Basel Committee
on Banking Supervision

Regulatory Consistency Assessment Programme (RCAP) – Second report on risk-weighted assets for market risk in the trading book

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BANK FOR INTERNATIONAL SETTLEMENTS

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Abbreviations

BCBS	Basel Committee on Banking Supervision
CDO	Collateralised debt obligation
CDS	Credit default swap
CRM	Comprehensive risk measure
CS01	Credit spread sensitivity
CTP	Correlation trading portfolio
FtD	First to default
FX	Foreign exchange
G-SIB	Global systemically important bank
HPE	Hypothetical portfolio exercise
IMV	Initial market value – valuation of portfolios at start of exercise (3 June 2013)
IPD	Interpercentile distance
IRB	Internal ratings-based
IRC	Incremental risk charge
IRS	Interest rate swap
JtD	Jump to default
LGD	Loss given default
Max	Maximum
Min	Minimum
mRWA	Market risk risk-weighted asset
OTC	Over the counter
PD	Probability of default
Phase 1	Hypothetical portfolio exercise of SIG TB Subgroup in 2012
Phase 2	Hypothetical portfolio exercise of SIG TB Subgroup in 2013
PV	Present value
P&L	Profit and loss
RCAP	Regulatory Consistency Assessment Programme
RWA	Risk-weighted asset
SFA	Supervisory formula approach
SIG	Supervision and Implementation Group
SSRC	Standardised specific risk charge
Stdev	Standard deviation
sVaR	Stressed VaR
TB	Trading book
VaR	Value-at-Risk

Introduction

Through its Regulatory Consistency Assessment Programme (RCAP), the Basel Committee on Banking Supervision (the Committee) monitors its members for timely adoption of the Basel III regulations, assesses the consistency of the adopted regulations with the Basel framework and analyses the quality and comparability of regulatory outcomes. The RCAP is fundamental to strengthening the resilience of the global banking system, maintaining market confidence in regulatory ratios, and providing a level playing field for internationally active banks.

The present report contains the results of Phase 2 of the analysis of banks' trading book risk-weighted assets (RWAs). The results of Phase 1 were released by the Committee in January 2013.[1] Phase 2 included a re-run of a number of Phase 1 portfolios and extended the analysis to more representative and complex trading positions drawn from all major asset classes: equities, interest rates, foreign exchange, commodities and credit.

The focus of the analysis was to identify the design elements of banks' internal models that contribute to the observed variability in trading book RWAs. No attempt was made to judge the correctness of the banks' modelling choices or to assess the compliance of supervisory approaches taken in different jurisdictions. Also, no attempt was made to identify an appropriate or acceptable level of variation in RWAs.

The analysis covered 17 banks in nine jurisdictions; all were internationally active and had substantial trading activities. Six of the participating banks received an on-site visit by an international team of supervisors. These visits allowed the Committee to better understand the key modelling choices and other factors that might underlie the observed differences in models' outcome. The analysis also used qualitative surveys to understand differences in banks' and supervisory practices.

As in Phase 1, the analysis in Phase 2 used hypothetical trading portfolios that allow testing for the impact of differences in modelling across banks by controlling for portfolio composition. It should be emphasised, however, that hypothetical portfolios show only the potential variation in RWA outcomes, not the actual variation.

Overall, the results of Phase 2 broadly confirm the findings of Phase 1. In addition, the Phase 2 results show that variability typically increases for more complex trading positions.

The executive summary presents the key findings of Phase 2 and policy responses being considered by the Committee.

[1] Basel Committee, *Regulatory Consistency Assessment Programme (RCAP) – Analysis of risk-weighted assets for market risk*, January 2013 (rev February 2013), www.bis.org/publ/bcbs240.htm. An analysis of banking book RWAs was published by the Basel Committee in July 2013: *Regulatory Consistency Assessment Programme (RCAP) – Analysis of risk-weighted assets for credit risk in the banking book*, www.bis.org/publ/bcbs256.htm.

Executive summary

Key findings of the analysis

The Basel standards deliberately allow banks and supervisors some flexibility in measuring risks, partly to accommodate differences in investment strategy and local practices but also to provide greater risk sensitivity. Some variation in RWAs should therefore be expected across banks. In addition, it is desirable to have some diversity in risk modelling practices; if all banks modelled in the same way, they could create additional financial instability. At the same time, it is undesirable for banks' capital calculation inputs to generate excessive variation in risk measurement, as it would undermine the credibility of capital ratios, distort the international playing field and hamper the functioning of financial markets.

Consistent with the findings from Phase 1, the results of Phase 2 show significant variation in the outputs of market risk internal models. For the two most diversified portfolios covered in the analysis, the standard deviation of the implied capital requirements is somewhere between 24% and 30% of the mean, depending on the portfolio and supervisory choices about multipliers (See Table 1 in the main text). In addition:

- The variability of value-at-risk (VaR) models and stressed value-at-risk (sVaR) models was generally found to be similar to that in Phase 1 for portfolios that were re-run. However, equity and commodity portfolios typically showed an increased level of variability for VaR and sVaR, which may reflect more volatile conditions in these markets since the Phase 1 exercise.
- The variation in outcome of IRC models has decreased relative to Phase 1 and is now more in line with other market risk internal models. This may reflect the fact that the passage of time has allowed industry practice to become more mature, and the jurisdictions of all participating banks have now implemented Basel 2.5.
- The impact on variation in RWAs resulting from supervisory choices has decreased relative to Phase 1, largely due to the lower range of multipliers applied by supervisors in 2013 relative to the 2012 analysis. The vast majority of variation found in this study therefore comes from the flexibility in modelling choices afforded to banks by the Basel standards; it also indicates that the impact of supervisory approaches over the multiplier on variations in RWAs can vary over time.

In addition, Phase 2 extended the analysis to correlation trading portfolios (CTPs). CTPs are hedged securitisation positions, which for most banks form legacy trading positions from the pre-2008 period.[2] The banks participating in the analysis were typically seeking to reduce their exposure to correlation trading. In the meantime, however, these positions can still incur large capital charges. The internal models-based approach for CTP is known as the comprehensive risk measure (CRM). The extension of the exercise to CTPs shows there is higher variation in the outcome of CRM than in the outcomes of the VaR, sVaR and IRC models. In addition, the highest variability of all the risk metrics for the CTPs was recorded by the standardised specific risk charge (SSRC), which forms the basis of a floor for the CRM result. The result for the SSRC corroborates the level of variability observed in banking book RWAs because all participating banks used internal model approaches of the banking book to calculate the SSRC.

[2] Correlation trading portfolios incorporate securitisation exposures and n-th-to-default credit derivatives, as defined by the Basel Committee in *Revisions to the Basel II market risk framework*, February 2011. The value of CTPs depends among other factors on the correlation of the underlying assets of the securitisation and the hedge.

Policy responses

The Phase 2 analysis confirms that differences in modelling choices are the most significant drivers of the amount of variation in market risk RWAs (mRWA) across banks. Thus, the analysis supports the types of policy recommendations that were identified in Phase 1 to reduce the level of variability in mRWA:

(i) improving public disclosure and the collection of regulatory data to aid the understanding of mRWAs;

(ii) narrowing the range of modelling choices for banks; and

(iii) further harmonising of supervisory practices with regard to model approvals.

However, considerable variation that is not due to modelling choices may remain in mRWAs. Notably, the findings for CTP show that the use of floors may not necessarily lead to less variability across banks if the floors are themselves based on modelled inputs.

In October 2013, the Basel Committee issued the second consultative document of the fundamental review of trading book policies that includes a series of measures that aim to narrow variability:

- moving from a VaR/sVaR approach to expected shortfall (ES) and fixing a number of modelling parameters, including the calibration period, the observation period and weighting schemes;
- constraining diversification benefits when aggregating risk factors to calculate capital charges;
- directly calculating the capital horizon with overlapping observations, rather than permitting scaling up from a one-day measure of risk;
- moving from an IRC model to a default-only model, thereby removing the migration model component, which was found to contribute the most to IRC variability (the proposal also includes additional constraints on the default modelling approach); and,
- removal of the option to use a model for CTPs and a new standardised approach to compute RWA for correlation trading portfolios.

The fundamental review will also seek to harmonise supervisory practices through the following elements:

- consistent P&L attribution and backtesting thresholds; and
- requirements for trading desk model approval;
- requirements for consistency (where appropriate) across supervisory-specified parameters; and
- consistent application of supervisory multipliers.

The Committee is also developing proposals to improve Pillar 3 disclosure requirements for banks. These proposals aim to improve comparability of the Pillar 3 information disclosed by banks and significantly enhance the quality, content and consistency of disclosures related to mRWA. This would facilitate users' understanding of remaining RWA variability across banks.

Overview of results of the hypothetical portfolio exercise

1.1 Rationale for the exercise

In Phase 1 of the HPE, the results of which were published in January 2013, participating banks were given a set of 26 hypothetical portfolios for which they were required to calculate a number of market risk internal model metrics (VaR, sVaR and IRC) over 20 trading days. Portfolios covered all the major market risk factors (equity, interest rate, foreign exchange, commodities, and credit spread). The exercise yielded important findings on the level of variability of market risk internal model outcomes, but the portfolios consisted of mostly simple ("plain vanilla") products. They did not include complex products and portfolios (such as the CTP), which, in addition to VaR and sVaR, are capitalised by the CRM model.

The Phase 2 exercise described in this report is intended to address the aspects of the market risk internal model approach that Phase 1 was not designed to investigate. The portfolios are significantly more comprehensive and include complex products, including the CTP; the Phase 2 exercise also re-runs a number of the plain vanilla portfolios included in Phase 1. The results of this more comprehensive exercise are thus based on a more realistic sample of trading book positions and provide a clearer view of the variability in the calculation of mRWA.

1.2 Overview of the hypothetical portfolio exercise structure

The Phase 2 exercise included seven CTPs (capitalised under the VaR, sVaR and CRM models with the application of a floor based on the SSRC), and 35 other portfolios (capitalised under the VaR, sVaR and IRC models) that included both plain vanilla and complex products in the five major asset classes: equity, interest rates, foreign exchange, commodities and credit spread.[3]

Following receipt of the results from participating banks in July 2013, along with completed questionnaires on their modelling methodologies, an international team of supervisors made on-site visits to six banks. During the visits, the team asked more detailed, tailored questions about each bank's model in order to better understand the drivers of differences in model results. On-site visits also helped to address any residual data quality issues so as to ensure the reliability and comparability of the data.

