	549300ZEF3QWM810M319	No	Y	Y

Annex 2: Data quality

The LDP information constitutes a subset of the supervisory benchmarking exercise, as laid down in the implementing technical standards (ITS) drafted by the EBA, pursuant to Article 78 of Directive 2013/36/EU (CRD IV) from the European Commission. This represents the second official data collection, which has a reference date of Q4 2016. The first official data collection under the ITS focused on HDPs, with a reference date of Q4 2015. The exercises with reference dates from Q4 2017 onwards will focus on both LDPs and HDPs.

Some constraints that emerged during this data collection (and that were confirmed during interviews with institutions) can be summarised as follows:

(i) unavailability of data as a result of late publication of the reporting requirements (difficulties in identifying and interpreting template C 102 relationships, particularly for facility type, collateralisation status and collateral breakdowns; difficulties in identifying counterparties because of a lack of 'universal' identifier);

(ii) unavailability of data as a result of incomplete submissions (incomplete submissions for template C 102, e.g. buckets, breakdowns and data relationships, as well as at total portfolio(s) level);

(iii) poor data quality and implausible figures (e.g. percentage values multiplied by 100, against existing guidance).

Annex 3: Data cleansing

From a total of 126 institutions that have had the internal models approved (Annex 1), 118 have credit risk internal models approved by their supervisors. These 118 institutions fall into the scope of the present exercise. However, institutions might not have had exposures, as described in Annex I and the information collected under templates C 101 and C 102, in their balance sheet at the reference date of Q4 2016.

For template C 101, where exposures to a predefined list of common counterparties are gathered, only 104 institutions submitted information, of which 89 contained at least one counterparty with EAD greater than zero. Another 15 institutions submitted an empty template (meaning that no exposures existed in their portfolio at the reference date), while 14 submitted no template at all.

For template C 102, which covers the various portfolios, only 109 out of 118 institutions returned the template, of which 103 submitted at least one portfolio with EAD greater than zero. Another six institutions submitted an empty template and nine submitted no template at all.

The cut-off date for the extraction of the data for this report was 30 August 2017.

The records with EAD equal to zero and the records with a portfolio ID or counterparty code not in the list in Annex I were excluded from the analyses throughout in this report.

In general, the records with PDs not between 0% and 100% (extremes included) were excluded from the analysis. Incoherent combinations of 'default status' and 'PD' values were also excluded (example: non-defaulted exposure with PD = 100%).

To compute the benchmark parameters for analysis of the IRB parameters (Chapter 6), a clean dataset has been used. This requires that:

a. only counterparty codes submitted by at least five institutions were considered;

b. counterparties classified as in default by at least one institution were excluded from the analysis of non-defaulted exposures;

c. counterparties for any particular institutions have been considered only if that institution submitted at least 10 counterparties where EAD was greater than zero;

d. only LGDs between 0% and 150% (extremes included) have been considered;

e. only RWs between 0% and 500% (extremes included) have been considered.

In addition, all analysis at total level (Chapters 4 and 5) was performed focusing on a sample of 83 banks. From the original 118 institutions with approved internal models for credit risk, the list below details and clarifies the reasons behind the exclusion of some institutions:

