EBA REPORT

RESULTS FROM THE 2014 LOW DEFAULT
PORTFOLIO (LDP) EXERCISE

EBA EUROPEAN BANKING AUTHORITY

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Abbreviations

AIRB	Advanced internal ratings-based
CA	Competent Authority
CCF	Credit Conversion Factor
CIC	Credit institutions cluster
COREP	Common supervisory reporting
CRD	Capital Requirements Directive
CRM	Credit Risk Mitigation
CRR	Capital Requirements Regulation
EAD	Exposure at default
EBA	European Banking Authority
EL	Expected losses
FIRB	Foundation internal ratings-based
GC	Global charge
GCA	Global charge amount
GCC	Governments and central banks cluster
IRB	Internal ratings-based
ITS	Implementing Technical Standards
LC	Large corporate
LDP	Low-default portfolio
LEI	Legal Entity Identifier
LGD	Loss given default
M	Maturity
PD	Probability of default
RW	Risk weights
RWA	Risk-weighted asset
SA	Standardised Approach

1. Executive summary

This report presents the results of the first supervisory benchmarking study pursuant to Article 78 CRD and the related draft technical standards on the internal approaches applied for the calculation of risk-weighted assets for the large corporate, sovereign and institutions portfolios across large EU institutions (collectively referred to as 'low default portfolios' (LDPs)). This report summarises findings from the benchmarking exercise, which is defined in Article 78 CRD and related draft technical standards. Previous reports on the topic of LDPs were published by the EBA in February and August 2013.

Altogether 41 institutions participated in the study and submitted data as of 30 June 2014. The data collection was based on draft technical standards for future benchmarking exercises and covered different portfolio breakdowns by key risk drivers, such as type of collateral, type of facility and rating grade, as well as PD, LGD and risk weight (RW) estimates for a predefined set of common obligors.

Different from previous EBA studies, only quantitative figures were collected systemically by the EBA. Limited qualitative information on specific aspects such as banks' modelling methodologies, data sources, length of time series, default definition, number and scope of models as well as on downturn approach for LGD have been collected through interviews with a sample of nine institutions.

Indeed, in the spirit of Article 78 CRD, the EBA focused its work on calculating and delivering benchmarks to support the work of the Competent Authorities (CAs) related to the assessment of the internal approaches applied by the institutions and to identify internal models that show significant dispersion of risk-weighted assets from peers and potential significant underestimations.

CAs shared the outcome of their assessments with the EBA and the other CAs. In general, the benchmarks calculated and shared by the EBA were found to be a useful monitoring tool to support the CAs' assessments of internal models and, in a large majority of cases, the CAs' assessments confirmed the existence of issues with specific institutions' internal models which were flagged as outliers in this benchmarking exercise. However, benchmarking exercises are not intended to identify all issues with internal models and hence, for a few institutions, CAs either judged the observed differences as justifiable or pointed to issues with some institutions' internal models which were not identified by the EBA's benchmarking.

It is planned to provide a feedback on benchmark parameters to participating institutions. Considering the low-default nature of the exposures, such a feedback is expected to complement the scarce set of information available to institutions for calibrating and monitoring of their internal models and will therefore provide positive incentives for institutions to improve the data quality of their data submissions in future supervisory benchmarking exercises.

Main findings of the benchmarking analysis

The analysis attempted to explain how much of the variability is driven by idiosyncratic portfolio features (riskiness) and to disentangle residual differences between PD and LGD models, credit risk mitigations, maturity and regulatory approaches (FIRB and AIRB). A key finding from the

analysis was that three-quarters of the observed difference in 'global charge' (GC) levels across institutions' real portfolios could be explained by two factors: the proportion of defaulted exposures in the portfolio and the portfolio mix between large corporate, sovereign and institutions exposures.

When looking at each portfolio separately, the analysis shows that the impact of defaulted exposures explains about 40% of the GC differences for the large corporate portfolios, but the remaining 60% may be due to differences in bank-specific factors, such as risk management practices or the IRB risk parameters.

For defaulted exposures in the large corporate portfolio, the discrepancy in terms of RW is very high among institutions. As highlighted in previous reports and confirmed in interviews with several banks, there is a wide range of practices as regards the definition of default and the treatment of defaulted assets. These differences are particularly important when comparing FIRB institutions, where RW should be zero, with AIRB institutions, where best estimates are used. Policy options dealing with observed differences in institutions' and supervisory practices have already been put forward by the EBA in a discussion paper on the future of the IRB Approach.

The analysis based on common obligors allowed a direct comparison of the IRB parameters and resulting RW on a set of identical real common obligors. This study highlighted that maturity has a very limited effect on RW differences for the large corporate portfolio while for the institutions and sovereign portfolios the impact is significant for several institutions.

A separate analysis of obligors under the FIRB Approach from obligors under the AIRB Approach ensured that findings, in particular as regards LGD, are not affected by differences in underlying approaches. For the large corporate portfolio, it was found that observed differences in PDs play a more significant role in explaining RW differences for FIRB institutions than for AIRB institutions.

Focusing on the AIRB Approach (applied by 20 institutions out of 41), the deviation caused by the LGD effect seems to be more significant than the deviation caused by the PD effect (LGD deviation is significant for nine institutions while the deviation caused by the PD effect is significant for six institutions). As regards the LGD effect, six out of nine institutions show that the use of real LGD parameters leads to lower RW than using benchmark LGD parameters. As regards the PD effect, two out of six institutions show that the use of real PD parameters leads to lower RW than using benchmark PD parameters. Compensation effects between PD and LGD were identified in some cases.

In addition to the real LGD, a hypothetical LGD based on a senior unsecured facility structure was used to isolate the effect of different deal and collateral structures from the analysis. The collection of enhanced collateral data in future exercises should allow more complete analysis of such effects.

A comparison of the Standardised Approach (SA) versus the IRB approach for the same exposures showed a similar dispersion of GC for the sovereign and institutions portfolios but greater dispersion for the large corporate portfolio. This may, however, be driven by inconsistent data quality for SA figures, which is expected to improve once figures are reported according to the draft ITS on supervisory benchmarking.

An analysis was performed to quantify the impact in terms of RWs of the differences in risk parameters. This analysis found that, if the internal IRB parameters estimated by institutions with

IRB parameters below benchmark parameters were replaced with benchmarking parameters calculated from peer distributions (under the same regulatory approach), RW would increase on average by about 7.5% (exposure-weighted average) in the large corporate portfolio and by 6.6% for the total portfolio. However, this impact is influenced by different collateralization status and deal structure and should not be interpreted as an underestimation due to potentially inadequate modelling.

Conclusions and future LDP studies

This LDP exercise served as a pilot implementation of future annual benchmarking exercises which will be run in accordance with technical standards defined by the EBA[1]. The data collection for this exercise was based on draft templates as specified in the ITS on supervisory benchmarking. Several areas of data quality improvements are identified throughout the report, which should prove useful for both institutions and Competent Authorities for the purpose of data validation.

The results of the study are broadly in line with the earlier studies on LDPs and confirm the conclusions and list of policy options included in a discussion paper on the future of the IRB Approach published by the EBA in March 2015[2].

As part of this benchmarking exercise, CAs provided individual assessments for each participating institution about any potential underestimation of the capital requirement as required by Article 78(4) of Directive 2013/36/EU. The majority of the CAs assessed the overall RW deviations as justified and confirmed that many issues were identified as part of the CA's regular assessments or monitoring of internal models. CAs' assessments also confirmed the existence of different supervisory practices related to add-ons and floors imposed on institutions' models. These may also lead to differences, the impact of which is hard to disentangle based on the data provided for this LDP exercise.

This study also provides a baseline for low-default portfolios against which future enhancements to IRB modelling can be monitored. It indicates that further investigation of potential divergences arising from specific areas might be useful. Due to observed caveats in this exercise, a more in-depth analysis of the following aspects should be performed:

- Comparisons between the IRB and standardised approaches;
- Impact analysis of collateral on internal LGD estimates.

The mentioned areas of further investigation will be made possible by enhanced data collections in future benchmarking exercises under the ITS on supervisory benchmarking.

A discussion of lessons learnt will follow the publication of the results of this benchmarking exercise and will include a workshop with participating institutions with a view to improving future exercises.

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[1] Technical standards on supervisory benchmarking were published by the EBA in January 2015 and are pending adoption by the EU Commission.

[2] The discussion paper identifies the main sources of differences in RWAs and is available on the EBA website.

The policy implications of the analyses carried out so far, as well as possible regulatory measures for improving the functioning of internal models, have been summarised in the Discussion Paper on the future of the IRB Approach published by the EBA in March this year.

2. Introduction and legal background

This report presents the results of a supervisory benchmarking exercise of the internal models used for low-default portfolios (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. The study anticipates the application of the framework designed by the EBA via its implementing and regulatory standards (prescribed by Article 78 of the Capital Requirements Directive (CRD)) published in March 2015, which are currently under review by the EU Commission. Previous studies on the topic of LDPs were published in February 2013 and in August 2013 as part of the European Banking Authority's (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 December 2013 and June 2014[4].

From 2016 onwards, these studies will form part of yearly benchmarking exercises which are prescribed by Article 78 of the CRD, which establishes requirements for institutions, Competent Authorities (CAs) and the EBA concerning the setup 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. It also establishes 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) testing the supervisory benchmarking framework as defined in the ITS; (iii) summarising the results of the supervisory assessment about the quality of the internal approaches in use and of the current measures under consideration for their improvements both by banks and supervisors; and (iv) providing evidence to policy makers for future activities relating to RWA differences.

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[3] The EBA has established the Task Force on Supervisory Benchmarking (TFSB) with members from the EBA, the ECB and European national supervisory authorities (NSAs) 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. Data set and assessment methodology

Altogether 41 institutions from 14 EU countries participated in this study and submitted data as of 30 June 2014, which were used to perform two kinds of analyses: a top-down analysis of institutions' actual portfolios and an analysis of IRB parameters for a common portfolio[5]. 36 out of those 41 institutions were also participating in the previous LDP exercise conducted in 2013. While the sample of institutions is roughly comparable, the data collected for this LDP study are not, making comparisons with the 2013 LDP exercise difficult.

Information sources

Data sources for the top-down analysis included common supervisory reporting (COREP)[6] data and data collected for this LDP exercise. Pending their final approval by the European Commission, the LDP data request was based on a subset of the draft version of the ITS on supervisory benchmarking portfolios to facilitate comparisons with future LDP studies and to ease the reporting burden on participating institutions[7]. The LDP-specific data used for top-down analysis are composed of information on the institution's actual exposure values and IRB parameters for low-default portfolios, broken down by type of facility including different types of collateral. In contrast to previous LDP studies, no information on exposures rated under the SA (either on a roll-out plan or under the Permanent Partial Use allowance) and no information on portfolios other than the LDPs were collected.

The common portfolio analysis relies exclusively on data collected for this LDP exercise. Participating institutions were requested to provide their own probability of default (PD) and hypothetical senior unsecured LGD for those obligors included in the list on which they had an actual exposure and/or a valid rating at the reference date of 30 June 2014[8].

During the process, the EBA computed benchmarks on risk parameters and provided detailed feedbacks and institution-specific reports to the CAs. The benchmarking exercise allowed CAs to assess the outcomes of institutions' internal models compared with a wider scope of institutions. Using additional information also helped to identify potential non-risk-based variability across firms. Competent Authorities will share any evidence within colleges of supervisors as appropriate and take appropriate corrective actions to overcome drawbacks when deemed necessary. CAs' assessments of the individual institutions in their respective jurisdiction were shared with the EBA and key findings of these assessments were used to confirm or explain findings from specific

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[5] Originally 44 institutions were expected to participate; however, three of them did not provide the requested data – hence institution labels in some charts range from 1 to 44.

[6] Common supervisory reporting requirements are specified by the EBA via Implementing Technical Standards which were adopted by the EU Commission as Regulation 680/2014.

[7] Although the change of the sample of participating institutions from one year to another will bring some limitations for comparisons, especially for the first year of application of the ITS on supervisory benchmarking.

[8] Since that date, some of the models under review will have been updated/replaced, so the analysis is a point in time assessment, with some of the findings mitigated since.

analysis throughout the report. A summary of the findings from CA assessments is presented in section 9.

Moreover, interviews were carried out with a subsample of nine 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.

Assessment methodology

With the information gathered in this LDP exercise and information received via institutions' regular COREP submissions, the EBA performed a top-down analysis on the LDPs. The method used in this part of the study is similar to that used and explained in the top-down study on the institutions' total credit portfolio and explained in the previous reports [9]. This method disentangles the global charge (GC)[10] contributions of the different 'A-type' drivers[11] into the following two categories: difference in share of defaulted exposure; and different relative shares of exposure classes (portfolio mix). However, in contrast to previous studies and due to different data collections, it was not possible to disentangle the share of partial use of the SA[12] (permanent and roll-out) and difference in the GC for exposures under SA in the current study. Hence, direct comparisons with previous reports may not always be possible.

The most challenging part of comparative RWA studies is to distinguish the influences of risk-based drivers 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. Central governments, credit institutions and large corporate portfolio exposures, however, generally show so few defaults that historical data may not provide statistically significant differentiation between different portfolio credit risks[13]. 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 of the nature of the actual exposures) also allows a comparison of loss given default (LGD). This way, the exposures are as comparable as possible with respect to their credit risk.

Since the LDP, and in particular the subset of common obligors used in section 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.

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[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] Global charge is computed as (12.5 * EL + RWA)/EAD for IRB exposures, (12.5 * provisions + RWA)/(Exposure value + provision) for SA defaulted exposures, and (RWA/exposure value) for SA non-defaulted exposures.

[11] As explained on page 18 of this report.

[12] Difference in the portion of exposure classes treated under SA and IRB approaches.

[13] Due to low PD estimates in LDPs for non-defaulted assets, the influence of every default on the GC could be relatively large.

BOX 1: Data availability and quality constraints

The present supervisory benchmarking exercise is based on information collected for the low-default portfolios (LDPs) of 41 institutions. Data requirements were set based on draft implementing technical standards (ITS) on supervisory benchmarking portfolios which were submitted by the EBA to the European Commission under the mandate of Article 78 of Directive 2013/36/EU (CRD IV). Although not adopted yet, these standards imply that the first official benchmarking data will be collected in 2016 for Q4 2015 reference date.

Essentially, two types of constraints have arisen during the present benchmarking exercise: (i) unavailability of data due to initial absence from the reporting requirements and (ii) unavailability of data due to incomplete submissions or poor quality reporting/implausible figures for which no data improvements have been received:

i. Absence of reporting requirements
    a. An example of not included reporting requirements is the lack of granularity at the total LDP exposures level, namely regarding the regulatory approach field for which the data compiler cannot distinguish accurately the relevance of each regulatory approach (AIRB/FIRB) for different institutions. This is not only true for each exposure class comprised in the LDP (weight of the declared regulatory approach could range from 51% to 100%, thus possibly providing misleading interpretations at the risk parameters level), but also for the facility type, collateralisation status and collateral type breakdowns.
ii. Data unavailability due to incomplete submissions or poor quality reporting/implausible figures
    a. In some cases, data submissions were provided on a best-efforts basis; for instance, Standardised Approach information, which is currently not required to be systematically calculated by all institutions for exposures for which IRB permission has been granted, but which was provided by many institutions using proxies.
    b. Data quality issues have been also found in regard to collateral information, namely on valuation and categorisation. Ultimately, this hampered the ability to draw definite conclusions about the amount of risk-weighted assets variability explained by this dimension. Some institutions advised that their internal collateral data collection systems were currently under improvement at the IT infrastructure and database level and so this is expected to improve in the future.
    c. Albeit a topic of ongoing debate and regulatory proposals, different practices across jurisdictions and institutions for defaulted or nearly defaulted assets contribute, directly and indirectly, to an increased variability of risk-weighted assets.
    d. It was not always possible for institutions to map their clients unambiguously to the Legal Entity Identifier because it is not fully integrated in institutions' IT systems. Therefore, a potential mismatch could be a source of differences.

It is worth noting that reporting requirements under the ITS on supervisory benchmarking are set for 2015 onwards and will remain unchanged until these standards are eventually reviewed. Until then, additional data requirements will not be incorporated into the same reporting framework. Any analysis that requires information not defined in the draft ITS submitted to the European Commission will thus not be possible to perform, at least in a regular and comparable way.

4. Portfolio composition and characteristics of participating institutions

This section 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 RWA differences.

Use of regulatory approaches

Institutions were invited to participate if they used the IRB Approach for at least one of the LDPs. Figure 1 provides an overview of the usage of regulatory approaches to calculate capital requirements for the portfolios under investigation. For the 'credit institutions' portfolio, 30 institutions reported exposures. Of these 30 institutions, 13 institutions predominantly use the Advance IRB approach (i.e. at least 50% of the exposures within a given portfolio are calculated using this approach), 12 institutions the Foundation IRB approach and five institutions do not report any approach being used predominantly. Compared with previous studies, the number of institutions using the IRB Approach for large corporates and institutions is almost identical. However, as regards the sovereign portfolio the number of institutions applying the IRB Approach has increased.

Figure 1: Overview of regulatory approaches by portfolio

Number of banks by regulatory approach and by portfolio					
Bank's Low Default Portfolio		Mainly following one approach		Mixed approach	Number of banks that submitted figures
Portfolio	Sector	AIRB	FIRB	FIRB and AIRB	
Institutions	Credit institutions	13	12	5	30
	Other financial corporations	10	9	3	22
Large corporate	Large corporate	20	10	10	40
Sovereign	Central banks and central governments	14	8	2	24

Of the participating total of 41 institutions, 40 institutions use an IRB approach to calculate capital requirements for their large corporate portfolio. One institution uses the IRB approach for institutions and sovereigns but not for large corporates. In general, more institutions that participated in this study use the Advanced IRB Approach than the Foundation IRB approach. This more widespread usage of the Advanced IRB Approach is particularly relevant for the large corporate portfolio. Most institutions do not use the IRB Approach for all exposures in a given portfolio. Some institutions use different approaches within a given portfolio[14]. For example, for the Large Corporate portfolio 15 institutions applied more than one approach, while for the Institutions and the Sovereign portfolios seven and five institutions applied more than one approach. No detailed information was made available via LDP data collections on the use of the

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[14] Some institutions also apply different approaches to exposures to the same obligor (e.g. in case of different permissions to use internal approaches in different countries).

Standardised Approach and COREP figures were not available at the EBA for all participating institutions.

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. Institutions that did not report exposures for certain portfolios were excluded from the respective analysis of those portfolios.

Figure 2 shows the relative EAD-weighted shares of the different portfolio types as reported by the participating institutions for this LDP exercise. In line with Figure 1, it shows that all but one institution use the IRB approach for large corporates and that several institutions use the IRB approach for large corporates exclusively. For example, the LDP of Bank 1 is composed of 14% large corporate, 19% institutions and 67% sovereign exposures.