1.3 Summary of key findings on the level of variability of RWAs

1.3.1 Key findings on the level of variability of RWAs – non-CTPs

All 17 banks participated in the non-CTP part of the exercise, and the results broadly confirm the Phase 1 findings. The modelling of individual positions exhibited wide variations in some cases; but as portfolios became more diversified and therefore more representative of the mix of positions that could exist in a "real" trading book portfolio, the variations were reduced. This suggests that, as additional positions were added to narrowly focused portfolios, the wide variation for them did not increase but rather was reduced as idiosyncratic issues became less prominent. From a regulatory capital perspective, the result for the aggregate portfolios is the most important as it is at this level that regulatory capital requirements are generally determined.

The following key (ie strong or moderate) drivers of variability were identified:

[3] Details of the test portfolios are set out in Annex 3. The 35 non-CTPs consisted of a number of the Phase 1 portfolios together with new, more complex products identified by participating banks as being representative of the types of risks typically held in large trading books.

- For VaR and sVaR: as in Phase 1, the length of data period and the method used to aggregate general and specific risk.[4]
- For IRC: as in Phase 1, drivers with a strong impact on variability were the correlation assumptions, the probability of default assumptions and the choice for spread models or transition matrix-based models. Drivers with a moderate impact on variability were the liquidity horizon assumptions, valuation approach (full versus partial repricing) and the calibration of the transition matrix. In general it was found that the migration component was driving most of the variation in IRC results across banks.[5]

To enhance the findings on drivers of VaR variability, data in Phase 2 were collected to allow a VaR figure to be derived for each participating bank using consistent assumptions for the following variability drivers: length of data period, use of scaling, and calculation of the VaR percentile. The analysis of these data showed how much variability was caused by these variability drivers. When differences in the choices of these drivers were removed, the observed variability across banks fell by approximately one third; the remaining variability was due to differences in the profit-and-loss (P&L) histories banks calculated for the hypothetical portfolios (see Annex 5 for further analysis).

Three types of variation in modelling practice can impact the consistency of RWAs for non-CTP portfolios: variability of the model results for individual positions; variability in diversification benefit when positions are aggregated into a portfolio; and variability in the multiplier applied to model results to convert them to a capital requirement. Each of these areas was analysed separately.

(i) Variability of model results

Based on the test portfolio results, the level of variability in model results is broadly comparable across VaR and sVaR. IRC variability is slightly higher but significantly more comparable to that of VaR and sVaR than was the case in the Phase 1 exercise – relative to Phase 1 IRC variability is now significantly lower. In Phase 1 it was suggested that the greater IRC variability partly stemmed from its being a relatively new model for which there was less convergence in modelling practice. The lower variability in Phase 2 may reflect greater convergence over time and the fact that all models in the sample are regulator approved, whereas in Phase 1 some models were used for banks' management purposes only.

The Phase 1 report noted a possible cause of the variability of results from the IRC model: it uses a higher confidence level (99.9%) compared to VaR (99%). Phase 2 investigated the issue of confidence level by having banks apply the (lower) VaR and sVaR confidence levels to their IRC result for their largest diversified portfolio. These hypothetical IRC results were not materially different, which indicates that the higher confidence level may not be a significant cause of the variability of IRC results. In Phase 2, differences across IRC models in their treatment of sovereign positions also emerged as a driver of IRC variability.

There was some evidence that more complex products produced more variable model results, as might be expected given the greater range of more complex risk factors to be modelled.

4 Also as in Phase 1, drivers with a lower impact included the valuation approach, the scaling approach to calculate a 10-day VaR measure, the choice of whether to use absolute or relative returns and, for sVaR, the calibration of the stressed period and the use of antithetic data.

Regarding the 10-day VaR measure, using a 10-day square root of time rule to scale up the VaR measure appeared, as in Phase 1 of the HPE, to be more conservative than a direct estimation of the 10-day VaR. However, the difference in the two approaches seems to be due to market volatility during the course of the exercise and cannot be considered to hold under all circumstances.

5 Beyond the detail of model parameters, differences in the treatment of sovereign exposures were also identified as a driver, eg some jurisdictions allow banks to exclude sovereign exposures from the IRC model.

Finally, Phase 2 re-ran a number of Phase 1 portfolios (see Annex 3 for a full list) for which it was possible to investigate changes in variability over time. In general, for VaR and sVaR, the variability in the re-runs was similar to that in Phase 1. However, equity and commodity portfolios typically showed an increased level of variability for VaR and sVaR, which may reflect the more volatile conditions in these markets since the Phase 1 exercise.

(ii) Variability in diversification benefit

Phase 2 for the non-CTP portfolios consisted of seven diversified portfolios: one portfolio for each of the five asset classes; one (portfolio 29) consisting of only the less complex portfolios in the exercise; and one (portfolio 30) consisting of all portfolios in the exercise, regardless of complexity. Portfolios 29 and 30 were included to measure the variability of the diversification benefit and to determine whether that variability differs across asset classes.

The *median level* of the diversification benefit was broadly consistent across VaR and sVaR models for all portfolios, while the benefit was typically lower for IRC models. Consistent with Phase 1, the *variability* in diversification benefit was significantly higher for IRC than VaR and sVaR. All models, however, show a significant range of diversification benefit: for VaR and sVaR on portfolio 30, the diversification benefit ranged from 60% to 87%; for IRC, the range was from 31% to 79%.

Across asset classes, the portfolio results showed a lower diversification benefit for the foreign exchange and commodities portfolios compared with the portfolios for equities, interest rates and credit spread. However, the diversified commodity portfolio consisted of only two underlying portfolios, which may impact the reliability of this finding.

In contrast to Phase 1, the results in Phase 2 showed some evidence of a positive correlation between banks showing a higher diversification benefit in VaR and sVaR and those taking a similarly high benefit in IRC.

(iii) Variability in multipliers applied to the model result

As was the case in Phase 1, banks were requested to provide details of the VaR and sVaR multipliers prescribed by their local supervisors for calculating their regulatory capital requirement. These multipliers have a direct impact on that calculation because they act on the output of the VaR and sVaR models. The multipliers in Phase 2 showed a lower range than in Phase 1: for VaR, multipliers ranged from 3 to 4.2; for sVaR, the range was 3 to 4.5 (in Phase 1 the multipliers ranged from 3 to 5.5).

(iv) The combined impact of variability drivers on capital requirements

The above three types of variability combine to produce variability in the resulting capital requirement for a portfolio. For Phase 2, the implied capital requirement for the largest diversified portfolios (portfolios 29 and 30) were calculated twice: once with the actual supervisory multipliers and once with the supervisory multipliers harmonised to the minimum level of 3.

For portfolio 29, the capital requirements calculated for participating banks ranged from €8.6 million to €18.5 million when the actual multipliers were used, and from €8.0 million to €18.5 million with all multipliers set to 3 (Table 1).

For portfolio 30, the capital requirements calculated for participating banks ranged from €6.3 million to €19.7 million when the actual multipliers were used, and the range did not change when all multipliers were set to 3. Notably, the range of implied capital requirements for portfolio 30 increases relative to portfolio 29 when the complex portfolios are included.

Figure 1 shows that, as in Phase 1, the supervisory multipliers have an impact on the variability of implied capital requirements, but the impact is much lower in Phase 2. In Phase 1, the level of variability (measured as stdev/mean) in implied capital requirements fell from 31% to 23% when multipliers were set to 3, whereas in Phase 2 this measure remains at a broadly similar level. This suggests that the impact of these differences in supervisory approach can vary over time.

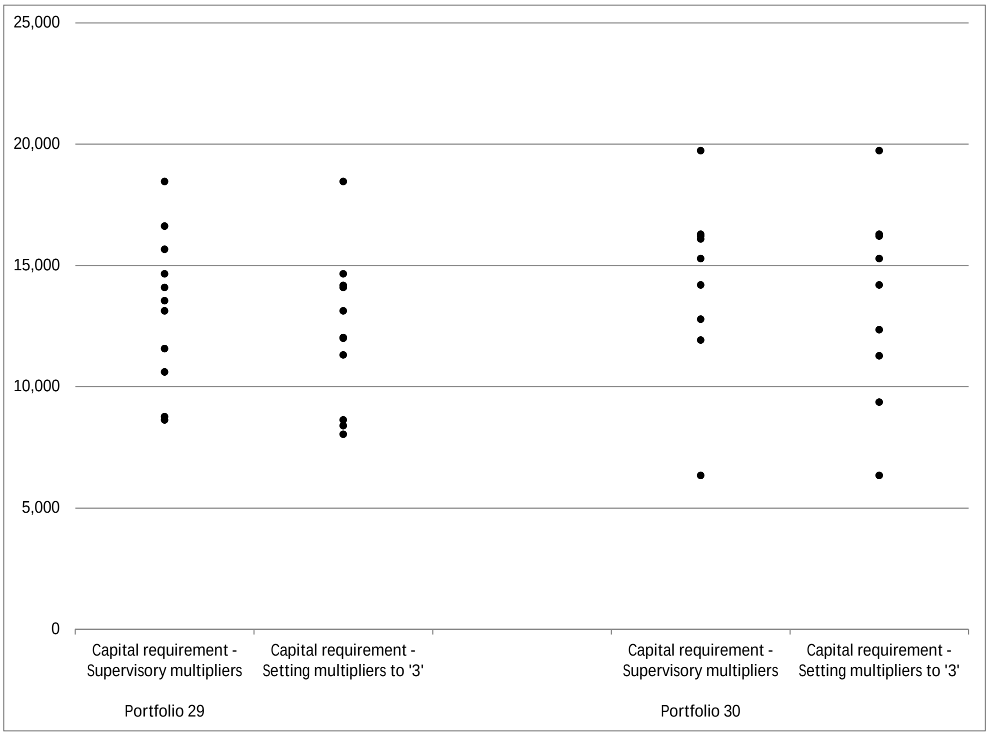
Implied capital requirements for portfolios 29 and 30 with and without actual multipliers

Thousands of euros except as noted — Table 1

	Implied capital requirement for diversified portfolio 29		Implied capital requirement for diversified portfolio 30	
	Using supervisory multiplier	Setting multipliers to 3	Using supervisory multiplier	Setting multipliers to 3
Min	8,628	8,036	6,337	6,337
Max	18,455	18,455	19,730	19,730
Median	13,541	12,027	15,276	14,193
Mean	13,244	12,260	14,312	13,445
Stdev	3,135	3,144	3,751	4,065
Stdev/mean	24%	26%	26%	30%
IPD (90%)/Median	58%	52%	40%	58%

Dispersion of implied capital requirements for portfolios 29 and 30

Thousands of euros — Figure 1



1.3.2 Key findings on the level of variability of RWAs – CTPs

Ten banks participated in the CTP part of the exercise, and most of them indicated that they are managing their CTPs in run-down mode. The four risk metrics relevant for the CTP showed significant variation. In general, greater complexity of products led to greater variation in the reported VaR and CRM but not in the reported sVaR and SSRC. The SSRC, in which all participating institutions used the supervisory formula approach (SFA) for securitisation exposures, exhibited the largest variability.

