EBA REPORT
RESULTS FROM THE 2022 MARKET RISK BENCHMARKING EXERCISE

EBA/REP/2023/08

EBA EUROPEAN BANKING AUTHORITY

Contents

List of figures and tables

Figures

Tables

Abbreviations

APR	all price risk
CA	competent authority
CDS	credit default swap
CO	commodities
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
CS	credit spread
CS01	credit spread value of 1 basis point changes
CTP	correlation trading portfolio
CV	coefficient of variation
EBA	European Banking Authority
EQ	equity
ES	expected shortfall
EU	European Union
FRTB	fundamental review of the trading book
FX	foreign exchange
HPE	hypothetical portfolio exercise
HS	historical simulation
IMV	initial market valuation
IQD	interquartile dispersion
IR	interest rates
IRC	incremental risk charge
IT	information technology
ITS	implementing technical standards
LGD	loss given default
MC	Monte Carlo
MR	market risk
MRWA	market-risk-weighted asset
OFR	Own Funds Requirements
P&L	profit and loss
PD	probability of default
Q&A	question and answer
RTS	regulatory technical standards
RWA	risk-weighted asset
sVaR	stressed value at risk
SBM	Sensitivities Based Method
VaR	value at risk

1. Executive summary

1. This report presents the results of the 2022 supervisory benchmarking exercise pursuant to Article 78 of the Capital Requirements Directive (CRD) and the related regulatory and implementing technical standards (RTS and ITS) that define the scope, procedures and portfolios for benchmarking internal models for market risk (MR).

2. The report summarises the conclusions drawn from a hypothetical portfolio exercise (HPE) conducted by the EBA during 2021/22. The primary objective of the exercise is to assess the level of variability observed in risk-weighted assets (RWA) for market risk produced by banks' internal models.

3. The exercise was performed on a sample of 41 European banks from 13 jurisdictions. The relevant institutions submitted data for 81 instruments recombined into 62 market portfolios across all major asset classes, i.e., equity (EQ), interest rates (IR), foreign exchange (FX), commodities (CO) and credit spreads (CS), as well as two correlation trading instruments recombined into four portfolios (CTPs), for a total of 66 benchmark portfolios. Thus, the exercise covers the entire population of EU banks with internal models for MR at the highest level of consolidation.

4. The analytical part of the exercise delivered by the EBA, as summarised in this report, provided to the competent authorities (CAs) a list of outliers to be examined in detail. The banks with the most significant number of outliers were also considered for interviews to discuss the assumptions behind banks' models that produced the outliers. Nonetheless, in the 2022 exercise, no interviews with banks were carried out by CAs, which preferred to address the issues reported bilaterally. The issues detected in the benchmarking exercise were considered and addressed, where possible, by banks and CAs. Moreover, CAs and the EBA collected feedback on how to improve forthcoming benchmarking exercises.

5. Finally, taking into consideration the results of the benchmarking exercise, CAs were asked to provide the EBA with responses to a questionnaire on the actions they plan to take with regard to each participating bank's internal model.

1.1 Main findings of the benchmarking analysis

6. The report measures variability in terms of the interquartile dispersion (IQD)[1] and the coefficient of variation (CV)[2] observed within each benchmark portfolio. The IQD is more robust than the CV when the sample is drawn from an unknown, fat-tailed distribution. As far as the market-risk-weighted asset (MRWA) variability is concerned, the IQD metric suggests a level of dispersion for all the risk measures provided by banks that need to be monitored.

7. The primary considerations are that the 2022 results show a small reduction in the dispersion of the initial market valuation (IMV) versus the 2021 exercise with regard to the FX asset class; see, for instance, Table 1. CS remained fairly stable versus the 2021 dispersion. Nonetheless, the IR average IQD remain high (16% vs 19% in 2021). The reason for this is that two IR instruments (36 and 38) present an IMV that is and close to zero and show high relative dispersion. This has the unwelcome effect of exacerbating minor absolute differences in the IMV submission in absolute terms, which turns into a very high percentage difference captured by the IQD metrics. Aside from the high IQD for these two instruments, there is no evidence of a significant misunderstanding of these instruments' features. Excluding them, the average IQD of the IR asset class is 2%, which is in line with the submissions for the previous exercises. EQ shows very high IQD (21%) which is driven by an error in the instruction that compromised the IMVs of some futures in this asset class. Error on the futures aside, the IQDs are similar to the previous exercise. Furthermore, the CO asset class sees a significant jump in the IQD in the 2022 exercise. This is due to only two instruments (48 and 49), but since the whole set of CO instruments is very limited, as well as the total number of submissions, minor differences in the IMVs tend to impact the average IQD of this asset class substantially.

8. Based on this year's submission of IMVs, we can conclude that the quality of the data did not decrease. The quality of the data is of paramount importance for the benchmarking exercise, and the banks should pay great attention when submitting these data. Some types of errors persist and are sometimes trivial, such as the wrong unit being reported. In order to increase the data quality substantially, the EBA notes that several rounds of iteration with submitters will be required, which is not possible within the short time frame of the exercise. Keep improving the specification of the details for the instruments is also a possibility that the EBA is always exploring. In general, the valuation used therefore is robust, albeit with the significant effort needed to be expanded on data quality.

9. The majority of the significant dispersions have been examined and justified by the banks and CAs. A minority of the outlier observations remain unexplained and are expected to be part of

[1] IQD is defined as the absolute value of the ratio of the interquartile range (Q3 – Q1) divided by the sum of the quartiles (Q3 + Q1). The higher the IQD is, the higher the dispersion in the data.

[2] CV is computed as the ratio of the standard deviation to the mean.

the ongoing activities of supervisors, who are expected to monitor and investigate the situation (see Section 1.2 and Chapter 6 of this report).

10. From a risk factor perspective, FX and CO portfolios exhibit a lower level of dispersion than the IR, EQ and credit spread asset classes. Except for IMV, in general, variability is lower than in the previous exercise. This is likely to be due to a decrease in market volatility, which impacted the level of the risk measures, decreasing the dispersion (see Table 4: Interquartile dispersion for IMV, risk metrics and SBM OFR by risk factor).

11. Regarding the single risk measures, across all asset classes except for CS the overall variability for value at risk (VaR) is lower than the observed variability for stressed VaR (sVaR) (21% and 28% respectively, compared with 27% and 31% in 2021 and with 18% and 29% in 2020).[3] More complex measures such as the incremental risk charge (IRC) show a higher level of dispersion (45%, compared with 43% in 2021, and 49% in 2020). We would point out that a direct comparison of the IQD dispersion between 2020, 2021 and 2022 IQDs is possible because the structures of the exercises and the instruments of which they were composed are basically the same.

12. As for the past exercise, to deepen the analysis of VaR and further investigate the variability drivers, different VaR metrics were computed and compared with the banks' reported VaR, in particular:

- an alternative estimation of VaR, called profit and loss (P&L) VaR, computed by the EBA using the 1-year daily P&L series submitted by banks using a historical simulation (HS) approach; and

- a comparable VaR, called HS VaR, which corresponds to the regulatory VaR reported by those banks that use an HS approach (only).

13. When comparing the variability between the regulatory VaR and these alternative risk measures, a decrease in the IQD when considering a more homogeneous sample is confirmed (i.e., HS banks only). In fact, for all the risk types, the dispersion observed for the P&L VaR tends to be lower but is still not negligible. This finding suggests that the modelling approach is not the only driver of the observed VaR variability. Other drivers, such as risks not captured in the model or the choice of absolute versus relative returns, offer further explanations for the results' variability (see Table 4: Interquartile dispersion for IMV, risk metrics and SBM OFR by risk factor).

14. Even so, within the subset of banks using an HS approach, modelling choices (see Table 6: Coefficient of variation for regulatory VaR (controlling for HS) by modelling choice) seem to make a noticeable difference. Modelling configurations produce mixed results depending on the different asset classes. In terms of conservativeness, the calibration of more than one-year

[3] These values are derived as a simple average of the IQD across all non-correlation trading portfolios.

lookback seems to produce more conservative results (see Table 7: Average regulatory VaR by modelling choice). These observations differ from the findings of the 2020 and 2021 exercises, which were run across the same portfolios (at least for 2021). Overall, it is clear that this analysis is extremely sensitive to the different portfolios used to produce the statistic and to the low number of subjects available, and to the passage of time from one exercise to another, different model setting impact differently the dispersion; so, this report will refrain from trying to generalise the results and define a 'less dispersed' and 'more conservative' configuration of modelling choices.

15. As mentioned above, the dispersion in sVaR figures is generally higher than the dispersion observed for regulatory VaR (see Table 21 and Table 22). The stressed period used was the one applied by the bank for capital purposes, so it was not harmonised in the sample. Different choices for the stressed period are permitted by the Capital Requirements Regulation (CRR), and these choices are considered and questioned as part of the regulatory approval process. While allowing banks to use their own individual stress periods reduces the comparability of the sVaR results across the sample, doing so facilitates the estimation of implied capital needs from the HPE. Nonetheless, banks in the exercise are asked to report the stressed period applied. As a result, the EBA drew up a subset of homogeneous time windows applied and ran the benchmark for this subsample. It appears clear that when a homogeneous stress window is applied, the sVaR figures tend to be less dispersed (see Table 41: Stress VaR statistics (2008-2009 stress period only)).

16. In addition to carrying out these analyses, the EBA conducted a comparison across banks of the ratio between sVaR and VaR for each of the hypothetical portfolios included in the benchmarking exercise (see Table 5: sVaR–VaR ratio by range (number of banks as a percentage of the total)). The ratio generally varies significantly between the portfolios, especially for instruments subject to credit spread risk (from 0.63 to 11.92). However, on average the ratio comes in at around 2.28 (see Table 25: sVaR/VaR statistics).

17. As expected, for the larger banks with significant trading activities the benchmarking portfolios are generally relevant to their actual trading book. For smaller banks, this is less the case, and this is why the EBA included simpler and more plain vanilla instruments starting from the 2019 exercise. The challenge remains to design a benchmarking exercise that can fit banks that have a specialised business model. Overall, the portfolios are, however, reflective of the risk factors experienced by most banks. In the 2022 exercise, the EBA despite noticing a decrease in the VaR dispersion, reports that in many cases (30 over 59 single portfolios) the IQD remain above 20%, especially for the CS asset class (see Table 21: VaR statistics). The aggregate portfolios also feature notably low levels of IQDs.

18. Regarding the IRC, the average variability (as measured by the average IQD for this category of portfolios) is higher than that observed for all other metrics considered in the report (45%). This high variability is slightly higher than in the previous exercise – the IQD was 43% on average in the 2021 exercise (see Table 13: IRC statistics and cluster analysis). The understanding of the IRC dispersion was further analysed by disaggregating various modelling choices (see Table 14, Table

43, Table 44, Table 45 and Table 46). While the number of risk factors applied seems to make a difference in terms of dispersions, while applying market conventions to the source of LGD seems not to change the dispersion of the IRC substantially. These results are not consistent with what was observed in the previous exercises, so it looks like even for the IRC, the modelling choices have an effect on the dispersion, but the effect cannot be generalised, and it looks very time-dependent.

19. Regarding the APR, the statistics for this risk measure are no longer reported, because after Brexit the number of the reporting entities for this metric is no longer sufficient to guarantee the anonymity of the statistics computed.

20. An additional metric considered as part of the analysis was the diversification benefits observed for VaR, sVaR and IRC in the aggregated portfolios (see Table 16: Diversification benefit statistics). As expected, there is evidence that larger aggregated portfolios exhibited greater diversification benefits than smaller ones. In general, the level of dispersion observed in diversification benefits tends to be lower than that in the corresponding metrics at the level of the individual portfolios.

21. As in the previous exercise, an assessment was also carried out on the variability of the empirical estimates of the expected shortfall (ES) at a 97.5% confidence level. The results indicate that the dispersion in this metric across risk factors is similar to that found for VaR and P&L VaR (see Table 24).

Dispersion in the capital outcome

22. Alongside the variability analysis, the EBA also conducted the usual assessment regarding possible underestimations of capital requirements (see Table 17: Interquartile dispersion for capital proxy). As the analysis is based on hypothetical portfolios and the capital requirements were defined using a proxy, the results should be interpreted as approximations of potential capital underestimations. The proxy for the implied capital requirements was defined as the sum of VaR and sVaR across all portfolios. For purposes of comparison, the proxy was computed three times. In one case, the VaR and sVaR figures were multiplied by the banks' total multiplication factor and, in the other, by the regulatory minimum of three only, i.e., ignoring the banks' individual addend(s) set by the CAs. Finally, a subset of banks applying the same stress period was also considered for capital dispersion. This metric enables a comparison of banks and an assessment of their variability in this regard.

23. The average variability across the sample as measured by the IQD is significant (around 20%), especially for the most complex portfolios in the credit spread asset class. This dispersion very slightly decreases when considering a more homogenous capital proxy (20% applying three as the multiplier, and 14% for banks with the same stress period). Moreover, an analysis of the capital proxy pattern across the HPE's trades suggests that the ranges of capital value dispersion are broadly consistent, irrespective of whether the banks' actual multiplication factors are used or not.

Additional analysis of Risk measures

24. As introduced in the previous exercises, the EBA extended the analysis to other drivers of variation (see Section 5.2.5), such as the size of the bank, the business model of the bank, the level of approval granted by the CAs and the already mentioned stressed period applied in the sVaR calibration. The size and business model analyses were further analysed as in the 2020 and 2021 reports.

25. In a nutshell, based on this additional analysis we can conclude that the size (in terms of RWA for market risk) of the bank has an impact on the figures, since medium-sized banks tend to produce slightly more dispersed results than larger banks (see Table 8: Asset class comparison for VaR in terms of banks' size). Smaller banks' statistics are affected by the low number of submissions, i.e., CO is not even reported. Consistently, when considering the size in terms of the trading book (as a ratio of total assets), the bigger a bank is in terms of its trading book, the (slightly) smaller the dispersion (on average).

26. The discrimination based on the business model did not deliver strong conclusions. As in past exercises, the EBA applied the internal classification of banks as a discriminant, under which many of them are classified as cross-border universal banks (see Table 9: Asset class comparison for VaR within the same business model (cross-border universal bank)). Applying this definition of the business model, a smaller decrease in the IQD was identified due to a more homogenous sample. The business model analysis was further extended by considering the 'Level 3' assets and liabilities in the bank's books as a proxy for a more sophisticated business model linked to more exotic products (see Table 34, Table 35 and Table 36). This further specification did not prove conclusive since the dispersion did not change substantially depending on the 'Level 3' assets and liabilities ratio in the bank's trading book.

27. The subsample analysis based on the level of approval delivered interesting results. A priori, it was expected that having banks with different levels of approval would have increased the dispersion of the results of the risk measures. In line with this assumption, the IQD results seem to fluctuate among the subsamples of different approval levels. This is because more homogeneous subsamples tend to produce smaller dispersions, but this positive effect is counterbalanced by the smaller number of firms in the sample. Basically, the benchmark provided and the 25th and 75th quantiles of the distribution tend to be less dispersed with respect to the whole set of banks. This implies that the different level of approval does indeed have an impact on the dispersion of the benchmarking results (see Table 10: Asset class comparison for VaR in terms of level of approval).

28. Finally, as already mentioned above, and in line with previous findings, sVaR figures are far less dispersed when the benchmark is computed for a homogeneous subsample of firms that applied a similar time period for the stress window used for calibrating the sVaR (see Table 11: Asset class comparison for sVaR in terms of the time window applied).

29. As introduced in the 2020 Report, PV statistics are reported (see Table 42). The PVs reported generally have low IQDs, and they were useful in distinguishing true outliers and outliers due to mispricing of the portfolios.

SBM OFR analysis

30. The 2022 benchmarking exercise see the intro of the SBM sensitivities and OFR data collection. Even if precious for assessing and understanding differences at a very granular level, sensitivities data are very fragmented and too complicated to be represented at the moment. Therefore, this Report focus on the analysis of the SBM Own Funds Requirements (OFR).

31. Overall, the OFR data submitted by the banks was quite complete and close to the Risk Measures data submission. The dispersion of the SBM OFR, as expected is generally lower than the dispersion for the standard Risk Measures (VaR and SVaR), as shown in Table 4. On the one hand, this is reassuring result, since standardised measures are supposed to be the same for all, and so a low IQD is expected. On the other side, there are portfolios where the IDQ is higher for the SBM measures with respect to the VaR measures (see Figure 20).

32. Finally, the level of detail in the SBM OFR submission, allow the supervisors to clearly define which are the asset class and risk class component of the OFR (see Figure 21 and Figure 22), and this allows to identify area of potential problem in the application of the standardised methodology.

1.2 CAs' assessments based on supervisory benchmarks

33. CAs shared the outcomes of their assessments at the bank level with the EBA (see Figure 16: CAs' own assessments of the levels of MR own funds requirements). The CAs' assessments confirmed the existence of some areas that require follow-up actions on the part of specific institutions whose internal models were flagged as outliers in this benchmarking exercise.

34. Overall, CAs' assessment of the over- and underestimation of RWA was encouraging in the sense that CAs were aware of and able to explain the causes of most deviations. Although the majority of the issues were identified and actions put in place in order to reduce the unwanted variability of the RWA, the effectiveness of these actions can be evaluated only by CAs via constant monitoring of the benchmarking results.

35. The CAs are expected to pay close attention to the minority of cases in which the over- and underestimations were unexplained, to closely monitor these institutions and to put in place additional efforts to reduce these cognitional gaps in future exercises.

1.3 2023 exercise and future expected changes

36. The 2019 exercise represented a significant change from the 2016-2018 exercises in terms of the simplification of the portfolios. This simplification had a positive effect in obtaining less

dispersed results than with the previous portfolios. Furthermore, it improved the significant data quality issues relating to some portfolios while focusing on the model risk elements.

37. In the 2020 exercise, the data submitted further improved in quality thanks to the clarification of the legal text description of some instruments, and also to the further practice that the banks have gained in conducting the present exercise. This had a positive effect in terms of dispersion in the data provided. Improvements in terms of less dispersed results have also stemmed from the change in the methodology to detect outliers for the risk measures.

38. In the 2021 exercise, the data quality of the submissions was acceptable. That said, the variabilities of the risk measures (VaR, PL VaR and ES) were substantially higher than in the previous year. This seems to be linked to the increased volatility of the markets in 2021 due to the Covid outbreak, as captured by the market model, which generally provided higher figures for the risk measures. These higher figures, in absolute terms, seem to exacerbate the differences in modelling outputs, producing higher IQD metrics. As a result, this higher dispersion does not seem to be the outcome of a decrease in the quality of the market model.

39. For the 2022 exercise, the set of instruments is mainly similar to the previous exercise, so the EBA reports a similar level in terms of the data quality of the submissions, aside from the mistake in the EQ instruction. The analysis that the EBA ran for the 2022 exercise is the first in which banks report sensitivities and OFR figures relating to the sensitivities-based method of the alternative standardised approach (ASA) introduced with the FRTB. The SBM submission was overall of good quality, especially considering the tendency to improve with time. Nonetheless, there is an expectation that additional interesting insights can be provided to competent authorities from the analysis of these additional data.

40. For the 2023 exercise, in order to keep the exercise informative, the data collection was extended to allow the collection of new instruments and portfolios, in particular as regards the instruments and portfolios that have lately been applied by the industry. These new instruments are also accompanied by a rationalisation of the references of the instruments in Annex V. For the rest, the exercise will not change substantially, so the EBA will focus on the analysis of the SBM data submitted.

41. For 2024, at the moment of the draft of the report, the EBA is proposing to extend the SBM data collection to the other ASA components (DRC and RRAO), to have a complete picture of the standardised approach.

42. On a medium-term horizon, the EBA will consider reshaping the instruments and the portfolios in the exercise in a way that still keeps the instruments simple to ensure clarity regarding the instruments. This is because the different interpretations of the instruments have been a significant source of variability. Nonetheless, further enrichment of the variety of the instruments monitored could be beneficial. In addition, and very importantly, extension of the scope of the BM exercise to the banks that do not have IMA approval, but apply the ASA, and the fundamental review of the trading book (FRTB) are understood to be of particular

significance for the market risk benchmarking exercise. In the future, the exercise will require a major redesign to take into consideration the specific features of the FRTB.

2. Introduction and legal background

43. European legislators have acknowledged the need to ensure consistency in the calculation of RWA for equivalent portfolios, and the CRR and CRD include a number of mandates for the EBA to deliver technical standards, guidelines and reports with the aim of reducing uncertainty and differences in the calculation of capital requirements.

44. In this regard, Article 78 of the CRD requires the EBA to produce a benchmarking study on both credit and market risk to assist CAs in the assessment of internal models. The study should highlight potential divergences among banks or areas in which internal approaches might have the potential to underestimate their own funds requirements that are not attributable to differences in the underlying risk profiles. CAs are required to share this evidence within colleges of supervisors as appropriate and take appropriate corrective actions to overcome these drawbacks when deemed necessary. Directive (EU) 2019/878[4] of the European Parliament and of the Council of 20 May 2019 amending Capital Requirements Directive IV (CRD V) has not changed this mandate.

45. The EBA has devoted significant effort to the analysis of the consistency of outcomes in RWA, to understand the causes of possible inconsistencies and to inform the regulatory repair process. The EBA's ongoing work on benchmarking, supervisory consistency and transparency is fundamental to restoring trust in internal models and the ways in which banks calculate asset risks.

46. The use of internal models gives banks the opportunity to model their risks according to their business models and the risks faced by the bank itself. The introduction of a benchmarking exercise does not change this objective; rather, it helps to identify the non-risk-based variability drivers observed across institutions.

47. This MR benchmarking exercise is an MRWA variability assessment performed over a large sample of banks (40 banks at the highest level of consolidation across 13 jurisdictions within the EU). The banks participating in this exercise are those that have been granted permission to calculate their own funds requirements using internal models for one or more of the following risk categories:

    a) general risk of equity instruments;

    b) specific risk of equity instruments;

[4] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L0878&from=EN

c) general risk of debt instruments;

d) specific risk of debt instruments;

e) foreign exchange risk;

f) commodities risk; and

g) correlation trading.

48. Pursuant to Article 362 of the CRR, the general risk of debt instruments should refer to interest rate risk. Similarly, the general risk of equity instruments refers to the change in the value of indices.

49. Banks that have approval only for the general risk of equity or debt instruments (in accordance with Article 363 of the CRR) may use a different definition of general risk (e.g., by including credit spread risk in the interest rate general risk) if they are able to demonstrate that this leads to higher RWA. Separate permission is required for each risk category. Many banks do not have permission for internal models for all risk categories, so the number of contributions for each hypothetical portfolio in this exercise varies across the sample.

50. Banks that have permission to use the internal model for calculating MR own funds requirements for one or more – but not all – of the risk categories in accordance with Article 363(1) of the CRR ('partial use') exclude certain risks or positions from the scope of the internal model approval. In this case, the own funds requirements for the risk categories outside the scope of the internal model are calculated according to the standardised approach.

51. In addition, as set out in Article 369(1)(c) of the CRR, banks should conduct validation exercises on hypothetical portfolios to test that the model is able to account for particular structural features. These portfolios should not be limited to the portfolios defined in this exercise; however, this exercise is a useful starting point for banks to meet this legislative requirement.

52. The assessed MR results, when provided and where applicable, are VaR, sVaR, IRC and APR figures for specific and aggregated trades. Moreover, a preliminary assessment of IMV was performed, primarily to ensure that the participating banks make uniform assumptions when entering the hypothetical trades.

53. In addition to these submissions, banks using an HS approach for VaR were requested to provide one year of P&L data for each of the individual and aggregated portfolios modelled. The objective of collecting this additional information was to employ the data vector to perform alternative calculations for VaR using, where possible, a consistent 1-year lookback period and controlling, as far as possible, for the different options that banks can apply within regulation.

54. Regulation (EU) 2019/876[5] of the European Parliament and of the Council of 20 May 2019 amending the Capital Requirements Regulation as regards the leverage ratio, the net stable funding ratio, requirements for own funds and eligible liabilities, counterparty credit risk, market risk, exposures to central counterparties, exposures to collective investment undertakings, large exposures, reporting and disclosure requirements (CRR II) will have a significant impact on the market risk benchmarking exercise once it is fully implemented. However, for the time being the CRR framework will be applied for the purpose of the benchmark exercise in accordance with Article 78 of the CRD.

[5] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0876&from=EN

3. Main features of the 2022 market risk benchmarking exercise

55. Based on the EBA benchmarking ITS, the MR benchmarking exercise is carried out by following three main steps. First, the EBA defines the hypothetical instruments and portfolios, which are the same for all banks, in order to achieve a homogeneous and comparable outcome across the sample. Second, banks are asked to submit the data accordingly. Third, and finally, the EBA processes and analyses the data, providing feedback to CAs. During the process, the EBA supports CAs' work by providing benchmarking tools to assess banks' results and detect anomalies in their submissions.

3.1 Definition of the market risk hypothetical portfolios

56. The MR portfolios have been defined as hypothetical portfolios composed of both non-CTPs and CTPs, as set out in Annex V of the benchmarking ITS. The exercise includes 81 instruments recombined into 65 portfolios (59 individual and 6 aggregated), capitalised under the VaR, sVaR and IRC models, comprising mainly plain vanilla and some complex financial products in all major asset classes: EQ (18 instruments and 10 individual portfolios), IR (20 instruments and 17 individual portfolios), FX (9 instruments and five individual portfolios), CO (four instruments and three individual portfolios) and CS (28 instruments and 21 individual portfolios). The EBA also designed aggregated portfolios, obtained by combining individual ones, to take into account diversification effects. Each aggregated portfolio has a particular composition: the first (portfolio 60) encompasses all asset classes; the second (portfolio 61) is made up of only EQ portfolios; the third (portfolio 62) is made up of only IR portfolios; the fourth (portfolio 63) is made up of only FX portfolios; the fifth (portfolio 64) is made up of only CO portfolios; and the sixth (portfolio 65) is made up of only CS portfolios.

57. In addition, the set of portfolios includes two instruments and four portfolios (three individual and one aggregated) used for correlation trading activities, capitalised under the VaR, sVaR and APR models. These portfolios contain positions in index tranches referencing the iTraxx Europe index on-the-run series. The portfolios are constructed by hedging each index tranche with the iTraxx Europe index on-the-run 5-year series to achieve a zero-credit spread value of 1 basis point (CS01) as at the initial valuation date (spread hedged). No further re-hedging is required.

58. A more detailed explanation of the portfolios can be found in the benchmarking ITS on the EBA website.[6]

3.2 Data collection process

59. The data for the supervisory benchmarking exercise were submitted by banks to their respective CAs using the supervisory reporting infrastructure. Banks submitted the specified templates provided in the ITS, where applicable.

3.2.1 IMV

60. The reference date for IMV was 23 September 2021, 5.30 p.m. CET. Banks entered all positions on 16 September 2021 ('reset or booking date'), and, once positions had been entered, each instrument aged for the duration of the exercise. Furthermore, banks did not take any action to manage the instruments in any way during the entire exercise period.

61. The IMV figure to be reported by the banks for each hypothetical instrument was defined as the mark to market of the instrument on the booking date plus the profit and loss from the booking until the valuation date and time. Therefore, it was the mark to market of the instrument on 23 September 2021, 5:30 p.m. CET.

3.2.2 Risk measures

62. Pursuant to the common instructions provided, banks were required to calculate the risks of the positions without taking into account the funding costs associated with the portfolios (i.e., no assumptions were admitted with regard to the means of funding the portfolios). Moreover, banks were required to exclude, as far as possible, counterparty credit risk when valuing the risks of the portfolios.

63. Banks were required to calculate the regulatory 10-day 99% VaR on a daily basis. sVaR and IRC could be calculated on a weekly basis. In such cases, sVaR and IRC had to be based on end-of-day prices for each Friday in the time window of the exercise. For the four CTPs (54-56 and 66), APR was also requested.

64. For each portfolio, banks were asked to provide results in the base currency, as indicated in Annex V of the benchmarking ITS. The choice of base currency for each trade was made to avoid polluting results with cross-dependencies on risk factors.

[6] https://eba.europa.eu/regulation-and-policy/supervisory-benchmarking-exercises/its-package-for-2022-benchmarking-exercise. Please also refer to Commission Implementing Regulation EU 2016/2070 of 14 September 2016 and Commission Implementing Regulation 2019/439 of 15 February 2019, laying down ITS in accordance with Article 78(2) of Directive 2013/36/EU (https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1562830373986&uri=CELEX:32019R0439).

65. All collected data underwent a preliminary analysis to spot possible misinterpretations of the common instructions set out in the ITS/RTS on benchmarking and outliers, as defined hereafter.

3.3 Participating banks

66. A total of 41 banks representing 13 EU countries participated in the exercise (see Table 18 in the annex). All EU banks with MR internal models approved by CAs were asked to submit data at all levels where own funds requirements are calculated. The EBA collected the results only at the highest level of consolidation.

67. CAs are in charge of conducting similar benchmarking investigations for results at a 'solo' level within their own jurisdictions for eligible banks.

3.4 Data quality issues

68. The data collection process aims to ensure the reliability and validity of the data obtained. In this regard, it is obvious that an unwanted driver of variability (which would pollute the results) could be misunderstandings vis-à-vis the portfolios and the specific instruments included in them.

69. IMV results reached the EBA in November/December 2021, after which the EBA carried out a preliminary IMV analysis and provided CAs with a tool to help them spot likely anomalies or misunderstandings regarding the interpretation of each portfolio. This was done to enhance the quality of all risk measures so that they would be provided in accordance with a correct interpretation of the portfolios. This step was conducted before the computation of the risk measures by the banks. Where the price of an instrument fell outside a certain range,[7] more investigation had to be undertaken by the CA, which could – if necessary – ask the banks in its jurisdiction for a repricing and subsequent resubmission. The same process was carried out for the risk measure submission.

70. The issue experienced in the previous exercises linked to the aggregated portfolio figures no longer seems to be a major issue. It is worth noting that some banks reported the IMVs and risk measures for the aggregated portfolios without including all the relevant components.[8] The reason was that the 2018 (and previous) ITS required banks to report the value of aggregated portfolios even if not all individual portfolios are modelled for the benchmarking exercise. As a result, the submissions were not comparable with those valued in full. This issue was addressed in the 2019 exercise, and since then banks have reported the results for the aggregated

[7] The range means the interval between the first and third quartiles. These quartiles were considered and subsequently updated when resubmissions were received.

[8] Some banks reported values for aggregated portfolios, taking into account only those components for which they had permission to use an internal model. This is clearly not a data quality issue, and it is correct that banks report results only where they have permission to do so for regulatory purposes.

portfolios only if the results of all components have been submitted.[9] The structure of the 2019-2020 exercise, i.e. a plurality of instruments that are recombined into a plurality of individual portfolios, which are themselves the components of the aggregated portfolios, produced a similar error, i.e. the absence of some instrument components within some of the individual portfolios. Nonetheless, banks should not provide any (aggregated or individual) portfolios where any instrument is missing in order not to distort the risk measures analysis. This specification was further clarified in the ITS 2022, so the possibility that some individual portfolios could have been submitted even when some specific instruments were missing cannot be ruled out. On the other hand, the data submission seems compatible with the correct interpretation of the rule, at least for the majority of submitters.

71. It should be recalled that the 2022 exercise is the first exercise where EBA is collection information concerning the sensitivities linked to the SBM and the OFR linked to the SBM from the banks participating in the benchmarking exercise. The complete representation of the sensitivities collected is not possible at the moment due to the very granular nature of the data collected. Nonetheless, some issues were detected, mainly linked to the volatility reported (inconsistent representation). All in all, the quality of the submitted sensitivities was more acceptable, especially considering this is the first exercise where the data is collected.

72. In the data analysis, it was clear that a major errors in the reporting of some Equity instruments were present; this was done because a mistake in the 2022 instruments on this asset class, concerning the notional of the instruments. A complete list of the errors in the submitted data is beyond the scope of this report, but the most common and easily avoided mistakes worth mentioning are as follows:

- Equity asset class: use of the wrong notional in the equity positions. This has generated very high dispersion for instruments 3, 5, 7 and 8; also, the future on Nikkei was wrongly represented. In the 2023 Annex, the instruction was corrected, reporting now the exact amount of share (or point of index) that the option or the future should report. This should enhance the quality of the submission of this asset class substantially.

- Interest rates: good results were obtained, especially where the international securities identification number was available. Minor errors were identified, such as wrong bookings (i.e., long position instead of short, or vice versa). But this was detected in a minority of the submissions. For instruments with very low IMVs, generally the swaps, a generally higher IQD (e.g., instruments 19, 21 and 36) was reported, but no systemic issue was detected. The Cross-currency Swap (now included on IR instruments), on the other side, present a very high IQD (256%) partially driven by the low IMVs, but also to an inconsistent booking practice of this instrument.

[9] Annex 5, Market risk 2021 BM, Section 1 (Common instructions), letter (ee)

- FX: the amendment of the previous instruction enhance the quality of the at submission for this asset class, which show now generally low IQD.

- Cmd: high IQD for instruments 48 and 49. This is driven mostly by the low value of the IMVs of these instruments.

- Credit spread: very good results in terms of CV and IQD, with very sporadic mistakes entailing possible wrong bookings, and no long position instead of a short, or vice versa.

73. Although these mistakes were detected thanks to the EBA data analysis and corrected by resubmission/cleansing of the data from the banks, unnoticed errors in data submissions could still be present in the dataset analysed, and this can potentially drive and pollute the results.

74. Data quality for the 2022 exercise has been fairly good, except for equity instruments. Ensuring data quality is a fundamental step for the benchmarking exercise. However, reporting errors might still occur in future exercises, and the process will allow both regulators and participating banks to learn from it.

4. Market risk benchmarking framework

75. The benchmarking exercise aims to assess the variability in banks' MR models and to identify the drivers that account for it. Variability in banks' models can come from three types of drivers.

76. First, variability can stem from banks' modelling choices that are explicitly envisaged in the regulation. For example, when modelling VaR institutions can choose to use a lookback period longer than the minimum (i.e., the previous year), use a weighting scheme for the data series, calculate the 10-day VaR directly or, alternatively, obtain a 1-day VaR and rescale it using the square root of time approximation. Likewise, when modelling IRC, banks can choose from several sources of the probability of default (PD) and have a certain degree of freedom when choosing the transition matrices applied, or when deciding on the liquidity horizon applied to a particular instrument. It should be highlighted that all of these possibilities are, in principle, acceptable under the current regulatory framework (the CRR), provided that they have been agreed on with the CA during the approval process. Therefore, given the wide range of approaches that each institution using internal models can choose to implement, some degree of variability is expected.

77. Second, there are other modelling choices that are not explicitly envisaged in the regulations, which may cause variability. Examples include differences in simulation engines; differences in pricing model assumptions; the modelling of returns, volatility, correlations and other indirect parameter estimates; additional risk factors considered in the models; different approaches to P&L computation and attribution; and a stochastic framework for the simulated shocks.

78. Finally, another source of potential variability originates from supervisory practices. In particular, the use of regulatory add-ons in the form of both VaR and sVaR multipliers and additional capital charges (e.g. to encompass risk not in VaR issues, any information technology (IT) and organisational weaknesses, independent pricing valuations or detected flaws) and, quite significantly, the application of limits to the diversification benefits applied by banks (i.e. not allowing a single calculation at consolidated level and, instead, requesting an aggregation of the capital results at sub-consolidated and/or subsidiary levels) are likely to increase the observed variability in capital. In most cases, these supervisory actions have been established to address known flaws or model limitations, or to add an additional layer of prudence. Therefore, they typically result in higher capital requirements than would otherwise be the case. However, they can also increase the variation in market own funds requirements between banks, particularly across jurisdictions. Although the effects on capital levels of these supervisory actions can be substantial, a benchmarking portfolio exercise is not suitable for assessing some of these supervisory actions. In particular, any constraints on diversification benefits and direct capital add-ons cannot be properly assessed, since these effects are entirely portfolio-dependent. To assess these effects, it would be necessary to use a much more realistic (hypothetical) portfolio,

comprising thousands of instruments and including partial model approval. Nevertheless, some supervisory actions can be assessed and the effects of regulatory add-ons on the VaR and sVaR multipliers will be analysed as part of this assessment.

79. Possible additional drivers of variation include:

- misunderstandings regarding the positions or risk factors involved that could not be resolved during the preliminary assessment (see Section 3.2);
- non-uniform market conventions and practices adopted in the hypothetical portfolio booking;
- incompletely implemented models (e.g., because a pricing module is being tested, or an additional risk factor is being taken into consideration);
- missing risk factors not incorporated into the model;
- differences in calibration or data series used in the modelling simulation;
- additional risk factors incorporated into the model;
- alternative model assumptions applied; and
- differences attributable to the methodology used (i.e. Monte Carlo (MC) versus HS or parametric).

4.1 Outlier analysis

80. After the data quality assurance process, the EBA performed an 'extreme value' analysis with the aim of excluding from the computation of the benchmarks those values for which the IMV and risk measures (RMs: VaR, SVaR, P&L VaR and ES) were found to lie outside a certain tolerance range due to misinterpretation of the trade or mistyping of bookings by the banks.

81. The presence of clear outliers in the data used to assess variability is deemed inappropriate, since these data points are likely to weigh heavily on the results, distorting the actual level of variability observed.

82. Extreme IMVs and RMs are defined as values outside the range of two truncated standard deviations[10] from the median. Since some results exhibited empirical distributions that had fatter tails than expected, outliers were defined as values differing by twice the truncated standard deviation or more from the median.

[10] The truncated standard deviation is computed by excluding the values below the 5th and above the 95th percentile of the data series.

83. If a bank's IMV or RM are found to be an extreme value for a particular instrument, then this observation is removed from the computation of the final benchmark statistics. The empirical evidence indicates that excluding the RMs based solely on IMV submissions, as in the previous exercise, implied that some extreme RM submissions are wrongly reflected in the benchmarking computation, while some good observations are removed. Changing this methodology did not influence the benchmarking data point, i.e., the median result. In addition, the overall dispersion of the portfolio was only marginally affected (slightly improved). The significant enhancement is in the communication to the CAs of the significant outliers to be examined with the bank. This approach, which was first adopted for the 2020 market risk benchmarking exercise, increased the overall quality of the benchmark data, providing more consistency for the benchmarks of these metrics.

84. The dispersion across the contributions is summarised by the IQD coefficient, which is more robust than the coefficient of variation (CV) for data derived from fat-tailed distributions. The higher the IQD, the more dispersed the data. IQD is defined as:

$$IQD = abs[(Q_{75th} - Q_{25th})/(Q_{75th} + Q_{25th})],$$

where Q_{75th} and Q_{25th} denote the 75th and 25th percentiles, respectively.

85. Another metric used in the variability studies is the CV, which is defined as the ratio between the standard deviation[11] and the mean (in absolute values):

$$CV = abs[StD/Mean].$$

86. The analysis reports both metrics because they jointly allow detection of the highest peaks of variability.

[11] The standard deviation was considered in order to gain a sense of the entire variability and a harmonised approach across the HPE. Obviously, a truncated standard deviation may appear more consistent for some highly dispersed trades.

Table 1: IMV statistics and extreme values

EU Statistics for IMV by instrument

		Main statistics								Percentiles			
	Instr. ID	Min	Max	Ave.	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Mean)	Num obs.[2]	25th	50th	75th	IQD
Equity	1	4,080,000	40,780,000	7,566,879	10,989,637	190,406,715	739	145%	21	4,080,500	4,085,399	4,085,399	0%
	2	464,750	465,450	465,098	142	199	6	0%	26	465,100	465,100	465,126	0%
	3	-4,503,163	-448,096	-2,314,663	2,039,824	2,044,982	8,643	88%	28	-4,479,125	-463,211	-448,585	82%
	4	-1,674,888	-802,152	-1,572,022	191,565	692,975	14,100	12%	19	-1,634,231	-1,599,246	-1,599,246	1%
	5	-18,379,750	-18,240	-8,827,553	8,359,908	8,335,511	38,891	95%	28	-18,287,861	-1,840,064	-1,833,332	82%
	6	-184,610	-177,761	-180,746	1,565	52,893	491	1%	24	-181,297	-180,503	-180,502	0%
	7	-1,062,395	-101,888	-540,141	477,336	478,490	3,443	88%	28	-1,039,401	-106,233	-103,543	82%
	8	-1,147,900	-108,273	-560,070	510,365	515,746	4,781	91%	27	-1,113,648	-118,027	-111,161	82%
	9	40,849	48,736	44,603	1,855	2,008	729	4%	25	43,745	44,768	45,278	2%
	10	-55,181	-48,810	-52,362	1,452	2,130	864	3%	24	-53,314	-52,716	-51,587	2%
	11	15,228	19,621	17,451	1,200	1,540	743	7%	23	16,646	17,732	18,265	5%
	12	19,629	23,650	21,584	943	1,020	739	4%	23	20,813	21,619	22,309	3%
	13	31,814	36,722	34,619	1,196	1,796	506	4%	24	34,124	34,766	35,263	2%
	14	-29,014	-22,941	-25,740	1,521	1,749	925	6%	25	-26,672	-25,983	-24,854	4%
	15	1,364	2,193	1,782	198	252	107	11%	22	1,688	1,791	1,903	6%
	16	2,913	3,672	3,215	240	285	111	8%	23	3,035	3,150	3,332	5%
	17	-2,924,000,000	-1,458,973,237	-1,877,763,980	642,954,041	726,768,509	10,310,321	34%	21	-2,657,601,598	-1,491,014,113	-1,488,413,560	28%
	18	1,012,192	1,053,152	1,031,950	11,333	12,353	7,908	1%	19	1,023,640	1,032,211	1,040,800	1%
Interest Rate	19	-25,491	-15,375	-21,579	2,729	3,389	1,901	13%	36	-23,535	-21,826	-19,814	9%
	20	-66,691	-43,000	-54,165	3,633	20,937	1,530	7%	35	-55,939	-54,249	-52,740	3%
	21	-44,191	-27,695	-37,531	4,689	5,316	3,358	13%	37	-40,999	-37,730	-33,511	10%
	22	-21,419	-14,372	-17,704	1,706	1,857	992	10%	38	-19,061	-17,789	-16,188	8%
	23	1,006,796	1,180,749	1,095,324	46,010	54,945	33,087	4%	14	1,063,589	1,089,248	1,124,946	3%
	24	1,250,045	1,293,152	1,279,277	10,259	16,040	620	1%	29	1,281,015	1,281,364	1,282,231	0%
	25	-1,436,915	-1,430,263	-1,432,023	1,043	3,458	202	0%	35	-1,432,264	-1,431,961	-1,431,782	0%
	26	1,307,147	1,310,244	1,308,484	832	24,752	499	0%	28	1,307,947	1,308,149	1,309,164	0%
	27	1,065,034	1,066,110	1,065,631	230	1,125	151	0%	32	1,065,509	1,065,571	1,065,804	0%
	28	1,157,813	1,159,859	1,158,660	538	678	297	0%	33	1,158,272	1,158,517	1,159,081	0%
	29	-1,151,837	-1,149,594	-1,150,366	715	934	195	0%	32	-1,151,110	-1,149,989	-1,149,862	0%
	30	-1,606,617	-1,596,170	-1,598,472	1,763	11,448	759	0%	34	-1,599,255	-1,597,826	-1,597,720	0%
	31	1,350,977	1,354,383	1,352,477	899	1,813	736	0%	35	1,351,757	1,352,410	1,353,350	0%
	32	1,156,719	1,163,658	1,160,971	1,181	2,387	355	0%	35	1,160,752	1,160,951	1,161,514	0%
	33	-1,081,416	-1,072,660	-1,077,289	1,626	2,777	860	0%	33	-1,078,264	-1,077,385	-1,076,892	0%
	34	1,075,000	1,083,493	1,079,406	2,401	3,148	770	0%	23	1,076,913	1,080,102	1,080,763	0%
	35	1,143,500	1,161,135	1,158,196	3,616	7,267	988	0%	24	1,157,148	1,158,025	1,160,237	0%
	36	9,763	45,000	31,055	10,065	10,450	7,801	32%	39	24,031	30,056	40,019	25%
	37	17,013	29,093	23,345	2,887	3,411	2,052	12%	37	21,554	23,411	25,020	7%
	38	-53,976	40,124	-7,488	23,906	27,598	16,431	319%	31	-21,812	-14,969	9,564	256%
FX	39	-23,811	-8,501	-18,435	3,460	7,497	2,895	19%	32	-21,453	-17,858	-16,080	14%
	40	82,327	115,290	101,180	6,952	14,289	4,361	7%	31	97,166	100,909	105,645	4%
	41	850,123	852,108	851,549	401	781	287	0%	30	851,289	851,667	851,789	0%
	42	16,526	20,589	18,559	1,121	1,875	611	6%	30	18,038	18,650	19,305	3%
	43	1,053,477	1,082,569	1,072,523	7,309	39,416	3,933	1%	32	1,069,744	1,072,934	1,077,340	0%
	44	-296,016	-237,602	-251,074	8,949	59,122	1,874	4%	33	-252,341	-250,317	-248,708	1%
	45	-44,519	-31,797	-38,225	2,246	6,281	859	6%	33	-39,000	-38,355	-37,371	2%
	46	925,790	962,188	939,739	7,908	13,385	3,620	1%	31	935,336	938,592	943,820	0%
	47	-1,018,399	-986,181	-1,006,971	7,171	14,615	3,088	1%	30	-1,011,262	-1,007,711	-1,006,688	0%
Commodities	48	-32,702	7,807	-17,238	11,300	17,333	6,561	66%	12	-23,018	-18,048	-9,050	44%
	49	-17,090	33,176	16,389	13,362	18,596	7,252	82%	12	9,317	17,958	24,016	44%
	50	198,295	299,469	260,440	25,002	33,007	9,634	10%	11	252,328	261,079	275,798	4%
	51	-174,782	-120,366	-143,926	13,960	18,157	3,095	10%	11	-148,472	-145,026	-136,424	4%
Credit Spread	52	-37,860	-36,651	-37,440	345	545	177	1%	19	-37,697	-37,517	-37,340	0%
	53	-14,359	-13,005	-13,531	343	559	81	3%	19	-13,613	-13,429	-13,350	1%
	54	35,566	36,386	35,951	208	242	115	1%	19	35,786	35,999	36,085	0%
	55	-4,240	-2,919	-3,694	273	1,012	91	7%	17	-3,801	-3,747	-3,621	2%
	56	45,114	49,292	46,273	920	2,608	303	2%	17	45,816	45,893	46,402	1%
	57	-47,287	-46,035	-46,644	291	367	144	1%	18	-46,777	-46,649	-46,558	0%
	58	21,021	22,063	21,583	278	348	139	1%	20	21,342	21,561	21,773	1%
	59	-21,835	-21,239	-21,564	160	301	106	1%	20	-21,676	-21,614	-21,443	1%
	60	27,387	28,073	27,701	172	223	63	1%	19	27,612	27,668	27,857	0%
	61	-23,227	-22,997	-23,090	63	84	40	0%	20	-23,128	-23,083	-23,054	0%
	62	24,717	25,087	24,899	89	110	54	0%	20	24,853	24,917	24,961	0%
	63	24,152	24,757	24,363	133	211	87	1%	19	24,257	24,350	24,438	0%
	64	35,029	36,165	35,773	319	442	63	1%	18	35,801	35,830	35,956	0%
	65	42,703	44,432	43,305	385	764	121	1%	21	43,092	43,134	43,486	0%
	66	-37,363	-36,670	-37,107	166	223	58	0%	20	-37,201	-37,087	-37,075	0%
	67	-21,032	-20,489	-20,788	141	168	58	1%	20	-20,875	-20,743	-20,724	0%
	68	1,088,750	1,111,328	1,107,236	6,932	13,584	588	1%	18	1,106,715	1,109,888	1,110,609	0%
	69	126,329	152,665	139,469	4,854	7,102	768	4%	18	139,011	139,757	140,548	1%
	70	1,096,589	1,106,277	1,103,808	1,826	4,109	540	0%	23	1,103,322	1,104,251	1,104,757	0%
	71	1,109,100	1,112,278	1,111,195	760	1,457	267	0%	24	1,110,613	1,111,478	1,111,675	0%
	72	-1,058,427	-1,056,183	-1,057,007	474	4,329	127	0%	22	-1,057,148	-1,057,001	-1,056,832	0%
	73	1,128,534	1,130,812	1,130,020	639	4,483	145	0%	21	1,129,936	1,130,210	1,130,370	0%
	74	1,600,316	1,627,515	1,619,999	7,812	27,669	1,812	1%	25	1,620,813	1,622,835	1,623,028	0%
	75	-109,843	-97,460	-103,026	2,858	3,475	1,754	3%	18	-104,881	-102,909	-101,239	2%
	76	1,065,980	1,074,492	1,070,001	2,102	14,436	1,251	0%	24	1,068,736	1,069,533	1,071,815	0%
	77	-140,151	-130,819	-135,099	2,928	3,298	2,521	2%	19	-137,668	-134,435	-132,626	2%
	78	1,223,815	1,236,836	1,230,165	3,231	27,905	1,988	0%	25	1,228,240	1,229,369	1,232,790	0%
	79	-179,542	-152,771	-166,645	8,134	8,758	5,109	5%	19	-176,776	-165,281	-160,519	5%
CTP	80								3				
	81								2				

[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

[2] Refers to the number of banks included in the computation of the statistics

Table 2: Average IMVs' interquartile dispersion by asset class

Average Interquartile dispersion by asset class

	Interquartile range 2022 exercise	*Interquartile range 2021 exercise*	*Interquartile range 2020 exercise*	*Interquartile range 2019 exercise*	*Interquartile range 2018 exercise*
Equity	21%	2%	1%	2%	2%
IR	16%	19%	2%	3%	8%
FX	3%	4%	16%	15%	6%
Commodity	24%	4%	10%	6%	8%
Credit spreads	1%	1%	1%	3%	6%
CTP			5%	8%	103%

87. Table 1 and Table 2 depict the results at the level of both each individual instrument and each risk type. As shown, the highest dispersion at the level of the individual instruments is detected for IR instrument 38 (5 years IRS) (IQD 256%). This high dispersion is due to the 'low value' (close to zero) of the instruments. In terms of its construction the IQD is a ratio of two absolute measures (difference of the 25th and 75th quantiles, divided by the sum of the two). Therefore, a difference of a few hundred euros in the IMV generates very high IQD statistics, which is the case for some derivative instruments that exhibit an IMV of close to zero at inception, since they are entered at market rates. The same differences in the case of instruments that are much more valuable generate IQDs close to zero. Moreover, it appears that the variety of market practices concerning this instrument is so that make it particularly difficult to describe precisely and so it becomes complicated for banks to book it consistently

88. Besides the 5-year IRS Instrument 37, IR instruments 36 show an IQD above 25%. The perception with regard to these submissions, besides the minor presence of trivial errors such as inverted bookings (long instead of short), is that minimal changes in the parameter cause a significant change in the IMVs. This exacerbates the issue described for instrument 38, which is linked to the low absolute value of the instruments. This tends to inflate the IQD index of these instruments. Excluding these instruments gives us an average IQD for the IR asset class of 2%, which can be interpreted as an extremely low dispersion.

89. The Cmd instruments 48 and 49 also show high IQDs (44%). This is likely due to the low IMVs value, which exacerbate the IQDs, since the instruments are not changed with respect the previous exercise, so such worsening of the IMVs submission would not be explained otherwise.

90. EQ instrument 3, 5, 7 and 8 presents IQDs barely above 50%. These high IDQs are due to an error in the instructions that caused a wrong booking of these instruments. The error was corrected and for the next exercise it is expected that the IQD of this asset class would return to normal standard.

91. Overall, the IQD by asset class for the instruments of the 2022 exercise is comparable to the past exercises for the FX and CS asset classes. The worsening of the other asset class is driven

by specific instruments (e.g., instrument 38) or by a mistake in the ITS instruction (EQ instruments – futures). This means that an adjustment to the 2022 instructions was needed, and for the future exercise there is the expectation that of obtaining a generally low IQD of the instruments in the exercise.

92. Comparing the 2022 instruments with the 2021 instruments purely on the basis of the IQD, once the instruments with values of close to zero that skew the average by asset class have been excluded, as well as the issue linked to the futures description, it would appear that the quality of the data remain stable.

93. From an aggregated risk-type perspective, EQ, IR and CO instruments show the highest dispersion, with values much higher with the 2021 exercise. The FX and CS asset classes are substantially equal with respect to the previous exercise.

94. CTP IMVs are no longer reported since the observations obtained are too few to provide meaningful statistics.

95. A cluster analysis (see Figure 1, Figure 2, Figure 24 and Table 3) was performed to strengthen and deepen the aforementioned descriptive insights. It shows the dispersion of the IMVs by instrument and helps in identifying clusters in the instruments' pricing that could explain the scattering of IMVs for some trades. The results of this analysis suggest that the clusters are observable for EQ instruments 1, 3-5, 7-8 and 17, for IR instrument 38, and for CO instruments 48 and 49. These clustered distributions for EQ are linked to the wrong instructions for futures, while the rest seems to be more closely linked to the extremely low value of the instruments rather than to a misinterpretation of the instruments; this is also confirmed by an analysis of the dispersion of the risk measures relating to these portfolios.

Table 3: IMV cluster analysis – number of banks by range

2022 IMV cluster analysis by instrument: number of banks by range

(X = ratio with the median)

100 *Range containing more than 15% of the total obs for that particular portfolio*

	Instr. ID	300% < X	300% ≥ X >200%	200% ≥ X >150%	150% ≥ X >100%	100% ≥ X >50%	50% ≥ X >0	0 ≥ X >-100%	-100% ≥ X > -200%	Num obs.
Equity	1	12			3	16				31
	2				10	21				31
	3	13				15				28
	4				13	5	10			28
	5	12			1	14	1			28
	6				11	12	4			27
	7	13				15				28
	8	13				15				28
	9				13	14				27
	10				14	13				27
	11	1			12	12				25
	12	1			11	13				25
	13				14	13				27
	14				14	13				27
	15	1			11	13				25
	16				12	13				25
	17		1	11	1	14			1	28
	18				10	11				21
Interest Rate	19		1		20	19		1		41
	20	1	1		16	18			2	38
	21	1			19	20	1			41
	22				21	19		1		41
	23				7	8				15
	24				16	17				33
	25				20	19				39
	26				16	16				32
	27				20	19				39
	28				20	19				39
	29				20	19				39
	30				20	19				39
	31				19	18				37
	32				19	19				38
	33				17	19				36
	34				12	13	1			26
	35				13	14		1		28
	36				21	14	5	1		41
	37				21	19		1		41
	38	2	4	2	8	5		5	3	29
FX	39				17	13	1	3		34
	40	1			16	16	2			35
	41				17	17				34
	42				17	17				34
	43				17	17				34
	44				17	15	2			34
	45			2	15	17				34
	46				16	18				34
	47				17	17				34
Commodities	48			2	5	2	1	1	2	13
	49			2	5	2	1	1	2	13
	50				6	6				12
	51				6	6				12
Credit Spread	52				11	11				22
	53				11	11				22
	54				11	11				22
	55		1		8	9				18
	56				9	9				18
	57				11	11				22
	58				11	12				23
	59				11	12				23
	60				11	12				23
	61				11	12				23
	62				11	12				23
	63				11	12				23
	64				10	11				21
	65				11	12				23
	66				11	12				23
	67				11	12				23
	68				10	11				21
	69				10	10				20
	70				13	14				27
	71				13	13	1			27
	72				13	14				27
	73				13	14				27
	74				12	15				27
	75				11	11				22
	76				13	14				27
	77				11	10	1			22
	78				13	14				27
	79				11	11				22
CTP	80									0
	81									0

96. In particular, as shown in Table 3 and Figure 2:

- Instrument 3, 5, 7, 8 and 17 (EQ) are the high IQD instruments, and this is due to the error in the instruction (amended in the 2023 instructions); for the rest there are generally very few extreme outlier observations, which do not represent a substantial problem for the CAs.
- Instruments 38 (IR): this the only extreme outliers with an IQD above 50%.
- Instruments 39 (FX): the only outlier with a relatively high IQD (above 10%).
- Instruments (CO): instruments 48 and 49 are high IQD instruments with some significant outliers.
- Instrument 67 (CS): No significant outliers.

97. Some of these extreme outlier banks were classified as a high priority for the CAs (see also Chapter 6), so they were followed with greater attention during the exercise in order to specifically define the reason for the extreme result.

98. CTPs are no longer reported in the cluster analysis because of the scarcity of contributions.

99. Despite many recommendations, some minor misalignments in the IMV have been detected due to the reporting of the 'clean price' (i.e., the price of a trade excluding the accrued interest) instead of the 'dirty price' (i.e., the price of a trade including any interest), which is what was intended for the mark to market valuation. This has been detected especially in the bond price, as in instruments 24-35. This problem was more frequent in the past, but it is evident that not all the banks follow the instructions in this regard. On the other hand, this mistake does not significantly prejudice the provision of the risk measures.

100. In addition, the EBA recommends that banks make better use of the Q&A tool by submitting questions before the start of the exercise to avoid misinterpretations in the future. Banks are kindly invited to provide, using the Q&A tool, their best practice and market standard conventions when further specifications of the hypothetical trades are needed.

101. Evidence from a large majority of the banks is that IMV comes from front office systems. This is acknowledged as the best practice for alignment with real market-trading activities.

102. Figure 1 and Figure 2 report the clusters found in the IMV results for a sample of low IQD instruments (0% IQD or close to zero) and high IQD (the highest in the asset class) instruments. All the instruments' IMV distributions are available in the annex in Figure 24.

Figure 1: IMV scatter plots – low-IQD instruments

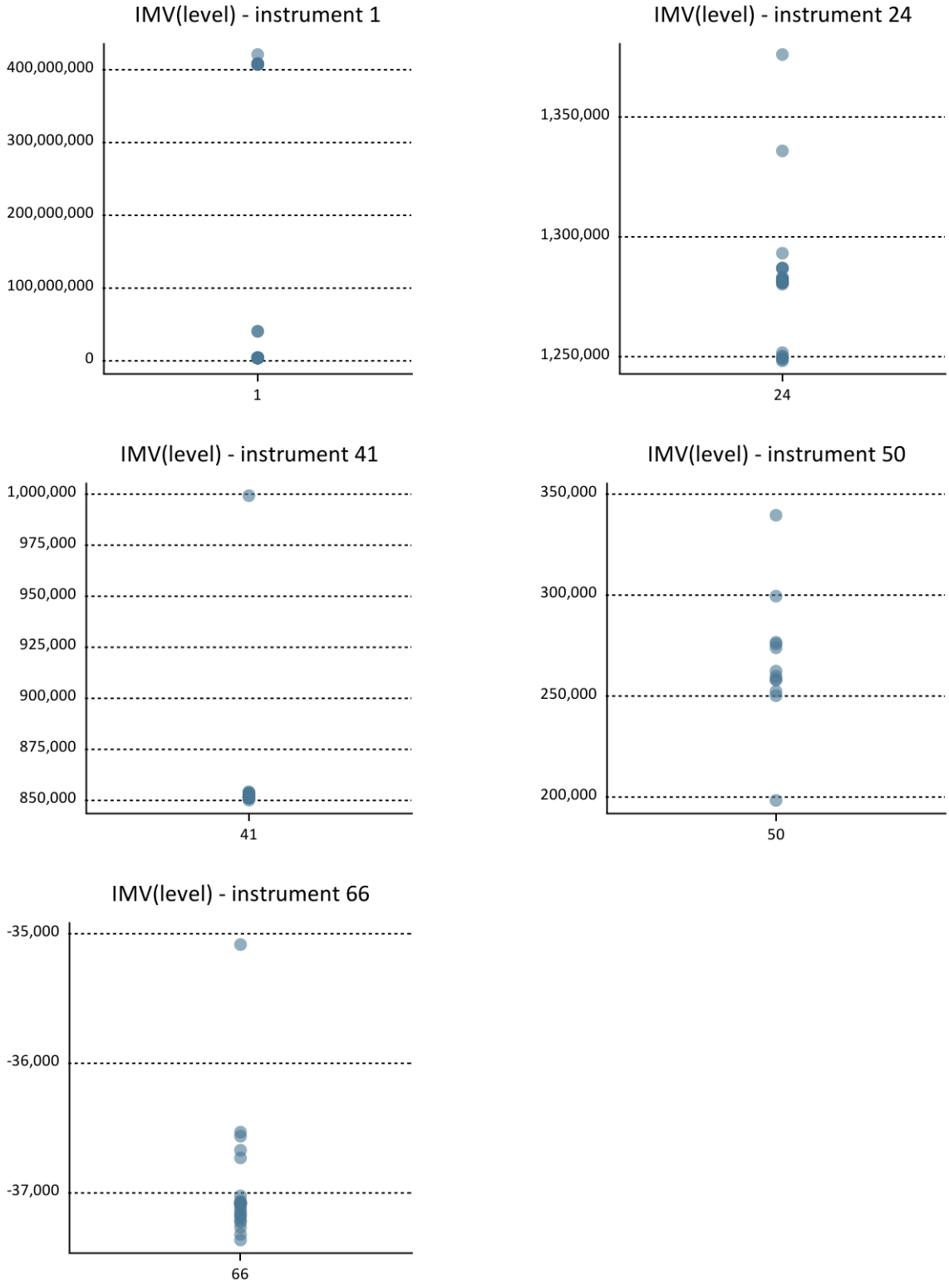
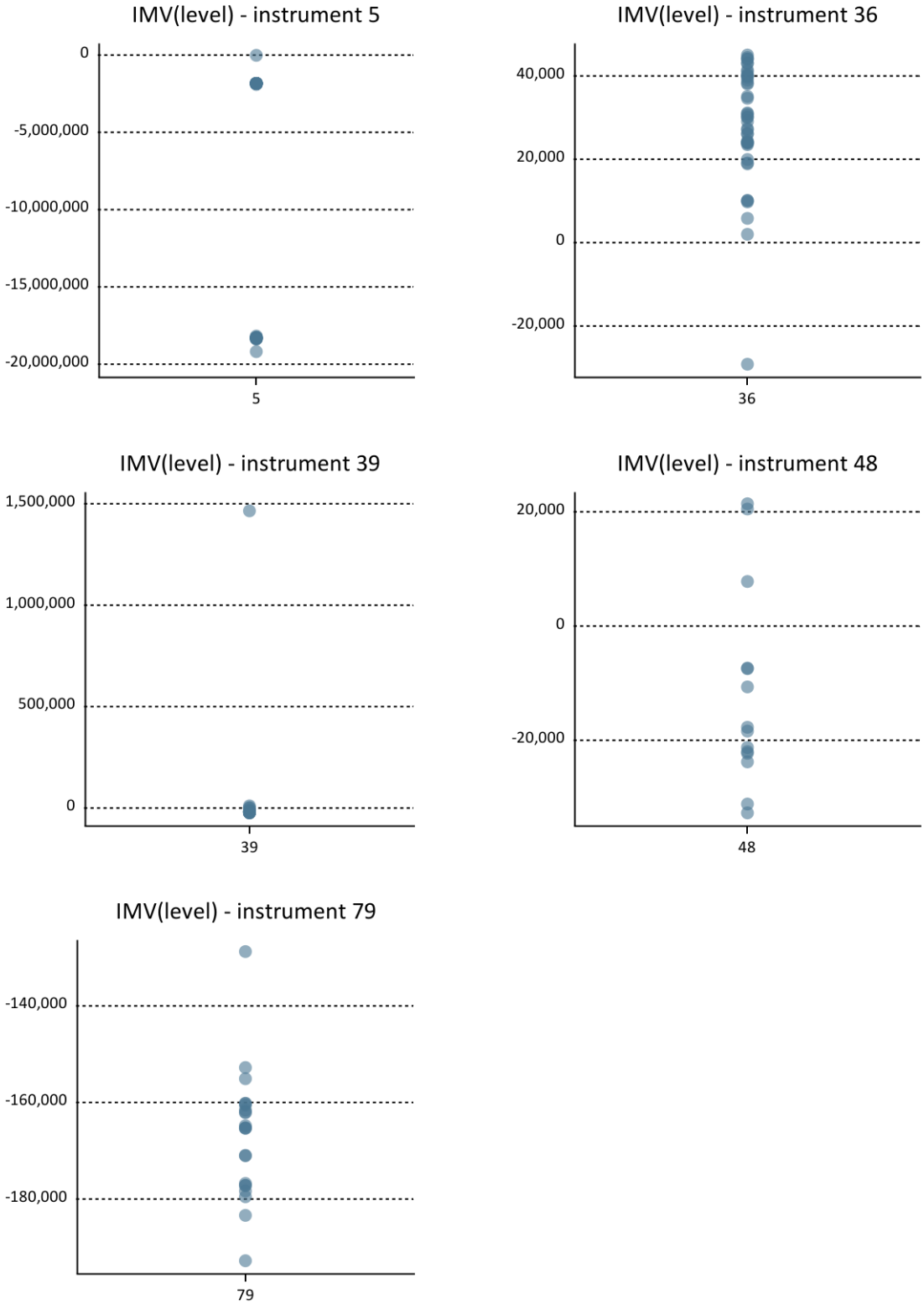


Figure 2: IMV scatter plots – high-IQD instruments



103. The 'concentration index' as per the percentage of values between 50% and 150% of the median value in Table 3 shows that, overall, 93% of the observations lie between those ranges.

104. This result is higher, because of the mistake in the future instruction, but consistent with that reported following last year's MR benchmarking exercise, demonstrating once again that the simplification of the instruments resulted in a decrease in the number of outliers.

105. Given the EBA's experience of past benchmarking exercises, values lying in this range might be considered acceptable on the basis of fine-tuning as successive benchmarking exercises are run. Nevertheless, the aim will be to increase this IMV empirical range coverage in subsequent exercises.

106. For many hypothetical instruments, the IMV variability is explained by the divergence in terms of both fixings and market practice assumptions by the participating banks. Therefore, the interpretation of the deals and market practices substantially explains the observed variability.

4.2 Risk and stressed measures assessment

107. For VaR and sVaR, variability was assessed by using the banks' reported VaR and sVaR over a 2-week period (from 17 January 2022 to 28 January 2022). Banks submitted weekly or daily observations, depending on their models, and the final risk measures by portfolio were obtained by averaging the observations over the 2 weeks.

108. In the sample, 12 out of 41 banks calculated weekly sVaR measures. The remaining two thirds of the participating banks computed daily sVaR measures.

109. In addition, a P&L VaR measure produced by the EBA using the P&L data provided by banks via an HS approach was analysed. The relevant banks delivered a yearly 1-day P&L vector for each of the individual and aggregated portfolios modelled. These were used to compute the P&L VaR.