Figure 2: Portfolio composition of the LDPs of participating institutions
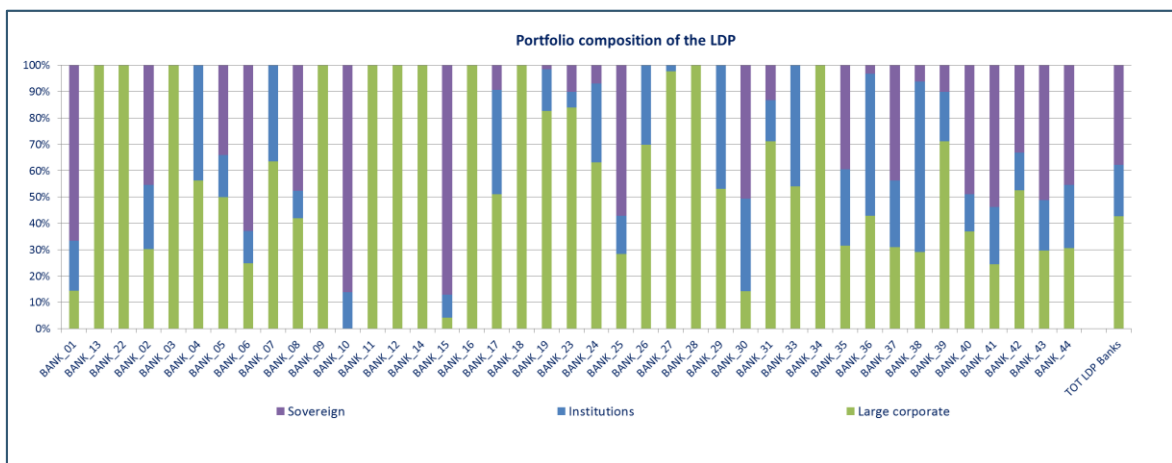

For all participating institutions the average portfolio consists of 43% large corporates, 19% institutions and 38% sovereign exposures. The findings of this report are valid for LDPs only and cannot be generalised to other portfolios. Therefore, it is important to assess the representativeness of LDPs as a share of the institutions' total IRB credit portfolios. It is worth noting that for some institutions IRB exposures may only represent a small portion of the total LDP exposures, as is often the case for sovereign exposures.

Figure 3 shows the relative EAD-weighted shares of the different portfolio types for the 41 institutions in the sample, comparing data submitted for the LDP exercise with COREP data as of 30 June 2014. Institutions that did not provide COREP data or institutions that did not pass quality checks were excluded from the comparisons with COREP. For example, exposures submitted for the LDP exercise by Bank 2 represent 31% of its total credit risk portfolio under the IRB approach. Exposures not submitted for this LDP study include retail exposures and corporate exposures other than large corporate exposures.

Figure 3: LDP compared with total IRB portfolio

LDP compared to total IRB portfolio
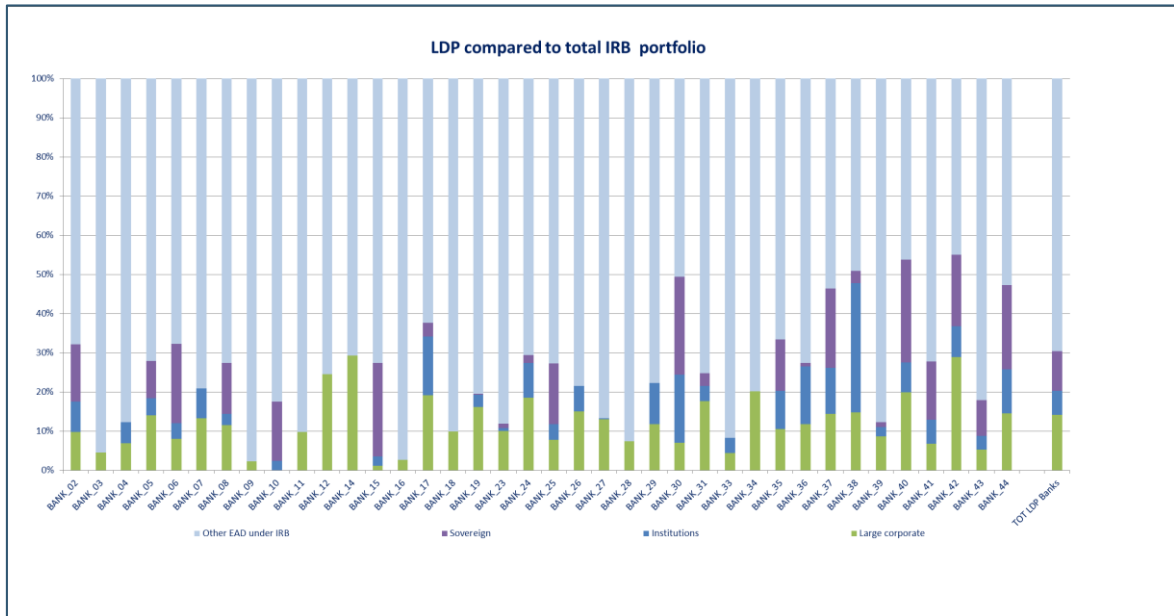
The share of the overall IRB LDP (sovereign, institutions, large corporate) compared with institutions' total IRB credit risk portfolio differs considerably between institutions (from less than 3% to almost 56%). On average about one-third of institutions' total IRB portfolios was analysed as part of the top-down analyses of this LDP exercise.

For the analysis of IRB parameters for common portfolios a smaller data set is used, representing exposures towards a predefined list of 1810 obligors consisting of 1647 large corporates, 102 institutions and 61 sovereigns. Data used for the common portfolio analysis represent a much smaller share (on average 9% in terms of EAD) of the institutions' total IRB credit risk portfolio.

Figure 4: LDP common obligors compared with total IRB portfolio

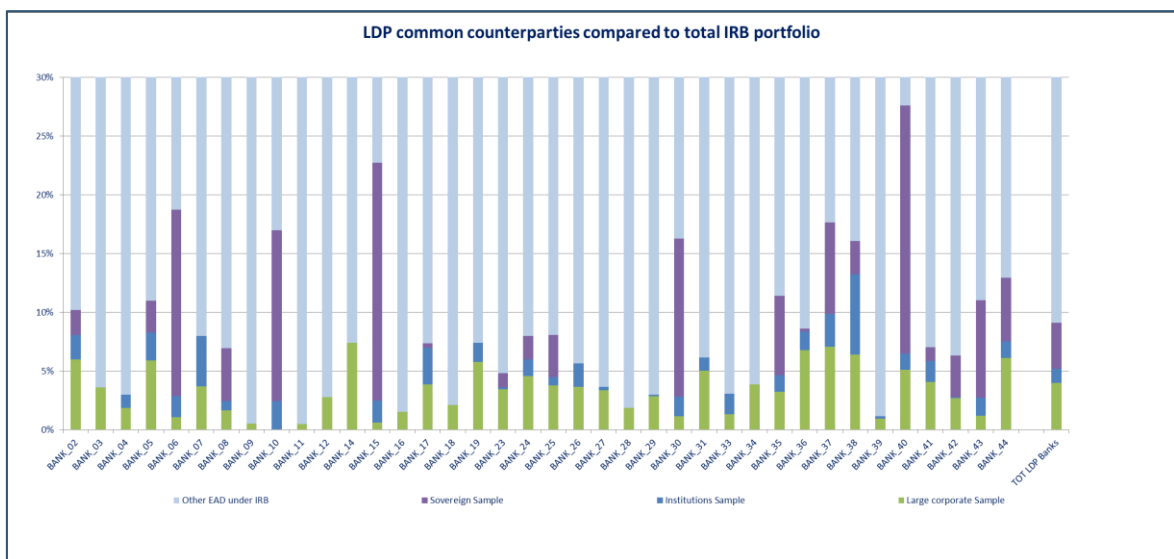LDP common counterparties compared to total IRB portfolio

Figure 4 shows that differences among institutions are significant and some institutions pointed out during interviews that the data used for common portfolio analysis are representative of neither their total LDP nor their total IRB credit risk portfolio.

5. Top-down analysis of the LDP

This section aims to determine and analyse the drivers behind RWA differences across the participating institutions. The top-down approach used shows the extent to which the riskiness of institutions' portfolios as well as portfolio composition contribute to differences in RWA. However, a top-down approach cannot fully clarify how much of those differences stems from individual practices, interpretations of regulatory requirements or modelling choices.

Figure 5 shows the GC and RW for the total LDP. The average RW per institution varies from 6% to 96% with an average RW of 36% across the sample. This compares to 35% reported in the August 2013 LDP study.

Figure 5: GC and RW of the total LDP
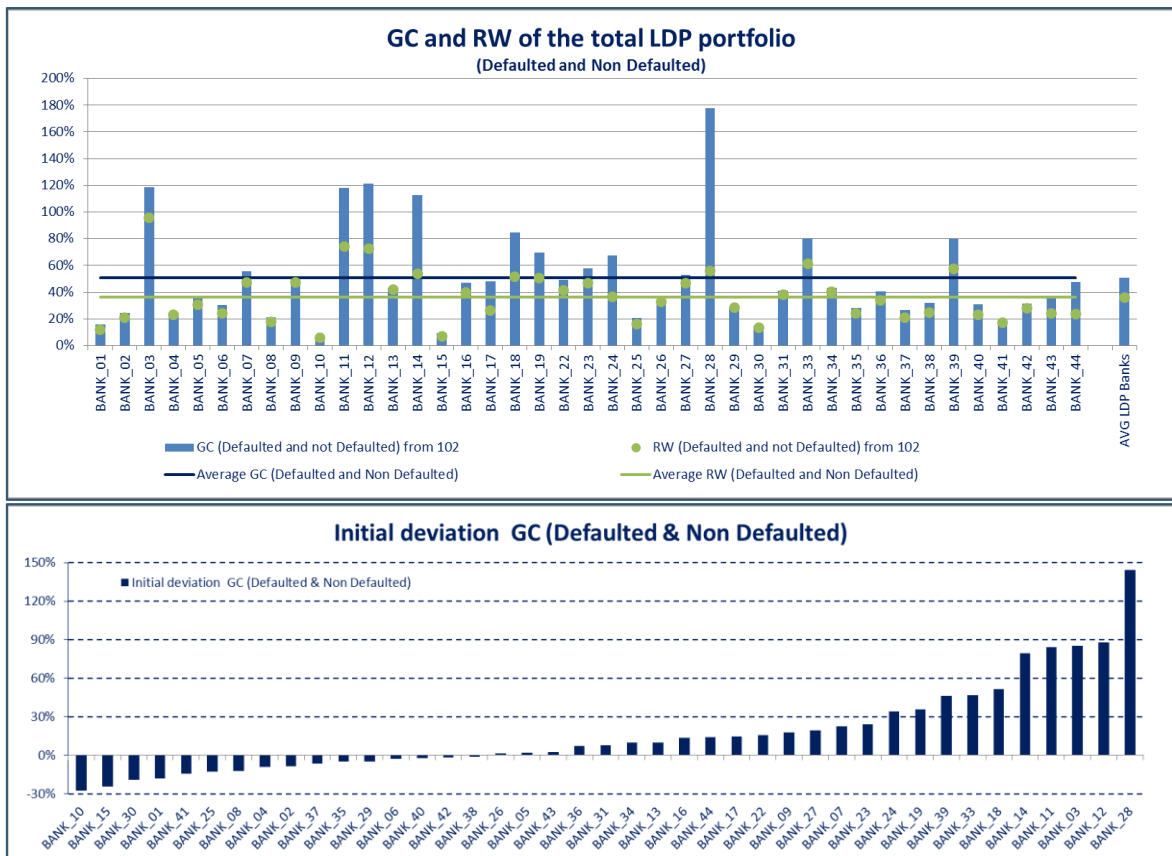
GC levels deviate significantly from the average GC for the participating institutions (33.4% computed using a composite institution approach[15] and 50.6% if computed as simple average), with GC deviations ranging from –27% to +144% compared with the average GC level of 33.4%. This compares to an average GC of 53% (simple average) reported in the August 2013 LDP study.

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[15] This means that data from all institutions were pooled as if there were only one single institution.

The standard deviation of the GC is 36%, which compares to 25% reported in the August 2013 LDP study; the difference can mostly be explained by changes in the sample of participating institutions and changes in the scope of data used. The initial GC standard deviation is set at 100 to create a standard deviation index in the analysis below.

Drivers of differences in GC and RW

The methodology for identifying drivers of GC and RW differences is the same as in the first EBA interim report. Differences in GC are classified as those stemming from structure and composition (A-type differences) and those related to IRB risk parameters (B-type differences).

Drivers could relate to differences in the characteristics of the exposures themselves or of credit risk management strategies between institutions, or to differences in supervisory practices and institutions' modelling practices. Applying a similar approach used in earlier studies allows the detection of A-type differences in GC across the institutions in the sample and, by doing so, isolates the so called B-type differences.

A-type differences include the following:

- different shares of defaulted exposure;
- different GC related to defaulted exposure;
- different relative shares of exposure classes ('portfolio mix effect').

Note that, due to a different data collection, it was not possible to compute the IRB roll-out effect and the SA GC effect in this year's exercise. This was because the data collection focused on exposures rated under an IRB approach and did not request information of exposures rated under the SA (either on a roll-out plan or under the Permanent Partial Use allowance). Future data collections will be based on the ITS on supervisory benchmarking and hence will allow for comparisons over time.

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 for non-defaulted IRB assets, credit risk mitigation (i.e. the business and risk strategy of the institutions) and the IRB risk parameters estimation (e.g. institution and supervisory practices).
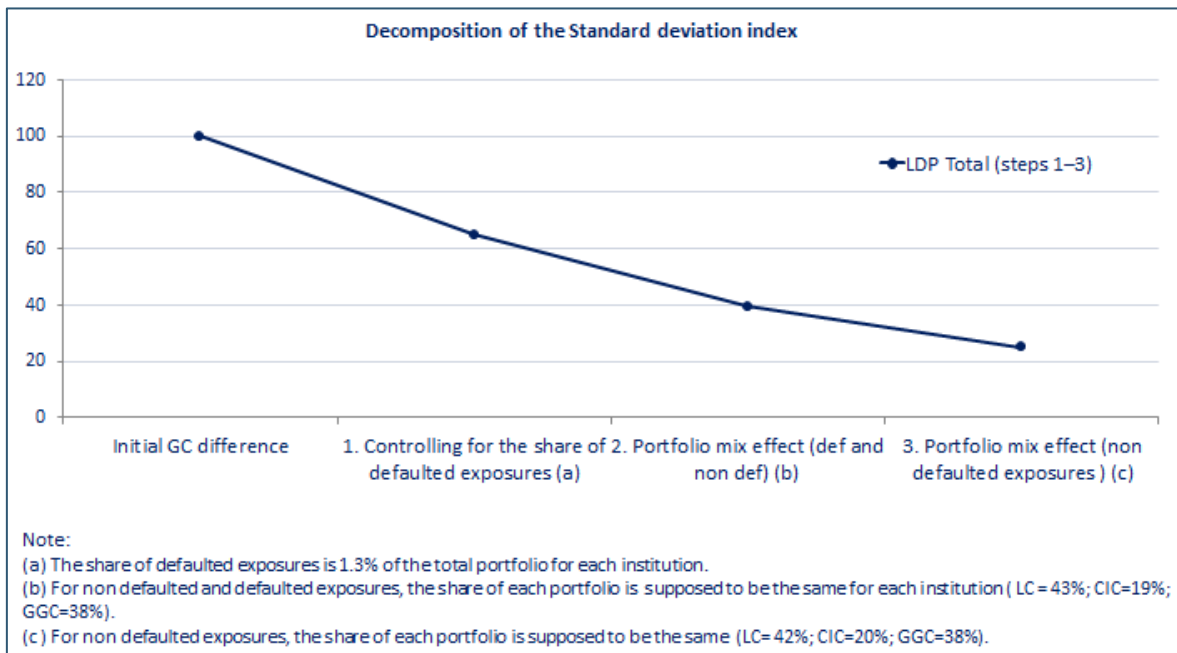
Each institution's initial GC deviation from the benchmark (EAD-weighted average) GC is broken down successively in order to identify the drivers of A-type differences: the share of defaulted assets, the global charge due to defaulted assets and the portfolio mix (see Figure 6). Each successive breakdown controls for a certain driver of A-type differences. After isolating all A-type differences, we are able to identify the B-type differences.

Figure 6 shows that A-type drivers explain around 75% of GC variability observed in the data, which can be mainly explained by the different share of the defaulted assets and by the portfolio mix effect[16].

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[16] The contribution of the individual A-type driver also depends on the decomposition order.

Figure 6: Decomposition of the standard deviation index

Decomposition of the Standard deviation index

— LDP Total (steps 1–3)

Categories (x-axis): Initial GC difference; 1. Controlling for the share of defaulted exposures (a); 2. Portfolio mix effect (def and non def) (b); 3. Portfolio mix effect (non defaulted exposures) (c)

Note:
(a) The share of defaulted exposures is 1.3% of the total portfolio for each institution.
(b) For non defaulted and defaulted exposures, the share of each portfolio is supposed to be the same for each institution (LC = 43%; CIC=19%; GGC=38%).
(c) For non defaulted exposures, the share of each portfolio is supposed to be the same (LC= 42%; CIC=20%; GGC=38%).

This result is not fully in line with previous findings, which pointed towards 50% of the GC deviation being explained by A-type drivers. However, as previously noted, differences in the data collected in the current and previous exercises make direct comparisons between the studies difficult. In particular, the initial GC difference was computed taking into account only IRB LDPs – excluding exposures rated under PPU of the SA. Moreover, the exclusion of other – non-low-default – corporates from this year's data collection further complicates the comparisons. These differences from previous studies might lead to the portfolio mix effect being exacerbated if compared with findings of previous studies and the proportion of variability explained by this driver might be overestimated.

Figure 7 shows the GC deviation for each portfolio separately with the initial GC deviation calculated taking into account total IRB LDP exposures at portfolio level.

Figure 7: Decomposition of the Standard deviation index by portfolio
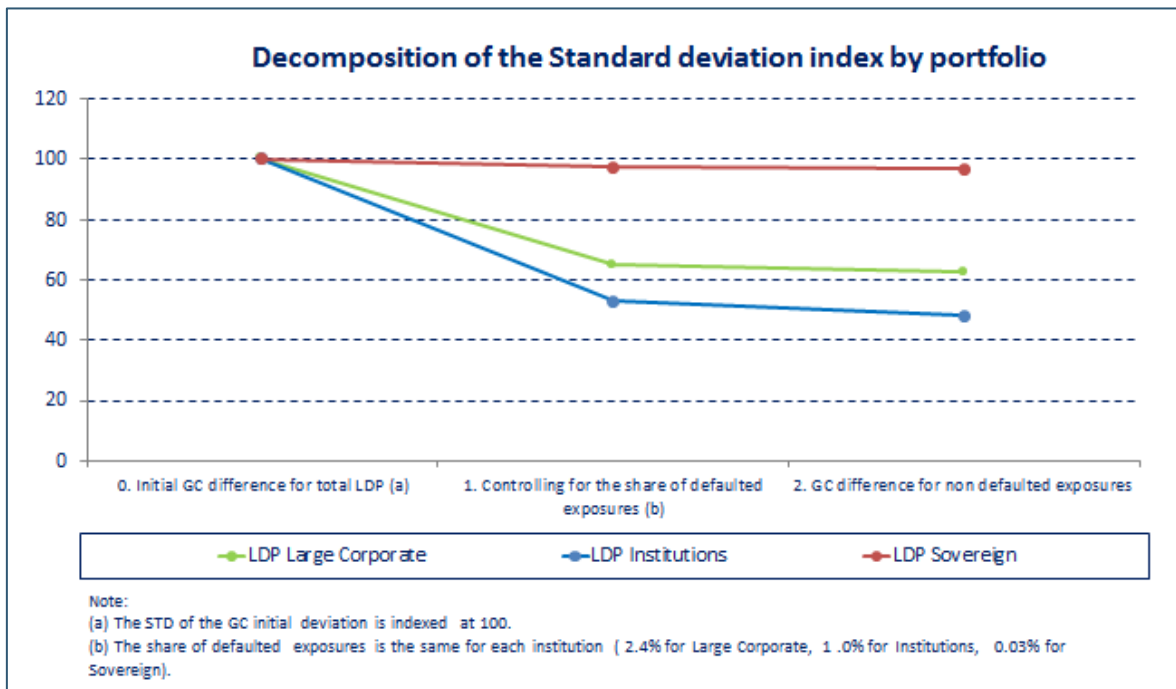
This analysis shows that, while the impact of defaulted exposures can explain around 50% of the GC differences for the institutions portfolio and 40% for the Large Corporate, the remaining difference may be due to differences in bank-specific factors, such as risk management practices or the IRB risk parameters.