Overall, a relatively large number of variability drivers were identified for the CTPs, which seems indicative of the complexity of the positions and the associated risk modelling:

- For VaR and sVaR: completeness of risk factors (inclusion of base correlation as a risk factor in the VaR model), data updating frequency, the length of data period, and the selection of stress period for sVaR.
- For CRM: the correlation model between default/migration and spread movements, the choice over whether to age positions,[6] and modelling of stochastic LGD in pricing.

(i) Variability of model results

For the CTPs, the CRM model displayed significantly higher variability than the other market risk internal models; sVaR was less variable than CRM and more variable than VaR.

An increase in complexity of CTP products had a differential effect: it generally resulted in greater variation in the reported VaR and CRM but not in the reported sVaR and SSRC. The SSRC exhibited the largest variability of all the risk metrics. The result for the SSRC corroborates the level of variability observed in banking book RWAs because all participating firms stated that they used the SFA for calculating the SSRC, and the SFA is dependent on banks' own estimate of PDs and LGDs as used in the IRB approaches.[7]

(ii) Variability in supervisory adjustments

Four of the ten institutions participating in the study had higher VaR and sVaR multipliers, ranging from 3.1 to 4.5. As in the Phase 1 observations for the non-CTP, supervisory multipliers on VaR and sVaR tended to increase variability in RWAs. However, even when the effect of supervisory multipliers was removed, significant variability in VaR and sVaR was still observed. In addition to multipliers on VaR and sVaR, the CRM is subject to an additional regulatory adjustment in the form of either a surcharge or floor based on 8% of the SSRC. Application of the supervisory adjustment as a floor across all institutions showed limited effect on the hypothetical portfolios, as the floor was reached in only four out of 68 test portfolio cases.[8] In contrast, four of the ten institutions reported that the floor is binding for their actual CTP exposures, which illustrates that the results of the exercise are only indicative and should not be used to infer actual variation in RWA levels.

1.3.3 Key findings on the drivers of variability

To determine the modelling choices that appear to be significant drivers of variation in the Phase 2 results for risk metrics, a statistical test of significance (described in Annex 4) was employed, together with expert judgement. Judgement was required because statistical tests are subject to limitations, and features of the data can cause them to pick up spurious correlations or to underestimate correlations. In addition, drivers with a statistically significant correlation may not necessarily have a large impact on the risk metrics, as the absolute impact on risk metrics also depends on the variability of the driver. For example, a statistically strong VaR driver and a strong IRC driver might have different absolute impacts on the risk metric. Expert judgement was therefore applied to interpret the statistical tests and to overrule the results if needed, so that drivers classified as having "low", "moderate" or "strong" significance are also expected

6 The ageing of positions means that the profit or loss on a portfolio based on the simulated market movements in the model is calculated based on the time to expiry of each position at the end of the one-year capital horizon rather than using their time to expiry at the calculation date.

7 Basel Committee, *Regulatory Consistency Assessment Programme (RCAP) – Analysis of risk-weighted assets for credit risk in the banking book*, July 2013.

8 Seven portfolios for each of 10 institutions, minus one exclusion and one non-submission, equals 68 data points.

to have a corresponding impact on the risk metrics. In general, however, the results of the statistical analysis closely resembled the expert judgement and thus strengthened the robustness of the analysis.

(i) CTP variability drivers

The results of the statistical approach for each portfolio were aggregated to identify an overall set of drivers of variability for the CTP (Table 2). This was supplemented by expert judgement if the quality of the responses received was insufficient or the statistical analyses were not sufficiently conclusive. Drivers shown in bold in Table 2 were supported by statistical analysis; the others were determined solely by expert judgement. For CRM models, a relatively high number of drivers were identified, which seems consistent with the complexity of the CRM models.

The significance of modelling choices on variability of model results – CTPs Table 2

Model type	Low significance	Moderate significance	Strong significance
VaR	**Modelling approach: Historical simulation vs Monte Carlo**	**Returns methodology (absolute/relative/mixed)**	**Data updating frequency**[1]
	Valuation approach: full repricing vs grid vs sensitivity-based approximation		**Length of data period**[2]
	Approach to 10-day measure: square root of time vs 10-day overlapping returns		Completeness of risk factors (inclusion of basis correlation)[3]
sVaR		Scaling approach[4]	Stress period selection[5]
CRM	**Stochastic LGD in case of a simulated default**	**Credit spread dynamics: calibration frequency**	**Stochastic LGD in pricing**
	Correlation between spreads and base correlation (modelled?)	**Base correlation dynamics**	**Correlation between defaults/migrations and spreads**
	Inclusion of dynamic hedging[6]		Ageing of positions[7]
	Migration model: actual rating migration or modelled as spread jumps[8]	**Number of simulations**	
	"Constant position" vs "Constant level of risk"[6]	Liquidity horizon[9]	
	Credit spread dynamics: jump model of spreads[10]		

Note: Entries in bold are drivers determined solely by statistical analysis; the others were determined by both statistical analysis and expert judgement.

1 Expert judgement to increase importance from moderate to strong.

2 For bespoke products only. No importance for standardised products.

3 Expert judgement: two firms that did not include base correlation reported significantly lower VaR. The Basel framework does not require banks to model base correlation when this is not material for their portfolio.

4 Expert judgement due to insufficient number of responses received.

5 Expert judgement due to same response received across all firms.

6 Expert judgement to decrease importance.

7 Expert judgement to increase importance.

8 Moderate for bespoke products only. Low or none for rest of CTP.

9 All except one institution used the same value of liquidity horizon (1 year).

10 Moderate for FtD CDS only. Low or none for rest of CTP.

(ii) Non-CTP variability drivers

The results of the statistical approach were used together with expert judgement to identify an overall set of drivers of variability for non-CTPs.

The results broadly re-confirm the drivers identified in Phase 1, although in some cases the strength of the significance of each driver has been refined. Table 3 shows the statistically identified drivers of variability and their relative significance. Drivers shown in bold in Table 3 were supported by statistical analysis; the others were determined solely by expert judgement.

The significance of modelling choices on variability of model results – non-CTPs Table 3

Model type	Low significance	Moderate significance	Strong significance
VaR	Calibration methodology (use of absolute versus relative returns)	**Valuation approach (full revaluation or use of approximations)[1]**	**Length of data period for calibration (taking into account weighting scheme)**
		Risk factor granularity	**Aggregation approach (across specific and general risk)**
		Approach to 10-day measure: square root of time vs 10-day overlapping returns[2]	
sVaR		**Calibration of stress period and resulting stressed period used for risk metric**	
		Approach to 10-day measure: square root of time vs 10-day overlapping returns[1]	
		Use of antithetic data	
IRC	**Single vs multi-factor model[3]** **Number of simulations[3]**	**Liquidity horizon assumptions** **Calibration of transition matrix (internal/external)**	**Correlation among obligors** **PD for obligors**
		Calculation of P&L on migration events (full versus partial repricing)	**Modelling approach – spread models vs transition matrix**
		Sovereign risk modelling	

Note: Entries in bold are drivers determined solely by statistical analysis; the others were determined by both statistical analysis and expert judgement.

1 Expert judgement to decrease importance from strong to moderate.

2 Expert judgement to increase importance from low to moderate.

3 Expert judgement to decrease importance from moderate to low.

A small number of drivers of variability highlighted in Phase 1 have not been identified as drivers in Phase 2 (Table 4). However, their absence here is not necessarily conclusive. It may be due to the design of the exercise or to a too limited number of observations.

Drivers of variability in Phase 1 not identified as drivers in Phase 2 Table 4

VaR	IRC
Modelling approach (historical simulation vs Monte Carlo) – low impact in Phase 1	Recovery rate assumptions –moderate impact in Phase 1
Calculation of VaR percentile – low impact in Phase 1[1]	Inclusion of basis risk in the model –moderate impact in Phase 1

1 Although there was no evidence to support this as a driver in Phase 2, the P&L analysis (described in Annex 5) showed some evidence that Phase 2 results are affected by the choice of the VaR percentile.

Annex 1: Scope of exercise and sample of banks

Overview

The test portfolio exercise, which forms the basis of the analysis in this report, covered the following market risk internal models:

- VaR;
- stressed VaR (sVaR);
- IRC; and
- CRM.

The Phase 1 analysis did not cover the CRM model.

The exercise involved the voluntary participation of banks that have significant trading books and are already calculating regulatory capital requirements under Basel 2.5 internal models (sVaR and IRC, as well as CRM where applicable). Thus, most participants are global systemically important banks (G-SIBs). However, some banks from countries with no G-SIBs were included in the exercise because of the materiality of their trading activities relative to their domestic peers. Overall, the range of banks included in the exercise provided significant coverage of the jurisdictions in which banks with large trading books operate.

Participating banks received two sets of test portfolios, one focused on the CTP and one focused on the other market risk models. A total of 17 banks participated in the non-CTP exercise, and of those, 10 participated in the CTP exercise as well, as shown in the table below for each country with a participating bank.

Country	Number of banks participating	
	Non-CTP exercise	CTP exercise
Canada	1	0
France	2	2
Germany	1	1
Italy	2	0
Japan	1	1
Netherlands	2	0
Switzerland	2	0
United Kingdom	2	2
United States	4	4
Total	**17**	**10**

In addition to running their models on the test portfolios and submitting results, participating banks were asked to complete qualitative questionnaires. The questionnaires sought qualitative information on the methodology applied in banks' VaR, sVaR, IRC and CRM models that could support the analysis of the quantitative results.

Following the receipt of completed questionnaires and test portfolio results, six of the participating banks were selected to receive an on-site visit. On-site visit teams included typically five to eight members of the Basel Committee's Supervision and Implementation Group Trading Book (SIG TB) or colleagues from their jurisdictions plus a representative of the home supervisor. The on-site visits provided an opportunity to gain a deeper understanding of the bank's submitted test portfolio results and associated qualitative questionnaire to help identify the key reasons for differences in results.

The test portfolio exercise ran during the period 3–14 June 2013, with participating banks being requested to provide the results of their internal model for each test portfolio on each business day (for VaR) or once per week (for sVaR, IRC and CRM) during that period. The on-site visits took place in September 2013.