110. The additional P&L information for non-APR portfolios allowed the EBA to compute the alternative measure for VaR previously defined, and to check the variability of the results across banks by calculating VaR using a 1-year lookback period.

111. Additional checks were carried out for the available P&L vectors, such as the 1-day P&L versus the 10-day P&L (either overlapped or not), where applicable. Furthermore, the time series with the wrong time window were dropped. P&L vectors provided by banks with no HS model were also dropped. A final consistency check across the HS banks entailed computing the ratio between P&L VaR and the regulatory VaR provided, which can be expected to be close to 1.[12]

[12] It should be noted that this expectation depends on the lookback period for VaR.

112. Clearly, the P&L VaR assessment is possible only for banks applying an HS approach, and with at least 185 days of results submitted. Accordingly, banks applying an MC or parametric approach, or another approach other than HS, cannot be subject to this assessment, and have been dropped from the sample (see also Section 3.4, 'Data quality issues').

113. The P&L VaR was computed as the absolute value of the empirical first percentile of the P&L vector rescaled to 10 days by applying the square root of time approximation, without applying any data-weighting scheme:[13]

$$VaR_{99\%}^{10day} = \sqrt{10} * VaR_{99\%}^{1day}$$

114. The P&L vector is used to assess the degree of P&L correlation across banks, as well as the level of volatility shown in each bank's vector. This analysis should provide useful insights into the degree of market consensus on the relevant risk factors in terms of both market dynamics and volatility levels. Obviously, this analysis, like most of those discussed here, relies on sufficient data points and portfolios being modelled by banks to ensure robustness and consistency.

115. The IRC analysis cannot be deepened in this way for VaR because of the higher level of confidence (99.9%) and longer capital horizon (1 year) applied in these metrics. Nevertheless, a variability analysis was performed. In the paragraph concerning IRC, particular emphasis is reserved for missing, zero or unrealistically low results, which suggest that key underlying risk factors are not efficiently captured by the IRC internal model.

116. In the sample, 13 out of 23 banks computed weekly IRC measures.

117. It is apparent that more complex risk measures, such as IRC, are computed at a less frequent pace (i.e., a weekly basis instead of a daily basis).

118. For APR, only a small number of contributions were submitted because of the scarcity of approved internal models on CTPs and because most institutions consider the CTP business to be declining significantly as a result of the recent financial crisis. Therefore, the sample is quite limited.

119. The ES, as an alternative risk metric to VaR, has been estimated from the daily P&L series by averaging the P&L observations below the 2.5th percentile converted by the square root of time approximation and taking the absolute value:

[13] Some banks apply data weightings at a risk factor level and these will be present in the P&L vectors. This is an implicit source of variability that cannot be controlled.

$$ES_{97.5\%}^{10day} = \sqrt{10} * ES_{97.5\%}^{1day} = \sqrt{10}\ \frac{1}{n}\ \sum_{i=1}^{n} P\&L_{t_i}$$

where *n* = number of days describing the 2.5th quantile rounded to the highest decimal.

120. For the aggregated portfolios, diversification effects were checked with regard to the VaR, sVaR and IRC metrics, regardless of whether they were provided or estimated.

121. For the most inclusive portfolios – i.e., the aggregate portfolios – the implied capital charges were also computed, and their variability analysed. Where possible, the idiosyncratic factors that drive variability and the impact of regulatory add-ons (e.g., multipliers) were analysed.

122. It is worth noting that, although the effects on capital levels of these supervisory actions can be substantial, an HPE is not suitable for assessing such differences. This is especially the case for diversification benefits since these effects are entirely portfolio-dependent. More on this is included in the following subsection entitled 'Limitations'.

123. Finally, to make the analysis more comprehensive, CAs were asked to complete a questionnaire about the takeaways from this benchmarking analysis and the actions they plan to take to overcome potential weaknesses in the banks' MR models (see Section 6 of this report). Thanks to the interview process, the EBA had the opportunity to discuss directly some issues raised by CAs when challenging the models in the ongoing assessment process.

4.2.1 Limitations

124. The design of the benchmarking portfolio exercise described in the ITS aims to ensure the quality of the data used in the report to be produced by the EBA and, more importantly, to identify the banks and portfolios that need specific attention on the part of the responsible CAs. Nevertheless, any conclusions regarding the total levels of capital derived from the hypothetical data should be treated with due caution. The hypothetical portfolios are very different from real portfolios in terms of size and structure. What is more, the data cannot reflect all the actions taken by supervisors.

125. From a methodological perspective, the sVaR metric variability observed could originate either from differences in modelling or from the different data periods used for sVaR computation. Further variability stems from banks' different stress periods because there is no common benchmarking stress period. To allow more specific analysis of this aspect, since the 2019-2020 benchmarking exercise more information about the stressed VaR time window has been requested from banks by expanding the relative template envisaged in Annex VI of the benchmarking ITS (in this regard, see subsection 5.2.5.d, 'Common stress period considered' below).

126. Another limitation that was tackled in this exercise is that of producing a segregated analysis for institutions with partial model approval (e.g., general risk only) in order to split the result for portfolios with specific risk to filter the additional unwarranted dispersion of VaR figures. The benchmark analysis was run by splitting banks with full approval for equity and IR

from those with partial approval to filter out the variability of the risk measure introduced by the partially approved banks.

127. Banks with partial model approval provided insights into how they approached the benchmarking exercise. It has been found that the differences reported by the banks in respect of the EBA's benchmark measure are almost entirely explained by considering the internal measure of risk, which is not approved for capital purposes but is more complete in terms of risk factor coverage.

128. In summary, the reporting of partial use approval results should be continued for the purpose of the exercise. However, it should be considered within the specific sample in order to assess any bias these partial use approval results could introduce into the results for the rest of the sample observed.

5. Overview of the results obtained

5.1 Analysis of VaR and sVaR metrics

129. The dataset used to perform the assessment of risk measures for the 2022 exercise was determined on the basis of the actual dispersion of the risk measures analysed. The outcome of the IMV extreme value analysis was used as an early indication of the potential problems to be reported to banks by their CAs. As explained in Section 4.1, banks' data were taken into account only for portfolios for which the RM is between the benchmark (50th percentile) +/- two times the truncated standard deviation in the portfolio analysed. The rest was classified as an outlier. As shown in Figure 33, we can see that this methodology, contrary to what was used until the 2019 exercise, does not exclude RMs that are clearly consistent with the benchmark.

130. To check if submissions (by portfolio) were at least approximately symmetrically distributed around the mean and/or the median, the EBA checked for any significant differences between the mean and median values for the truncated sample. Table 20 in the annex reports the banks' VaR results in relation to the median, aggregated into six buckets, to enable the detection of unexpected clusters.

131. As Table 20 and Table 21 clearly show, the variability of the VaR (above 20% in IQD) remained substantially high and comparable to the previous year, where only FX portfolios asset class report some decrease in the IQDs. The analysis also identifies substantial clusters for portfolios 1-4 and 7 (EQ), portfolio 24 (IR), portfolio 33 (CO), and_36-37, 40-41, 43, 45, 52-53 (credit spread). After the spikes in the volatilities of the 2020-2021, in the 2021-2022 period the volatility in the market seems to be back to pre-Covid period (just slightly higher). This is reflected by lower levels of VaR. Nonetheless, the IQDs remain substantially high. At least for EQ portfolio this high IDQs should be caused by the errors in booking of the future products. Nonetheless, IQDs for FX and CS portfolio are substantially lower.

132. As in the previous exercise, the VaR values for CTPs (portfolios 54 to 56) are not reported because of insufficient numbers of these data submission to guarantee the significance of the statistics provided and the anonymity of the submissions.

133. The cluster analysis presented above is superior to a simple outlier analysis that flags submissions more than a designated number of standard deviations from the mean, as this method cannot easily be used for clustered or strongly asymmetric portfolios.

Interquartile dispersion

134. Figure 3 and Table 4 summarise the variability of the results, measured via the IQD and coefficient of variation, for the IMV as well as all three VaR measures (i.e. VaR, VaR for HS banks only and VaR calculated from the 1-year P&L series submitted by HS banks). IQD and CV for IMV,

PV, VaR and stress VaR, divided by risk factors, are reported at the bottom of Figure 3. Table 4 also includes the VaR results for MC simulation banks and the expected shortfall.

135. In terms of risks across different assets classes, the IQDs for VaR for EQ asset class is increased; while they are close to 20% for the IR and CO portfolios, they are lower than EQ and CS risk types. The asset class with the lower level of IQD is FX, with just 11%. The asset class with the highest IQD remain the CS (28%; it was 37% in 2021). Overall, the IQD is lower than in the 2021 exercise, where there was an average dispersion of the VaR of 25%, whereas this decrease to 21% in the 2022 exercise (it was 17% before Covid pandemic in 2020). This decrease in the IQD of the VaR is likely to have stemmed from a decrease in the volatility in the market in 2022.

136. As expected, the IQD for sVaR is higher than for VaR (see the bottom panels of Figure 3), with an average IQD of 28% (29% in 2021 and 25% in 2020). The CS asset class features a higher dispersion once again (35%; in 2020 and in 2021 it was 34%), but the IQD ratios for IR is also above 30%. Higher sVaR dispersion is likely to be due to the differences between banks in their choice of the 1-year stress period used, which is chosen based on each participating bank's actual portfolio. It might therefore be the case that the sVaR is not calculated with respect to the 1-year period that maximises VaR for the given hypothetical portfolio.

Figure 3: Interquartile dispersion and coefficient of variation for IMV and risk metrics by portfolio

Table 4: Interquartile dispersion for IMV, risk metrics and SBM OFR by risk factor

Average Interquartile dispersion by risk factor

	IMV	VaR (all sample)	SVaR	P&L VaR	VaR HS banks	VaR MC banks	Exp shortfall	OFR SBM
Equity	21%	25%	28%	24%	24%	9%	22%	17%
IR	16%	21%	33%	18%	17%	13%	17%	11%
FX	3%	11%	26%	12%	10%	10%	9%	2%
Commodity	24%	18%	18%	14%	13%	0%	25%	26%
Credit spr.	1%	28%	35%	27%	24%	17%	26%	22%

137. Table 4 confirms that when a homogeneous subset of banks is considered (i.e., HS or MC banks), the VaR results show less dispersion than the total sample (average 18% vs. 21%). With regard to the P&L VaR, it is evident that the dispersion (19% on average) is slightly higher with respect to both HS VaR and all-sample VaR for all the asset classes. This is not consistent with the assumption that fewer differences in the methodology would imply less dispersion among the risk measures. Further investigations on the P&L VaR shall be run in the future in order to clarify this inconsistency.

138. When comparing variability for HS VaR and MC VaR, also this year's result tells us that the MC VaR values are less dispersed than those of the HS VaR, as it was in the past exercise. Nonetheless, the analysis needs to take account of the fact that the sample of MC banks is quite small compared with that of HS banks (i.e., 7 MC banks versus 28 HS banks). As far as parametric banks are concerned, a similar analysis is not informative as the total number of parametric banks is very small (i.e., three banks in the sample – the remaining three apply a combination of methods).

139. The ratio between sVaR and VaR was also analysed across the sample (see Table 25 in the annex). Some banks have ratios below 1 for many portfolios, while other banks have extremely high ratios for some portfolios. While it is generally expected that the sVaR is greater than the VaR, the clear disparity between these values is usually a natural indication that something is wrong with the data submitted, and the EBA and CAs have to pay attention to these observations.

140. Table 5 shows the distribution of the sVaR–VaR ratio classified into three buckets (i.e., below 1, between 1 and 3, and above 3) for each portfolio. It is worth noting that a significant number of portfolios for EQ, and IR have a significant proportion of ratios below 1.

Table 5: sVaR–VaR ratio by range (number of banks as a percentage of the total)

Distribution of sVaR / Var ratio over portfolios

(X = ratio with the median)

	Port. ID	X > 3	1 < X ≤ 3	X ≤ 1
Equity	1	11.1%	81.5%	7.4%
	2	32.0%	68.0%	0.0%
	3	0.0%	82.6%	17.4%
	4	4.3%	78.3%	17.4%
	5	17.4%	65.2%	17.4%
	6	0.0%	62.5%	37.5%
	7	25.0%	62.5%	12.5%
	8	0.0%	68.2%	31.8%
	9	9.1%	81.8%	9.1%
	10	33.3%	66.7%	0.0%
Interest Rate	11	22.9%	68.6%	8.6%
	12	0.0%	78.1%	21.9%
	13	6.5%	87.1%	6.5%
	14	18.4%	52.6%	28.9%
	15	46.2%	46.2%	7.7%
	16	0.0%	85.7%	14.3%
	17	7.7%	80.8%	11.5%
	18	22.2%	59.3%	18.5%
	19	0.0%	91.7%	8.3%
	20	34.4%	53.1%	12.5%
	21	0.0%	87.9%	12.1%
	22	9.1%	84.8%	6.1%
	23	0.0%	93.1%	6.9%
	24	18.2%	63.6%	18.2%
	25	9.7%	74.2%	16.1%
	26	19.2%	57.7%	23.1%
	27	69.2%	26.9%	3.8%
FX	28	10.3%	79.3%	10.3%
	29	21.4%	78.6%	0.0%
	30	10.7%	89.3%	0.0%
	31	35.5%	64.5%	0.0%
	32	42.9%	57.1%	0.0%
Commodities	33	53.8%	46.2%	0.0%
	34	22.2%	66.7%	11.1%
	35	16.7%	83.3%	0.0%
Credit Spread	36	38.9%	55.6%	5.6%
	37	42.9%	50.0%	7.1%
	38	35.3%	64.7%	0.0%
	39	40.0%	46.7%	13.3%
	40	66.7%	22.2%	11.1%
	41	44.4%	50.0%	5.6%
	42	17.6%	58.8%	23.5%
	43	40.0%	45.0%	15.0%
	44	35.0%	55.0%	10.0%
	45	50.0%	44.4%	5.6%
	46	35.3%	58.8%	5.9%
	47	55.6%	33.3%	11.1%
	48	37.5%	62.5%	0.0%
	49	44.4%	44.4%	11.1%
	50	10.5%	78.9%	10.5%
	51	20.0%	80.0%	0.0%
	52	13.3%	66.7%	20.0%
	53	6.3%	87.5%	6.3%
	57	0.0%	100.0%	0.0%
	58	29.4%	70.6%	0.0%
	59	15.0%	75.0%	10.0%
CTP	54	0.0%	0.0%	0.0%
	55	0.0%	0.0%	0.0%
	56	0.0%	0.0%	0.0%
ALL-IN no-CTP	60	18.2%	72.7%	9.1%
Equity Cumulative	61	11.8%	64.7%	23.5%
IR Cumulative	62	7.7%	88.5%	3.8%
FX Cumulative	63	46.4%	50.0%	3.6%
Commodity Cumulative	64	22.2%	66.7%	11.1%
CS Cumulative	65	7.4%	85.2%	7.4%
CTP Cumulative	66	37.9%	58.6%	3.4%

5.2 A closer look at the VaR and sVaR results

141. Figure 4 and Figure 5 give an overview of the VaR and sVaR results for portfolios 1 to 59, i.e. they do not include the aggregated portfolios, where fewer observations were available for the reasons explained above (see Section 3.4).

142. Broken down by portfolio, the figures show the average VaR and sVaR over the 10-day submission period for each bank, normalised by the median[14] of the given portfolio.[15]

143. Comparing Figure 4 and Figure 5, it looks as if the dispersion is higher for sVaR than for VaR (sVaR 28% IQD versus 21% VaR IQD on average). Differences in dispersion between VaR and sVaR seem steady but are more marked for the FX and IR portfolios, in which sVaR shows a higher level of dispersion than in the other asset classes (26% and 33%).

144. FX and CO are the asset classes with the lowest levels of dispersion for VaR (11% and 18%), as they are for sVaR (26% and 18%).

[14] The portfolio median is the median of the average VaR and sVaR over the submission period.

[15] Note that the figures are restricted to VaR–median and sVaR–median ratios below 450%.

Figure 4: VaR submissions normalised by the median of each portfolio

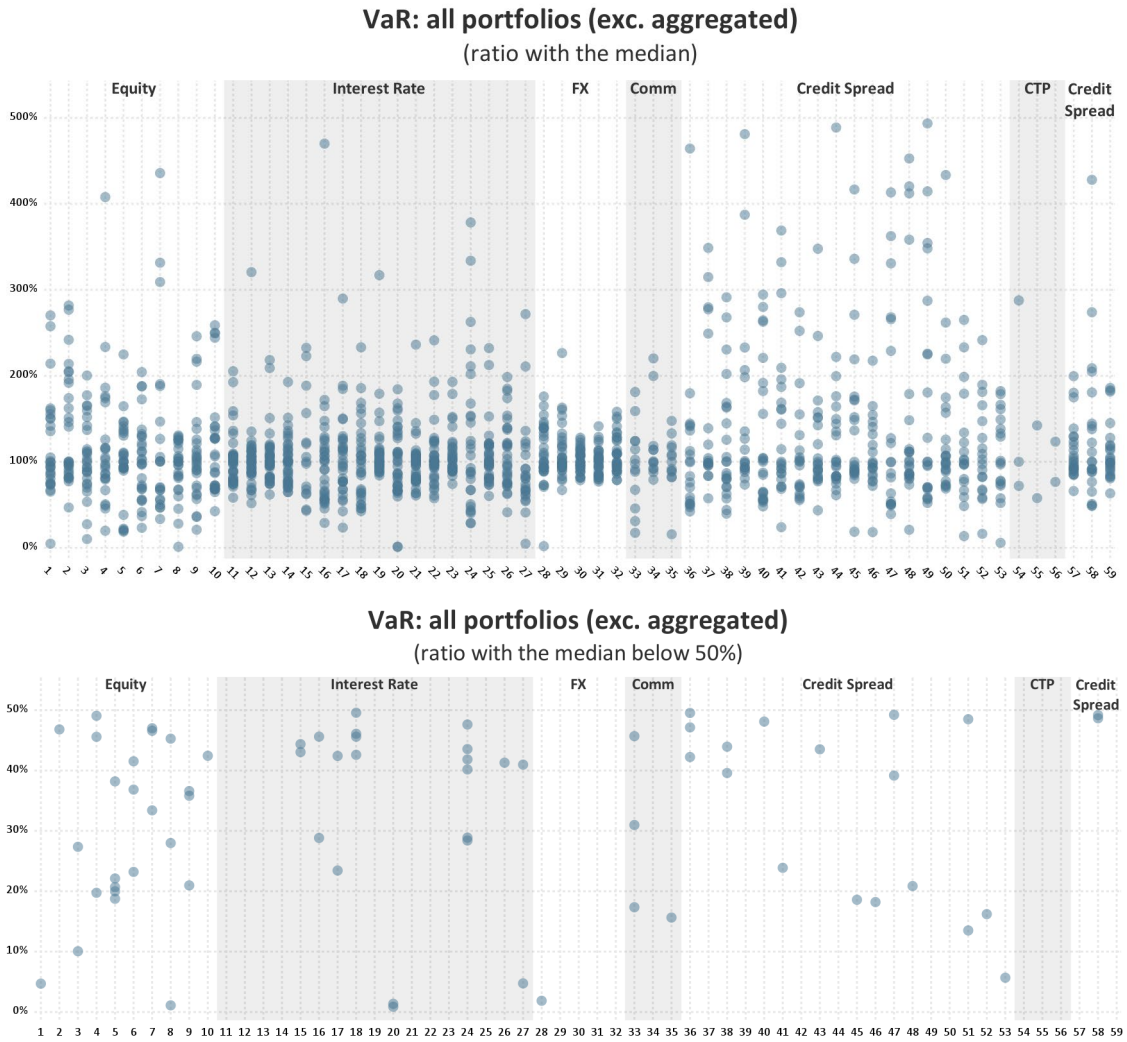
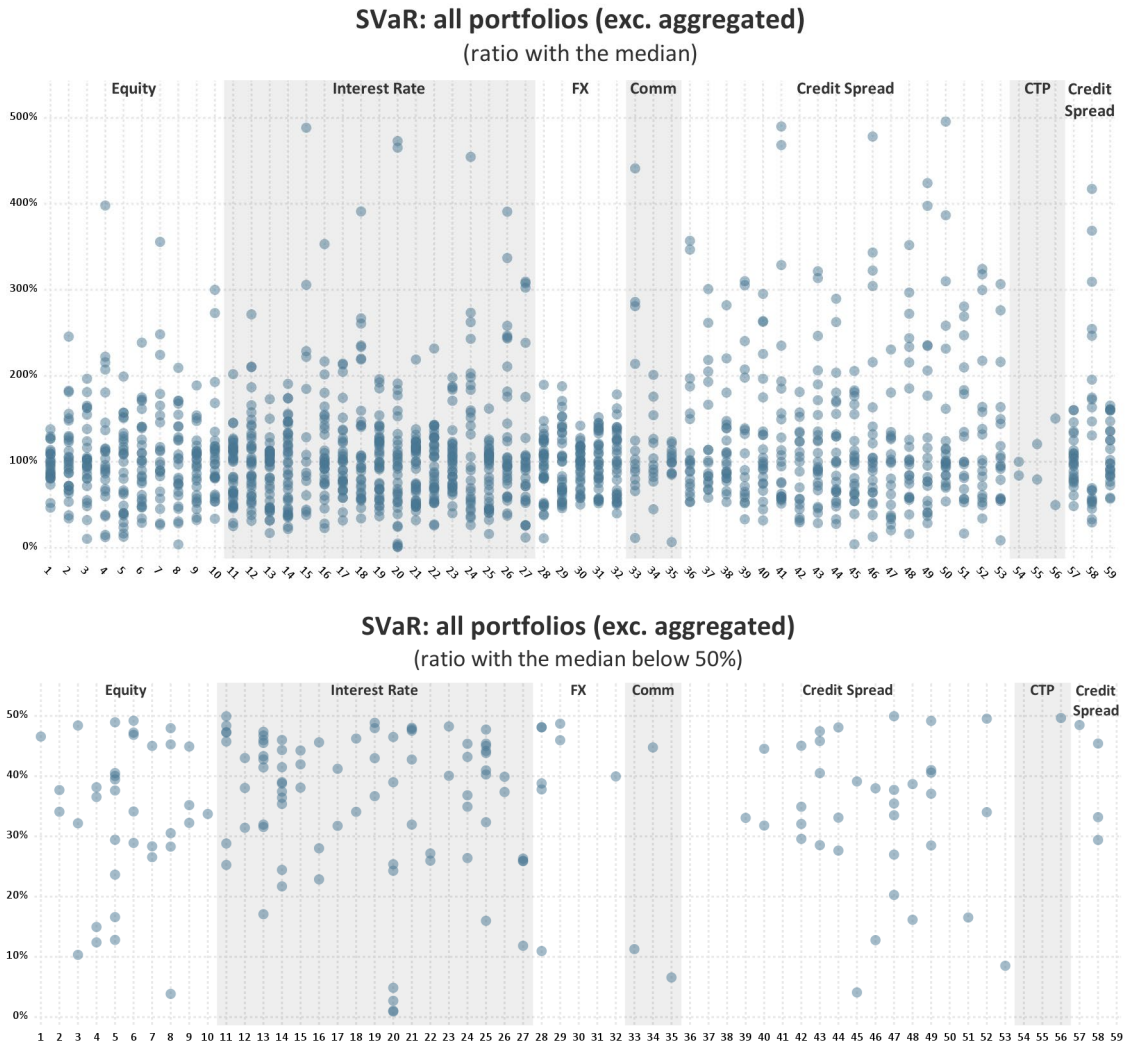


Figure 5: sVaR submissions normalised by the median of each portfolio



145. Table 21 and Table 22 in the annex report all the VaR and sVaR statistics along with EU benchmarks for all HPE portfolios.

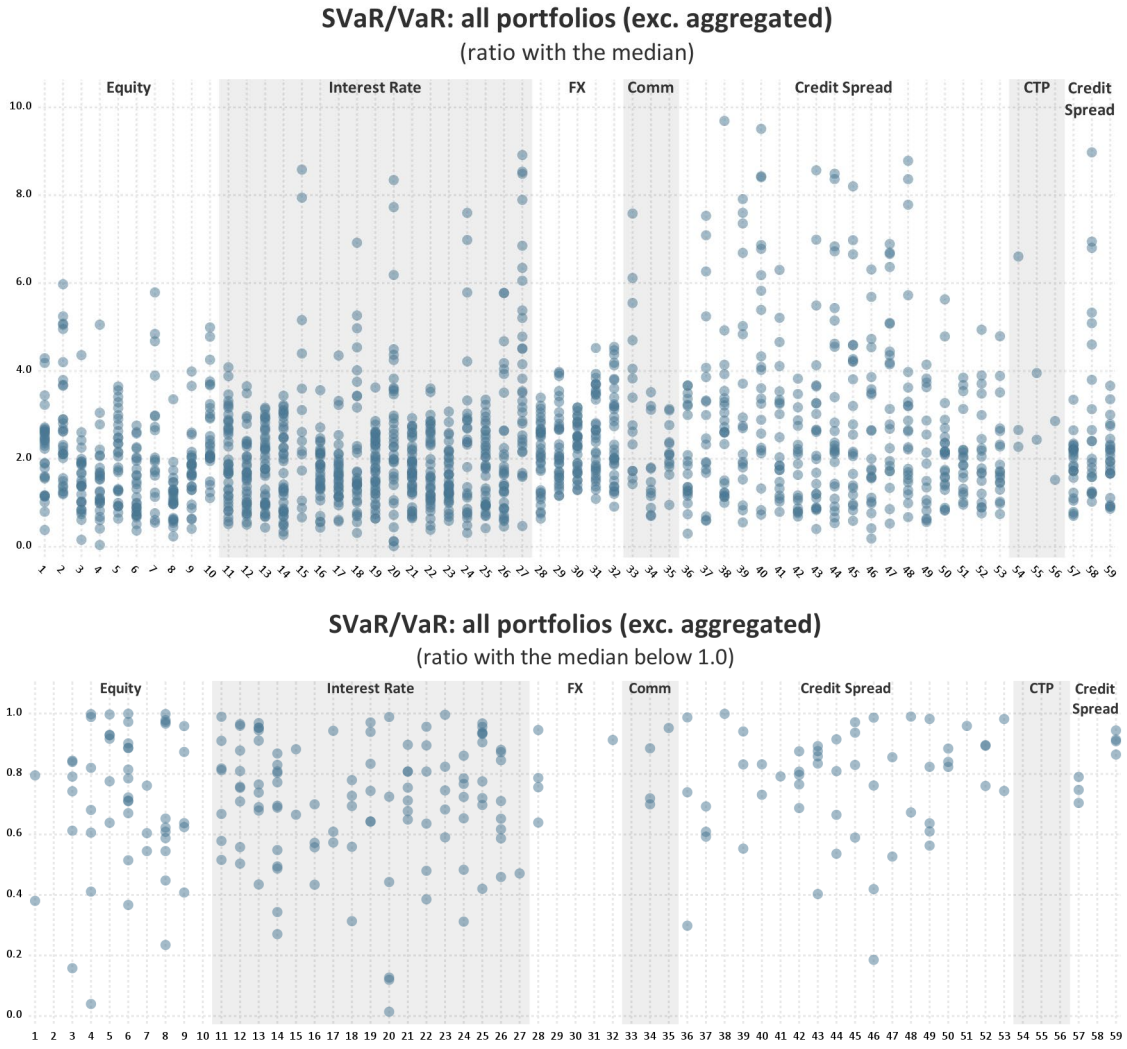
5.2.1 Comparison of sVaR and VaR ratios

146. Banks were assessed in relation to the full sample not only by their VaR and sVaR values, but also by their sVaR–VaR ratios (Table 25). In general, it should be expected that sVaR would be at least as high as VaR, as sVaR is calibrated to a 1-year period of significant stress. This is verified in 89% of cases. This was just 73 percentage in the previous exercise. It should be noted that the 2021 VaR statistics submitted in the previous exercise were substantially higher in absolute terms compared to the past (this percentage was usually above 90%) due to the Covid pandemic and the higher volatility generated in the market. The evidence tell that this ration has now return to the level pre-pandemic.

147. Figure 6 shows the ratio of the average sVaR to the average VaR for each bank. The sVaR–VaR ratio varies significantly across the portfolios. Excluding outliers, the average sVaR–VaR

ratio per portfolio varies between 0.63 and 11.92 and averages 2.31. The portfolios with the lowest levels of dispersion for the sVaR–VaR ratio (excluding outliers) are portfolios 9 (EQ), 17(IR), 30 (FX), 35 (CO) and 57 (CS).

Figure 6: sVaR–VaR ratio for the average VaR and sVaR by portfolio



148. A few banks have a high sVaR–VaR ratio for portfolios in certain asset classes only. This suggests that these asset classes dominate the banks' real trading portfolios and, for that reason, drive the calibration of the sVaR window.

5.2.2 Drivers of variation

149. Based on the qualitative information provided by banks (Figure 7 to Figure 11), the most common methodological approach used by banks to model MR is HS (68%). Although the majority of banks use the same methodological approach, the dispersion of VaR remains significant because other modelling choices play a key role in producing variability of the risk

measures (e.g., differences in time scaling and/or weighting scheme choices, absolute versus relative returns for different asset classes).

Figure 7: Qualitative data: VaR methodological approaches

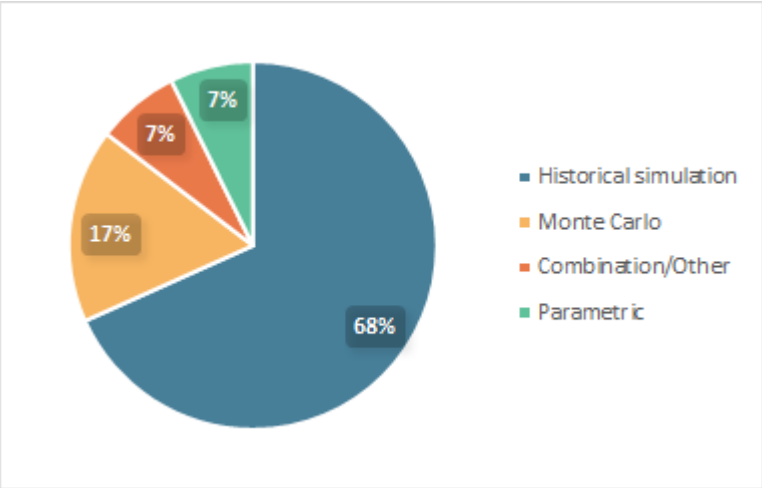
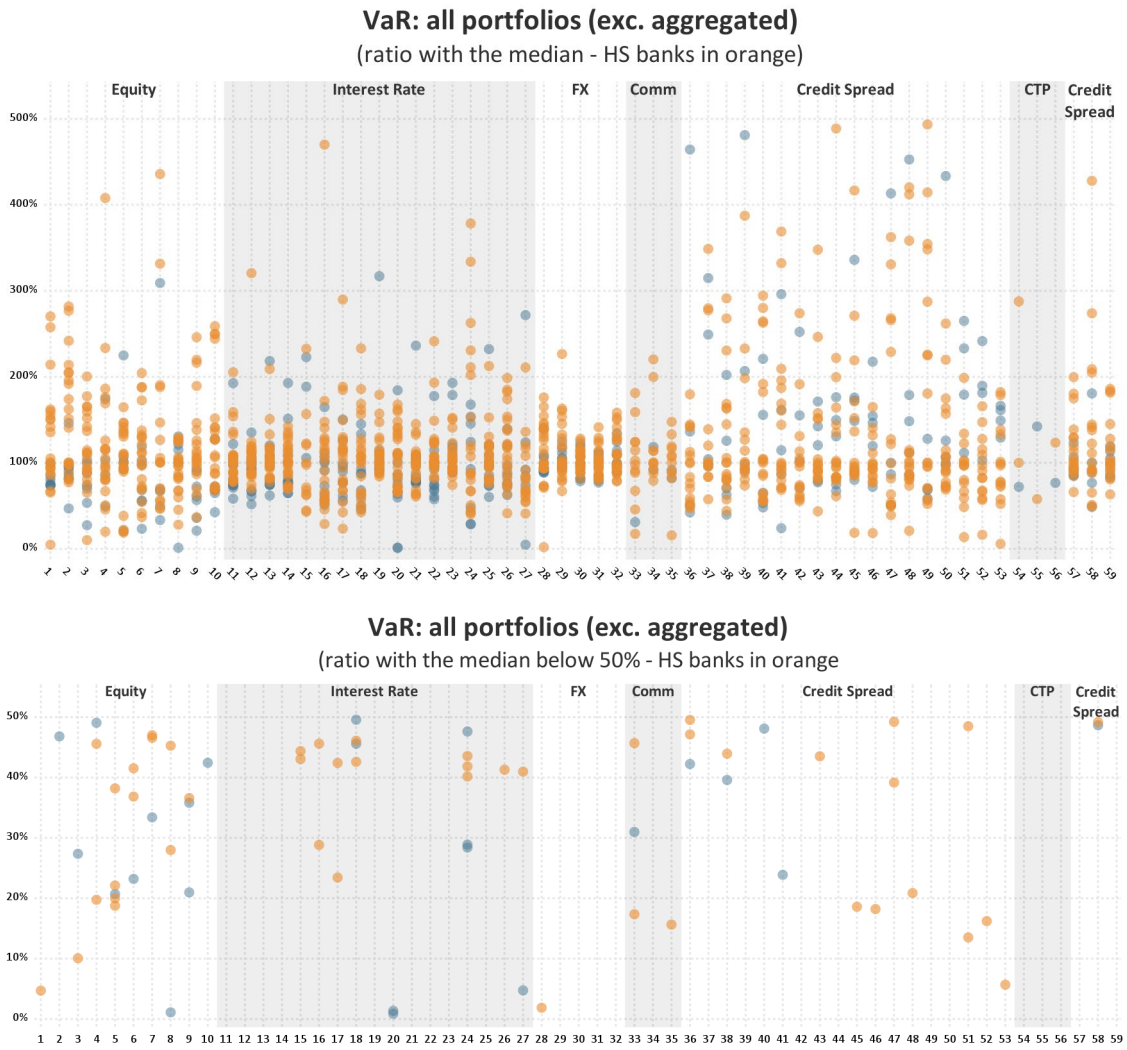
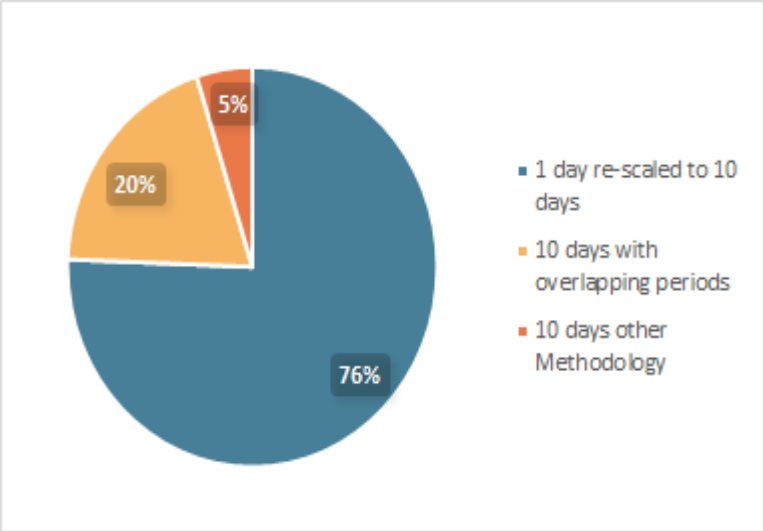


Figure 8: VaR submissions normalised by the median of each portfolio (by methodological approach)



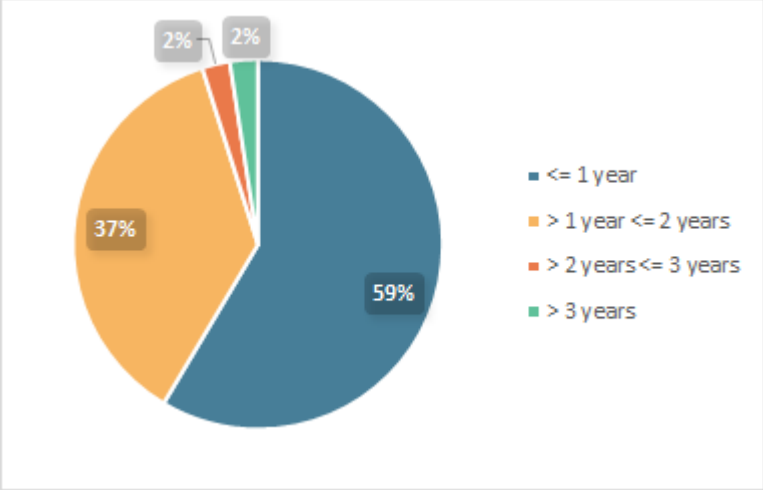
150. With regard to the regulatory 10-day VaR computation, by far the preferred method is rescaling the 1-day VaR to the 10-day VaR using the square root of time approximation.

Figure 9: Qualitative data: VaR time-scaling techniques



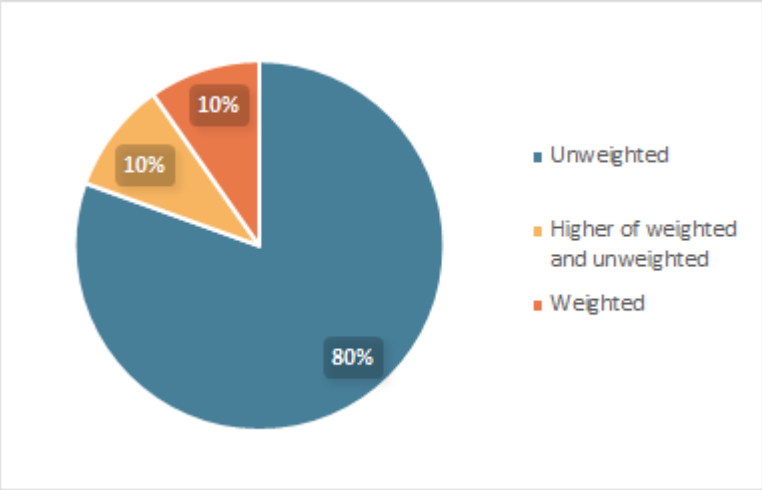
151. With regard to the historical lookback period used to calibrate banks' VaR models, 59% of the banks use the minimum period of one year and applying a period longer than 2 years is very unusual.

Figure 10: Qualitative data – length of VaR lookback period



152. As for the possible use of a data-weighting scheme, the great majority of banks' models use unweighted data in the regulatory VaR computation (80% of respondents).

Figure 11: Qualitative data – VaR weighting choices



153. Finally, with regard to supervisory actions on regulatory add-ons, 83% of the banks in the sample have a total multiplication factor greater than the minimum of 3, which includes the addend resulting from the number of over-shootings (Table 1 in Article 366 of the CRR) and any supervisory extra charge(s). The average total multiplication factor in this sample is equal to 3.73, with a maximum of 5.5. As a result, quite a number of banks either have to correct for excessive over-shootings or are subject to supervisory measures. In addition, some banks have been assigned other kinds of added penalties that encompass risk 'not in VaR' and additional charges for IRC and APR. This was apparent from the additional and related information provided by some CAs about their supervised banks, and from discussions with some banks during the interviews.

154. These responses suggest that the observed variation may be due to a number of different drivers. The EBA chooses to present the analysis using the following broad headings:

- supervisory actions;
- modelling differences; and
- other drivers of variation.

5.2.3 Supervisory actions

155. Supervisory actions can take different forms and are therefore difficult to capture fully in the analysis. However, the effects of some types of supervisory charges can be approximated. The effect of a higher VaR or sVaR multiplier imposed by a CA because of model weaknesses, for example, can be studied using the following proxy:

$$\text{Capital proxy} = m_{vaR} * VaR + m_{sVaR} * sVaR$$

where m_{VaR} and m_{sVaR} are the total regulatory multipliers given by 3 plus any add-on resulting from excessive backtesting exceptions and other prudential extra charges imposed by the regulator (where appropriate).

156. Including the multipliers in the analysis did not significantly change the results in terms of variability across the sample; that is, the positioning across the sample changed, but, on average, the extent of the dispersion did not.

157. Other supervisory measures, such as capital add-ons, cannot be easily captured. They are normally calculated at an aggregate level on the basis of the banks' actual portfolios and cannot therefore be readily computed for the hypothetical portfolios used for benchmarking. Moreover, it tends to be the case that these add-ons are intended to capture difficulties in modelling risks associated with more exotic trades not represented well in the HPE.

5.2.4 Modelling differences

158. As outlined in Chapter 4, the CRR permits banks to tailor their VaR models to their specific requirements by making different modelling choices. To test the impact of different modelling choices in a controlled manner, four portfolios were selected based on low IQD. Obviously, the average sample size in this analysis is limited.

159. The portfolios – portfolios 3, 13, 31 and 48 – cover the main asset classes (i.e., EQ, IR, FX and CS) and were chosen due to the relative low variability of the submissions received for them. Six subsets of banks were defined within (and hence controlling for) the sample of banks using historical simulation, distinguishing the following modelling choices:

- 1-day scaled versus 10-day overlapping returns[16];
- the length of the historical lookback period (1 year versus > 1 year)[17]; and
- keeping constant the 1-day and unweighted modelling choices and varying the length of the lookback period (1 year versus > 1 year).[18]

160. As shown in Table 6 and Table 7, there seems to be evidence that the modelling choices matter in terms of dispersion and the conservativeness of the VaR. For instance, for the EQ portfolio the 1-day calibration, more than 1 year and unweighted choices produce less dispersed and more conservative results.

161. For the IR portfolio the 1-day and more than 1-year calibrations produce more dispersed and more conservative results.

[16] 31 banks adopted 1-day returns, while 10 banks adopted 10-day returns.

[17] 24 banks adopted 1-year, while 17 banks adopted > 1 year.

[18] 16 banks adopted 1-day, unweighted & 1-year, while 9 banks adopted 1-day, unweighted & >1 year.

162. For the IR, FX and CS portfolios, the '1 year' calibration produces less dispersed but less conservative results.

163. Columns 5 and 6 of Table 6 and Table 7 illustrate the effect of increasing the lookback period (1-year compared to 'more than 1 year') when we keep the other factors (1-day & unweighted shocks) the same. We see the 'more than 1 year' calibration tending to produce less dispersed and more conservative results across assets classes. This result is the opposite of what observed in the previous exercise.

164. These results can be directly matched to the previous year's results because the instruments selected are the same. It is clear that these results depend on the portfolios' selection but also on the period applied for this analysis. Therefore, based on this analysis, it is difficult to support the idea that one specific model choice will lead to consistently more conservative and less dispersed risk measures, at least on a stable basis.

Table 6: Coefficient of variation for regulatory VaR (controlling for HS) by modelling choice (%)

	Coefficient of Variation for regulatory VaR (controlling for HS)					
Port.	*1-day*	*10-day*	*1y*	*>1y*	*1d, 1y, unw*	*1d, >1y, unw*
EQ 3	35.9%	35.3%	30.0%	26.2%	35.0%	7.6%
IR 13	15.0%	14.4%	15.4%	15.4%	15.6%	12.6%
FX 31	14.2%	12.0%	11.0%	11.6%	11.8%	14.5%
CS 48	30.0%	36.1%	30.5%	32.7%	39.9%	15.7%
mean	23.8%	24.5%	21.8%	21.5%	25.5%	12.6%

Table 7: Average regulatory VaR by modelling choice

	Average VaR subsamples					
	1-day	*10-day*	*1y*	*>1y*	*1d, 1y, unw*	*1d, >1y, unw*
EQ 3	12,409	12,431	10,294	15,321	10,035	18,051
IR 13	148,786	138,907	143,999	149,020	143,155	152,640
FX 31	313,264	306,444	292,609	340,852	294,050	338,885
CS 48	8,429	9,375	8,151	10,342	8,079	8,552

5.2.5 Other drivers of variation

165. In addition to the drivers of variation discussed in the preceding two subsections, there may be other drivers of variation.

166. In subsection 5.2.4 'Modelling differences', for instance, only results obtained with HS VaR were discussed, although the methodological aspects considered are expected to be important for other model types (e.g., MC simulation) as well.

167. Another driver of variation are the risks not captured in a model. Due to the simplification of the exercise compared to initial benchmarking exercises (2016-2018), the majority of the most exotic instruments were deleted, so most of the possible risk factors not in the models are no longer present in the exercise. Moreover, banks that are not able to model specific trades are allowed by the Benchmarking RTS not to submit the risk measure. This is shown, for example, in instrument 23 (IR 'Cap and Floor' on 10-year note), where only 14 observations (across 41 banks) are available. Nonetheless, for this non-vanilla product the IQD is 32% for the VaR (portfolio 15), which is similar to other IR portfolios, which means that the submitting banks presented some consistent risk measures. As a result, it is likely that few risks not in VaR were present.

168. The use of proxies probably leads to spurious variability in some of the hypothetical portfolios characterised by less liquid risk factors, for example some credit spreads. This consideration also applies to the sVaR.

169. As in the previous exercise, the EBA also presents an analysis of aspects not considered in the past (2016-2018). Four additional drivers of variation will therefore be tested in the following areas: (a) size of the bank, (b) business model, (c) level of approval of model (e.g., general interest risk versus general and specific interest risk approval, or general equity risk versus general and specific equity risk approval) and (d) time window selected for the calibration of the stressed VaR. As for the previous exercise (2020 and 2021), the EBA also tested different definitions of size and business models.

a. Size of the bank

170. The size of the bank could have some impact on the internal model. Larger banks are expected to invest more in internal modelling, and this could have an impact on the quality of the model and the results submitted. The same can be said of banks that invest more in market activities in terms of their whole bank activity. The composition of the bank's trading portfolio could also have some influence on the design and performance of the internal model. Nonetheless, size is not a uniquely definable variable.

171. For the scope of the analysis, the size of the banks was selected based on banks' common reporting results concerning the RWA for market risk. The market risk RWA was preferred in selecting the size because a bigger bank in terms of total RWA can have a smaller market risk trading book in relative terms. The market risk RWA variable was therefore preferred. It should be noted that market risk RWA also incorporates the standardised measure but classifying the bank by the internal model market risk RWA did not change the composition of the sample substantially.

172. The banks were divided into three subsamples: large (above the 75th quantile), medium (between the 75th and 25th quantiles) and small (lower than the 25th quantile). Detailed VaR tables are presented in the annex (see Table 27, Table 28 and Table 29).

173. Table 8 summarises the effect of the bank's size. Because of the decreased number of submitters, the 'small banks' sample lost a little of its significance. Fewer banks means fewer submissions, and the smaller banks usually report less information. Therefore, it is more interesting to look at the difference in dispersion among medium and large banks. For all asset classes other than CS, it seems that dispersion decreases with the size of the banks. This implies that the banks' size does matter and that variability in size increases the dispersion of the general results submitted.

174. Further analysis of this aspect can be carried out in terms of the factors selected to define the size. If we run the same analysis using the size of the trading book[19] instead of the size of the bank (defined by RWA for market risk), we can see that dispersion varies again across different asset classes and different sizes of banks. The results are reported in Table 30, Table 31 and Table 32. Looking solely at the trading book size, we obtain different results. The average IQD ratio is not monotonic with the size of the trading book. The average IQD is 14% for small TB banks, 21% for medium TB and 12% for large TB banks.

175. The results concerning the impact of size on variability are mixed, but interesting, and these results merit investigation in the exercises.

Table 8: Asset class comparison for VaR in terms of banks' size

	VaR - Avg. Interquartile Range			
	All Banks	*Small Banks*	*Medium Banks*	*Large Banks*
Equity	25%	20%	29%	12%
Interest Rate	21%	12%	22%	13%
FX	11%	9%	11%	7%
Commodities	18%		20%	8%
Credit Spread	28%	16%	24%	21%
CTP				
All-in	10%	6%	8%	7%

b. Business model

176. The business model of the banks in the sample was selected based on a previous analysis run by the EBA (EBA – LCR Report[20]). In the sample of 41 banks, 23 were classified as cross-border universal banks, which is by far the most numerous business model in the sample. The

[19] The size of the trading book was defined as: (assets held for trading + liabilities held for trading) / (total assets × 2). Data source: FINREP data)

[20] https://eba.europa.eu/-/eba-reports-on-the-monitoring-of-the-lcr-implementation-in-the-eu

remaining banks were either not classified or had different business models (e.g., local universal banks), but they were too few to use as a subsample for this kind of analysis. As a result, the cross-border universal bank business model was selected.

177. Specific VaR results for banks classified as cross-border universal banks are shown in Table 33 of the annex. Table 9 summarises the impact of the business model on different asset classes. It is clear that the business model selected is so predominant in the sample that it does not allow for proper discrimination among the whole sample; therefore, the dispersion of the banks belonging to the same business model is very close to the dispersion of the whole sample for the banks. Judging from the results, there is some weak evidence that the business model has some effect in increasing the dispersion of the VaR submission.

178. Further analysis of the business model can be carried out in terms of factors selected to define the business model. If we run the analysis based on the amount of 'Level 3 assets and liabilities' in relation to the size of the trading book[21] (FINREP data), the results are reported in Table 34, Table 35 and Table 36. The average IQD is 17% for the low level of Level 3 A&L banks, 20% for the medium level and 16% for the high level of Level 3 A&L banks. Therefore, it seems that a more exotic composition of the bank's trading book does not affect the variability of the results.

Table 9: Asset class comparison for VaR within the same business model (cross-border universal bank)

	VaR - Avg. Interquartile Range	
	All Banks	*Cross-border Universal bank*
Equity	25%	21%
Interest Rate	21%	18%
FX	11%	10%
Commodities	18%	20%
Credit Spread	28%	21%
CTP		
All-in	10%	7%

c. Level of approval

179. Banks can have different levels of approval for equity and interest rate risks. To be more specific, banks can apply to obtain approval for the general equity or interest rate risk or they can apply for approval of the specific equity or interest rate risk as well. See also the discussion in Section 4.2 on this point. In general, having approval for both the general and the specific parts of the equity and interest rate risks allows banks to fully model the instruments in the equity and credit spread sections of the exercise. Nonetheless, banks with only general approval are required to report these instruments as well, but this has been known to generate additional

[21] (Level 3 assets held for trading + level 3 liabilities held for trading) / (assets held for trading+ liabilities held for trading)

dispersion in the risk measures submitted. For this reason, in this exercise the EBA filtered all the results submitted and produced IQD statistics for the banks belonging to the sample of banks with different levels of approval.

180. Among the banks that submitted results for interest rate risk, 22 banks in the report have general and specific approval (see Table 37) and 17 banks have only general approval (see Table 38). Among the banks that submitted results for equity asset risk, 26 banks in the report have general and specific approval (see Table 39) and 8 banks have only general approval (see Table 40).

181. Table 10 summarises the result of the analysis when the filter for the level of approval is applied. It is clear that the presence of banks with different levels of approval tends to slightly impact the benchmarking results.

182. Looking at Table 10, we see that the EQ asset class IQD is very slightly smaller when considering only the subsample of firms with the full level of approval with respect to the full sample. The CS asset class also decreases, but it should be considered that almost no banks without specific IR approval submitted any CS results. Finally, for the IR asset class splitting the sample between banks with general and specific approval and banks with only general approval produces some marginal changes in the benchmark for this asset class, confirming that the submissions from banks with partial approval tends to increase the IQD of the submissions.

Table 10: Asset class comparison for VaR in terms of level of approval

	VaR - Avg. Interquartile Range			
	All Banks	*IR Gen + Specific*	*IR Gen only*	*Eq Gen + Specific*
Equity	25%			24%
Interest Rate	21%	17%	16%	
Credit Spread	28%	23%		

d. Common stress period considered

183. The stress window applied by the participating banks has always been understood as one of the main sources of the greater dispersion of the sVaR compared to the VaR, but this hypothesis was tested only from the 2019 exercise onwards due to a lack of information regarding the time window applied by the banks to calibrate the sVaR. This information was collected for the 2020, 2021 and 2022 exercises as well and applied to test the impact of the stress time window selected to calibrate the sVaR.

184. Generally speaking, in their time window for the sVaR the banks select periods that include either 2008-2009 or 2011 in order to calibrate their sVaR, with a preference for 2008-2009. Because of the higher number of banks selecting 2008-2009, the EBA filtered the sample of the

banks that applied a 2008–2009-time window for sVaR calibration, obtaining a subsample of 30 banks. The benchmark and the related statistics for this subsample of banks are available in Table 41 in the annex, and they are easily comparable with the full sample sVaR statistics in Table 22.

185. Table 11 summarises this stress period filtering analysis. It seems clear that the different time window selected for the bank actually has a significant impact on sVaR statistics. This means that the subsample with the same stress period generally exhibits smaller dispersion results for sVaR than the whole sample.

Table 11: Asset class comparison for sVaR in terms of the time window applied

	SVaR - Avg. Interquartile	
	All Banks	*Stressed Period*
Equity	28%	20%
Interest Rate	33%	19%
FX	26%	13%
Commodities	18%	12%
Credit Spread	35%	27%
CTP		
All-in	28%	13%

5.2.6 Portfolio comparison

186. Selective comparison of VaR results across portfolios can be informative in instances where the riskiness of those portfolios may be ranked in a model-independent way. For example, all else being equal, it is expected that a more diversified and hedged portfolio would lead to a lower VaR than a more concentrated and unhedged portfolio.

187. This hypothesis can be tested with several portfolios in the 2022 exercise. Use of the following portfolios is suggested:

- portfolio 16, which is composed of instruments 24 (long 5 million German bond – 10 years) and 25 (short 2 million German bond – 5 years);
- portfolio 17, which is composed of instruments 24 (long 5 million German bond – 10 years), 25 (short 2 million German bond – 5 years) and 26 (long 5 million Italian bond – 10 years), so it is equal to portfolio 16 plus instrument 26.

188. Both of these portfolios comprise sovereign bond instruments, yet portfolio 16 is concentrated on only one issuer and is partially hedged (long and short positions). Portfolio 17 adds a second issuer to this portfolio without any hedge. Against this backdrop and in view of the specific portfolio definitions, we would expect the following result:

$$VaR_{Portfolio\ 17} > 200\% \times VaR_{Portfolio\ 16}$$

189. Table 12 reports when this hypothesis holds true.

Table 12: Portfolio comparison for VaR, sVaR and IRC

	VaR(P17) > VaR(P16)	sVaR(P17) > sVaR(P16)	IRC(P17) > IRC(P16)
Num of banks	31 out of 32	31 out of 32	22 out of 23
	VaR(P17) > 1.5*VaR(P16)	sVaR(P17) > 1.5*sVaR(P16)	IRC(P17) > 1.5*IRC(P16)
Num of banks	30 out of 32	31 out of 32	22 out of 23
	VaR(P17) > 1.75*VaR(P16)	sVaR(P17) > 1.75*sVaR(P16)	IRC(P17) > 1.75*IRC(P16)
Num of banks	30 out of 32	30 out of 32	22 out of 23
	VaR(P17) > 2*VaR(P16)	sVaR(P17) > 2*sVaR(P16)	IRC(P17) > 2*IRC(P16)
Num of banks	30 out of 32	24 out of 32	22 out of 23

190. The comparison between the two portfolios with respect to regulatory VaR shows that only 2 out of 32 banks do not meet the initial expectation. The same comparison based on sVaR yields 8 banks that are not in line with this expectation. With regard to the IRC model, one bank does not meet the a priori expectation.

5.3 Analysis of IRC

191. Banks with an approved IRC model constitute a subsample of those with an approved VaR model; only banks using internal models for specific risks of debt instruments are permitted to use IRC models (Article 372 of the CRR).

192. The full set of submissions for IRC results for each trade, after the data-cleaning process has been run as previously described, is reported in Table 13.

193. In the context of the HP exercise, only a subset of banks made submissions for IRC, and a number of those banks submitted very low figures. This suggests that important risk factors (in the context of the HPE) have not been modelled. While the submission of low figures may be linked to risk factors not modelled, this should not be taken to mean that banks with higher IRC figures included all risk factors from a given portfolio in their model.

194. The number of submissions is limited for some of the all-in portfolios. Statistical inferences for these portfolios are thus not appropriate. A prerequisite for consideration of banks' submissions for the all-in portfolios is that a bank needs to be able to model all the corresponding underlying portfolios.

195. As in the case of VaR, a selective comparison of IRC results across portfolios can be informative in instances where the riskiness of those portfolios may be ranked in a model-independent way. As shown in subsection 5.2.6, the expected diversification relationship holds true for all but one of the banks that submitted such results.

196. It is recommended that CAs assess the extent to which these missing risk factors are important in the context of banks' overall risk, and whether or not they need to be added to the model.

197. CAs should devote particular attention to portfolios 15-23, 26, 36, 39 44-51, 57 and 59, i.e., where IRC shows a higher level of dispersion (above 50%) above the average.

198. As is the case for VaR and sVaR, banks can choose from a range of permitted modelling approaches for IRC. For example, banks need to choose:

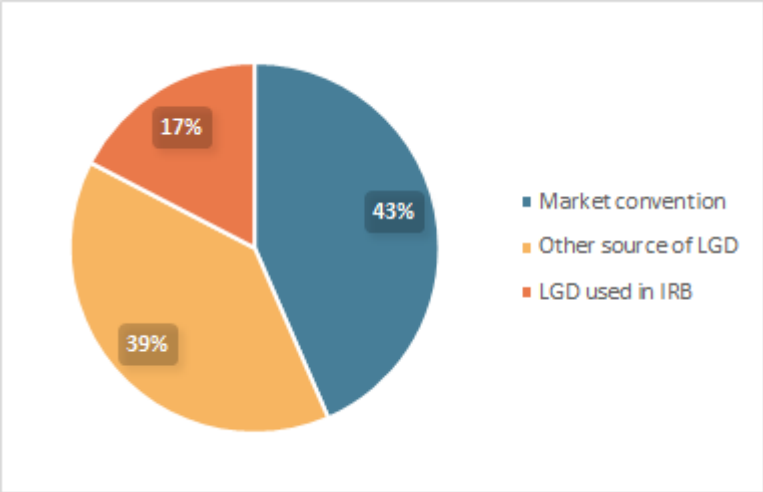
- a source of credit risk estimates such as PD and loss given default (LGD).
- the number of systemic factors used to model the co-movement among obligors in their portfolios.
- the size and granularity of credit spread shocks to apply to positions with an obligor following a rating transition; and
- the liquidity horizons to assign to positions with a particular obligor.

199. The responses to the qualitative questionnaire relating to the IRC methodological aspects suggest that the use of market LGD predominates among respondents (Figure 12), with 10 out of 23 banks using market convention as the source of LGD. A minority of banks – 4 out of 23 –

use their own IRB models as the source of LGD. The rest – 9 banks – use various other sources to obtain the LGD.

200. The PDs are provided by rating agencies in 63% of cases, by the IRB in 29% and by other sources in 8%. The transition matrices are mostly taken from rating agencies (19 respondents out of 23), and the rest of the banks use their IRB, 'market implied transition matrices and various other sources.

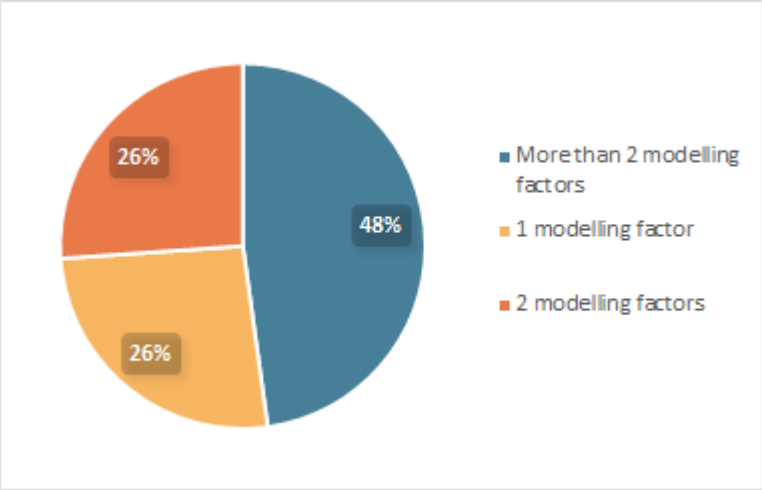
Figure 12: Qualitative data: source of LGD for IRC modelling



201. Moreover, a majority of respondents stated that they use more than two systemic modelling factors at the overall IRC model level (Figure 13).

202. The liquidity horizon applied at the portfolio level for the IRC model is predominantly between nine and 12 months (75% of the responses).

Figure 13: Qualitative data – number of modelling factors for IRC



203. Hence, in the context of IRC the modelling practices across the sample of banks participating in the benchmarking exercise seem to be consistent.

Table 13: IRC statistics and cluster analysis

EU Statistics for IRC

		Main statistics								Percentiles			
	Port. ID	Min	Max	Ave.	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Mean)	Num obs.[2]	25th	50th	75th	IQD
Interest Rate	15	50,444	658,318	255,023	184,369	318,854	120,157	72%	11	119,530	273,984	355,647	50%
	16	4,065	46,327	23,488	14,930	37,315	13,870	64%	19	7,524	25,237	39,860	68%
	17	132,661	876,403	403,157	232,927	282,415	118,886	58%	19	218,823	369,460	625,833	48%
	18	193,017	1,484,743	714,133	428,147	486,207	219,913	60%	20	399,181	627,800	1,182,953	50%
	23	439	267,529	100,809	81,886	102,230	60,458	81%	20	31,252	97,325	150,083	66%
	24	471,865	1,170,823	861,451	195,084	221,458	141,524	23%	18	779,877	814,790	1,012,411	13%
	26	201,455	1,839,869	909,141	516,757	531,983	378,879	57%	21	571,641	813,111	1,312,077	39%
Credit Spread	36	20,565	223,568	67,706	52,481	110,262	19,397	78%	19	34,725	52,688	85,618	42%
	37	21,870	161,255	75,517	28,270	45,338	7,202	37%	17	59,622	77,188	82,828	16%
	38	26,198	164,652	85,875	38,050	51,902	21,671	44%	19	57,210	82,303	111,847	32%
	39	20,601	257,353	90,364	71,335	151,851	31,071	79%	16	39,810	68,768	128,462	53%
	40	8,830	102,341	55,456	23,048	27,908	13,676	42%	19	39,690	56,674	78,744	33%
	41	451,134	1,017,002	687,613	154,933	192,986	45,103	23%	19	616,681	650,327	771,135	11%
	42	91,733	416,981	218,780	91,142	148,695	25,737	42%	17	172,095	197,839	224,539	13%
	43	567,561	1,070,268	795,906	136,399	151,520	93,380	17%	20	696,846	792,691	872,212	11%
	44	35,600	150,832	91,035	40,081	44,486	39,654	44%	21	53,643	96,411	119,345	38%
	45	51,903	246,770	154,538	58,761	79,207	48,487	38%	19	106,893	170,224	206,698	32%
	46	120	82,049	24,701	25,290	51,369	17,997	102%	19	1,125	20,598	39,304	94%
	47	36,882	228,776	114,241	52,614	130,829	41,682	46%	18	64,191	124,153	142,149	38%
	48	1,616	82,062	23,473	23,346	30,940	9,775	100%	19	4,962	22,422	37,424	77%
	49	11,186	247,355	95,725	80,346	132,738	40,482	84%	19	36,519	74,587	173,191	65%
	50	4,599	141,544	48,032	43,803	81,764	23,832	91%	19	12,120	53,525	89,917	76%
	51	1,760	178,101	45,428	49,071	136,965	11,707	108%	15	8,893	40,488	66,838	77%
	52	39,517	221,650	90,633	42,863	109,079	10,474	47%	15	61,475	89,247	96,785	22%
	53	55,433	352,445	110,587	70,212	137,046	16,951	64%	15	84,882	98,171	111,090	13%
	57	17,723	907,081	406,936	303,064	297,498	220,114	75%	22	124,188	355,727	592,885	65%
	58	8,545	84,544	39,164	19,017	28,390	8,525	49%	18	27,985	38,181	46,346	25%
	59	5,189	312,253	125,915	104,023	170,380	73,898	83%	19	26,984	129,888	226,224	79%
ALL-IN no-CTP **	60	127,493	2,160,232	1,121,269	556,577	556,577	345,783	50%	15	770,869	1,052,484	1,619,116	35%
CS Cumulative **	64												

[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

[2] Refers to the number of banks included in the computation of the statistics

*** For the aggregated portfolios (57 to 63), banks that reported at least a missing portfolio IMV among the ones composing the aggregate are not included in the computation of the benchmarks for that particular aggregate portfolio.*

204. Table 13 shows that the average variability of IRC is higher than that observed for VaR. This table presents a summary of the descriptive statistics concerning the IRC values submitted, along with the median, first and third quartiles used to select out-of-range values to be discussed with the banks during the interviews. EBA received on average 18 submissions for IRC in relation to the IR and CS hypothetical trades.

205. In this exercise, the EBA also provided a disaggregated analysis of sources of LGD and numbers of modelling factors. It is possible to split the sample between market convention and non-market convention (IRB and other sources) and the number of modelling factors (1-2 vs. more than 2). In Table 14 below, the average interquartile is reported. The full set of results is also reported in Table 43, Table 44, Table 45 and Table 46.

206. The IQD dispersion of the subsample is very stable for the CS portfolios among different model choices. Market convention and 1-2 modelling factors seem to produce slightly less dispersed results for CS portfolios.

Table 14: Coefficient of variation for regulatory IRC by modelling choice (%)

	VaR - Avg. Interquartile Range				
	All Banks	Source of LGDss		No. modelling factors	
		Market Convention	Non-market Convention	1-2 factors	>2 factors
Interest Rate	48%	47%	39%	32%	51%
Credit Spread	43%	36%	40%	33%	42%
All-in	25%	13%	16%	18%	23%

5.4 Analysis of APR

207. This report is no longer reporting the summary of the responses to the qualitative questionnaire relating to the APR methodological aspects, since only 3 responses are available at the overall CTP model level, so no disclosure is possible without disclosing some specific information on the submitters.

208. The average variability of the APR charge is also no longer reported, since the limited data available do not allow a meaningful computation of the IQD of each CTP.

Table 15: APR statistics and cluster analysis

EU Statistics for APR

		Main statistics								Percentiles			
	Port. ID	Min	Max	Ave.	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Mean)	Num obs.[2]	25th	50th	75th	IQD
CTP	54								3				
	55								2				
	56								2				
CTP Cumulative	66								2				

[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

[2] Refers to the number of banks included in the computation of the statistics

** *For the aggregated portfolios (57 to 63), banks that reported at least a missing portfolio IMV among the ones composing the aggregate are not included in the computation of the benchmarks for that particular aggregate portfolio.*

5.5 P&L analysis

209. The P&L analysis is complementary to the outcome of the assessment of variability based on VaR modelling. For each individual portfolio, the P&L vectors provided by banks using HS were compared, and a benchmark analysis is provided in the annex (see Table 23).