As shown in Figure 8, the remaining deviations at total LDP level mostly stem from the large corporate portfolio. While 14 institutions show RW deviations of 5% or more for the large corporate portfolio, only one institution shows a RW deviation of 5% or more for the sovereign portfolio (Bank 19). Given that deviations are more common for the large corporate portfolio, the analysis of IRB parameters for common obligors focuses predominantly on the large corporate portfolio. Figure 8 also shows that there can be compensation effects between portfolios. For example, Bank 10 shows a RW deviation of +2.6% for its institutions portfolio, which is partly offset by a RW deviation of -1.8% for its sovereign portfolio.

Figure 8: Remaining RW deviation by portfolio (order by GC at total level)
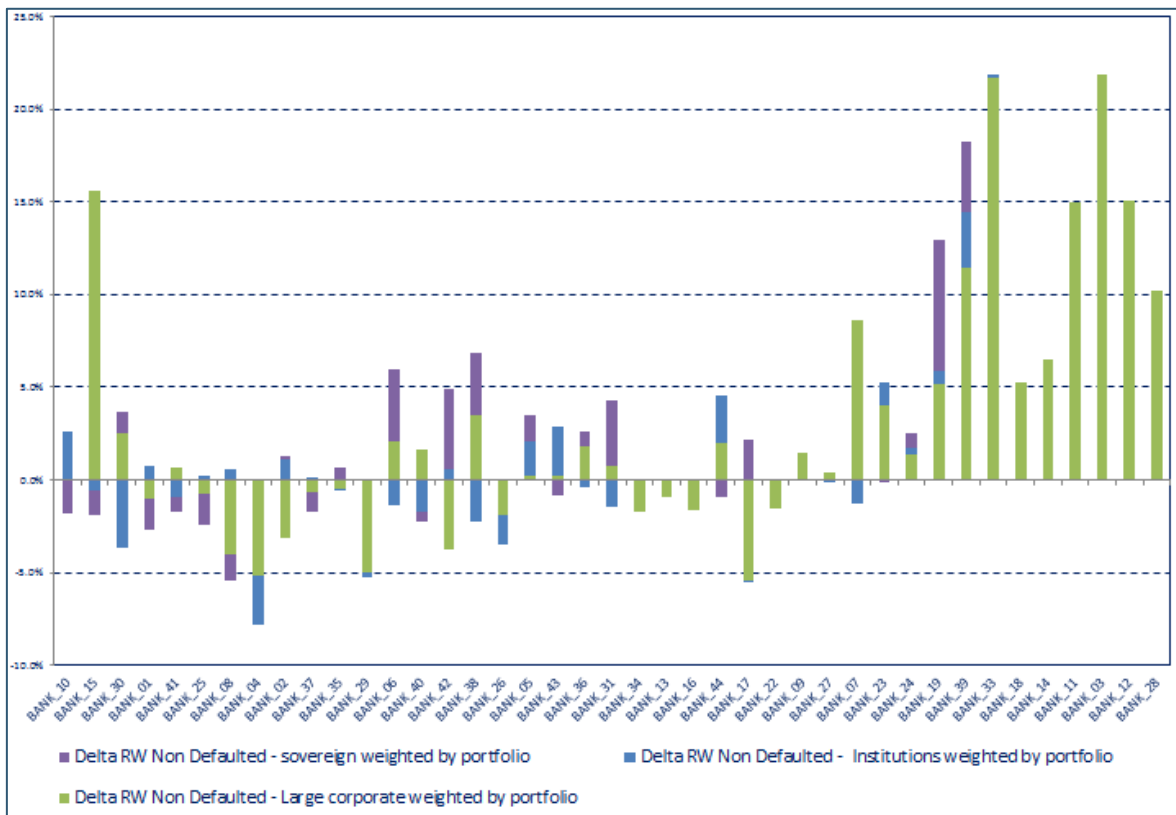
Defaulted exposures in the LDP

One of the main A-type drivers of GC variation shown in Figure 6 is found to be 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 might need to be excluded from in-depth analysis of IRB parameters (as performed in section 6).

Across all participating institutions, on average 2.3% (simple average) of the total EAD for the LDP is in default (1.3% using an exposure-weighted average). Figure 9 shows that, within the LDP, most of the defaulted exposures (84% of total defaulted exposures) stem as expected from the large corporate portfolio. On average 3% of the total LDP is reported as defaulted within the large corporate portfolio while defaulted exposures within the Institutions portfolio amount to 1% of total LDP. The differences among participating institutions, however, are very high, with the share of defaulted exposures within the large corporate portfolio ranging from 0% to 18%, indicating potential differences in credit policies and workout processes across participating institutions as well as different economic conditions for participating institutions. This can also suggest that the definition of large corporate used for this exercise might require some fine-tuning.

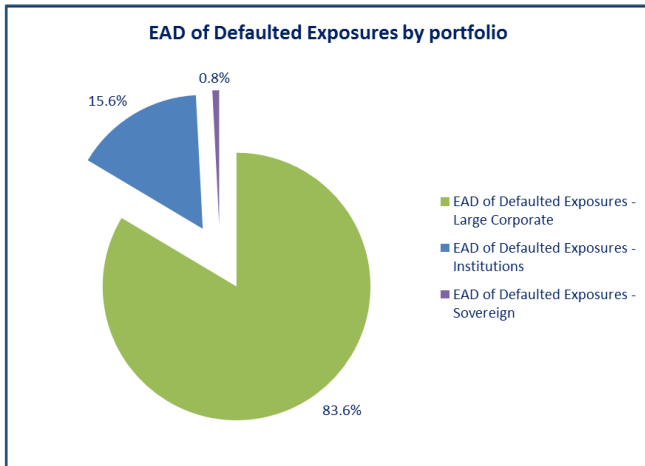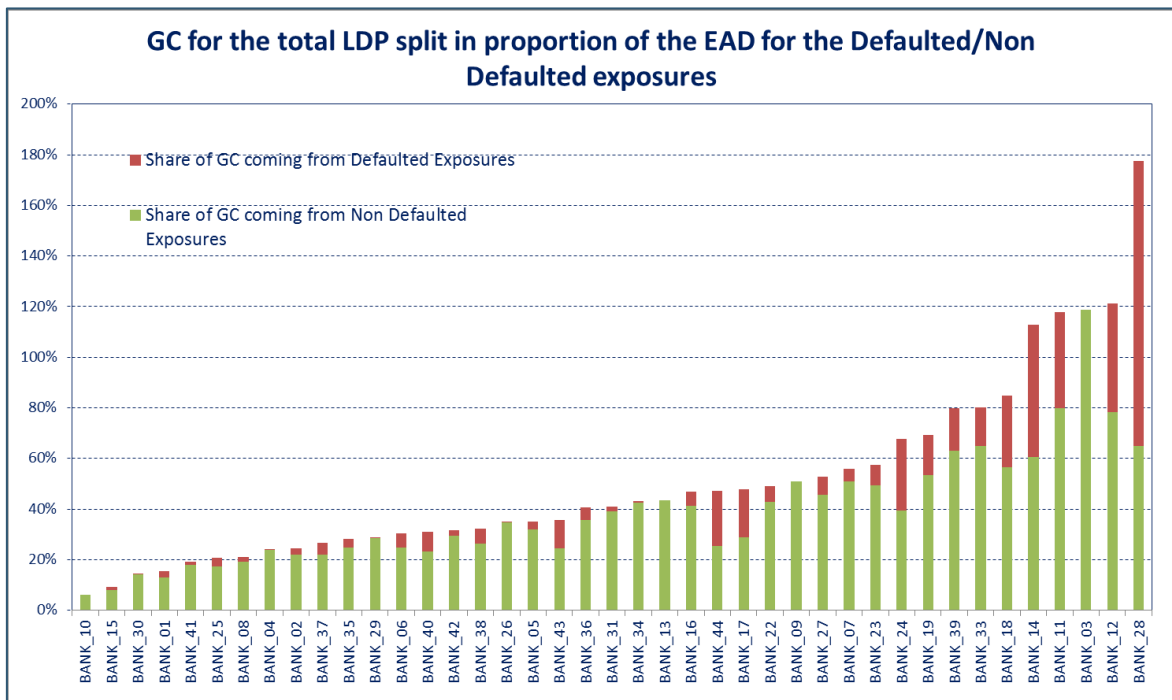**Figure 9: Defaulted exposures by portfolio**

Figure 10 shows the impact of defaulted exposures on GC levels and highlights significant differences across institutions, a finding which is in line with Figure 6 above[17]. For example, Bank 24 has a GC of close to 68%, of which approximately two-thirds is due to non-defaulted exposures[18].

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[17] The allocation of the share between the portfolios is directly proportional to the global charge amount (GC * EAD) of the related portfolio.

[18] The impact was calculated using GC amount figures (GCA) and applying the following formula: GCA(Defaulted)/GCA(Total portfolio) * GC(Total portfolio).

Figure 10: GC contribution from defaulted exposures (order by GC at total level)

As can be seen, Bank 28 exhibits a high proportion of IRB GC from defaulted exposures, relative to other institutions in the benchmark sample. This can be explained by a deterioration in credit quality of the institution's credit portfolio. Bank 3 did not report any defaulted exposures in the LDP, mainly explained by the low number of Large Corporates with annual turnover exceeding EUR 200 million in its portfolio (definition of Large Corporates for the purpose of this exercise).

For defaulted exposures in the large corporate portfolio, the discrepancy in terms of RW is very high among institutions, with RW ranging from close to zero to above 200% and an average RW of 63%. As highlighted in previous reports 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 the low default portfolios are characterised by the coexistence of the 'unlikely to pay' criterion and close monitoring of the obligors belonging to a warning list, which may create dispersion. Regulatory Technical Standards on a materiality threshold of credit obligations past due are being developed by the EBA and should guide institutions to assess the materiality of their past due credit obligations, so that the occurrence of default can be defined in a more harmonised manner across the EU.

Also, discrepancies were found in the treatment of defaulted assets, mostly around the estimation of LGD in-default and best estimate of expected loss. Few institutions reported 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[19]. Additionally, it has to be noted that FIRB institutions do not compute RWAs on defaulted assets in accordance with Article 153(1)(ii) CRD, further increasing the difficulties of a uniform comparison.

## Portfolio composition of non-defaulted exposures in the LDP

After controlling for differences caused by defaulted exposures in the LDP, the next A-type difference shown in Figure 6 above is portfolio composition. Figure 11 shows the average RW for each institution and each portfolio for non-defaulted exposures. It shows that the benchmark median RW for the non-defaulted large corporate portfolio was 47%, the benchmark median RW for the non-defaulted institutions portfolio was 26% and the benchmark median RW for the non-defaulted sovereign portfolio was 6%. This means that institutions with different compositions of their overall portfolios will necessarily calculate different overall RWs according to their portfolio mix.

Note that because non-defaulted exposures' EL and RW are functions of the same 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 the comparison does not take into account any supervisory corrective actions aimed at increasing RW to correct any model deficiencies which were imposed by some competent authorities on institutions' models.

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[19] These findings are in line with findings put forward in a discussion paper on improvements to the IRB regulatory framework, published on the EBA website in March 2015 (http://www.eba.europa.eu/-/eba-puts-forward-preliminary-proposals-to-improve-the-irb-regulatory-framework).

Figure 11: Average RW by portfolio, non-defaulted exposures
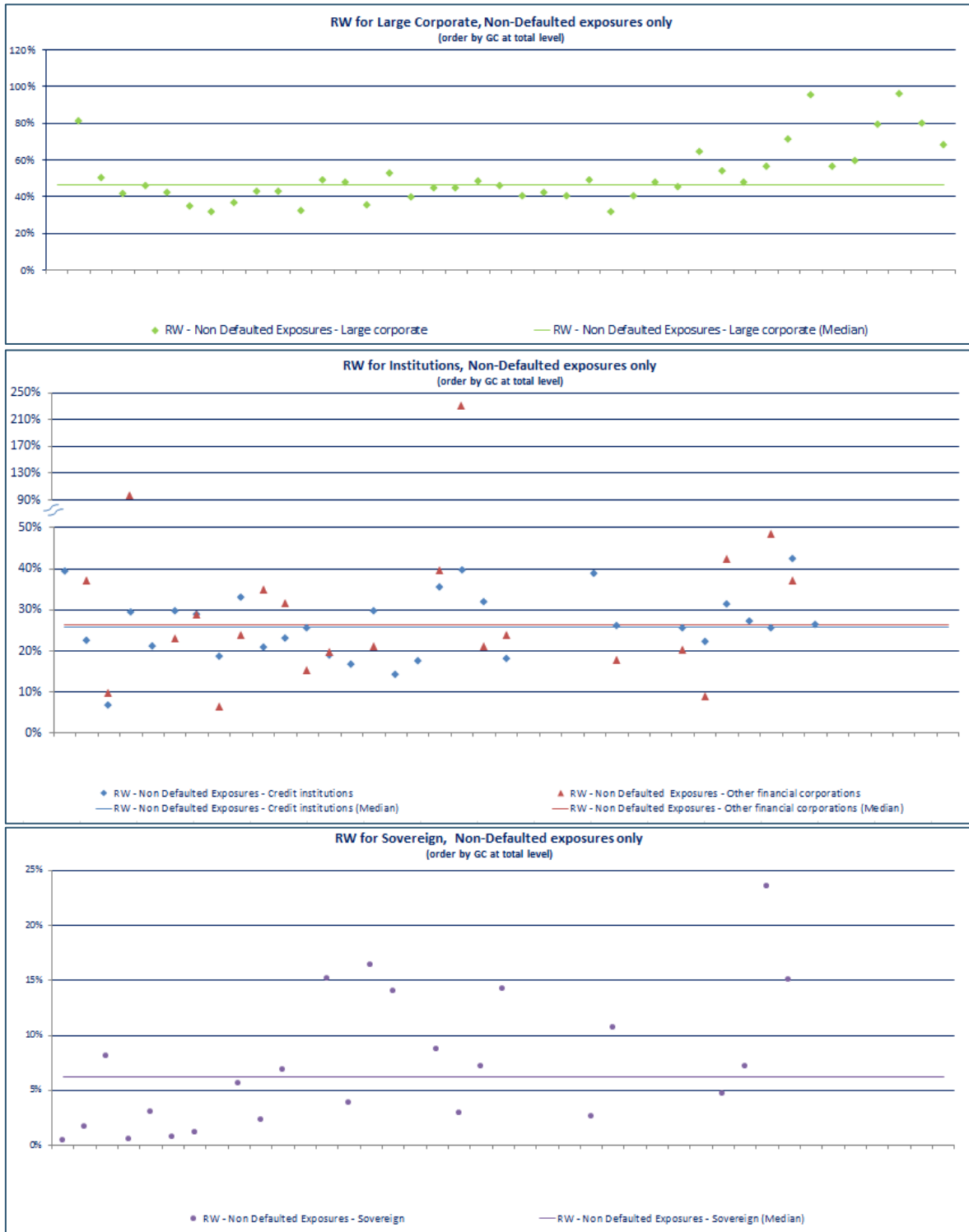
B-type drivers of differences in RW: Facility type analysis

A-type drivers can explain a material part of the variation observed between institutions' LDPs. The remaining deviation can be analysed using information collected at facility type level. This can be useful to understand whether or not collateral type is a determinant for differences. During interviews with some institutions, collateral was mentioned as one of the main drivers. However, as found during interviews with participating institutions, not all institutions use collateral information homogeneously as input to their models. Indeed, Figure 12 shows significant dispersion among institutions also after controlling for facility types. Exposures with eligible financial collateral and exposures with funded credit protection show the lowest RW levels, with median RW levels of 15% and 27%, respectively.

Figure 12: RW volatility by facility type buckets for the drawn portfolios of the large corporate
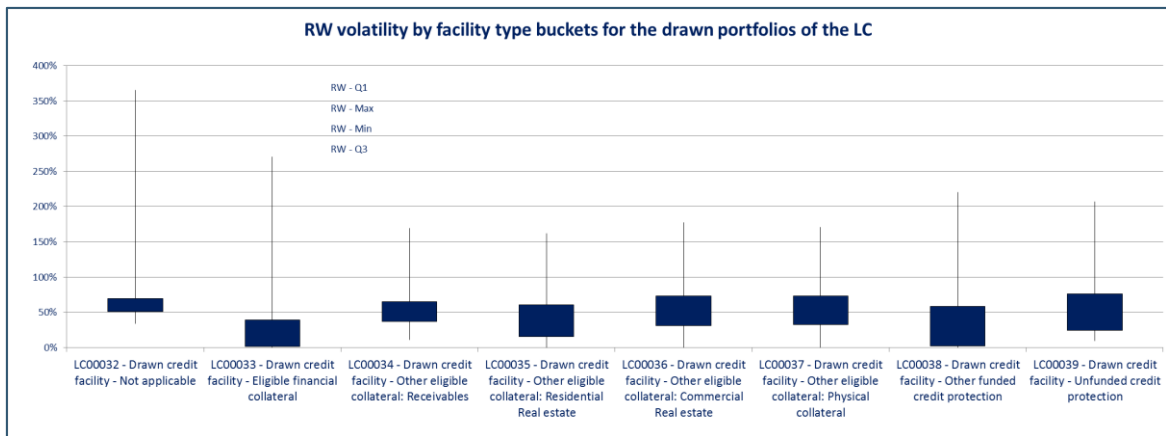

Figure 13: RW volatility by facility type buckets for the undrawn portfolios of the large corporate
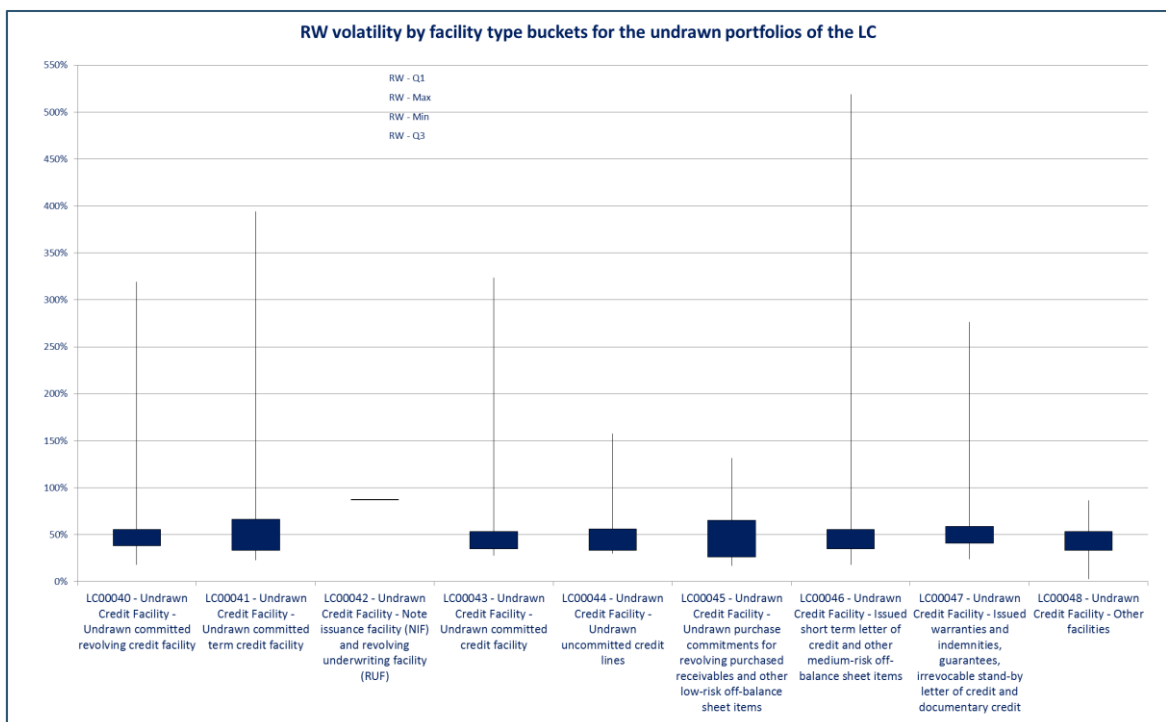
Figure 13 shows the RW deviation for undrawn credit facilities. Compared with drawn credit facilities, the dispersion among institutions and facility types is not as high for undrawn credit facilities. There are a few outliers, which may be due to data quality issues.