Limitations of the exercise

The Phase 2 exercise is more comprehensive than that conducted in 2012, but the limited number of banks in the exercise prohibits a robust statistical inference about the relative importance of drivers of variability. In any case, these drivers will vary across asset classes.

Similarly, for the test portfolio exercises to be practical, they could include only a small number of positions relative to the actual portfolios held by participating banks. Hence, the results are only indicative of the potential levels of variability in RWAs and should not be used to infer actual levels.

Data handling

The bank data were prepared for analysis in the following ways:

- Data from models not approved by regulators were excluded from the analysis.
- Outlier observations were considered for removal if there was a strong indication of an incorrect booking of the hypothetical portfolio (for example, if the initial market value differed widely from the mean or median initial market value).
- The banks were queried about all doubtful outlier observations—either in writing or during follow-up on-site visits. If the banks could not validate or revise those observations, they were removed.

The data preparation employed the "four-eye" review principle, and all exclusions were documented and justified by the analysis team. All data exclusions were shared with the national supervisors.

Annex 2: Detailed results

1. CTP – Analysis of test portfolio exercise results

1.1 Analysis methodology

The analysis of the test results for the correlation trading portfolio (CTP) focused on the following issues:

- the level of variability of each risk metric, whether modelled (VaR, sVaR, CRM) or standardised, across the industry, for common products in the CTP; and
- the assessment of drivers of risk metric variability based on regulatory requirements for internal models and on expert judgement (case-by-case modification).

For VaR, a simple average of the 10-day time series was taken. For sVaR, the CRM and the SSRC, a simple average of the two weekly results was taken.

Unless otherwise indicated, all figures reported are normalised with respect to the median of distribution across institutions.

Annex 4 describes the methodology for the Kendall's tau test used to supplement expert judgement in determining drivers of variability in the reported metrics. In some cases, supplementary analysis used Spearman's rank correlation.

1.2 Test portfolios

Because most institutions indicated that their CTP business is in wind-down mode, the exercise was limited to the most simple and liquid products. However, to understand the variability of results for more complicated products, the exercise included credit spread (CS01) hedged bespoke tranches, based on the iTraxx EU standard index tranches, that varied in one of the three possible dimensions[9] that are applicable regardless of pricing or risk model.

[9] Maturity, attachment and detachment point and obligor composition.

1.2.1 Portfolio description

The exercise covered seven CTPs:

Description of CTPs

Table 5

Portfolio number	Description
P1	Long position in spread hedged equity tranche of CDX.NA.IG index series 9 v4 (attachment point: 0%, detachment point: 3%)
P2	Long position in spread hedged mezzanine tranche of CDX.NA.IG index series 9 v4 (attachment point: 7%, detachment point: 10%)
P3	Short position in spread hedged super senior tranche of CDX.NA.IG index series 9 v4 (attachment point: 30%, detachment point: 100%)
P4	Spread hedged first-to-default CDS on basket of 5 obligors with a US tech sector focus
P5	Spread hedged bespoke synthetic CDO tranche referencing iTraxx Europe index series 9 with non-standard maturity
P6	Spread hedged bespoke synthetic CDO tranche referencing iTraxx Europe index series 9 with non-standard attachment and detachment points
P7	Spread hedged bespoke synthetic CDO tranche referencing 100 obligors with US and Europe mix

The seven portfolios were selected from an original portfolio of 52 trades on the basis of feedback from various institutions regarding materiality of the products under investigation. An all-in portfolio containing P1–P7 was not investigated because nearly all institutions indicated that it would not be representative of a real CTP.

Correlation and jump-to-defaults (JtD) were not hedged in the bespoke products (P5–P7) as they add yet another layer of variability and complexity to an already challenging problem. VaR, sVaR, CRM, and SSRC for completely unhedged versions of P1–P3 were examined to separate variability introduced by the plain vanilla hedging instruments.

1.2.2 Exclusions

Ten banks supplied data. Given that limited amount of data, individual results were excluded on a risk metric and portfolio basis:

Metric\Portfolio	Excluded institutions						
	P1	P2	P3	P4	P5	P6	P7
IMV	2 banks	3 banks	2 banks	3 banks	4 banks	2 banks	3 banks
VaR	No exclusions						
sVaR	No exclusions						
CRM	No exclusions	No exclusions	No exclusions	1 bank	No exclusions	No exclusions	No exclusions
SSRC	No exclusions						

Banks that supplied a 3 June 2013 initial market value (IMV) including the present value of the hedging instruments were excluded; however, exclusion from IMV did not automatically result in a bank's result being excluded from the rest of the study if there were reasonable assurances[10] that the bank had correctly booked its positions. Additional exclusions were made for obvious mistakes.[11] Risk metrics resulting from models without regulatory approval were automatically excluded. Exclusion from VaR automatically meant exclusion from sVaR.

After the initially excluded firms had the opportunity to confirm their results, only one bank for one portfolio was excluded from the study.

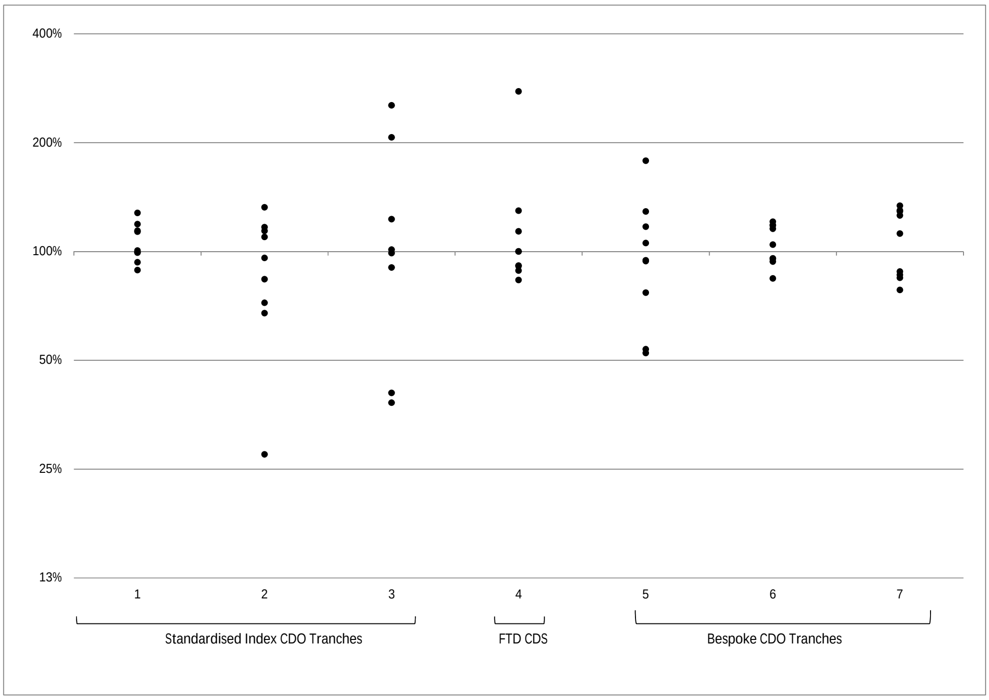
1.3 Key findings

1.3.1 Analysis of the variability of the hedge notional calculated by banks

CTPs are almost always spread delta hedged to allow traders to express views on spread convexity and default correlations. Therefore the exercise collected spread hedge notional information from each institution to assess the variability of hedging strategies.

Dispersion of normalised hedge notional results for correlation trading portfolio

Figure 2



For any tranche, the hedge notional is highly related to the recovery rate model within a bank's pricing model. Before models for stochastic recovery rates were introduced, deltas were related only to the way banks modelled PD, which varied little from one bank to another for banks using the Gaussian copula. The introduction of randomness in the recovery rate has potentially led to different distributions of {PD, LGD}. Therefore, discrepancies on the hedge notional may mainly reflect differences between LGD

[10] That is, all excluded banks submitted figures close to each other and had separately confirmed their result.

[11] Such as reports of IMV being higher than the sum of all undiscounted cash flows from the instrument.

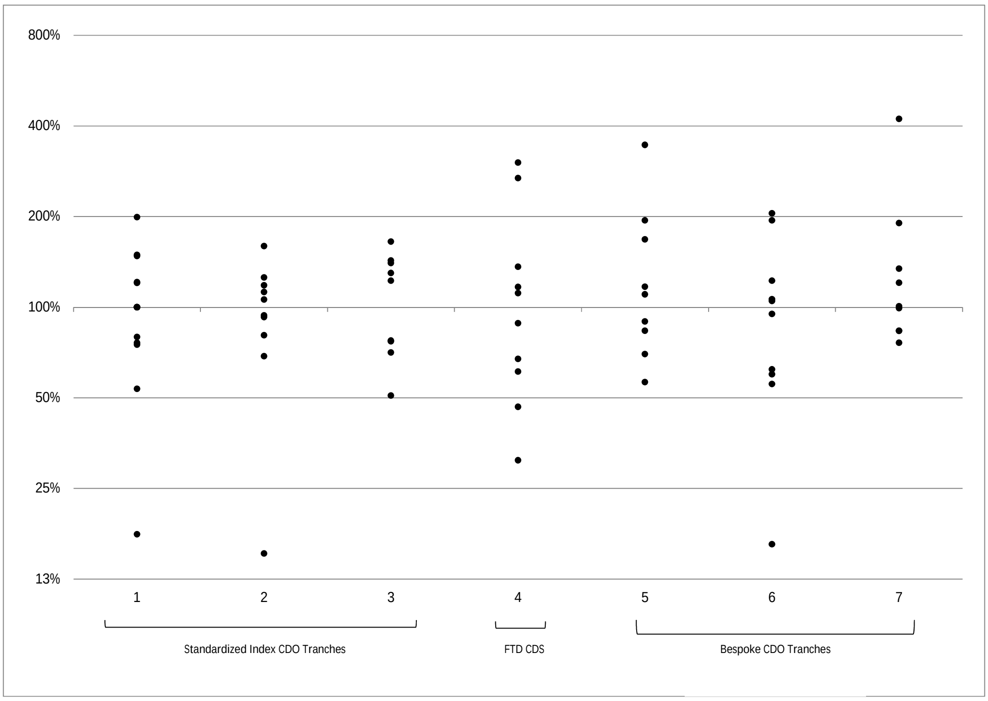
models used for pricing. This plays a significant role in CRM, which is a measure that incorporates default risk. JtDs will then differ from one bank to another as there is no uniform practice for hedging for JtDs of specific obligors. To further investigate the impact of hedging differences, supplementary analysis of risk metrics for completely unhedged tranches and the hedging instruments itself were conducted for P1–P3.