210. A graphic exemplification of low and high IQD portfolios is presented below in Figure 14 and Figure 15. Even though the P&L vectors available are much longer, only 3 months (1 November 2021 to 1 February 2022) are reported to simplify the representation. Additional examples of low and high IQD portfolios can be found in the annex in Figure 31 and Figure 32. It is clear that P&L vector series that perform better tend to be closer to the benchmark. On the other hand, the low absolute value of the P&L, as per the risk measures, tends to provide misleading information if we consider the IQD figures alone.

Figure 14: P&L chart example of low IQD

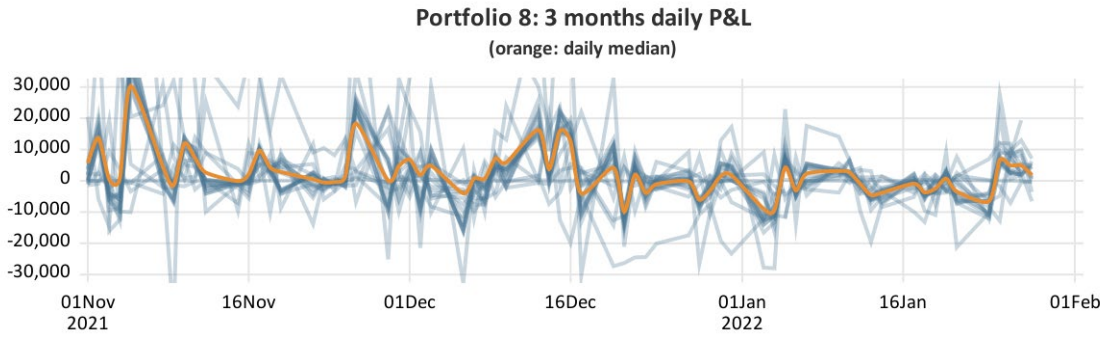
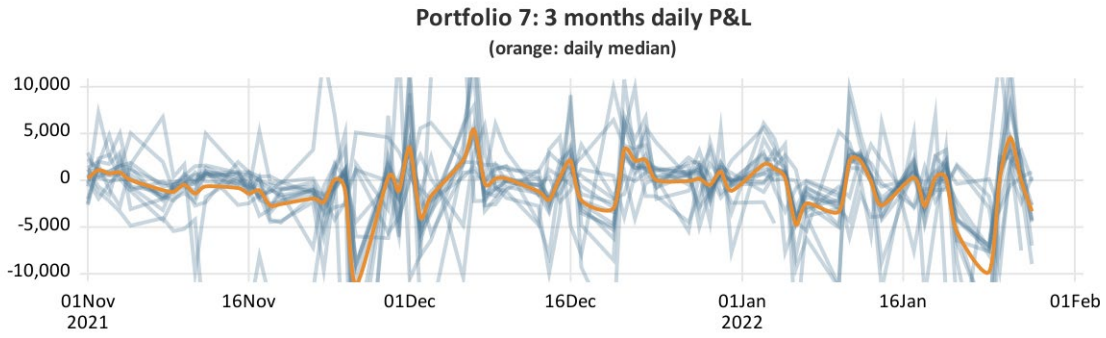


Figure 15: P&L chart example of high IQD



211. Another useful check for the P&L results submitted was a comparison of the ratio between the P&L VaR computed by the EBA (see Section 4.2 and Table 26) and the regulatory VaR submitted by the participating banks. A significant deviation of this ratio from 1 indicates an incoherent submission by the bank (see Table 26 in the annex). Moreover, it allows the tightness

or the width of the realised P&L distribution for each bank to be checked at each hypothetical trade position. This can be done by referring to the standard deviation of the P&L series.

212. Another metric computed by the EBA from the P&L series provided by HS banks is the empirical ES (see Table 24 in the annex). The empirical ES results have approximately the same level of dispersion as the P&L VaR (see Table 4 in Section 5.1).

5.6 Diversification benefit

213. An additional metric considered as part of the analysis was the diversification benefit observed for VaR, sVaR and IRC in the aggregated portfolios.

214. The diversification benefit of a given metric (e.g., VaR) is computed as the absolute benefit, i.e., the difference between the sum of the single results for each individual position and the result for the aggregated portfolio, divided by the sum of the single results from each individual portfolio. Table 16 summarises the results of the analysis.

215. As expected, there is evidence that larger aggregated portfolios exhibited greater diversification benefits than smaller ones. The diversification benefit for all-in portfolio 60 (all-in no-CTP portfolio), for instance, clearly exceeds the benefit for the other risk types, whose all-in portfolios are based on fewer individual instruments. With regard to the dispersion shown by the diversification benefits, it is possible to observe a significantly higher IQD for some portfolios than for others, and – in some cases – a quite comparable dispersion across VaR, sVaR and IRC (e.g., interest rate and commodity risk categories).

Table 16: Diversification benefit statistics

Diversification benefit statistics

Diversification benefit = (Sum of single portfolios VaR - Aggregated Port. VaR)/Sum of single portfolios VaR

VaR

		Other statistics			Percentiles			
	Port.	Ave.	STDev	Num obs. [3]	25th	50th	75th	Interquartile dispersion
ALL-IN no-CTP	60	66%	17%	8	64%	72%	74%	7%
Equity Cumulative	61	53%	27%	21	40%	62%	74%	30%
IR Cumulative	62	54%	8%	31	49%	56%	59%	9%
FX Cumulative	63	32%	7%	31	28%	32%	38%	15%
Commodity Cumulative	64	3%	4%	11	1%	1%	2%	33%
Credit spread Cumulative	65	-11%	42%	6	-24%	-9%	7%	-179%

sVaR

		Other statistics			Percentiles			
	Port.	Ave.	STDev	Num obs. [3]	25th	50th	75th	Interquartile dispersion
ALL-IN no-CTP	60	28%	22%	8	21%	22%	24%	8%
Equity Cumulative	61	28%	23%	21	14%	24%	39%	48%
IR Cumulative	62	37%	18%	31	24%	30%	44%	30%
FX Cumulative	63	15%	8%	31	9%	13%	19%	36%
Commodity Cumulative	64	2%	3%	11	0%	1%	2%	61%
Credit spread Cumulative	65	-1%	28%	6	-9%	-6%	3%	-179%

IRC

		Other statistics			Percentiles			
	Port.	Ave.	STDev	Num obs. [3]	25th	50th	75th	Interquartile dispersion
Credit spread (36 to 53)**	27			0				

5.7 Dispersion in capital outcome

216. As a final means of comparison, for each individual position a variable equating to the sum of the regulatory VaR and sVaR was computed. This variable was used in two ways: using the banks' total multiplication factor, and using only the regulatory multiplication factor, i.e., ignoring the banks' individual addend(s) set by the CAs. The results were averaged across a given risk type, thus arriving at a proxy for the implied capital outcome.

217. In addition, the exercise also attempted to isolate the effect of the time windows selected as the stress period. Therefore, the same statistics were reported for banks applying the 2008-9 stress period.

Table 17: Interquartile dispersion for capital proxy

Interquartile dispersion for capital proxy

	Capital proxy (banks own mult)	*Capital proxy (fixed mult, =3)*	*Capital proxy Stressed period (fixed mult, =3)*
Equity	22%	21%	14%
IR	22%	21%	16%
FX	17%	19%	11%
Commodity	15%	13%	9%
Credit spreads	26%	25%	22%
CTP			

218. Table 17 suggests that variability is slightly exacerbated by regulatory add-ons. The ranges of capital value dispersion remain broadly aligned whether or not the banks' actual multiplication factors are used. Moreover, filtering for banks with the same stress window seems to have a further impact in decreasing the variability. Nonetheless, we need to take into consideration the fact that the sample of banks decreases in number when analysing the subsample of banks with the same stress period, which – other things being equal – tends to increase the IQD.

5.8 Present value

219. The 2020 exercise introduced the PV as a statistic to be provided by the banks. The full set of statistics is provided in Table 42 for this year's exercise as well.

220. The average IQD of the PV among the single portfolios is 4% (it was 11% in 2021). This IQD would be much lower, at 2%, if 2 portfolios with a relatively high IQD (Portfolios 10 and 27) were excluded. By asset class, the IQD is distributed as follows: EQ (4%- or 2% if portfolio 10 is excluded), IR (7% - or 2% if portfolio 27 is excluded), FX (0%), CO (4%) and CS (1%).

221. PV measures are useful to CAs to verify the RM values. The ratio of RM over PV helps the CAs to quickly verify if the RM outlier comes from a simple mispricing of the portfolio or if it is indeed a true outlier with respect to the RM benchmark. Further analysis of these aspects is expected to be carried out in future.

6. Competent authorities' assessment

222. For each participating institution, the CAs provided individual assessments of any potential underestimation of the capital requirement as required by Article 78(4) of the CRD and Articles 9 and 10 of the draft RTS on supervisory benchmarking. This chapter highlights some key information derived from these assessments.

223. The EBA designed a questionnaire about this assessment, which asked CAs to provide detailed information concerning the level of priority, based on both judgemental and qualitative/quantitative examination results, the overall assessment concerning the MR capital requirements of the internal models and, finally, the CAs' ongoing monitoring activities.

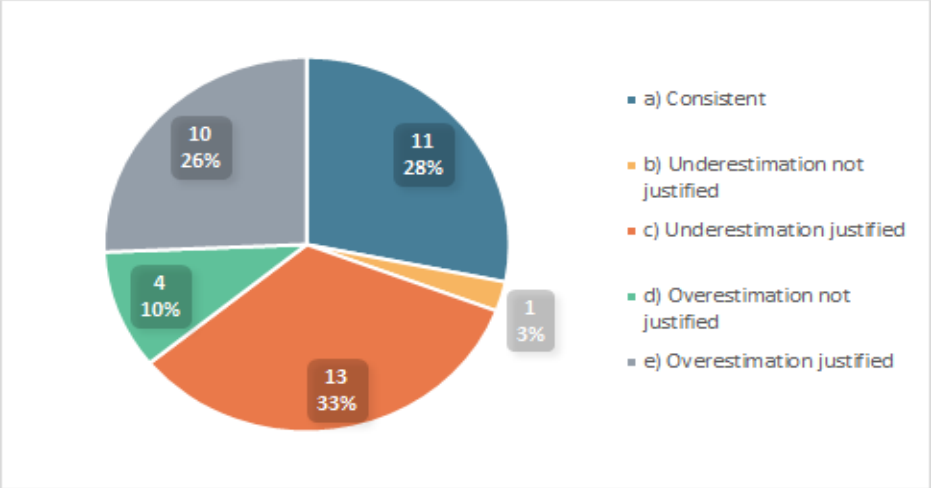
224. A total of 39 questionnaires from 12 jurisdictions, provided by the CAs, have been considered in this assessment of the MR benchmarking exercise.

225. Regarding the level of priority of the assessments, three banks were reported to be a high priority for intervention by CAs. The CA gave high priority because of the level of representativeness of the EBA portfolio in the trading portfolio of the bank or for the representativeness of the banks within the jurisdiction.

226. Figure 16 reports the CAs' own overall assessments of the levels of own funds requirements. When it comes to benchmark deviations, justified or not, 28 banks were reported by CAs as under or overestimating MR own funds requirements, of which 23 provided justifications for this. Obviously, 'not justified' implies that further and targeted CA investigation is required. Finally, 11 banks had consistent results (i.e., no benchmark deviations).

227. CAs' assessments acknowledge five cases out of 33 of unjustified under- or overestimation of internal model market capital requirements that require further in-depth analysis. Obviously, CAs – and the joint supervisory teams, where applicable – pay close attention to the potential cases of underestimation, both across the portfolio and across the risk categories. All these five cases were classified as low priority by their supervisors.

Figure 16: CAs' own assessments of the levels of MR own funds requirements (BM exercise 2022)



228. The main factors and reasons that may explain possible underestimations are as follows: benchmarking portfolios that do not represent the actual composition of the real trading portfolios of the institutions (9/88); differences in calibration or data used in modelling estimation and/or simulation (8/88); proxies applied (12/88); and differences attributable to the methodology used (18/88). These explanations, and very often a combination of these explanations, were offered by a large majority of the applicable respondents.

229. Just one bank was identified as possibly underestimating, without justification, during the banks' internal assessment process run by the CAs. Nonetheless, the unjustified part refers to just a single asset class of the whole set of portfolios examined. Therefore, only a limited set of aspects were still under clarification with the Cas.

230. The four banks identified as possibly overestimating, without justification, are also classified as 'low priority' by the CA. Differences in calibration or data used in modelling estimations and/or simulations were also identified by the CA, which was nonetheless unable to fully explain and investigate the misalignment; these misalignments did not raise substantial concerns for Cas, since the over-estimations was nonetheless consistent with the shortcoming of the models examined by the Cas, and generally refer to a minority of portfolio in the exercise.

231. Overall, CAs planned some action in respect of 15 banks, such as:

a. reviewing the banks' internal VaR and IRC models;

b. extra supervisory charges;

c. further internal model investigations at the peer level.

232. Currently, five banks have a due date for making improvements to their MR internal models, as already requested by CAs.

7. SBM OFR

233. The ITS 2022 introduced the sensitivities-based method (SBM) component of the alternative standardised approach (ASA)/FRTB SA to the EBA Benchmarking exercise.

234. The ITS 2022 required banks the submission of granular sensitivity data and aggregated OFR computed via SBM.

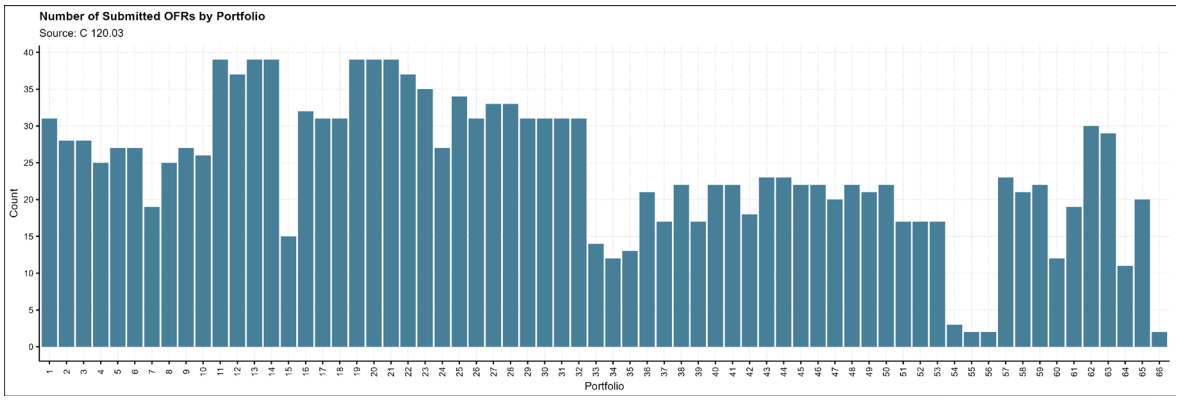
235. The high granularity, number of data submissions and remaining data quality issues for the sensitivities do not allow, for the moment, a concise representation. Therefore, this year's report focuses on the representation of the SBM OFR aggregated data.

7.1 Assessment of completeness of SBM OFR submissions

236. Overall, the submission rate for new SBM OFR data is considered broadly adequate and fairly high. Figure 17 shows the total number of SBM OFR submissions per portfolio. Overall, it can be concluded that, for each portfolio, SBM OFR figures were reported whenever the traditional risk measures (e.g., VaR or SVaR) was also reported.

237. Very few banks drive the discrepancy between the number of submissions for IMA and SBM.

Figure 17: SBM OFR total submissions by portfolio



238. This is also confirmed in Figure 34, which presents the differences in the numbers of submissions between the SBM OFR and the IMA OFR by portfolio. Almost all institutions that have submitted data for IMA, have also submitted figures for SBM. However, there are also institutions that have submitted SBM OFRs but no IMA figures for certain portfolios.

239. For cumulative Portfolios 60, 62 and 63, one additional bank (different for each portfolio) reported SBM OFR which did not report IMA data.

7.2 SBM Variation within Portfolios

240. As for the other risk measures, dispersion is a very important factor to consider and monitor in the benchmarking process for OFR-SBM. Average summarised statistics of dispersion can be seen in Table 4, while detailed figures for SBM OFR, such as benchmarking of the sample, quantiles of the distribution and IQD figures by portfolios, are reported in Table 47.

241. Figure 18 illustrates the variation of SBM-OFR by portfolios, where outliers are highlighted by applying the EBA market risk outlier definition[22] (median +/- two times truncated standard deviation).

242. Of course, other definitions of outliers are possible. For instance, the industry applies a simpler outlier definition[23] in its benchmarking exercise (see Figure 35). Alternatively, the Median Absolute Deviation, i.e., MAD[24] concept could be applied (see Figure 36) or the traditional boxplot outlier definition[25] (see Figure 37).

243. To achieve a harmonious appearance, all portfolio-OFRs are standardised by the respective portfolio median and the ordinate is log-2-transformed. In addition, the standardised OFR are top-coded at 1,600%. In Figure 18, Figure 35 and Figure 36, the cyan bars represent the standardised Interquartile Range of the respective portfolio, i.e. the distance between the ratio of the respective portfolio's first quartile to its median and the ratio of the third quartile to the portfolio's median. In all figures only portfolios are included for which at least 10 OFR observations are available.

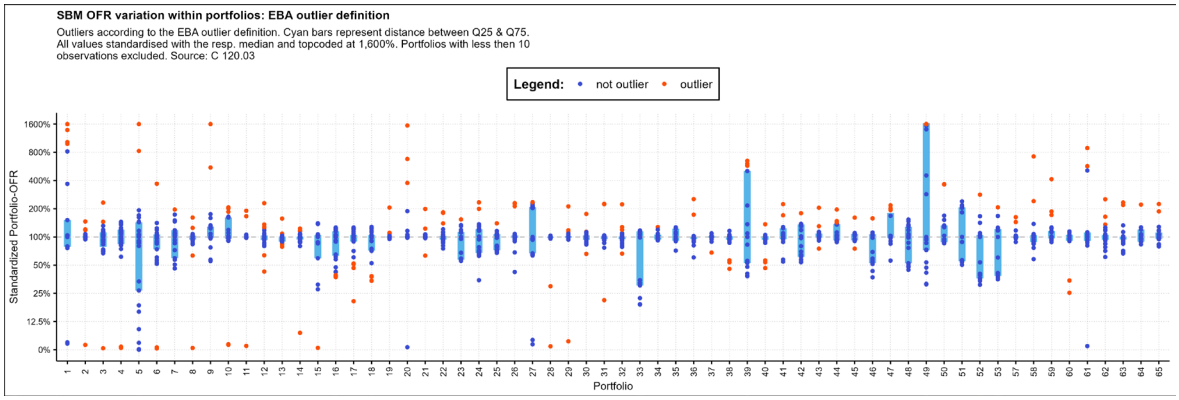
[22] EBA Outliers are defined as values outside the interval [ex − 2 ⋅ TSD, ex + 2 ⋅ TSD]. Where "ex" is the median of portfolio-OFRs., and TSD (truncated standard deviation) is the standard deviation of the portfolio-OFRs between the 5-th and the 95-th percentile.

[23] (50%-150% outlier definition) - Industry outliers are defined as values outside the interval [0.5 · ex, 1.5 · ex], where ex is the median of portfolio-OFRs.

[24] Median Absolute Deviation (MAD) defines outliers as values outside the interval [ex − 2 ·MAD, ex + 2 ·MAD], where MAD is the Median Absolute Deviation, i.e., MAD = median(|xi − ex|), where xi are the OFR observations of the respective portfolio and ex is their median.

[25] Outliers are defined as values outside the interval [Q25 − 1.5 · IQR,Q75 + 1.5 · IQR]. IQR is the Interquartile Range, i.e. IQR = Q75 − Q25.

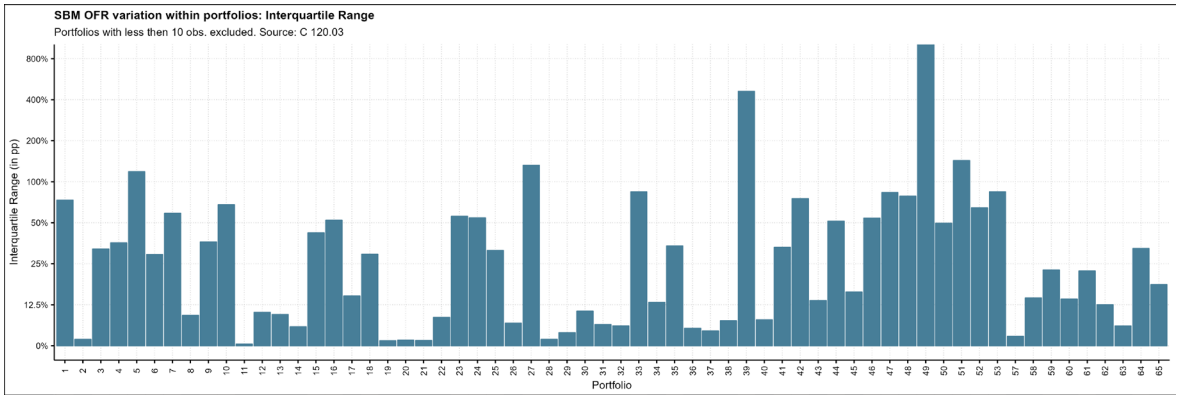
Figure 18: SBM OFR variation within portfolios (EBA outliers' definition)



244. Figure 18 demonstrates that for about half of the portfolios the reported OFR values are concentrated around the respective median. However, there are also several portfolios where a large dispersion is apparent, often in the form of clusters of observations. The varying dispersion can be observed more clearly in Figure 19, which depicts the standardised Interquartile Ranges in percentage points. While for 32 portfolios the standardised Interquartile Range amounts to less than 25 percentage points, 5 portfolios show values larger than 100 percentage points.

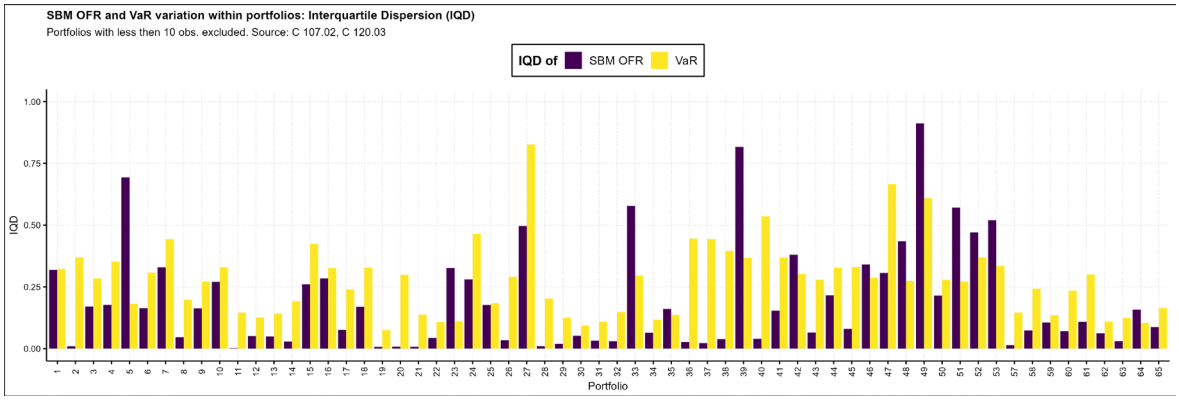
245. Figure 38, Figure 39, Figure 40, Figure 41, and Figure 42 illustrate the variations of SBM-OFR-components attributable to different risk classes, where each risk class portfolio with less than 5 observations has been excluded in the representation. Apparently, large dispersion is persistent even on the more granular risk-class level.

Figure 19: SBM OFR variation within portfolios: Interquartile Range



246. Figure 20 compares the IQDs of SBM OFR and the VaR by portfolio. As might be expected from a standardised approach, the IQDs of VaR are larger than those of SBM OFR for the majority of portfolios. Nevertheless, there are several portfolios for which the opposite holds.

Figure 20: SBM OFR and VaR variation within portfolios: Interquartile Dispersion (IQD)



247. A similar comparison, but also taking into account the IQDs of the SVaR as well can be seen in Figure 43. This comparison can be seen more clearly, when split by asset classes, as shown in Figure 45, Figure 46, Figure 47, Figure 48 and Figure 49.

248. Finally, a comparison of the dispersion of SBM OFR against VaR is informative for banks and supervisors. In general, a very low dispersion is expected for the SBM measure owing to the standardised nature of the calculation, so an increased dispersion of SBM – possibly even exceeding the dispersion observed for VaR – warrants increased attention. Figure 44 highlights several cases where IQD Ratio of SBM-OFR to VaR unexpectedly exceeds 1.

7.3 Comparison of SBM OFR by portfolio across risk class/component

249. Aside from the dispersion of the portfolio OFR, as presented in the previous section, the collected data allows the EBA and the supervisors to present the actual composition of these requirements, splitting each instrument and portfolio by the risk class and components (Delta, Curvature, Vega). In this context, it should be noted that under the SBM, total OFR are calculated as the simple sum of OFR across the relevant risk classes and components.

250. Looking at single portfolios, it appears that the reported Risk classes are to some degree heterogeneous across submissions, and this possibly reflects different interpretations of the ASA rules for modelling of these instruments.

251. This is shown in Figure 21, where the frequency of SBM submission by risk classes relative to the total number of submissions per portfolio is shown. The plot shows the relative frequency of banks who reported a non-zero figure in a given risk class for the given portfolio with respect to the total number of submissions.

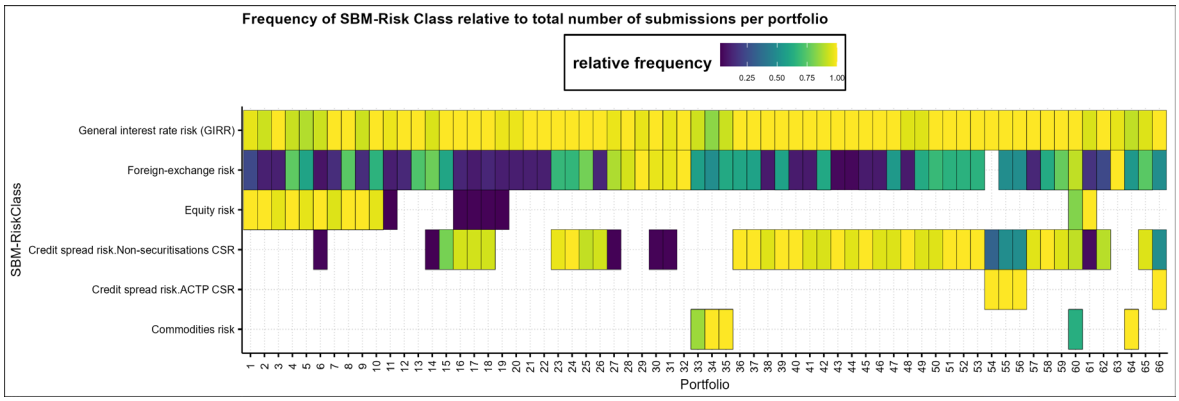
252. Most banks reported values in the same risk category in line with the expectation according to the asset class of the portfolio (e.g., for EQ portfolios, EQ risk expected). Nonetheless, for some EQ portfolios, not all banks submitted an EQ risk component. Interest rate risk is present

across all portfolios with the majority of banks submitting OFR relating to interest rate risk for all portfolios.

253. Some banks reported additional FX components for some portfolios (pf 11 and 16-19, which are just EUR IRS).

254. The plot does not necessarily allow for concluding whether deviating submissions are wrong, but identifies portfolios where bank-specific investigations are meaningful.

Figure 21: Frequency of SBM risk classes relative to the total number of submissions per portfolio



255. Furthermore, the frequency analysis was performed per risk component.

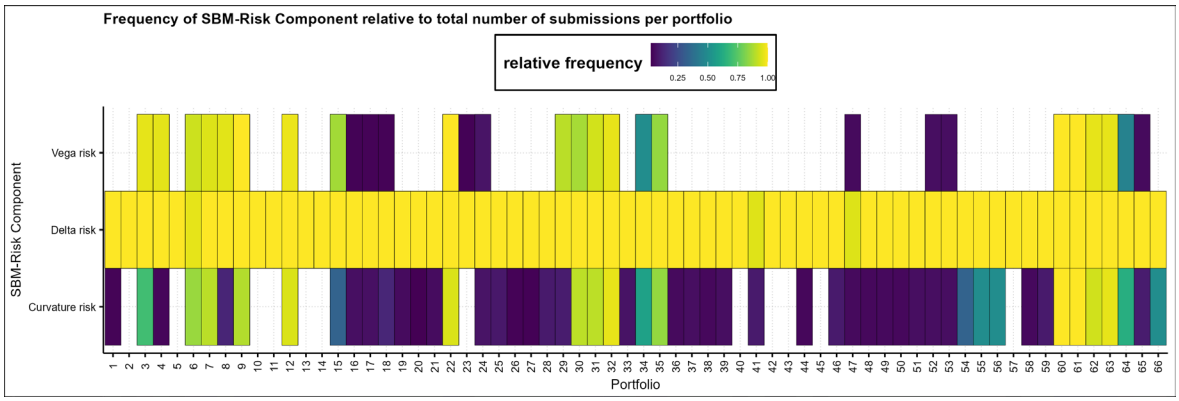
256. Figure 22 presents the frequency of SBM risk component relative to total number of submissions per portfolio.

257. Not surprisingly, most banks reported values in the same risk component. As expected, Delta risk for at least one risk class was reported by all banks in nearly all portfolios.

258. But differences are recognisable with respect to the other risk components.

259. The chart in Figure 22 does not immediately allow for the conclusion of whether deviating submissions are wrong but indicates portfolios where bank specific investigations are meaningful. Justified deviations may result from the use of methodological alternatives available to banks after supervisory approval (e.g., the inclusion of linear instruments in Curvature calculation).

Figure 22: Frequency of SBM risk component relative to the total number of submissions per portfolio



260. An overlapping of these two previous analyses can be seen in Figure 50, where the frequency of SBM risk component within SBM risk classes relative to the total number of submissions per portfolio is represented.

261. Within GIRR, delta risk is reported for nearly all portfolios, while only in some cases additionally Vega and Curvature risk are reported. From this analysis we can see that within EQ, some banks reported risk components for interest rate risk.

262. Most banks reported values in the same risk category in line with expectations (e.g., for EQ Pfs, Delta-EQ risk is expected).

263. Additional FX components for some portfolios (pf 11 and 15-19, EUR IR-) mentioned above fall within Delta risk.

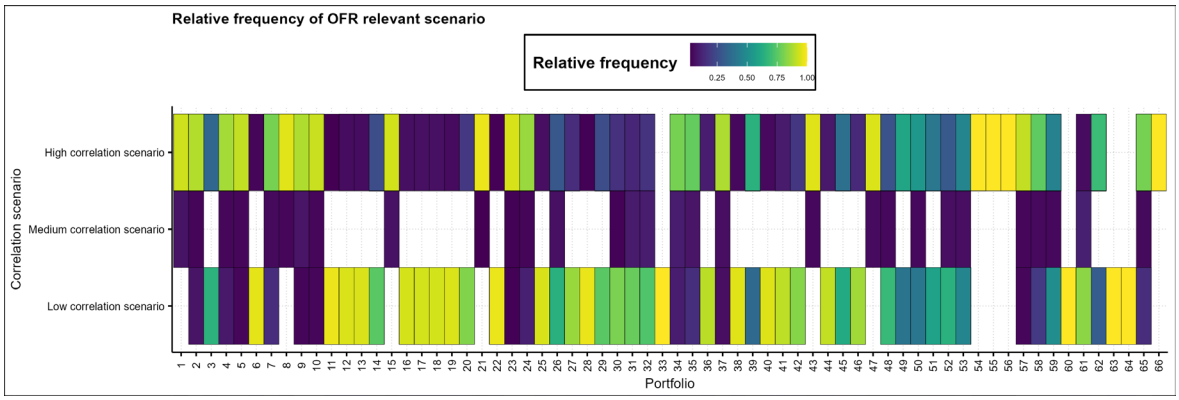
264. The data submitted allow the EBA and the supervisor to check, for each portfolio, which scenario is the one that maximises the SBM-OFR. From this analysis it is clear that the scenario maximising the OFR is not identical for all banks.

265. This is represented in Figure 23. For most portfolios, the high or low correlation scenario leads to the highest OFR. Very rarely the medium correlation scenario yields the highest OFR. For none of the portfolios the same scenario is chosen across all banks. Due to the simplicity of the calculation, it can be expected that the implementation of the correlation scenario logic in itself is not a driver of variability. Instead, the fact that differing correlation scenarios are

observed for the same portfolio may result from differences in the portfolio's interpretation, the risk classes and components considered, or the regulatory buckets that risk factors that have been allocated.

266. Nonetheless, as shown in the Figure 51 – where the median OFR per correlation scenario is represented - only in some portfolios there is a significant difference in OFR with respect to scenario (for instance, Pf 20, 28, 33, 38, 40, 63). Therefore, the impact of correlation scenarios is limited for submitted median OFR in most cases. It should be noted that the impact of the correlation scenario follows the design of the EBA hypothetical portfolio and is not indicative of impacts that can be observed for real trading portfolios.

Figure 23: Relative frequency of OFR relevant scenario



8. Conclusion

267. This report has presented an analysis of the observed variability across results provided by EU banks that have been granted permission to adopt internal models for MR own funds requirements.

268. It must be remembered and emphasised that, as the quantitative analysis is based on hypothetical portfolios, this report focuses solely on potential rather than actual variations. The analysis shows the extent of the variability in these hypothetical portfolios, but this cannot automatically lead to conclusions regarding real under- or overestimations for the MR capital charge.

269. However, the analysis might help in determining possible supervisory activities to address uniformity and harmonisation across the Member States and in promoting in-depth future cross-investigations of this matter.

270. The objective of the benchmarking exercise was not to reach a final judgement on the key drivers of variation and the calculation of the implied capital charges but to provide supervisors with insights into how to increase comparability and reduce the variability between banks that is attributable to non-risk-driven behaviours.

271. In particular, the report provides inputs for CAs on areas that may require further investigation, such as IMV variability for some credit spread products. Supervisors should pay attention to the materiality of risk factors not in VaR and in particular, not encompassed in the IRC models.

272. Moreover, the conclusions reached in regular supervisory model monitoring activities will take into account the outcome of the supervisory benchmarking exercises to achieve greater alignment between CAs' targeted internal model reviews and the EU's benchmarking analysis.

273. Overall, this exercise exhibits a small reduction in the IMV variability for FX, and stable dispersion for CS. IR IMV is substantially high, but this is due to a few instruments with very low IMVs that distort the IQD ratio. EQ and CO IQDs are very high, but for the EQ this is due to an error in the instruction that was fixed in the 2023 instruction, so this fourth submission of the (almost) same instruments and portfolios is acceptable overall. The variability of risk measures, especially the VaR, is lower than the previous exercise and more aligned with the past, and this should be due to a reduction in market volatility. The variability of the VaR aggregated portfolios is limited: the 'all-in portfolio' IQD is 11% (it was 16% in 2021). Aggregated by asset class, the portfolio IQD of the others is 9 (vs 15% in 2021) on average and never above 11%. The analysis carried out in the 2019-2021 exercise – relating to the considerations of the level of approval, size of banks, business model adopted and stress period – was repeated in the 2022 exercise and should now be considered a consolidated piece of information in the benchmarking report. The 2022 Market Risk benchmarking report also provides an analysis of the new SBM OFR. These

SBM OFRs are overall at an acceptable level in terms of data quality and exhibit, as they are supposed to do, a lower level of dispersion with respect to the IMA Risk measures (Table 4). The granularity of the data submitted, and their representation shed some light on where potential problems of ASA implementation could be at the bank-specific level.

274. Finally, this report provides a framework that can be considered useful for the purpose of future benchmarking exercises under Article 78 of the CRD. Therefore, the type of analysis conducted (i.e., the statistical tools provided to CAs, the graphs and tables created, and the methodology defined, etc.) offers a clear direction for future investigations into and activities relating to these issues.

9. Annex

Table 18: Banks participating in the 2022 EBA MR benchmarking exercise

Country	Bank name
AT	Erste Group Bank AG
AT	Raiffeisen Bank International AG
BE	Belfius Bank
BE	Dexia
BE	KBC Groep
DE	COMMERZBANK Aktiengesellschaft
DE	DEUTSCHE BANK AKTIENGESELLSCHAFT
DE	DZ BANK AG Deutsche Zentral-Genossenschaftsbank, Frankfurt am Main
DE	DekaBank Deutsche Girozentrale
DE	HSBC Germany Holdings GmbH
DE	Landesbank Baden-Württemberg
DE	Landesbank Hessen-Thüringen Girozentrale
DE	Norddeutsche Landesbank - Girozentrale -
DK	Danske Bank A/S
DK	Nykredit Realkredit A/S
ES	Banco Bilbao Vizcaya Argentaria, S.A.
ES	Banco Santander, S.A.
ES	CaixaBank, S.A.
ES	Credit Suisse Bank (Europe), S.A.
FI	Nordea Bank Abp
FR	BNP Paribas
FR	Groupe BPCE
FR	Groupe Crédit Agricole
FR	HSBC Continental Europe
FR	Société générale S.A.
GR	ALPHA SERVICES AND HOLDINGS S.A.
GR	Eurobank Ergasias Services and Holdings S.A.
GR	National Bank of Greece, S.A.
IE	Barclays Bank Ireland plc
IE	Citibank Holdings Ireland Limited
IT	BANCO BPM SOCIETA' PER AZIONI
IT	Intesa Sanpaolo S.p.A.
IT	UNICREDIT, SOCIETA' PER AZIONI
NL	ABN AMRO Bank N.V.
NL	Coöperatieve Rabobank U.A.
NL	ING Groep N.V.
NL	NIBC Holding N.V.
NL	RBS Holdings N.V.
PT	Banco Comercial Português, SA
SE	Skandinaviska Enskilda Banken - gruppen
SE	Swedbank - Grupp

Country	AT	BE	DE	DK	ES	FI	FR	GR	IE	IT	NL	PT	SE
N.banks	2	3	8	2	4	1	5	3	2	3	5	1	2

Table 19: Instruments/portfolios underlying the HPE

	Instruments
	EQUITY
1	Long EURO STOXX 50 index
2	Long 10000 BAYER (Ticker: BAYN GR) shares.
3	Short Future BAYER (Ticker: BAYN GR) (1 contract = 100 shares).
4	Short Future, STELLANTIS
5	Short Future, ALLIANZ
6	Short Future BARCLAYS
7	Short Future DEUTSCHE BANK
8	Short Future CRÉDIT AGRICOLE
9	Long Call Option. Underlying BAYER
10	Short Call Option. Underlying BAYER
11	Long Call Option. Underlying PFIZER
12	Long Put Option. Underlying PFIZER
13	Long Call Option. Underlying BAYER
14	Short Call Option. Underlying BAYER
15	Long Call Option. Underlying AVIVA
16	Long Put Option. Underlying AVIVA
17	Short Future NIKKEI 225
18	Auto-callable Equity product
	IR
19	5-year IRS EUR – Receive fixed rate and pay floating rate.

20	Two-year EUR swaption on 5-year interest rate swap.
21	5-year IRS USD. Receive fixed rate and pay floating rate.
22	2-year IRS GBP. Receive fixed rate and pay floating rate.
23	Long position on 'Cap and Floor' 10-year UBS AG (Ticker: UBSG VX) Notes.
24	Long GERMANY GOVT EUR 1 MLN
25	Short GERMANY GOVT EUR 1 MLN
26	Long ITALY GOVT EUR 1 MLN
27	Long ITALY GOVT EUR 1 MLN
28	Long SPAIN GOVT EUR 1 MLN
29	Short FRANCE GOVT EUR 1 MLN
30	Short GERMANY GOVT EUR 11 MLN
31	Long UNITED KINGDOM GOVT GBP 1 MLN
32	Long PORTUGAL GOVT EUR 1 MLN
33	Short UNITED STATES GOVT USD 1 MLN
34	Long BRAZIL GOVT 1 MLN USD
35	Long MEXICO GOVT 1 MLN USD
36	10-year IRS EURO – Receive floating rate and pay fixed rate.
37	5-year IRS EURO – Receive floating rate and pay fixed rate.
38	5-year Mark to Market (MtM) Cross Currency EUR/USD SWAP
	FX
39	6-month USD/EUR forward contract
40	6-month EUR/GBP forward contract.
41	Long 1 MLN USD Cash.
42	Long Call option. EUR 10 MLN.
43	Long Call option. EUR 10 MLN.

44	Short Call option. EUR 10 MLN
45	Short Call option. EUR 10 MLN.
46	Long Put option. EUR 10 MLN.
47	Short Put option. EUR 10 MLN
	COMMODITIES
48	Long 3,500,000 6-month ATM London Gold Forwards
49	Short 3,500,000 12-month ATM London Gold Forwards contracts
50	Long 30 contracts of 6-month WTI Crude Oil Call option
51	Short 30 contracts of 6-month WTI Crude Oil Put option
	CREDIT SPREAD
52	Long (i.e. Buy protection) USD 1 MLN CDS on PORTUGAL.
53	Long (i.e. Buy protection) USD 1 MLN CDS on ITALY.
54	Short (i.e. Sell protection) USD 1 MLN CDS on SPAIN.
55	Long (i.e. Buy protection) USD 1 MLN CDS on MEXICO.
56	Long (i.e. Buy protection) USD 1 MLN CDS on BRAZIL.
57	Long (i.e. Buy protection) USD 1 MLN CDS on UK.
58	Short (i.e. Sell protection) EUR 1 MLN CDS on Telefonica (Ticker TEF SM).
59	Long (i.e. Buy protection) EUR 1 MLN CDS on Telefonica (Ticker TEF SM).
60	Short (i.e. Sell protection) EUR 1 MLN CDS on Aviva (Ticker AV LN).
61	Long (i.e. Buy protection) EUR 1 MLN CDS on Aviva (Ticker AV LN).
62	Short (i.e. Sell protection) EUR 1 MLN CDS on Vodafone (Ticker VOD LN).
63	Short (i.e. Sell protection) EUR 1 MLN CDS on ENI SpA (Ticker ENI IM).
64	Short (i.e. Sell protection) USD 1 MLN CDS on Eli Lilly (Ticker LLY US).

65	Short (i.e. Sell protection) EUR 1 MLN CDS on Unilever (Ticker UNA NA).
66	Long (i.e. Buy protection) EUR 1 MLN CDS on Total SA (Ticker FP FP).
67	Long (i.e. Buy protection) EUR 1 MLN CDS on Volkswagen Group (Ticker VOW GR).
68	Long position on TURKEY Govt. notes USD 1 MLN (ISIN US900123CF53)
69	Long (i.e. Buy protection) USD 1 MLN CDS on TURKEY. Effective date as booking date.
70	Long position on Telefonica notes EUR 1 MLN
71	Long position on Volkswagen Group notes EUR 1 MLN
72	Short position Volkswagen Group notes EUR 1 MLN
73	Long position on Total SA notes EUR 1 MLN (ISIN XS0830194501)
74	Long Austria GOVT EUR 1 MLN
75	Long (i.e. Buy protection) USD 1 MLN CDS on Austria
76	Long NETHERLANDS GOVT EUR 1 MLN
77	Long (i.e. Buy protection) USD 1 MLN CDS on NETHERLANDS
78	Long BELGIUM GOVT EUR 1 MLN
79	Long (i.e. Buy protection) USD 1 MLN CDS on BELGIUM

	CTP
80	Short position in spread hedged Super Senior tranche of iTraxx Europe index on-the-run series.
81	Long (i.e. Buy protection) USD 1 MLN First to Default Basket Swap on {Brazil, Mexico and Turkey}.

Individual Portfolio	**Combination of instruments:**

1	1 – 1 instrument
2	3 – 1 instrument
	4 – 1 instrument
	5 – 1 instrument
3	13 – 1 instrument
	10 – 1 instrument
4	15 – 1 instrument
	16 – 1 instrument
5	17 – 1 instrument
6	9 – 1 instrument
	10 – 1 instrument
7	18 – 1 instrument
8	11 – 1 instrument
	12 – 1 instrument
9	2 – 1 instrument
	14 – 1 instrument
10	6 – 1 instrument
	7 – 1 instrument
	8 – 1 instrument
11	19 – 1 instrument
12	20 – 1 instrument
13	21 – 1 instrument
14	22 – 1 instrument
15	23 – 1 instrument
16	24 – 1 instrument
	25 – 1 instrument

17	24 – 1 instrument
	25 – 1 instrument
	26 – 1 instrument
18	24 – 1 instrument
	25 – 1 instrument
	26 – 1 instrument
	27 – 1 instrument
	28 – 1 instrument
	29 – 1 instrument
	30 – 1 instrument
19	19 – 1 instrument
	36 – 1 instrument
20	19 – 1 instrument
	37 – 1 instrument
21	36 – 1 instrument
	37 – 1 instrument
22	19 – 1 instrument
	20 – 1 instrument
23	31 – 1 instrument
24	33 – 1 instrument
	34 – 1 instrument
	35 – 1 instrument
25	21 – 1 instrument
	33 – 1 instrument
26	26 – 1 instrument
	27 – 1 instrument

	28 – 1 instrument
	32 – 1 instrument
27	38 – 1 instrument
28	39 – 1 instrument
	40 – 1 instrument
29	41 – 1 instrument
	42 – 1 instrument
30	42 – 1 instrument
	43 – 1 instrument
	44 – 1 instrument
31	45 – 1 instrument
	46 – 1 instrument
32	47 – 1 instrument
33	48 – 1 instrument
	49 – 1 instrument
34	50 – 1 instrument
	51 – 1 instrument
35	48 – 1 instrument
	51 – 1 instrument
36	52 – 1 instrument
	53 – 1 instrument
	54 – 1 instrument
37	55 – 1 instrument
	56 – 1 instrument
38	58 – 1 instrument
	59 – 1 instrument

39	54 – 1 instrument
	55 – 1 instrument
40	60 – 1 instrument
	61 – 1 instrument
41	62 – 1 instrument
	63 – 1 instrument
	65 – 1 instrument
	66 – 1 instrument
	67 – 1 instrument
42	68 – 1 instrument
	69 – 1 instrument
43	70 – 1 instrument
	71 – 1 instrument
	73 – 1 instrument
44	71 – 1 instrument
	72 – 1 instrument
45	70 – 1 instrument
	59 – 1 instrument
46	66 – 1 instrument
	73 – 1 instrument
47	64 – 1 instrument
48	71 – 1 instrument
	72 – 1 instrument
	67 – 1 instrument
49	57 – 1 instrument
	54 – 1 instrument

50	53 – 1 instrument
	27 – 1 instrument
51	55 – 1 instrument
	35 – 1 instrument
52	56 – 1 instrument
	34 – 1 instrument
53	55 – 1 instrument
	35 – 1 instrument
	56 – 1 instrument
	34 – 1 instrument
54	80 – 1 instrument
55	81 – 1 instrument
56	81 – 1 instrument
	68 – 1 instrument
	34 – 1 instrument
	35 – 1 instrument
57	74 – 1 instrument
	76 – 1 instrument
	78 – 1 instrument
58	75 – 1 instrument
	77 – 1 instrument
	79 – 1 instrument
59	74 – 1 instrument
	75 – 1 instrument
	76 – 1 instrument
	77 – 1 instrument

	78 – 1 instrument 79 – 1 instrument

Aggregated Portfolio	**Combination of individual portfolios:**
60 ALL-IN no-CTP	1, 2, 6, 7, 9, 11, 12, 18, 21, 27, 28, 30, 31, 32, 33, 34, 38, 41, 43, 59
61 EQUITY Cumulative	1, 2, 6, 7, 9
62 IR Cumulative	11, 12, 18, 21
63 FX Cumulative	28, 30, 31, 32
64 Commodity Cumulative	33, 34
65 Credit Spread cumulative	38, 41, 43, 59
66 CTP cumulative EUR	54, 56

For a detailed description of the portfolios, please refer to the EBA website:

https://www.eba.europa.eu/regulation-and-policy/supervisory-benchmarking-exercises/its-package-2022-benchmarking-exercise

Adopted as:

Commission Implementing Regulation (EU) 2022/951 of 24 May 2022 amending Implementing Regulation (EU) 2016/2070 laying down implementing technical standards for templates, definitions and IT solutions to be used by institutions when reporting to the European Banking Authority and to competent authorities in accordance with Article 78(2) of Directive 2013/36/EU of the European Parliament and of the Council (text with EEA relevance)

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Table 20: VaR cluster analysis – number of banks by range

2022 VaR cluster analysis: number of banks by range

(X = ratio with the median)

100

	Port. ID	300% < X	300% ≥ X >200%	200% ≥ X >150%	150% ≥ X >100%	100% ≥ X >50%	50% ≥ X >0	Num obs.
Equity	1		3	5	4	14	1	27
	2		3	5	3	14	1	26
	3			4	8	12	1	25
	4		1	4	6	10	3	24
	5			1	12	10	1	24
	6			1	10	11	3	25
	7			2	5	8	3	18
	8				13	10		23
	9			1	10	11	3	25
	10			1	9	13	1	24
Interest Rate	11				16	20		36
	12				17	16		33
	13				17	19		36
	14				17	20		37
	15		1	2	3	6	2	14
	16			1	13	14	1	29
	17			1	12	14	1	28
	18			3	11	12	4	30
	19				16	20		36
	20			3	14	18		35
	21				16	17		33
	22				16	18		34
	23				14	19		33
	24		3	3	5	8	6	25
	25			1	15	17		33
	26			1	11	15	1	28
	27	3	2		5	15	2	27
FX	28				14	16		30
	29				12	16		28
	30				14	16		30
	31				14	16		30
	32				12	16		28
Commodities	33			2	4	4	3	13
	34				4	6		10
	35				6	6		12
Credit Spread	36			1	7	8	3	19
	37		3		4	9		16
	38		1	3	4	10	2	20
	39		2	1	4	9		16
	40		1	3	3	11	1	19
	41		1	5	2	11	1	20
	42			2	5	10		17
	43	1	1	4	3	12	1	22
	44		1	3	5	13		22
	45		2	4	2	11	1	20
	46		1	2	5	11	1	20
	47	2	3		2	9	2	18
	48			1	6	11	1	19
	49	2	3	1	2	11		19
	50			3	5	12		20
	51			2	5	7	2	16
	52			3	5	8	1	17
	53			4	5	8	1	18
	57				9	13		22
	58		2	1	6	9	2	20
	59				9	12		21
CTP	54							0
	55							0
	56							0
ALL-IN no-CTP	60			2	3	5	1	11
Equity Cumulative	61		1	1	4	11		17
IR Cumulative	62				11	16		27
FX Cumulative	63				12	15		27
Commodity Cumulative	64				4	6		10
CS Cumulative	65			5	22	2		29
CTP Cumulative	66							0

Table 21: VaR statistics

EU Statistics for VaR

		Main statistics								Percentiles			
	Port. ID	Min	Max	Ave.	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Mean)	Num obs.[2]	25th	50th	75th	IQD
Equity	1	184,485	10,626,420	4,574,049	2,309,746	7,944,722	929,742	51%	28	3,064,419	3,931,522	5,918,603	32%
	2	1,295,510	5,918,479	3,392,008	1,358,966	1,610,727	495,769	40%	26	2,381,789	2,767,536	4,492,038	31%
	3	3,170	19,170	11,903	4,099	4,359	2,140	34%	25	9,354	11,585	13,265	17%
	4	239	2,823	1,284	612	930	240	48%	24	970	1,209	1,462	20%
	5	443,522,356	1,911,290,183	1,285,916,415	312,866,031	445,136,273	131,206,424	24%	24	1,086,777,023	1,161,096,051	1,562,764,494	18%
	6	1,283	9,545	5,067	2,022	2,302	1,604	40%	25	3,778	5,530	6,555	27%
	7	10,673	60,798	28,788	15,005	26,786	8,535	52%	18	17,680	31,955	33,760	31%
	8	25,062	54,731	42,555	8,912	11,270	7,326	21%	23	35,222	41,891	52,065	19%
	9	9,235	83,437	41,090	16,409	20,709	10,600	40%	25	30,628	44,050	48,764	23%
	10	209,500	748,369	472,893	156,482	278,709	96,268	33%	24	340,024	493,584	627,493	30%
Interest Rate	11	51,989	121,534	84,199	15,583	18,788	9,292	19%	37	69,700	89,290	95,063	15%
	12	23,100	43,087	34,034	5,221	5,920	3,947	15%	34	30,554	34,645	38,447	11%
	13	110,316	197,859	146,519	22,819	25,373	19,788	16%	37	122,331	148,895	161,912	14%
	14	28,545	60,058	42,121	9,110	9,242	8,347	22%	38	33,584	44,169	48,304	18%
	15	11,124	57,592	27,064	13,926	15,899	8,631	52%	14	16,342	25,839	31,611	32%
	16	14,505	52,397	29,332	10,477	11,263	9,525	36%	30	19,066	31,804	36,484	31%
	17	32,427	114,915	73,911	21,995	27,466	15,392	30%	28	58,613	76,442	89,589	21%
	18	36,567	144,620	81,053	31,443	33,387	26,135	39%	30	54,138	85,834	99,887	30%
	19	102,562	157,602	123,551	12,551	18,216	8,823	10%	37	115,843	121,867	132,515	7%
	20	3,000	8,443	5,087	1,610	1,730	1,307	32%	36	3,625	5,034	6,485	28%
	21	205,699	339,957	283,772	38,394	48,529	28,254	14%	34	243,724	300,063	319,862	14%
	22	49,121	127,144	83,661	16,965	23,231	6,434	20%	35	71,881	85,402	91,552	12%
	23	22,888	52,275	37,006	5,362	7,909	2,460	15%	33	33,924	37,114	40,021	8%
	24	12,903	104,801	46,887	26,513	34,771	18,483	57%	25	22,945	45,426	66,120	48%
	25	78,873	199,920	130,884	26,196	35,030	24,094	20%	34	105,998	130,935	154,444	19%
	26	42,861	159,507	102,643	30,305	36,920	23,426	30%	28	77,688	103,793	124,901	23%
	27	1,346	237,848	46,327	60,012	108,023	6,990	130%	27	18,789	28,439	35,222	30%
FX	28	250,423	517,434	377,112	79,665	89,750	34,755	21%	31	325,174	353,806	459,443	17%
	29	14,093	30,497	21,464	3,601	4,753	1,398	17%	29	19,672	20,997	23,417	9%
	30	150,875	234,767	192,368	23,182	23,438	17,946	12%	31	176,520	191,831	210,574	9%
	31	246,168	401,491	311,284	41,950	43,953	39,044	14%	31	269,530	319,945	340,606	12%
	32	272,434	465,526	358,710	55,484	68,515	34,988	16%	29	322,138	346,422	384,035	9%
Commodities	33	1,445	15,092	7,967	3,954	13,555	2,216	50%	13	5,611	8,330	10,341	30%
	34	361,384	540,930	454,574	57,850	204,071	43,327	13%	10	417,550	456,497	519,577	11%
	35	399,770	720,763	515,026	101,045	155,437	70,296	20%	12	434,774	488,374	575,728	14%
Credit Spread	36	4,951	21,063	10,795	4,875	15,344	3,730	45%	19	6,037	11,724	15,976	45%
	37	15,679	76,319	35,468	19,414	25,539	2,750	55%	16	26,126	27,287	35,338	15%
	38	2,121	10,836	5,440	2,434	3,251	1,151	45%	20	3,790	5,359	7,242	31%
	39	8,325	26,386	13,627	5,533	12,752	1,482	41%	16	10,337	11,328	14,856	18%
	40	1,889	8,672	3,827	2,062	3,049	1,058	54%	19	2,196	3,927	4,100	30%
	41	2,023	17,726	9,773	4,244	6,213	2,210	43%	20	7,033	8,470	13,641	32%
	42	28,210	97,253	48,352	18,914	32,334	12,736	39%	17	35,640	50,816	53,440	20%
	43	13,159	105,172	37,048	20,135	44,827	5,332	54%	22	25,377	30,238	45,716	29%
	44	4,714	17,120	8,797	3,460	9,510	1,618	39%	22	6,375	7,714	11,119	27%
	45	2,466	35,960	16,291	7,675	12,118	1,725	47%	20	11,662	13,269	21,448	30%
	46	1,579	18,873	9,429	3,667	13,175	1,760	39%	20	7,315	8,675	11,814	24%
	47	750	6,942	2,586	2,031	2,749	808	79%	18	972	1,915	4,385	64%
	48	1,870	16,035	8,727	2,828	9,788	1,160	32%	19	7,490	8,965	10,018	14%
	49	2,036	13,857	5,439	3,936	5,311	1,477	72%	19	2,667	3,909	8,789	53%
	50	10,440	26,515	15,794	4,625	7,597	1,972	29%	20	12,590	15,169	16,826	14%
	51	3,243	47,699	23,798	11,036	15,640	5,488	46%	16	17,208	24,004	28,087	24%
	52	4,719	55,181	30,077	13,734	16,354	8,839	46%	17	19,694	29,107	37,170	31%
	53	2,776	89,131	53,051	24,048	24,048	17,435	45%	18	36,321	48,919	72,958	34%
	57	105,689	222,270	162,359	28,450	42,524	14,532	18%	22	144,400	160,257	181,761	11%
	58	15,838	67,983	35,701	15,506	18,869	9,285	43%	20	26,801	32,555	45,496	26%
	59	99,637	228,434	158,343	28,903	44,747	20,600	18%	21	141,025	157,580	178,658	12%
CTP	54								3				
	55								2				
	56								2				
ALL-IN no-CTP **	60	853,190	4,486,543	2,678,089	1,036,766	1,348,030	299,225	39%	11	2,222,671	2,586,623	2,793,925	11%
Equity Cumulative **	61	1,537,143	6,167,625	2,932,447	1,079,678	9,500,539	323,012	37%	17	2,411,352	2,784,022	2,991,876	11%
IR Cumulative **	62	160,466	276,055	216,867	29,186	43,321	17,818	14%	27	199,306	220,726	237,443	9%
FX Cumulative **	63	602,702	901,613	728,540	90,203	103,076	39,336	12%	28	667,851	702,199	789,631	8%
Commodity Cumulative **	64	362,341	521,219	451,563	52,380	203,064	41,410	12%	10	420,822	456,678	503,641	9%
CS Cumulative **	65	101,810	276,790	178,266	39,451	73,138	14,256	22%	19	158,045	174,697	191,956	10%
CTP Cumulative **	66								2				

[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

[2] Refers to the number of banks included in the computation of the statistics

*** For the aggregated portfolios (57 to 63), banks that reported at least a missing portfolio IMV among the ones composing the aggregate are not included in the computation of the benchmarks for that particular aggregate portfolio.*

Table 22: sVaR statistics

EU Statistics for SVaR

		Main statistics								Percentiles			
	Port. ID	Min	Max	Ave.	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Mean)	Num obs.[2]	25th	50th	75th	IQD
Equity	1	4,043,696	11,962,650	8,333,895	1,875,738	27,606,873	1,164,427	23%	27	7,145,715	8,682,882	9,492,397	14%
	2	3,086,612	14,097,239	8,632,457	2,991,083	3,391,483	2,328,456	35%	26	6,477,337	9,053,896	11,134,249	26%
	3	5,081	26,088	15,918	5,669	6,085	2,783	36%	25	12,739	15,795	18,366	18%
	4	196	3,506	1,641	916	1,272	436	56%	24	1,057	1,578	1,989	31%
	5	323,391,795	3,964,883,697	2,198,726,015	1,171,635,727	1,133,690,100	952,564,573	53%	28	1,016,623,683	2,524,434,972	3,152,035,369	51%
	6	1,944	11,750	6,606	2,963	2,869	2,723	45%	27	3,810	6,723	9,347	42%
	7	19,316	130,239	71,000	32,191	42,219	18,851	45%	18	47,560	72,758	85,262	28%
	8	11,331	68,489	40,004	17,601	17,601	12,650	44%	24	27,618	40,037	53,908	32%
	9	33,388	114,429	72,379	22,437	23,780	12,142	31%	25	58,089	74,332	83,337	18%
	10	434,521	2,485,038	1,253,834	457,980	610,979	223,029	37%	26	1,037,384	1,288,630	1,483,442	18%
Interest Rate	11	88,868	282,205	176,004	59,055	57,119	46,754	34%	38	123,151	194,280	225,140	29%
	12	16,692	99,127	51,691	20,590	23,741	15,372	40%	35	33,472	53,111	67,409	34%
	13	134,832	467,288	289,040	84,212	88,595	37,304	29%	35	224,855	311,257	342,603	21%
	14	16,248	130,297	70,449	33,315	30,726	28,134	47%	40	37,802	74,887	97,363	44%
	15	24,978	200,506	80,184	53,856	80,864	27,638	67%	14	39,983	65,572	121,142	50%
	16	10,203	80,433	44,889	17,347	19,734	10,109	39%	30	33,947	44,631	58,761	27%
	17	37,958	208,533	113,167	39,234	49,403	26,335	35%	29	89,082	119,579	134,120	20%
	18	43,519	298,330	133,754	68,240	85,741	41,819	51%	28	80,908	127,698	180,626	38%
	19	86,643	363,915	227,380	77,692	79,219	66,522	34%	38	159,641	236,253	291,900	29%
	20	113	58,955	13,237	12,805	24,423	4,736	97%	36	6,613	12,463	15,233	39%
	21	231,427	745,932	490,190	165,954	159,355	135,584	34%	39	299,167	541,280	637,659	36%
	22	80,855	223,596	153,226	48,754	51,476	42,711	32%	35	107,761	156,371	199,942	30%
	23	23,635	80,660	53,376	13,868	21,089	11,055	26%	32	42,350	57,729	64,706	21%
	24	23,137	212,979	93,598	55,861	64,824	41,119	60%	25	47,310	87,645	137,883	49%
	25	112,140	350,642	244,387	80,734	83,790	51,381	33%	33	162,855	278,442	303,036	30%
	26	55,619	384,242	177,838	98,106	131,130	47,554	55%	29	116,804	148,859	215,041	30%
	27	16,622	434,681	154,148	118,860	294,823	47,358	77%	27	77,909	140,443	151,263	32%
FX	28	315,619	1,200,656	786,122	241,491	251,872	170,466	31%	32	658,553	813,472	998,984	21%
	29	24,607	91,418	51,997	20,753	20,475	17,419	40%	32	34,822	53,530	71,625	35%
	30	267,145	585,073	444,824	91,855	95,966	65,549	21%	30	378,935	458,870	526,155	16%
	31	410,612	1,204,279	802,284	251,623	238,819	196,236	31%	33	634,849	793,687	1,056,000	25%
	32	384,565	1,560,256	937,194	342,894	333,148	333,542	37%	32	591,367	962,481	1,214,587	35%
Commodities	33	2,495	63,252	27,713	18,425	25,741	5,456	67%	13	17,634	22,127	27,588	22%
	34	326,848	1,283,239	770,424	270,172	327,003	139,848	35%	11	600,390	730,188	924,016	21%
	35	939,878	1,369,343	1,138,461	143,300	325,873	108,878	13%	12	1,025,257	1,106,694	1,235,545	9%
Credit Spread	36	11,099	72,559	24,003	14,714	26,303	5,437	61%	19	14,840	20,922	31,323	36%
	37	44,868	168,523	87,243	40,575	56,923	16,257	47%	16	58,741	77,153	108,129	30%
	38	6,724	18,647	12,581	3,531	4,970	2,110	28%	20	10,236	12,648	14,916	19%
	39	12,434	90,360	40,668	23,458	32,777	12,742	58%	16	22,665	37,598	51,818	39%
	40	4,472	31,706	14,895	6,935	9,060	3,692	47%	20	10,512	14,064	18,472	27%
	41	12,231	56,033	24,740	12,968	24,856	6,721	52%	20	14,123	23,838	33,082	40%
	42	29,877	182,965	95,018	47,387	47,387	43,494	50%	19	50,978	100,992	134,936	45%
	43	24,531	177,313	88,809	41,155	57,755	27,419	46%	22	61,830	85,958	112,563	29%
	44	7,047	51,925	25,725	12,768	14,740	8,553	50%	23	16,510	25,499	33,627	34%
	45	19,577	91,599	51,802	22,696	22,696	17,736	44%	21	32,301	50,037	62,199	32%
	46	2,744	46,387	20,286	10,161	19,429	6,163	50%	19	13,833	21,485	26,091	31%
	47	1,638	18,628	7,483	4,483	10,492	2,910	60%	19	3,047	8,080	10,352	55%
	48	4,142	62,497	27,308	16,508	20,251	8,113	61%	20	15,059	25,636	31,123	35%
	49	4,083	60,790	19,192	16,387	23,799	6,265	85%	20	7,426	14,332	27,440	57%
	50	14,960	71,709	31,051	14,163	23,844	4,214	46%	20	23,354	27,763	31,853	15%
	51	6,962	104,076	47,285	26,880	33,598	16,390	57%	16	26,336	42,122	66,022	43%
	52	16,442	105,127	48,601	24,950	45,627	17,628	51%	15	27,938	48,328	66,755	41%
	53	7,310	185,493	85,680	43,737	67,326	32,569	51%	16	48,989	85,806	112,679	39%
	57	183,254	439,860	301,093	66,469	75,079	43,476	22%	22	244,909	301,399	331,172	15%
	58	25,513	220,856	94,374	63,718	85,399	29,257	68%	19	46,020	86,772	149,600	53%
	59	169,286	477,691	323,892	99,668	96,004	74,890	31%	23	247,076	296,734	402,789	24%
CTP	54								3				
	55								2				
	56								2				
ALL-IN no-CTP **	60	1,102,373	13,909,817	5,803,188	3,380,134	6,745,382	1,477,103	58%	11	3,667,105	6,244,300	6,541,831	28%
Equity Cumulative **	61	2,136,198	26,986,292	6,113,890	6,001,609	27,120,784	1,618,458	98%	17	3,193,601	5,542,422	6,353,306	33%
IR Cumulative **	62	184,256	690,513	431,109	146,814	165,581	108,982	34%	28	322,846	461,271	543,783	25%
FX Cumulative **	63	834,371	3,079,451	1,813,434	685,376	641,650	585,579	38%	31	1,120,421	2,023,229	2,305,300	35%
Commodity Cumulative **	64	326,810	1,278,379	764,548	274,590	332,873	99,746	36%	11	592,921	704,907	956,083	23%
CS Cumulative **	65	234,296	542,060	391,668	96,753	96,753	71,962	25%	20	306,842	405,339	473,752	21%
CTP Cumulative **	66								2				