However, information by facility type should be interpreted with care, as data quality or availability seems to be an issue. Many institutions mentioned during the data collection phase of this exercise that this has been one of the most challenging data requests for the institutions. Several institutions did not report figures at all because of IT or resourcing issues. Further investigations around collateral and facility type will be made possible by enhanced data collections in future benchmarking exercises under the ITS on supervisory benchmarking.

6. Analysis of IRB parameters for common obligors

The purpose of this analysis is to compare institutions' IRB parameters for a common set of exposures and, by doing so, to try to explain the remaining B-type differences.

Participating institutions were instructed to provide risk parameters for a predefined list of obligors. This list of obligors is composed of 61 central governments, 102 institutions and 1647 large corporates[20]. Obligors were identified using the Legal Entity Identifier (LEI)[21] as a unique and internationally accepted identifier.

The analysis was carried out excluding the obligors that were reported as defaulted by at least one institution or those obligors with fewer than four institutions reporting actual exposure values. While 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 14 obligors.

This allowed a direct comparison of the IRB parameters and resulting RW on a set of identical real common obligors, even if real exposures might differ due to different CRM techniques and/or collateralisation schemes. The RW deviation for each institution compared with a benchmark can be calculated for creating a better understanding of the different drivers. The benchmark used is the median of the RW assigned by other institutions applying the same regulatory approach (RA) to that particular obligor (the value of the examined institution is excluded from the computation of the median). Hence an obligor under FIRB is compared with its FIRB benchmark and an obligor under AIRB with its AIRB benchmark. For each institution and each of its obligors, the deviation from the benchmark is computed and the findings for each institution are summarised, computing a simple average deviation for all obligors reported by a given institution.

In order to isolate the impact of each IRB parameter, we recalculate the RWs, at obligor level, using different combinations of actual and benchmark parameters. Hence, by replacing a given institution's risk parameter with a benchmark parameter (median risk parameter of the other institutions) we can disentangle the different effects of each parameter.

One limitation in this approach is that it does not take into account regulatory adjustments currently in place at RWA level. Hence, for some institutions in jurisdictions where such adjustments are in place, the recomputed RWA are not directly comparable with the RWA actually held and/or reported by the Institutions.

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

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[20] For this LDP study, large corporates were defined as firms with annual sales exceeding EUR 200 million.

[21] 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.

- 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 benchmarking values (median PD of peers' real PD and median LGD of peers' real LGD) and the maturity fixed at 2.5 years [Dev1 := RiskWeight(M, pd, LGD) - RiskWeight(M=2.5, b_pd, b_LGD)[22]]. 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 they are compared with RWs computed with the benchmarking values (median PD of peers' real 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 benchmarking 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 benchmarking 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)].

As a next step, the RW deviation after neutralising maturity has been calculated:

- Deviation 2 represents the **RW deviation after neutralising maturity**. RW computed with the real PD and LGD but maturity fixed at 2.5 years are compared with RW computed with the benchmarking values (median PD of peers' real PD and median LGD of peers' real LGD) [Dev2: = RiskWeight(M=2.5, pd, LGD) - RiskWeight(M=2.5, b_pd, b_LGD)]. This is only reported in Annex 2.

Since the real LGD estimated by the bank is used in the computation of these differences, the LGD effect also includes the impact of Credit Risk Mitigation (CRM). Therefore, the analysis has been repeated using the hypothetical LGD, where the values were provided assuming that the exposure to a given obligor was a senior unsecured exposure.

- Deviation 3 represents the **combined PD and hypothetical LGD effect**. RW are computed with the maturity fixed at 2.5 and the hypothetical senior unsecured LGD reported by the institution [Dev3: = RiskWeight(M=2.5, pd, Hyp_LGD_unsec) - RiskWeight(M=2.5, b_pd , b_Hyp_LGD_unsec)]. The difference between deviation 2 and 3 provides an indication of the CRM effect.
- Deviation 4 represents the **PD effect**. RW are computed with maturity fixed at 2.5 and LGD fixed at benchmark values [Dev4: = RiskWeight(M=2.5, pd, b_Hyp_LGD_unsec) - RiskWeight(M=2.5, b_pd, b_Hyp_LGD_unsec)].

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

- Deviation 5 represents the **hypothetical LGD effect**. RW 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 a hypothetical LGD effect, since collateralisation is not taken into account in order to achieve a uniform comparison.

Deviations 1 to 4 are analysed for obligors under both approaches (AIRB and the FIRB) while deviation 5 (the hypothetical LGD effect) is obviously 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. A separate analysis of obligors under the FIRB Approach 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

The analysis of IRB parameters for a common set of exposures in the large corporate portfolio was the focus of this year's LDP exercise due to the relative significance of this portfolio in terms of risk and its material contribution to RWA deviation. Hence, this section of the report is more extensive than the sections on institutions and sovereign portfolios.

An analysis of the volatility of the different deviations (see Figure 14) reveals that interquartile differences under the AIRB Approach are slightly lower than those under the FIRB Approach and that FIRB institutions tend to exhibit greater negative deviations to benchmark levels. However, more negative outliers can be observed under the AIRB Approach than under the FIRB Approach (positive outliers could bias the benchmark towards a higher level, implying that many of the FIRB institutions seem to be below the benchmark).

Figure 14: Dispersion of RW deviations (obligors separated by regulatory approach) – Large Corporate
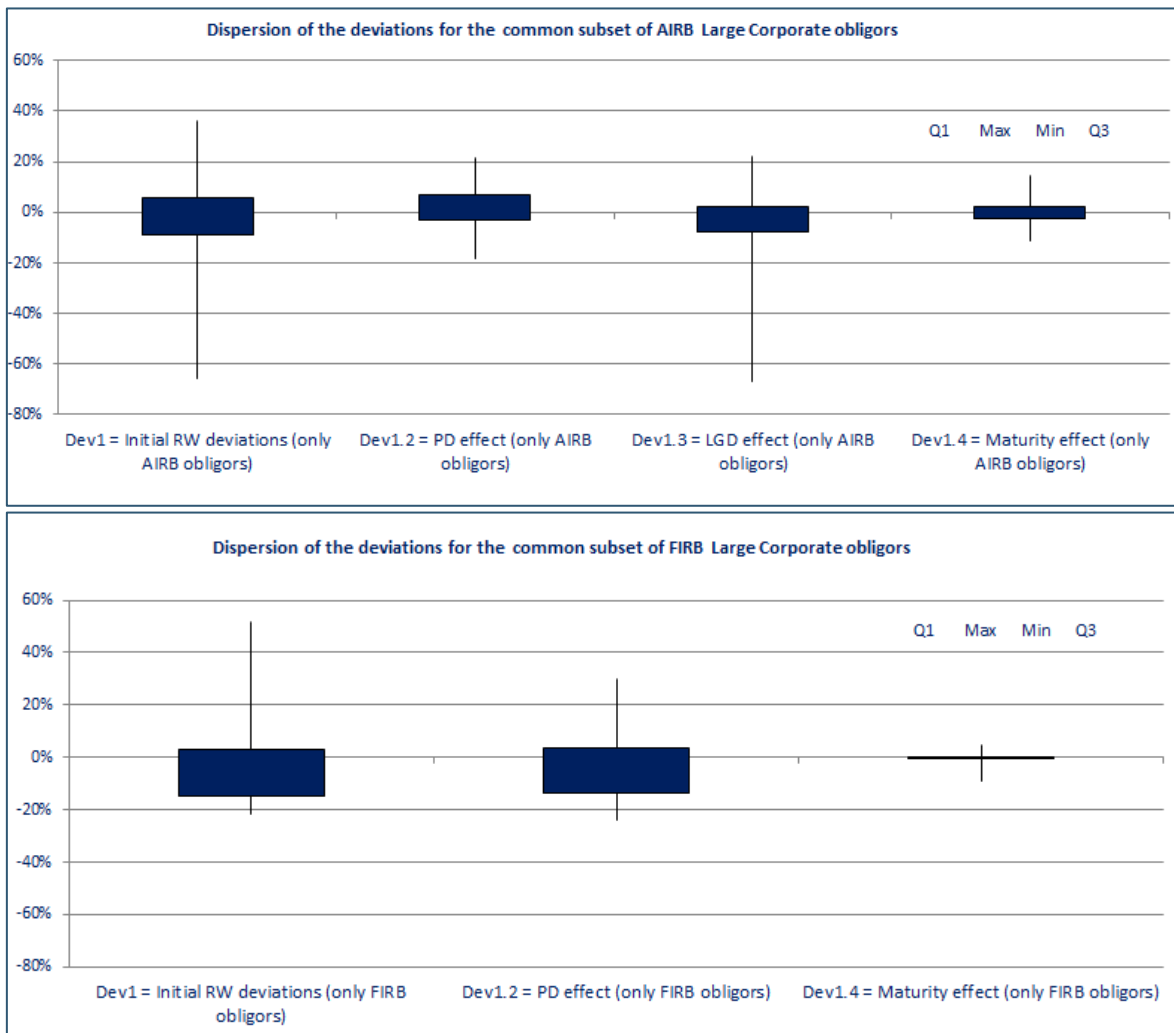

Figure 14 also suggests that the difference between real PD values used and the benchmark PD values (Dev1.2), which represents a proxy for the impact on RWA, is greater for obligors under the FIRB Approach than for those under the AIRB Approach. For AIRB banks, the LGD effect is higher than the PD effect and also shows greater dispersion across banks.

The maturity effect (Dev1.4) makes a significant difference for a limited number of institutions, while for the majority of institutions no material impact arises. Only few FIRB institutions seem to use the effective maturity instead of the 2.5 FIRB maturity, which explains the very limited maturity effect for those institutions.

Figure 15: RW Deviations 1, 1.2, 1.3, 1.4 for large corporates (AIRB and FIRB separate)
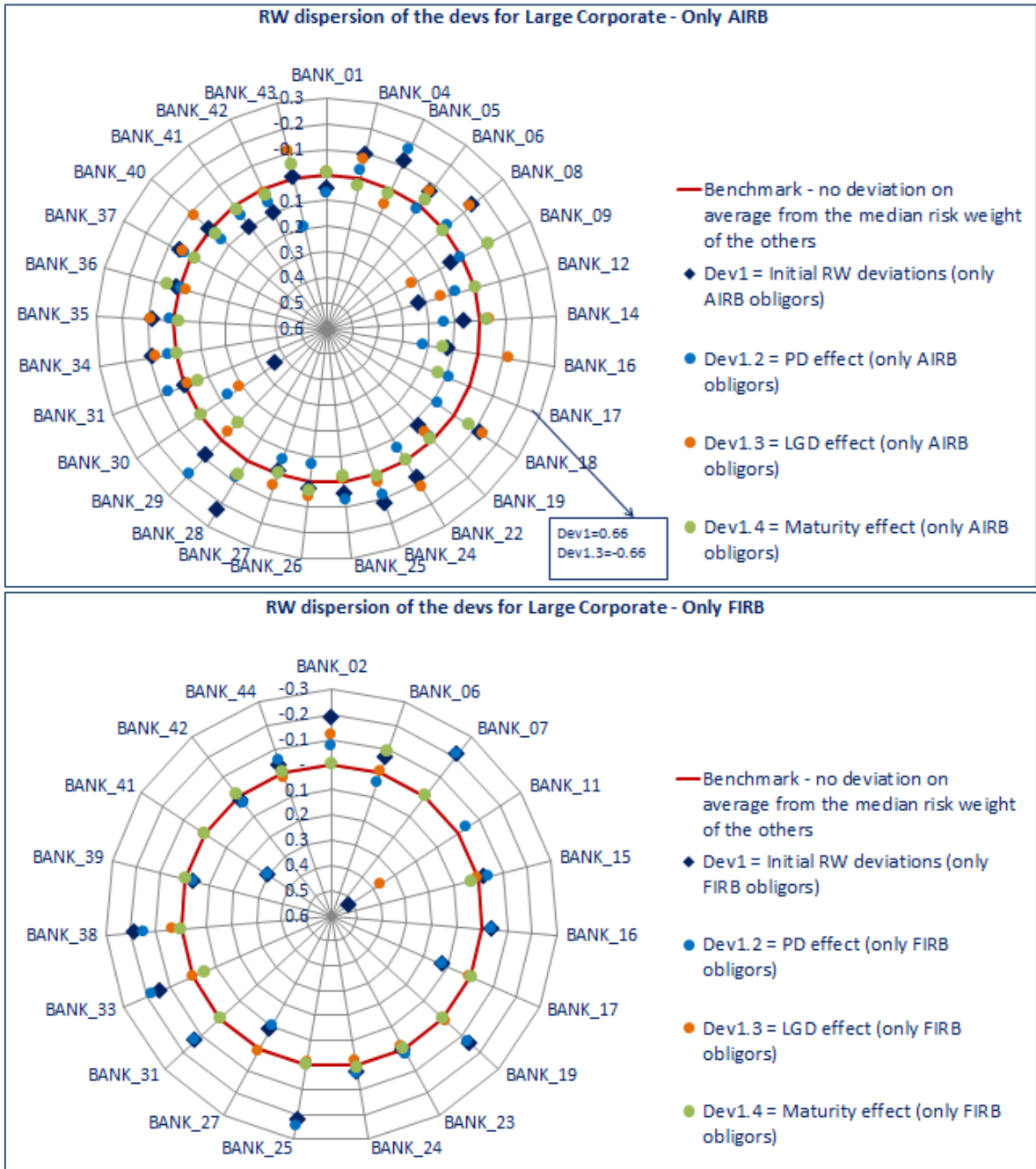

Figure 15 confirms that for the FIRB institutions the PD parameter plays a significant role in explaining RW deviation. Differences in the PD parameter seem to explain some part of the RW deviation with both positive and negative outliers. For AIRB institutions, the LGD parameter plays a more prominent role instead, with Bank 17 representing an extreme outlier (see Figure 15).

It is worth noting that some banks, Bank 6 for example, show values for obligors under both AIRB and FIRB Approaches, which confirms an earlier finding that some banks do not apply the same approach to all obligors within the same portfolio.

Focusing on obligors under the AIRB Approach (Figure 15), the LGD effect is significant (i.e. deviation is greater than 0.1) in nine cases while the PD effect is significant is six cases. As regards the LGD effect, six out of nine cases show that the use of real LGD parameters leads to lower RW than using benchmark LGD parameters[23]. As regards the PD effect, two out of six cases show that the use of real PD parameters leads to lower RW than using benchmark PD parameters.

The same results can be found when analysing the impact of the hypothetical LGD (see Figure 16). Using hypothetical LGDs (hypothetical LGD values were provided assuming the exposure to a given obligor was a senior unsecured exposure) allows us to isolate the effect of deal structure and supporting collateral from individual deals. Again, the PD effect is more relevant for FIRB institutions than for AIRB institutions while for AIRB institutions the deviation caused by the LGD effect seems to be more significant than the deviation caused by the PD effect.

Figure 16: Dispersion of RW deviations with hypothetical LGD (obligors separated by regulatory approach)

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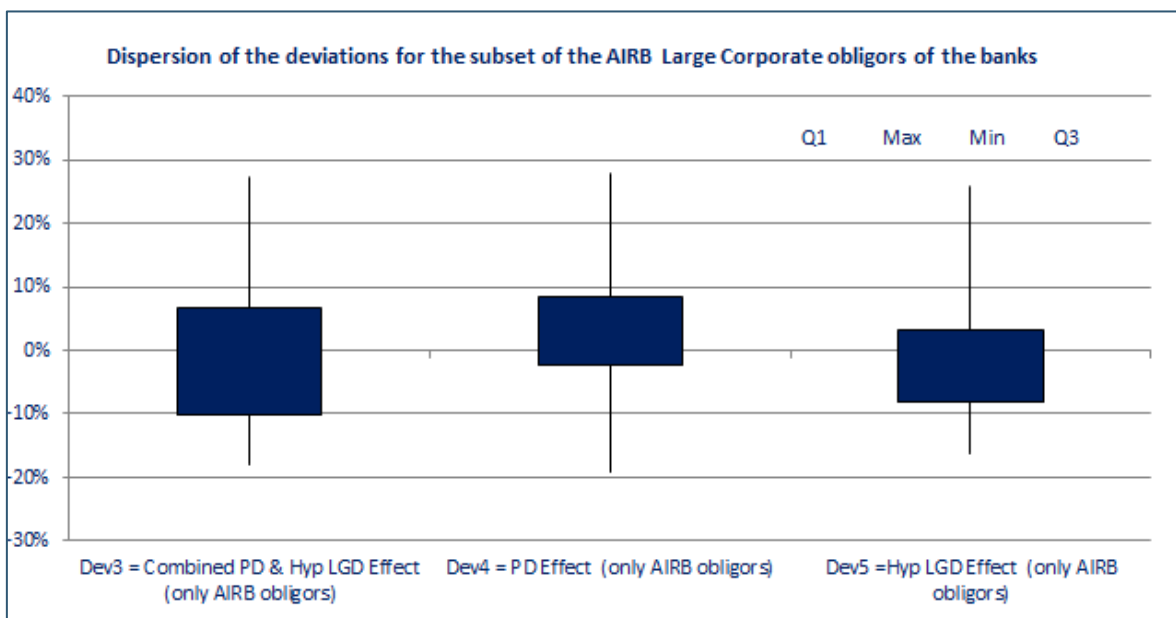
[23] Comparisons using real LGD values need to be interpreted with care, as different products and collaterals can influence LGD values.