1.3.2 Cross-portfolio analysis of variability of VaR

VaR and sVaR figures include the spread hedges set by banks at the beginning of the exercise. As of the end of the exercise period, the efficiency of those hedges may differ from one bank to another. Therefore, VaR and sVaR figures are assumed to be primarily driven by the correlation risk factor. However, partial inefficiency of delta hedging together with convexity effects can influence the figures.

Dispersion of normalised VaR results for correlation trading portfolio

Figure 3

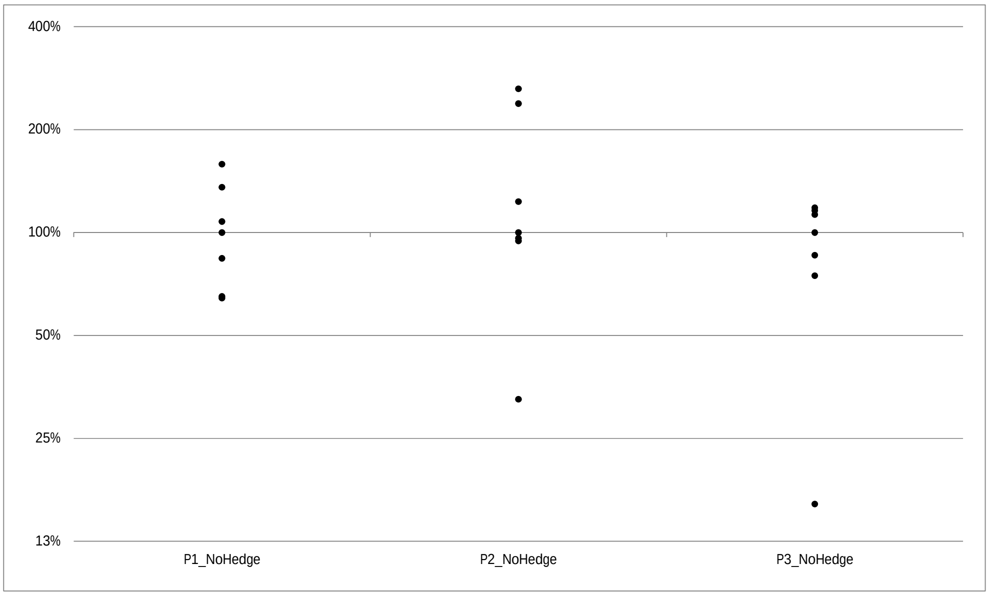


Variability on P4 is related to the fact the structured position is a first-to-default CDS referencing an illiquid distressed issuer; as such, one may expect large bid-ask spreads on the input market parameters as well as a varying degree of proxy methodology.

Unsurprisingly, bespoke products (P4–P7) exhibited much larger variably than standardised products (P1–P3). Two of the institutions contributed to most of the lowest figures because the base correlation was excluded as a risk factor in their approved VaR model. To further investigate the effect of hedges, unhedged versions of index tranches were examined (Figure 4).

Dispersion of normalised VaR results for correlation trading portfolio

Figure 4



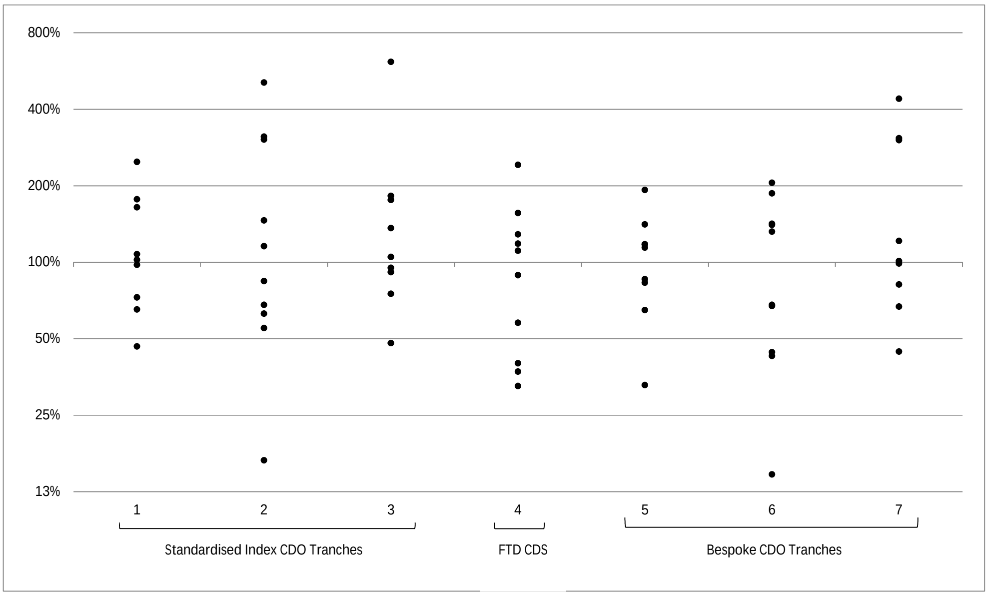
While removal of the hedging instruments reduced VaR variability in P1–P3, variability was increased in P2. Therefore, it can be concluded that a significant amount of variability exists in VaR, even without the spread delta hedges.

1.3.3 Cross-portfolio analysis of variability of sVaR

The VaR analysis was repeated for sVaR:

Dispersion of normalised sVaR results for correlation trading portfolio

Figure 5

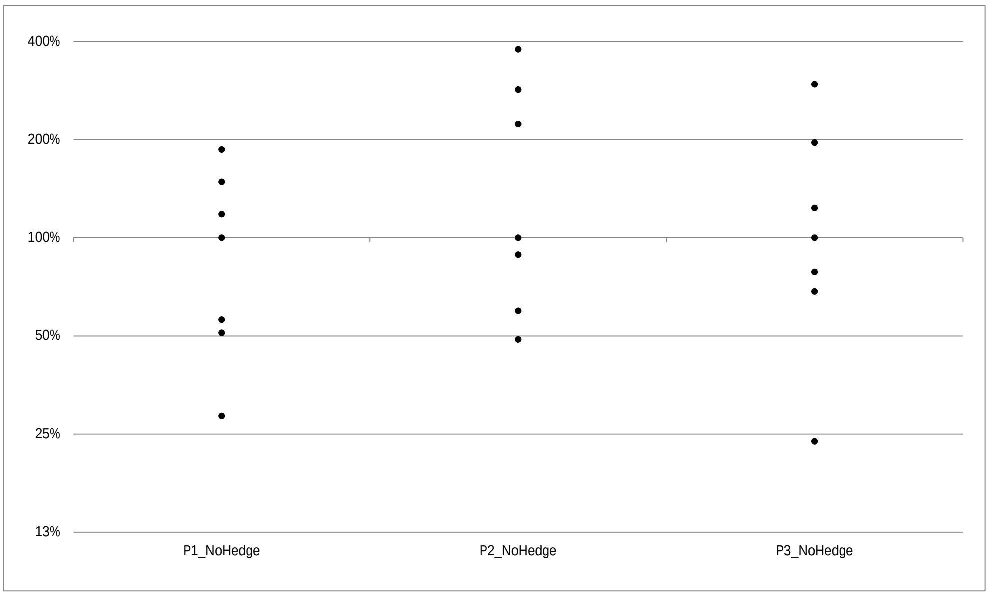


Interestingly, compared with VaR results, sVaR of standardised products tended to exhibit more variability, whereas sVaR of bespoke products tended to exhibit less variability.

Unhedged versions of P1–P3 were also examined (Figure 6).

Dispersion of normalised sVaR results for correlation trading portfolio

Figure 6



Clearly, sVaR variability did not decline when the effect of hedging was removed. This suggests that variability in sVaR modelling of CTP products are strongly driven by variability in the risk model of the structured credit product itself rather than variability in the model of the typical package of the product and hedging instrument.

Ratio of sVaR to VaR

Stress periods for sVaR are selected according to a top-of-the-house level stress which likely varies from one institution to the other; nonetheless, the stress period in general should also correspond to a period of stress for products in the CTP. Therefore, the exercise compared sVaR to VaR.

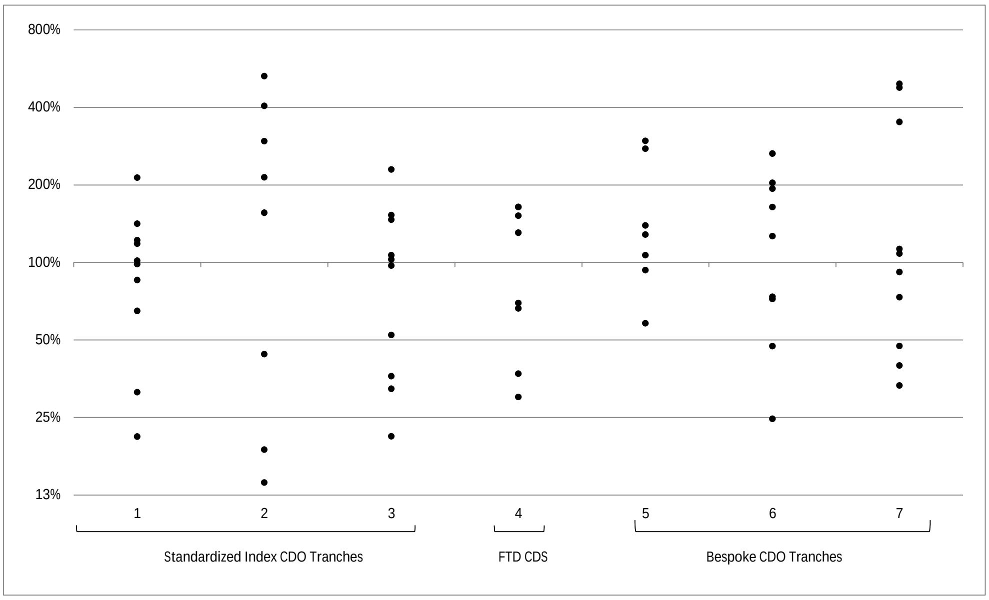
sVaR/VaR	P1	P2	P3	P4	P5	P6	P7
Min	184.5%	99.0%	111.8%	95.2%	100.4%	103.3%	92.0%
Max	790.8%	893.7%	776.8%	987.4%	253.4%	848.4%	828.5%
Median	360.0%	342.3%	308.6%	292.6%	163.3%	281.6%	256.9%

Ratios of sVaR to VaR are quite different across the portfolios and across the banks, apart from one bank having a systematically higher ratio on all portfolios. In three cases (the minimum metric for P2, P4 and P7), the reported sVaR were somewhat lower than VaR, probably because overlapping data periods were used for sVaR and not for VaR. As expected, for most of the cases, sVaR significantly exceeded the level of VaR reported.