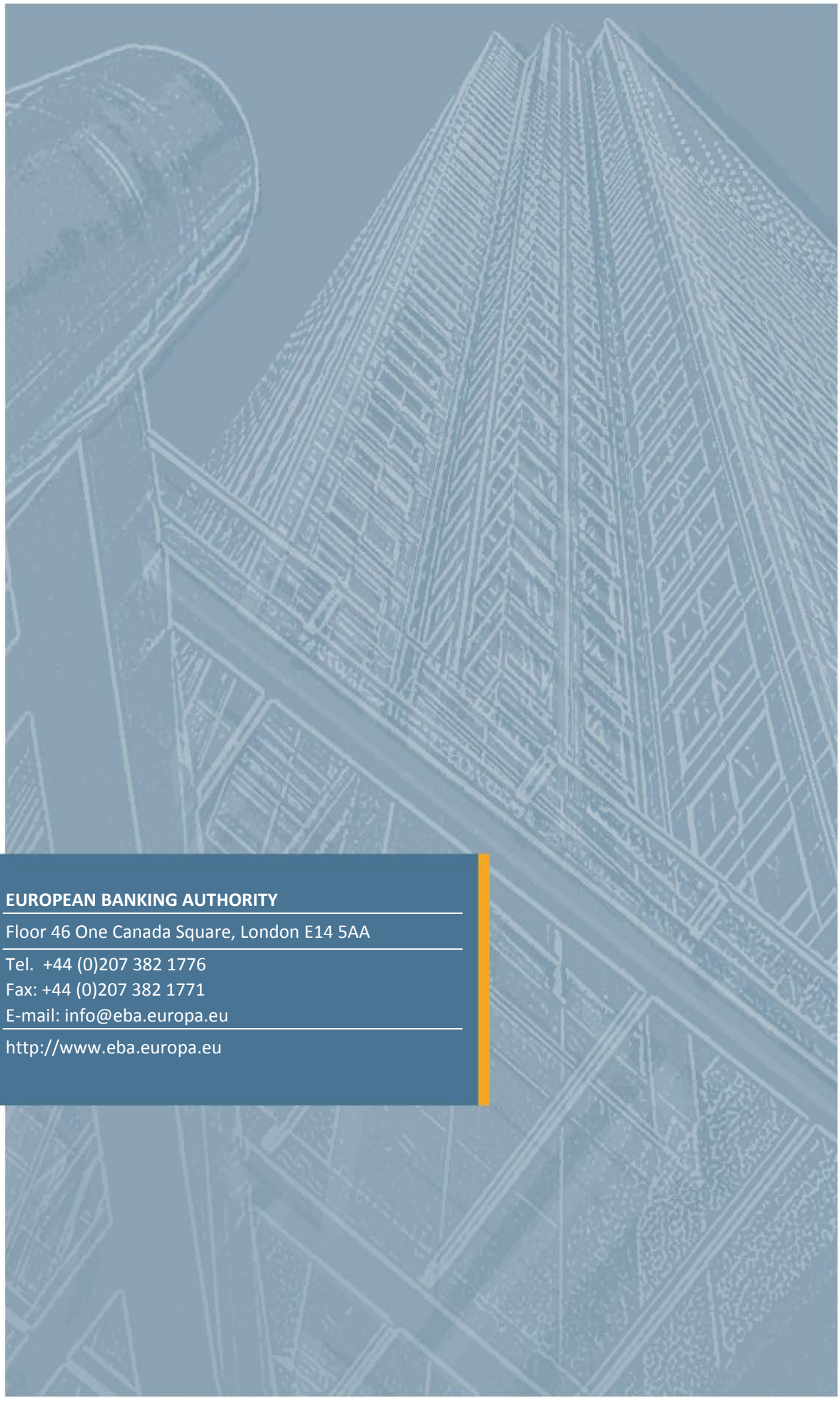
1) Sum of EAD reported in template C 102, for the total portfolio(s) level, for either regulatory approach AIRB or FIRB, risk type 'CT', defaulted and non-defaulted, and with

no rating breakdown, was zero and less than the EAD submitted in template C 101 (i.e. risk type 'CT').

2) Either one of:
    a. no EAD submitted within template C 102, for the total portfolio(s) level, for either regulatory approach AIRB or FIRB, risk type 'CT', defaulted and non-defaulted, and with no rating breakdown;
    b. no exposures in scope for the this LDP exercise;
    c. no submission of template C 102;
    d. incomplete submission of template C 102 (total-level data were not submitted for some portfolio(s)).

3) The EAD submitted within template C 102, for the total portfolio(s) level, for either regulatory approach AIRB or FIRB, risk type 'CT', defaulted and non-defaulted, and with no rating breakdown greater than that submitted within template C 09.

4) The GC, as computed during the top-down analysis, was over 150% for at least one of the top-down analyses.



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