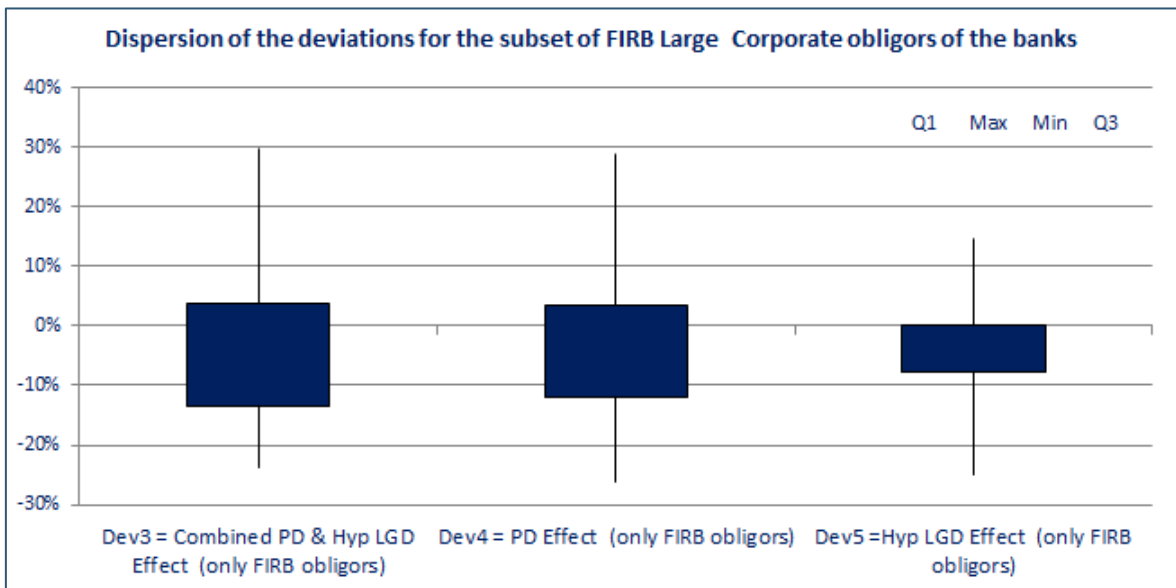**Dispersion of the deviations for the subset of FIRB Large Corporate obligors of the banks**

Figure 17 shows the results of calculating deviations 3, 4 and 5 for FIRB and AIRB separately. Also this graph seems to suggest that the observed differences in PDs play a more significant role in explaining RW differences for FIRB institutions. For AIRB institutions, the differences in LGD unsecured seem to be more significant and outliers are more extreme than for FIRB institutions.

Figure 17: RW Deviations 3 to 5 for large corporates (AIRB and FIRB separate)
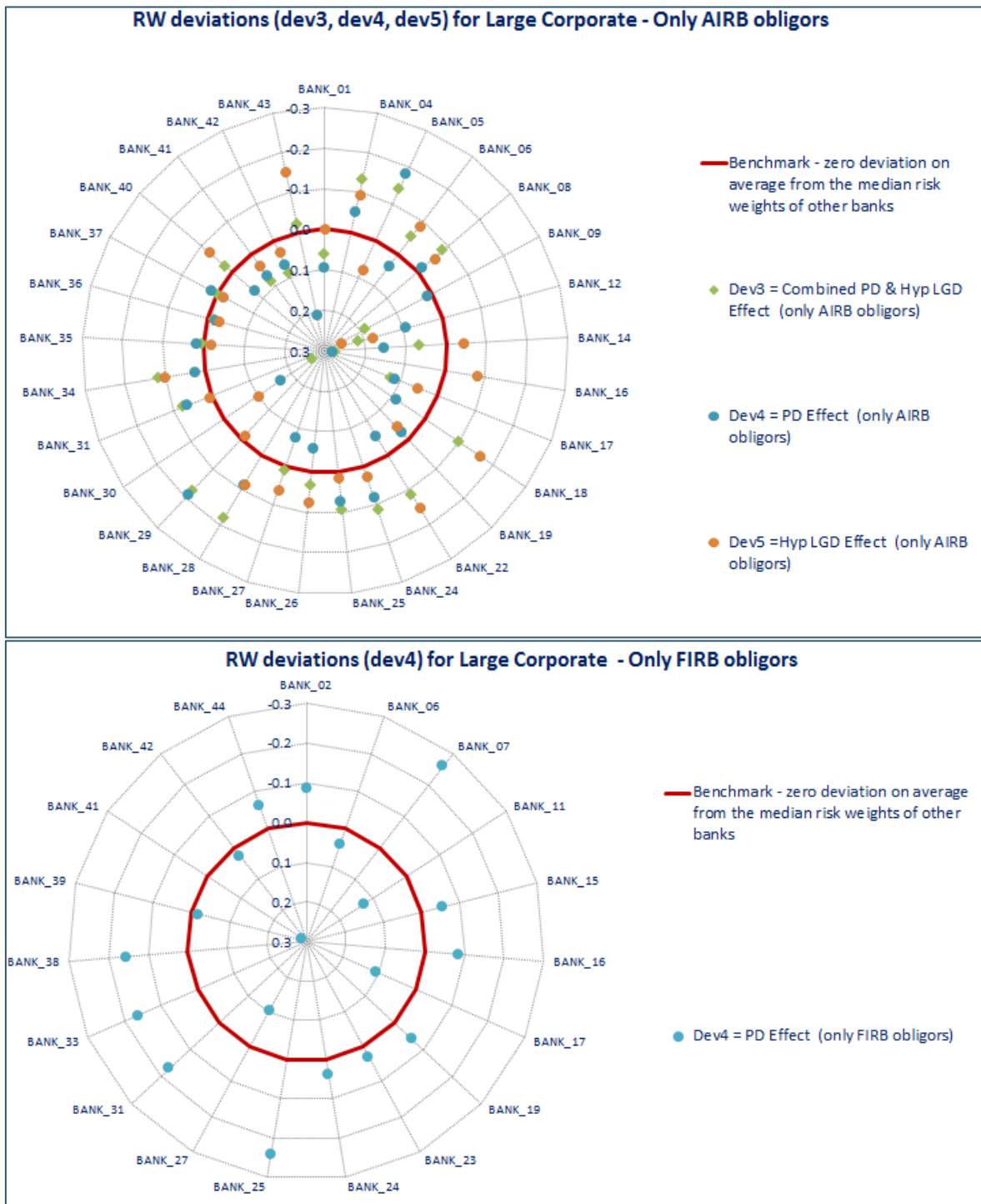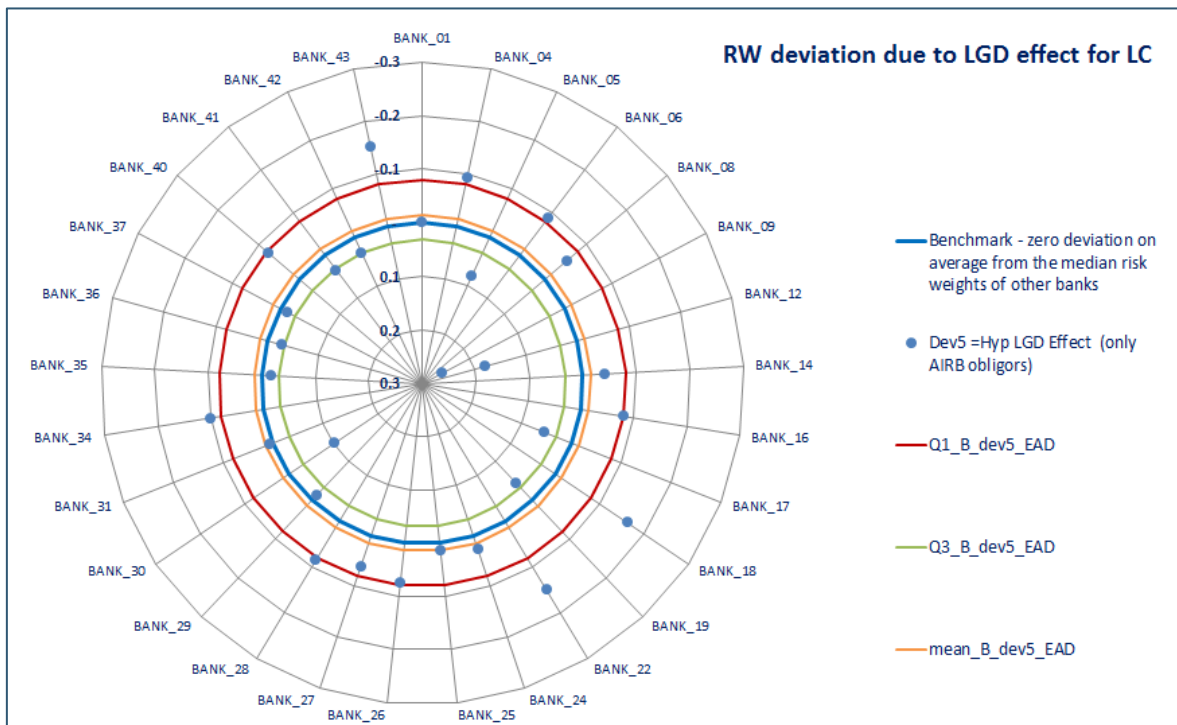

Figure 18 shows the RW deviations due to hypothetical LGD for obligors under the AIRB Approach.

Figure 18: RW deviation due to hypothetical LGD effect for large corporates under AIRB

By comparing the relative distributional effects on RW deviation for AIRB institutions, it can be seen that hypothetical LGD causes greater relative RW deviation than PD, for this sample of large corporates. In other words, the first and third quartiles of RW deviation caused by hypothetical LGD (Figure 18) are further away from the median and mean benchmarks than the respective quartiles of RW deviation caused by PD (Figure 19).

Focusing on the PD effect, Figure 19 shows that the RW deviation, in particular the distance between the first quartile and the median and mean benchmarks, is greater for FIRB institutions than for AIRB institutions.

Figure 19: RW deviation due to PD effect for large corporates (AIRB and FIRB separate)
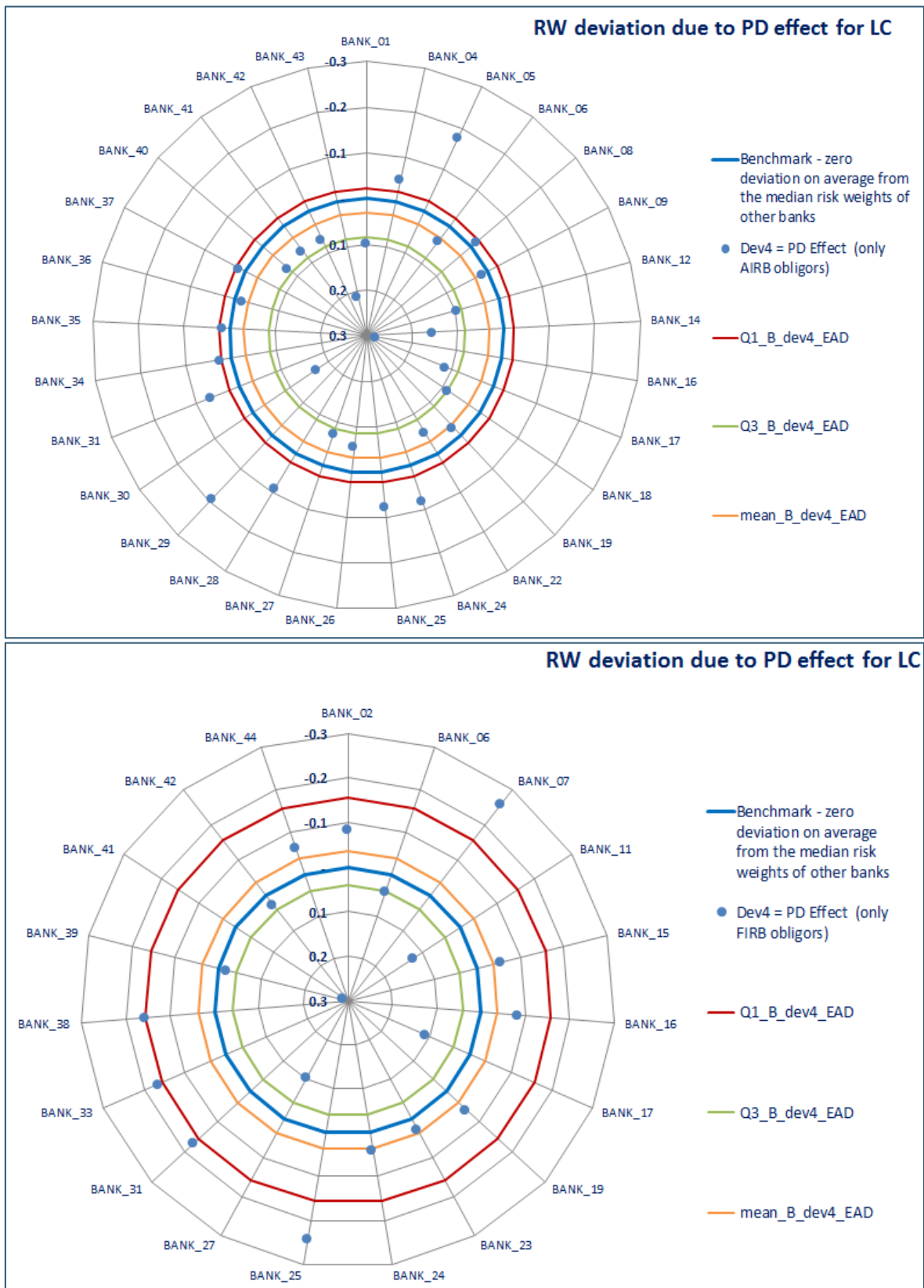
Given the above, we try to analyse if the residence of the obligors could be a driver in the differences of the RW using the information we collected at obligor level. From interviews with participating institutions we learned that some institutions use a 'country risk' factor in their model, while others do not. Some institutions use the 'country of residence of the obligor' as an input to the model while others use the 'country of activity of the obligor' as an input to the model.

On the same subset of obligors used in previous analysis we compute the Q1 and Q3 at obligor level on the main parameters (GC, RW, PD, LGD). As a final step we compute the median of the interquartile difference (between Q3 and Q1) for each country.

As shown in Figure 20 the median of the interquartile difference (Q3–Q1) for the RW in some cases is significant (up to 60%) for some countries. These high interquartile differences indicate that the country of the obligor could be a driver for differences in the width of distributions of RW between institutions. However, these results might also be driven by a different distribution by rating grade of the sample of obligors used and by different economic environments experienced by participating institutions. Hence, this finding is tentative, lacking data on the historical riskiness of obligors across countries.

Figure 20: Distribution of the median of the delta interquartile (Q3–Q1) for the RW by country of residence of the obligors
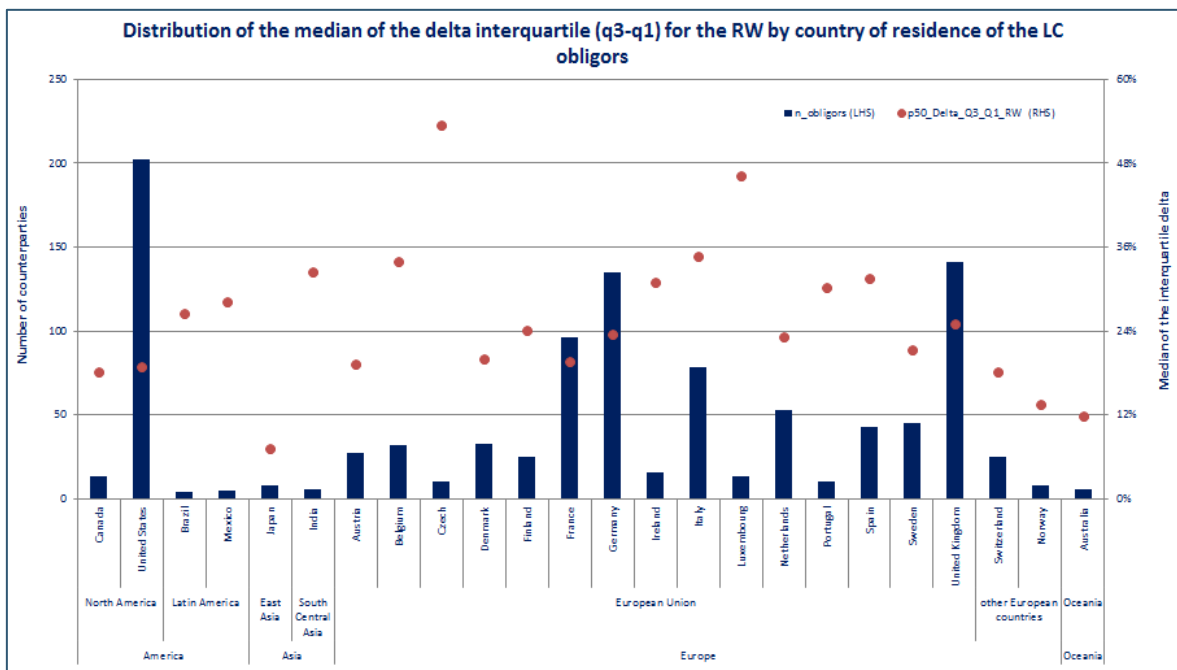
During the interviews it was confirmed that institutions use very different rating grade scales (number of grades and PD levels) to estimate PDs and multiple PD internal models for large corporate exposures. While these different practices might not necessarily lead to RW variability, they make comparisons across institutions more difficult. The impact of different practices on the RW variability was not quantifiable in this exercise, but might be analysed further in future benchmarking exercises based on the ITS on supervisory benchmarking.

As regards LGD, institutions use a wide range of LGD values for an unsecured loan. In the majority of the cases, institutions make use of less differentiated LGD parameters for unsecured exposures which are very close to the prescribed Foundation IRB value (45%) but there are a few institutions with more complex approaches that try to differentiate the LGD parameter and show a significant dispersion of the parameter applied (ranging from close to zero up to 100%).

Sovereign portfolio

Similarly to the analysis undertaken for the large corporate sample to understand B-type differences in GC, this section considers B-type differences in the sovereign portfolio. Fewer institutions reported IRB exposures to sovereigns, and so the analysis focused only on the RW deviations.

The analysis below must be treated carefully due to the application of Article 150 of the CRR, allowing 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.