[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

[2] Refers to the number of banks included in the computation of the statistics

*** For the aggregated portfolios (57 to 63), banks that reported at least a missing portfolio IMV among the ones composing the aggregate are not included in the computation of the benchmarks for that particular aggregate portfolio.*

Table 23: P&L VaR statistics

EU Statistics for PnL VaR

		Main statistics								Percentiles			
	Port. ID	Min	Max	Ave.	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Mean)	Num obs.[2]	25th	50th	75th	IQD
Equity	1	19,382	10,326,869	4,378,765	2,197,080	7,168,108	110,691	50%	19	3,444,011	3,486,443	5,809,170	26%
	2	2,041,687	5,795,295	3,518,876	1,453,685	1,748,186	550,671	41%	18	2,285,074	3,061,251	5,302,778	40%
	3	1,149	18,677	10,671	4,405	7,043	1,072	41%	18	8,544	9,423	11,805	16%
	4	481	2,354	1,323	499	561	261	38%	18	993	1,274	1,485	20%
	5	7,905,087	2,031,765,410	987,666,226	558,395,062	757,445,768	314,100,222	57%	20	636,721,954	1,021,298,970	1,331,279,740	35%
	6	4,119	10,078	6,827	1,571	1,818	778	23%	17	6,105	6,903	7,517	10%
	7	13,980	69,766	34,245	19,614	92,353	11,349	57%	14	18,031	32,482	46,609	44%
	8	36,109	59,013	46,944	5,854	15,197	1,674	13%	17	44,561	45,454	49,676	5%
	9	18,570	84,466	39,621	14,165	33,517	5,677	36%	18	32,426	37,786	42,994	14%
	10	274,059	831,483	480,885	171,776	290,043	141,442	36%	17	320,266	552,399	608,620	31%
Interest Rate	11	69,444	166,842	91,187	21,145	76,594	7,514	23%	24	78,022	88,321	93,262	9%
	12	20,874	62,215	33,535	8,039	18,431	3,608	24%	21	29,759	33,618	36,741	10%
	13	134,074	296,675	166,545	38,830	82,342	10,187	23%	24	144,255	156,457	172,356	9%
	14	30,154	76,377	42,824	10,860	27,289	4,667	25%	24	37,301	41,882	45,656	10%
	15	11,346	37,311	18,773	9,188	45,207	2,205	49%	10	14,339	15,097	17,427	10%
	16	13,414	54,512	27,682	12,081	27,856	9,717	44%	19	16,733	30,666	36,116	37%
	17	16,733	132,098	72,337	25,818	75,202	17,091	36%	19	53,045	79,758	89,024	25%
	18	41,910	240,822	81,334	44,356	84,131	18,401	55%	20	51,666	75,914	90,272	27%
	19	106,936	214,212	128,211	22,277	72,632	5,377	17%	24	117,131	122,848	127,690	4%
	20	2,768	10,250	5,072	1,677	4,387	885	33%	23	3,826	4,924	5,984	22%
	21	260,199	526,187	308,341	52,554	128,272	15,600	17%	24	282,456	298,238	315,179	5%
	22	70,366	209,604	96,433	30,411	75,206	5,787	32%	23	80,625	87,825	96,221	9%
	23	3,735	68,977	35,777	11,717	18,945	3,339	33%	22	32,309	35,766	39,382	10%
	24	17,790	125,244	53,236	33,507	119,865	11,348	63%	18	34,881	41,359	66,997	32%
	25	118,026	220,645	145,539	27,400	60,783	10,730	19%	20	127,047	138,053	160,485	12%
	26	42,083	309,306	117,697	53,357	110,218	19,173	45%	20	92,400	116,242	130,793	17%
	27	11,514	459,849	77,918	120,650	264,839	3,838	155%	21	17,381	19,303	59,672	55%
FX	28	272,364	590,913	368,109	95,468	268,727	42,430	26%	22	292,040	344,280	450,256	21%
	29	17,838	31,694	22,511	4,425	13,589	934	20%	20	19,916	21,326	22,646	6%
	30	123,642	259,011	206,871	33,249	109,002	20,671	16%	20	177,480	219,154	233,108	14%
	31	246,313	416,456	307,905	47,432	226,281	21,555	15%	20	274,303	296,666	330,462	9%
	32	259,572	438,980	326,998	53,887	253,725	22,332	17%	20	292,891	311,218	345,306	8%
Commodities	33	2,236	28,656	11,998	7,496	11,602	2,320	63%	10	7,836	10,401	12,476	23%
	34	428,099	1,639,144	653,507	405,037	851,470	83,405	62%	8	445,510	573,953	604,286	15%
	35	60,919	1,584,108	564,099	408,468	557,902	21,211	72%	9	471,587	496,358	507,839	4%
Credit Spread	36	2,884	31,360	10,526	8,773	12,373	2,469	83%	15	4,563	7,197	13,443	49%
	37	12,162	87,301	34,375	24,952	33,686	1,300	73%	12	24,103	25,517	26,738	5%
	38	2,495	12,022	6,214	2,897	8,943	2,343	47%	15	3,931	6,182	8,952	39%
	39	6,438	33,482	12,465	7,164	12,529	516	58%	11	9,896	10,796	12,076	10%
	40	1,891	10,793	4,642	2,314	5,764	1,283	50%	15	3,102	3,922	5,740	30%
	41	4,642	23,290	9,842	5,138	11,019	2,636	52%	15	6,453	9,252	12,769	33%
	42	21,860	166,823	53,970	40,148	69,439	17,579	74%	13	29,291	47,845	54,655	30%
	43	13,035	104,633	37,562	24,232	180,362	4,592	65%	16	24,097	29,317	42,040	27%
	44	4,853	18,740	8,858	3,771	35,482	1,474	43%	16	6,259	7,878	10,424	25%
	45	2,338	37,689	15,883	9,335	67,928	2,397	59%	15	11,341	13,721	17,146	20%
	46	1,732	119,058	17,890	28,748	57,351	1,130	161%	16	7,204	8,608	9,433	13%
	47	645	4,712	2,353	1,392	1,669	1,381	59%	14	787	2,313	3,661	65%
	48	1,797	35,536	9,735	8,464	29,624	721	87%	15	6,669	7,521	8,149	10%
	49	2,767	16,118	5,980	4,195	14,777	709	70%	14	3,503	3,977	7,291	35%
	50	9,220	33,045	15,291	5,511	32,501	2,142	36%	15	12,842	14,595	16,504	12%
	51	2,990	47,230	19,605	11,351	29,127	5,618	58%	11	13,554	19,836	25,034	30%
	52	3,913	61,595	25,332	14,849	41,978	2,493	59%	11	18,526	22,844	33,237	28%
	53	2,486	93,121	42,959	24,283	67,250	7,483	57%	11	34,067	36,739	49,655	19%
	57	103,694	458,534	171,724	81,946	245,656	18,891	48%	16	134,249	148,342	178,050	14%
	58	15,154	121,644	51,950	31,932	37,255	19,956	62%	15	27,127	49,653	76,477	48%
	59	96,890	432,083	167,175	79,589	239,866	17,603	48%	15	129,200	149,601	173,134	15%
CTP	54								2				
	55												
	56												
ALL-IN no-CTP **	60	2,201,764	8,039,968	3,251,672	1,972,330	5,816,149	231,985	61%	8	2,277,107	2,605,962	3,140,841	16%
Equity Cumulative **	61	2,322,900	18,525,191	4,272,661	4,526,621	9,462,539	199,018	106%	13	2,598,354	2,700,642	2,860,212	5%
IR Cumulative **	62	103,675	275,188	215,942	40,219	149,583	23,861	19%	19	192,550	222,253	244,545	12%
FX Cumulative **	63	573,070	882,579	673,853	89,652	473,684	35,489	13%	20	623,718	661,188	687,198	5%
Commodity Cumulative **	64	429,022	1,649,300	648,252	409,510	836,431	66,734	63%	8	445,760	566,046	581,055	13%
CS Cumulative **	65	98,303	469,437	195,734	90,939	485,775	21,910	47%	14	147,481	172,516	204,119	16%
CTP Cumulative **	66												

[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

[2] Refers to the number of banks included in the computation of the statistics

*** For the aggregated portfolios (57 to 63), banks that reported at least a missing portfolio IMV among the ones composing the aggregate are not included in the computation of the benchmarks for that particular aggregate portfolio.*

Table 24: Empirical expected shortfall statistics

EU Statistics for empirical expected shortfall

		Main statistics								Percentiles			
	Port. ID	Min	Max	Ave.	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Mean)	Num obs.[2]	25th	50th	75th	IQD
Equity	1	17,996	9,788,297	4,683,578	2,146,012	7,886,327	135,635	46%	19	3,739,112	3,801,610	6,720,552	29%
	2	2,120,900	5,944,776	3,530,497	1,453,344	1,779,271	468,397	41%	18	2,377,652	2,844,541	4,834,614	34%
	3	1,217	18,224	10,952	4,215	6,853	923	39%	18	9,192	10,279	10,938	9%
	4	472	2,236	1,269	454	579	225	36%	18	1,007	1,294	1,447	18%
	5	8,108,509	2,107,207,917	1,035,157,842	599,818,280	744,129,236	349,052,673	58%	20	672,400,412	1,043,456,361	1,389,984,874	35%
	6	2,622	9,832	6,126	1,606	2,024	788	26%	17	5,417	6,477	6,718	11%
	7	17,549	77,472	35,239	19,544	92,235	9,721	56%	14	19,374	30,866	48,881	43%
	8	35,624	56,095	45,436	5,355	15,790	3,163	12%	17	41,609	45,232	47,877	7%
	9	18,863	84,941	40,351	16,414	34,628	3,789	41%	18	31,668	36,628	39,246	11%
	10	294,636	806,171	475,413	149,994	280,425	113,163	32%	17	342,125	522,234	595,987	27%
Interest Rate	11	69,219	172,116	88,850	20,829	66,465	7,216	23%	24	76,727	84,478	92,720	9%
	12	20,148	67,821	32,713	10,579	19,378	1,671	32%	22	28,839	30,514	32,184	5%
	13	131,551	288,568	162,038	38,858	84,824	6,137	24%	24	141,562	147,663	167,598	8%
	14	33,939	90,426	49,688	12,745	29,616	4,143	26%	24	44,029	46,640	52,940	9%
	15	12,255	35,686	17,481	7,560	43,558	1,203	43%	10	13,764	14,625	16,169	8%
	16	13,505	53,804	27,607	11,726	26,861	9,710	43%	19	16,756	32,807	36,874	38%
	17	13,964	136,800	73,158	26,679	74,244	17,215	37%	19	51,690	80,148	92,024	28%
	18	40,500	261,189	86,072	51,039	92,722	22,342	59%	20	50,656	84,948	93,150	30%
	19	107,872	214,401	128,444	21,803	73,396	7,760	17%	24	115,241	125,531	129,914	6%
	20	2,755	9,810	5,290	1,858	4,269	1,088	35%	23	3,853	5,336	6,322	24%
	21	269,159	506,610	294,967	49,020	137,213	9,137	17%	24	272,497	282,119	290,414	3%
	22	67,415	178,981	90,130	25,946	65,577	4,404	29%	23	76,024	79,958	95,834	12%
	23	3,923	68,687	35,096	11,492	19,548	3,517	33%	22	31,355	35,775	38,258	10%
	24	17,241	125,680	52,348	33,086	117,764	10,671	63%	18	32,583	42,158	58,863	29%
	25	117,315	226,369	141,996	27,843	58,164	9,013	20%	20	123,052	132,044	160,240	13%
	26	44,784	320,930	117,252	56,602	108,479	17,341	48%	20	89,371	109,391	119,041	14%
	27	10,653	434,439	78,702	114,263	268,094	7,506	145%	21	17,664	28,193	55,169	51%
FX	28	297,800	627,134	383,733	102,121	249,869	29,422	27%	22	311,727	334,793	500,552	23%
	29	16,491	30,952	21,974	4,415	13,580	771	20%	20	19,652	20,434	21,766	5%
	30	123,096	257,311	208,029	26,658	105,035	10,552	13%	20	192,932	217,013	218,946	6%
	31	249,338	409,233	289,738	47,331	217,295	9,592	16%	20	263,371	272,478	286,156	4%
	32	262,891	475,717	326,975	58,743	255,568	14,796	18%	20	293,632	309,816	336,673	7%
Commodities	33	2,295	29,630	14,618	9,819	9,819	2,910	67%	11	7,599	10,375	27,153	56%
	34	443,025	1,610,233	647,240	392,607	791,302	48,738	61%	8	469,654	542,238	576,426	10%
	35	70,995	540,311	449,862	156,700	606,335	32,340	35%	8	454,944	518,839	532,385	8%
Credit Spread	36	1,787	22,568	8,826	6,474	11,863	2,053	73%	14	4,466	6,871	13,157	49%
	37	10,080	91,949	34,552	25,121	34,515	903	73%	12	24,686	25,898	26,932	4%
	38	2,493	12,113	5,866	3,038	8,656	1,897	52%	15	3,344	5,056	8,282	42%
	39	6,147	33,988	12,619	7,248	11,972	194	57%	11	10,656	10,851	11,500	4%
	40	1,648	12,126	4,617	2,851	5,898	1,061	62%	15	2,500	3,503	7,069	48%
	41	5,384	20,419	10,762	5,145	11,325	3,035	48%	15	6,913	9,823	15,539	38%
	42	30,468	130,061	50,531	27,093	63,546	8,241	54%	12	35,219	50,131	54,202	21%
	43	11,859	128,351	39,854	28,582	164,536	5,317	72%	16	25,691	33,365	39,866	22%
	44	5,059	18,848	8,764	3,887	30,321	1,275	44%	16	6,072	7,798	10,402	26%
	45	2,315	34,004	16,356	9,121	59,883	3,888	56%	15	10,933	14,929	19,935	29%
	46	1,598	102,760	15,159	24,814	51,934	1,173	164%	15	7,281	7,933	9,638	14%
	47	698	4,249	2,413	1,114	1,496	867	46%	14	1,260	2,815	3,205	44%
	48	1,740	33,069	9,779	8,474	23,261	530	87%	15	6,515	6,989	8,332	12%
	49	2,889	11,145	5,095	2,682	14,257	596	53%	14	3,182	3,859	6,563	35%
	50	10,248	34,042	15,431	5,883	29,536	1,479	38%	15	12,072	14,547	17,464	18%
	51	3,130	43,127	18,818	10,285	28,539	5,316	55%	11	13,233	17,976	22,696	26%
	52	3,746	67,315	24,957	16,361	40,753	2,495	66%	11	18,676	22,084	25,415	15%
	53	2,274	82,259	39,519	21,209	67,856	4,484	54%	11	31,059	34,377	44,777	18%
	57	99,822	459,536	171,974	83,691	253,585	7,981	49%	16	133,918	145,127	184,168	16%
	58	14,816	112,959	49,377	29,761	34,282	21,889	60%	15	26,583	48,021	71,973	46%
	59	93,705	444,765	167,067	83,679	255,817	13,592	50%	15	127,937	145,400	166,592	13%
CTP	54								2				
	55												
	56												
ALL-IN no-CTP **	60	2,072,031	8,067,294	3,170,354	2,020,371	5,707,726	380,398	64%	8	2,112,783	2,660,598	3,045,292	18%
Equity Cumulative **	61	2,215,545	17,075,528	3,943,857	4,204,073	11,275,924	145,658	107%	13	2,297,768	2,418,804	2,669,502	7%
IR Cumulative **	62	99,306	285,887	211,631	42,392	149,883	21,292	20%	19	187,790	212,958	244,382	13%
FX Cumulative **	63	578,898	929,788	673,319	96,337	472,806	44,954	14%	20	605,540	655,245	694,170	7%
Commodity Cumulative **	64	442,267	1,606,514	645,085	391,709	781,602	50,008	61%	8	468,598	542,145	571,141	10%
CS Cumulative **	65	94,481	492,365	195,232	98,228	392,159	17,649	50%	14	147,864	169,427	181,834	10%
CTP Cumulative **	66												

[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

[2] Refers to the number of banks included in the computation of the statistics

*** For the aggregated portfolios (57 to 63), banks that reported at least a missing portfolio IMV among the ones composing the aggregate are not included in the computation of the benchmarks for that particular aggregate portfolio.*

Table 25: sVaR/VaR statistics

EU Statistics for sVaR/VaR

		Main statistics								Percentiles			
	Port. ID	Min	Max	Ave.	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Mean)	Num obs.[2]	25th	50th	75th	IQD
Equity	1	0.38	4.29	2.09	0.93			44%	27	1.36	2.23	2.59	31%
	2	1.20	5.24	2.82	1.27			45%	25	2.02	2.62	3.68	29%
	3	0.61	2.60	1.51	0.54			36%	23	1.03	1.45	1.91	30%
	4	0.41	3.05	1.43	0.64			45%	23	1.02	1.26	1.68	25%
	5	0.64	3.65	2.07	0.91			44%	23	1.28	2.14	2.84	38%
	6	0.51	2.76	1.41	0.65			46%	24	0.87	1.37	1.97	39%
	7	0.55	5.79	2.64	1.47			56%	16	1.71	2.34	3.21	31%
	8	0.23	1.93	1.01	0.39			39%	22	0.63	1.05	1.26	33%
	9	0.62	3.99	1.88	0.75			40%	22	1.43	1.85	2.03	17%
	10	1.11	4.99	2.69	1.02			38%	24	2.06	2.32	3.35	24%
Interest Rate	11	0.81	4.08	2.21	0.90			41%	35	1.56	1.89	2.88	30%
	12	0.50	2.93	1.53	0.65			42%	32	0.96	1.56	2.00	35%
	13	0.91	3.13	2.05	0.67			33%	31	1.64	2.20	2.57	22%
	14	0.27	3.44	1.81	0.99			55%	38	0.81	1.98	2.72	54%
	15	0.88	8.58	3.52	2.34			66%	13	2.10	2.61	4.40	35%
	16	0.43	2.71	1.64	0.58			35%	28	1.34	1.73	2.10	22%
	17	0.57	3.32	1.63	0.63			39%	26	1.29	1.61	1.87	18%
	18	0.31	5.26	1.93	1.33			69%	27	1.11	1.43	2.25	34%
	19	0.64	2.86	1.89	0.61			32%	36	1.45	1.95	2.42	25%
	20	0.01	11.52	2.93	2.30			78%	32	1.58	2.47	3.59	39%
	21	0.75	2.93	1.85	0.61			33%	33	1.41	1.88	2.29	24%
	22	0.64	3.60	1.94	0.81			42%	33	1.20	1.71	2.63	37%
	23	0.59	2.40	1.49	0.45			31%	29	1.21	1.38	1.88	22%
	24	0.65	6.98	2.39	1.53			64%	22	1.18	2.38	2.88	42%
	25	0.72	3.35	1.94	0.77			40%	31	1.21	2.04	2.51	35%
	26	0.62	4.68	1.90	1.17			62%	26	1.06	1.53	2.21	35%
	27	0.47	13.95	5.51	3.58			65%	26	2.60	4.65	7.63	49%
FX	28	0.64	3.39	2.17	0.75			34%	29	1.77	2.33	2.67	20%
	29	1.16	3.98	2.34	0.83			35%	28	1.68	2.05	2.82	25%
	30	1.40	3.17	2.34	0.53			23%	28	1.88	2.39	2.77	19%
	31	1.30	4.52	2.63	0.90			34%	31	1.80	2.54	3.49	32%
	32	1.20	4.55	2.64	1.05			40%	28	1.81	2.48	3.45	31%
Commodities	33	1.43	7.58	3.66	1.82			50%	13	2.33	3.39	4.70	34%
	34	0.72	3.20	1.75	0.81			46%	9	1.22	1.47	1.80	19%
	35	1.64	3.13	2.28	0.47			21%	12	1.92	2.11	2.48	13%
Credit Spread	36	0.74	13.13	2.77	2.71			98%	18	1.27	1.90	3.33	45%
	37	0.59	6.26	2.98	1.46			49%	14	1.91	2.73	3.73	32%
	38	1.00	4.14	2.53	0.98			39%	17	1.44	2.61	3.22	38%
	39	0.55	7.91	3.50	2.28			65%	15	1.85	2.75	4.93	46%
	40	0.73	9.51	4.67	2.56			55%	18	2.65	4.21	6.63	43%
	41	0.79	15.10	3.15	3.12			99%	18	1.75	2.26	3.33	31%
	42	0.69	3.82	1.99	0.97			49%	17	1.11	2.10	2.75	43%
	43	0.86	6.99	2.65	1.59			60%	20	1.20	2.63	3.36	47%
	44	0.81	8.37	3.25	2.06			64%	20	2.07	2.34	4.57	38%
	45	0.94	6.98	3.26	1.75			54%	18	2.08	2.99	4.26	34%
	46	0.76	4.73	2.43	1.26			52%	17	1.56	2.00	3.50	38%
	47	0.53	6.89	3.66	2.03			56%	18	1.85	3.64	4.93	45%
	48	0.99	8.36	2.85	1.65			58%	16	1.75	2.64	3.23	30%
	49	0.56	15.57	5.73	5.93			104%	18	1.39	2.71	11.92	79%
	50	0.84	4.79	2.09	0.90			43%	19	1.50	2.12	2.43	24%
	51	0.96	3.85	2.04	0.84			41%	15	1.45	1.86	2.20	21%
	52	0.76	3.71	1.89	0.91			48%	15	1.10	1.69	2.34	36%
	53	0.74	3.51	1.81	0.70			39%	16	1.41	1.66	2.29	24%
	57	1.05	2.65	1.95	0.43			22%	20	1.73	2.12	2.23	13%
	58	1.02	6.80	2.55	1.59			62%	17	1.26	1.91	3.13	43%
	59	0.91	3.66	2.11	0.70			33%	20	1.73	2.11	2.36	15%
CTP	54												
	55												
	56												
ALL-IN no-CTP **	60	0.75	3.28	2.15	0.82			38%	11	1.56	2.29	2.80	28%
Equity Cumulative **	61	0.73	4.38	1.96	1.00			51%	17	1.04	2.14	2.51	42%
IR Cumulative **	62	0.73	3.31	2.00	0.65			32%	26	1.62	2.00	2.44	20%
FX Cumulative **	63	0.93	4.11	2.56	1.00			39%	28	1.80	2.70	3.31	30%
Commodity Cumulative **	64	0.72	3.20	1.75	0.81			47%	9	1.23	1.42	1.84	20%
CS Cumulative **	65	0.71	3.31	2.04	0.65			32%	27	1.64	2.00	2.48	20%
CTP Cumulative **	66	0.93	4.11	2.39	0.98			41%	29	1.69	2.34	3.24	31%

[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

[2] Refers to the number of banks included in the computation of the statistics

*** For the aggregated portfolios (57 to 63), banks that reported at least a missing portfolio IMV among the ones composing the aggregate are not included in the computation of the benchmarks for that particular aggregate portfolio.*

Table 26: P&L VaR/VaR statistics

EU Statistics for P&L VaR/VaR

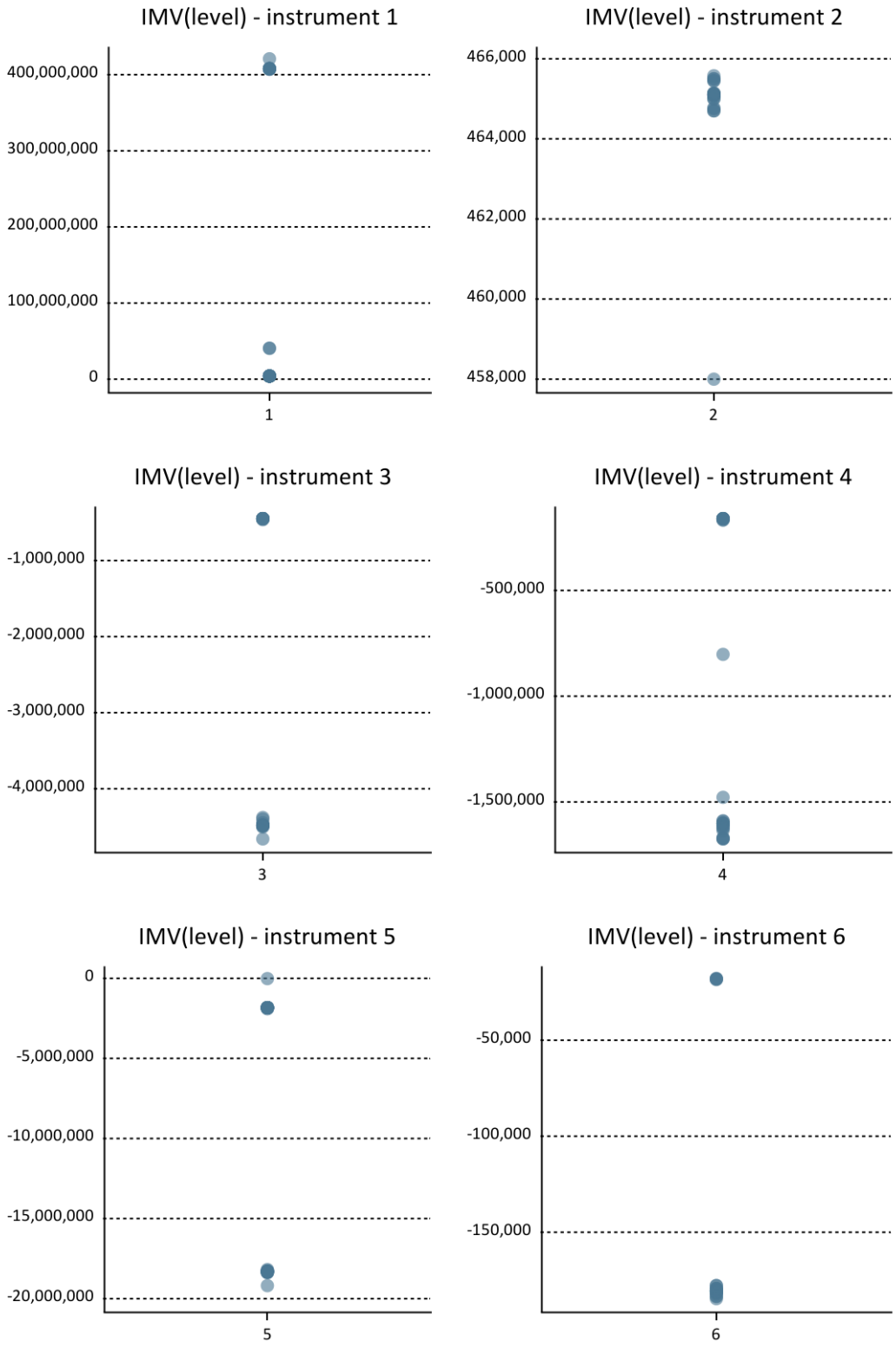
		Main statistics							Percentiles		
	Port. ID	Min	Max	Ave.	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Mean)	Num obs.[2]	25th	50th	75th
Equity	1	0.34	9.52	1.62	1.91			118%	20	1.00	1.09	1.58
	2	0.34	2.50	1.23	0.52			42%	17	1.02	1.07	1.19
	3	0.34	2.31	1.18	0.45			38%	17	1.07	1.10	1.27
	4	0.42	1.54	0.97	0.29			30%	19	0.85	1.03	1.10
	5	0.33	137.56	8.28	30.47			368%	19	1.00	1.13	1.50
	6	0.28	1.17	0.83	0.25			31%	17	0.68	0.96	0.99
	7	0.32	2.03	1.13	0.45			40%	13	0.95	1.00	1.26
	8	0.29	1.24	0.88	0.21			24%	18	0.82	0.93	0.97
	9	0.49	1.85	1.17	0.28			24%	17	1.07	1.16	1.26
	10	0.34	2.73	1.21	0.50			41%	16	1.00	1.09	1.15
Interest Rate	11	0.34	1.27	0.98	0.20			20%	24	0.92	1.06	1.09
	12	0.32	1.42	0.98	0.28			29%	24	0.96	1.06	1.11
	13	0.30	1.43	0.90	0.26			29%	25	0.89	0.99	1.01
	14	0.33	1.71	0.99	0.33			33%	26	0.92	1.03	1.08
	15	0.74	2.56	1.35	0.51			38%	10	1.03	1.17	1.60
	16	0.32	1.52	1.03	0.29			28%	19	1.00	1.03	1.18
	17	0.32	1.48	0.95	0.29			30%	18	0.88	1.03	1.07
	18	0.33	1.89	1.06	0.36			34%	20	1.01	1.03	1.10
	19	0.32	1.15	0.92	0.26			28%	24	0.87	1.02	1.08
	20	0.32	1.73	0.98	0.35			35%	26	0.94	1.04	1.13
	21	0.32	1.31	0.92	0.28			30%	22	0.93	1.02	1.06
	22	0.31	1.20	0.93	0.24			25%	24	0.87	1.02	1.05
	23	0.34	9.46	1.35	1.78			132%	22	0.98	1.02	1.08
	24	0.32	2.45	1.12	0.50			45%	16	0.96	1.03	1.16
	25	0.30	1.07	0.89	0.22			24%	22	0.89	0.96	1.02
	26	0.35	1.54	0.99	0.22			22%	18	0.97	1.02	1.05
	27	0.09	1.58	1.01	0.35			34%	20	0.97	1.01	1.11
FX	28	0.32	1.73	1.05	0.34			33%	21	0.92	1.04	1.16
	29	0.29	1.35	0.93	0.26			28%	19	0.92	0.96	1.07
	30	0.26	1.78	0.89	0.31			35%	21	0.88	0.94	1.00
	31	0.31	1.46	0.97	0.30			31%	21	0.93	1.03	1.12
	32	0.33	1.52	1.03	0.28			27%	19	1.01	1.07	1.11
Commodities	33	0.20	1.45	0.80	0.37			47%	11	0.49	0.97	1.02
	34	0.32	1.07	0.83	0.27			33%	7	0.65	1.00	1.05
	35	0.37	1.33	0.90	0.31			34%	9	0.85	1.03	1.09
Credit Spread	36	0.31	3.09	1.30	0.73			56%	15	0.96	1.25	1.40
	37	0.31	3.13	1.30	0.86			66%	12	0.96	1.13	1.25
	38	0.36	1.42	1.01	0.30			30%	14	0.91	1.02	1.24
	39	0.30	2.71	1.19	0.63			53%	12	1.03	1.05	1.28
	40	0.37	1.76	0.99	0.37			38%	13	0.81	1.03	1.11
	41	0.36	1.71	1.13	0.34			30%	15	0.99	1.14	1.33
	42	0.32	1.42	0.99	0.30			30%	13	1.04	1.04	1.08
	43	0.34	1.69	1.09	0.31			29%	16	1.01	1.09	1.14
	44	0.34	1.52	1.05	0.28			27%	16	0.99	1.02	1.13
	45	0.32	1.76	1.07	0.31			29%	15	1.02	1.03	1.15
	46	0.32	1.62	1.06	0.29			28%	14	0.94	1.06	1.21
	47	0.31	2.05	1.18	0.44			37%	14	1.01	1.22	1.38
	48	0.32	1.91	1.12	0.32			28%	14	1.04	1.08	1.23
	49	0.32	3.21	1.12	0.69			61%	14	0.78	1.02	1.22
	50	0.33	1.93	1.12	0.36			32%	15	1.01	1.05	1.13
	51	0.30	1.83	1.00	0.43			43%	13	0.90	1.01	1.08
	52	0.31	1.74	0.97	0.40			42%	13	0.83	1.01	1.13
	53	0.31	3.10	1.04	0.67			65%	13	0.69	1.02	1.08
	57	0.35	1.50	1.07	0.24			22%	15	1.04	1.05	1.12
	58	0.32	1.67	0.92	0.38			42%	14	0.59	1.00	1.16
	59	0.35	1.53	1.07	0.25			24%	14	1.03	1.05	1.10
CTP	54											
	55											
	56											
ALL-IN no-CTP **	60	0.32	1.46	1.09	0.33			31%	8	1.00	1.12	1.30
Equity Cumulative **	61	0.30	1.57	0.99	0.33			34%	13	0.99	1.01	1.13
IR Cumulative **	62	0.32	1.55	0.95	0.30			32%	20	0.94	1.02	1.06
FX Cumulative **	63	0.32	1.42	1.00	0.27			26%	19	1.01	1.03	1.06
Commodity Cumulative **	64	0.32	1.07	0.84	0.27			32%	7	0.69	1.00	1.05
CS Cumulative **	65	0.32	1.55	1.04	0.24			23%	19	1.01	1.03	1.08
CTP Cumulative **	66	0.32	1.63	1.00	0.32			32%	21	1.01	1.03	1.12

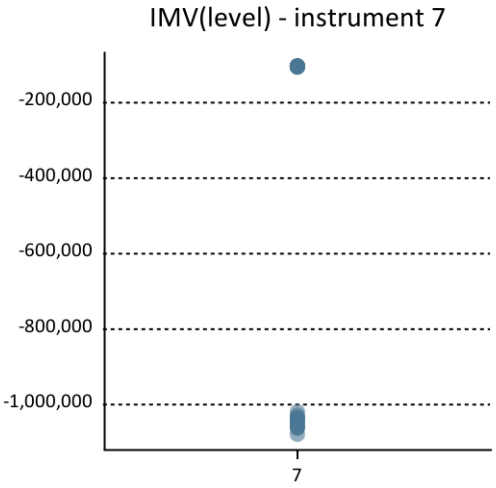
[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

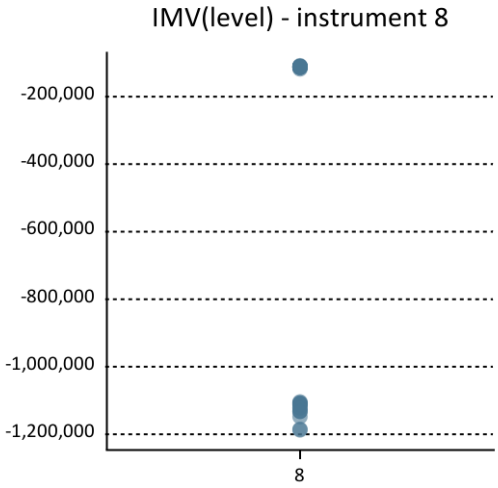
[2] Refers to the number of banks included in the computation of the statistics

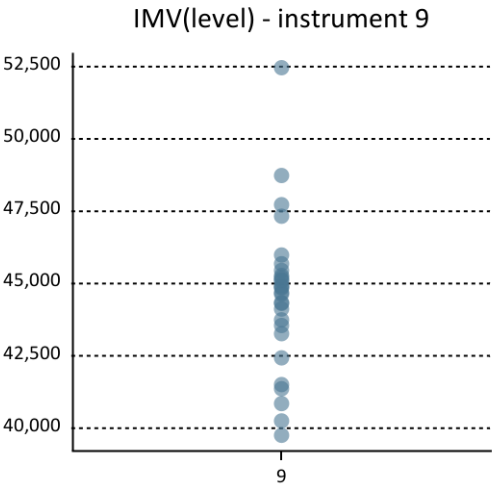
*** For the aggregated portfolios (57 to 63), banks that reported at least a missing portfolio IMV among the ones composing the aggregate are not included in the computation of the benchmarks for that particular aggregate portfolio.*

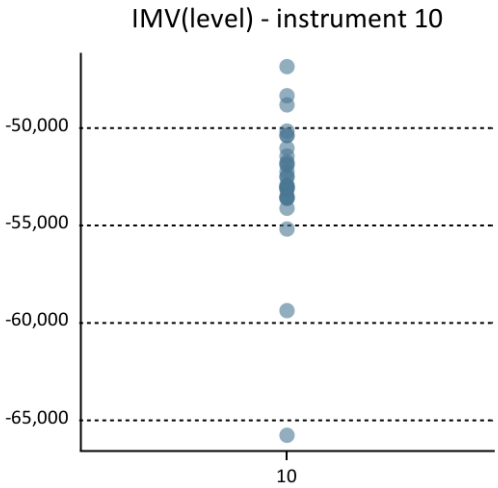
Figure 24: IMV scatter plots (all)

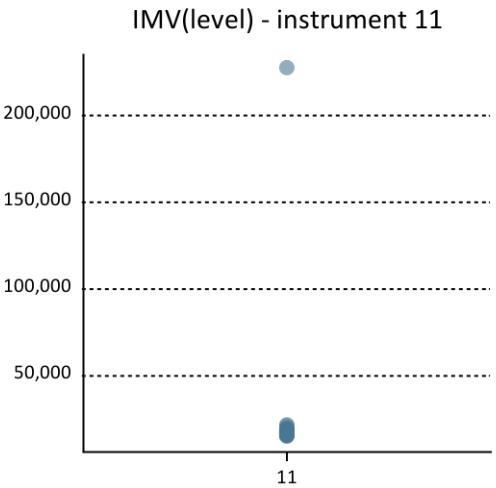


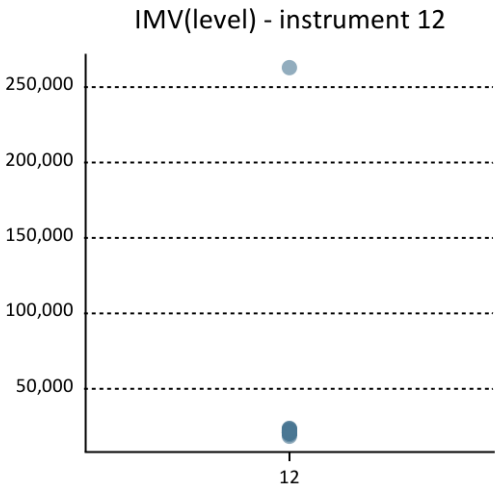

IMV(level) - instrument 7
-200,000
-400,000
-600,000
-800,000
-1,000,000
7

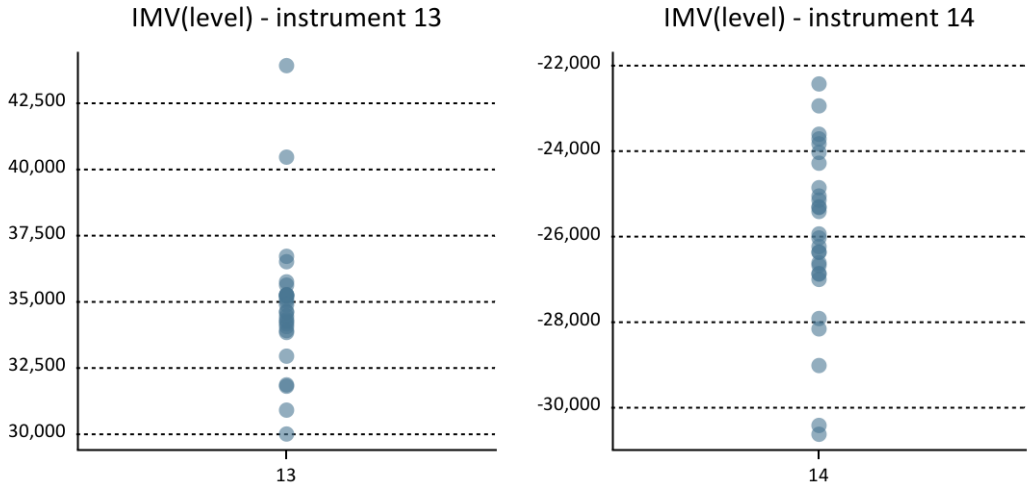

IMV(level) - instrument 8
-200,000
-400,000
-600,000
-800,000
-1,000,000
-1,200,000
8

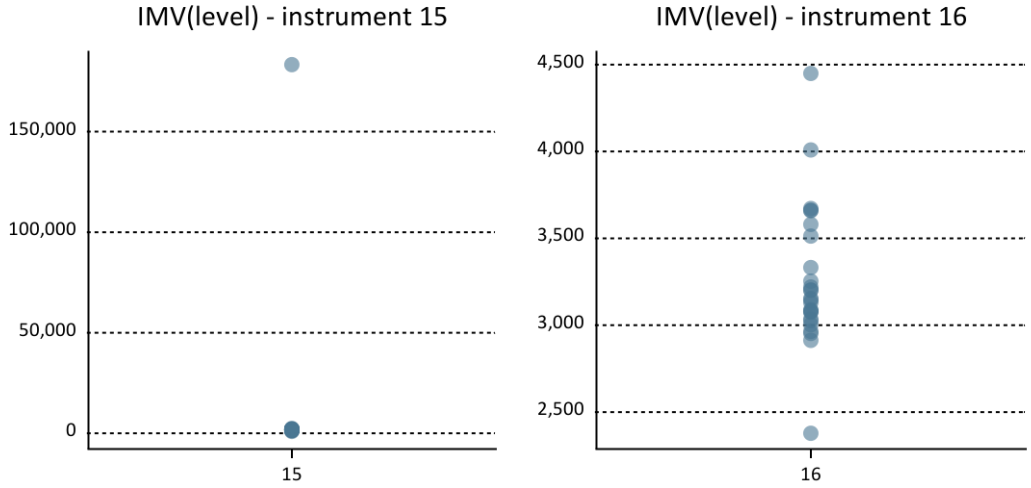

IMV(level) - instrument 9
52,500
50,000
47,500
45,000
42,500
40,000
9

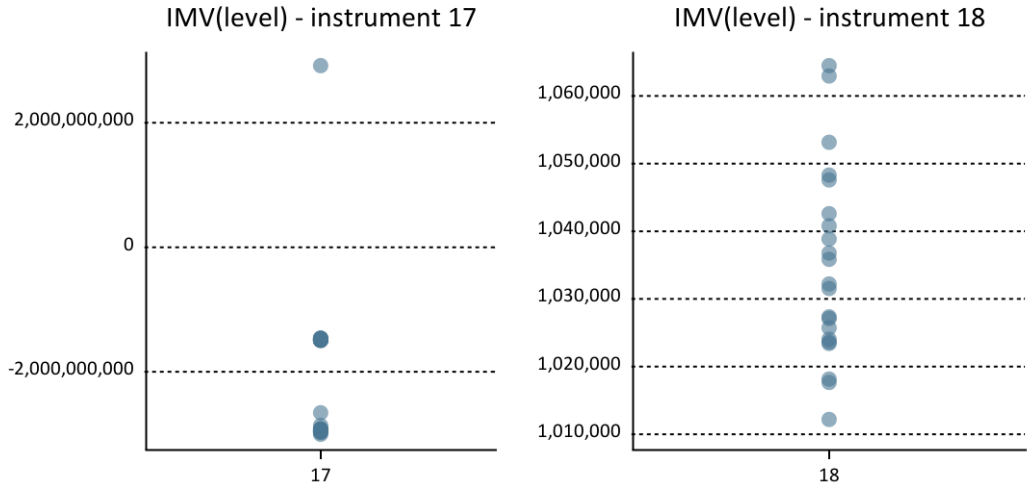

IMV(level) - instrument 10
-50,000
-55,000
-60,000
-65,000
10

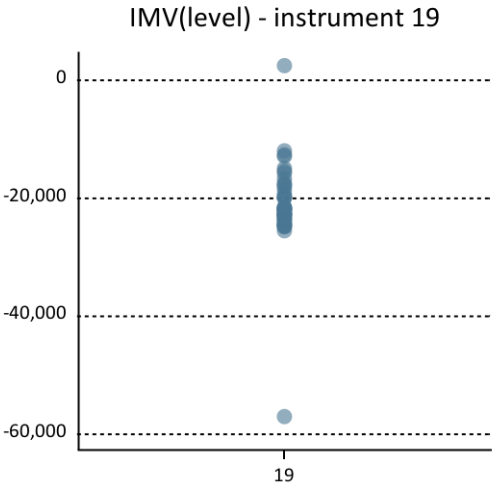

IMV(level) - instrument 11
200,000
150,000
100,000
50,000
11

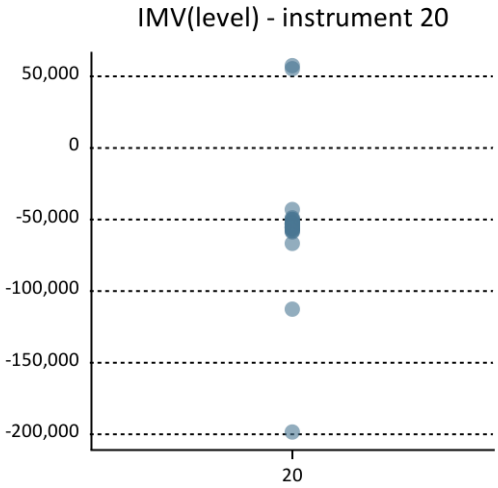

IMV(level) - instrument 12
250,000
200,000
150,000
100,000
50,000
12

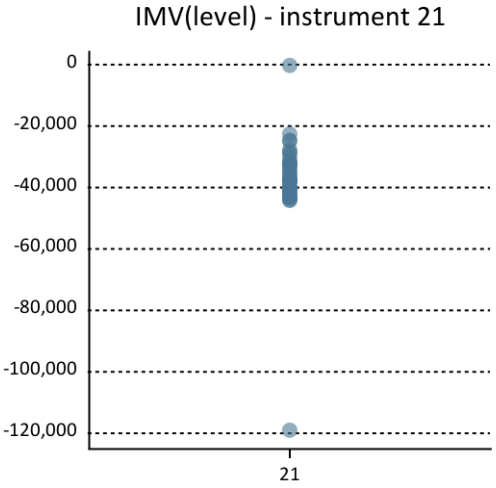

IMV(level) - instrument 13
42,500
40,000
37,500
35,000
32,500
30,000
13
IMV(level) - instrument 14
-22,000
-24,000
-26,000
-28,000
-30,000
14

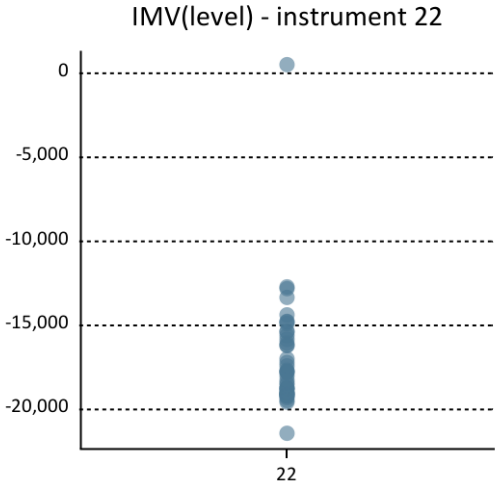

IMV(level) - instrument 15
150,000
100,000
50,000
0
15
IMV(level) - instrument 16
4,500
4,000
3,500
3,000
2,500
16

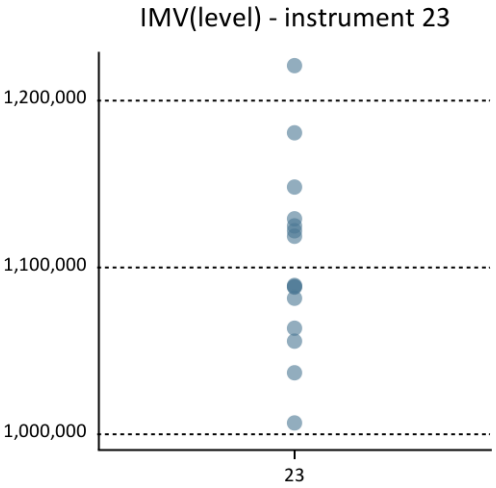

IMV(level) - instrument 17
2,000,000,000
0
-2,000,000,000
17
IMV(level) - instrument 18
1,060,000
1,050,000
1,040,000
1,030,000
1,020,000
1,010,000
18

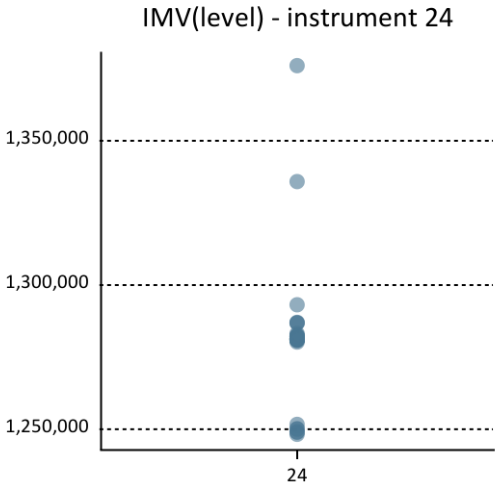

IMV(level) - instrument 19
0
-20,000
-40,000
-60,000
19

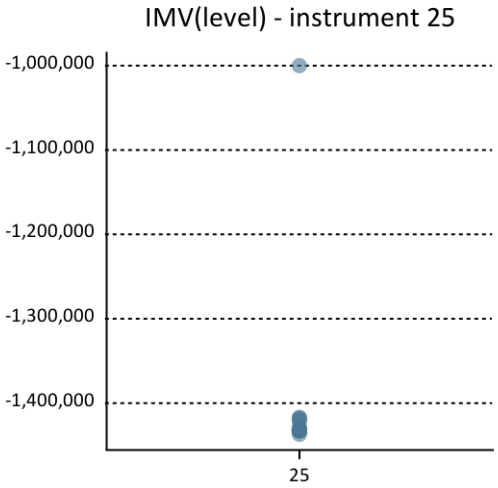

IMV(level) - instrument 20
50,000
0
-50,000
-100,000
-150,000
-200,000
20

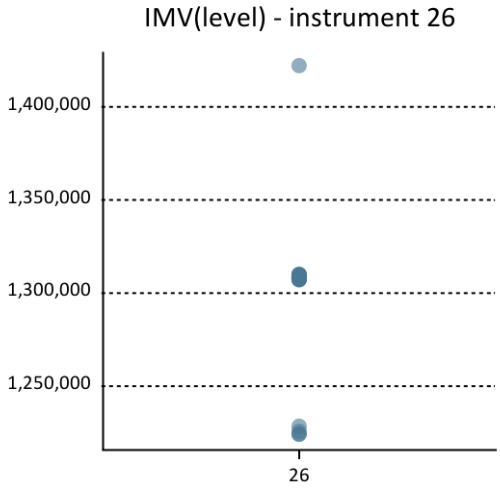

IMV(level) - instrument 21
0
-20,000
-40,000
-60,000
-80,000
-100,000
-120,000
21

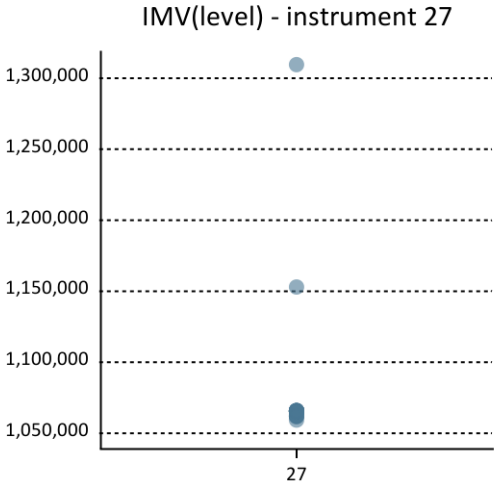

IMV(level) - instrument 22
0
-5,000
-10,000
-15,000
-20,000
22

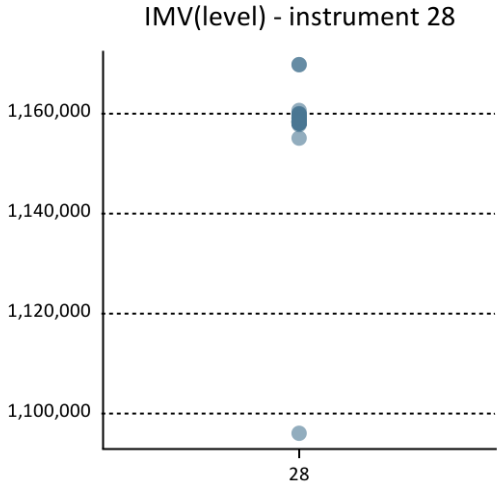

IMV(level) - instrument 23
1,200,000
1,100,000
1,000,000
23

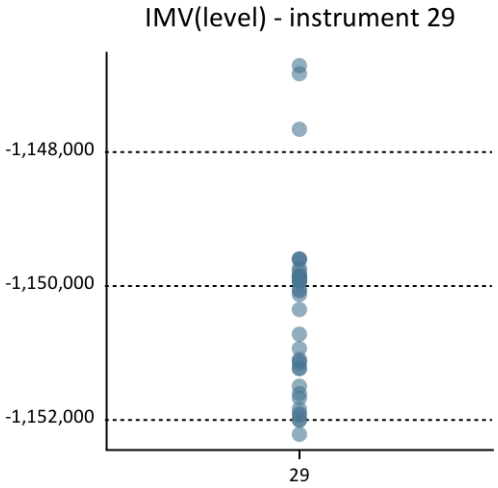

IMV(level) - instrument 24
1,350,000
1,300,000
1,250,000
24

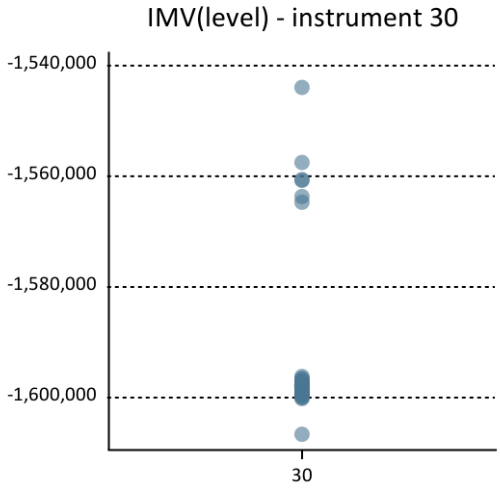

IMV(level) - instrument 25
-1,000,000
-1,100,000
-1,200,000
-1,300,000
-1,400,000
25

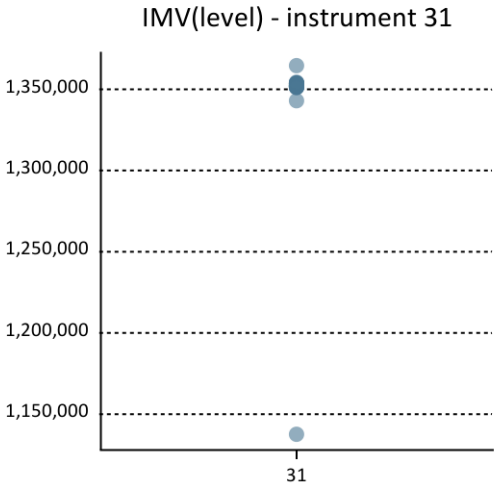

IMV(level) - instrument 26
1,400,000
1,350,000
1,300,000
1,250,000
26

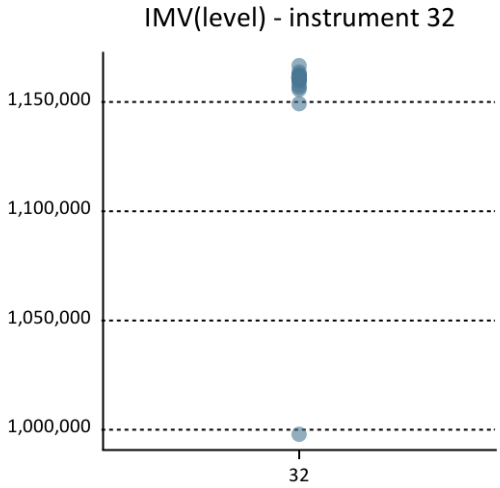

IMV(level) - instrument 27
1,300,000
1,250,000
1,200,000
1,150,000
1,100,000
1,050,000
27

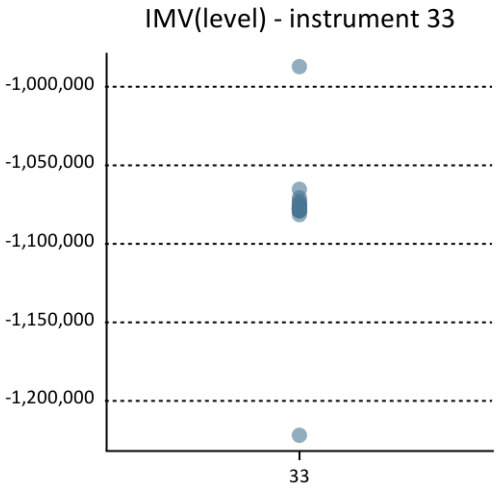

IMV(level) - instrument 28
1,160,000
1,140,000
1,120,000
1,100,000
28

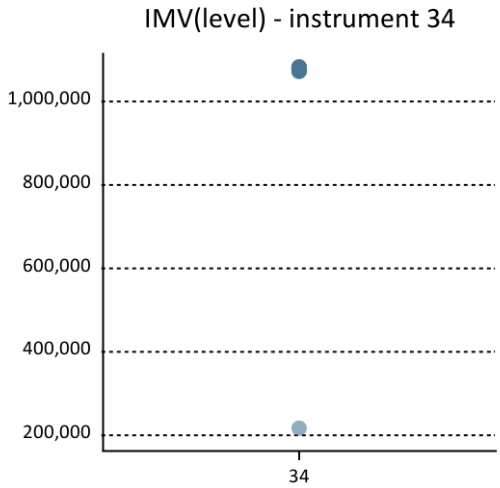

IMV(level) - instrument 29
-1,148,000
-1,150,000
-1,152,000
29

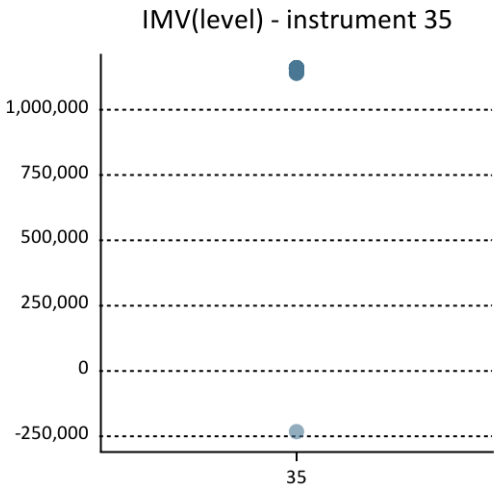

IMV(level) - instrument 30
-1,540,000
-1,560,000
-1,580,000
-1,600,000
30

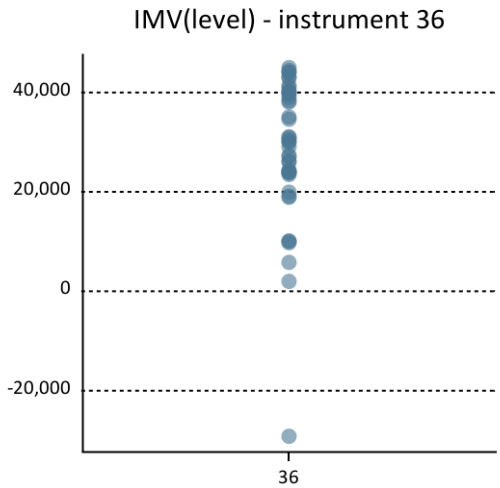

IMV(level) - instrument 31
1,350,000
1,300,000
1,250,000
1,200,000
1,150,000
31

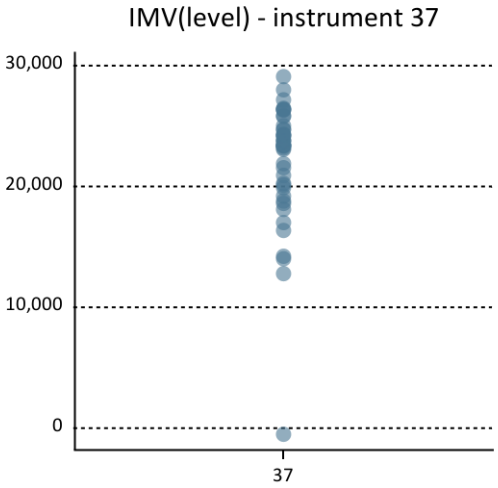

IMV(level) - instrument 32
1,150,000
1,100,000
1,050,000
1,000,000
32

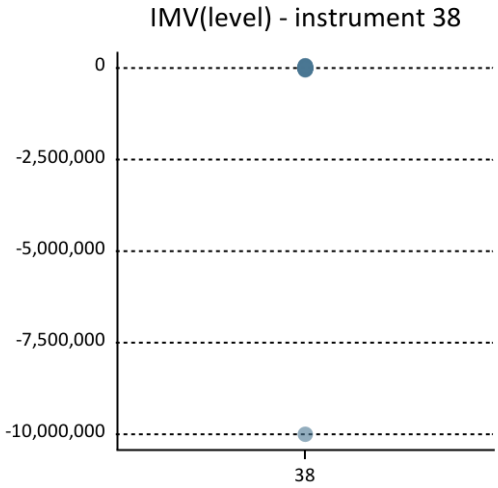

IMV(level) - instrument 33
-1,000,000
-1,050,000
-1,100,000
-1,150,000
-1,200,000
33

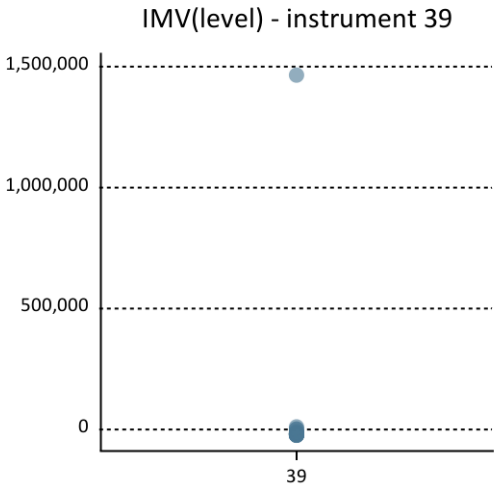

IMV(level) - instrument 34
1,000,000
800,000
600,000
400,000
200,000
34

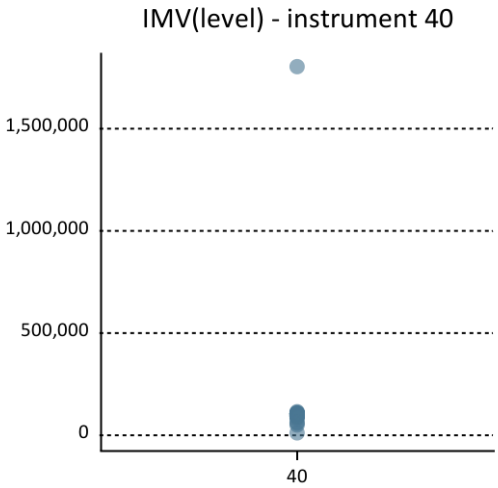

IMV(level) - instrument 35
1,000,000
750,000
500,000
250,000
0
-250,000
35

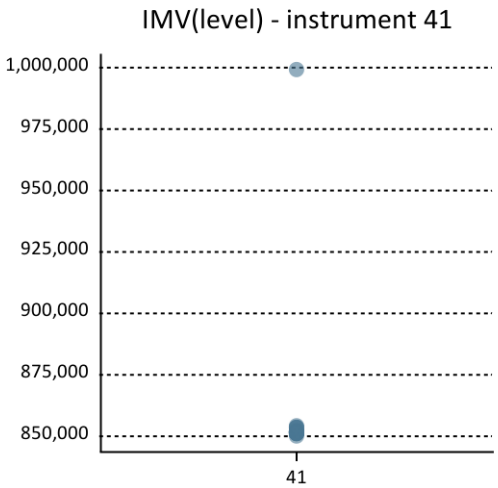

IMV(level) - instrument 36
40,000
20,000
0
-20,000
36

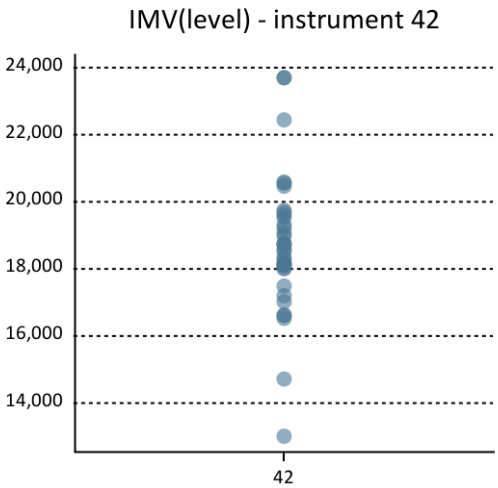

IMV(level) - instrument 37
30,000
20,000
10,000
0
37

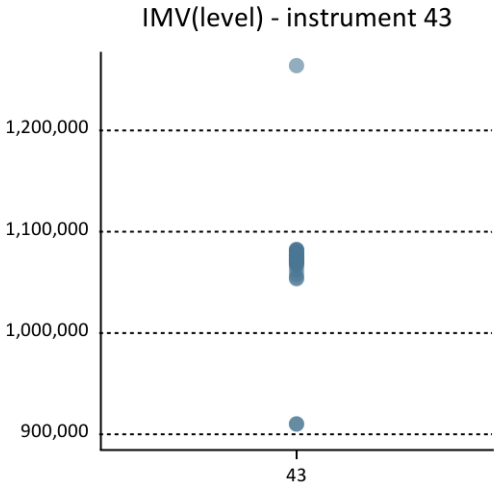

IMV(level) - instrument 38
0
-2,500,000
-5,000,000
-7,500,000
-10,000,000
38

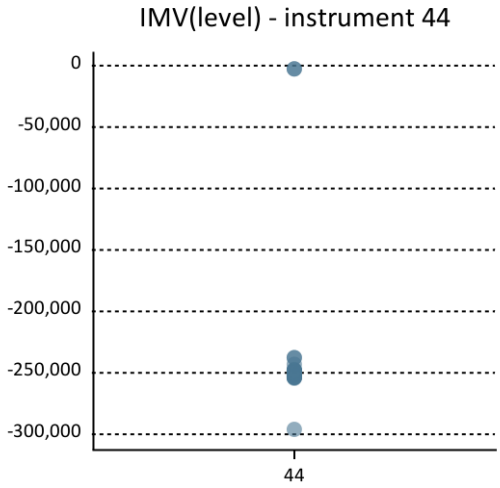

IMV(level) - instrument 39
1,500,000
1,000,000
500,000
0
39

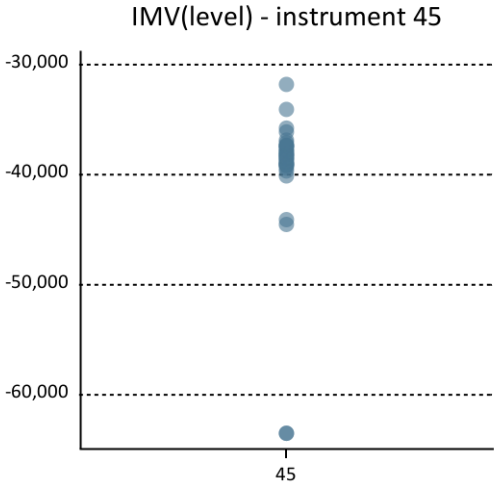

IMV(level) - instrument 40
1,500,000
1,000,000
500,000
0
40

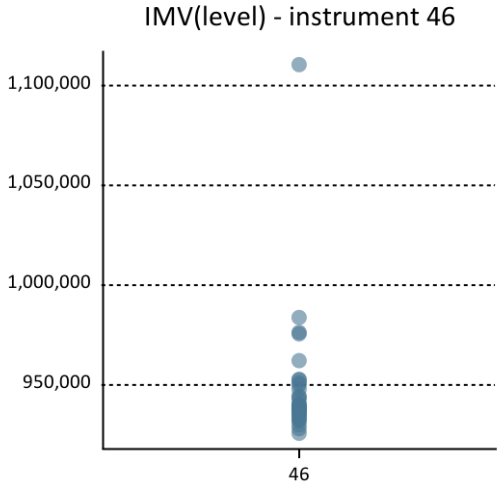

IMV(level) - instrument 41
1,000,000
975,000
950,000
925,000
900,000
875,000
850,000
41