1.3.4 Cross-portfolio analysis of variability of CRM

With the tranches all being delta hedged and having relatively short residual maturities, portfolios are highly sensitive to JtD and, to a lesser degree, to shifts in market parameters. Analysis of the seven portfolios is therefore essential for comparing the credit losses (defaults and recoveries) simulated in the model.

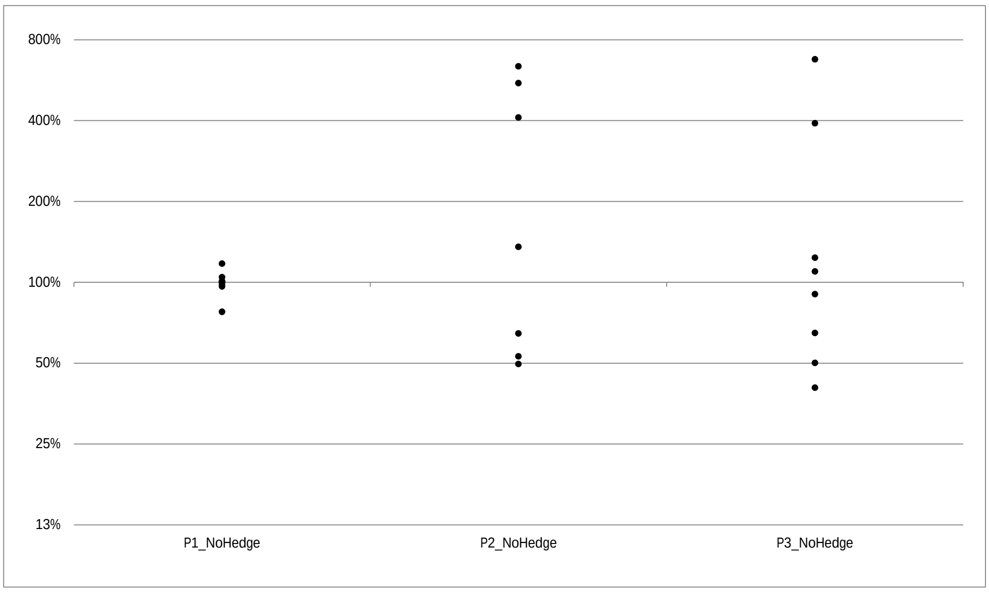
Dispersion of normalised CRM results for all portfolios — Figure 7



After taking into account the use of robust metrics (the IPD), one sees that the level of variability for CRM is substantially higher than the level of variability for VaR for most of the products.

Unhedged versions of P1–P3 were examined to isolate the effect of hedges:

Dispersion of normalised CRM results for correlation trading portfolio — Figure 8



Interestingly, relative to the spread delta hedged versions of the trades, the variability of CRM was drastically reduced in the unhedged standard equity tranche, whereas variability was increased in the other two standard tranches. The CRM for each of the seven CTPs is discussed further below.

Portfolio 1

As a long delta hedged position in an equity tranche, P1 in theory is very sensitive to JtD. In practice, correlation between CRM model charges and hedge notional for all banks except for one is about 85%. Together with the fact that the unhedged version of the same trade exhibited significantly less CRM variability, the sensitivity of P1 to JtD is confirmed, as most of the variability clearly came from the spread hedge instruments.

Portfolio 2

Three of the banks allow for ageing of the portfolio. Because the scheduled maturity date of the mezzanine tranche is 20 December 2014, CRM for these banks should in theory be mainly driven by defaults. Assuming an LGD of 60%, the default rate will have to be more than about 11% (13 defaults) before the tranche gets hit. This justifies the very low CRM figures for the three banks with ageing effects.

For other banks, constant shocks are applied. As defaults occur, positive P&L provided by the hedge (which represents approximately 6% of the notional of the underlying portfolio of the tranche on average across all banks) is more than covered by losses, which arise because the decrease in subordination leads to an increase in leverage and consequently to a higher sensitivity to credit spreads. The CRM for those banks should be all the more significant since spreads are correlated to credit migration and defaults. This is confirmed by the significant increases in the CRM of this portfolio when spread delta hedges are removed.

Part of the heterogeneity could be linked to the strikes of the tranches used by the banks. The initial 7–10% tranche has been transformed into a 6.45–9.9% tranche after the 45 defaults since 2008. Information supplied to the banks clarified the stance on this issue, it is possible that not all institutions carefully followed the instructions.

Portfolio 3

P3 is a short position on a hedged super senior tranche with a par spread acknowledged to be about 2–5 basis points. It is therefore most likely to be sensitive only to defaults occurring in the underlying portfolio. This is evidenced by a correlation of more than 93% between CRM and hedge notional throughout all 10 banks and by the dramatic increase in the CRM of this portfolio when spread delta hedges were removed.

Portfolio 4

P4 is a short delta-hedged position in a first-to-default, and one of the referenced obligors appears to be significantly more distressed than the others. This portfolio is therefore mostly exposed to several defaults occurring on one side and to an increase of default correlation on the other side.

Many banks do not have correlation as a risk factor applied to first-to-defaults in the CRM model. Therefore, discrepancies in the observed results may be driven by a combination of the number of defaults simulated and the order of the simulated defaults. Specifically, any default of the more distressed underlying obligor occurring after a default of one of the other four obligors will result in a high CRM figure.

Portfolio 5

This portfolio is in largely the same situation as P2, except that the maturity is not standard. For banks applying ageing of positions, P5 is in a pure default/non-default mode. CRM is fully driven by the defaults simulated in the underlying portfolio as well as by the severity of losses. For other banks, as in P2, losses are due both to defaults and to variations in market parameters.

The effect of the nonstandard maturity cannot be fully explained through this portfolio. Hedges on correlation and JtD will be required to explore variations in the mapping methodology banks employ in correlation hedges.

Portfolio 6

This portfolio is largely in the same situation as P2, except that the strikes are not standard. Simulation of defaults and recovery rates is the primary driver of CRM on this portfolio. As in P5, additional results where CS01, base correlation and JtD are all hedged will be useful in further investigating the variability of CRM for this portfolio.

Portfolio 7

As a long delta-hedged position in a bespoke mezzanine tranche, P7 is highly sensitive to defaults as well as to base correlation slope and spread increase. Nonstandard characteristics of the tranche are not significant drivers of CRM diversity, as there is no correlation hedge with standard index tranches. As in P5, additional results where CS01, base correlation and JtD are all hedged will be useful in further investigating the variability of CRM for this portfolio.

Ratio of VaR to CRM

As the CRM is a one-year figure at the 99.9% confidence level, it is expected that CRM is the major contributor to RWA for the CTP. Therefore, VaR was compared to CRM in the following table. Institutions excluded from either VaR or CRM were also excluded from this study.

VaR/CRM	P1	P2	P3	P4	P5	P6	P7
Min	2.0%	0.1%	0.8%	0.8%	0.1%	0.5%	0.1%
Max	34.1%	124.6%	94.7%	10.0%	4336.3%	181.4%	19.1%
Median	6.7%	5.9%	10.6%	7.2%	5.4%	4.5%	4.7%

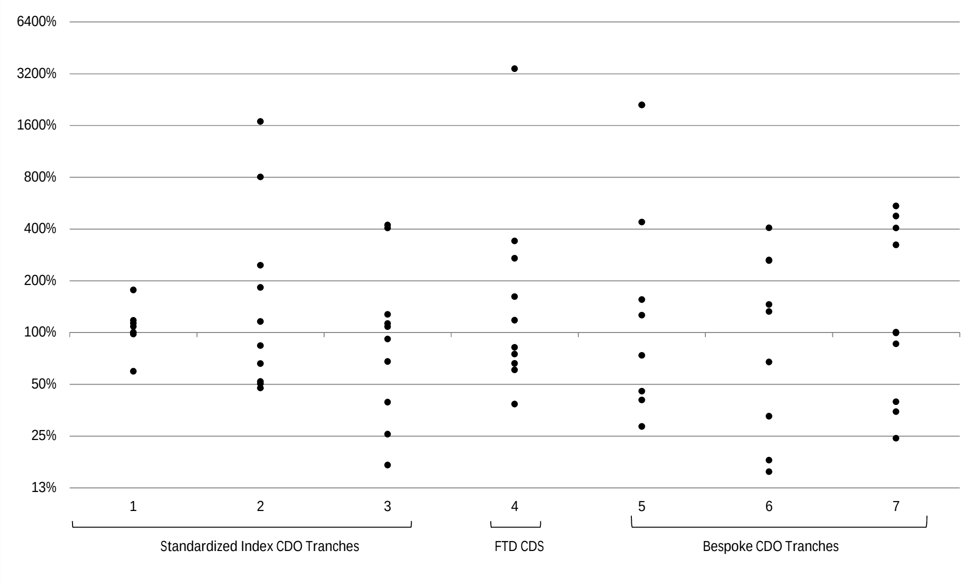
In the maximum metric for P2, P5 and P6, VaR significantly exceeded CRM. Responses from institutions suffering from this apparent problem indicated that it is due to their choice to model ageing effects on very short dated trades; when that is combined with the constant position assumption, the trade runs off as maturity approaches, resulting in a low CRM figure.

1.3.5 Cross-portfolio analysis of variability of SSRC

The standardised specific risk charge (SSRC) was analysed to compare the variability of modelled versus standardised charges. However, all institutions participating in the study used the SFA for calculating the SSRC. Therefore, reported SSRC figures rely on internally modelled IRB parameters and thus largely reflect the level of variability of the PD and LGD estimates from the banking book of each institution.

Dispersion of normalised standardised specific charge results for correlation trading portfolio

Figure 9



All institutions were instructed to report the SSRC rather than the floor to the CRM charge, which is currently 8% of the SSRC; if floors were reported, they were converted to SSRC prior to the analysis. Nonetheless, the SSRC exhibited the most significant variability of all risk metrics relevant for the CTP.

Ratio of CRM to floor for CRM charge

As noted, the floor for the CRM charge is 8% of the SSRC. In the table below, the minimum metric for P1, P2, P4 and P5 was less than 100%, which indicates that the floor was binding for at least one institution for each portfolio. Institutions excluded from the CRM or SSRC were excluded from this study.