Figure 21: Dispersion of RW deviations (obligors separated by regulatory approach) – sovereign
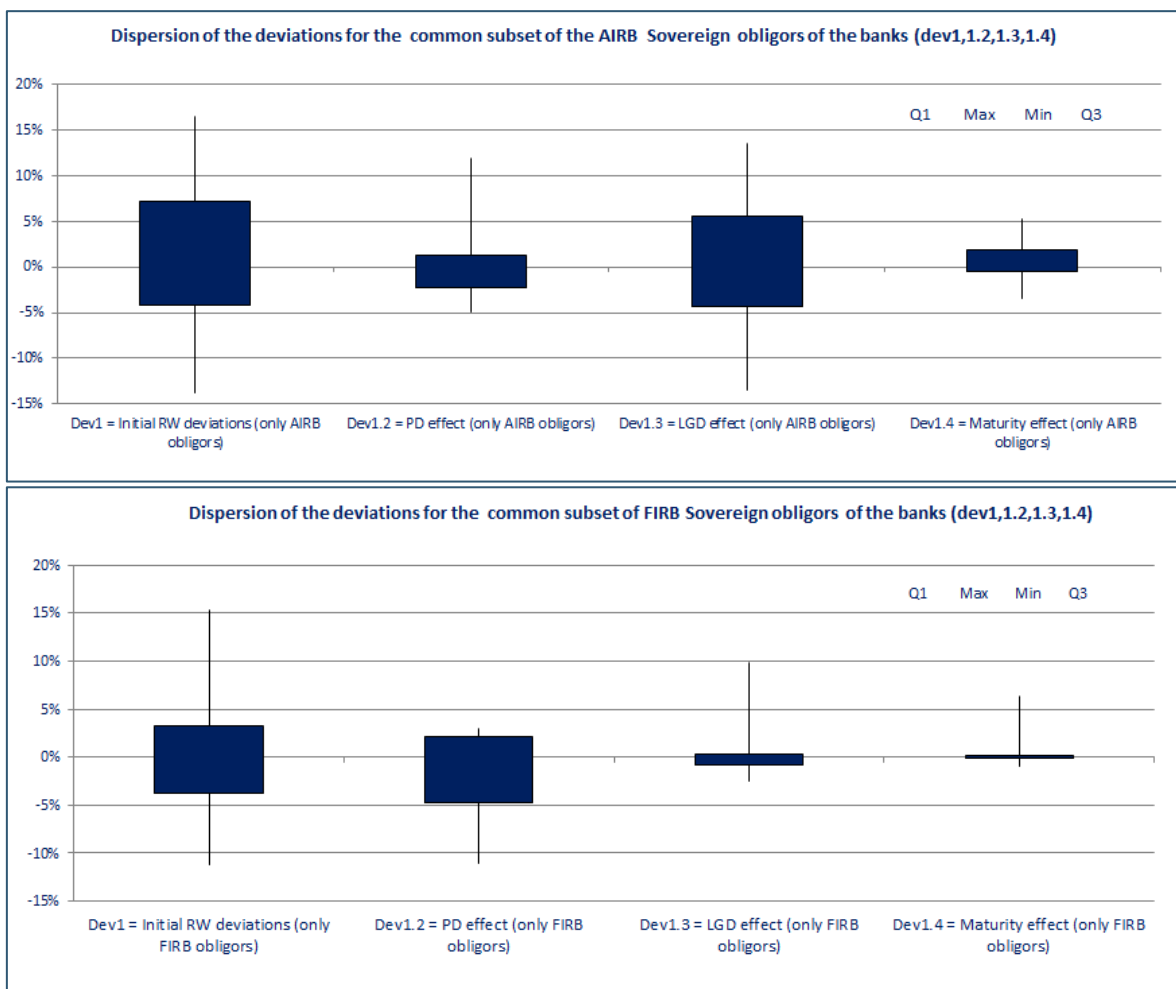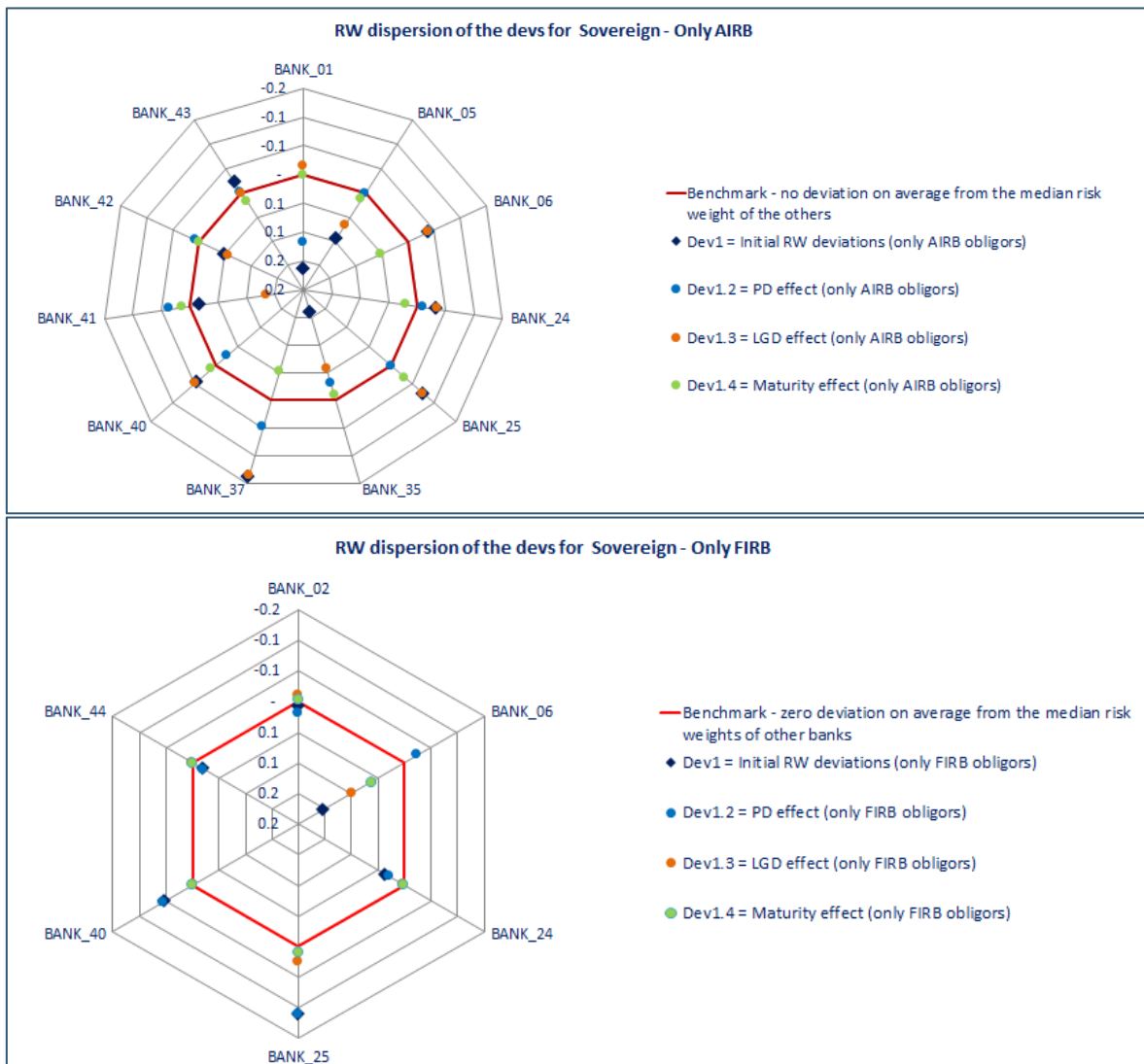

Figure 22 suggests that maturity may explain RW deviation to some extent (up to 5 basis points) for four institutions under AIRB and one institution under FIRB.

Figure 22: RW deviations 1 to 3 for sovereigns (AIRB and FIRB separate)

As regards the PD effect, both RW-lowering and RW-increasing impacts can be observed. Compensation effects between PD and LGD were also observed in two cases. For AIRB institutions, the LGD effect seems to be more significant in explaining RW deviations than the PD effect.

Figure 23: RW deviations 3 to 5 for sovereigns (AIRB and FIRB separate)
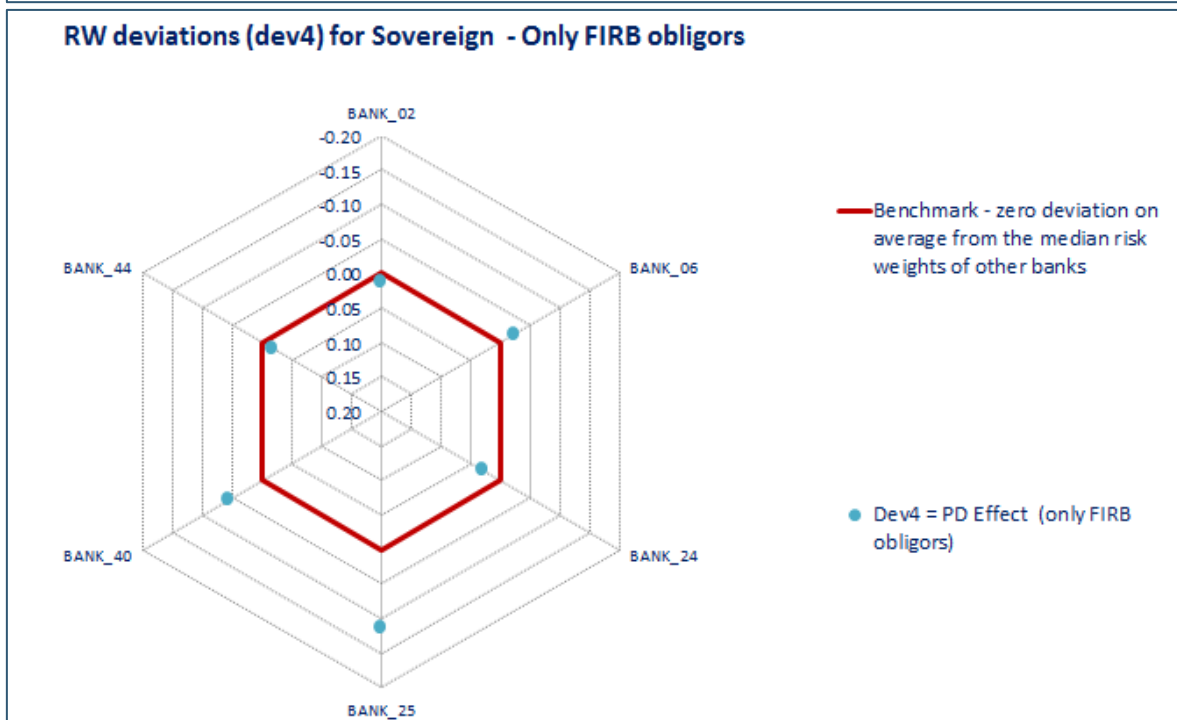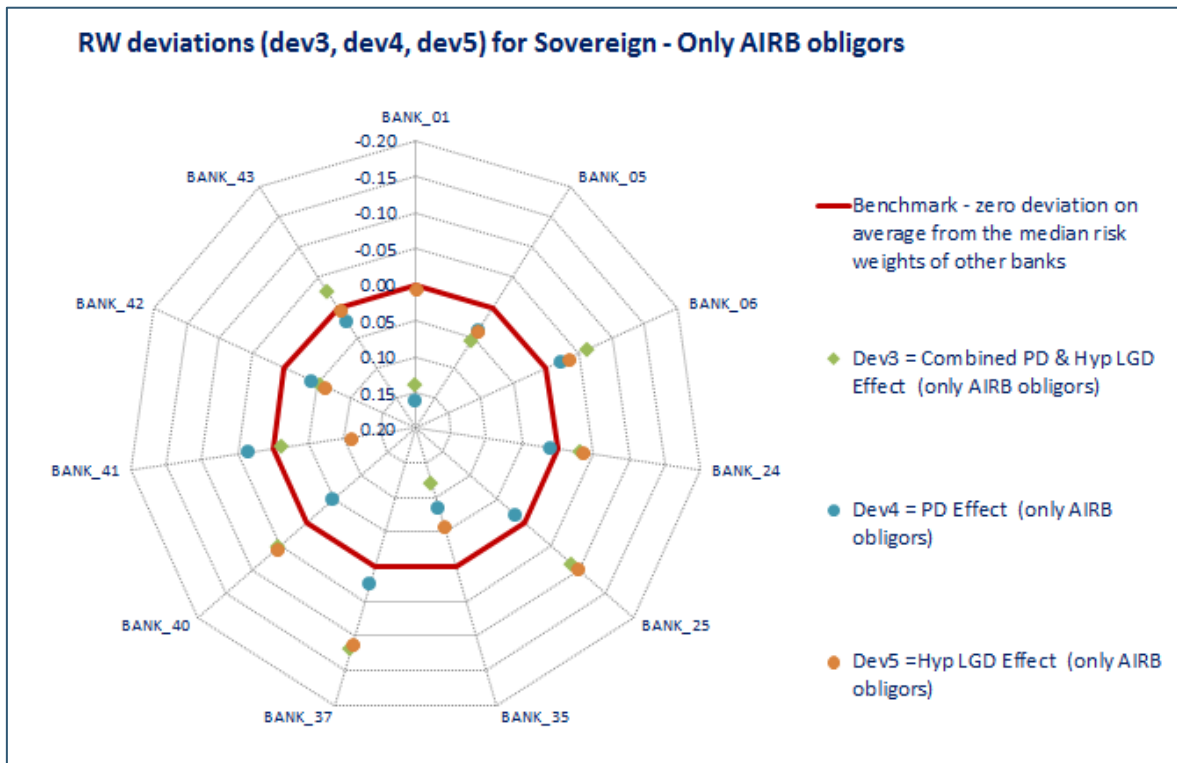
Credit institutions portfolio

Similarly to the analysis undertaken for the large corporate sample to understand B-type differences in GC, this section considers B-type differences in the institutions portfolio. Fewer institutions reported IRB exposures to institutions, and so the analysis focused only on the RW deviations.

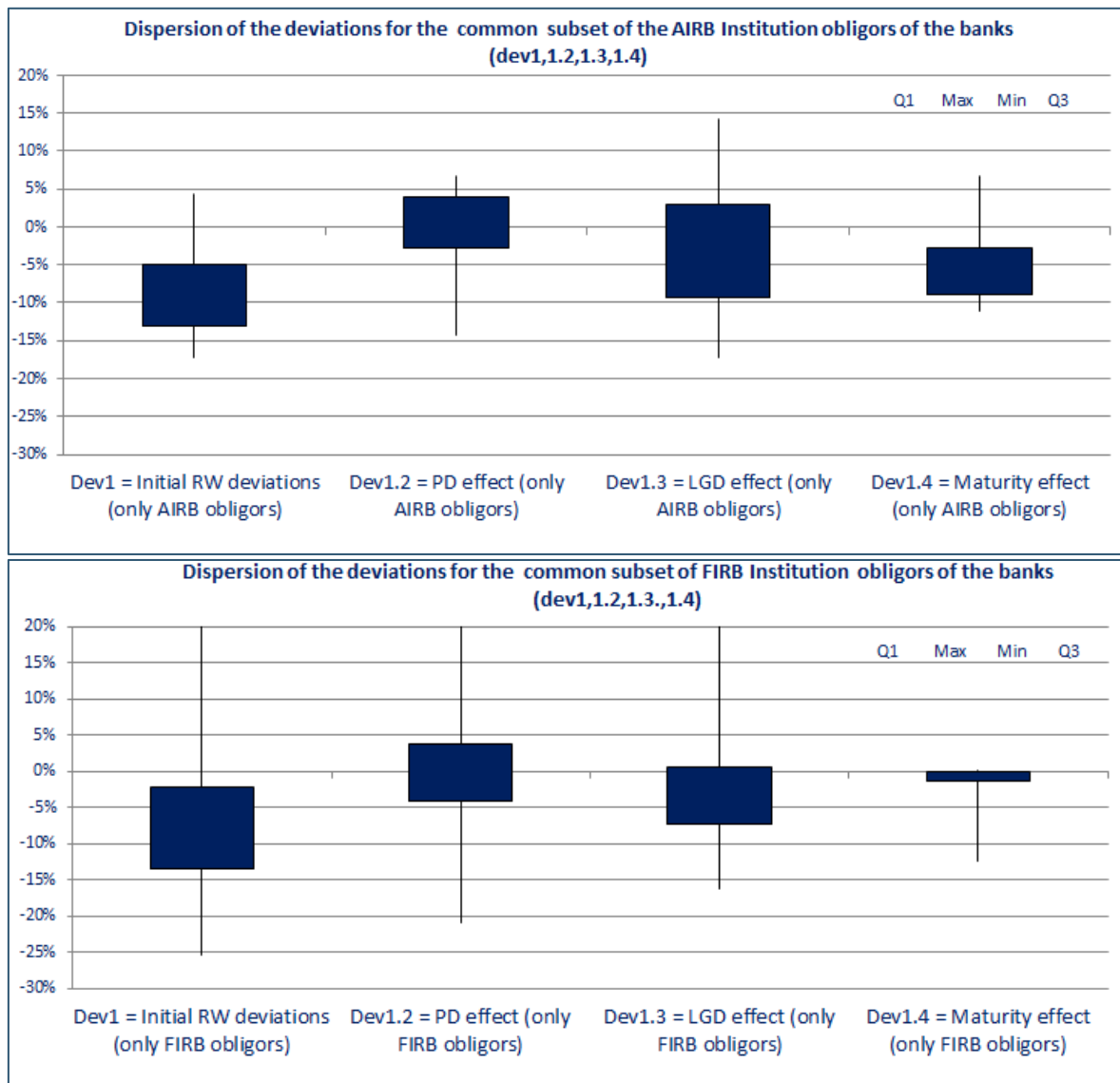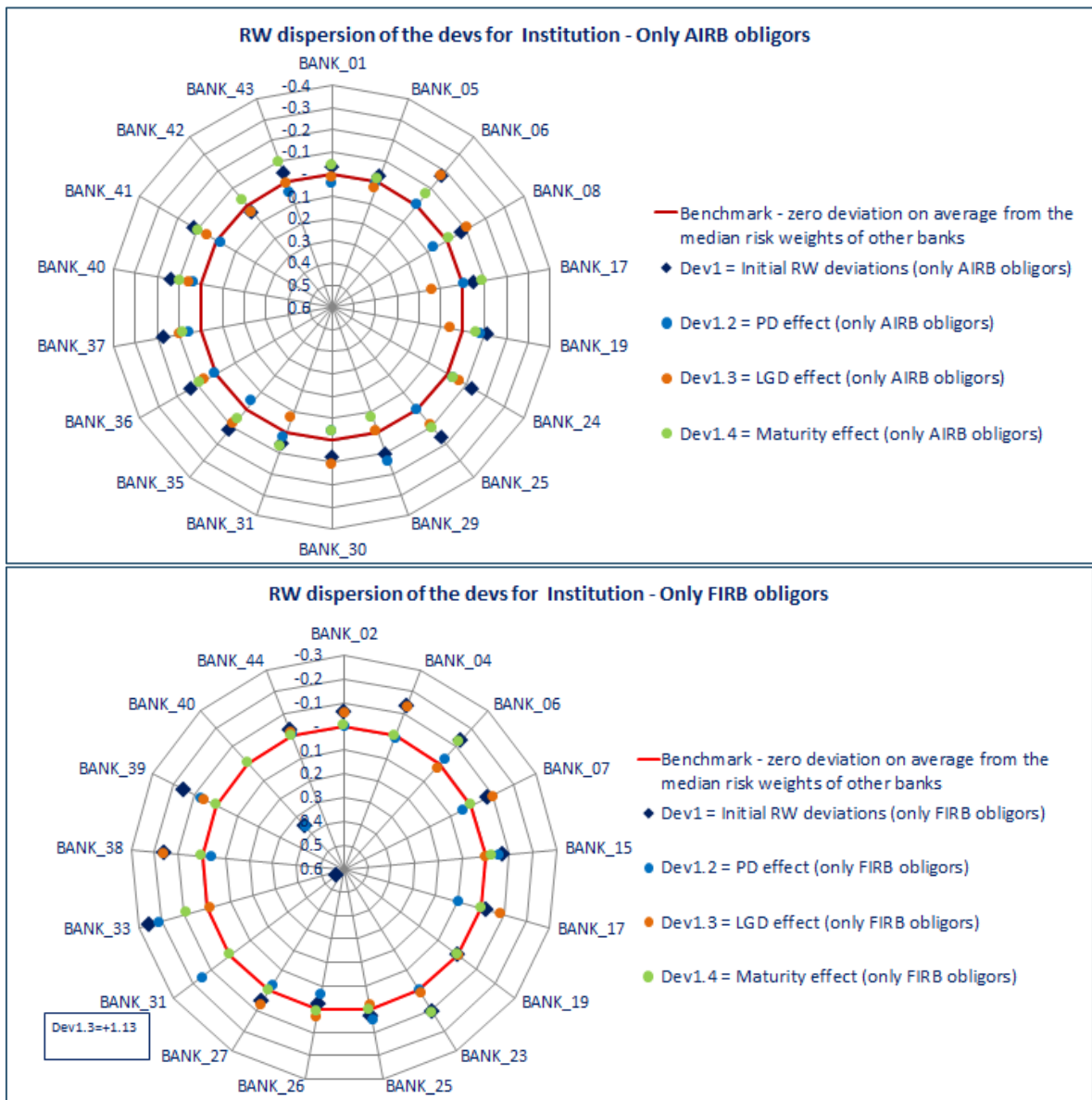**Figure 24: Dispersion of RW deviations (obligors separated by regulatory approach) – Institution**

Figure 25 suggests that maturity may explain RW deviation to a limited extent for several institutions.