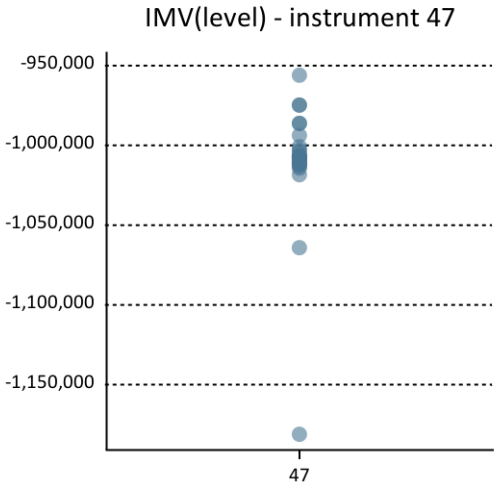

IMV(level) - instrument 42
24,000
22,000
20,000
18,000
16,000
14,000
42

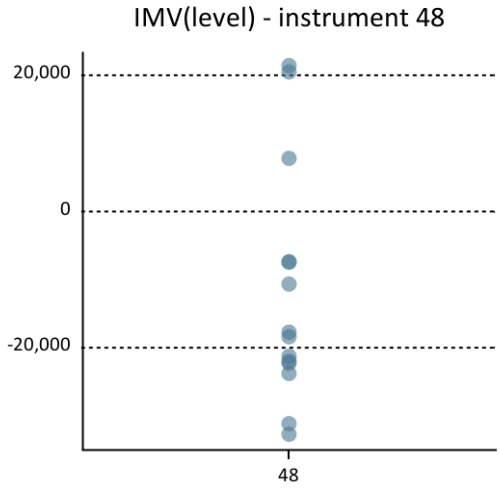

IMV(level) - instrument 43
1,200,000
1,100,000
1,000,000
900,000
43

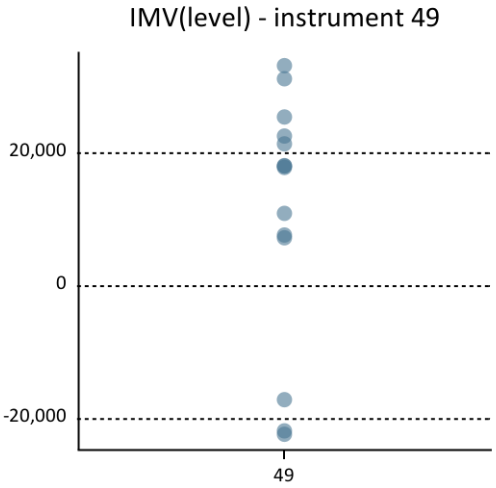

IMV(level) - instrument 44
0
-50,000
-100,000
-150,000
-200,000
-250,000
-300,000
44

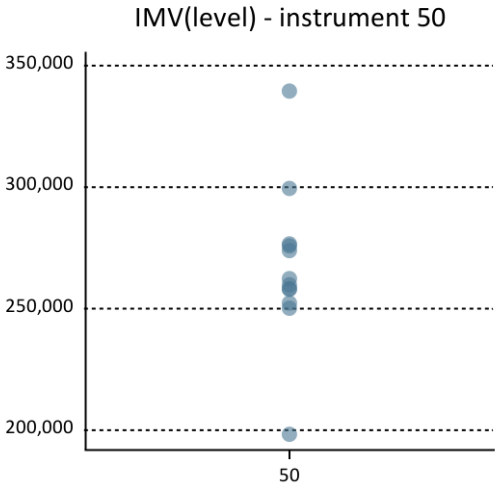

IMV(level) - instrument 45
-30,000
-40,000
-50,000
-60,000
45

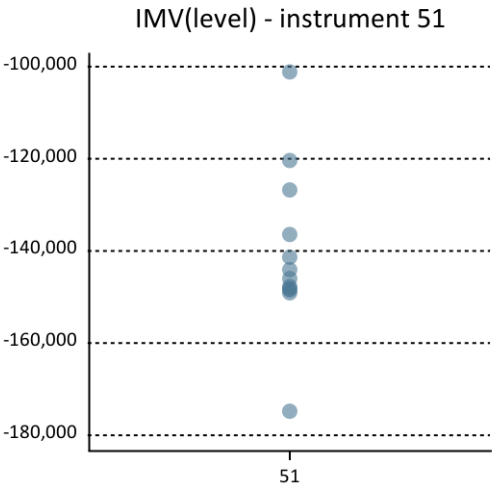

IMV(level) - instrument 46
1,100,000
1,050,000
1,000,000
950,000
46

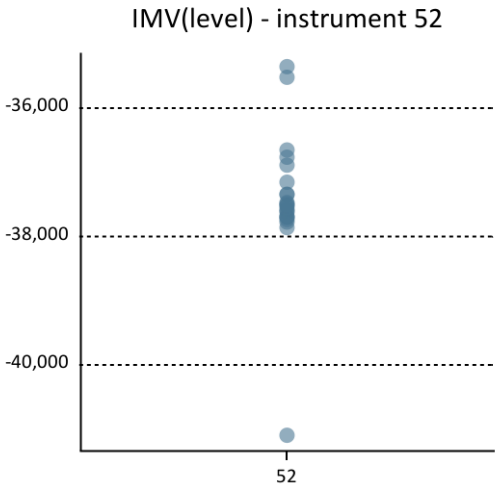

IMV(level) - instrument 47
-950,000
-1,000,000
-1,050,000
-1,100,000
-1,150,000
47

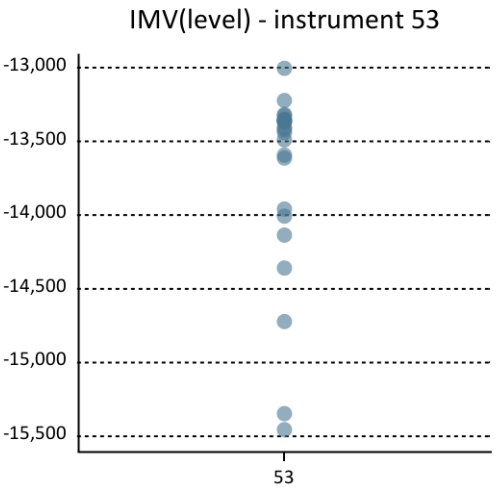

IMV(level) - instrument 48
20,000
0
-20,000
48

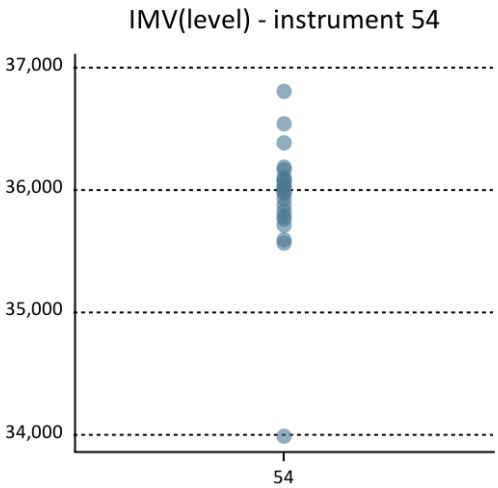

IMV(level) - instrument 49
20,000
0
-20,000
49

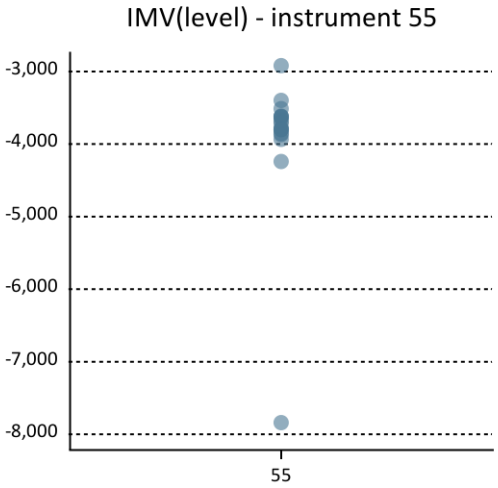

IMV(level) - instrument 50
350,000
300,000
250,000
200,000
50

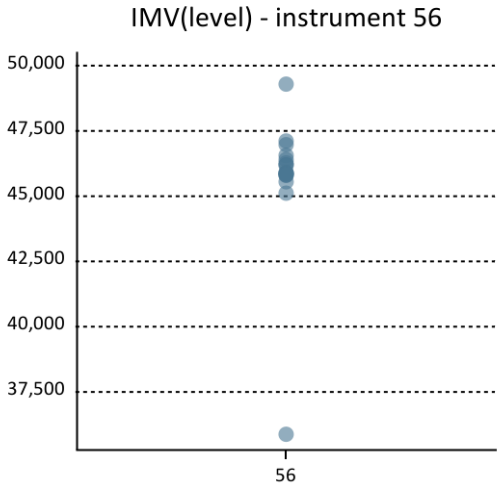

IMV(level) - instrument 51
-100,000
-120,000
-140,000
-160,000
-180,000
51

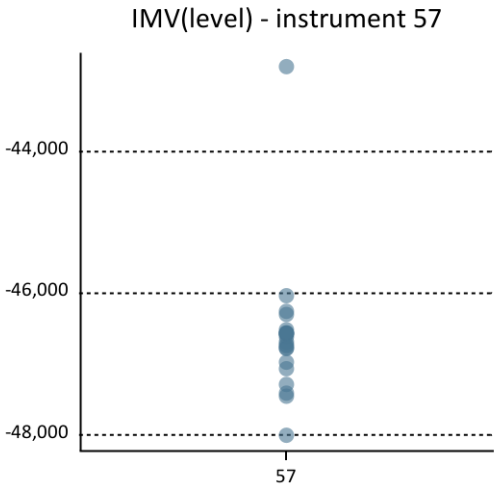

IMV(level) - instrument 52
-36,000
-38,000
-40,000
52

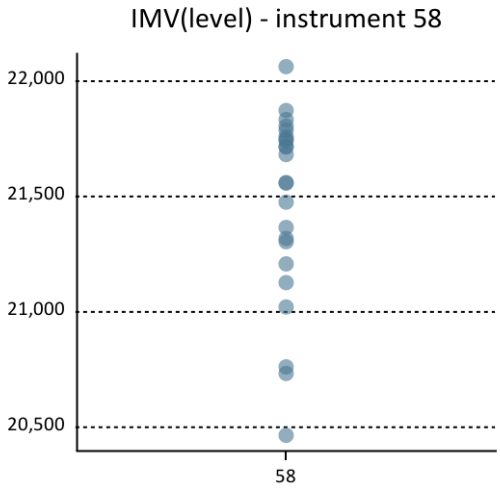

IMV(level) - instrument 53
-13,000
-13,500
-14,000
-14,500
-15,000
-15,500
53

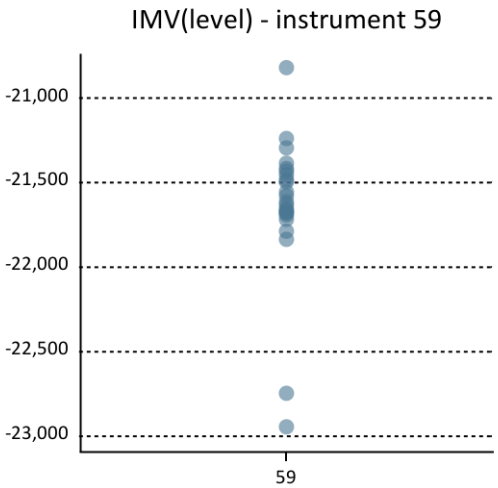

IMV(level) - instrument 54
37,000
36,000
35,000
34,000
54

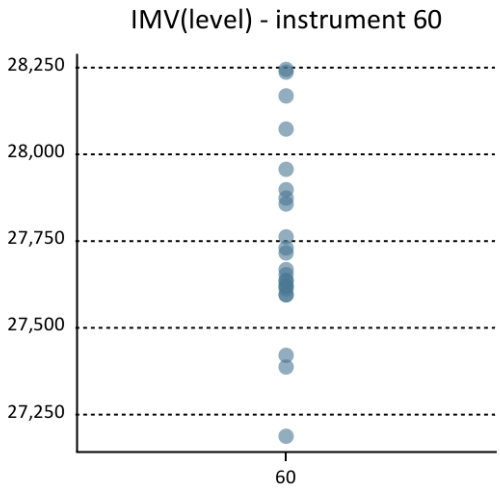

IMV(level) - instrument 55
-3,000
-4,000
-5,000
-6,000
-7,000
-8,000
55

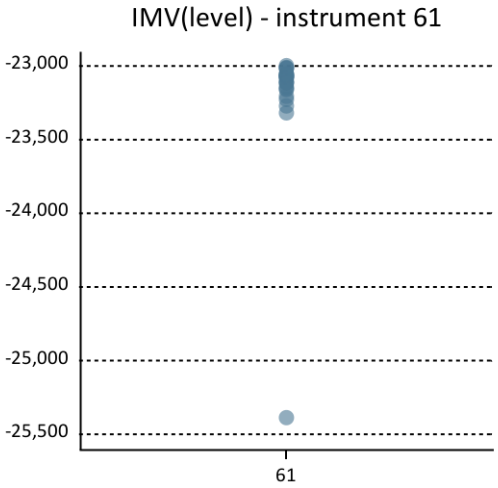

IMV(level) - instrument 56
50,000
47,500
45,000
42,500
40,000
37,500
56

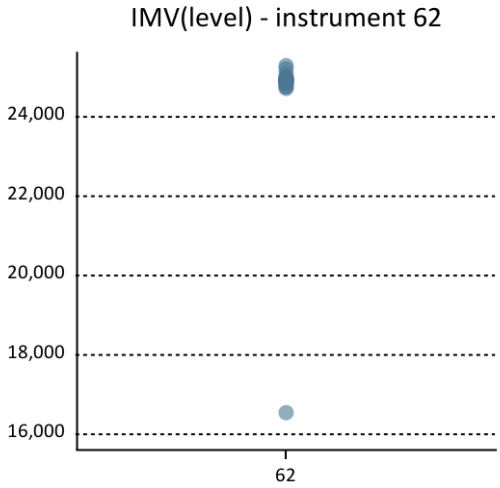

IMV(level) - instrument 57
-44,000
-46,000
-48,000
57

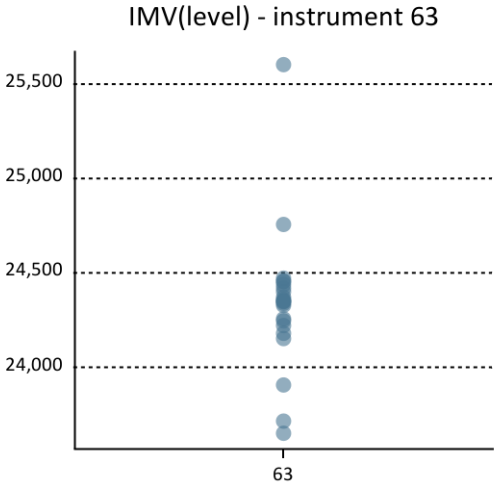

IMV(level) - instrument 58
22,000
21,500
21,000
20,500
58

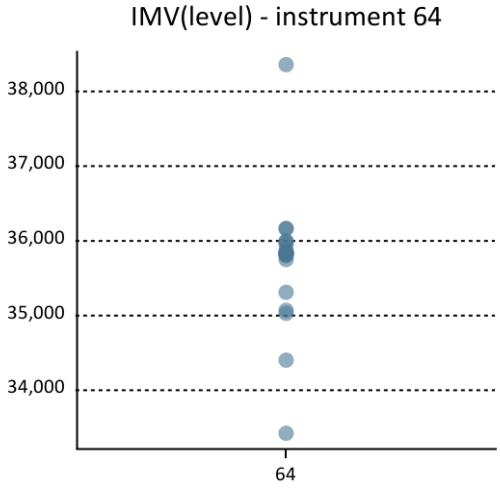

IMV(level) - instrument 59
-21,000
-21,500
-22,000
-22,500
-23,000
59

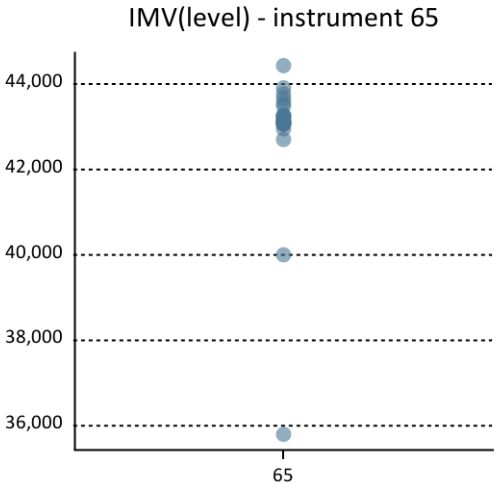

IMV(level) - instrument 60
28,250
28,000
27,750
27,500
27,250
60

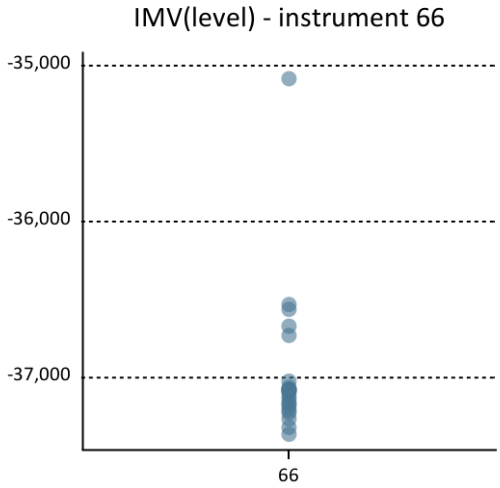

IMV(level) - instrument 61
-23,000
-23,500
-24,000
-24,500
-25,000
-25,500
61

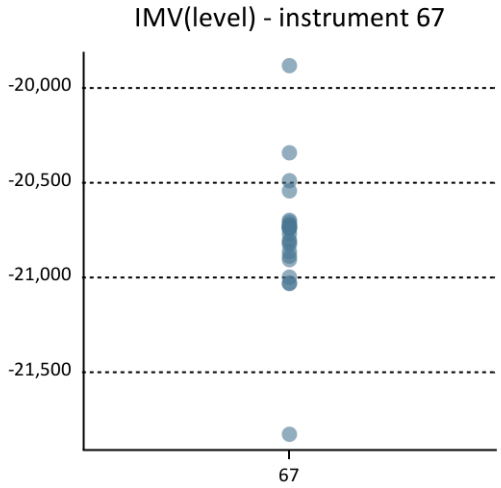

IMV(level) - instrument 62
24,000
22,000
20,000
18,000
16,000
62

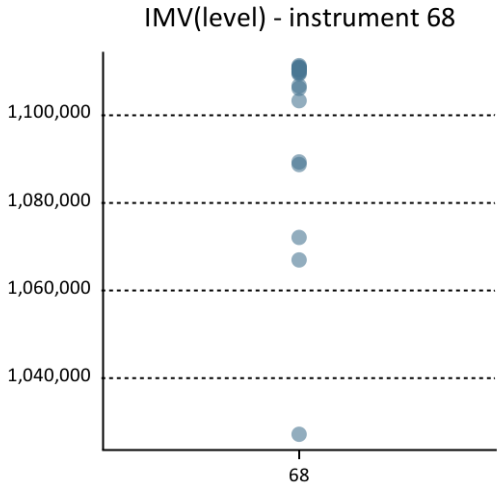

IMV(level) - instrument 63
25,500
25,000
24,500
24,000
63

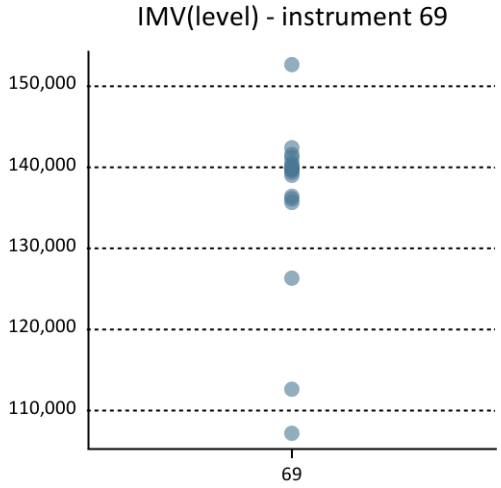

IMV(level) - instrument 64
38,000
37,000
36,000
35,000
34,000
64

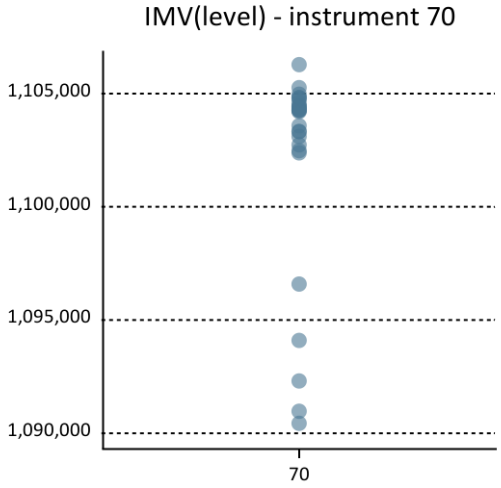

IMV(level) - instrument 65
44,000
42,000
40,000
38,000
36,000
65

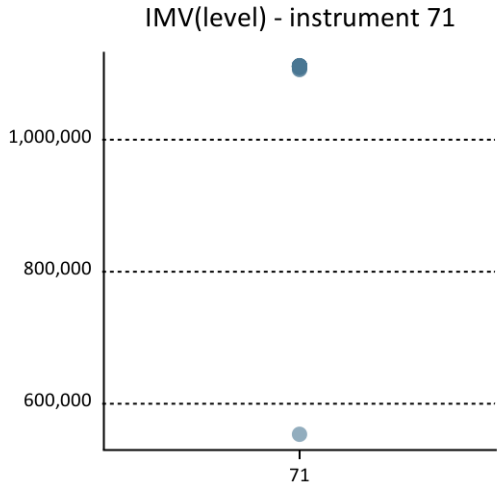

IMV(level) - instrument 66
-35,000
-36,000
-37,000
66

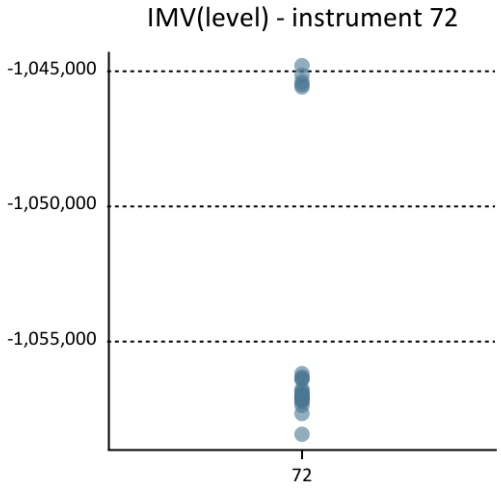

IMV(level) - instrument 67
-20,000
-20,500
-21,000
-21,500
67

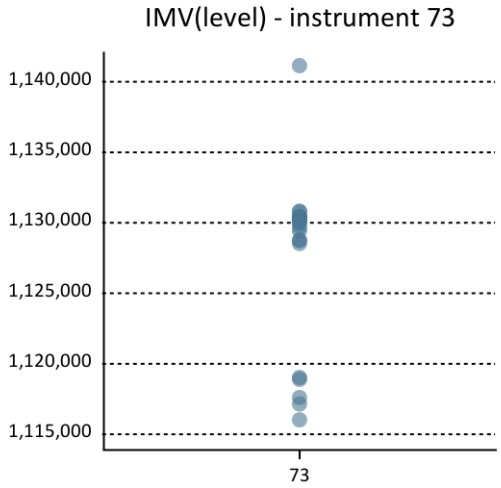

IMV(level) - instrument 68
1,100,000
1,080,000
1,060,000
1,040,000
68

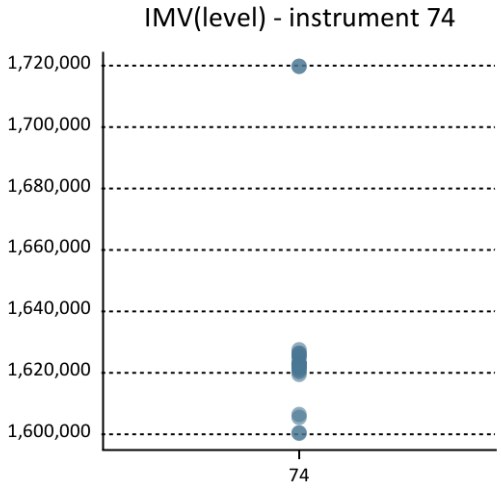

IMV(level) - instrument 69
150,000
140,000
130,000
120,000
110,000
69

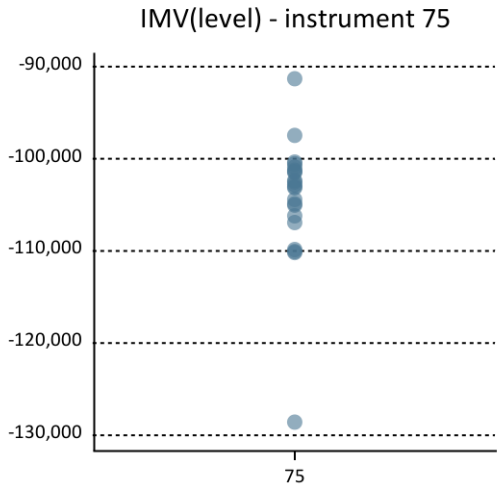

IMV(level) - instrument 70
1,105,000
1,100,000
1,095,000
1,090,000
70

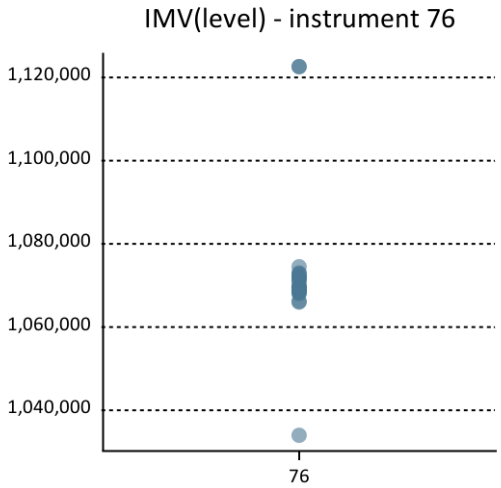

IMV(level) - instrument 71
1,000,000
800,000
600,000
71

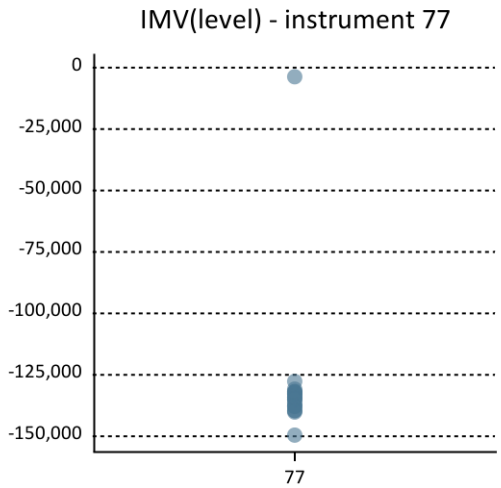

IMV(level) - instrument 72
-1,045,000
-1,050,000
-1,055,000
72

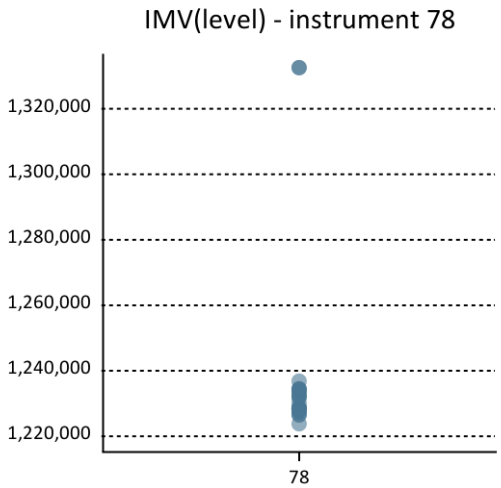

IMV(level) - instrument 73
1,140,000
1,135,000
1,130,000
1,125,000
1,120,000
1,115,000
73

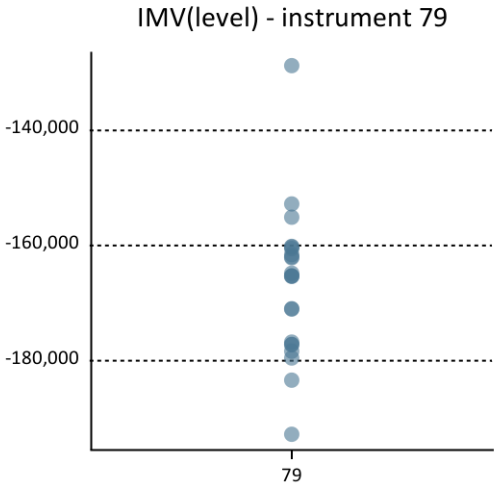

IMV(level) - instrument 74
1,720,000
1,700,000
1,680,000
1,660,000
1,640,000
1,620,000
1,600,000
74

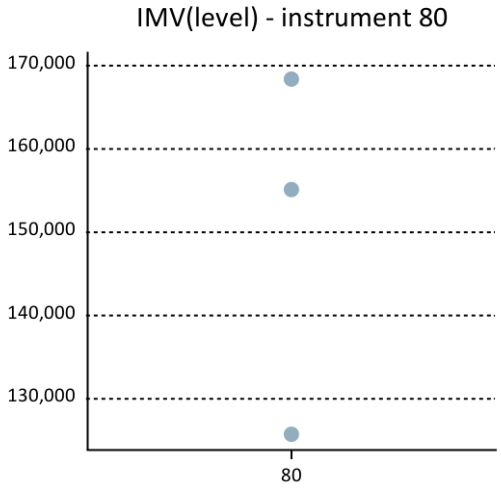

IMV(level) - instrument 75
-90,000
-100,000
-110,000
-120,000
-130,000
75


IMV(level) - instrument 76
1,120,000
1,100,000
1,080,000
1,060,000
1,040,000
76


IMV(level) - instrument 77
0
-25,000
-50,000
-75,000
-100,000
-125,000
-150,000
77


IMV(level) - instrument 78
1,320,000
1,300,000
1,280,000
1,260,000
1,240,000
1,220,000
78


IMV(level) - instrument 79
-140,000
-160,000
-180,000
79


IMV(level) - instrument 80
170,000
160,000
150,000
140,000
130,000
80

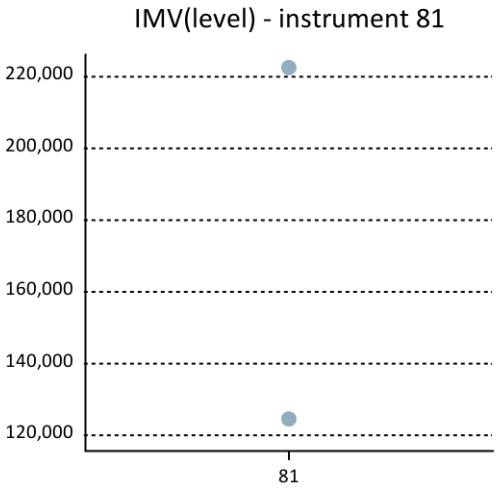
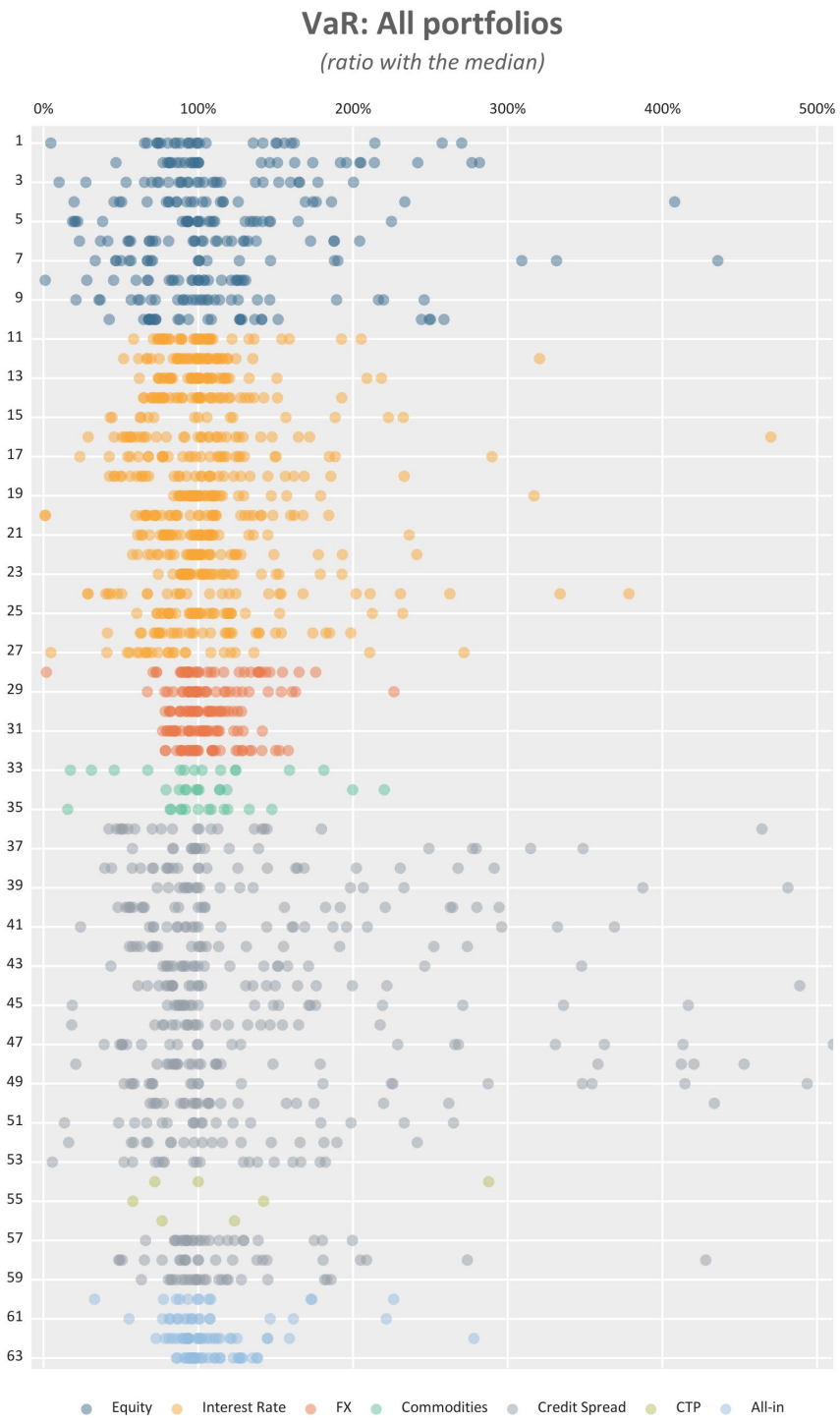
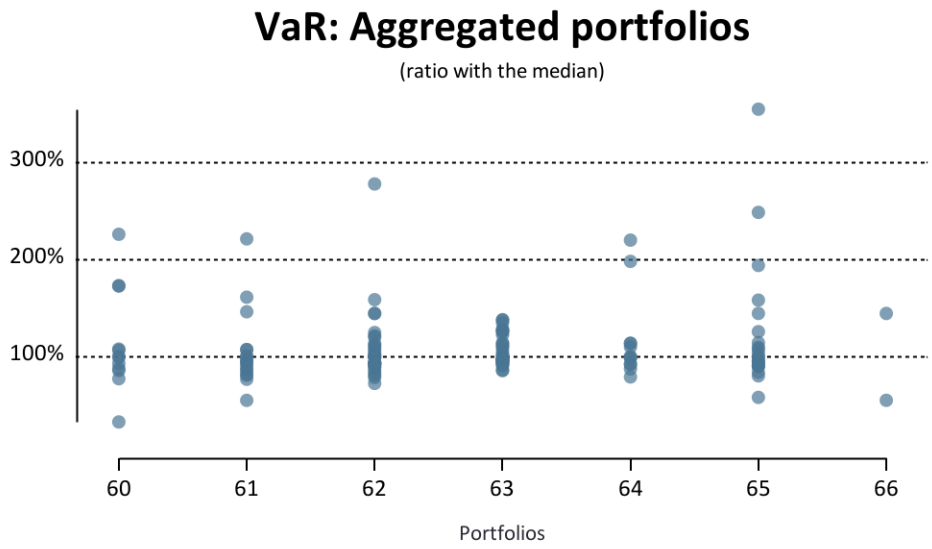
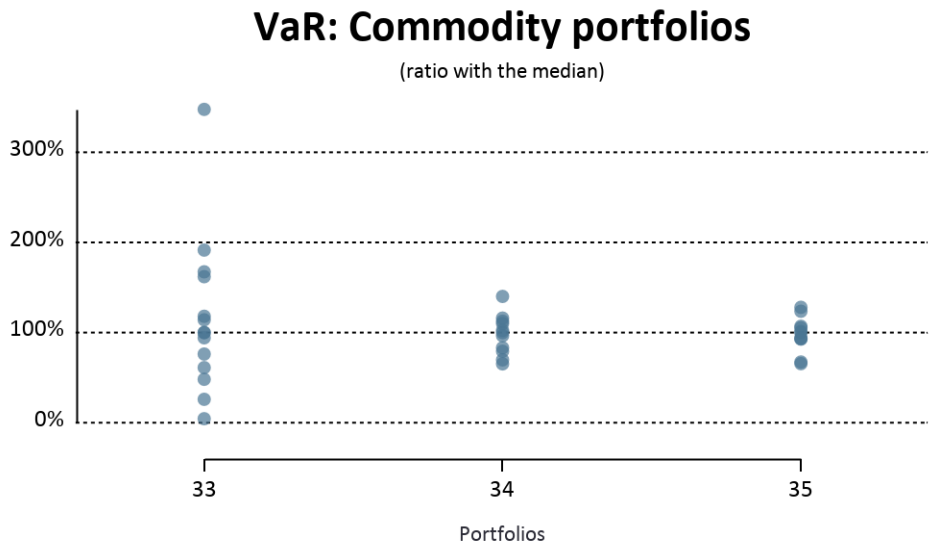
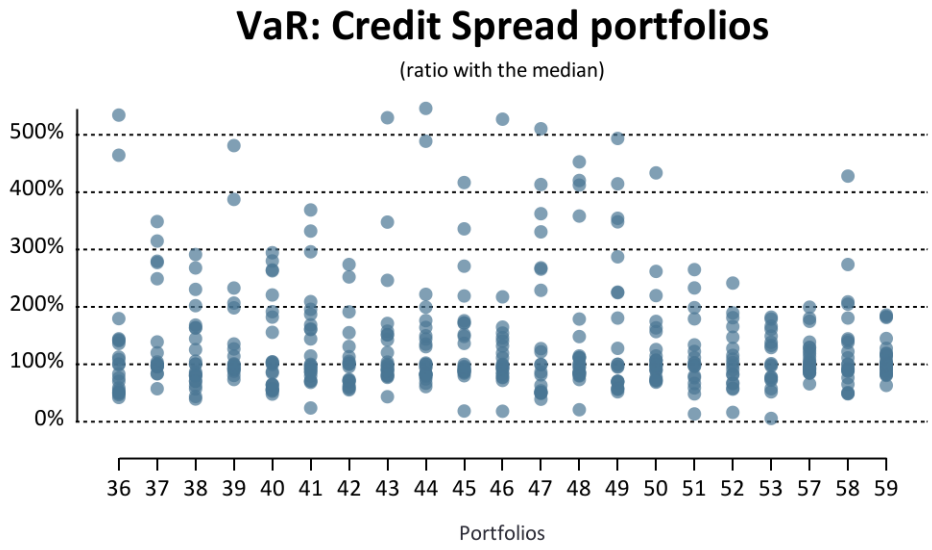

IMV(level) - instrument 81
220,000
200,000
180,000
160,000
140,000
120,000
81

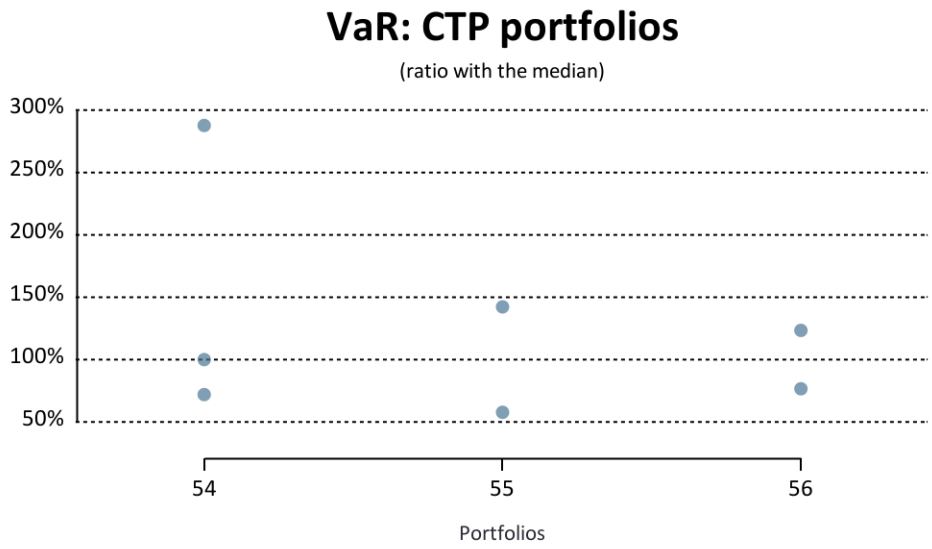
Figure 25: VaR submissions normalised by the median of each portfolio (by asset class)

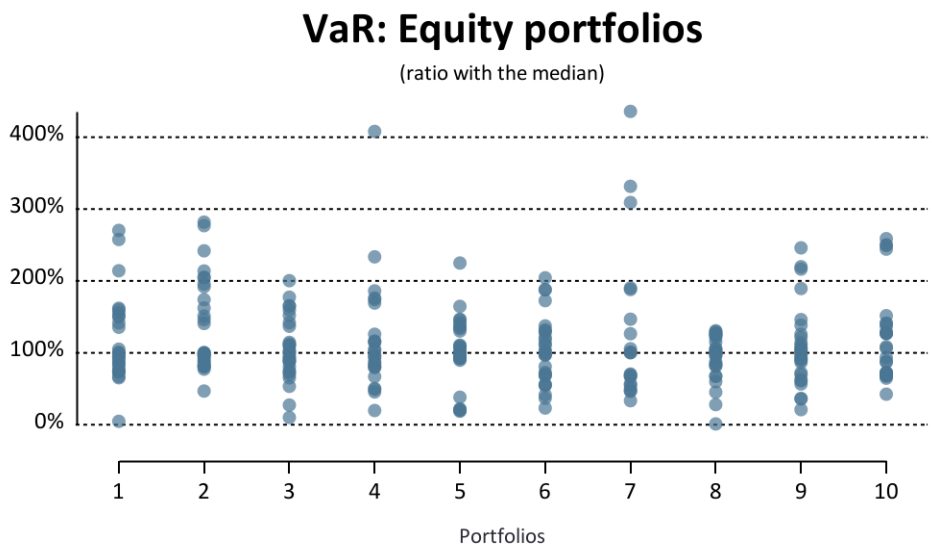


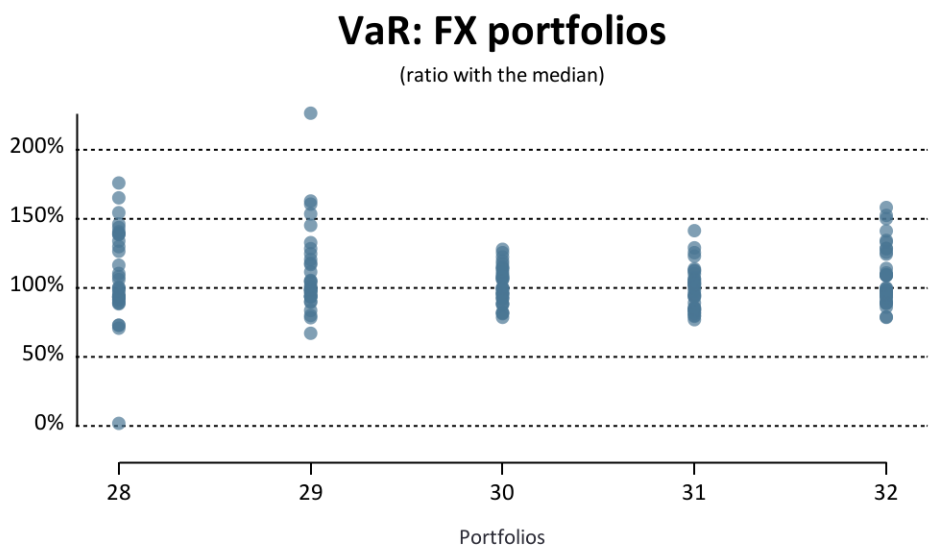

VaR: Aggregated portfolios
(ratio with the median)
300%
200%
100%
60
61
62
63
64
65
66
Portfolios


VaR: Commodity portfolios
(ratio with the median)
300%
200%
100%
0%
33
34
35
Portfolios


VaR: Credit Spread portfolios
(ratio with the median)
500%
400%
300%
200%
100%
0%
36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 57 58 59
Portfolios


VaR: CTP portfolios
(ratio with the median)
300%
250%
200%
150%
100%
50%
54
55
56
Portfolios


VaR: Equity portfolios
(ratio with the median)
400%
300%
200%
100%
0%
1
2
3
4
5
6
7
8
9
10
Portfolios


VaR: FX portfolios
(ratio with the median)
200%
150%
100%
50%
0%
28
29
30
31
32
Portfolios

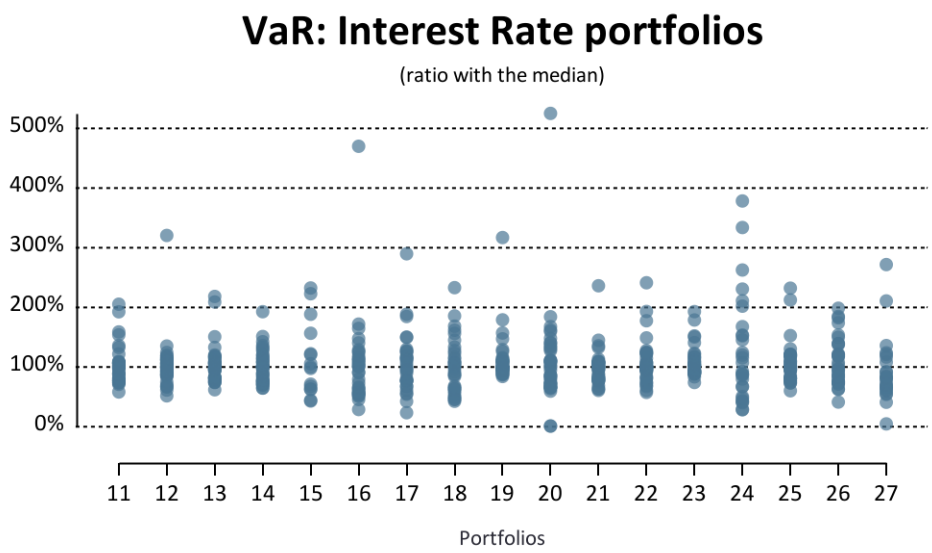
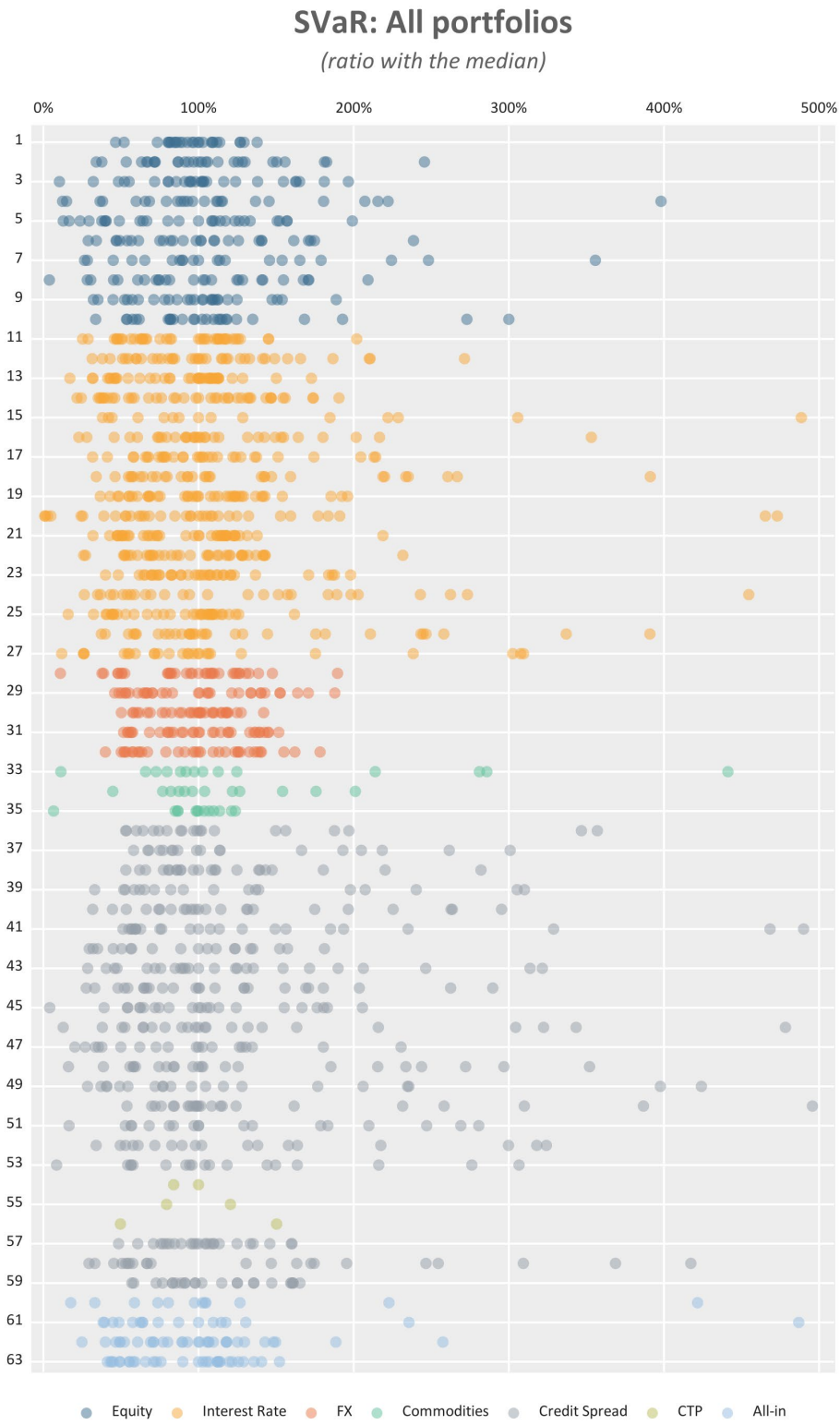
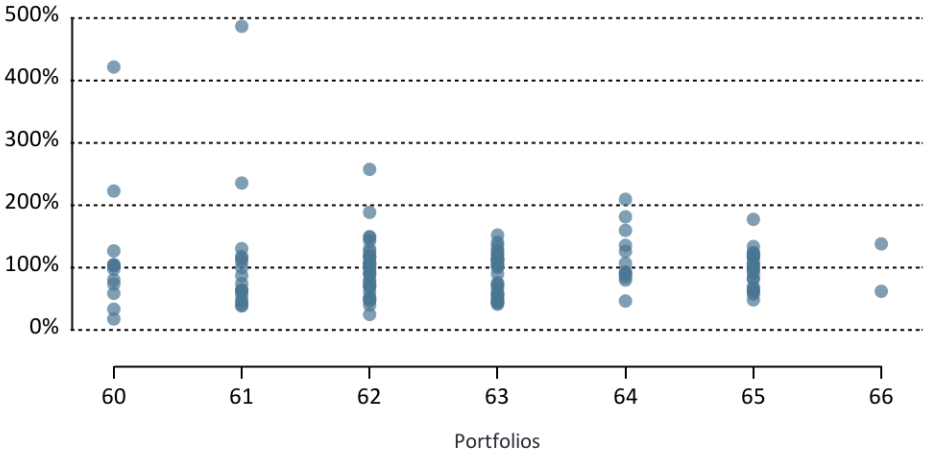

VaR: Interest Rate portfolios
(ratio with the median)
500%
400%
300%
200%
100%
0%
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
Portfolios

Figure 26: sVaR submissions normalised by the median of each portfolio (by asset class)



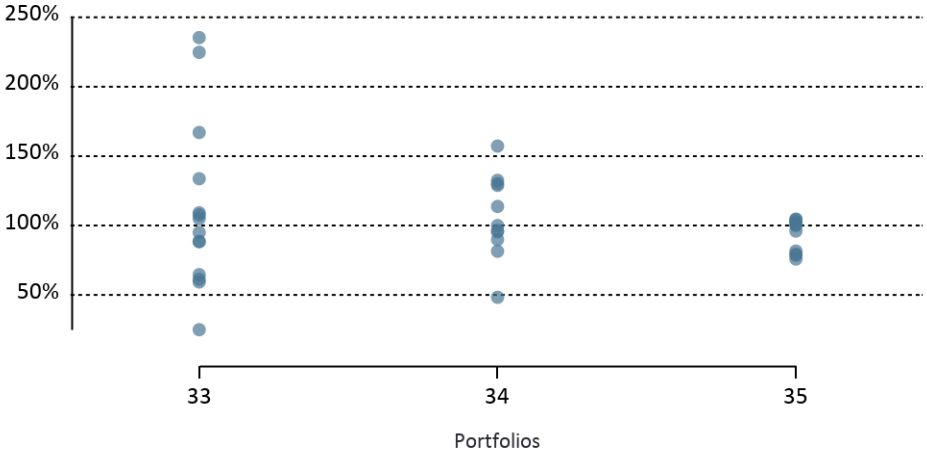
SVaR: Aggregated portfolios

(ratio with the median)



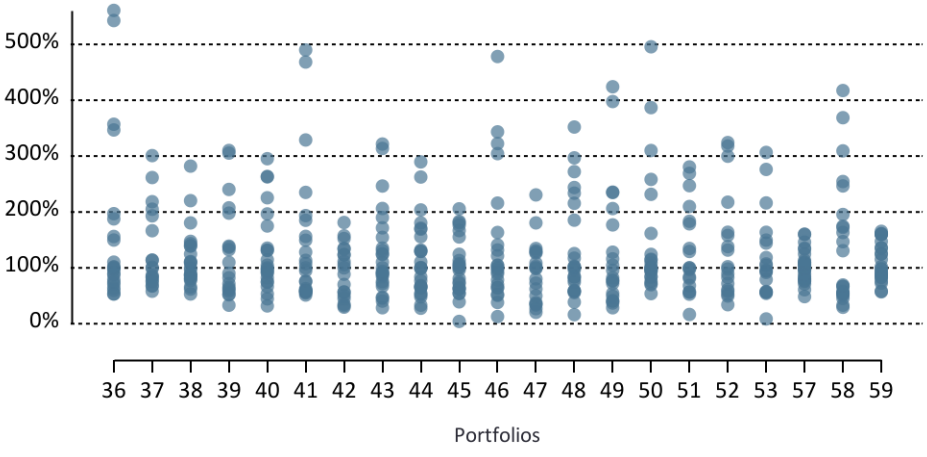
SVaR: Commodity portfolios

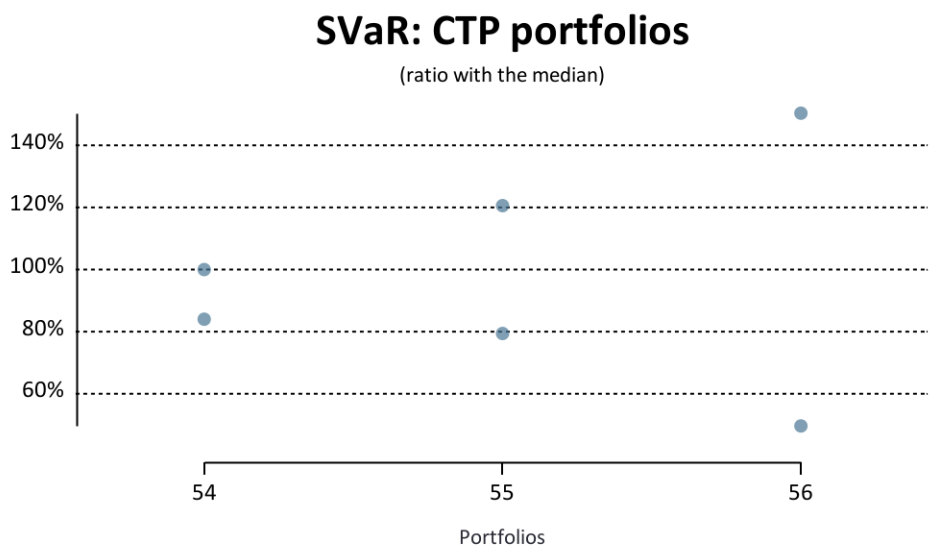
(ratio with the median)

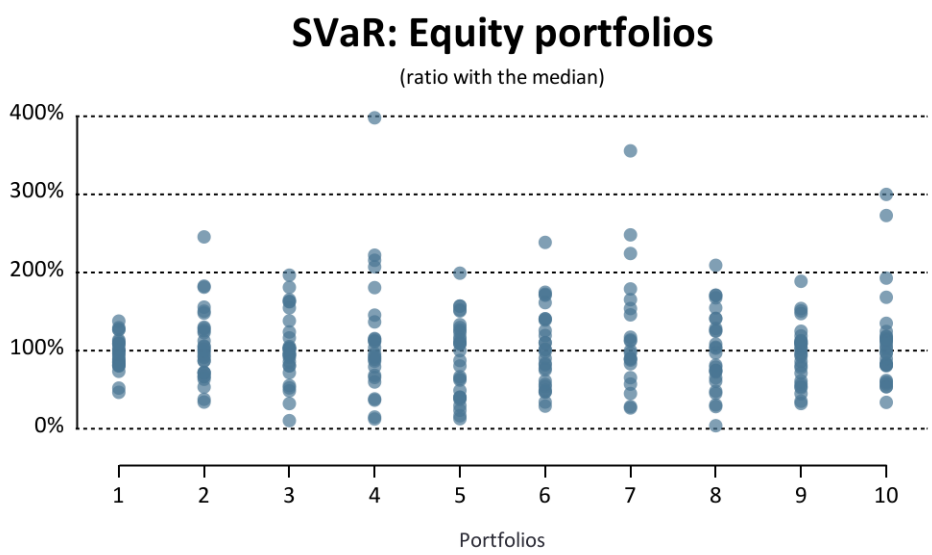


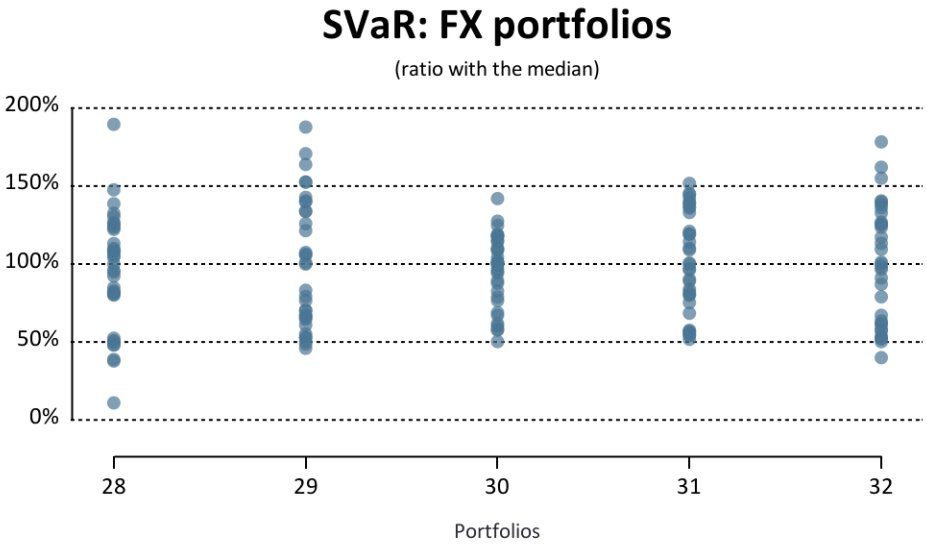
SVaR: Credit Spread portfolios

(ratio with the median)




SVaR: CTP portfolios
(ratio with the median)
140%
120%
100%
80%
60%
54
55
56
Portfolios


SVaR: Equity portfolios
(ratio with the median)
400%
300%
200%
100%
0%
1
2
3
4
5
6
7
8
9
10
Portfolios


SVaR: FX portfolios
(ratio with the median)
200%
150%
100%
50%
0%
28
29
30
31
32
Portfolios

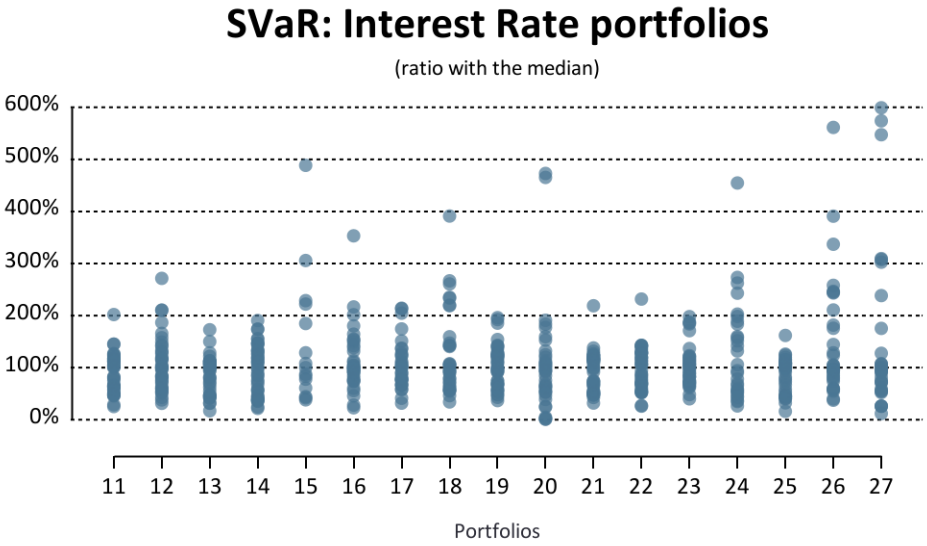

SVaR: Interest Rate portfolios
(ratio with the median)
600%
500%
400%
300%
200%
100%
0%
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
Portfolios

Figure 27: sVaR submissions normalised by the median of each portfolio (by methodological approach)

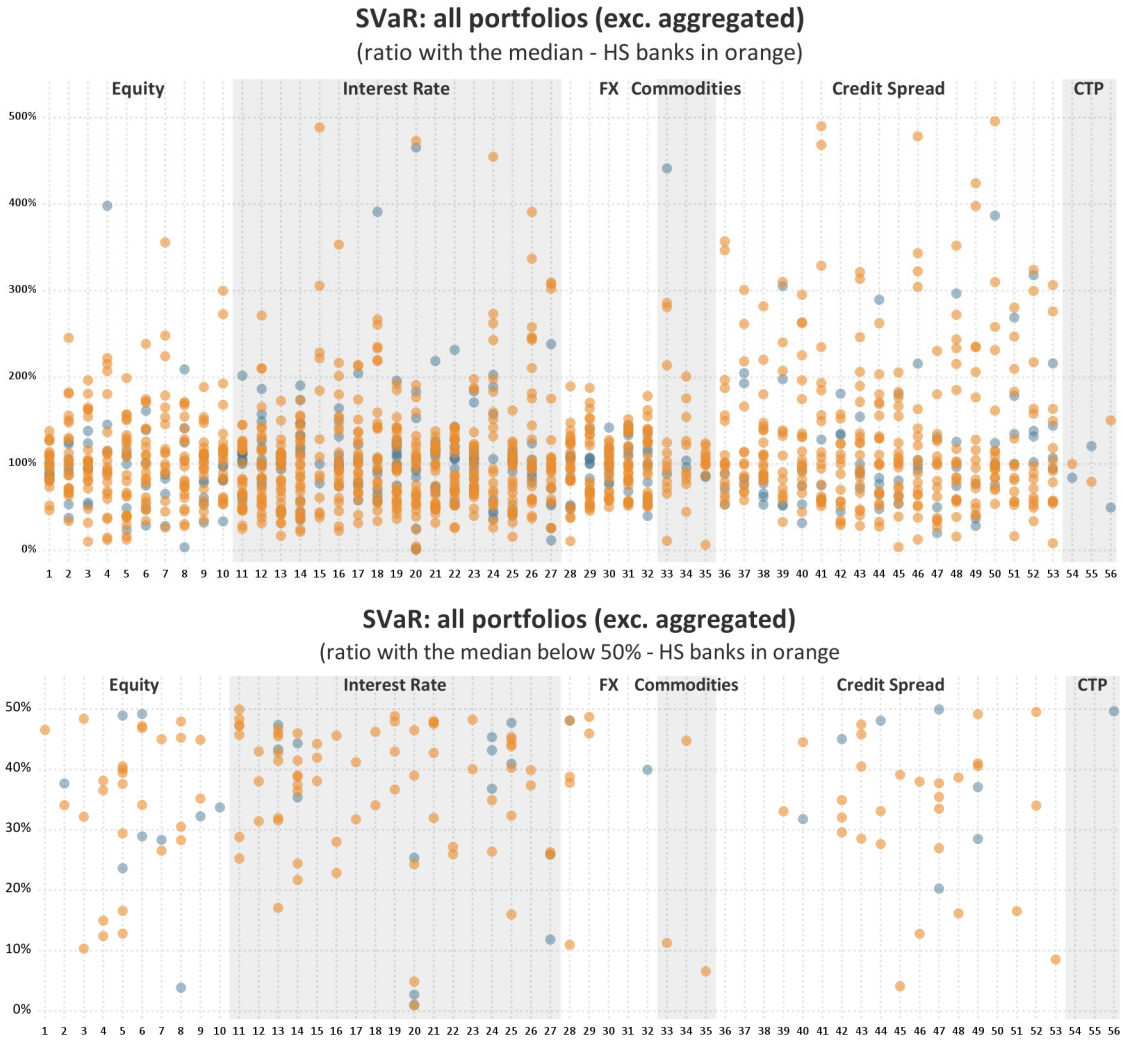


Table 27: VaR statistics (small banks only)