CRM / (8% of SSRC)	P1	P2	P3	P4	P5	P6	P7
Min	87%	76%	272%	87%	9%	221%	165%
Max	962%	24805%	3629%	3548%	62627%	9687%	23926%
Median	424%	4140%	1702%	1405%	10244%	1551%	4336%

In total, the floor was breached in exactly four of the 68 sample data points (seven portfolios across 10 institutions minus two exclusions). However, floors that are (not) binding on a per trade basis may (not) be binding on a portfolio basis for a realistic CTP.

1.3.6 Drivers of variability of VaR and sVaR for correlation trading portfolio

The exercise combines responses to the methodology questionnaire with the reported VaR and sVaR levels to confirm our understanding of the drivers of each risk metric relevant for the CTP. Drivers were inferred from comments from the questionnaire regarding either the CTP or the larger firm-wide model. Details of the Kendall’s tau statistical test used in this process are in Annex 4.

VaR

The Kendall’s tau analysis indicated that the frequency of data updates is a strong driver of VaR variability for standardised products. This is unsurprising given the liquid nature of these products; more frequent updates will tend to pick up the most recent information, which changes quite frequently for liquid products. Similar analysis also indicated that the length of data periods used to calibrate the VaR model is a strong driver of VaR variability for the bespoke products. Finally, firms that did not implement base correlation in their VaR model (because of the immateriality of this type of risk for their portfolio) produced significantly lower results.

sVaR

The analysis for VaR was repeated for sVaR. However, the sVaR analysis is based on expert judgement because the responses received from the questionnaires were not sufficient for a statistical identification of sVaR variability drivers. The drivers for VaR as well as the selection of the stress period are strong drivers for sVaR.

1.3.7 Drivers of variability of CRM

Statistical identification is again supplemented with expert judgement to assess drivers of materiality for the CRM. The following drivers were identified as having strong significance and were examined in further detail.

Stochastic LGD in pricing

As previously discussed, LGDs used in pricing of the tranches affect the calibration of the base correlation parameters. Therefore, firms that jointly calibrate stochastic pricing LGDs with base correlations will tend to produce default behaviour that is quite different from that produced by firms that assume LGDs to be constant.

Correlation between defaults/migrations and spreads

This driver largely corroborates Phase 1 findings on the drivers of IRC with respect to the modelling for the transition probability matrix approach versus the spread approach. However, in the CRM portfolio, three general types of approaches were observed to model correlation between default/migrations and spreads: (i) separate but correlated stochastic processes driving migration/default and spread movement, (ii) spread changes driving migration/default, and (iii) default/migrations driving spread changes.

Ageing of positions

While the Kendall's tau analysis did not find ageing of positions to be a significant driver, expert opinion and bank feedback suggested that banks modelling ageing effects tend to produce lower CRM figures. Table 6 shows, for each portfolio, CRM figures normalised with respect to the median of the distribution across institutions, along with the institution's response for their ageing assumption.[12]

12 Except P4, for which ageing is much less relevant because it has a five-year maturity.

CRM normalised with respect to median — Table 6

Ageing	P1	P2	P3	P5	P6	P7
Yes	123%	12%	23%	9%	7%	57%
Yes	98%	14%	94%	4%	7%	17%
Yes	86%	23%	35%	0%	101%	89%
No	142%	942%	116%	141%	99%	131%
No	215%	140%	160%	123%	280%	48%
No	32%	497%	57%	77%	174%	578%
No	21%	682%	106%	170%	65%	111%
No	102%	60%	251%	184%	266%	137%
No	65%	1291%	112%	392%	225%	425%
No	119%	45%	39%	13%	34%	40%

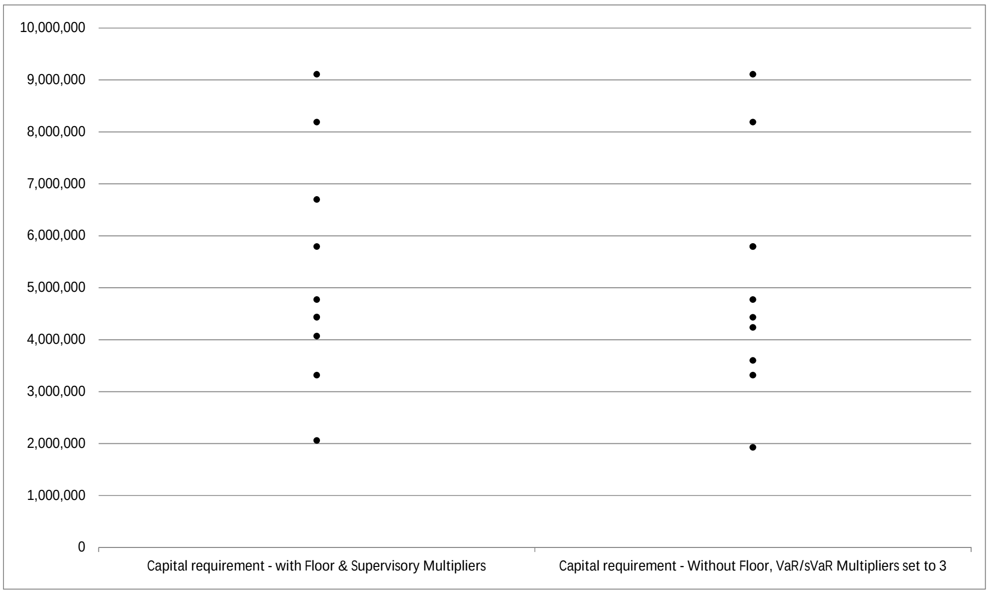
1.3.8 Variability of total market risk RWA for correlation trading portfolio

Combining the effect of variation in each risk metric, the total RWA is calculated and compared against an idealised RWA from which all regulatory adjustments were removed. This meant resetting the VaR/sVaR multipliers to 3. Further, to maintain comparable impact across all submissions, it was assumed that all jurisdictions implemented the supervisory adjustment on the CRM modelled charge as a floor equal to 8% of the SSRC rather than as a surcharge.

For P1, supervisory adjustments had only a limited effect in reducing the variability of RWA, as only one of the institutions hit the CRM floor, which increased the CRM charge by 15%. Only four institutions had increased VaR and sVaR multipliers, which resulted in an increases ranging from 3% to 33% in VaR and 3% to 50% in sVaR.

P1 (CS01 hedged standardised index equity tranche) – dispersion of implied capital requirements

US dollar — Figure 10

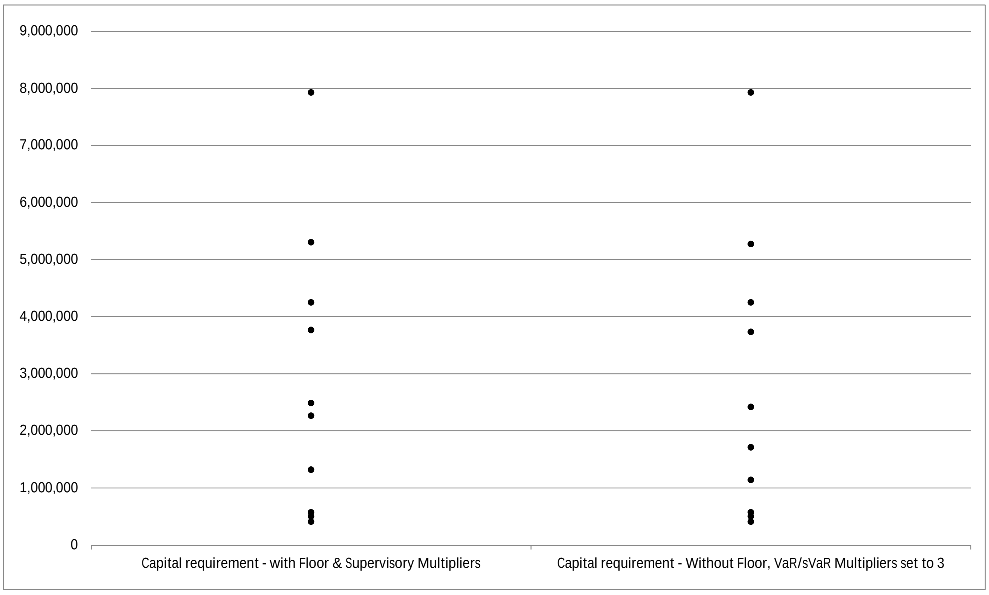


For P2, supervisory adjustments had a moderate effect in reducing the variability of RWAs, as only one of the institutions hit the CRM floor, which increased the CRM charge by 32%. Only four institutions had increased VaR/sVaR multipliers, which resulted in an increase of 3% to 33% in VaR and 3% to 50% in sVaR.

P2 (CS01 hedged standardised index mezzanine tranche) – dispersion of implied capital requirements

US dollar

Figure 11

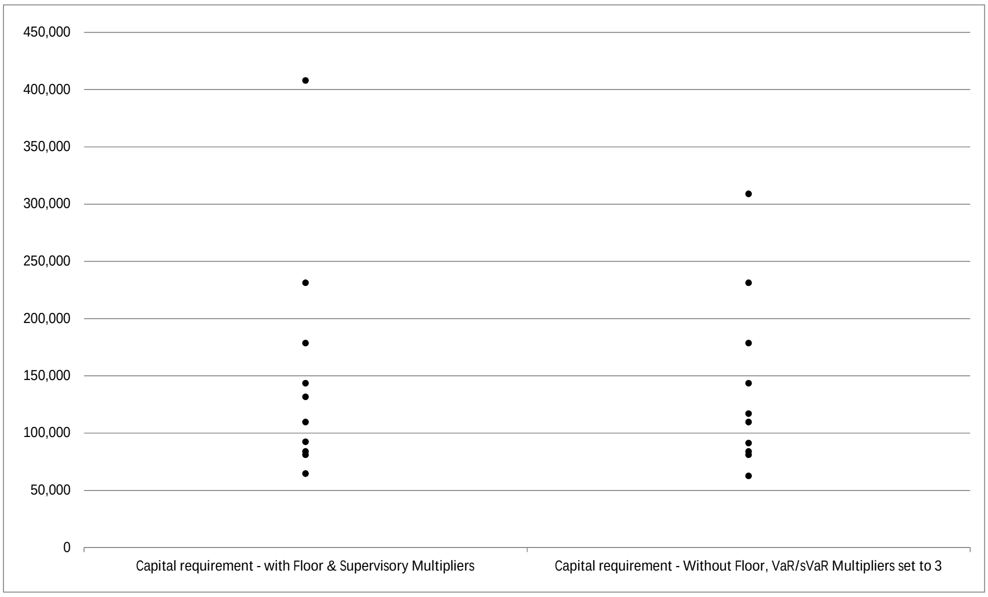


For P3, supervisory adjustments had a moderate effect in reducing the variability of RWA, as none of the institutions hit the CRM floor. Only four institutions had increased VaR/sVaR multipliers, which resulted in an increase of 3% to 33% in VaR and 3% to 50% in sVaR.