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

As regards the PD effect, both RW-lowering and RW-increasing impacts can be observed. Compensation effects between PD and LGD were also observed in several cases. For AIRB institutions, the LGD effect seems to be more significant in explaining RW deviations than the PD effect.

Figure 26: RW deviations 3 to 5 for institutions (AIRB and FIRB separate)
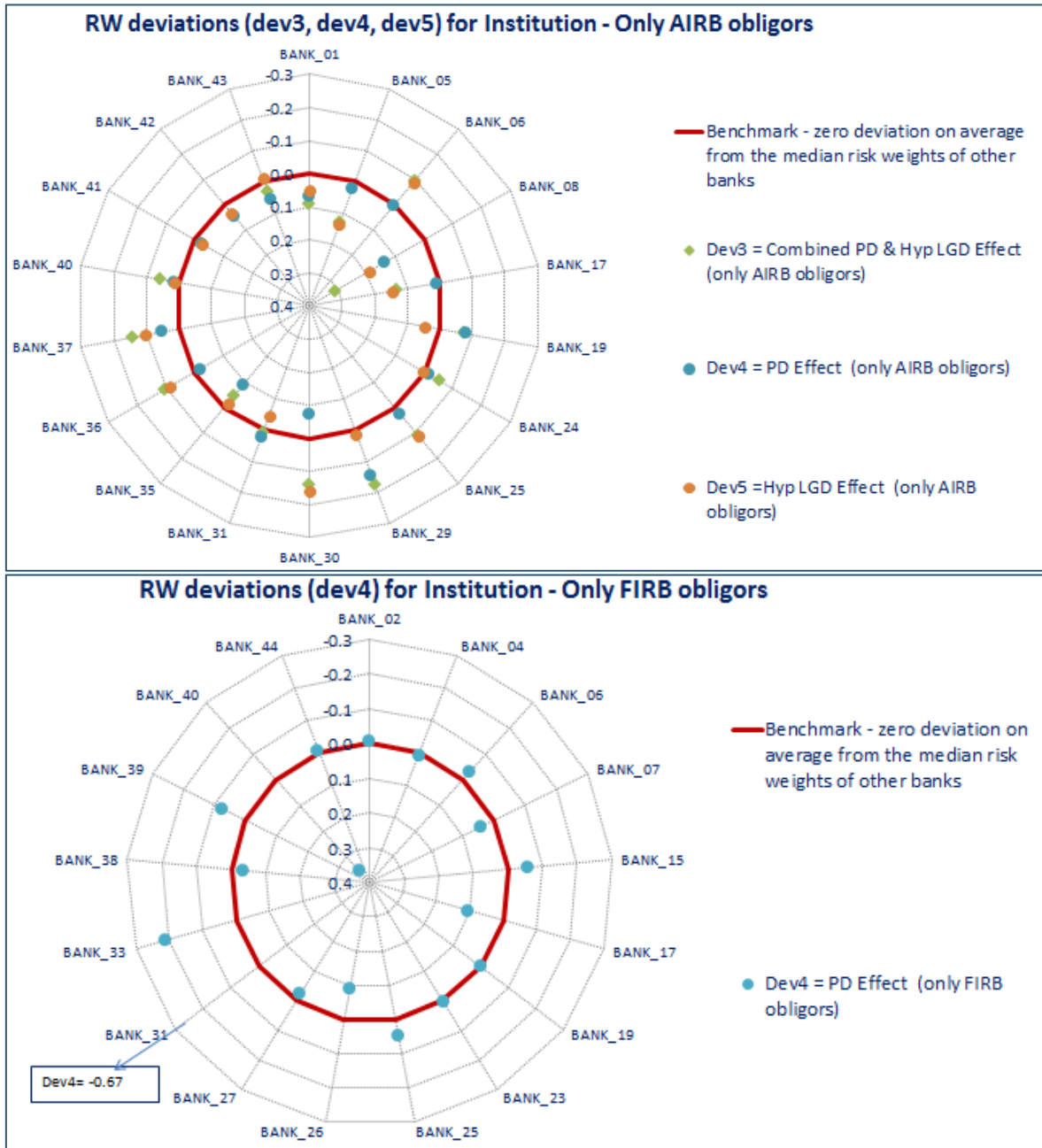
7. Impact analysis using benchmark parameters

This section describes the outcome of an impact analysis assuming a scenario in which all institutions use benchmark IRB parameters for a set of common obligors. Thus, this scenario analysis does not try to reflect regulatory measures or corrective actions in place that are impacting on the institutions' capital requirements, nor does it consider institutions' different risk management practices or different 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 re-computed RW using the institution's real parameters (maturity, PD and LGD) with the RW obtained with 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 section 6, the results represent a small portion (on average 9% in terms of EAD) of the institutions' total IRB credit risk portfolio. Extrapolations to the total IRB credit risk portfolio cannot be made, due to the specific nature of LDP exposures.

Figure 27 shows the deviation between institutions' real RW and the RW computed using benchmarking parameters from the institution's peers on a total level (considering all common obligors in the sample[24]). If benchmark parameters were used by all institutions to compute the overall RW, RW would increase on average by 4.2%. It is also interesting to understand what would happen if risk parameters estimated by less conservative institutions were replaced with benchmarking parameters[25]. Considering only those banks with a total RW computed with the bank's parameters that is lower than the total RW computed with the benchmarking parameters, RW would increase on average by about 6.6%, with material dispersion across institutions.

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[24] The subset of common obligors used for this analysis consists of 1196 different obligors, all of which were rated by at least four different institutions participating in the study. The average number of ratings per obligor was 7.8.

[25] To isolate the impact for institutions with RW below the median.

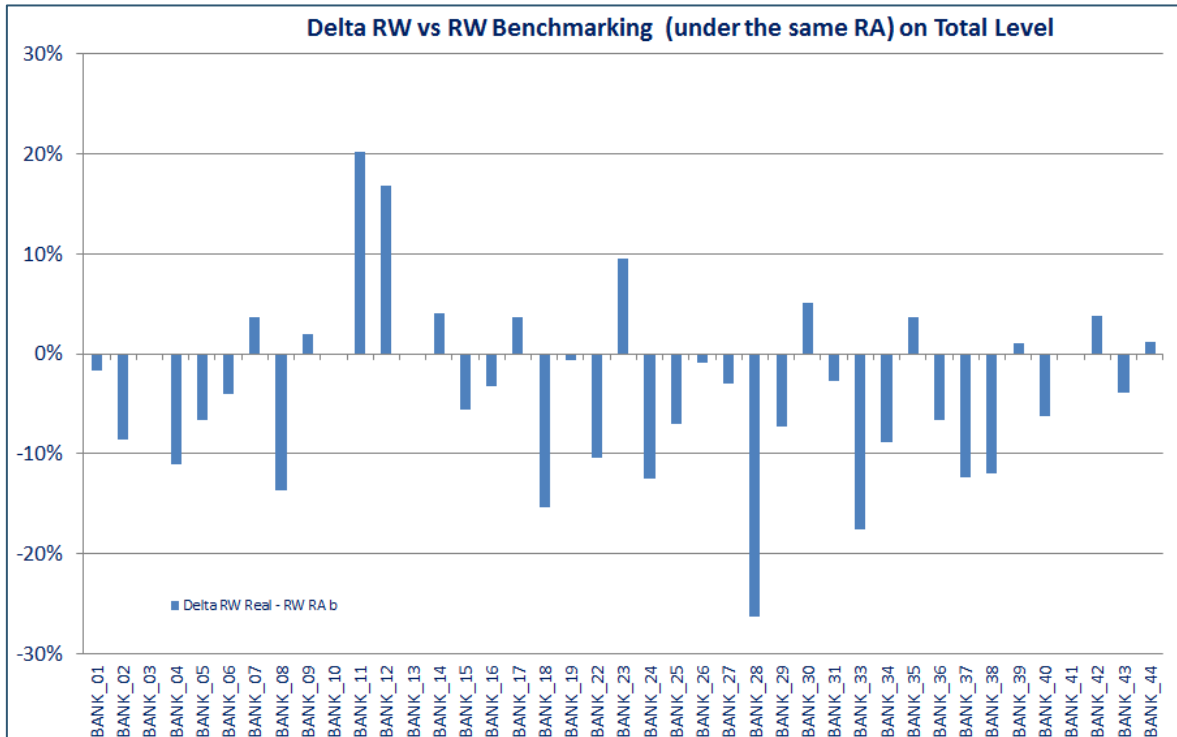**Figure 27: RW impact of using benchmarking parameters at total level**

Figure 28 shows the RW impact of replacing institution parameters with benchmark parameters for the set of common obligors in the large corporate portfolio. Considering only those institutions with a negative RW impact (i.e. actual RW lower than benchmark RW), RW would increase on average by about 7.5%. A comparison between Figure 27 and Figure 28 also highlights that there are compensation effects between portfolios. For example, Bank 19 shows a positive RW impact for the large corporate portfolio but a negative impact at total LDP level, representing an exposure-weighted net impact of an RW increase by 0.6% at total LDP level.

**Figure 28: RW impact of using BM parameters for large corporates**
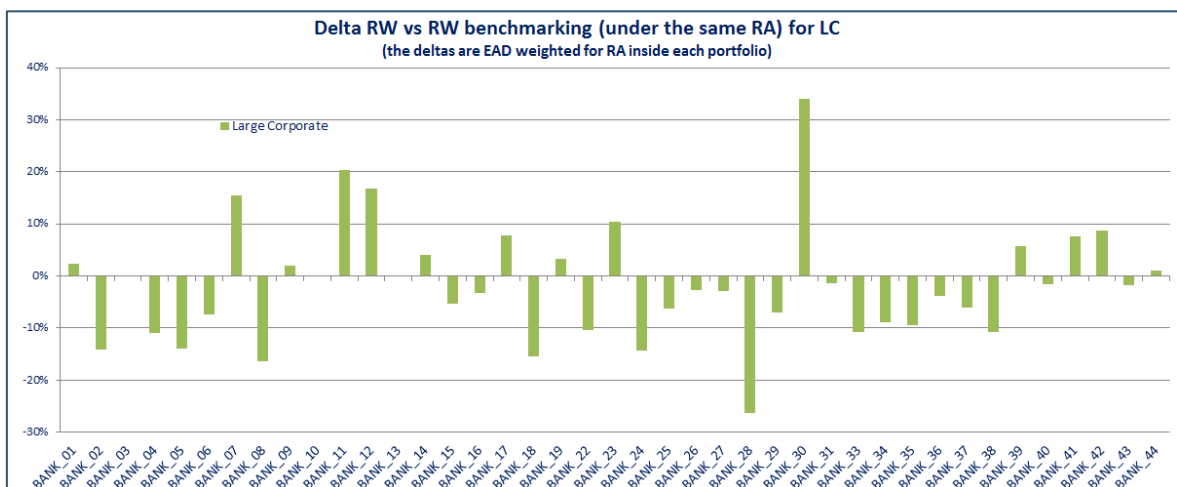
8. Comparative analysis of GC under the IRB approach and Standardised Approach

The purpose of this section is to explain to what extent GCs for non-defaulted exposures deviate at total portfolio level when calculated using the SA versus the IRB approach. This analysis is useful as the SA is the current alternative method to calculating own funds requirements for credit risk when the IRB approach is not used. Note that GC was investigated in this section, rather than RW, as RW is defined as a measure of 'total loss' under SA, and as a measure of 'unexpected loss' under the IRB approach. Therefore, GC is a more comparable measure between the two approaches. Note that other differences between the two approaches (such as the treatment of provisions) were not incorporated.

The analysis in this section was based on the data submitted by participating institutions as part of the benchmarking exercise. Since there is currently no legal requirement for all institutions to calculate SA for exposures for which they have been granted IRB permission, the SA data were calculated by the participating institutions on a 'best-efforts' basis. This meant that assumptions and simplifications were sometimes made in the SA calculations. For example, during the interviews, one institution advised that its IRB PD ratings were mapped to credit quality steps for the purpose of SA, rather than using External Credit Assessment Institution ratings. Another institution advised that its IRB collateral tranches were utilised, with different discount rates, to approximate the credit risk mitigation under SA. Given this, the SA figures presented in this section should be interpreted as indicative only.

Figure 29 shows the GC distributions by portfolios for the IRB and SA approaches.

Figure 29: GC IRB by portfolio and regulatory approach
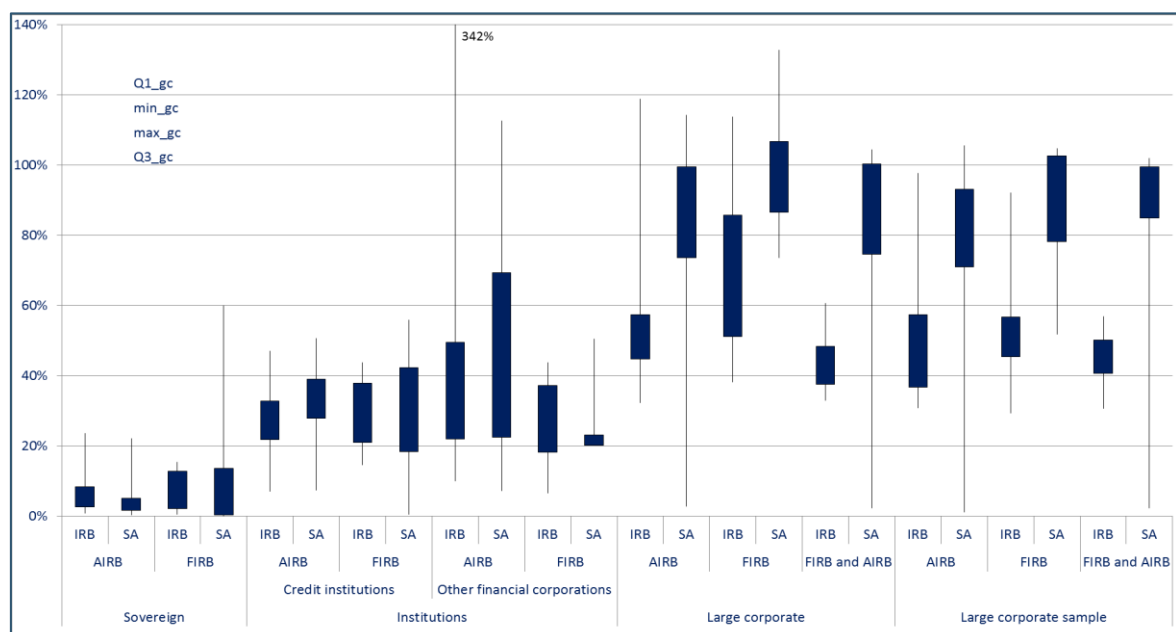
Several observations can be made by comparing the first and third quartiles from each distribution. Firstly, SA appears to produce similar levels and dispersion of GC to those of IRB for the sovereign portfolios. Secondly, SA appears to produce roughly comparable levels of GC for the institutions' portfolios, but varying dispersion relative to IRB, with no clear pattern. Finally, SA appears to produce materially higher GC for large corporate portfolios, but also greater dispersion for large corporate portfolios except those rated under FIRB.

9. Competent Authorities' assessment

As part of the LDP 2014 exercise, the CAs provided individual assessments for each participating institution about 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 section highlights some key information derived from these assessments.

The EBA received 35 CA assessments. The majority of the CAs assessed the overall RW deviations as justified and confirmed that many issues were identified as part of the CA's regular assessments or monitoring of internal models. At the same time, 20% of the CAs assessed the overall deviations as unjustified. With regards to the overall assessment of the level of own fund requirements, the answers were more concentrated, with the vast majority of the CAs mentioning they are consistent. Nevertheless, 17% of the CAs reported as part of their own overall assessment an underestimation of the level of own funds requirements. From the answers, in view of identified and unjustified underestimation of risks, there are already actions being taken by both the CAs and the institutions and other actions planned for the future.

Figure 30: CA assessment of deviations
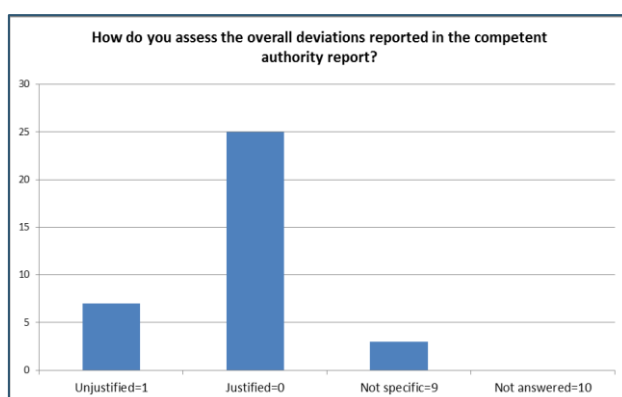
Regarding the 20% of the CAs that assessed overall RW deviations as unjustified and the 17% of the CAs with overall assessments referring to an underestimation of the level of own funds requirements, the explanations of the CAs' assessments allowed us to understand the impact of the modelling practice on specific parameters. For the CAs that mentioned that the modelling practices have an impact on the deviation, and taking into account the impacts on RWs, PDs, LGDs, CCF or maturity, the driver that is mentioned most often is the quality of the available time series to capture downturn conditions.