EU Statistics for VaR

		Other stats						Percentiles							
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range
Equity	1	2,922,012	10,626,420	6,701,175	3,532,549	53%	5	3,116,225	3,310,438	3,893,077	5,934,876	10,129,491	10,427,648	10,527,034	44%
	2	2,255,717	5,418,554	3,185,728	1,496,185	47%	4	2,283,835	2,311,952	2,396,305	2,534,321	3,323,744	4,580,650	4,999,592	16%
	3	8,512	19,170	12,530	4,048	32%	5	8,868	9,224	10,292	12,005	12,669	16,570	17,870	10%
	4	1,041	2,250	1,558	573	37%	5	1,063	1,085	1,150	1,243	2,105	2,192	2,221	29%
	5	1,068,391,622	1,693,004,617	1,377,909,512	302,279,288	22%	4	1,084,585,990	1,100,780,359	1,149,363,463	1,375,120,904	1,603,666,952	1,657,269,551	1,675,137,084	17%
	6	3,778	9,545	5,679	2,314	41%	5	3,824	3,871	4,010	5,413	5,647	7,986	8,765	17%
	7														
	8	34,030	50,812	40,473	6,668	16%	5	34,268	34,507	35,222	40,466	41,834	47,221	49,016	9%
	9	24,946	60,905	42,256	18,017	43%	3	26,543	28,140	32,932	40,917	50,911	56,907	58,906	21%
	10	319,505	696,605	546,040	164,958	30%	4	351,865	384,226	481,306	584,024	648,757	677,466	687,035	15%
Interest Rate	11	65,729	96,746	81,443	12,370	15%	7	65,991	66,253	73,161	79,761	90,774	95,736	96,241	11%
	12	24,113	41,133	30,892	5,469	18%	7	24,646	25,180	28,012	30,895	32,039	35,942	38,537	7%
	13	110,316	197,859	144,037	28,326	20%	10	112,810	115,305	119,901	142,709	157,492	176,981	187,420	14%
	14	28,664	53,252	41,393	8,022	19%	10	29,965	31,267	36,481	42,022	47,038	50,154	51,703	13%
	15						1								
	16	31,804	46,975	38,081	6,758	18%	4	32,137	32,471	33,471	36,772	41,382	44,738	45,856	11%
	17	72,889	114,338	86,178	19,204	22%	4	73,224	73,559	74,564	78,743	90,358	104,746	109,542	10%
	18	72,488	134,145	89,230	29,971	34%	4	72,838	73,189	74,239	75,144	90,134	116,541	125,343	10%
	19	108,119	153,650	123,525	13,497	11%	9	109,708	111,297	116,909	121,867	123,617	137,935	145,792	3%
	20	4,088	8,443	5,693	1,664	29%	8	4,111	4,134	4,615	5,252	6,168	8,161	8,302	14%
	21	205,699	323,883	270,311	43,848	16%	9	217,123	228,548	243,595	248,538	306,588	322,013	322,948	11%
	22	59,462	127,144	87,482	22,370	26%	7	63,188	66,913	75,890	82,532	95,728	114,032	120,588	12%
	23	27,517	40,315	35,845	4,480	12%	7	29,556	31,595	34,425	35,320	39,459	40,139	40,227	7%
	24	19,786	69,768	44,777	35,343	79%	2	22,285	24,784	32,282	44,777	57,273	64,770	67,269	28%
	25	101,016	155,687	121,778	21,930	18%	6	102,081	103,146	105,373	115,012	135,088	147,176	151,431	12%
	26	65,785	100,806	80,270	18,278	23%	3	66,628	67,472	70,002	74,218	87,512	95,488	98,147	11%
	27						1								
FX	28	316,627	517,434	395,944	85,605	22%	6	318,764	320,901	326,542	371,318	458,343	495,614	506,524	17%
	29	18,956	22,135	20,563	1,074	5%	6	19,245	19,535	20,179	20,458	21,077	21,696	21,915	2%
	30	155,956	184,553	173,051	10,047	6%	7	159,732	163,509	168,961	170,485	181,221	183,695	184,124	4%
	31	246,168	335,832	301,594	36,313	12%	7	254,329	262,490	273,529	319,945	331,078	334,727	335,279	10%
	32	328,118	461,212	388,848	57,819	15%	7	328,708	329,298	335,975	379,585	440,535	451,618	456,415	13%
Commodities	33						1								
	34														
	35						1								
Credit Spread	36	6,037	16,933	13,231	6,231	47%	3	7,106	8,174	11,380	16,722	16,828	16,891	16,912	19%
	37	26,194	37,924	32,059	8,294	26%	2	26,781	27,367	29,127	32,059	34,992	36,751	37,338	9%
	38	3,357	10,836	7,097	5,288	75%	2	3,731	4,105	5,227	7,097	8,966	10,088	10,462	26%
	39	10,281	14,368	12,325	2,890	23%	2	10,485	10,690	11,303	12,325	13,346	13,959	14,164	8%
	40	2,085	8,672	5,379	4,658	87%	2	2,414	2,744	3,732	5,379	7,025	8,013	8,343	31%
	41						1								
	42	35,640	97,253	66,447	43,567	66%	2	38,721	41,801	51,043	66,447	81,850	91,092	94,172	23%
	43						1								
	44						1								
	45						1								
	46	6,240	10,369	8,305	2,920	35%	2	6,446	6,653	7,272	8,305	9,337	9,956	10,163	12%
	47	972	6,942	4,750	3,286	69%	3	1,508	2,045	3,654	6,335	6,639	6,821	6,881	29%
	48						1								
	49	2,727	13,613	8,170	7,698	94%	2	3,271	3,816	5,449	8,170	10,892	12,524	13,069	33%
	50						1								
	51						1								
	52	29,882	48,248	39,065	12,987	33%	2	30,800	31,719	34,474	39,065	43,657	46,411	47,330	12%
	53	65,034	72,958	68,996	5,603	8%	2	65,430	65,826	67,015	68,996	70,977	72,166	72,562	3%
	57	135,561	147,202	141,382	8,231	6%	2	136,143	136,725	138,471	141,382	144,292	146,038	146,620	2%
	58	28,860	58,817	36,808	14,679	40%	4	28,978	29,095	29,448	29,778	37,138	50,146	54,481	12%
	59	130,877	156,148	143,513	17,869	12%	2	132,141	133,404	137,195	143,513	149,830	153,621	154,884	4%
CTP	54														
	55														
	56														
ALL-IN no-CTP	60						1								
Equity Cumulative	61	2,411,352	2,784,022	2,597,687	263,517	10%	2	2,429,986	2,448,619	2,504,520	2,597,687	2,690,855	2,746,755	2,765,389	4%
IR Cumulative	62	178,867	268,400	217,226	34,402	16%	5	182,955	187,043	199,306	207,334	232,221	253,928	261,164	8%
FX Cumulative	63	681,191	901,613	768,592	97,655	13%	7	682,021	682,850	693,078	714,417	848,384	898,593	900,103	10%
Commodity Cumulative	64														
CS Cumulative	65	147,094	165,953	156,524	13,335	9%	2	148,037	148,980	151,809	156,524	161,238	164,067	165,010	3%
CTP Cumulative	66														

Figure 28: VaR ratio with median (focus on small banks)

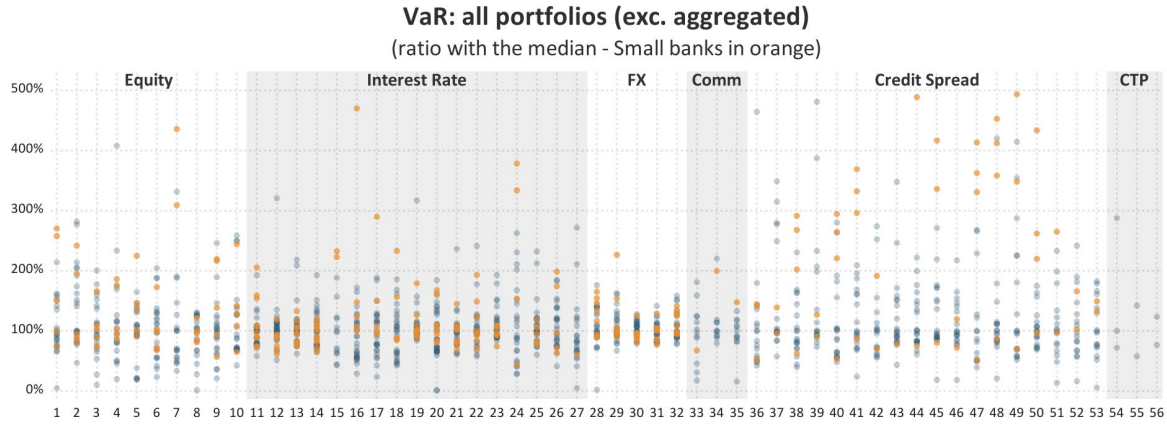


Table 28: VaR statistics (medium-sized banks only)

EU Statistics for VaR

		Other stats						Percentiles							
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range
Equity	1	184,485	8,419,537	4,078,128	1,970,177	48%	15	1,853,003	2,694,382	2,935,205	3,663,940	5,451,391	6,182,850	6,984,766	30%
	2	1,295,510	5,918,479	3,568,169	1,448,422	41%	13	1,847,803	2,223,669	2,286,423	3,896,922	4,492,038	5,505,398	5,774,087	33%
	3	3,170	19,110	11,070	4,976	45%	11	4,676	6,182	8,374	10,333	13,772	18,491	18,801	24%
	4	239	2,045	1,104	528	48%	10	398	558	698	1,146	1,397	1,573	1,809	33%
	5	443,522,356	1,911,290,183	1,259,506,393	371,592,334	30%	12	772,297,728	1,045,127,314	1,085,209,921	1,200,200,319	1,522,965,507	1,634,538,096	1,764,142,453	17%
	6	1,283	7,600	4,249	2,139	50%	11	1,660	2,037	2,674	3,897	5,929	7,140	7,370	38%
	7	10,673	46,885	26,701	13,183	49%	8	12,148	13,622	14,987	26,769	34,237	42,371	44,628	39%
	8	28,115	53,486	41,434	10,035	24%	9	28,223	28,332	34,763	43,474	52,065	52,716	53,101	20%
	9	9,235	64,402	37,340	17,063	46%	12	12,834	15,813	27,001	41,403	47,317	54,881	59,458	27%
	10	209,500	748,369	504,837	174,375	35%	13	285,170	335,778	337,701	524,796	627,602	691,169	716,623	30%
Interest Rate	11	51,989	118,547	81,099	15,956	20%	20	62,835	65,832	69,074	80,112	92,710	95,208	97,168	15%
	12	23,100	41,303	33,646	5,354	16%	17	23,234	26,734	29,936	34,689	36,715	39,370	40,235	10%
	13	111,135	172,297	142,375	19,997	14%	18	111,193	114,036	122,796	147,593	157,972	163,941	169,218	13%
	14	28,545	60,058	41,255	9,675	23%	20	30,628	31,822	33,438	40,383	45,518	56,463	58,801	15%
	15	16,342	48,699	29,974	12,868	43%	6	16,626	16,910	19,418	28,427	38,258	44,586	46,643	33%
	16	14,505	37,540	23,739	8,120	34%	16	15,758	16,458	17,659	20,237	29,883	36,027	36,748	26%
	17	32,427	96,331	63,500	19,857	31%	15	38,820	42,040	49,318	59,111	81,851	88,488	91,177	25%
	18	36,567	144,620	75,487	36,822	49%	17	38,621	39,390	43,321	54,670	97,178	130,186	140,003	38%
	19	106,026	157,602	122,225	12,957	11%	19	107,091	108,481	114,671	119,348	129,943	136,060	142,598	6%
	20	3,000	8,160	5,095	1,748	34%	18	3,179	3,286	3,345	4,728	6,666	7,182	7,562	33%
	21	226,731	326,368	275,156	35,275	13%	17	231,357	232,566	238,998	285,711	303,175	320,636	322,605	12%
	22	49,121	108,971	80,055	18,311	23%	18	51,484	55,892	64,786	83,619	91,446	104,447	107,023	17%
	23	31,038	52,275	37,820	5,660	15%	18	32,542	32,951	33,563	36,191	40,604	45,210	46,676	9%
	24	12,903	95,868	43,086	27,785	64%	15	13,055	15,173	20,321	36,355	59,008	85,547	93,004	49%
	25	78,873	170,741	124,858	24,045	19%	18	93,422	96,103	106,578	126,894	139,659	155,055	160,810	13%
	26	42,861	155,658	100,219	33,372	33%	16	59,375	69,977	77,381	88,541	129,654	144,557	147,441	25%
	27	1,346	237,848	48,070	64,685	135%	18	10,107	14,267	19,368	25,013	35,021	114,698	207,370	29%
FX	28	250,423	508,305	377,997	81,825	22%	16	255,923	286,328	328,297	364,372	450,505	494,286	500,205	16%
	29	16,457	30,497	21,841	3,861	18%	14	16,683	17,664	19,709	20,869	23,068	26,726	28,195	8%
	30	150,875	234,767	195,964	25,621	13%	15	155,129	157,251	180,249	206,102	212,370	220,238	224,880	8%
	31	255,710	364,045	310,558	40,593	13%	15	259,545	264,113	269,276	303,001	346,493	359,767	361,479	13%
	32	273,365	465,526	347,599	54,156	16%	14	289,480	300,901	308,298	337,760	378,078	416,894	443,069	10%
Commodities	33	1,445	15,092	8,370	5,088	61%	7	1,786	2,126	4,970	8,533	11,791	13,980	14,536	41%
	34	361,384	519,577	429,910	65,742	15%	4	369,809	378,234	403,509	419,340	445,742	490,043	504,810	5%
	35	399,770	649,484	495,946	101,813	21%	6	400,292	400,814	409,580	477,256	557,982	609,769	629,626	15%
Credit Spread	36	5,945	16,547	11,236	4,309	38%	7	6,085	6,225	7,664	11,654	14,590	16,204	16,376	31%
	37	15,679	76,319	32,537	21,890	67%	6	17,448	19,217	23,581	26,430	27,408	51,965	64,142	8%
	38	3,071	8,737	5,760	1,891	33%	8	3,487	3,903	4,432	5,522	6,987	8,048	8,393	22%
	39	8,325	26,386	14,907	7,016	47%	7	9,019	9,713	10,937	11,422	18,171	24,605	25,496	25%
	40	2,196	7,156	4,182	1,687	40%	8	2,312	2,428	3,203	3,967	4,604	6,427	6,791	18%
	41	6,009	15,844	9,767	3,628	37%	9	6,016	6,023	7,817	8,318	13,604	14,111	14,978	27%
	42	28,210	66,596	51,078	12,701	25%	6	33,862	39,513	50,941	51,652	56,155	62,070	64,333	5%
	43	13,159	74,490	36,147	17,194	48%	11	18,582	24,004	26,319	29,253	46,710	51,788	63,139	28%
	44	4,714	17,120	8,653	3,916	45%	11	4,946	5,178	6,156	6,438	11,334	12,670	14,895	30%
	45	2,466	29,074	15,974	8,003	50%	9	6,071	9,676	11,723	12,763	22,737	24,116	26,595	32%
	46	1,579	18,873	8,791	4,622	53%	9	3,650	5,721	7,210	8,091	9,653	12,930	15,901	14%
	47	972	5,092	2,115	1,401	66%	7	989	1,006	1,297	1,902	2,123	3,435	4,264	24%
	48	1,870	16,035	8,187	3,699	45%	9	3,756	5,641	7,161	7,775	8,598	11,169	13,602	9%
	49	2,036	13,857	6,354	4,409	69%	8	2,110	2,183	3,388	4,452	9,400	12,020	12,939	47%
	50	10,440	26,515	16,379	5,761	35%	9	10,714	10,987	11,746	13,883	19,078	24,353	25,434	24%
	51	3,243	47,699	24,334	15,840	65%	7	6,515	9,787	16,282	19,170	33,830	44,893	46,296	35%
	52	4,719	55,181	27,732	16,806	61%	7	8,385	12,051	18,317	26,414	35,588	47,779	51,480	32%
	53	2,776	89,131	51,103	33,978	66%	7	9,580	16,384	30,889	37,742	83,147	88,124	88,628	46%
	57	105,689	207,508	166,265	32,313	19%	10	122,208	138,726	150,488	158,778	193,649	206,995	207,252	13%
	58	16,013	67,983	35,165	18,106	51%	7	16,176	16,338	23,168	32,600	41,611	55,397	61,690	28%
	59	99,637	188,056	158,461	29,872	19%	9	111,629	123,620	144,254	163,274	181,761	186,710	187,383	12%
CTP	54														
	55														
	56														
ALL-IN no-CTP	60	853,190	4,486,543	2,662,275	1,293,313	49%	5	1,165,172	1,477,153	2,413,098	2,764,618	2,793,925	3,809,496	4,148,019	7%
Equity Cumulative	61	1,537,143	4,495,610	2,727,855	902,832	33%	7	1,753,067	1,968,990	2,397,366	2,601,499	2,833,000	3,594,687	4,045,149	8%
IR Cumulative	62	160,466	276,055	214,429	34,150	16%	14	169,126	176,758	198,067	206,411	240,549	261,417	269,348	10%
FX Cumulative	63	602,702	887,786	724,734	99,928	14%	13	605,532	617,143	661,258	675,853	776,472	879,002	885,177	8%
Commodity Cumulative	64	362,341	519,948	431,498	65,305	15%	4	371,113	379,885	406,202	421,851	447,146	490,827	505,388	5%
CS Cumulative	65	101,810	220,007	172,114	37,943	22%	7	118,684	135,557	159,590	174,524	194,639	208,146	214,077	10%
CTP Cumulative	66														

Figure 29: VaR ratio with median (focus on medium-sized banks)

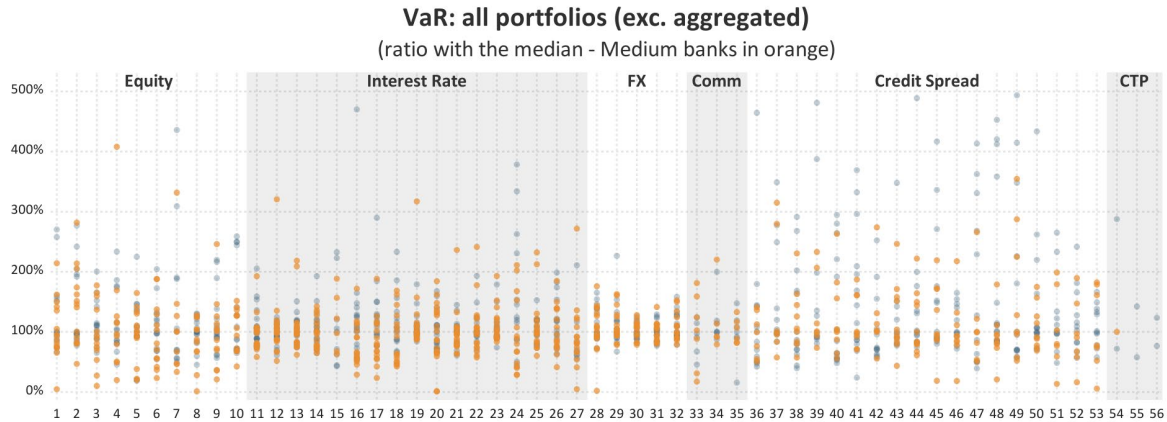


Table 29: VaR statistics (large banks only)

EU Statistics for VaR

		Other stats						Percentiles							
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range
Equity	1	2,633,661	6,290,314	4,174,446	1,319,914	32%	8	2,876,833	3,120,005	3,437,140	3,795,616	4,499,484	6,170,291	6,230,302	13%
	2	2,138,047	5,656,852	3,229,233	1,297,439	40%	9	2,235,544	2,333,041	2,650,765	2,703,003	2,767,536	5,380,131	5,518,492	2%
	3	7,558	17,616	12,572	3,091	25%	9	8,591	9,624	10,803	12,841	13,265	16,670	17,143	10%
	4	551	2,823	1,331	715	54%	9	654	757	979	1,038	1,403	2,269	2,546	18%
	5	1,073,634,502	1,703,522,817	1,279,534,901	243,722,369	19%	8	1,078,129,700	1,082,624,897	1,087,159,836	1,205,543,709	1,355,011,845	1,631,918,141	1,667,720,479	11%
	6	3,017	7,306	5,726	1,494	26%	9	3,328	3,639	5,346	6,211	6,722	7,209	7,258	11%
	7	16,009	60,798	30,458	16,827	55%	10	16,761	17,513	18,941	22,343	33,309	60,157	60,478	27%
	8	25,062	54,731	44,834	9,247	21%	9	31,102	37,141	41,948	44,609	52,570	54,240	54,485	11%
	9	26,897	83,437	45,241	15,865	35%	10	27,157	27,417	39,697	42,955	48,311	56,464	69,951	10%
	10	335,403	434,551	371,771	41,697	11%	7	337,486	339,569	345,472	354,320	393,589	431,223	432,887	7%
Interest Rate	11	69,700	121,534	92,327	15,206	16%	10	73,437	77,175	81,586	92,206	97,151	110,039	115,787	9%
	12	31,986	43,087	36,893	3,465	9%	10	32,310	32,635	34,628	37,063	38,986	40,404	41,746	6%
	13	122,281	178,979	155,575	19,082	12%	9	128,880	135,479	146,467	151,523	173,906	177,111	178,045	9%
	14	30,941	57,535	45,984	8,245	18%	8	33,938	36,934	43,095	46,138	51,090	54,225	55,880	8%
	15	11,124	31,195	20,208	7,973	39%	7	11,226	11,329	13,789	18,433	26,564	28,851	30,023	32%
	16	19,066	52,397	34,780	10,293	30%	10	20,927	22,788	27,070	34,792	40,790	45,427	48,912	20%
	17	58,573	114,915	85,810	19,146	22%	9	58,605	58,638	71,861	90,211	97,096	102,348	108,631	15%
	18	56,695	114,510	87,933	19,567	22%	9	57,347	57,998	84,309	91,692	99,887	107,353	110,932	8%
	19	102,562	139,093	126,376	11,655	9%	9	108,596	114,629	118,183	129,857	134,817	136,979	138,036	7%
	20	3,323	7,090	4,591	1,247	27%	10	3,434	3,544	3,622	4,073	5,529	5,764	6,427	21%
	21	300,063	339,957	317,223	14,688	5%	8	300,082	300,102	303,549	318,410	327,126	332,949	336,453	4%
	22	78,824	105,725	87,475	8,173	9%	10	79,877	80,931	83,267	85,403	86,894	98,751	102,238	2%
	23	32,996	43,657	36,768	4,205	11%	8	33,192	33,389	33,832	34,675	39,254	42,837	43,247	7%
	24	22,945	104,801	54,542	24,259	44%	8	28,553	34,162	39,764	53,502	58,881	77,724	91,263	19%
	25	99,723	199,920	145,618	27,072	19%	10	110,182	120,641	129,606	150,108	157,846	162,769	181,344	10%
	26	77,915	159,507	114,409	23,929	21%	9	83,540	89,165	97,737	121,925	124,445	133,130	146,319	12%
	27	15,809	178,815	46,047	55,553	121%	8	16,480	17,151	18,837	21,828	39,896	95,611	137,213	36%
FX	28	258,425	493,584	362,984	78,573	22%	9	280,202	301,979	330,034	344,219	355,029	491,176	492,380	4%
	29	14,093	27,875	21,477	4,426	21%	9	15,481	16,869	18,812	20,702	24,752	25,827	26,851	14%
	30	176,520	229,108	201,399	18,664	9%	9	180,177	183,834	190,121	192,176	218,099	225,924	227,516	7%
	31	253,979	401,491	320,030	50,571	16%	9	257,391	260,802	299,653	312,731	328,871	394,950	398,221	5%
	32	272,434	444,961	351,783	52,838	15%	8	289,830	307,227	322,782	339,820	381,451	410,156	427,559	8%
Commodities	33	3,806	10,341	7,875	2,527	32%	5	4,559	5,311	7,569	8,127	9,533	10,018	10,179	11%
	34	400,862	540,930	471,016	51,183	11%	6	413,348	425,834	451,669	456,497	505,061	530,717	535,824	6%
	35	436,805	581,402	496,776	59,798	12%	5	438,998	441,190	447,768	488,374	529,530	560,653	571,028	8%
Credit Spread	36	4,951	21,063	9,639	5,093	53%	9	5,181	5,412	5,808	8,234	11,794	14,374	17,719	34%
	37	22,915	75,681	38,519	20,837	54%	8	24,187	25,458	26,813	27,690	41,558	70,288	72,985	22%
	38	2,121	9,024	4,852	2,352	48%	10	2,226	2,332	3,779	4,322	5,181	8,820	8,922	16%
	39	9,139	22,473	12,719	4,742	37%	7	9,385	9,632	10,177	10,601	13,235	18,196	20,334	13%
	40	1,889	7,529	3,167	1,772	56%	9	1,995	2,101	2,192	2,490	3,334	4,768	6,149	21%
	41	2,023	17,726	10,019	5,061	51%	10	3,723	5,422	6,894	8,739	13,774	16,702	17,214	33%
	42	29,218	78,830	42,514	15,864	37%	9	29,717	30,216	31,883	36,707	48,664	58,518	68,674	21%
	43	24,157	105,172	39,409	24,279	62%	10	24,414	24,672	27,151	29,905	41,395	51,811	78,491	21%
	44	6,417	15,398	9,259	3,099	33%	10	6,422	6,426	7,290	7,795	10,344	13,777	14,588	17%
	45	11,234	35,960	17,143	7,934	46%	10	11,399	11,564	11,976	12,720	20,048	24,599	30,280	25%
	46	6,675	14,300	10,316	2,801	27%	9	7,191	7,707	8,423	8,675	12,702	13,574	13,937	20%
	47	750	5,135	2,187	1,686	77%	8	818	885	965	1,435	2,926	4,610	4,873	50%
	48	7,490	13,298	9,379	1,838	20%	9	7,519	7,548	7,665	9,110	10,025	10,880	12,089	13%
	49	2,196	8,827	4,020	2,340	58%	9	2,234	2,272	2,667	2,761	3,913	7,413	8,120	19%
	50	10,763	24,805	15,384	3,869	25%	10	10,860	10,957	14,012	15,065	16,171	17,125	20,965	7%
	51	11,642	32,136	23,396	6,738	29%	8	13,168	14,694	21,404	24,005	27,435	30,214	31,175	12%
	52	16,520	52,763	29,883	11,675	39%	8	17,499	18,478	22,774	27,868	34,514	41,848	47,305	20%
	53	28,158	81,344	51,022	16,959	33%	9	31,039	33,920	38,153	48,360	63,201	70,407	75,876	25%
	57	136,377	222,270	162,648	26,873	17%	10	136,936	137,495	145,300	154,470	170,328	193,815	208,042	8%
	58	15,838	66,673	35,626	15,605	44%	9	17,992	20,147	24,945	32,510	44,916	50,195	58,434	29%
	59	127,119	228,434	161,202	31,142	19%	10	130,683	134,246	142,701	153,352	163,924	204,103	216,269	7%
CTP	54														
	55														
	56														
ALL-IN no-CTP	60	2,004,409	4,471,615	2,714,543	1,004,943	37%	5	2,048,061	2,091,714	2,222,671	2,275,662	2,598,359	3,722,313	4,096,964	8%
Equity Cumulative	61	2,141,617	6,167,625	3,195,155	1,342,808	42%	8	2,191,629	2,241,640	2,386,276	2,738,830	3,263,347	4,704,719	5,436,172	16%
IR Cumulative	62	189,516	243,143	220,911	17,062	8%	8	195,123	200,730	215,539	223,149	229,221	239,153	241,148	3%
FX Cumulative	63	639,813	801,662	699,679	59,231	8%	8	641,714	643,615	664,916	686,070	710,790	785,850	793,756	3%
Commodity Cumulative	64	399,988	521,219	464,940	42,929	9%	6	412,850	425,712	452,136	456,678	492,510	512,430	516,825	4%
CS Cumulative	65	140,550	276,790	186,920	43,766	23%	10	148,326	156,102	160,106	171,370	189,498	255,267	266,029	8%
CTP Cumulative	66														

Figure 30: VaR ratio with median (focus on large banks)

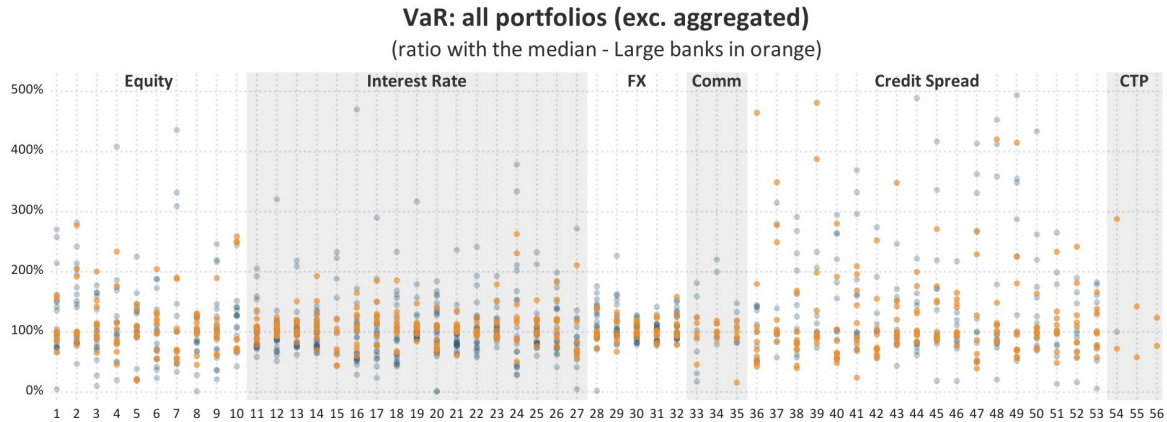


Table 30: VaR statistics (small TB banks only)

EU Statistics for VaR

		Other stats						Percentiles									Extreme Values range (Full Sample)	
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	STDev_trunc[1]	-2*STDev_trunc	+2*STDev_trunc
	1	2,922,012	10,626,420	5,050,074	2,887,089	57%	6	2,980,243	3,038,475	3,339,472	4,011,382	5,213,154	8,100,365	9,363,392	22%	7,944,722	-11,957,921	19,820,965
	2	2,255,717	4,492,038	2,820,564	945,869	34%	5	2,261,858	2,267,999	2,286,423	2,443,168	2,625,474	3,745,412	4,118,725	7%	1,610,727	-453,918	5,988,989
	3						4											
	4						4											
Equity	5	1,068,391,622	1,513,406,924	1,215,413,705	180,937,952	15%	5	1,070,635,560	1,072,879,498	1,079,611,313	1,176,354,077	1,239,304,587	1,403,765,989	1,458,586,457	7%	445,136,273	270,823,506	2,051,368,597
	6						3											
	7						1											
	8						4											
	9						3											
	10	209,500	632,808	464,931	191,038	41%	5	231,501	253,502	319,505	535,240	627,602	630,726	631,767	33%	278,709	-63,835	1,051,003
	11	51,989	96,746	80,887	15,535	19%	8	57,104	62,219	71,228	87,906	91,209	93,667	95,206	12%	18,788	51,714	126,867
	12	29,936	39,968	33,376	3,613	11%	6	30,176	30,416	31,071	32,690	34,001	37,021	38,495	5%	5,920	22,806	46,484
	13	115,859	197,859	151,519	25,918	17%	9	117,152	118,445	141,731	149,309	161,912	179,301	188,580	7%	25,373	98,149	199,640
	14	28,545	53,252	40,440	8,587	21%	9	29,749	30,954	32,695	42,344	47,622	49,294	51,273	19%	9,242	25,685	62,653
	15						2											
	16	16,175	34,026	24,200	8,186	34%	5	16,522	16,869	17,911	21,084	31,804	33,137	33,582	28%	11,263	9,277	54,330
	17						4											
	18	39,135	92,261	65,001	22,848	35%	5	39,972	40,809	43,321	74,823	75,464	85,542	88,902	27%	33,387	19,060	152,608
Interest Rate	19	107,209	140,931	119,081	10,756	9%	8	107,528	107,846	111,099	120,132	121,552	128,342	134,637	4%	18,216	85,434	158,299
	20	4,153	8,443	6,527	1,518	23%	6	4,488	4,824	5,759	6,809	7,358	7,950	8,196	12%	1,730	1,574	8,495
	21	205,699	323,883	268,758	39,217	15%	8	215,695	225,692	244,705	271,499	294,693	309,387	316,635	9%	48,529	203,005	397,122
	22	59,462	105,291	84,488	16,750	20%	7	62,210	64,959	75,371	86,165	94,877	104,210	104,751	11%	23,231	38,939	131,865
	23	33,012	45,688	37,732	4,278	11%	8	33,468	33,923	34,480	37,082	39,543	42,500	44,094	7%	7,909	21,296	52,931
	24						3											
	25	101,016	170,741	132,351	23,648	18%	8	102,507	103,998	120,157	129,591	145,261	160,203	165,472	9%	35,030	60,875	200,995
	26	42,861	142,546	88,012	36,867	42%	5	49,132	55,404	74,218	79,631	100,806	125,850	134,198	15%	36,920	29,952	177,634
	27						4											
	28	316,627	517,434	393,921	78,347	20%	8	319,618	322,610	332,784	378,873	420,150	511,044	514,239	12%	89,750	174,307	533,306
FX	29	20,377	30,497	24,404	3,630	15%	7	20,641	20,904	21,696	23,417	26,573	28,372	29,435	10%	4,753	11,491	30,503
	30	155,956	219,631	189,794	22,961	12%	7	159,983	164,009	174,348	190,061	207,106	212,693	216,162	9%	23,438	144,956	238,707
	31	246,168	364,045	316,212	43,623	14%	7	254,329	262,490	288,186	333,990	346,455	357,000	360,523	9%	43,953	232,038	407,851
	32	307,304	465,526	377,573	71,444	19%	6	307,965	308,626	317,927	360,726	440,805	463,369	464,448	16%	68,515	209,393	483,451
	33						2											
Commodities	34																	
	35						2											
	36						1											
	37						1											
	38						3											
	39						1											
	40						3											
	41						2											
	42						1											
	43						3											
	44						3											
	45						2											
Credit Spread	46						3											
	47						1											
	48						2											
	49						1											
	50						2											
	51																	
	52						1											
	53						1											
	57						4											
	58						2											
	59						3											
	54																	
CTP	55																	
	56																	
ALL-IN no-CTP	60						1											
Equity Cumulative	61						2											
IR Cumulative	62	178,867	276,055	221,543	39,290	18%	5	182,955	187,043	199,306	208,330	247,156	264,495	270,275	11%	43,321	134,084	307,368
FX Cumulative	63	602,702	901,613	777,605	121,529	16%	6	627,576	652,451	705,254	787,839	877,893	892,525	897,069	11%	103,076	496,047	908,352
Commodity Cumulative	64																	
CS Cumulative	65						3											
CTP Cumulative	66																	

Table 31: VaR statistics (medium TB banks only)

EU Statistics for VaR

		Other stats						Percentiles									Extreme Values range (Full Sample)	
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	STDev_trunc[1]	-2*STDev_trunc	+2*STDev_trunc
Equity	1	184,485	8,419,537	4,000,320	1,934,001	48%	15	1,853,003	2,694,382	2,935,205	3,663,940	4,931,012	6,045,262	6,809,058	25%	7,944,722	-11,957,921	19,820,965
	2	1,295,510	5,677,826	3,639,677	1,427,658	39%	12	1,801,778	2,263,925	2,742,981	3,336,988	4,939,502	5,407,794	5,535,226	29%	1,610,727	-453,918	5,988,989
	3	3,170	19,170	11,732	4,623	39%	11	4,676	6,182	9,728	11,675	14,567	16,434	17,802	20%	4,359	2,866	20,303
	4	593	2,250	1,224	514	42%	13	603	650	960	1,118	1,403	2,009	2,179	19%	930	-652	3,069
	5	443,522,356	1,911,290,183	1,239,847,013	372,883,151	30%	12	772,297,728	1,045,813,976	1,086,926,573	1,159,397,087	1,363,596,491	1,683,827,198	1,791,233,122	11%	445,136,273	270,823,506	2,051,368,597
	6	1,283	9,545	5,158	2,445	47%	13	1,735	2,233	3,052	5,346	7,140	7,541	8,378	40%	2,302	927	10,133
	7	10,673	60,798	28,240	16,800	59%	9	12,358	14,043	15,020	22,504	33,760	49,668	55,233	38%	26,786	-21,617	85,527
	8	28,115	54,117	41,674	7,788	19%	10	31,107	34,098	37,466	41,207	44,325	52,682	53,400	8%	11,270	19,351	64,431
	9	9,235	83,437	42,472	20,866	49%	13	13,161	15,847	30,628	44,610	48,764	63,703	72,016	23%	20,709	2,631	85,468
	10	335,617	748,369	524,653	155,540	30%	11	346,798	357,979	393,589	462,373	661,422	696,605	722,487	25%	278,709	-63,835	1,051,003
Interest Rate	11	63,406	121,534	84,150	17,051	20%	20	65,613	66,064	69,110	79,740	95,174	99,784	118,696	16%	18,788	51,714	126,867
	12	23,100	43,087	34,657	6,463	19%	17	23,234	23,775	30,133	36,566	39,166	41,201	41,660	13%	5,920	22,806	46,484
	13	110,316	176,644	143,012	22,017	15%	18	111,012	111,183	122,796	146,383	155,718	174,286	175,393	12%	25,373	98,149	199,640
	14	28,664	60,058	43,009	9,593	22%	20	30,634	31,210	33,994	44,150	50,693	56,463	58,801	20%	9,242	25,685	62,653
	15	16,342	40,473	25,000	8,691	35%	7	16,683	17,023	17,955	25,242	28,517	34,906	37,690	23%	15,899	-5,960	57,637
	16	14,505	44,652	28,331	10,130	36%	15	16,070	16,907	17,965	29,041	36,052	39,887	41,489	33%	11,263	9,277	54,330
	17	32,427	99,206	70,850	22,583	32%	14	38,363	43,154	51,782	80,063	88,418	95,031	97,835	26%	27,466	21,509	131,374
	18	36,567	138,849	74,601	30,442	41%	14	38,512	40,458	49,036	78,399	90,689	106,569	119,728	30%	33,387	19,060	152,608
	19	106,026	136,450	121,154	9,116	8%	18	108,383	110,690	115,025	118,705	129,235	133,623	134,373	6%	18,216	85,434	158,299
	20	3,000	8,160	4,815	1,638	34%	19	3,286	3,328	3,474	4,364	5,456	7,280	8,052	22%	1,730	1,574	8,495
	21	226,731	339,957	288,340	39,614	14%	16	231,068	232,557	242,543	302,544	318,104	328,157	332,448	13%	48,529	203,005	397,122
	22	49,121	108,971	80,965	16,568	20%	18	56,331	61,171	70,446	82,818	86,717	106,011	107,023	10%	23,231	38,939	131,865
	23	22,888	52,275	35,960	6,351	18%	15	28,593	31,821	33,311	34,525	38,177	41,500	45,423	7%	7,909	21,296	52,931
	24	12,903	104,801	43,265	28,741	66%	14	13,044	14,886	22,455	37,662	50,941	87,877	98,995	39%	34,771	-24,116	114,968
	25	78,873	159,058	127,703	25,089	20%	17	92,567	96,087	108,319	129,140	154,444	157,152	158,724	18%	35,030	60,875	200,995
	26	64,880	144,412	95,476	24,626	26%	13	65,423	67,643	77,140	89,667	111,977	122,671	131,479	18%	36,920	29,952	177,634
	27	1,346	201,991	33,210	47,401	143%	15	11,470	16,367	18,258	21,053	23,873	36,490	87,670	13%	108,023	-187,608	244,485
FX	28	250,423	493,584	352,985	74,044	21%	13	254,823	269,185	322,782	332,467	355,029	475,251	492,074	5%	89,750	174,307	533,306
	29	16,457	25,315	19,855	2,330	12%	13	16,665	16,956	18,812	19,700	20,740	21,683	23,239	5%	4,753	11,491	30,503
	30	150,875	225,128	186,696	24,204	13%	14	154,825	157,176	169,029	186,603	205,563	217,622	222,212	10%	23,438	144,956	238,707
	31	255,710	401,491	307,639	43,423	14%	14	259,271	263,382	269,149	312,446	329,881	354,470	374,768	10%	43,953	232,038	407,851
	32	273,365	445,222	340,424	43,338	13%	14	289,480	301,034	314,299	332,351	367,393	382,170	405,450	8%	68,515	209,393	483,451
Commodities	33	1,445	13,238	7,298	3,762	52%	8	1,842	2,240	6,165	7,848	8,783	10,645	11,941	18%	13,555	-18,780	35,439
	34	361,384	520,504	450,448	57,219	13%	7	378,234	395,084	419,340	454,262	489,155	519,948	520,226	8%	204,071	48,355	864,639
	35	399,770	581,402	470,986	72,644	15%	6	400,292	400,814	409,580	460,559	513,419	551,585	566,493	11%	155,437	177,499	799,248
Credit Spread	36	5,527	16,547	8,865	3,663	41%	10	5,653	5,780	6,062	7,571	10,970	13,087	14,817	29%	15,344	-18,965	42,413
	37	15,679	75,681	31,118	18,443	59%	8	18,156	20,632	25,600	26,852	27,126	42,031	58,856	3%	25,539	-23,790	78,365
	38	2,355	8,797	4,856	1,755	36%	9	2,937	3,519	4,259	4,489	5,384	6,287	7,542	12%	3,251	-1,144	11,862
	39	8,325	22,473	11,881	4,384	37%	8	8,897	9,470	10,285	10,620	11,282	14,737	18,605	5%	12,752	-14,176	36,833
	40	2,154	7,529	3,327	1,704	51%	9	2,171	2,188	2,276	2,527	3,428	4,711	6,120	20%	3,049	-2,172	10,025
	41	5,800	17,726	10,658	4,548	43%	10	5,902	6,004	7,784	8,394	14,938	16,702	17,214	31%	6,213	-3,956	20,895
	42	28,210	57,544	40,629	11,694	29%	8	28,563	28,916	31,217	36,710	51,846	54,671	56,108	25%	32,334	-13,851	115,484
	43	25,377	74,490	34,656	15,152	44%	10	26,046	26,715	27,307	28,792	31,125	48,743	61,616	7%	44,827	-59,416	119,891
	44	6,206	17,120	8,369	3,317	40%	10	6,282	6,358	6,430	7,549	7,842	11,100	14,110	10%	9,510	-11,305	26,734
	45	11,601	29,074	15,807	6,067	38%	10	11,656	11,711	12,060	12,655	18,437	23,371	26,222	21%	12,118	-10,967	37,504
	46	6,757	14,300	9,325	2,459	26%	10	6,961	7,165	7,997	8,312	10,752	12,996	13,348	15%	13,175	-17,675	35,025
	47	750	5,135	2,203	1,832	83%	8	818	885	1,008	1,388	2,700	5,105	5,120	46%	2,749	-3,583	7,413
	48	6,584	10,276	8,308	1,325	16%	10	6,844	7,103	7,508	7,720	9,614	10,044	10,160	12%	9,788	-10,611	28,541
	49	2,036	8,789	4,094	2,171	53%	10	2,131	2,225	2,749	3,744	3,911	7,233	8,011	17%	5,311	-6,713	14,531
	50	10,763	26,515	15,584	5,520	35%	10	10,925	11,088	12,168	13,803	14,941	24,976	25,746	10%	7,597	-25	30,363
	51	11,642	47,699	24,518	11,706	48%	8	12,520	13,398	17,348	21,357	30,077	36,805	42,252	27%	15,640	-7,276	55,285
	52	16,939	42,845	29,043	8,878	31%	8	17,903	18,868	22,868	29,069	34,514	38,873	40,859	20%	16,354	-3,601	61,814
	53	25,456	89,131	48,928	20,428	42%	8	29,259	33,062	37,387	42,811	54,026	74,110	81,621	18%	24,048	822	97,015
	57	142,397	222,270	161,784	24,094	15%	9	143,198	143,999	148,682	155,038	162,517	177,800	200,035	4%	42,524	75,210	245,304
	58	16,555	67,983	39,167	16,451	42%	8	18,189	19,823	27,642	42,355	46,309	53,300	60,641	25%	18,869	-5,184	70,294
	59	129,616	228,434	160,550	27,285	17%	10	134,750	139,884	145,957	155,079	162,208	183,636	206,035	5%	44,747	68,086	247,073
CTP	54																	
	55																	
	56																	
ALL-IN no-CTP	60						4											
Equity Cumulative	61	1,537,143	6,167,625	3,341,366	1,369,561	41%	9	1,957,423	2,337,704	2,601,499	2,991,876	4,077,759	4,830,013	5,498,819	22%	9,500,539	-16,217,055	21,785,100
IR Cumulative	62	160,466	226,480	204,243	21,297	10%	12	167,794	174,779	196,957	207,009	221,021	224,143	225,332	6%	43,321	134,084	307,368
FX Cumulative	63	607,419	896,579	691,900	70,685	10%	13	626,855	643,059	661,258	672,600	687,657	743,638	807,772	2%	103,076	496,047	908,352
Commodity Cumulative	64	362,341	521,219	451,509	56,747	13%	7	379,885	397,430	421,851	454,239	489,533	520,456	520,838	7%	203,064	50,550	862,806
CS Cumulative	65	157,830	252,876	179,637	29,516	16%	9	157,920	158,010	161,125	174,524	182,125	201,806	227,341	6%	73,138	28,422	320,972
CTP Cumulative	66																	

Table 32: VaR statistics (large TB banks only)

EU Statistics for VaR

		Other stats						Percentiles									Extreme Values range (Full Sample)	
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	STDev_trunc[1]	-2*STDev_trunc	+2*STDev_trunc
Equity	1	2,633,661	6,369,864	4,606,438	1,602,206	35%	6	2,807,355	2,981,050	3,418,299	4,508,177	6,049,854	6,330,089	6,349,977	28%	7,944,722	-11,957,921	19,820,965
	2	2,138,047	5,918,479	3,519,863	1,529,561	43%	8	2,223,357	2,308,666	2,489,765	2,676,884	4,552,372	5,735,340	5,826,910	29%	1,610,727	-453,918	5,988,989
	3	7,558	18,491	11,949	4,141	35%	8	7,746	7,935	9,040	10,818	14,035	17,879	18,185	22%	4,359	2,866	20,303
	4	239	2,823	1,220	900	74%	6	317	395	673	1,154	1,369	2,113	2,468	34%	930	-652	3,069
	5	1,073,634,502	1,703,522,817	1,388,812,260	280,773,725	20%	6	1,077,072,662	1,080,510,821	1,133,775,102	1,412,290,122	1,620,721,956	1,673,635,837	1,688,579,327	18%	445,136,273	270,823,506	2,051,368,597
	6	2,296	7,185	5,008	1,943	39%	7	2,540	2,784	3,452	5,398	6,639	6,907	7,046	32%	2,302	927	10,133
	7	16,009	60,086	27,346	15,303	56%	7	16,630	17,250	19,742	21,531	27,157	43,314	51,700	16%	26,786	-21,617	85,527
	8	25,062	54,731	43,506	12,253	28%	7	26,059	27,056	35,238	48,217	53,028	53,984	54,358	20%	11,270	19,351	64,431
	9	26,897	53,467	39,458	10,123	26%	8	27,099	27,302	30,735	39,757	47,317	51,108	52,288	21%	20,709	2,631	85,468
	10	335,403	674,007	416,739	132,161	32%	7	336,092	336,782	340,024	348,598	439,558	584,480	629,244	13%	278,709	-63,835	1,051,003
Interest Rate	11	68,996	108,762	86,432	13,675	16%	8	69,242	69,489	75,929	87,880	95,117	99,214	103,988	11%	18,788	51,714	126,867
	12	25,891	38,447	32,934	3,879	12%	9	27,495	29,098	30,554	32,707	35,464	37,173	37,810	7%	5,920	22,806	46,484
	13	115,250	178,979	149,038	22,545	15%	8	117,711	120,172	134,655	153,230	161,767	174,302	176,640	9%	25,373	98,149	199,640
	14	30,941	57,535	40,293	10,020	25%	7	31,241	31,542	33,109	34,490	46,433	51,561	54,548	17%	9,242	25,685	62,653
	15	11,124	48,699	22,938	15,814	69%	5	11,192	11,260	11,465	16,113	27,288	40,155	44,417	41%	15,899	-5,960	57,637
	16	19,066	52,397	33,306	10,805	32%	8	20,513	21,961	24,745	33,988	38,407	44,425	48,411	22%	11,263	9,277	54,330
	17	58,573	114,915	81,484	20,217	25%	8	58,601	58,630	66,236	79,815	95,339	101,906	108,411	18%	27,466	21,509	131,374
	18	56,695	144,620	97,040	29,261	30%	9	57,347	57,998	79,327	97,178	114,510	128,452	136,536	18%	33,387	19,060	152,608
	19	102,562	157,602	131,509	17,790	14%	9	107,874	113,187	118,183	134,817	139,093	154,440	156,021	8%	18,216	85,434	158,299
	20	3,210	6,835	4,746	1,379	29%	9	3,255	3,300	3,619	4,300	5,617	6,501	6,668	22%	1,730	1,574	8,495
	21	233,826	326,186	290,149	35,766	12%	8	238,975	244,124	261,903	302,378	320,313	323,021	324,603	10%	48,529	203,005	397,122
	22	51,901	97,976	82,493	13,757	17%	8	61,324	70,747	80,580	85,028	89,244	93,479	95,728	5%	23,231	38,939	131,865
	23	32,807	45,005	37,717	5,219	14%	8	33,070	33,332	33,832	34,828	43,260	44,061	44,533	12%	7,909	21,296	52,931
	24	21,634	91,776	55,371	26,058	47%	7	22,027	22,421	37,700	56,468	71,162	82,432	87,104	31%	34,771	-24,116	114,968
	25	99,723	199,920	138,765	34,752	25%	7	101,606	103,488	114,482	131,003	155,874	175,013	187,466	15%	35,030	60,875	200,995
	26	77,915	159,507	121,501	29,857	25%	9	81,715	85,515	91,978	125,356	144,702	156,428	157,967	22%	36,920	29,952	177,634
	27	19,207	178,815	54,927	56,084	102%	7	21,285	23,363	28,439	34,418	47,587	107,497	143,156	25%	108,023	-187,608	244,485
FX	28	258,425	497,505	393,254	91,186	23%	8	277,480	296,535	325,743	398,590	467,226	492,653	495,079	18%	89,750	174,307	533,306
	29	14,093	27,875	21,952	4,440	20%	7	15,757	17,420	20,188	22,021	24,650	26,001	26,938	10%	4,753	11,491	30,503
	30	176,520	234,767	204,338	22,348	11%	8	179,332	182,143	185,386	202,999	220,851	230,806	232,786	9%	23,438	144,956	238,707
	31	253,979	393,315	312,754	47,898	15%	8	256,964	259,949	279,497	306,192	341,587	369,190	381,252	10%	43,953	232,038	407,851
	32	272,434	444,961	378,098	61,280	16%	8	289,830	307,227	339,300	386,702	432,195	438,582	441,771	12%	68,515	209,393	483,451
Commodities	33						2											
	34						3											
	35						3											
Credit Spread	36	4,951	21,063	13,379	5,719	43%	6	6,155	7,360	10,275	13,885	16,536	18,893	19,978	23%	15,344	-18,965	42,413
	37	22,915	76,319	45,676	24,594	54%	5	24,015	25,115	28,415	32,752	67,977	72,982	74,651	41%	25,539	-23,790	78,363
	38	2,121	9,024	5,726	2,577	45%	7	2,615	3,110	4,055	5,359	7,734	8,852	8,938	31%	3,251	-1,144	11,862
	39	9,139	26,386	17,082	7,555	44%	5	9,536	9,933	11,125	15,344	23,418	25,199	25,792	36%	12,752	-14,176	36,833
	40	1,889	7,156	3,998	2,202	55%	6	1,965	2,041	2,283	3,318	5,605	6,635	6,896	42%	3,049	-2,172	10,025
	41	2,023	14,293	9,624	4,572	48%	7	3,443	4,862	7,034	9,705	13,641	13,924	14,109	32%	6,213	-3,956	20,895
	42	30,466	78,830	49,579	16,702	34%	6	32,026	33,587	39,696	49,740	51,695	65,409	72,120	13%	32,334	-13,851	115,484
	43	24,157	105,172	47,341	25,505	54%	8	24,357	24,557	33,488	44,387	48,725	67,803	86,488	19%	44,827	-59,416	119,891
	44	6,417	15,398	11,011	3,048	28%	8	6,711	7,004	9,376	11,334	12,902	14,137	14,768	16%	9,510	-11,305	26,734
	45	11,234	35,960	20,455	8,345	41%	7	11,452	11,670	15,032	19,715	23,107	28,386	32,173	21%	12,118	-10,967	37,504
	46	6,675	18,873	11,620	4,369	38%	6	7,112	7,549	8,731	11,178	13,220	16,133	17,503	20%	13,175	-17,675	35,025
	47	972	6,942	2,949	2,053	70%	7	1,178	1,384	1,787	2,331	3,413	5,408	6,175	31%	2,749	-3,583	7,413
	48	8,432	16,035	10,978	3,029	28%	6	8,565	8,699	9,001	9,568	12,480	14,667	15,351	16%	9,788	-10,611	28,541
	49	2,196	13,613	6,546	4,683	72%	7	2,225	2,253	2,479	4,998	10,030	12,185	12,899	60%	5,311	-6,713	14,531
	50	10,978	23,812	16,800	3,917	23%	7	12,235	13,493	15,632	16,196	17,675	20,972	22,392	6%	7,597	-25	30,363
	51	16,002	43,022	26,353	8,962	34%	6	17,803	19,603	23,520	24,552	26,247	34,903	38,962	5%	15,640	-7,276	55,285
	52	16,520	55,181	32,687	16,990	52%	6	17,219	17,919	20,491	26,172	46,655	53,972	54,577	39%	16,354	-3,601	61,814
	53	28,158	87,453	60,388	23,558	39%	7	30,319	32,480	41,861	63,201	80,093	83,788	85,620	31%	24,048	822	97,015
	57	136,377	207,508	174,531	30,382	17%	8	136,812	137,246	145,404	181,098	199,943	207,109	207,309	16%	42,524	75,210	245,304
	58	15,838	66,673	33,419	14,789	44%	8	19,025	22,213	27,730	31,211	33,504	45,352	56,013	9%	18,869	-5,184	70,294
	59	127,119	201,400	164,468	28,702	17%	7	129,495	131,870	141,384	165,562	187,215	193,394	197,397	14%	44,747	68,086	247,073
CTP	54																	
	55																	
	56																	
ALL-IN no-CTP	60	853,190	2,598,359	1,990,858	670,518	34%	5	1,083,434	1,313,678	2,004,409	2,222,671	2,275,662	2,469,280	2,533,820	6%	1,348,030	-109,438	5,282,684
Equity Cumulative	61	2,141,617	2,808,796	2,382,401	258,145	11%	5	2,164,671	2,187,725	2,256,888	2,284,507	2,420,199	2,653,357	2,731,077	3%	9,500,539	-16,217,055	21,785,100
IR Cumulative	62	189,516	268,400	232,259	30,991	13%	8	192,122	194,728	203,393	240,293	254,936	266,536	267,468	11%	43,321	134,084	307,368
FX Cumulative	63	645,244	887,786	751,821	83,948	11%	7	657,016	668,787	686,256	776,472	790,368	836,112	861,949	7%	103,076	496,047	908,352
Commodity Cumulative	64						3											
CS Cumulative	65	140,550	276,790	192,536	49,708	26%	6	144,924	149,298	160,501	179,913	212,994	248,399	262,594	14%	73,138	28,422	320,972
CTP Cumulative	66																	

Table 33: VaR statistics (same business model – cross-border universal bank)

EU Statistics for VaR

		Other stats								Percentiles								Extreme Values range (Full Sample)	
	Port. ID	Min	Max	Ave.	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	-2*STDev_trunc	+2*STDev_trunc
	1	184,485	6,290,314	3,739,554	1,682,118			45%	12	1,495,463	2,600,925	2,915,637	3,675,911	4,313,385	6,064,398	6,196,010	19%	-11,957,921	19,820,965
	2	1,295,510	5,656,852	3,356,100	1,334,599			40%	13	1,871,634	2,280,931	2,625,474	2,767,536	4,492,038	5,211,898	5,449,311	26%	-453,918	5,988,989
	3	3,170	19,110	11,588	4,137			36%	12	6,108	8,526	9,769	11,585	12,879	17,154	18,288	14%	2,866	20,303
	4	593	2,823	1,370	661			48%	12	602	630	981	1,256	1,564	2,099	2,428	23%	-652	3,069
Equity	5	1,073,634,502	1,703,522,817	1,284,579,136	234,187,325			18%	10	##########	##########	##########	1,168,725,064	##########	##########	1,657,491,240	14%	270,823,506	2,051,368,597
	6	1,283	7,185	5,425	1,742			32%	11	2,531	3,778	4,909	5,647	6,639	7,140	7,163	15%	927	10,133
	7	14,886	60,086	28,322	15,911			56%	10	14,946	15,007	16,427	20,130	38,317	48,205	54,146	40%	-21,617	85,527
	8	28,115	54,731	43,742	7,469			17%	12	31,771	35,303	41,416	43,502	48,866	52,394	53,542	8%	19,351	64,431
	9	9,235	55,412	38,574	12,704			33%	13	18,662	25,336	30,628	40,917	45,391	52,164	54,245	19%	2,631	85,468
	10	319,505	695,459	459,090	151,390			33%	11	327,454	335,403	338,982	357,979	626,637	632,808	664,134	30%	-63,835	1,051,003
	11	63,406	121,534	85,710	16,188			19%	16	65,427	66,352	72,056	87,395	95,352	103,231	111,955	14%	51,714	126,867
	12	29,045	41,303	35,370	4,009			11%	14	29,624	30,434	32,166	35,241	38,153	40,825	41,193	9%	22,806	46,484
	13	111,135	178,979	146,929	22,863			16%	14	116,306	120,043	127,990	144,706	169,709	176,049	177,461	14%	98,149	199,640
	14	30,941	60,058	44,183	9,937			22%	14	31,341	31,898	34,216	44,312	51,042	56,956	59,198	20%	25,685	62,653
	15	11,465	57,592	27,480	13,829			50%	10	13,557	15,648	16,626	26,265	31,507	42,185	49,888	31%	-5,960	57,637
	16	14,505	52,397	30,400	11,325			37%	15	16,361	17,535	20,075	31,804	38,001	43,194	46,976	31%	9,277	54,330
	17	32,427	114,915	69,841	22,965			33%	15	38,820	43,686	55,208	71,861	85,666	96,261	102,442	22%	21,509	131,374
	18	36,567	114,510	72,799	25,550			35%	15	38,662	40,757	49,948	74,823	92,497	103,293	108,248	30%	19,060	152,608
Interest Rate	19	106,026	140,931	123,755	11,363			9%	15	107,967	110,116	115,326	122,947	134,138	138,036	139,644	8%	85,434	158,299
	20	3,318	7,456	4,544	1,321			29%	14	3,357	3,450	3,640	4,121	4,909	6,648	7,218	15%	1,574	8,495
	21	226,731	339,957	296,629	39,005			13%	13	230,201	232,863	300,063	306,588	323,883	326,332	331,804	4%	203,005	397,122
	22	49,121	106,679	81,890	15,648			19%	16	56,877	61,485	76,610	83,619	88,102	101,851	105,964	7%	38,939	131,865
	23	33,012	52,275	36,951	5,402			15%	14	33,130	33,264	33,695	34,431	38,178	42,566	46,673	6%	21,296	52,931
	24	13,120	104,801	50,258	26,839			53%	11	16,453	19,786	30,485	52,454	67,676	69,768	87,285	38%	-24,116	114,968
	25	78,873	199,920	132,051	30,703			23%	16	91,832	100,714	107,695	126,421	156,367	158,850	169,274	18%	60,875	200,995
	26	64,880	159,507	100,263	29,482			29%	15	65,514	69,158	76,107	91,978	123,185	136,142	147,634	24%	29,952	177,634
	27	1,346	201,991	41,374	58,301			141%	10	7,854	14,363	18,894	23,309	25,523	74,156	138,073	15%	-187,608	244,485
	28	250,423	508,305	360,583	80,493			22%	15	255,556	279,801	319,705	330,135	383,509	492,380	498,000	9%	174,307	533,306
	29	16,457	27,875	21,602	3,537			16%	15	16,700	17,607	19,297	20,740	24,650	26,300	27,232	12%	11,491	30,503
FX	30	150,875	229,108	192,251	24,617			13%	15	154,432	160,991	173,395	191,831	209,321	222,316	226,322	9%	144,956	238,707
	31	246,168	401,491	307,863	50,397			16%	15	251,636	256,863	269,276	299,653	335,450	381,607	395,768	11%	232,038	407,851
	32	273,365	444,961	350,665	44,383			13%	13	288,240	302,953	328,118	341,866	377,819	392,109	415,128	7%	209,393	483,451
	33	1,445	15,092	8,400	5,081			60%	7	1,786	2,126	5,075	8,533	11,790	13,980	14,536	40%		
Commodities	34	361,384	540,930	451,896	67,569			15%	6	375,426	389,467	418,445	435,968	502,384	530,254	535,592	9%		
	35	399,770	649,484	483,274	90,058			19%	7	400,396	401,023	417,301	447,768	525,649	577,512	613,498	11%		
	36	4,951	21,063	9,436	4,837			51%	10	5,398	5,846	6,131	7,912	11,183	13,538	17,301	29%	-18,965	42,413
	37	15,679	75,681	35,985	20,931			58%	9	18,509	21,340	26,194	27,610	32,752	69,518	72,599	11%	-23,790	78,365
	38	2,121	10,836	5,642	2,592			46%	12	2,801	3,398	4,137	5,003	6,444	9,001	9,839	22%	-1,144	11,862
	39	8,325	22,473	12,605	4,439			35%	8	9,010	9,694	10,549	11,180	12,403	17,483	19,978	8%	-14,176	36,833
	40	1,889	8,672	3,749	2,292			61%	11	1,987	2,085	2,236	2,557	4,043	7,529	8,101	29%	-2,172	10,025
	41	2,023	16,588	8,699	3,896			45%	11	4,025	6,027	7,335	7,817	9,088	14,293	15,441	11%	-3,956	20,895
	42	28,210	78,830	43,530	17,094			39%	9	28,613	29,016	30,466	35,640	51,315	61,801	70,316	25%	-13,851	115,484
	43	23,345	105,172	37,958	23,533			62%	11	23,751	24,157	26,319	28,011	39,732	45,882	75,527	20%	-59,416	119,891
	44	5,757	15,398	8,815	3,210			36%	11	5,982	6,206	6,407	7,705	10,257	13,597	14,498	23%	-11,305	26,734
	45	10,626	35,960	17,491	7,848			45%	11	10,930	11,234	11,662	12,763	21,448	23,337	29,649	30%	-10,967	37,504
Credit Spread	46	6,240	14,300	9,254	2,936			32%	11	6,458	6,675	6,984	8,091	11,536	13,392	13,846	25%	-17,675	35,025
	47	972	5,135	2,255	1,503			67%	9	995	1,018	1,212	1,658	2,440	4,535	4,835	34%	-3,583	7,413
	48	6,584	13,298	8,782	1,954			22%	10	6,844	7,103	7,681	8,187	9,755	10,352	11,825	12%	-10,611	28,541
	49	2,036	8,827	3,829	2,291			60%	10	2,131	2,225	2,385	2,744	3,871	7,237	8,032	24%	-6,713	14,531
	50	11,124	24,805	15,300	3,590			23%	11	11,435	11,746	13,659	14,961	16,145	16,272	20,539	8%	-25	30,363
	51	14,150	47,699	23,778	10,589			45%	8	14,798	15,446	17,811	21,357	25,045	33,058	40,378	17%	-7,276	55,285
	52	16,939	52,763	28,421	11,923			42%	9	17,890	18,841	19,694	24,012	29,882	44,829	48,796	21%	-3,601	61,814
	53	25,456	89,131	53,734	21,702			40%	10	29,913	34,371	36,676	47,915	70,519	82,123	85,627	32%	822	97,015
	57	135,561	222,270	160,139	25,573			16%	12	136,010	136,501	141,203	154,424	167,898	188,742	204,881	9%	75,210	245,304
	58	15,838	67,983	37,499	18,635			50%	12	16,232	17,022	24,015	31,146	49,960	65,887	67,263	35%	-5,184	70,294
	59	127,119	228,434	159,272	29,675			19%	13	128,617	129,868	135,038	155,638	165,562	196,852	212,214	10%	68,086	247,073
CTP	54																		
	55																		
	56																		
ALL-IN no-CTP	60	2,222,671	4,486,543	2,798,376	853,585			31%	6	2,235,919	2,249,167	2,310,021	2,505,729	2,745,034	3,640,234	4,063,389	9%	-109,438	5,282,684
Equity Cumulative	61	2,284,507	4,495,610	2,844,031	654,724			23%	9	2,338,784	2,393,061	2,537,844	2,671,928	2,808,796	3,292,623	3,894,116	5%	-16,217,055	21,785,100
IR Cumulative	62	173,789	247,156	209,826	23,406			11%	13	176,836	179,831	199,306	206,683	220,726	242,003	244,748	5%	134,084	307,568
FX Cumulative	63	607,419	883,437	708,685	70,550			10%	14	639,023	657,606	666,039	686,256	721,542	794,885	830,283	4%	496,047	908,352
Commodity Cumulative	64	362,341	519,948	446,844	58,281			13%	6	376,961	391,582	421,336	437,157	490,590	511,795	515,871	8%		
CS Cumulative	65	140,550	276,790	182,573	41,601			23%	12	144,149	148,189	158,053	170,239	189,768	246,784	263,637	9%	28,422	320,972
CTP Cumulative	66																		