Figure 31: Impact of time series, downturn conditions on IRB parameter
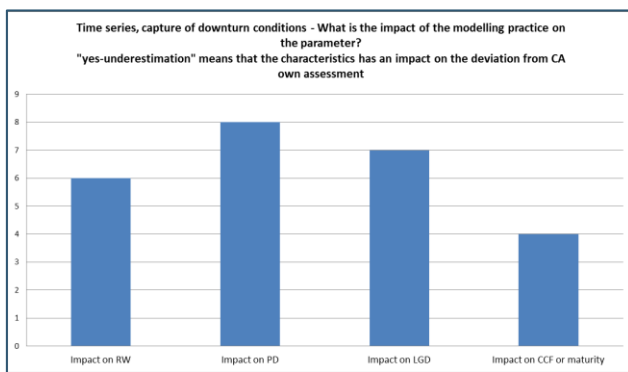
Regarding the impact of the modelling practice and the importance of the time series to capture downturn conditions, the main reasons mentioned for possible underestimations are: (i) the quality of the data (not including enough and exhaustive events of defaults), also used for the notation process (time series of the notation, or underlying financial data); (ii) more specifically, poor representation of the 2008 crisis in the times series used for PD and LGD estimations, which could create discrepancies in the estimation of the parameters; (iii) the lack of serious downturn in some jurisdictions impacting all the risk parameters (institutions' internal data stemming mainly from benign economic conditions); and (iv) insufficient conservativeness of the downturn characteristics of the internal models (e.g. assumptions, methodologies, etc.). These points are addressed by the EBA's requirements as regards model validation[26] and may be part of further investigations.

Another driver mentioned was the default and cure rate definition (including any materiality threshold); however, this was mentioned by only a few CAs (6% mentioning an impact on PD with possible underestimation, whereas 80% mentioned no impact from this driver). The reliance placed on 'unlikeliness to pay' indicators to trigger defaults for LDPs, instead of the 90 days past due threshold, is not a concern to most CAs.

Different supervisory practices related to add-ons and floors imposed on institutions' models may also lead to differences; however, from the CAs´ answers, only five mention the impact on RWs with both possible impacts, i.e. overestimations or underestimations of the RWs. The possible overestimations were mentioned for the LGD, CCF and maturity parameters, whereas possible underestimations were mentioned for the PD parameter. The implementation of regulatory floors may provide disincentives to banks to estimate PDs by applying directly the regulatory floor instead of estimating potentially higher PDs.

Regarding the institutions' internal validation of the different models and the possible identification of the issues above, the only aspect that received a strong confirmation was about the PD parameter. The focus on the PD parameter is also driven by the fact that approximately one-third of participating institutions use the FIRB approach. For the remaining aspects of the institutions´ internal validation, such as CCF or maturity parameters, governance and internal

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[26] Technical standards and guidelines on model validation can be found on the EBA website (http://www.eba.europa.eu/regulation-and-policy/model-validation).

controls, most of the answers confirmed that possible issues with impact on overall deviations are not identified across the internal models.

Figure 32: Institution internal validation findings
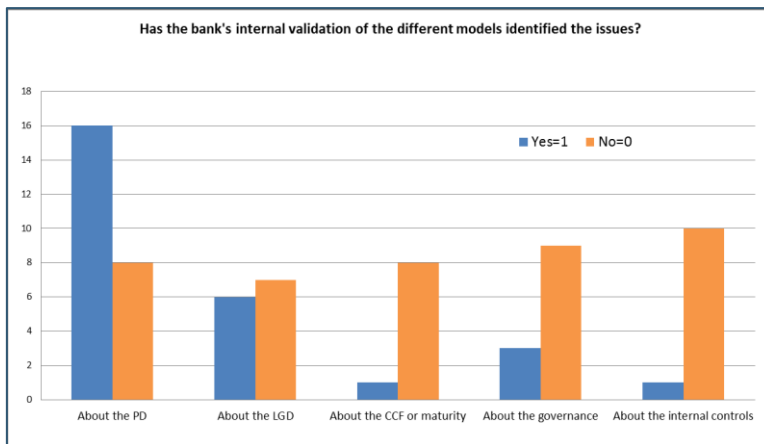

As concerns CA inspections of the internal models, issues around the PD parameter were identified most often. Again, there is a bias towards findings on the PD due to several institutions using the FIRB approach. However, for other parameters and aspects of the model validations, many issues are not identified through the CA inspections, such as about the LGD, CCF and maturity parameters as well as about governance and internal controls.

Figure 33: CA model inspections
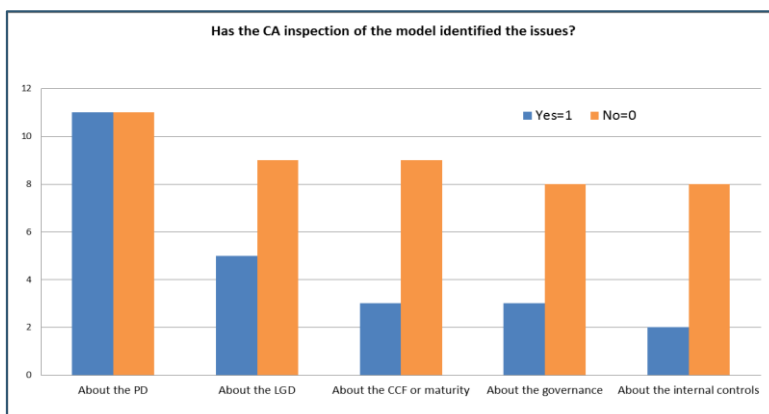
According to the answers, the actions planned by the CA are focused on the PD parameter and also on the RWs. In contrast, less frequent actions are planned by the CA as regards the CCF and maturity. There are no or less frequent actions planned by the CAs for some parameters because there are no shortcomings identified. The majority of the CAs assessed the overall deviations identified by the EBA as justified and confirmed that many issues were identified as part of the CA's regular assessments or monitoring of internal models.

Figure 34: Actions planned by the CA
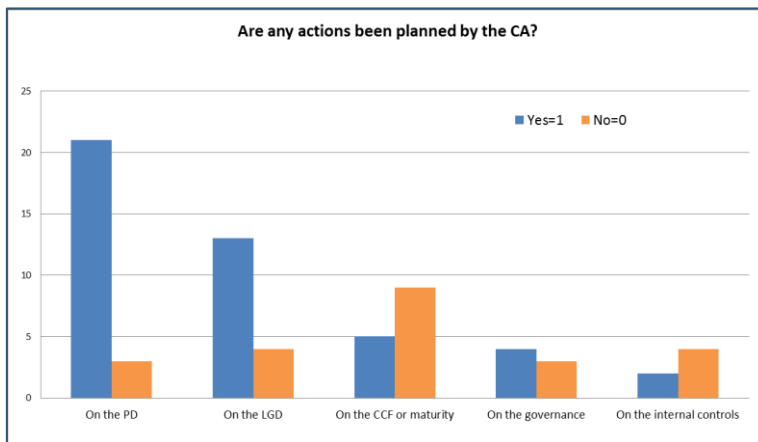
Regarding the follow-up to the problems identified as part of the regular review of internal models as well as the outcome of the benchmarking, there is a mix of actions that are already under way and some that are planned for the future. While for actions on PD, LGD, CCF, maturity and governance most of the actions exist already, actions on internal controls are planned for the future.

On the policy side, the implications of the analyses carried out so far as well as possible regulatory measures for improving the functioning of internal models have been summarised in the Discussion Paper on the future of the IRB Approach published by the EBA in March this year.

10. Conclusion

This report on differences in risk-weighted assets in LDP identifies significant variation in RW and GC across institutions.

Key drivers in explaining the differences are the portfolio mix effect and the share of defaulted exposures. Both drivers combined can explain at least 75% of the differences. The remaining 25% may be due to the inherent credit risk of the institutions' exposures and different practices applied by both institutions and supervisors. However, when looking at each portfolio separately (i.e. excluding compensation effects between portfolios), the analysis shows that the impact of defaulted exposures explains almost 50% of the GC differences for both the large corporate and institutions portfolios, but the remaining 50% may be due to differences in bank-specific factors, such as risk management practices or the IRB modelling. The large impact of the portfolio mix effect is caused by significant differences in portfolio composition among the participating institutions which provided data for this LDP exercise, representing between 3% and 56% of their respective total IRB exposures. The large corporate portfolio is identified as the main driver of overall GC levels due to the relative importance and relatively high RW and EL figures of this portfolio compared with the sovereign and institutions portfolios.

For defaulted exposures in the LDP, the discrepancy in terms of GC is very high among institutions. As highlighted in previous reports and confirmed in interviews with several institutions, discrepancies were found with regard to defaulted exposures, especially when it comes to the best-estimate expected loss. These findings and policy options were put forward in a discussion paper on the future of the IRB Approach.

The analysis based on common obligors allowed a direct comparison of the IRB parameters and resulting RW on a set of identical real common obligors. This study highlighted that maturity has a very limited effect on RW differences for the large corporate portfolio while for the institutions and sovereign portfolios the impact is significant for several institutions.

A separate analysis of obligors under the FIRB Approach from obligors under the AIRB Approach ensured that findings, in particular as regards PD and LGD, are not affected by differences in underlying approaches. For the Large Corporate portfolio, it was found that observed differences in PDs play a more significant role in explaining RW differences for FIRB institutions than for AIRB institutions. However, more negative outliers can be observed under the AIRB Approach than under the FIRB Approach.

Focusing on the AIRB Approach (applied by 20 institutions out of 41), the deviation caused by the LGD effect seems to be more significant than the deviation caused by the PD effect (LGD deviation is significant for nine institutions while the deviation caused by the PD effect is significant for six institutions). As regards the LGD effect, six out of nine institutions show that the use of real LGD parameters leads to lower RW than using benchmark LGD parameters. As regards the PD effect, two out of six institutions show that the use of real PD parameters leads to lower RW than using benchmark PD parameters. Compensation effects between PD and LGD were identified in some cases.

However, some findings may have been driven by a necessary simplifying assumption for LGD, whereby a hypothetical LGD based on a senior unsecured facility structure for a predefined list of

obligors was used to isolate the effect of different deal and collateral structures from the analysis. The collection of enhanced collateral data in future exercises should allow more complete analysis of such effects.

This study also found significant RW differences due to PD and LGD effects across all portfolios with some compensation effects between PD and LGD for AIRB institutions. As reported in previous LDP studies and as found during interviews with some institutions and reported by several CAs' assessments, different practices around downturn conditions and the usage of collateral information are potential drivers of divergence of RW. The length of the time series and the availability of a sufficient number of observable defaults or of a serious downturn period used to calibrate the models differ among institutions and may add to potential drivers of RW differences.

An analysis was performed to quantify the impact in terms of RWs of the differences in risk parameters. This analysis found that if the internal IRB parameters estimated by institutions were replaced with benchmarking parameters calculated from peer distributions, for a subset of common obligors in the large corporate portfolio, RW would increase on average by about 7.5% (exposure-weighted average, 6.6% for the total LDP portfolios) for those institutions with IRB parameters below benchmark parameters.

A comparison of GC calculated under SA with GC calculated under IRB shows that SA appears to produce similar dispersion of GC to IRB for the sovereign and institutions portfolios but greater dispersion for some large corporate portfolios. This may however be driven by inconsistent data quality, as institutions submitted SA data on a best-efforts basis.

As part of this benchmarking exercise, the CAs provided individual assessments for each participating institution about any potential underestimation of the capital requirement as required by Article 78(4) of Directive 2013/36/EU. The majority of the CAs assessed the overall RW deviations as justified and confirmed that many issues were identified as part of the CA's regular assessments or monitoring of internal models. CAs' assessments also confirmed the existence of different supervisory practices related to add-ons and floors imposed on institutions' models. These may also lead to differences, the impact of which is hard to disentangle based on the data provided for this LDP exercise.

Some institutions advised during this exercise that they have started or are in the process of adjusting and aligning their internal models based on supervisory guidance, which in turn is influenced by a more harmonised understanding of supervisory authorities.

Annex 1: List of participating institutions

Name	Country	LEI	Participated in prev LDP exercise?
Erste Group Bank AG	AT	PQOH26KWDF7CG10L6792	Yes
Raiffeisen Zentralbank Österreich (RZB)	AT	EVOYOND2GGP3UHGGE885	Yes
KBC BANK	BE	213800X3Q9LSAKRUWY91	Yes
Belfius (Ex-Dexia bank)	BE	A5GWLFH3KM7YV2SFQL84	Yes
DEUTSCHE BANK AG	DE	7LTWFZYICNSX8D621K86	Yes
COMMERZBANK AG	DE	851WYGNLUQLFZBSYGB56	Yes
Landesbank Baden-Württemberg	DE	B81CK4ESI35472RHJ606	No
DZ Bank	DE	529900HNOAA1KXQJUQ27	No
Bayrische Landesbank	DE	VDYMYTQGZZ6DU0912C88	No
DANSKE BANK	DK	MAES062Z21O4RZ2U7M96	Yes
Jyske Bank	DK	3M5E1GQGKL17HI6CPN30	Yes
Sydbank	DK	GP5DT10VX1QRQUKVBK64	Yes
Nykredit	DK	52965FONQ5NZKP0WZL45	Yes
BANCO SANTANDER S.A.	ES	5493006QMFDDMYWIAM13	Yes
BANCO BILBAO VIZCAYA ARGENTARIA S.A. (BBVA)	ES	K8MS7FD7N5Z2WQ51AZ71	Yes
OP-Pohjola Group	FI	7437003B5WFBOIEFY714	Yes
BNP PARIBAS	FR	R0MUWSFPU8MPRO8K5P83	Yes
Groupe CREDIT AGRICOLE	FR	969500TJ5KRTCJQWXH05	Yes
Société Générale	FR	O2RNE8IBXP4R0TD8PU41	Yes
ROYAL BANK OF SCOTLAND GROUP plc	GB	2138005O9XJIJN4JPN90	Yes
HSBC HOLDINGS plc	GB	MLU0ZO3ML4LN2LL2TL39	Yes
BARCLAYS plc	GB	G5GSEF7VJP5I7OUK5573	Yes
LLOYDS BANKING GROUP plc	GB	549300PPXHEU2JF0AM85	Yes
ALLIED IRISH BANKS PLC	IE	3U8WV1YX2VMUHH7Z1Q21	Yes
BANK OF IRELAND	IE	Q2GQA2KF6XJ24W42G291	Yes
PERMANENT TSB GROUP	IE	635400DTNHVYGZODKQ93	Yes
INTESA SANPAOLO S.p.A	IT	2W8N8UU78PMDQKZENC08	Yes
UNICREDIT S.p.A	IT	549300TRUWO2CD2G5692	Yes
BANCA MONTE DEI PASCHI DI SIENA S.p.A	IT	J4CP7MHCXR8DAQMKIL78	Yes
BANCO POPOLARE	IT	5493006P8PDBI8LC0O96	Yes
UBI Banca	IT	81560097964CBDAED282	Yes
CREDEM	IT	8156004B244AA70DE787	No
ING BANK NV	NL	3TK20IVIUJ8J3ZU0QE75	Yes
RABOBANK NEDERLAND	NL	DG3RU1DBUFHT4ZF9WN62	Yes
ABN AMRO	NL	BFXS5XCH7N0Y05NIXW11	Yes
DNB	NO	549300GKFG0RYRRQ1414	No
BANCO COMERCIAL PORTUGUÊS, SA (BCP OR MILLENNIUM BCP)	PT	JU1U6S0DG9YLT7N8ZV32	Yes
Nordea Bank AB (publ)	SE	6SCPQ280AIY8EP3XFW53	Yes
Skandinaviska Enskilda Banken AB (publ) (SEB)	SE	F3JS33DEI6XQ4ZBPTN86	Yes
Svenska Handelsbanken AB (publ)	SE	NHBDILHZTYCNBV5UYZ31	Yes
Swedbank AB (publ)	SE	M312WZV08Y7LYUC71685	Yes

Annex 2: Additional charts on RW deviations

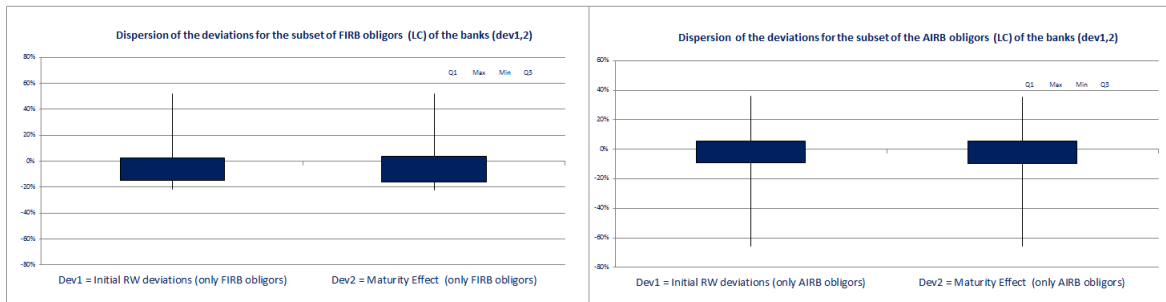**Figure 35: RW deviation 1 and 2 for Large Corporate (FIRB and AIRB separate)**

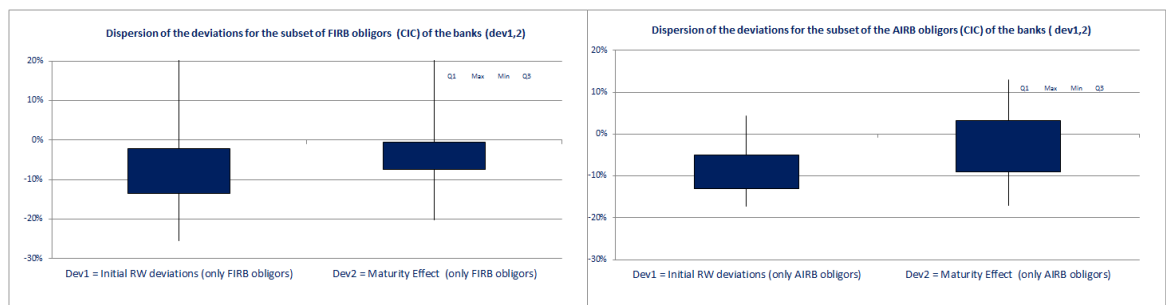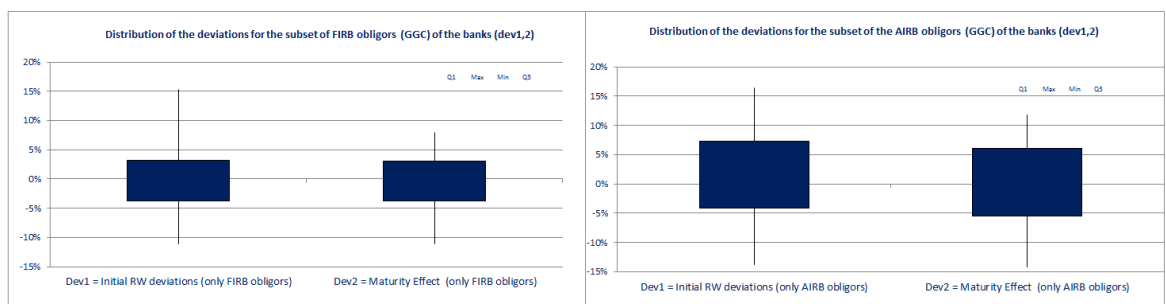**Figure 36: RW deviation 1 and 2 for Institutions (FIRB and AIRB separate)**

Figure 37: RW deviation 1 and 2 for Sovereign (FIRB and AIRB separate)