Table 34: VaR statistics (low L3 A&L banks only)

EU Statistics for VaR

		Other stats						Percentiles								Extreme Values range (Full Sample)		
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	STDev_trunc[1]	-2*STDev_trunc	+2*STDev_trunc
	1	2,922,012	6,369,864	4,540,051	1,370,392	30%	8	3,080,657	3,239,302	3,653,883	3,926,386	5,980,870	6,194,156	6,282,010	24%	7,944,722	-11,957,921	19,820,965
	2	2,215,998	5,918,479	3,800,123	1,547,225	41%	8	2,229,900	2,243,801	2,533,035	3,327,905	5,337,852	5,568,532	5,743,505	36%	1,610,727	-453,918	5,988,989
	3	8,512	19,170	13,443	4,353	32%	6	9,085	9,658	11,021	11,840	16,870	18,831	19,000	21%	4,359	2,866	20,303
	4	1,174	2,250	1,636	445	27%	8	1,198	1,222	1,347	1,403	2,112	2,167	2,208	22%	930	-652	3,069
Equity	5	1,041,295,759	1,693,004,617	1,332,741,111	296,927,674	22%	7	1,054,850,409	1,068,405,058	1,086,777,024	1,176,354,077	1,622,489,640	1,663,451,160	1,678,227,889	20%	445,136,273	270,823,506	2,051,368,597
	6	2,037	9,545	5,726	2,616	46%	6	2,472	2,908	4,245	5,929	6,908	8,343	8,944	24%	2,302	927	10,133
	7						3											
	8	40,466	53,486	45,233	4,963	11%	7	40,876	41,287	41,891	43,474	47,711	51,882	52,684	6%	11,270	19,351	64,431
	9	16,120	60,905	41,761	14,472	35%	8	19,209	22,298	36,924	46,171	49,097	53,339	57,122	14%	20,709	2,631	85,468
	10	319,505	696,605	538,449	156,058	29%	7	331,105	342,705	410,273	625,671	653,408	683,046	689,826	23%	278,709	-63,835	1,051,003
	11	51,989	121,534	85,532	20,477	24%	9	57,835	63,680	69,113	87,454	95,506	101,141	111,338	16%	18,788	51,714	126,867
	12	30,133	41,303	35,420	4,491	13%	8	30,280	30,428	31,336	35,249	39,401	40,465	40,884	11%	5,920	22,806	46,484
	13	119,091	174,661	152,420	17,245	11%	9	128,377	137,662	146,299	148,886	161,912	174,057	174,559	5%	25,373	98,149	199,640
	14	30,738	52,806	40,774	8,752	21%	9	31,085	31,392	31,942	39,590	48,304	51,534	52,170	20%	9,242	25,685	62,653
	15						4											
	16	16,175	44,652	28,025	11,331	40%	7	16,345	16,515	16,949	31,804	34,823	39,233	41,942	35%	11,263	9,277	54,330
	17	42,759	86,769	63,524	17,138	27%	6	45,010	47,260	51,782	62,367	74,564	80,946	83,857	18%	27,466	21,509	131,374
	18	39,135	144,620	74,855	35,241	47%	7	41,832	44,528	51,131	74,823	81,572	110,456	127,538	23%	33,387	19,060	152,608
Interest Rate	19	112,092	157,602	127,230	14,363	11%	8	112,976	113,860	118,165	125,159	130,894	141,085	149,343	5%	18,216	85,434	158,299
	20	3,334	8,040	5,616	1,532	27%	8	3,621	3,907	4,857	5,402	6,585	7,375	7,708	15%	1,730	1,574	8,495
	21	234,260	323,883	297,624	33,967	11%	8	242,319	250,378	284,444	314,430	321,576	322,330	323,106	6%	48,529	203,005	397,122
	22	59,462	106,679	85,318	15,337	18%	9	63,126	66,791	81,538	85,589	91,552	105,916	106,297	6%	23,231	38,939	131,865
	23	31,038	41,134	35,702	3,497	10%	6	31,857	32,676	34,369	34,774	37,387	39,656	40,395	4%	7,909	21,296	52,931
	24	19,007	104,801	52,455	30,334	58%	6	23,998	28,988	39,256	41,092	62,843	87,285	96,043	23%	34,771	-24,116	114,968
	25	105,276	158,641	135,589	18,341	14%	7	112,010	118,745	128,432	130,867	148,736	156,869	157,755	7%	35,030	60,875	200,995
	26	74,218	155,658	97,602	27,264	28%	7	75,842	77,466	82,564	89,667	99,272	122,747	139,202	9%	36,920	29,952	177,634
	27	18,806	77,287	34,833	24,521	70%	5	19,025	19,244	19,902	23,754	34,418	60,139	68,713	27%	108,023	-187,608	244,485
	28	316,627	493,584	399,834	79,907	20%	7	319,191	321,755	327,655	382,807	475,255	492,074	492,829	18%	89,750	174,307	533,306
	29	20,377	26,190	22,769	2,419	11%	6	20,468	20,559	21,019	21,995	24,520	25,753	25,971	8%	4,753	11,491	30,503
FX	30	155,956	225,128	186,610	29,534	16%	6	156,205	156,454	160,059	187,740	206,134	215,637	220,382	13%	23,438	144,956	238,707
	31	246,168	401,491	311,621	62,369	20%	6	248,554	250,939	260,125	307,027	349,399	376,898	389,194	15%	43,953	232,038	407,851
	32	307,748	465,526	379,409	63,455	17%	6	314,938	322,129	337,848	360,726	428,813	455,374	460,450	12%	68,515	209,393	483,451
	33						1											
Commodities	34						1											
	35																	
	36						4											
	37						4											
	38	2,355	10,836	6,624	3,369	51%	6	2,606	2,856	3,933	7,198	8,782	9,817	10,326	38%	3,251	-1,144	11,862
	39						4											
	40	2,085	8,672	5,267	2,887	55%	6	2,102	2,120	2,617	5,582	7,436	8,101	8,386	48%	3,049	-2,172	10,025
	41	5,800	13,604	8,571	2,966	35%	5	6,112	6,423	7,358	7,773	8,318	11,490	12,547	6%	6,213	-3,956	20,895
	42						4											
	43	23,345	47,704	35,718	10,590	30%	5	24,724	26,102	30,238	31,421	45,882	46,975	47,340	21%	44,827	-59,416	119,891
	44	5,757	12,670	8,538	2,920	34%	5	5,893	6,029	6,438	7,392	10,431	11,774	12,222	24%	9,510	-11,305	26,734
	45	10,626	22,737	16,730	5,224	31%	5	10,905	11,185	12,023	18,104	20,159	21,706	22,221	25%	12,118	-10,967	37,504
Credit Spread	46	6,240	14,300	9,555	2,723	29%	6	6,704	7,168	8,240	9,164	10,190	12,355	13,317	11%	13,175	-17,675	35,025
	47						4											
	48	7,562	10,018	8,303	1,014	12%	5	7,595	7,628	7,728	7,775	8,432	9,384	9,701	4%	9,788	-10,611	28,541
	49						4											
	50						4											
	51						3											
	52						4											
	53						4											
	57	135,561	222,270	167,175	37,339	22%	6	137,270	138,979	143,598	147,942	192,374	214,604	218,437	15%	42,524	75,210	245,304
	58	28,860	67,983	48,306	15,437	32%	5	31,047	33,234	39,794	46,076	58,817	64,317	66,150	19%	18,869	-5,184	70,294
	59	129,616	228,434	157,220	41,203	26%	5	129,868	130,120	130,877	141,025	156,148	199,520	213,977	9%	44,747	68,086	247,073
CTP	54																	
	55																	
	56																	
ALL-IN no-CTP	60																	
Equity Cumulative	61						4											
IR Cumulative	62	178,867	265,737	211,814	27,304	13%	7	184,999	191,130	200,343	206,330	215,538	240,930	253,334	4%	43,321	134,084	307,368
FX Cumulative	63	607,419	896,579	755,074	107,324	14%	6	631,114	654,809	705,254	731,493	833,087	878,920	887,749	8%	103,076	496,047	908,352
Commodity Cumulative	64						1											
CS Cumulative	65	147,094	252,876	176,362	43,295	25%	5	149,241	151,388	157,830	158,055	165,953	218,107	235,491	3%	73,138	28,422	320,972
CTP Cumulative	66																	

Table 35: VaR statistics (medium L3 A&L banks only)

EU Statistics for VaR

		Other stats						Percentiles								Extreme Values range (Full Sample)		
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	STDev_trunc[1]	-2*STDev_trunc	+2*STDev_trunc
Equity	1	184,485	6,290,314	3,648,582	1,596,217	44%	12	1,495,463	2,599,657	2,893,341	3,568,657	4,259,631	5,549,725	5,896,511	19%	7,944,722	-11,957,921	19,820,965
	2	1,295,510	5,656,852	3,372,138	1,247,198	37%	12	1,892,963	2,408,687	2,684,139	2,772,295	4,261,169	4,783,321	5,194,211	23%	1,610,727	-453,918	5,988,989
	3	3,170	19,110	11,700	4,462	38%	13	4,977	6,676	9,354	11,495	13,265	17,380	18,214	17%	4,359	2,866	20,303
	4	239	2,823	1,137	723	64%	11	416	593	710	980	1,194	2,045	2,434	25%	930	-652	3,069
	5	1,073,634,502	1,703,522,817	1,294,385,941	218,690,443	17%	10	1,079,823,189	1,086,011,876	1,156,192,126	1,208,246,671	1,456,151,488	1,566,829,413	1,635,176,115	11%	445,136,273	270,823,506	2,051,368,597
	6	1,283	7,306	4,899	2,047	42%	12	1,840	2,368	3,043	5,372	6,597	7,139	7,239	37%	2,302	927	10,133
	7	10,673	60,798	27,540	17,394	63%	12	12,990	14,899	15,762	20,130	34,208	58,121	60,406	37%	26,786	-21,617	85,527
	8	28,115	54,731	42,668	9,950	23%	10	28,237	28,359	36,113	42,809	51,482	54,178	54,455	18%	11,270	19,351	64,431
	9	9,235	83,437	40,868	18,639	46%	13	13,161	18,003	30,628	42,420	46,390	55,023	66,622	20%	20,709	2,631	85,468
	10	335,403	695,459	443,136	130,873	30%	10	335,499	335,596	343,909	393,492	502,235	634,388	664,923	19%	278,709	-63,835	1,051,003
Interest Rate	11	63,406	108,762	83,961	13,109	16%	16	65,427	66,974	72,056	88,798	91,901	96,411	100,465	12%	18,788	51,714	126,867
	12	23,268	43,087	33,616	5,177	15%	16	25,235	27,468	29,927	34,645	36,742	39,208	40,748	10%	5,920	22,806	46,484
	13	111,135	178,979	146,969	22,067	15%	15	111,183	115,627	131,587	149,309	160,133	174,905	177,345	10%	25,373	98,149	199,640
	14	30,941	60,058	42,895	8,996	21%	15	32,169	33,051	34,203	44,131	46,433	55,448	59,132	15%	9,242	25,685	62,653
	15	11,465	48,699	27,134	11,877	44%	9	13,324	15,183	17,477	25,839	31,611	42,118	45,409	29%	15,899	-5,960	57,637
	16	14,505	52,397	30,167	10,859	36%	15	16,889	17,988	20,075	32,504	37,012	40,658	44,425	30%	11,263	9,277	54,330
	17	32,427	114,915	75,933	24,794	33%	15	38,820	43,686	58,831	87,768	95,670	98,362	103,919	24%	27,466	21,509	131,374
	18	36,567	124,410	78,875	28,920	37%	16	38,812	41,056	49,659	89,526	97,855	110,037	116,985	33%	33,387	19,060	152,608
	19	106,026	153,650	126,655	12,839	10%	17	108,244	112,355	117,646	126,991	134,842	139,828	143,475	7%	18,216	85,434	158,299
	20	3,318	7,456	4,664	1,394	30%	16	3,328	3,355	3,607	4,073	5,606	6,695	6,990	22%	1,730	1,574	8,495
	21	226,731	339,957	289,948	38,185	13%	15	230,779	235,108	257,448	300,118	323,024	328,514	332,949	11%	48,529	203,005	397,122
	22	49,121	97,976	79,561	13,020	16%	16	55,483	60,555	76,610	84,111	86,496	89,801	92,840	6%	23,231	38,939	131,865
	23	32,996	52,275	37,775	5,642	15%	17	33,009	33,121	33,557	34,525	42,486	44,196	46,459	12%	7,909	21,296	52,931
	24	12,903	91,776	47,083	25,207	54%	13	13,033	14,146	30,461	52,454	66,120	74,809	82,432	37%	34,771	-24,116	114,968
	25	78,873	199,920	132,779	31,164	23%	16	91,711	96,071	107,695	132,061	155,665	158,733	169,274	18%	35,030	60,875	200,995
	26	42,861	159,507	107,252	32,517	30%	16	59,375	69,977	77,381	116,951	125,651	143,624	148,403	24%	36,920	29,952	177,634
	27	1,346	201,991	35,616	47,691	134%	15	11,175	15,556	18,258	22,864	28,439	49,256	102,564	22%	108,023	-187,608	244,485
FX	28	250,423	508,305	369,581	81,646	22%	15	255,556	279,801	326,408	349,655	419,145	494,733	500,745	12%	89,750	174,307	533,306
	29	16,457	30,497	21,869	4,208	19%	15	16,700	17,108	19,225	20,737	24,650	27,507	28,662	12%	4,753	11,491	30,503
	30	150,875	234,767	199,630	21,663	11%	16	170,778	180,249	185,386	198,061	215,149	224,370	230,523	7%	23,438	144,956	238,707
	31	253,979	393,315	312,070	39,513	13%	16	259,587	265,106	281,253	308,839	331,622	361,448	371,363	8%	43,953	232,038	407,851
	32	273,365	444,961	359,008	52,178	15%	15	290,719	302,873	322,568	345,021	386,702	433,900	438,582	9%	68,515	209,393	483,451
Commodities	33	1,445	15,092	8,680	4,207	48%	10	1,956	2,467	7,709	9,033	10,343	13,423	14,258	15%	13,555	-18,780	35,439
	34	361,384	540,930	461,327	61,956	13%	8	381,042	400,700	420,235	454,769	519,809	526,632	533,781	11%	204,071	48,355	864,639
	35	399,770	649,484	502,275	83,158	17%	10	400,710	401,649	436,500	505,071	559,922	588,210	618,847	12%	155,457	177,499	799,248
Credit Spread	36	4,951	21,063	10,583	5,217	49%	11	5,380	5,808	6,660	8,916	13,815	16,722	18,893	35%	15,344	-18,965	42,413
	37	15,679	76,319	36,017	21,099	59%	9	18,509	21,340	26,548	26,901	32,752	69,645	72,982	10%	25,539	-23,790	78,365
	38	2,121	9,024	4,747	1,785	38%	12	2,644	3,141	3,800	4,396	5,365	6,596	7,763	17%	3,251	-1,144	11,862
	39	8,325	26,386	14,202	6,385	45%	9	8,979	9,633	10,601	11,235	15,344	24,012	25,199	18%	12,752	-14,176	36,833
	40	1,889	6,114	3,165	1,216	38%	11	2,043	2,196	2,383	2,557	3,678	4,078	5,096	21%	3,049	-2,172	10,025
	41	2,023	17,726	10,156	4,762	47%	12	4,215	6,011	6,991	9,088	13,832	16,359	17,100	33%	6,213	-3,956	20,895
	42	28,210	78,830	46,777	15,581	33%	10	29,225	30,240	32,895	49,740	53,077	59,673	69,251	23%	32,334	-13,851	115,484
	43	24,157	105,172	38,468	21,863	57%	13	24,889	25,674	27,260	29,253	43,057	50,574	73,142	22%	44,827	-59,416	119,891
	44	6,105	15,398	9,032	3,049	34%	13	6,166	6,240	6,427	7,714	11,119	13,187	14,317	27%	9,510	-11,305	26,734
	45	11,234	35,960	16,556	7,598	46%	12	11,368	11,490	11,693	12,655	20,506	23,291	29,017	27%	12,118	-10,967	37,504
	46	6,675	18,873	9,981	3,851	39%	11	6,716	6,757	7,315	8,091	12,443	13,392	16,133	26%	13,175	-17,675	35,025
	47	943	6,942	2,399	1,877	78%	10	982	1,020	1,300	1,780	2,309	4,641	5,791	28%	2,749	-3,583	7,413
	48	6,584	16,035	9,397	2,921	31%	11	6,873	7,161	7,381	8,598	10,151	13,298	14,667	16%	9,788	-10,611	28,541
	49	2,036	13,613	5,092	3,926	77%	12	2,152	2,251	2,573	3,265	5,955	10,992	12,304	40%	5,311	-6,713	14,531
	50	10,763	23,812	15,489	3,487	23%	13	10,980	11,248	13,883	15,169	16,272	18,738	20,972	8%	7,597	-25	30,363
	51	14,150	47,699	27,670	10,978	40%	10	14,983	15,817	19,927	25,711	31,450	43,490	45,594	22%	15,640	-7,276	55,285
	52	16,939	55,181	33,470	13,281	40%	10	18,009	19,079	24,613	30,028	41,426	53,005	54,093	25%	16,354	-3,601	61,814
	53	25,456	89,131	60,367	22,411	37%	11	30,409	35,361	43,051	63,201	80,093	87,453	88,292	30%	24,048	822	97,015
	57	136,377	207,508	166,598	22,488	13%	13	137,122	138,975	153,810	162,517	181,761	196,219	201,570	8%	42,524	75,210	245,304
	58	15,838	66,673	33,181	14,368	43%	12	16,232	17,022	24,015	31,211	38,390	46,798	55,857	23%	18,869	-5,184	70,294
	59	127,119	201,400	163,695	21,395	13%	14	132,266	137,803	151,929	161,143	180,985	187,551	192,726	9%	44,747	68,086	247,073
CTP	54																	
	55																	
	56																	
ALL-IN no-CTP	60	853,190	4,486,543	2,764,383	1,208,143	44%	8	1,332,508	1,811,827	2,262,414	2,505,729	3,213,348	4,476,093	4,481,318	17%	1,348,030	-109,438	5,282,684
Equity Cumulative	61	1,537,143	6,167,625	3,125,830	1,381,303	44%	10	1,861,028	2,184,914	2,318,430	2,604,886	3,760,518	4,662,812	5,415,218	24%	9,500,539	-16,217,055	21,785,100
IR Cumulative	62	173,789	276,055	227,124	29,435	13%	14	180,222	190,141	208,870	224,193	246,153	263,281	271,079	8%	43,321	134,084	307,368
FX Cumulative	63	602,702	887,786	720,535	86,498	12%	15	628,680	646,304	662,743	687,657	777,773	850,727	884,742	8%	103,076	496,047	908,352
Commodity Cumulative	64	362,341	521,219	457,675	55,712	12%	8	382,809	403,278	422,365	455,276	507,718	520,329	520,774	9%	203,064	50,550	862,806
CS Cumulative	65	140,550	276,790	186,297	35,382	19%	12	150,172	158,353	164,998	178,498	194,027	218,030	245,559	8%	73,138	28,422	320,972
CTP Cumulative	66																	

Table 36: VaR statistics (high L3 A&L banks only)

EU Statistics for VaR

		Other stats						Percentiles								Extreme Values range (Full Sample)		
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	STDev_trunc[1]	-2*STDev_trunc	+2*STDev_trunc
Equity	1	2,633,661	8,419,537	4,848,030	2,353,360	49%	5	2,737,916	2,842,171	3,154,937	4,129,687	5,902,329	7,412,654	7,916,095	30%	7,944,722	-11,957,921	19,820,965
	2						4											
	3						3											
	4						3											
	5	443,522,356	1,911,290,183	1,189,333,485	524,161,631	44%	5	570,740,147	697,957,939	1,079,611,313	1,239,304,587	1,272,938,986	1,655,949,704	1,783,619,944	8%	445,136,273	270,823,506	2,051,368,597
	6						4											
	7						2											
	8						3											
	9						3											
	10	209,500	748,369	455,455	223,577	49%	5	235,140	260,780	337,701	354,320	627,384	699,975	724,172	30%	278,709	-63,835	1,051,003
Interest Rate	11	65,729	118,547	82,506	16,918	21%	9	67,036	68,343	69,700	79,718	92,347	99,701	109,124	14%	18,788	51,714	126,867
	12	24,113	41,133	35,102	5,939	17%	6	26,603	29,094	34,422	36,160	38,443	40,053	40,593	6%	5,920	22,806	46,484
	13	110,316	175,172	139,894	22,612	16%	8	112,043	113,770	120,523	142,908	152,464	164,955	170,053	12%	25,373	98,149	199,640
	14	28,545	57,535	40,214	10,978	27%	9	28,593	28,640	31,262	38,421	44,454	56,476	57,005	17%	9,242	25,685	62,653
	15						1											
	16	17,826	39,517	28,764	8,075	28%	5	19,313	20,799	25,259	28,812	32,407	36,673	38,095	12%	11,263	9,277	54,330
	17	58,573	85,940	74,680	11,065	15%	5	60,611	62,649	68,763	77,761	82,364	84,510	85,225	9%	27,466	21,509	131,374
	18	56,695	138,849	91,358	32,728	36%	5	59,854	63,012	72,488	79,327	109,432	127,082	132,966	20%	33,387	19,060	152,608
	19	102,562	123,617	115,801	7,274	6%	8	104,188	105,815	113,685	117,713	120,769	121,846	122,732	3%	18,216	85,434	158,299
	20	3,210	8,160	5,294	1,827	35%	8	3,250	3,289	3,897	4,902	6,793	7,393	7,776	27%	1,730	1,574	8,495
	21	233,826	306,588	273,741	30,840	11%	7	236,795	239,765	245,955	287,028	298,418	305,617	306,103	10%	48,529	203,005	397,122
	22	51,901	108,971	83,317	20,951	25%	6	56,896	61,891	73,886	81,829	98,557	106,231	107,601	14%	23,231	38,939	131,865
	23	22,888	45,688	35,387	7,019	20%	7	25,864	28,839	33,366	35,267	38,568	42,288	43,988	7%	7,909	21,296	52,931
	24	19,786	95,868	39,318	32,284	82%	5	20,156	20,525	21,634	22,945	36,355	72,063	83,965	25%	34,771	-24,116	114,968
	25	99,723	170,741	130,658	25,183	19%	7	101,606	103,488	115,178	126,063	143,862	160,963	165,852	11%	35,030	60,875	200,995
	26						4											
	27	17,205	237,848	88,464	95,030	107%	6	18,659	20,113	26,071	36,949	143,780	208,332	223,090	69%	108,023	-187,608	244,485
FX	28	258,425	411,989	342,264	57,318	17%	5	272,869	287,313	330,646	335,320	374,938	397,169	404,579	6%	89,750	174,307	533,306
	29						4											
	30	168,544	220,642	185,250	21,500	12%	5	168,932	169,320	170,485	176,520	190,061	208,410	214,526	5%	23,438	144,956	238,707
	31	262,508	360,379	311,425	42,242	14%	5	264,744	266,980	273,687	319,945	340,606	352,470	356,424	11%	43,953	232,038	407,851
	32	272,434	384,035	324,395	40,605	13%	5	279,408	286,382	307,304	328,118	330,084	362,455	373,245	4%	68,515	209,393	483,451
Commodities	33						1											
	34						1											
	35						1											
Credit Spread	36						2											
	37						1											
	38						1											
	39						1											
	40						1											
	41						2											
	42						1											
	43						3											
	44						3											
	45						2											
	46						2											
	47						2											
	48						2											
	49						2											
	50						2											
	51						1											
	52						1											
	53						1											
	57						2											
	58						1											
	59						1											
CTP	54																	
	55																	
	56																	
ALL-IN no-CTP	60						2											
Equity Cumulative	61						2											
IR Cumulative	62						4											
FX Cumulative	63						3											
Commodity Cumulative	64						1											
CS Cumulative	65						1											
CTP Cumulative	66																	

Table 37: VaR statistics (IR and CS asset classes – only banks with general and specific IR risk approval)

EU Statistics for VaR

		Other stats						Percentiles							
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range
	11	66,603	121,534	89,810	14,581	16%	21	69,700	71,169	79,346	89,290	95,506	108,762	118,547	9%
	12	29,045	43,087	35,455	4,130	12%	21	29,900	30,554	31,986	34,709	38,972	40,106	41,303	10%
	13	119,091	197,859	152,491	22,142	15%	21	122,263	122,281	138,779	151,523	172,297	176,644	178,979	11%
	14	30,941	60,058	45,537	9,435	21%	20	31,525	31,903	38,656	46,138	51,614	57,655	58,801	14%
	15	11,124	57,592	24,882	13,400	54%	12	11,312	11,930	16,285	21,838	28,265	39,545	48,177	27%
	16	14,505	52,397	32,264	10,656	33%	19	16,891	17,760	24,230	33,963	38,837	45,117	47,517	23%
	17	32,427	114,915	79,059	23,249	29%	18	40,190	48,701	61,956	86,355	93,809	103,746	114,425	20%
	18	36,567	144,620	88,382	34,044	39%	21	39,560	43,321	58,324	87,680	105,564	138,849	144,620	29%
Interest Rate	19	102,562	157,602	127,045	14,761	12%	20	105,853	108,522	118,049	127,181	134,823	140,944	157,602	7%
	20	3,318	8,160	5,017	1,477	29%	21	3,323	3,378	3,631	5,091	6,417	6,835	7,090	28%
	21	234,260	339,957	304,305	30,366	10%	17	241,728	257,253	300,063	316,957	323,883	327,799	331,947	4%
	22	59,462	127,144	89,419	13,922	16%	22	70,411	79,058	84,098	86,280	91,552	106,584	108,856	4%
	23	32,996	52,275	37,914	5,154	14%	17	33,445	33,777	34,314	35,013	40,315	43,339	45,381	8%
	24	18,252	104,801	51,425	24,237	47%	16	21,772	26,703	34,893	46,286	66,898	80,772	95,032	31%
	25	99,723	199,920	137,378	26,165	19%	19	104,721	105,587	115,642	133,119	155,924	158,724	163,144	15%
	26	42,861	159,507	107,268	31,277	29%	19	71,082	74,902	83,791	106,780	124,901	155,658	156,043	20%
	27	15,387	201,991	47,854	56,949	119%	16	15,704	16,768	19,103	27,249	35,483	119,384	184,609	30%
	36	4,951	21,063	9,950	4,820	48%	16	5,383	5,668	6,014	8,575	12,021	16,740	17,966	33%
	37	15,679	76,319	36,096	19,926	55%	15	20,632	22,819	26,371	26,965	35,338	72,599	75,872	15%
	38	2,121	10,836	5,424	2,543	47%	19	2,332	2,928	3,790	4,489	7,198	8,842	9,205	31%
	39	8,325	26,386	12,978	5,240	40%	14	8,854	9,385	10,309	10,882	13,632	20,334	23,843	14%
	40	1,889	8,672	3,870	2,199	57%	18	2,056	2,133	2,216	2,946	4,060	7,268	7,700	29%
	41	2,023	17,726	9,855	4,339	44%	19	5,422	5,967	7,034	8,318	13,604	15,993	16,702	32%
	42	28,210	97,253	46,894	19,541	42%	15	28,916	29,717	33,762	37,490	52,378	70,316	84,357	22%
	43	23,345	105,172	38,690	20,021	52%	20	24,116	24,672	27,161	29,905	45,758	50,383	76,024	26%
	44	5,757	17,120	9,238	3,443	37%	20	6,088	6,196	6,425	7,710	11,507	13,777	15,484	28%
	45	10,626	35,960	16,768	7,007	42%	19	11,173	11,429	11,842	12,763	19,937	24,484	29,763	25%
Credit Spread	46	6,240	14,300	9,357	2,411	26%	19	6,632	6,741	7,692	8,528	10,907	12,840	13,483	17%
	47	750	6,335	2,441	1,786	73%	16	895	958	1,015	1,780	2,926	5,114	5,435	49%
	48	6,584	13,298	8,686	1,601	18%	18	7,074	7,239	7,588	8,432	9,742	10,100	10,729	12%
	49	2,036	11,233	4,430	2,884	65%	16	2,156	2,221	2,573	3,240	4,700	8,808	9,429	29%
	50	10,763	26,515	15,908	4,644	29%	18	10,946	11,080	13,507	14,921	16,253	24,110	25,062	9%
	51	11,642	47,699	23,893	8,922	37%	14	13,272	14,706	18,603	23,402	26,247	31,312	37,583	17%
	52	16,520	52,763	30,094	11,163	37%	15	16,813	17,890	21,810	28,331	35,399	46,087	49,603	24%
	53	25,456	89,131	54,581	20,978	38%	16	27,483	31,760	37,387	48,919	68,994	84,399	87,873	30%
	57	135,561	222,270	166,308	27,194	16%	20	136,336	137,495	146,502	157,648	183,984	206,995	208,246	11%
	58	15,838	67,983	37,382	15,988	43%	17	16,412	19,356	28,658	32,510	46,076	61,959	66,935	23%
	59	127,119	228,434	158,825	26,526	17%	18	129,241	130,499	141,832	155,079	164,990	190,882	205,455	8%
IR Cumulative	62	173,789	276,055	223,313	28,815	13%	19	178,359	187,386	205,369	221,905	240,293	265,737	266,769	8%
CS Cumulative	65	140,550	276,790	180,308	35,668	20%	17	145,785	153,536	158,055	167,869	189,038	221,294	257,659	9%

Table 38: VaR statistics (IR and CS asset classes – only banks with general IR risk approval)

EU Statistics for VaR

		Other stats						Percentiles							
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range
	11	51,989	96,746	77,284	13,644	18%	17	61,123	64,800	67,846	72,769	90,830	95,019	95,400	14%
	12	23,100	41,133	32,183	5,980	19%	13	23,201	23,437	29,936	33,783	35,793	39,317	40,434	9%
	13	110,316	175,172	137,513	20,699	15%	16	110,930	111,169	115,707	142,505	149,424	161,230	165,227	13%
	14	28,545	53,252	37,716	7,262	19%	17	28,640	29,908	32,695	34,490	43,527	45,994	49,294	14%
	15						1								
	16	16,175	39,517	22,871	7,981	35%	10	16,430	16,684	17,847	19,002	27,052	33,118	36,318	21%
	17	42,759	82,364	61,061	14,249	23%	8	44,199	45,640	50,602	59,059	71,013	79,142	80,753	17%
	18	39,135	109,432	64,936	24,785	38%	9	40,502	41,869	43,321	54,138	79,327	95,695	102,564	29%
Interest Rate	19	107,209	140,931	118,990	8,343	7%	17	107,937	110,148	114,725	118,516	120,915	127,773	135,391	3%
	20	3,000	8,443	5,392	1,865	35%	15	3,147	3,258	3,711	5,034	6,884	7,806	8,161	30%
	21	205,699	321,546	265,526	35,315	13%	17	222,525	230,201	233,826	257,286	293,497	305,617	309,580	11%
	22	49,121	105,291	74,748	17,252	23%	14	50,928	53,612	62,902	75,890	82,429	98,322	104,120	13%
	23	22,888	45,688	35,533	5,455	15%	14	28,186	31,569	33,057	34,616	38,983	40,800	42,728	8%
	24	12,903	95,868	30,330	28,015	92%	8	12,979	13,055	16,969	19,397	26,742	58,207	77,038	22%
	25	78,873	170,741	121,980	24,178	20%	15	90,855	96,054	103,507	125,117	133,200	149,380	159,333	13%
	26	42,861	144,412	87,832	34,298	39%	9	51,669	60,476	65,785	79,631	87,415	142,919	143,666	14%
	27	1,346	237,848	45,200	66,654	147%	11	8,367	15,387	18,006	23,020	30,628	77,287	157,568	26%
	36														
	37														
	38						1								
	39														
	40						1								
	41						1								
	42														
	43						2								
	44						2								
	45						1								
Credit Spread	46						1								
	47														
	48						1								
	49														
	50						1								
	51														
	52														
	53														
	57						2								
	58														
	59						2								
IR Cumulative	62	160,466	276,055	209,921	36,164	17%	8	168,593	176,720	193,643	203,855	217,290	255,826	265,940	6%
CS Cumulative	65						1								

Table 39: VaR statistics (EQ asset class – only banks with general and specific EQ risk approval)

EU Statistics for VaR

		Other stats						Percentiles							
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range
Equity	1	184,485	10,129,491	4,668,546	2,143,829	46%	23	2,574,640	2,691,331	3,400,906	3,903,350	6,026,864	6,369,864	8,214,570	28%
	2	2,138,047	5,918,479	3,852,177	1,413,180	37%	20	2,249,834	2,369,182	2,684,139	3,336,988	5,337,852	5,701,891	5,918,479	33%
	3	7,558	19,170	13,237	3,746	28%	21	8,512	8,652	10,803	12,669	16,434	18,491	19,110	21%
	4	239	2,823	1,332	620	47%	22	554	630	979	1,256	1,492	2,128	2,244	21%
	5	443,522,356	1,911,290,183	1,345,802,175	335,622,408	25%	20	1,042,128,895	1,085,193,582	1,138,614,380	1,278,662,083	1,611,860,031	1,694,056,437	1,713,911,185	17%
	6	2,296	9,545	5,657	1,805	32%	19	2,945	3,626	4,185	5,647	6,931	7,365	7,795	25%
	7	14,886	60,798	30,263	15,586	52%	15	14,980	15,416	17,879	22,504	37,099	54,806	60,300	35%
	8	25,062	54,731	42,953	9,048	21%	22	28,129	28,950	37,466	42,782	52,095	53,486	54,085	16%
	9	24,946	83,437	46,010	13,531	29%	21	26,897	27,475	39,877	45,391	50,097	60,905	64,402	11%
	10	319,505	748,369	514,959	157,504	31%	19	333,813	335,574	351,459	524,796	653,408	695,688	701,781	30%
Equity Cumulative	61	2,141,617	6,167,625	3,019,654	1,051,434	35%	16	2,228,070	2,270,698	2,417,987	2,670,396	2,992,425	4,286,685	4,913,614	11%

Table 40: VaR statistics (EQ asset class – only banks with general EQ risk approval)

EU Statistics for VaR

		Other stats						Percentiles							
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range
Equity	1	2,883,832	10,626,420	4,511,112	3,030,735	67%	6	2,887,002	2,890,171	2,961,117	3,265,110	3,941,086	7,378,054	9,002,237	14%
	2	1,295,510	4,045,941	2,468,800	890,512	36%	6	1,525,632	1,755,754	2,233,604	2,364,796	2,505,110	3,285,849	3,665,895	6%
	3						4								
	4						3								
	5	1,041,295,759	1,239,304,587	1,117,939,866	81,225,423	7%	5	1,046,714,932	1,052,134,104	1,068,391,622	1,079,611,313	1,161,096,051	1,208,021,173	1,223,662,880	4%
	6	1,283	4,010	2,698	1,055	39%	5	1,434	1,585	2,037	3,052	3,109	3,650	3,830	21%
	7						2								
	8						1								
	9						4								
	10	209,500	535,240	380,559	124,727	33%	5	235,140	260,780	337,701	357,979	462,373	506,093	520,667	16%
Equity Cumulative	61						1								

Table 41: Stress VaR statistics (2008-2009 stress period only)

EU Statistics for SVaR

		Other stats						Percentiles							
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range
Equity	1	6,380,028	11,962,650	8,536,560	1,275,701	15%	17	7,142,423	7,378,969	7,640,468	8,410,044	9,406,680	9,578,267	10,158,188	10%
	2	3,412,139	14,097,239	10,070,814	2,670,961	27%	16	6,751,420	8,064,463	8,698,672	9,535,011	11,657,281	13,508,968	13,741,758	15%
	3	5,081	26,088	16,510	6,723	41%	16	7,462	8,493	12,364	15,019	22,468	25,708	25,832	29%
	4	236	3,506	1,770	922	52%	13	441	677	1,401	1,760	2,157	3,074	3,364	21%
	5	596,908,604	3,964,883,697	3,000,170,260	857,358,676	29%	15	1,723,212,682	2,333,322,647	2,746,757,450	3,116,321,655	3,584,706,048	3,915,029,954	3,964,582,140	13%
	6	1,944	11,750	5,947	3,040	51%	16	2,207	2,735	3,549	5,410	7,456	10,159	11,077	36%
	7	20,623	130,239	71,299	32,954	46%	12	27,296	34,236	57,240	65,271	81,084	118,852	124,758	17%
	8	11,331	68,489	45,979	16,821	37%	13	22,387	30,120	32,571	49,926	56,600	66,081	67,662	27%
	9	33,388	92,780	70,135	19,097	27%	14	37,864	41,837	58,619	78,420	83,033	86,920	89,865	17%
	10	1,037,384	2,485,038	1,429,894	440,261	31%	14	1,045,733	1,051,859	1,082,938	1,288,630	1,573,988	2,039,827	2,279,433	18%
Interest Rate	11	91,818	282,205	199,882	56,099	28%	25	92,281	102,077	194,280	218,300	230,252	245,507	274,727	8%
	12	16,692	99,127	58,958	19,665	33%	22	29,665	39,172	44,329	61,155	70,159	82,845	87,815	23%
	13	214,118	467,288	322,652	55,529	17%	25	228,552	247,110	296,899	333,069	347,750	368,217	395,689	8%
	14	54,583	130,297	92,480	21,305	23%	25	58,199	63,434	80,852	93,653	109,656	116,315	127,434	15%
	15	24,978	145,637	66,967	42,062	63%	6	28,729	32,481	43,681	60,173	69,537	108,248	126,943	23%
	16	10,203	80,433	50,778	17,521	35%	19	30,602	33,731	39,638	49,144	65,120	69,933	74,037	24%
	17	37,958	208,533	112,590	40,120	36%	19	66,487	76,900	85,036	100,368	138,105	154,626	168,691	24%
	18	59,044	279,558	119,172	53,418	45%	20	69,473	71,754	78,229	116,028	134,489	184,242	207,292	26%
	19	86,643	363,915	260,183	74,595	29%	24	115,922	134,338	228,969	285,616	302,810	333,824	336,918	14%
	20	336	58,955	15,928	15,545	98%	21	605	3,027	8,123	12,755	16,481	23,808	57,995	34%
	21	231,427	745,932	564,018	142,912	25%	25	275,724	357,254	526,770	621,625	658,395	678,200	706,036	11%
	22	80,855	223,596	172,934	44,803	26%	23	82,919	95,187	156,372	184,333	203,953	221,590	223,050	13%
	23	23,635	100,888	60,933	16,536	27%	19	39,955	43,478	51,868	62,532	68,478	74,199	82,683	14%
	24	23,137	177,821	100,421	56,398	56%	14	32,702	38,425	53,009	97,302	155,151	171,402	175,205	49%
	25	186,521	350,642	287,402	45,046	16%	21	203,281	215,920	281,783	301,019	311,173	333,164	345,045	5%
	26	55,619	367,131	144,664	66,341	46%	20	59,200	79,509	115,201	140,874	155,622	193,602	222,646	15%
	27	16,622	334,808	136,809	72,682	53%	16	61,484	77,174	100,615	131,066	150,018	212,756	268,442	20%
FX	28	690,185	1,127,901	918,157	124,147	14%	19	744,451	767,458	831,767	894,423	1,020,305	1,064,282	1,082,955	10%
	29	26,073	87,720	61,553	18,599	30%	18	31,600	34,779	54,271	66,206	75,095	81,683	82,596	16%
	30	410,218	572,350	494,606	46,407	9%	18	429,396	435,693	459,926	500,584	536,321	544,408	550,147	8%
	31	665,501	1,152,277	938,842	169,351	18%	19	702,985	714,123	781,742	947,012	1,095,973	1,133,778	1,148,912	17%
	32	837,410	1,492,368	1,139,433	190,912	17%	18	871,283	914,017	965,436	1,158,970	1,302,010	1,348,012	1,373,268	15%
Commodities	33	16,073	63,252	30,914	18,326	59%	9	17,468	18,863	20,355	22,725	27,588	62,406	62,829	15%
	34	561,628	924,016	717,352	131,688	18%	8	575,195	588,761	628,691	683,020	791,605	900,009	912,012	11%
	35	939,878	1,257,140	1,093,696	118,329	11%	9	946,291	952,704	961,075	1,097,385	1,181,849	1,222,588	1,239,864	10%
Credit Spread	36	11,099	31,323	18,810	6,060	32%	10	11,141	11,183	15,025	19,483	21,171	23,888	27,606	17%
	37	57,964	168,523	110,127	45,882	42%	8	60,266	62,567	66,236	108,048	151,249	161,258	164,891	39%
	38	7,842	18,115	12,641	3,784	30%	12	8,110	8,474	10,094	11,053	16,224	17,639	17,858	23%
	39	19,841	90,360	50,316	27,543	55%	8	20,599	21,357	25,668	45,525	75,298	81,698	86,029	49%
	40	7,518	31,706	17,094	8,014	47%	10	8,844	10,169	12,824	13,590	22,471	28,049	29,878	27%
	41	12,231	46,132	26,653	13,501	51%	10	12,831	13,431	14,389	24,233	36,851	44,322	45,227	44%
	42	56,897	182,965	123,756	40,931	33%	10	57,167	57,438	111,247	129,903	149,458	161,318	172,142	15%
	43	40,788	147,480	93,502	31,121	33%	12	49,982	59,053	75,350	90,369	113,502	131,149	139,404	20%
	44	13,871	46,016	27,589	9,787	35%	11	15,623	17,375	20,476	25,646	33,318	39,705	42,861	24%
	45	31,039	91,599	57,256	23,714	41%	12	31,164	31,737	36,986	53,223	80,332	90,190	90,940	37%
	46	13,841	46,387	25,303	9,963	39%	10	14,374	14,907	19,385	22,440	29,806	36,217	41,302	21%
	47	4,035	18,628	9,479	4,200	44%	9	4,770	5,505	6,495	10,213	10,553	12,428	15,528	24%
	48	14,301	59,897	33,704	16,393	49%	9	17,181	20,060	21,621	26,341	47,514	56,184	58,041	37%
	49	4,083	25,346	12,650	6,063	48%	10	4,891	5,699	10,499	11,412	14,657	19,051	22,199	17%
	50	20,003	34,476	27,378	4,201	15%	11	20,548	21,092	26,383	27,454	29,140	32,012	33,244	5%
	51	28,711	104,076	61,509	28,113	46%	8	31,016	33,322	39,538	58,714	80,024	93,082	98,579	34%
	52	40,011	105,127	63,209	22,846	36%	7	40,968	41,926	45,280	63,684	71,542	87,848	96,488	22%
	53	48,382	185,493	109,913	43,136	39%	8	59,028	69,673	81,360	107,800	131,403	153,941	169,717	24%
	57	213,874	407,667	309,782	67,667	22%	10	225,223	236,572	262,751	293,687	364,667	402,645	405,156	16%
	58	46,020	213,984	113,666	58,775	52%	10	46,544	47,068	58,364	120,414	151,009	174,072	194,028	44%
	59	169,286	477,691	341,095	94,303	28%	12	211,958	247,499	281,015	356,042	402,263	469,975	477,553	18%
CTP	54														
	55														
	56														
ALL-IN no-CTP	60	2,072,620	13,909,817	6,807,467	3,340,024	49%	8	3,107,828	4,143,037	5,819,810	6,454,838	6,884,492	9,711,678	11,810,747	8%
Equity Cumulative	61	3,193,601	26,986,292	7,948,134	6,852,305	86%	11	3,365,766	3,537,931	4,467,346	6,071,447	6,875,128	13,059,525	20,022,909	21%
IR Cumulative	62	184,256	690,513	445,290	130,457	29%	17	219,346	259,398	411,957	463,843	543,491	558,174	599,807	14%
FX Cumulative	63	1,435,698	3,079,451	2,213,627	437,402	20%	18	1,465,890	1,514,883	2,048,424	2,274,227	2,452,535	2,650,166	2,796,585	9%
Commodity Cumulative	64	563,970	956,083	709,918	143,524	20%	8	574,103	584,236	618,516	647,944	788,248	908,882	932,483	12%
CS Cumulative	65	260,037	542,060	382,285	86,380	23%	10	269,774	279,510	333,102	378,249	425,047	482,546	512,303	12%
CTP Cumulative	66														

Table 42: PV statistics

EU Statistics for PV

		Main statistics								Percentiles			
	Port. ID	Min	Max	Ave	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Ave)	Num obs.[3]	25th	50th (Median)	75th	Interquantile range
Equity	1	276,987	46,406,975	36,699,382	13,307,020	141,619,038	28,446	36%	26	41,051,053	41,085,000	41,098,215	0%
	2	-35,198,107	-23,211,950	-28,454,783	1,807,661	6,618,562	40,654	6%	24	-28,345,405	-28,310,069	-28,261,209	0%
	3	-28,062	-26,201	-27,156	457	884	293	2%	23	-27,502	-27,157	-26,900	1%
	4	3,444	4,303	3,877	207	244	128	5%	23	3,760	3,882	4,019	3%
	5	-13,661,765,078	-2,713,300,000	-10,966,556,169	4,729,337,256	5,594,620,684	28,059,031	43%	25	-13,579,000,000	-13,536,750,000	-13,475,203,087	0%
	6	-10,903	-5,737	-7,996	1,004	1,904	567	13%	23	-8,532	-8,039	-7,274	8%
	7	1,014,045	1,041,143	1,028,144	8,553	8,553	7,885	1%	19	1,019,461	1,027,225	1,036,157	1%
	8	67,090	74,648	71,099	2,072	2,430	1,798	3%	24	69,545	71,181	72,409	2%
	9	475,681	482,409	479,028	1,591	1,891	721	0%	25	478,173	478,790	479,530	0%
	10	-4,793,908	-229,324	-2,973,482	1,340,369	1,226,878	85,079	45%	28	-4,573,184	-2,625,108	-2,593,120	28%
Interest Rate	11	-174,130	-167,551	-170,874	1,510	2,572	841	1%	34	-171,889	-171,008	-169,733	1%
	12	-35,654	-24,700	-31,403	2,453	6,456	1,184	8%	36	-32,926	-32,202	-29,749	5%
	13	-295,023	-279,383	-288,336	4,377	6,204	2,246	2%	37	-291,080	-290,162	-287,364	1%
	14	-115,075	-100,513	-108,181	3,127	5,664	1,662	3%	35	-110,169	-107,827	-106,373	2%
	15	1,027,292	1,161,694	1,095,063	38,468	38,468	32,144	4%	15	1,062,647	1,096,101	1,128,245	3%
	16	-411,890	-62,019	-142,725	75,952	375,249	13,309	53%	28	-148,365	-119,510	-119,183	11%
	17	-220,595	1,329,671	1,078,065	280,164	695,319	30,577	26%	28	1,126,756	1,159,578	1,167,691	2%
	18	-693,813	878,471	600,365	280,347	695,624	27,924	47%	28	644,210	680,811	682,069	3%
	19	110,075	121,439	117,578	2,830	3,835	1,520	2%	34	116,394	117,321	119,528	1%
	20	-11,734	-9,363	-10,180	546	783	300	5%	33	-10,453	-10,182	-9,864	3%
	21	437,828	456,667	448,353	5,275	7,080	3,844	1%	34	444,614	448,851	452,086	1%
	22	-204,974	-193,613	-201,371	2,947	8,559	2,113	2%	34	-203,789	-201,830	-199,403	1%
	23	1,293,445	1,319,931	1,300,260	4,656	13,701	152	0%	32	1,299,312	1,299,509	1,299,625	0%
	24	1,080,152	1,166,136	1,102,628	19,364	195,860	497	2%	25	1,096,409	1,097,689	1,098,123	0%
	25	-1,377,005	-1,315,449	-1,327,650	11,264	30,023	2,325	1%	33	-1,328,762	-1,326,837	-1,323,997	0%
	26	4,389,819	4,735,051	4,579,028	80,718	311,503	9,804	2%	28	4,565,270	4,587,387	4,590,148	0%
	27	-99,472	61,398	-9,855	31,336	137,565	9,618	318%	30	-17,455	-11,613	-752	92%
FX	28	83,908	153,547	138,985	10,698	146,018	2,508	8%	33	139,204	140,475	143,039	1%
	29	849,975	1,130,242	893,248	46,155	258,283	501	5%	29	886,150	886,342	887,066	0%
	30	649,463	660,458	654,946	2,353	3,013	1,534	0%	30	653,335	655,282	656,652	0%
	31	923,965	961,156	934,368	8,206	16,099	1,601	1%	30	930,004	931,324	936,554	0%
	32	-1,174,977	-1,158,821	-1,170,460	3,874	8,394	2,179	0%	27	-1,172,914	-1,171,099	-1,169,327	0%
Commodities	33	-21,559	-8,168	-14,171	3,139	9,052	898	22%	13	-14,587	-13,981	-13,129	5%
	34	520,711	595,821	547,303	24,517	55,937	16,666	5%	11	523,340	537,479	571,252	4%
	35	207,197	240,912	218,702	9,039	54,679	3,544	4%	12	213,883	215,641	221,555	2%
Credit Spread	36	-6,521	-4,213	-5,224	460	1,019	31	9%	20	-5,175	-5,155	-5,113	1%
	37	49,578	55,100	53,912	1,194	4,999	169	2%	17	53,905	53,982	54,298	0%
	38	-5,102	-3,211	-4,200	426	788	40	10%	21	-4,211	-4,169	-4,134	1%
	39	31,278	33,175	32,669	410	2,212	75	1%	16	32,646	32,715	32,815	0%
	40	2,572	3,015	2,691	120	192	39	5%	20	2,626	2,669	2,687	1%
	41	27,064	30,455	28,179	776	1,640	330	3%	18	27,716	28,013	28,734	2%
	42	1,158,308	1,285,067	1,194,303	26,994	94,469	1,365	2%	18	1,188,864	1,191,130	1,192,244	0%
	43	3,245,102	3,351,361	3,283,786	22,406	90,416	1,780	1%	22	3,281,182	3,284,439	3,284,655	0%
	44	39,310	47,239	42,170	2,487	4,824	1,123	6%	22	40,231	42,992	44,009	4%
	45	1,050,667	1,078,562	1,055,595	7,548	29,739	1,004	1%	21	1,052,245	1,053,279	1,053,627	0%
	46	1,062,665	1,104,653	1,083,205	8,363	30,928	328	1%	21	1,083,276	1,083,974	1,084,191	0%
	47	33,713	35,661	34,652	430	512	120	1%	18	34,489	34,707	34,785	0%
	48	19,977	30,451	26,061	2,610	4,850	1,399	10%	20	24,244	26,905	27,933	7%
	49	-10,920	-10,481	-10,720	91	511	42	1%	19	-10,768	-10,703	-10,667	0%
	50	1,030,533	1,040,940	1,034,511	2,206	10,628	258	0%	19	1,033,466	1,034,465	1,034,633	0%
	51	1,088,015	1,165,022	1,105,502	15,875	105,245	287	1%	17	1,102,694	1,103,598	1,103,670	0%
	52	1,068,436	1,139,752	1,088,909	17,519	98,557	864	2%	17	1,083,732	1,084,886	1,085,071	0%
	53	2,163,870	2,304,774	2,192,087	31,017	310,306	623	1%	16	2,185,577	2,188,391	2,188,564	0%
	57	3,781,047	3,893,602	3,826,951	26,997	38,585	2,102	1%	21	3,824,426	3,831,957	3,832,980	0%
	58	-465,981	-347,654	-410,805	25,137	35,725	7,738	6%	20	-422,131	-405,667	-399,558	3%
	59	3,425,670	3,584,267	3,478,885	41,604	85,470	12,960	1%	21	3,455,512	3,474,617	3,484,944	0%
CTP	54								3				
	55								2				
	56								2				
ALL-IN no-CTP **	60	-28,307,737	23,488,385	12,037,361	15,916,208	110,808,863	2,088,907	132%	11	7,353,696	21,916,873	23,310,058	52%
Equity Cumulative **	61	-28,307,737	19,378,824	6,615,761	12,020,468	157,232,132	2,824,055	182%	16	-1,350,146	14,243,224	14,342,181	121%
IR Cumulative **	62	319,588	1,124,783	884,355	158,687	737,492	11,089	18%	26	893,179	929,754	934,376	2%
FX Cumulative **	63	-47,751	1,440,025	763,466	283,524	478,490	7,968	37%	28	763,945	784,663	790,929	2%
Commodity Cumulative **	64	353,573	583,207	514,508	58,349	153,812	13,718	11%	11	507,634	521,178	538,896	3%
CS Cumulative **	65	6,696,877	6,959,219	6,793,418	59,177	96,564	14,677	1%	19	6,763,107	6,785,614	6,794,171	0%
CTP Cumulative **	66								2				

[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

[2] Refers to the number of banks included in the computation of the statistics

*** For the aggregated portfolios (57 to 63), banks that reported at least a missing portfolio IMV among the ones composing the aggregate are not included in the computation of the benchmarks for that particular aggregate portfolio.*

Table 43: IRC – modelling choice: source of LGD – market convention

EU Statistics for IRC

		Other stats						Percentiles								Extreme Values range (Full Sample)		
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	STDev_trunc[1]	-2*STDev_trunc	+2*STDev_trunc
Equity	1																	
	2																	
	3																	
	4																	
	5																	
	6																	
	7																	
	8																	
	9																	
	10																	
Interest Rate	11																	
	12																	
	13																	
	14																	
	15	87,616	279,170	174,323	82,308	47%	5	93,999	100,382	119,530	143,084	242,214	264,388	271,779	34%	318,854	-363,723	911,691
	16	6,277	46,327	23,705	15,705	66%	9	6,647	7,017	7,524	21,072	37,814	41,857	44,092	67%	37,315	-49,392	99,866
	17	132,661	845,599	414,619	243,945	59%	10	137,678	142,695	238,454	352,637	617,454	684,438	765,018	44%	282,415	-195,371	934,291
	18	193,017	1,484,743	709,273	493,522	70%	10	207,562	222,108	347,585	538,806	1,161,986	1,367,086	1,425,915	54%	486,207	-344,615	1,600,215
	19																	
	20																	
	21																	
	22																	
	23	13,521	267,529	99,156	93,193	94%	10	18,864	24,208	30,322	59,358	145,790	245,214	256,372	66%	102,230	-107,136	301,786
	24	471,865	1,170,823	853,725	197,553	23%	9	595,070	718,275	796,840	814,565	1,012,411	1,047,626	1,109,225	12%	221,458	371,873	1,257,706
	25																	
	26	201,455	1,839,869	839,189	585,398	70%	10	216,538	231,620	380,397	700,338	1,279,364	1,607,039	1,723,454	54%	531,983	-250,854	1,877,076
	27																	
FX	28																	
	29																	
	30																	
	31																	
	32																	
Commodities	33																	
	34																	
	35																	
Credit Spread	36	22,619	76,587	42,150	16,639	39%	9	23,191	23,762	34,725	38,451	52,573	57,561	67,074	20%	110,262	-167,835	273,211
	37	55,883	92,803	75,649	12,512	17%	8	57,192	58,500	69,003	79,596	82,761	85,821	89,312	9%	45,338	-13,487	167,863
	38	52,057	164,652	86,180	38,731	45%	8	53,503	54,949	56,955	76,409	94,143	134,433	149,543	25%	51,902	-21,502	186,107
	39	20,601	125,520	51,717	36,247	70%	7	21,082	21,563	29,099	37,356	60,171	86,605	106,063	35%	151,851	-234,935	372,470
	40	36,001	87,377	57,501	22,345	39%	8	36,164	36,327	37,033	50,469	80,446	83,694	85,535	37%	27,908	859	112,489
	41	615,172	706,432	644,211	37,885	6%	7	615,625	616,077	619,291	623,822	662,736	696,858	701,645	3%	192,986	264,355	1,036,300
	42	148,213	416,981	218,205	90,220	41%	7	154,771	161,328	177,710	193,546	206,639	296,056	356,518	8%	148,695	-99,551	495,229
	43	643,408	870,440	741,605	82,236	11%	8	661,006	678,604	694,343	713,845	770,211	866,040	868,240	5%	151,520	489,651	1,095,730
	44	38,487	150,832	97,958	41,078	42%	10	44,986	51,485	65,927	94,261	134,497	149,649	150,240	34%	44,486	7,440	185,382
	45	51,903	225,652	154,022	64,518	42%	8	69,476	87,049	110,068	158,680	208,957	218,709	222,181	31%	79,207	11,809	328,639
	46	1,125	82,049	25,510	28,228	111%	8	2,742	4,359	6,296	16,849	29,059	62,662	72,355	64%	51,369	-82,139	123,335
	47	49,664	228,776	130,880	63,507	49%	8	53,899	58,133	82,444	127,514	179,398	198,073	213,424	37%	130,829	-137,505	385,810
	48	4,212	82,062	20,070	26,720	133%	8	4,334	4,456	4,862	7,232	22,811	45,495	63,779	65%	30,940	-39,457	84,302
	49	11,186	247,355	59,665	73,156	123%	9	13,228	15,270	20,207	36,686	60,689	107,312	177,333	50%	132,738	-190,888	340,063
	50	4,599	101,829	42,223	39,039	92%	9	5,002	5,405	8,182	22,077	68,606	92,299	97,064	79%	81,764	-110,004	217,053
	51	8,276	178,101	43,836	62,735	143%	7	8,410	8,545	8,809	16,324	43,268	111,343	144,722	66%	136,965	-233,442	314,418
	52	59,702	96,785	82,982	13,448	16%	6	64,391	69,079	79,441	83,979	92,635	95,889	96,557	8%	109,079	-128,911	307,405
	53	55,433	352,445	124,984	101,909	82%	7	64,268	73,102	84,918	85,560	105,738	210,867	281,656	11%	137,046	-175,921	372,262
	54	17,723	769,190	280,334	261,796	93%	9	36,771	55,820	94,525	124,188	468,771	595,413	682,302	66%	297,498	-239,269	950,723
	55	25,067	84,544	43,672	19,583	45%	10	26,380	27,693	30,569	37,205	46,459	72,879	78,712	21%	28,390	-18,599	94,960
	56	5,189	312,253	132,399	123,183	93%	10	6,715	8,242	17,917	104,151	237,271	292,624	302,439	86%	170,380	-210,872	470,648
CTP	57																	
	58																	
	59																	
ALL-IN no-CTP	60	127,493	1,619,116	864,778	490,413	57%	6	269,478	411,462	714,291	826,806	1,040,446	1,356,065	1,487,590	19%	556,577	-60,670	2,165,639
Equity Cumulative	61																	
IR Cumulative	62																	
FX Cumulative	63																	
Commodity Cumulative	64																	
CS Cumulative	65	694,466	1,093,013	794,349	147,914	19%	7	697,438	700,410	710,344	724,218	814,028	972,514	1,032,763	7%	190,874	516,566	1,280,060
CTP Cumulative	66																	

Table 44: IRC – modelling choice: source of LGD – non-market convention

EU Statistics for IRC

		Other stats						Percentiles								Extreme Values range (Full Sample)		
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	STDev_trunc[1]	-2*STDev_trunc	+2*STDev_trunc
Equity	1																	
	2																	
	3																	
	4																	
	5																	
	6																	
	7																	
	8																	
	9																	
	10																	
Interest Rate	11																	
	12																	
	13																	
	14																	
	15	50,444	658,318	322,273	225,000	70%	6	68,347	86,251	160,039	314,816	443,801	565,752	612,035	47%	318,854	-363,723	911,691
	16	0	46,034	21,175	15,912	75%	11	2,033	4,065	8,896	19,864	33,028	41,460	43,747	58%	37,315	-49,392	99,866
	17	0	876,403	351,380	252,854	72%	10	80,103	160,206	209,321	286,754	461,032	650,890	763,647	38%	282,415	-195,371	934,291
	18	287,533	1,301,127	718,992	378,644	53%	10	339,786	392,038	449,893	529,618	1,064,477	1,239,701	1,270,414	41%	486,207	-344,615	1,600,215
	19																	
	20																	
	21																	
	22																	
	23	439	219,202	102,461	73,923	72%	10	6,729	13,018	50,120	97,326	135,444	208,965	214,084	46%	102,230	-107,136	301,786
	24	525,377	1,149,729	869,177	204,233	23%	9	557,868	590,359	759,281	919,207	1,005,693	1,055,934	1,102,831	14%	221,458	371,873	1,257,706
	25																	
	26	311,044	1,753,873	972,733	465,094	48%	11	441,343	571,641	670,057	813,111	1,224,023	1,713,734	1,733,804	29%	531,983	-250,854	1,877,076
	27																	
FX	28																	
	29																	
	30																	
	31																	
	32																	
Commodities	33																	
	34																	
	35																	
Credit Spread	36	20,565	223,568	90,706	63,416	70%	10	23,310	26,054	39,431	83,995	128,156	142,282	182,925	53%	110,262	-167,835	273,211
	37	21,870	161,255	75,399	38,228	51%	9	31,614	41,359	56,327	72,747	84,076	102,133	131,694	20%	45,338	-13,487	167,863
	38	0	157,748	78,516	45,009	57%	12	14,409	26,393	55,201	80,082	105,444	127,562	142,106	31%	51,902	-21,502	186,107
	39	42,265	257,353	120,424	78,946	66%	9	42,820	43,375	43,952	127,355	137,834	231,439	244,396	52%	151,851	-234,935	372,470
	40	8,830	102,341	53,968	24,514	45%	11	24,260	39,690	41,675	50,898	65,080	78,744	90,543	22%	27,908	859	112,489
	41	451,134	1,017,002	712,931	191,309	27%	12	462,889	476,433	607,438	665,804	824,564	1,002,145	1,016,564	15%	192,986	264,355	1,036,300
	42	91,733	403,581	219,182	96,648	44%	10	96,286	100,838	177,185	197,347	266,415	337,810	370,695	20%	148,695	-99,551	495,229
	43	567,561	1,070,268	832,107	155,749	19%	12	601,266	635,872	733,743	849,952	909,876	1,044,378	1,061,108	11%	151,520	489,651	1,095,730
	44	35,600	144,860	84,742	40,035	47%	11	38,134	40,667	50,108	93,297	113,064	138,810	141,835	39%	44,486	7,440	185,382
	45	70,009	246,770	154,913	57,455	37%	11	72,551	75,093	117,303	158,211	186,488	225,079	235,925	23%	79,207	11,809	328,639
	46	120	66,895	24,113	24,343	101%	11	360	599	745	19,122	37,062	62,032	64,463	96%	51,969	-82,139	123,335
	47	36,882	150,057	100,930	40,608	40%	10	48,580	60,278	64,817	107,331	137,451	142,636	146,346	36%	130,829	-137,505	385,810
	48	1,616	68,098	25,949	21,571	83%	11	2,440	3,263	7,586	24,372	40,806	46,572	57,335	69%	30,940	-39,457	84,302
	49	36,519	244,836	128,179	75,388	59%	10	39,714	42,909	59,319	126,324	174,315	227,831	236,334	49%	132,738	-190,888	340,063
	50	8,498	141,544	53,260	49,179	92%	10	10,128	11,758	15,730	30,025	94,454	116,268	128,906	71%	81,764	-110,004	217,053
	51	1,760	104,719	46,822	37,918	81%	8	5,471	9,183	18,079	40,488	68,644	97,823	101,271	58%	136,965	-233,442	314,418
	52	39,517	221,650	95,733	55,035	57%	9	41,082	42,647	61,475	87,470	102,009	147,302	184,476	25%	109,079	-128,911	307,405
	53	60,560	139,290	98,008	23,879	24%	8	66,187	71,815	87,034	97,469	111,057	119,550	129,420	12%	137,046	-175,921	372,262
	57	79,115	907,081	494,583	307,731	62%	13	106,568	132,665	272,148	473,161	864,266	891,431	900,256	52%	297,498	-239,269	950,723
	58	0	67,874	29,803	20,121	68%	9	3,418	6,836	21,826	29,905	38,181	50,652	59,263	27%	28,390	-18,599	94,960
	59	14,299	267,049	118,711	84,647	71%	9	30,207	46,115	54,925	88,197	162,878	234,389	250,719	50%	170,380	-210,872	470,648
CTP	54																	
	55																	
	56																	
ALL-IN no-CTP	60	399,353	2,160,232	1,292,264	556,382	43%	9	562,379	725,406	1,052,073	1,137,926	1,792,980	1,896,158	2,028,195	26%	556,577	-60,670	2,165,639
Equity Cumulative	61																	
IR Cumulative	62																	
FX Cumulative	63																	
Commodity Cumulative	64																	
CS Cumulative	65	694,466	1,093,013	794,349	147,914	19%	7	697,438	700,410	710,344	724,218	814,028	972,514	1,032,763	7%	190,874	516,566	1,280,060
CTP Cumulative	66																	

Table 45: IRC – modelling choice: source of LGD – 1-2 modelling factors

EU Statistics for IRC

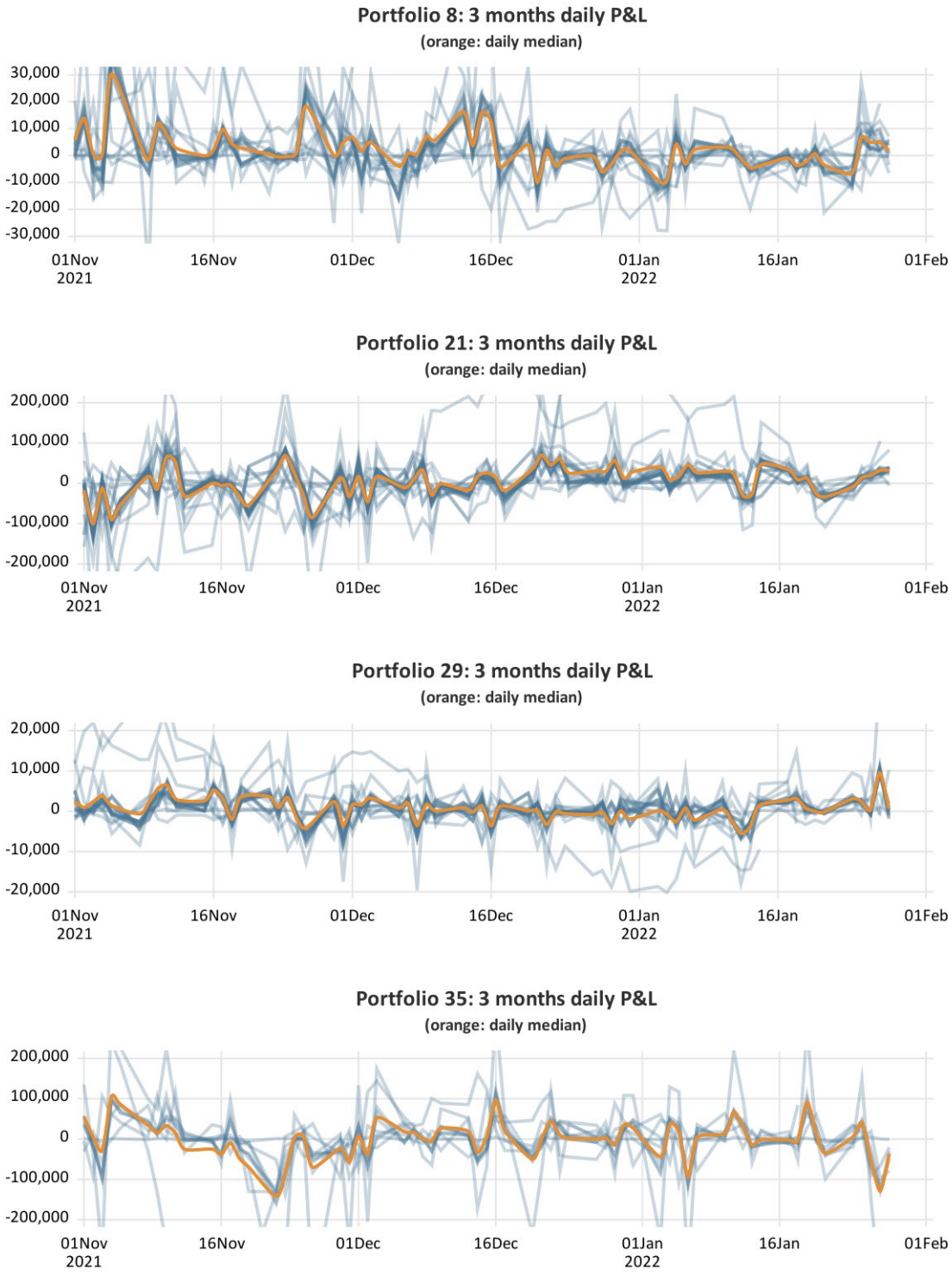
		Other stats						Percentiles								Extreme Values range (Full Sample)		
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	STDev_trunc[1]	-2*STDev_trunc	+2*STDev_trunc
Equity	1																	
	2																	
	3																	
	4																	
	5																	
	6																	
	7																	
	8																	
	9																	
	10																	
Interest Rate	11																	
	12																	
	13																	
	14																	
	15						4											
	16	0	46,034	26,106	15,939	61%	10	2,848	5,696	15,002	27,717	40,009	41,917	43,976	45%	37,315	-49,392	99,866
	17	0	876,403	404,346	269,892	67%	11	103,077	206,154	284,285	296,893	517,107	845,599	861,001	29%	282,415	-195,371	934,291
	18	394,712	1,484,743	747,539	387,816	52%	11	418,836	442,959	460,253	554,500	995,924	1,301,127	1,392,935	37%	486,207	-344,615	1,600,215
	19																	
	20																	
	21																	
	22																	
	23	439	242,735	112,962	70,673	63%	12	21,056	39,060	77,351	99,047	144,624	213,382	229,792	30%	102,230	-107,136	301,786
	24	471,865	1,032,485	809,051	208,377	26%	10	495,945	520,026	654,164	840,469	993,843	1,014,418	1,023,452	21%	221,458	371,873	1,257,706
	25																	
	26	411,075	1,753,873	963,349	416,235	43%	12	499,386	576,393	687,479	891,571	1,179,995	1,554,260	1,658,886	30%	531,983	-250,854	1,877,076
	27																	
FX	28																	
	29																	
	30																	
	31																	
	32																	
Commodities	33																	
	34																	
	35																	
Credit Spread	36	26,664	223,568	84,406	64,389	76%	9	30,811	34,958	40,513	52,573	123,918	148,368	185,968	51%	110,262	-167,835	273,211
	37	46,231	161,255	82,559	34,702	42%	8	49,765	53,298	68,179	77,218	83,892	109,523	135,389	10%	45,338	-13,487	167,863
	38	0	121,482	65,338	35,718	55%	11	13,099	26,198	42,168	75,620	83,510	103,309	112,396	33%	51,902	-21,502	186,107
	39	35,993	224,960	94,922	69,773	74%	7	37,875	39,756	42,959	60,662	128,462	167,725	196,342	50%	151,851	-234,935	372,470
	40	8,830	82,115	47,055	20,475	44%	10	21,267	33,703	37,839	42,841	55,124	74,018	78,066	19%	27,908	859	112,489
	41	472,506	1,017,002	683,112	147,504	22%	11	492,142	511,778	628,448	662,242	738,784	807,552	912,277	8%	192,986	264,355	1,036,300
	42	91,733	416,981	246,664	115,181	47%	8	111,501	131,269	181,395	219,989	311,176	407,601	412,291	26%	148,695	-99,551	495,229
	43	567,561	1,070,268	781,122	143,034	18%	12	601,266	630,300	681,773	789,112	866,612	890,872	972,633	12%	151,520	489,651	1,095,730
	44	40,667	144,860	87,940	38,867	44%	11	43,620	46,572	54,909	79,916	118,764	139,935	142,398	37%	44,486	7,440	185,382
	45	75,093	225,652	145,574	51,751	36%	10	87,251	99,409	108,350	133,387	176,960	225,136	225,394	24%	79,207	11,809	328,639
	46	120	82,049	29,616	27,949	94%	9	312	503	15,975	20,628	34,819	69,924	75,987	57%	51,969	-82,139	123,335
	47	36,882	228,776	110,456	56,043	51%	10	48,580	60,278	64,817	113,949	139,680	150,812	189,794	37%	130,829	-137,505	385,810
	48	1,616	68,098	21,949	23,023	105%	9	2,954	4,293	5,054	8,884	31,696	50,877	59,488	72%	30,940	-39,457	84,302
	49	16,291	225,942	96,004	71,247	74%	9	24,449	32,607	43,619	60,689	129,568	184,940	205,441	50%	132,738	-190,888	340,063
	50	5,606	108,097	40,888	38,822	95%	9	8,212	10,817	13,807	22,077	53,525	103,083	105,590	59%	81,764	-110,004	217,053
	51	12,364	94,867	47,300	31,876	67%	6	14,197	16,031	22,305	45,016	65,104	80,853	87,860	49%	136,965	-233,442	314,418
	52	39,517	221,650	102,250	56,521	55%	7	51,199	62,880	82,384	91,025	99,397	149,865	185,758	9%	109,079	-128,911	307,405
	53	60,560	116,482	96,275	21,254	22%	6	66,641	72,721	87,059	102,318	111,079	113,786	115,134	12%	137,046	-175,921	372,262
	57	124,188	864,266	434,999	224,983	52%	12	145,999	174,674	300,056	412,249	520,086	751,560	811,974	27%	297,498	-239,269	950,723
	58	29,905	71,583	47,031	15,381	33%	8	30,596	31,287	36,949	44,232	52,898	68,987	70,285	18%	28,390	-18,599	94,960
	59	5,189	245,870	115,979	75,098	65%	10	27,185	49,181	60,547	105,773	156,266	214,913	230,391	44%	170,380	-210,872	470,648
CTP	54																	
	55																	
	56																	
ALL-IN no-CTP	60	127,493	1,792,980	1,133,598	557,693	49%	7	331,321	535,149	929,702	1,137,926	1,508,692	1,688,662	1,740,821	24%	556,577	-60,670	2,165,639
Equity Cumulative	61																	
IR Cumulative	62																	
FX Cumulative	63																	
Commodity Cumulative	64																	
CS Cumulative	65	596,876	1,030,631	847,816	140,664	17%	10	654,180	711,484	729,525	904,563	940,421	979,864	1,005,247	13%	190,874	516,566	1,280,060
CTP Cumulative	66																	

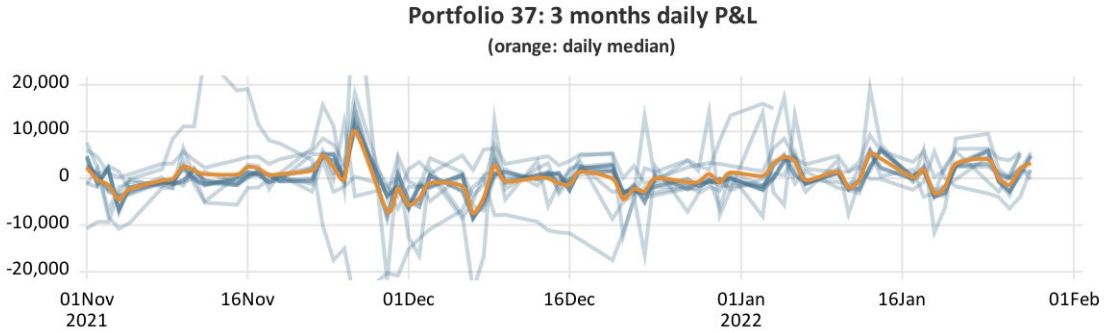
Table 46: IRC – modelling choice: source of LGD – >2 modelling factors

EU Statistics for IRC

		Other stats						Percentiles								Extreme Values range (Full Sample)		
	Port. ID	Min	Max	Ave.	STDev	Coefficient of variation (STDev/Mean)	Num obs.	5th	10th	25th	50th (Median)	75th	90th	95th	Interquantile range	STDev_trunc[1]	-2*STDev_trunc	+2*STDev_trunc
Equity	1																	
	2																	
	3																	
	4																	
	5																	
	6																	
	7																	
	8																	
	9																	
	10																	
Interest Rate	11																	
	12																	
	13																	
	14																	
	15	50,444	658,318	256,134	208,865	82%	7	61,596	72,747	103,573	242,214	317,409	476,715	567,517	51%	318,854	-363,723	911,691
	16	4,065	46,327	18,522	14,767	80%	10	5,060	6,056	7,283	13,349	24,914	40,507	43,417	55%	37,315	-49,392	99,866
	17	132,661	666,531	356,909	221,201	62%	9	137,121	141,580	178,007	223,107	504,529	663,348	664,939	48%	282,415	-195,371	934,291
	18	193,017	1,354,013	673,303	493,913	73%	9	205,946	218,875	287,533	403,650	1,232,876	1,317,413	1,335,713	62%	486,207	-344,615	1,600,215
	19																	
	20																	
	21																	
	22																	
	23	13,521	267,529	82,579	98,581	119%	8	13,834	14,148	22,650	31,253	104,035	225,738	246,634	64%	102,230	-107,136	301,786
	24	759,281	1,170,823	926,951	166,654	18%	8	766,490	773,698	798,946	866,886	1,050,053	1,156,057	1,163,440	14%	221,458	371,873	1,257,706
	25																	
	26	201,455	1,839,869	836,863	647,371	77%	9	214,862	228,269	311,044	720,954	1,382,475	1,738,961	1,789,415	63%	531,983	-250,854	1,877,076
	27																	
FX	28																	
	29																	
	30																	
	31																	
	32																	
Commodities	33																	
	34																	
	35																	
Credit Spread	36	20,565	133,250	52,676	35,964	68%	10	21,489	22,414	26,717	38,272	70,641	90,381	111,816	45%	110,262	-167,835	273,211
	37	21,870	92,803	69,258	21,237	31%	9	35,475	49,080	59,622	76,874	82,828	85,821	89,312	16%	45,338	-13,487	167,863
	38	52,057	164,652	101,434	41,622	41%	9	54,118	56,179	77,197	85,030	129,308	159,129	161,890	25%	51,902	-21,502	186,107
	39	20,601	257,353	86,819	76,536	88%	9	21,243	21,884	37,356	59,679	125,520	161,738	209,545	54%	151,851	-234,935	372,470
	40	36,001	102,341	64,789	23,182	36%	9	37,910	39,819	44,123	57,042	79,889	90,370	96,355	29%	27,908	859	112,489
	41	451,134	1,016,205	693,803	174,837	25%	8	508,547	565,961	616,304	642,576	736,757	917,782	966,994	9%	192,986	264,355	1,036,300
	42	101,850	330,502	193,994	59,470	31%	9	129,139	156,428	172,095	193,546	197,839	225,208	277,855	7%	148,695	-99,551	495,229
	43	693,688	1,053,613	818,083	131,957	16%	8	699,582	705,476	715,503	768,986	893,145	988,966	1,021,289	11%	151,520	489,651	1,095,730
	44	35,600	150,832	94,441	43,206	46%	10	36,899	38,198	60,212	94,854	130,723	149,649	150,240	37%	44,486	7,440	185,382
	45	51,903	246,770	164,497	67,410	41%	9	59,145	66,388	122,960	189,765	206,698	221,941	234,356	25%	79,207	11,809	328,639
	46	664	62,032	20,278	23,215	114%	10	736	809	2,280	9,805	34,259	55,121	58,576	88%	51,969	-82,139	123,335
	47	49,664	184,914	118,972	51,367	43%	8	53,899	58,133	82,444	119,240	156,933	179,766	182,340	31%	130,829	-137,505	385,810
	48	3,263	82,062	24,845	24,790	100%	10	3,690	4,117	5,772	16,756	35,524	47,975	65,019	72%	30,940	-39,457	84,302
	49	11,186	247,355	95,474	91,645	96%	10	15,245	19,305	35,317	54,829	149,112	245,088	246,221	62%	132,738	-190,888	340,063
	50	4,599	141,544	54,461	48,998	90%	10	6,211	7,824	9,816	48,018	84,589	116,268	128,906	79%	81,764	-110,004	217,053
	51	1,760	178,101	44,181	59,788	135%	9	4,366	6,973	8,724	16,324	50,848	119,395	148,748	71%	136,965	-233,442	314,418
	52	43,429	128,715	80,468	26,135	32%	8	49,125	54,820	61,032	83,979	89,351	105,110	116,912	19%	109,079	-128,911	307,405
	53	55,433	352,445	120,129	89,937	75%	9	63,915	72,397	84,954	90,499	101,348	181,921	267,183	9%	137,046	-175,921	372,262
	57	17,723	907,081	373,280	387,473	104%	10	39,152	60,582	82,968	123,403	793,742	896,844	901,962	81%	297,498	-239,269	950,723
	58	0	84,544	29,882	21,409	72%	11	4,273	8,545	22,750	27,985	34,649	38,181	61,363	21%	28,390	-18,599	94,960
	59	8,581	312,253	136,956	133,198	97%	9	10,868	13,155	14,895	71,874	267,049	294,805	303,529	89%	170,380	-210,872	470,648
CTP	54																	
	55																	
	56																	
ALL-IN no-CTP	60	399,353	2,160,232	1,110,482	593,870	53%	8	502,980	606,608	752,010	967,408	1,277,295	1,929,167	2,044,699	26%	556,577	-60,670	2,165,639
Equity Cumulative	61																	
IR Cumulative	62																	
FX Cumulative	63																	
Commodity Cumulative	64						1											
CS Cumulative	65	694,466	1,165,141	899,610	190,850	21%	9	698,428	702,391	716,316	889,898	1,093,013	1,147,412	1,156,277	21%	190,874	516,566	1,280,060
CTP Cumulative	66																	

Figure 31: Additional P&L charts with examples of low IQD




Portfolio 37: 3 months daily P&L
(orange: daily median)
20,000
10,000
0
-10,000
-20,000
01Nov 2021
16Nov
01Dec
16Dec
01Jan 2022
16Jan
01Feb

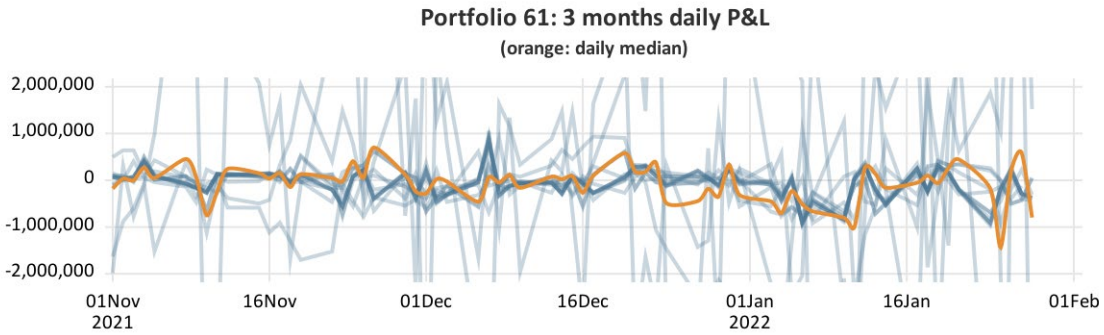
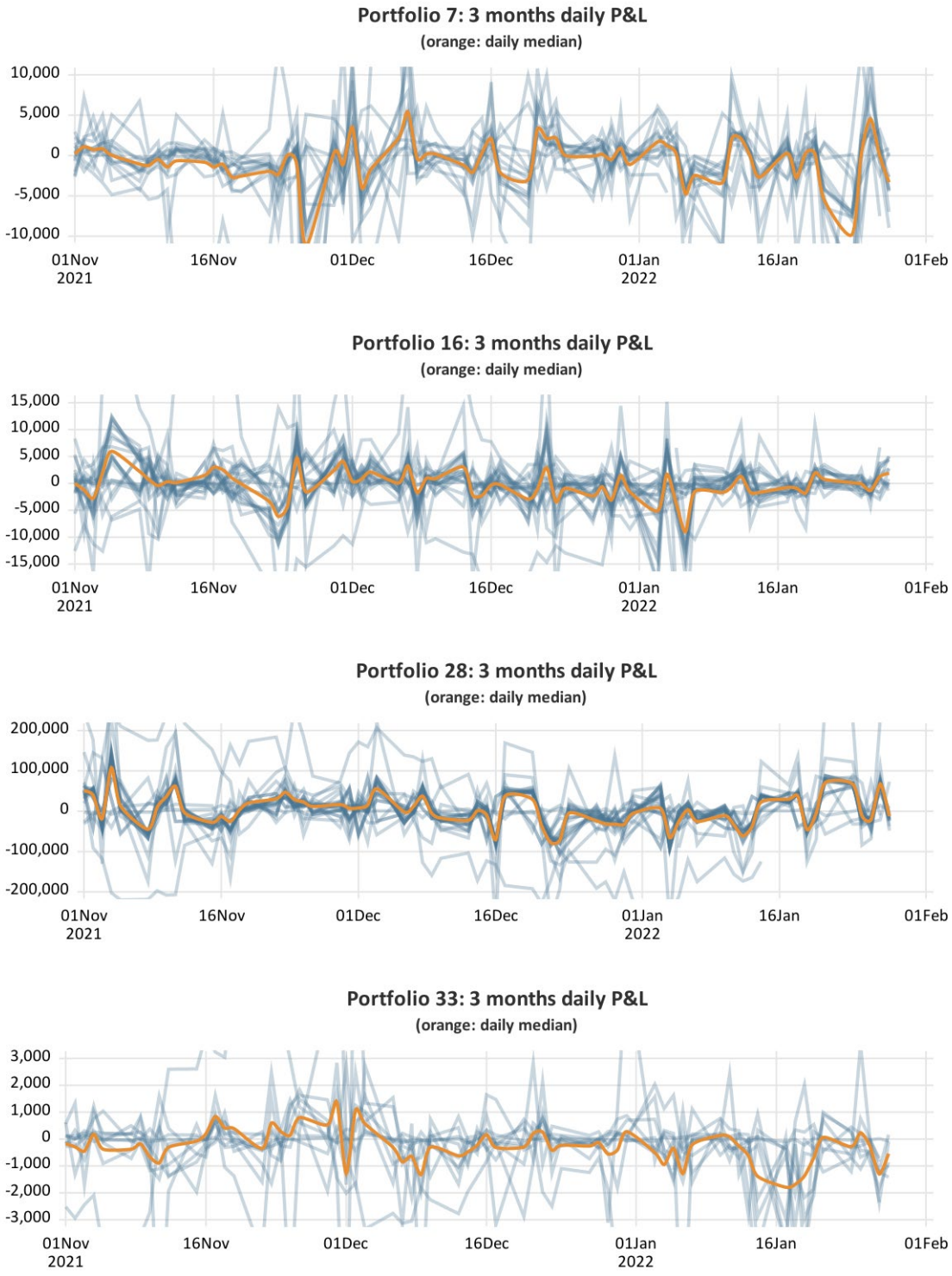
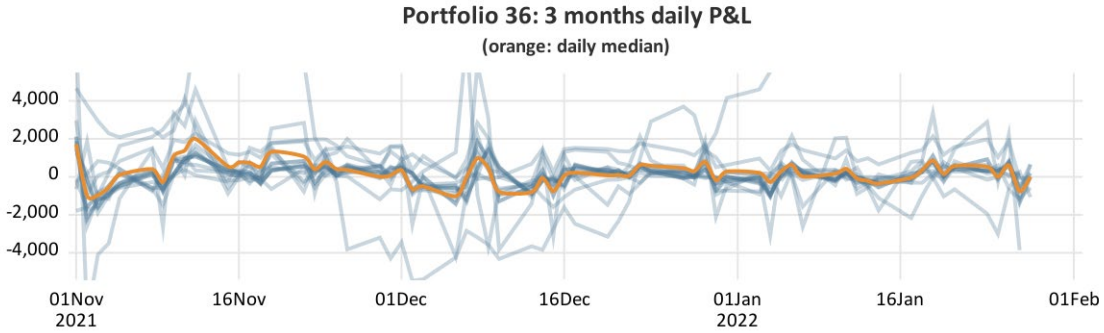

Portfolio 61: 3 months daily P&L
(orange: daily median)
2,000,000
1,000,000
0
-1,000,000
-2,000,000
01Nov 2021
16Nov
01Dec
16Dec
01Jan 2022
16Jan
01Feb

Figure 32: Additional P&L charts with examples of high IQD




Portfolio 36: 3 months daily P&L
(orange: daily median)
4,000
2,000
0
-2,000
-4,000
01Nov 2021
16Nov
01Dec
16Dec
01Jan 2022
16Jan
01Feb

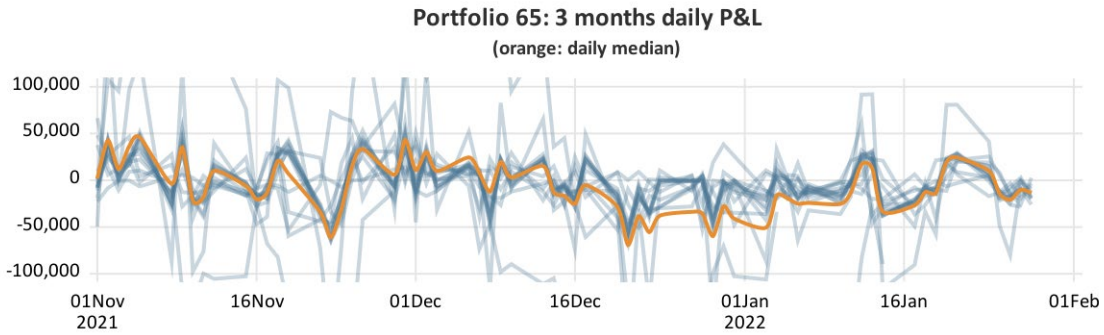

Portfolio 65: 3 months daily P&L
(orange: daily median)
100,000
50,000
0
-50,000
-100,000
01Nov 2021
16Nov
01Dec
16Dec
01Jan 2022
16Jan
01Feb

Figure 33: Comparison between IMV and truncated STD deviation method to select outliers for risk measures

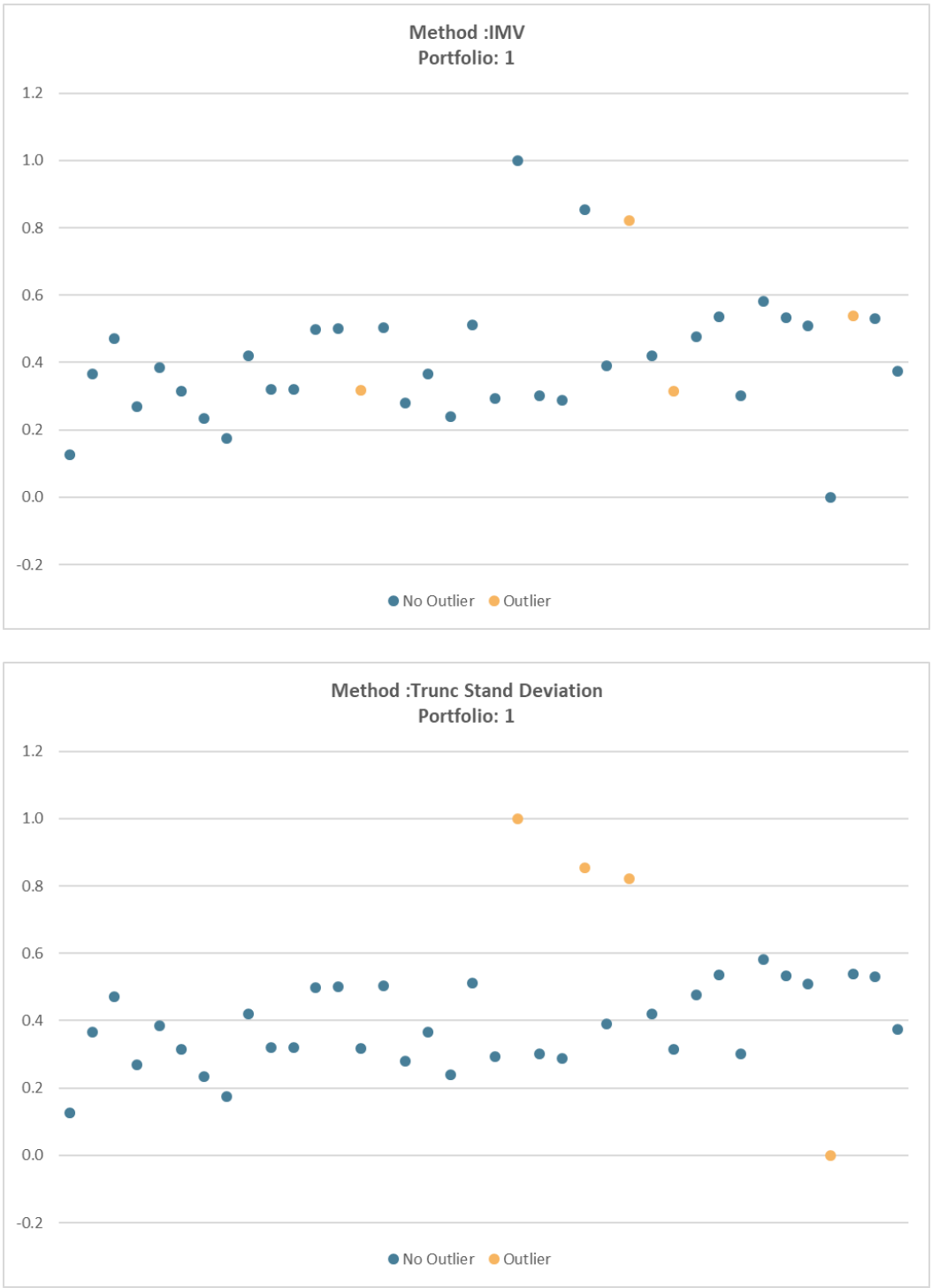


Figure 26. Example of dispersion in VaR submission for portfolio 1. Above the chart, marked in yellow: the portfolios which would have been excluded based on the IMV methodology outlier, which was used in 2019 (and before) to detect outliers among risk measures. Below the chart: the same submission, but marked in yellow, indicating the submissions that have been excluded in VaR and benchmarking statistics in the 2020 exercise (and onward) based on the +/- two times truncated standard deviation of the sample.

Table 47: EU Statistics for SBM OFR

EU Statistics for SBM OFR

		Main statistics								Percentiles			
	Port. ID	Min	Max	Ave	STDev	STDev_trunc[1]	MAD (median absolute deviation)	Coefficient of variation (STDev/Ave)	Num obs.[2]	25th	50th (Median)	75th	Interquantile range
Equity	1	212,677	63,863,753	11,752,254	15,768,134	29,199,730	1,280,040	134%	27	6,311,748	7,723,040	8,069,909	12%
	2	11,481,030	13,236,136	12,016,676	354,128	1,052,992	43,126	3%	23	11,904,728	12,003,256	12,036,695	1%
	3	24,357	47,946	33,918	6,245	7,152	4,414	18%	25	29,792	34,348	37,017	11%
	4	6,243	14,787	10,367	2,299	2,956	1,502	22%	23	8,522	9,632	12,057	17%
	5	5,290	4,367,161,487	1,927,130,335	1,310,442,068	3,581,972,230	1,289,564,617	68%	25	616,808,606	2,242,543,092	2,448,734,177	60%
	6	15,701	44,887	29,209	7,008	8,969	2,830	24%	24	26,747	30,012	32,622	10%
	7	79,457	303,099	166,391	65,554	74,290	40,039	39%	18	105,539	169,005	194,410	30%
	8	134,836	171,251	154,011	9,539	17,709	6,824	6%	21	148,000	154,913	159,606	4%
	9	81,240	256,462	158,490	41,576	138,802	17,422	26%	25	139,289	141,837	191,925	16%
	10	1,024,690	1,894,351	1,288,021	344,414	487,693	63,124	27%	21	1,070,612	1,102,134	1,379,415	13%
Interest Rate	11	347,307	382,000	355,157	6,826	42,999	759	2%	36	352,903	353,564	354,448	0%
	12	323,419	476,867	383,493	37,278	59,107	16,991	10%	31	364,681	385,389	400,594	5%
	13	332,121	384,000	360,107	17,529	20,819	5,983	5%	34	338,841	368,255	373,103	5%
	14	133,269	177,275	156,888	9,059	13,176	1,881	6%	34	151,554	159,098	159,886	3%
	15	161,069	836,010	530,490	194,603	231,495	65,036	37%	14	498,341	563,256	597,925	9%
	16	95,822	292,000	216,358	57,630	63,232	41,563	27%	29	204,491	218,867	262,510	12%
	17	255,558	534,275	418,950	64,383	92,970	16,004	15%	26	397,853	400,237	452,552	6%
	18	210,005	531,981	407,046	76,436	109,737	26,574	19%	26	389,481	392,528	460,340	8%
	19	395,127	425,000	409,845	5,481	17,156	2,743	1%	34	407,061	410,464	412,484	1%
	20	261	44,061	23,226	5,323	25,069	72	23%	36	22,956	23,019	23,143	0%
	21	1,050,417	1,175,593	1,086,493	31,599	59,006	3,507	3%	36	1,071,319	1,074,342	1,079,308	0%
	22	481,611	772,220	603,411	54,181	138,186	20,435	9%	33	576,181	606,530	612,509	3%
	23	138,663	341,567	221,277	73,908	73,575	75,873	33%	34	143,660	240,750	281,393	32%
	24	75,696	299,473	200,332	62,940	70,665	56,702	31%	25	148,251	206,496	259,629	27%
	25	304,053	514,436	399,293	68,887	67,799	58,464	17%	33	325,520	424,684	465,272	18%
	26	165,247	417,032	367,417	46,624	125,705	7,497	13%	28	369,125	376,112	388,223	3%
	27	18,874	1,871,168	1,090,477	581,659	556,860	742,181	53%	32	546,677	777,929	1,642,930	50%
FX	28	1,180,519	1,274,065	1,216,244	20,373	150,607	7,149	2%	31	1,200,995	1,217,104	1,224,273	1%
	29	92,890	108,737	98,174	3,490	6,093	1,175	4%	27	96,414	97,528	99,166	1%
	30	956,993	1,293,461	1,103,642	90,826	96,982	53,220	8%	28	1,049,836	1,106,704	1,149,096	5%
	31	1,145,240	1,495,939	1,399,404	76,472	357,854	37,011	6%	28	1,371,872	1,415,898	1,452,359	3%
	32	1,252,028	1,726,673	1,495,664	93,980	154,920	37,675	6%	27	1,459,713	1,519,059	1,538,796	3%
Commodities	33	37,709	230,946	144,748	84,781	84,781	40,327	59%	14	60,155	188,094	224,847	58%
	34	889,330	1,193,802	966,784	91,664	125,848	40,141	10%	11	896,882	948,181	996,445	5%
	35	1,300,787	2,298,659	1,848,565	330,307	330,307	194,867	18%	13	1,602,871	1,716,914	2,218,913	16%
Credit Spread	36	23,815	38,559	35,977	3,433	7,167	1,209	10%	19	35,190	37,389	38,093	4%
	37	97,178	119,799	107,179	4,945	8,815	2,390	5%	16	104,868	106,161	109,665	2%
	38	75,008	101,660	84,284	5,687	11,644	2,281	7%	19	80,378	83,643	86,184	3%
	39	1,942	25,872	5,732	6,564	12,335	848	115%	13	2,345	4,834	5,443	40%
	40	188,652	225,548	209,438	9,715	29,172	4,739	5%	18	202,065	210,553	216,548	3%
	41	156,294	375,448	283,695	57,298	66,357	10,379	20%	20	266,634	277,964	305,324	7%
	42	84,025	222,780	152,555	56,823	62,791	58,485	37%	17	98,476	152,115	216,001	37%
	43	380,230	480,982	419,985	29,292	42,145	7,463	7%	20	401,415	407,066	437,601	4%
	44	110,891	179,838	131,227	25,228	29,383	4,304	19%	20	114,678	122,094	136,256	9%
	45	137,744	169,510	151,858	12,227	12,227	10,320	8%	20	140,080	148,673	163,527	8%
	46	70,113	206,785	146,011	50,629	57,556	43,566	35%	20	95,971	178,816	195,015	34%
	47	43,429	130,825	75,450	17,435	33,130	1,611	23%	15	73,405	74,799	76,273	2%
	48	79,340	279,919	171,632	65,034	60,071	64,696	38%	22	92,536	173,064	234,919	43%
	49	590	27,820	5,408	8,988	13,549	741	166%	15	856	1,790	5,420	73%
	50	41,474	82,101	53,177	13,333	29,861	2,246	25%	20	42,393	46,780	65,036	21%
	51	38,825	193,227	103,652	60,320	60,320	37,911	58%	17	43,722	76,736	160,106	57%
	52	56,468	300,088	138,196	78,201	119,278	62,454	57%	16	66,096	172,918	183,431	47%
	53	100,433	467,481	232,571	127,044	146,834	113,187	55%	16	108,047	268,089	340,903	52%
	57	692,920	935,126	767,940	43,662	94,393	8,054	6%	21	753,014	761,155	769,360	1%
	58	182,473	439,775	294,624	49,645	113,804	21,948	17%	19	267,832	300,838	316,829	8%
	59	531,530	781,940	616,827	75,972	157,747	25,447	12%	19	569,338	585,082	688,262	9%
CTP	54								3				
	55								2				
	56								2				
ALL-IN no-CTP	60	13,857,348	17,865,440	15,481,593	1,389,686	4,419,508	1,087,588	9%	10	14,071,714	14,962,202	16,089,329	7%
Equity Cumulative	61	181,509	60,341,278	13,270,242	12,445,056	26,130,976	664,924	94%	17	10,361,866	11,137,101	11,251,631	4%
IR Cumulative	62	835,739	1,729,531	1,291,512	182,904	252,924	71,137	14%	27	1,217,551	1,297,550	1,363,883	6%
FX Cumulative	63	1,536,769	3,071,549	2,129,748	285,101	595,363	43,498	13%	27	2,064,373	2,177,332	2,205,000	3%
Commodity Cumulative	64	862,568	1,333,103	1,032,009	154,691	404,280	72,029	15%	10	911,400	994,785	1,095,387	9%
CS Cumulative	65	921,909	1,504,554	1,143,253	150,479	265,397	100,495	13%	18	1,073,608	1,108,293	1,215,612	6%
CTP Cumulative	66								2				

[1] *STDev trunc* is the standard deviation computed excluding values below the *5th* and above the *95th* percentile

[2] Refers to the number of banks included in the computation of the statistics

*** For the aggregated portfolios (60 to 66), banks that reported at least a missing portfolio IMV among the ones composing the aggregate are not included in the computation of the benchmarks for that particular aggregate portfolio.*

Figure 34: Difference in total number of submissions

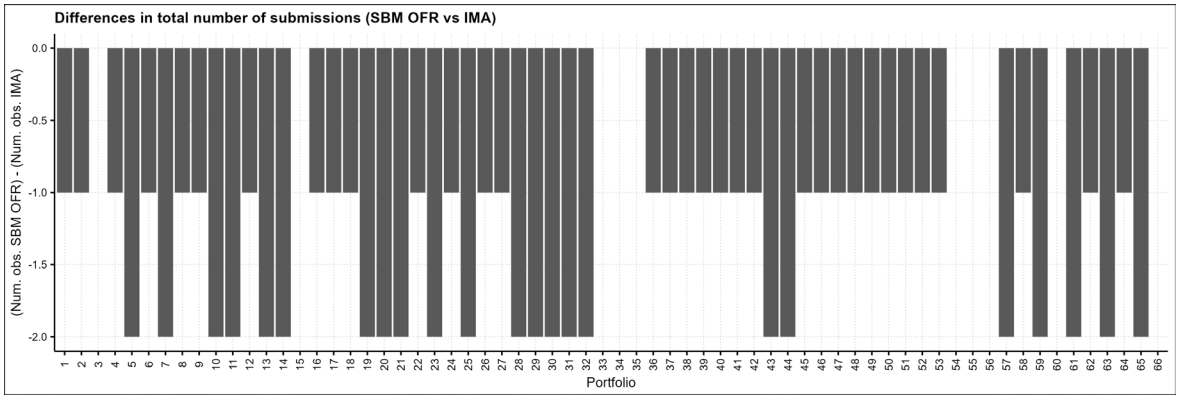
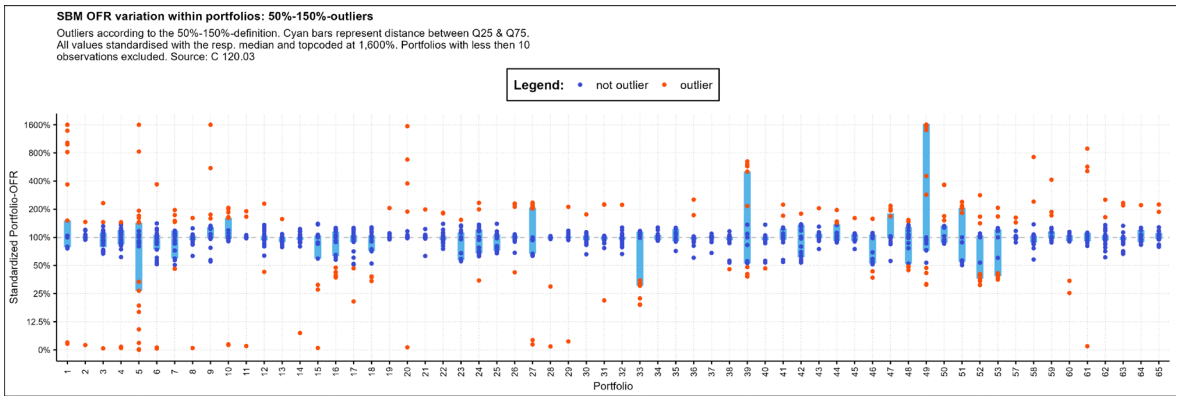


Figure 35: BM OFR variation within portfolios: 50%-150%-outliers

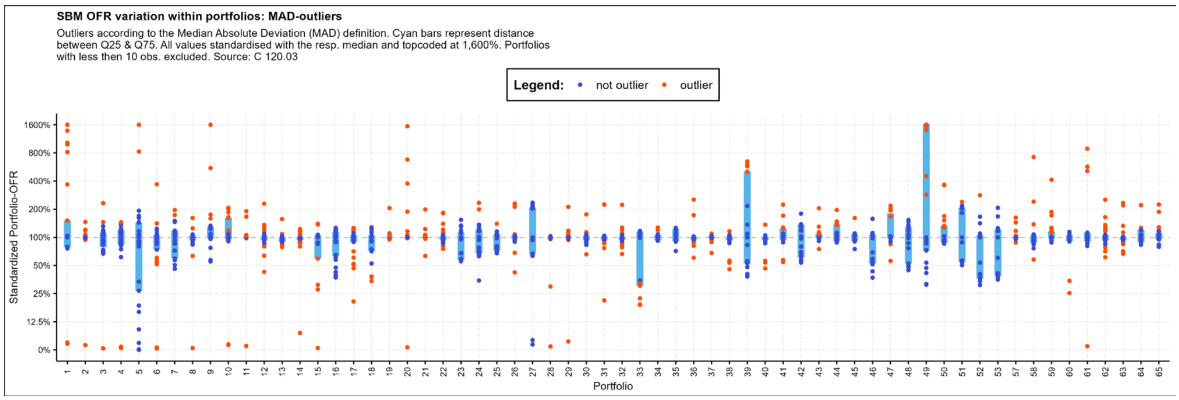


50%-150% outlier definition

• Outliers are defined as values outside the interval [0.5 · ex, 1.5 · ex].

• ex is the median of portfolio-OFRs.

Figure 36: SBM OFR variation within portfolios: MAD-outliers

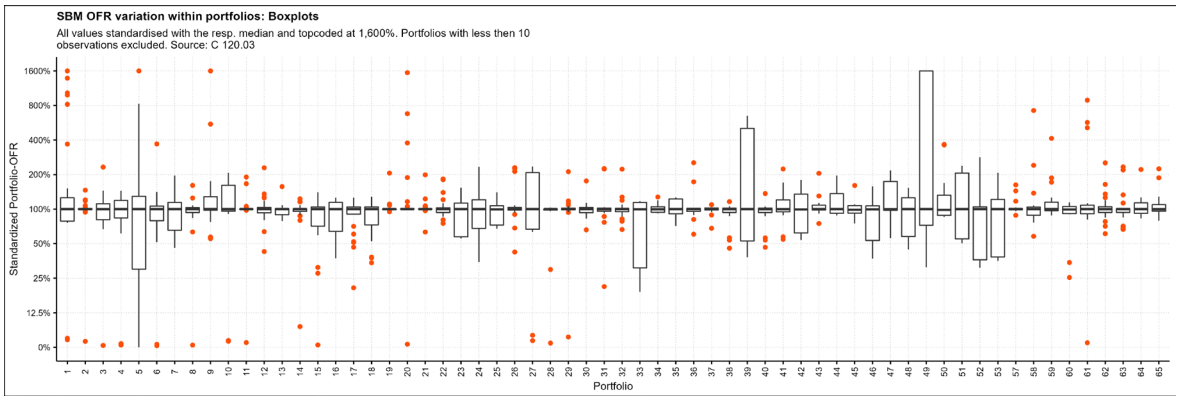


Median Absolute Deviation (MAD) outlier definition

• Outliers are defined as values outside the interval [ex − 2 ·MAD, ex + 2 ·MAD].

• MAD is the Median Absolute Deviation, i.e., MAD = median(|xi − ex|), where xi are the OFR observations of the respective portfolio and ex is their median.

Figure 37: SBM OFR variation within portfolios: Boxplots



Boxplots with 1.5 IQR outlier definition

• Outliers are defined as values outside the interval [Q25 − 1.5 · IQR,Q75 + 1.5 · IQR].

• IQR is the Interquartile Range, i.e., IQR = Q75 − Q25.

Figure 38: SBM OFR variation within EQ portfolio (EBA outliers' definition)

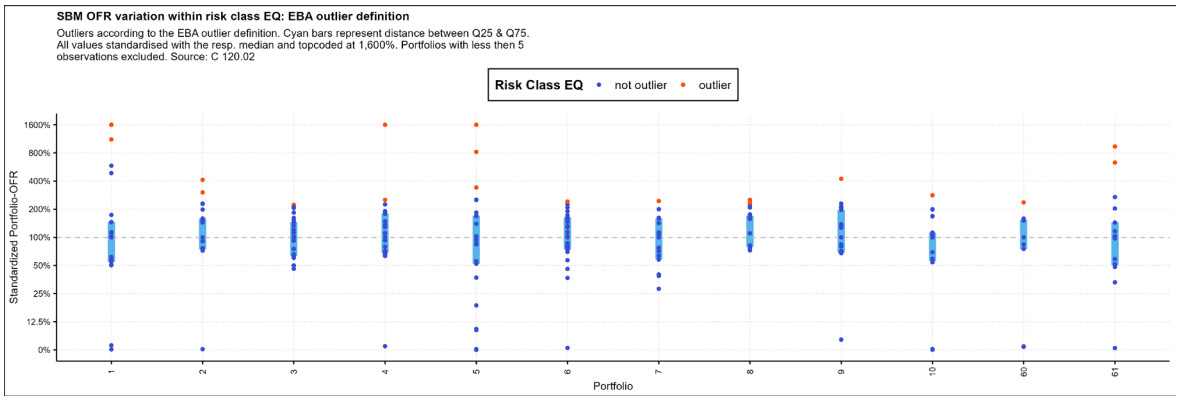


Figure 39: SBM OFR variation within FX portfolio (EBA outliers' definition)

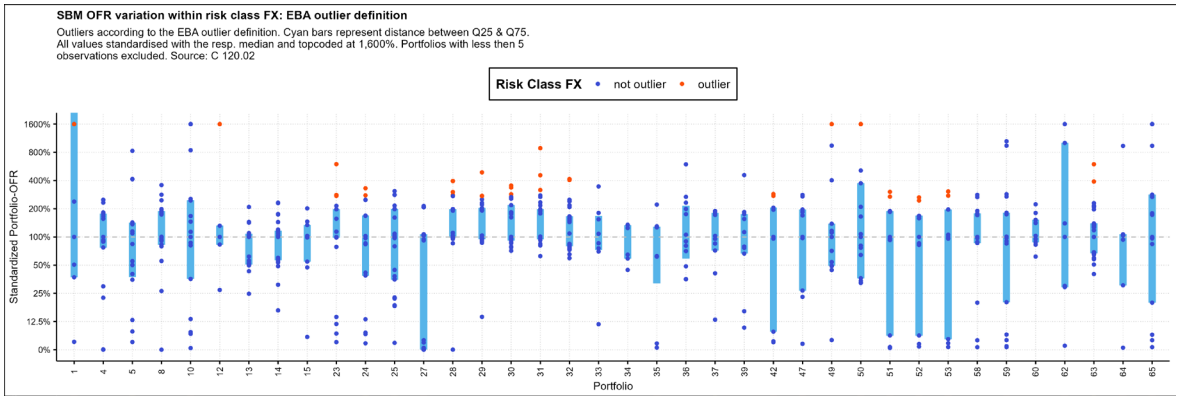


Figure 40: SBM OFR variation within GIRR portfolio (EBA outliers' definition)

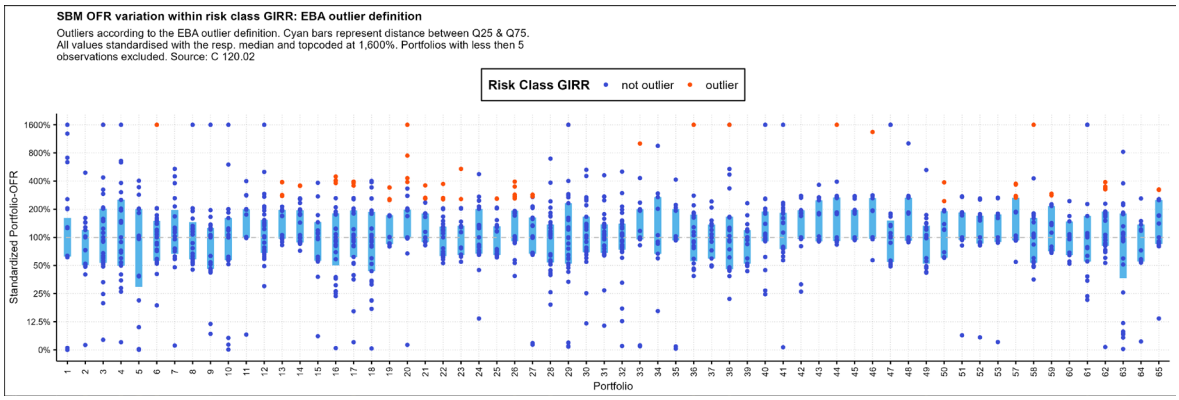


Figure 41: SBM OFR variation within CS portfolio (EBA outliers' definition)

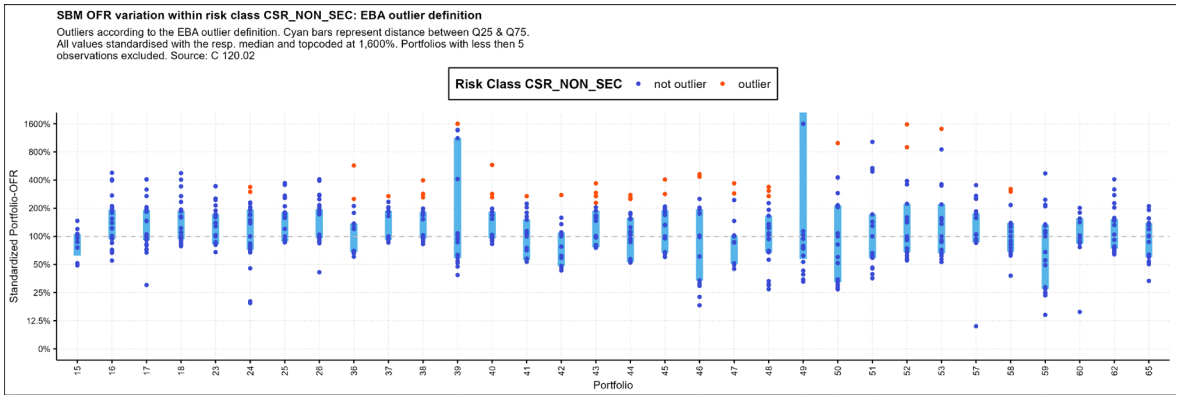


Figure 42: SBM OFR variation within CO portfolio (EBA outliers' definition)

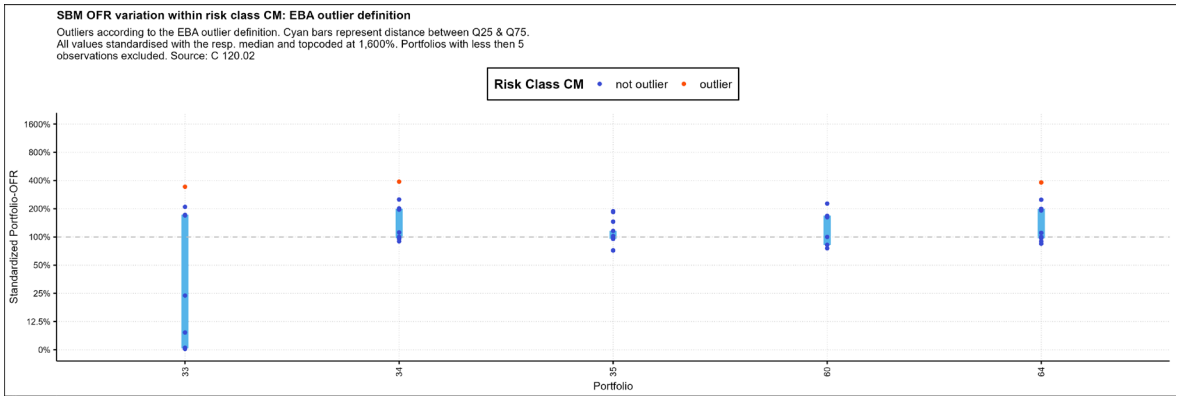


Figure 43: SBM OFR VaR and SVaR variation within portfolios: Interquartile Dispersion (IQD)

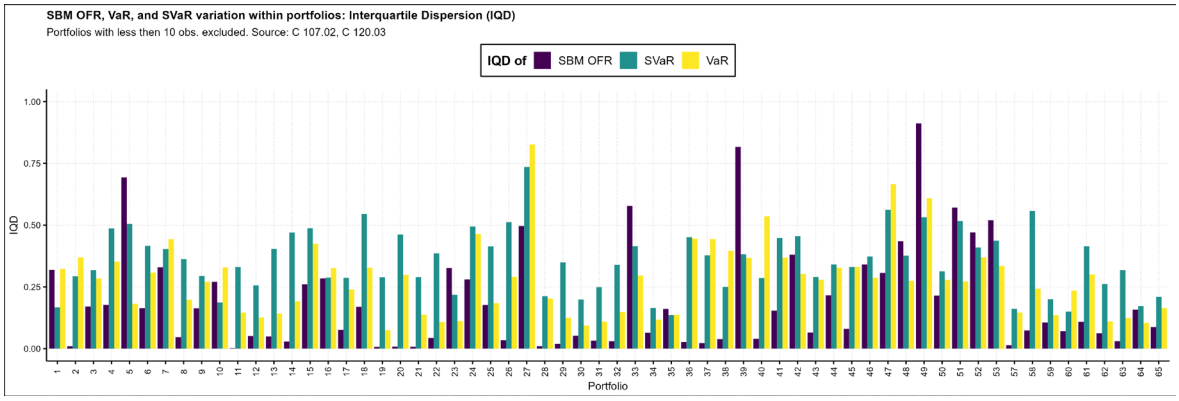


Figure 44: IQD-Ratio of SBM-OFR to VaR

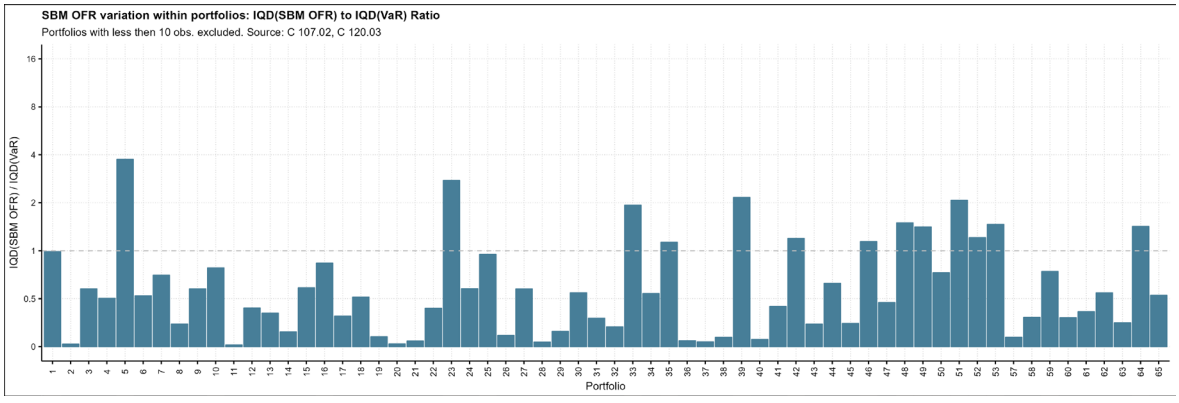


Figure 45: SBM OFR VaR and SVaR variation within EQ portfolios: Interquartile Dispersion (IQD)

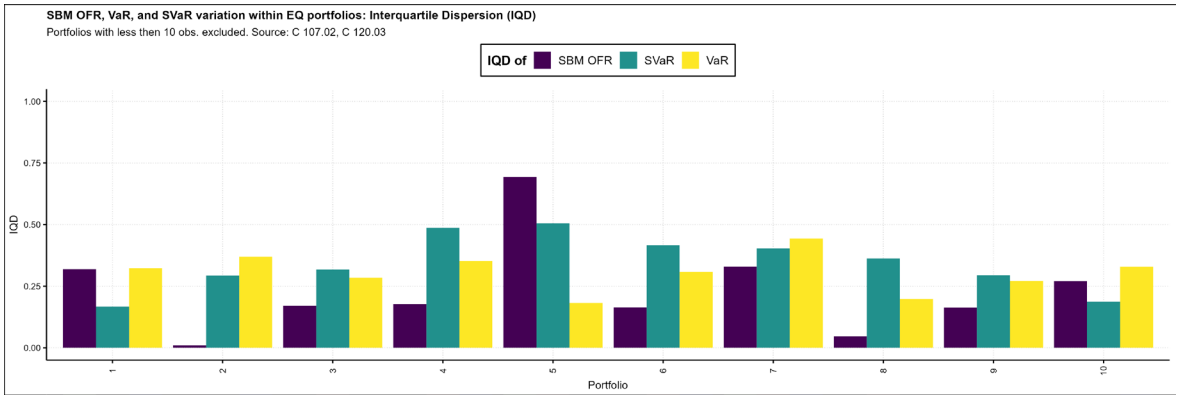


Figure 46: SBM OFR VaR and SVaR variation within IR portfolios: Interquartile Dispersion (IQD)

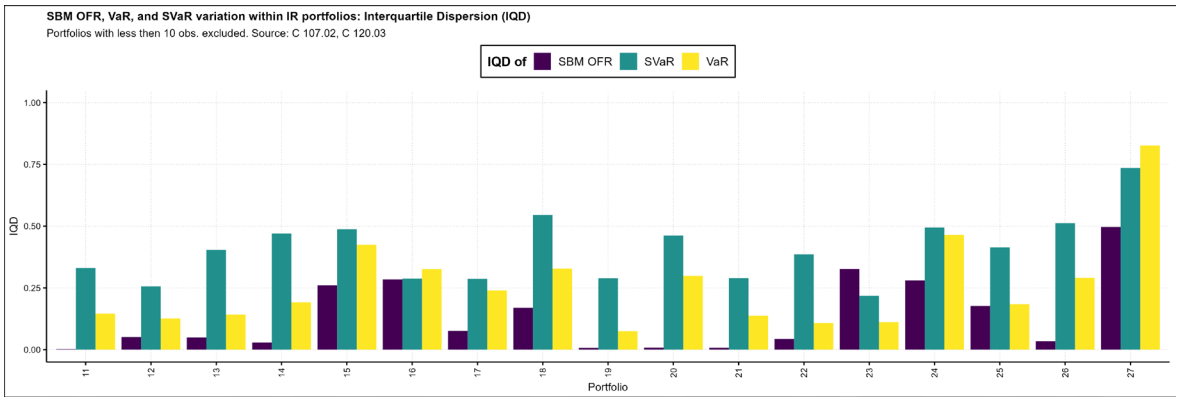


Figure 47: SBM OFR VaR and SVaR variation within FX portfolios: Interquartile Dispersion (IQD)

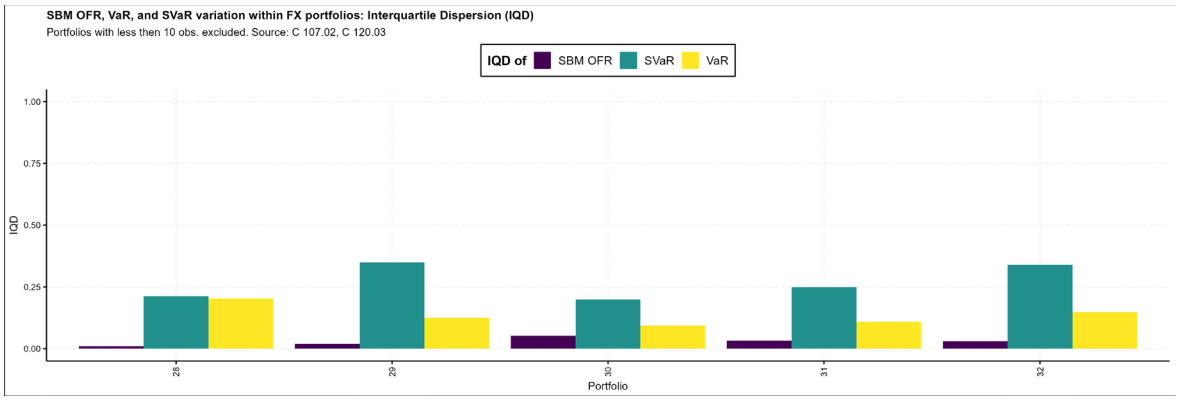


Figure 48: SBM OFR VaR and SVaR variation within CO portfolios: Interquartile Dispersion (IQD)

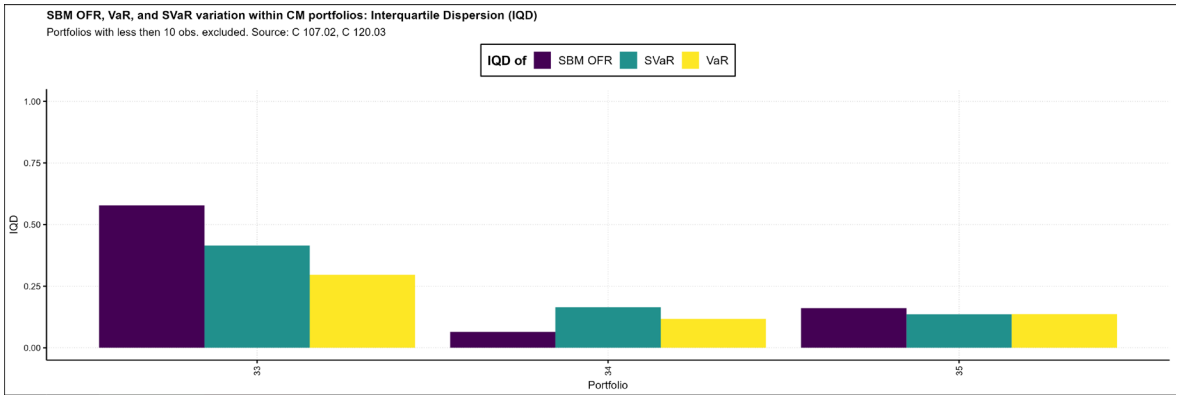


Figure 49: SBM OFR VaR and SVaR variation within CS portfolios: Interquartile Dispersion (IQD)

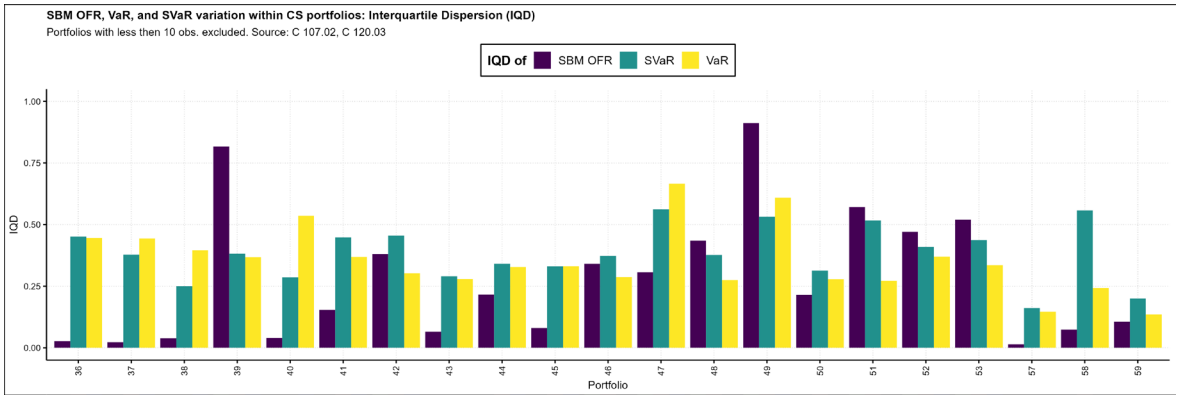


Figure 50: Frequency of SBM risk component within SBM risk classes relative to total number of submissions per portfolio

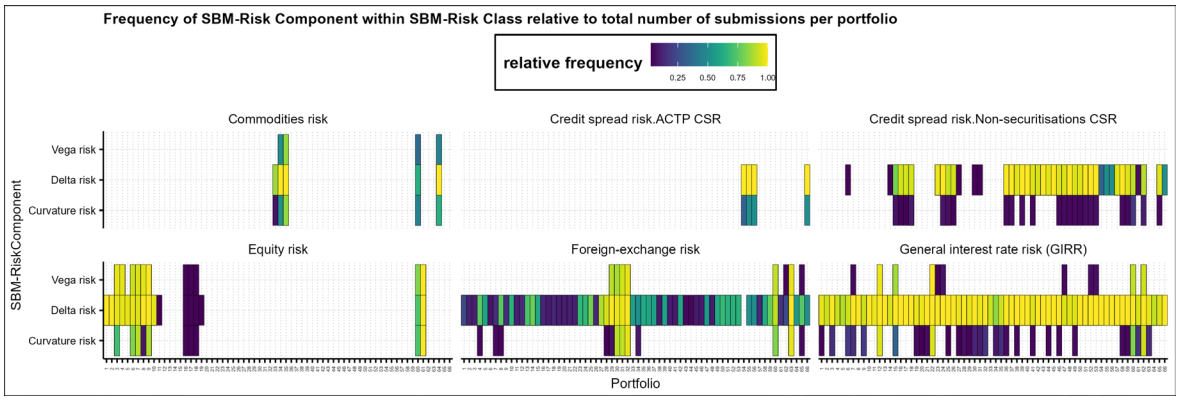
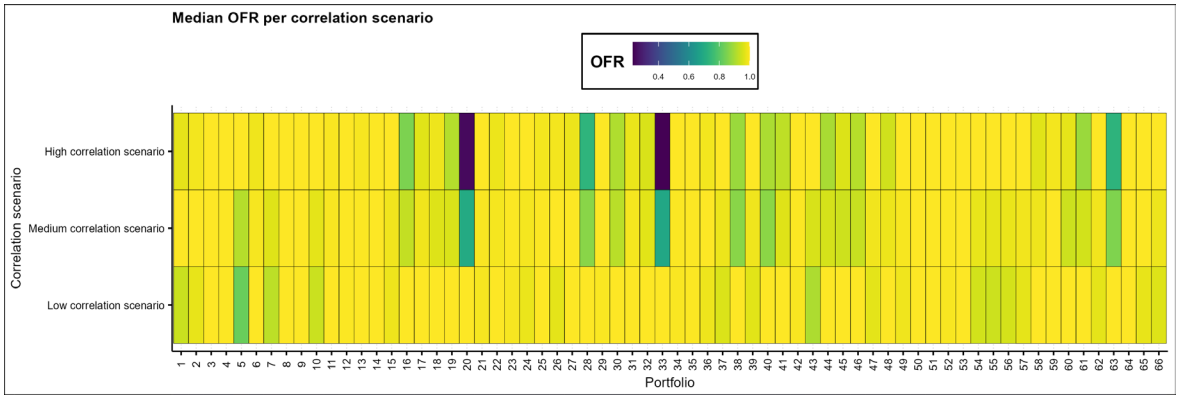


Figure 51: Median OFR per correlation scenario


Median OFR per correlation scenario
OFR
0.4
0.6
0.8
1.0
High correlation scenario
Medium correlation scenario
Low correlation scenario
Correlation scenario
Portfolio

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