P3 (CS01 hedged standardised index super senior tranche) – dispersion of implied capital requirements

US dollar

Figure 12

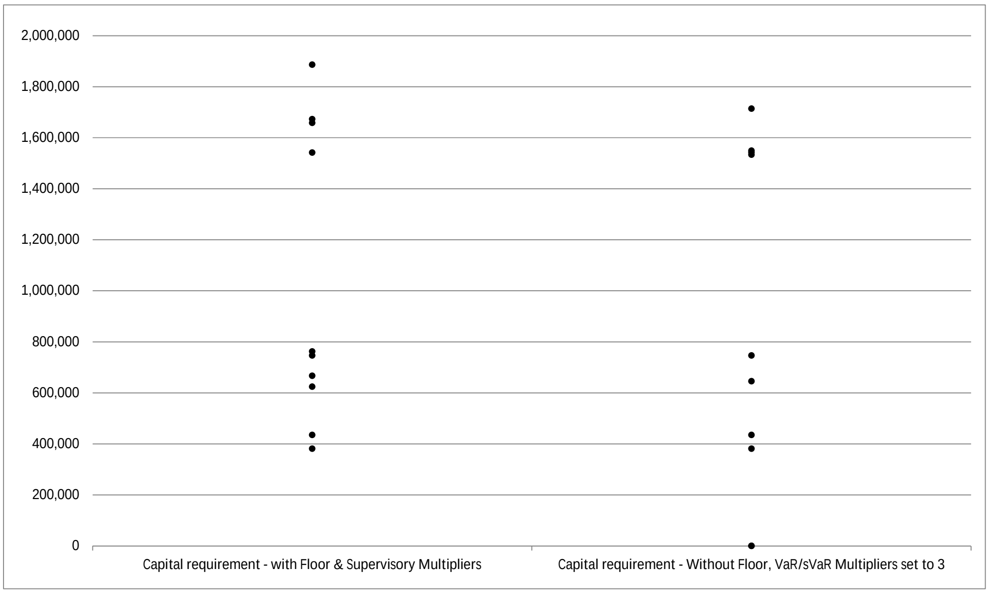


For P4, supervisory adjustments actually increased the variability of RWA, as only one of the institutions hit the CRM floor, which increased the CRM charge by 15%. Only four institutions had increased VaR/sVaR multipliers, which resulted in an increase of 3% to 33% in VaR and 3% to 50% in sVaR.

P4 (CS01 hedged first to default CDS on basket of 5 US tech sector obligors) – dispersion of implied capital requirements

US dollar

Figure 13

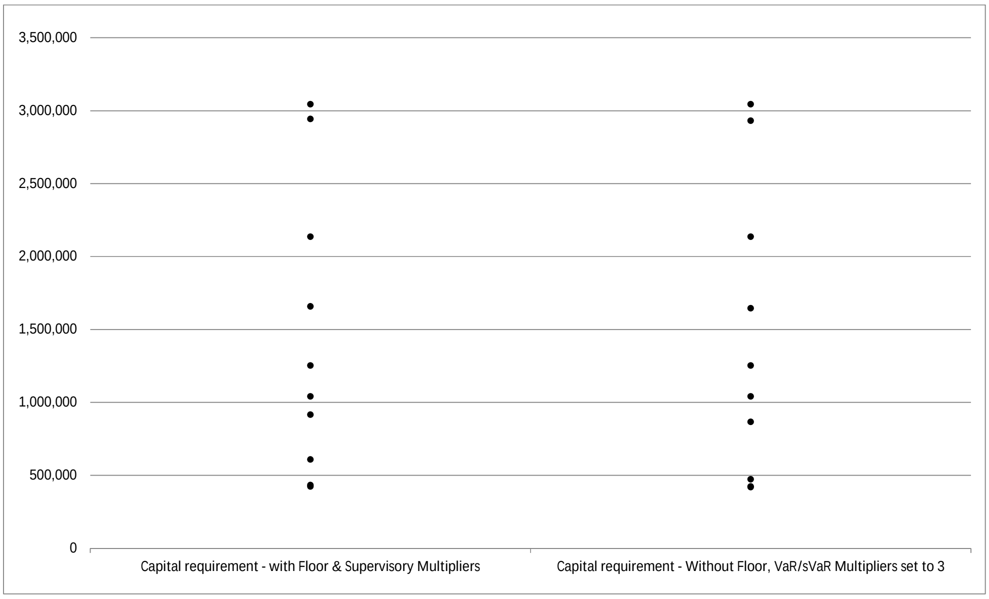


For P5, supervisory adjustments had no effect in reducing the variability of RWA, as only one of the institutions hit the CRM floor, which increased the CRM charge by 960%. Only four institutions had increased VaR/sVaR multipliers, which resulted in an increase of 3% to 33% in VaR and 3% to 50% in sVaR.

P5 (CS01 hedged bespoke mezzanine tranche based on iTraxx.EU with non-standard maturity) – dispersion of implied capital requirements

Euro

Figure 14

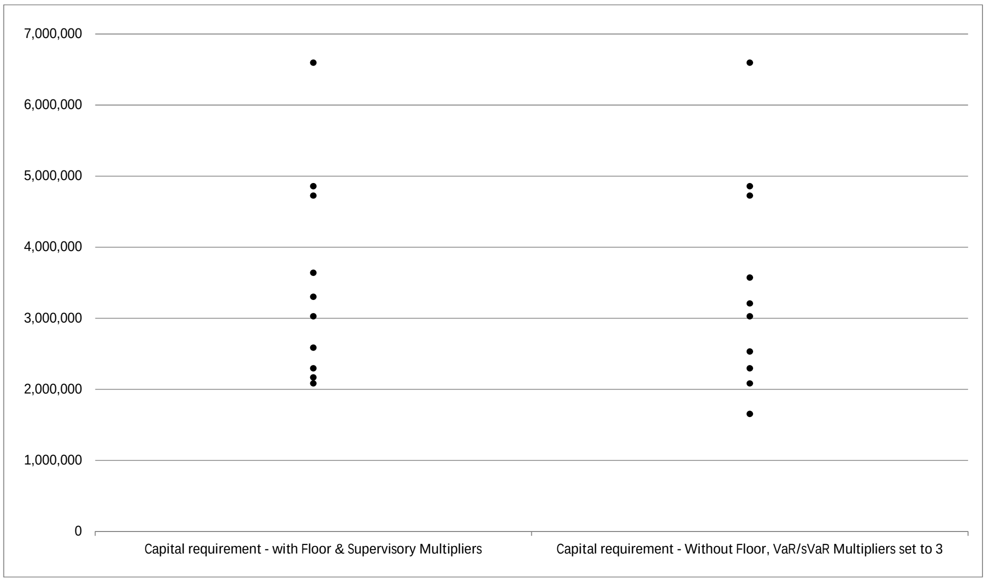


For P6, supervisory adjustments had a moderate effect in reducing the variability of RWA, as none of the institutions hit the CRM floor. Only four institutions had increased VaR/sVaR multipliers, which resulted in an increase of 3% to 33% in VaR and 3% to 50% in sVaR.

P6 (CS01 hedged bespoke mezzanine tranche based on iTraxx.EU with non-standard attachment/detachment points) – dispersion of implied capital requirements

Euro

Figure 15

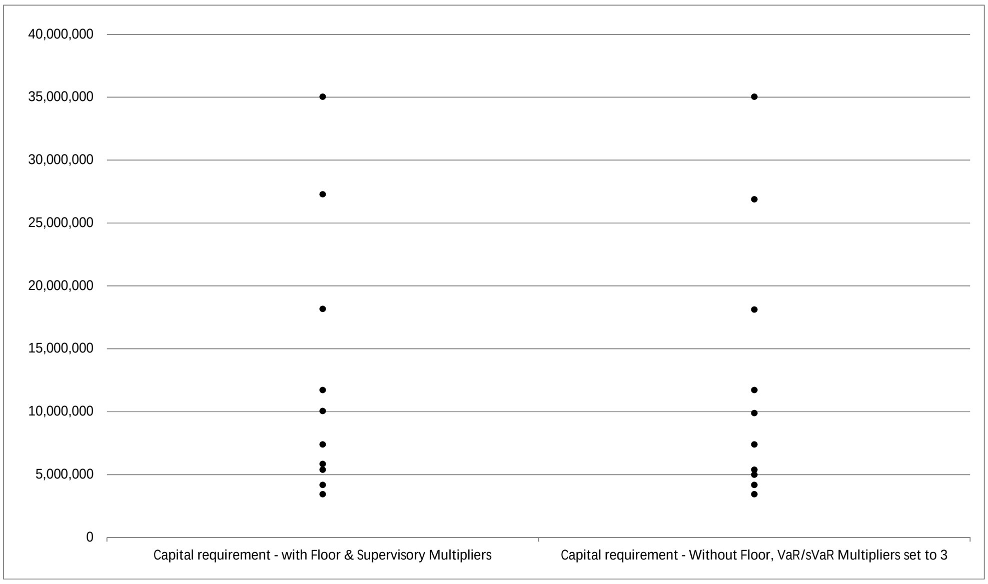


For P7, supervisory adjustments slightly increased the variability of RWA, as none of the institutions hit the CRM floor. Only four institutions had increased VaR/sVaR multipliers, which resulted in an increase of 3% to 33% in VaR and 3% to 50% in sVaR.

P7 (bespoke mezzanine tranche with US/EU obligor mix) – dispersion of implied capital requirements

Euro

Figure 16



2. Non-CTP – Analysis of test portfolio exercise results

2.1 Analysis methodology

The analysis of the results for the non-CTP portfolios focused on the following issues:

- understanding the variability of the products in Phase 2, which are more complex than the plain vanilla products in Phase 1;
- providing an insight into the level of variation in RWAs on a more realistic diversified portfolio based on a more consistent booking of portfolios;
- understanding the importance of diversification benefit to different models and asset classes;
- re-assessing the drivers of variability using the more comprehensive set of positions included in Phase 2 and more robust statistical techniques; and
- collecting more detailed information to allow a deeper understanding on the importance of the choice of historical calibration period in driving VaR differences.

To investigate the above issues, the 10-day time series of test portfolio results were averaged. The use of averages is a reliable approach to the analysis given the stable time series and low volatilities in the series.

Bank results for the diversified portfolio for each asset class were used to identify drivers of the observed variability in the risk metrics. The Phase 2 analysis was improved relative to Phase 1 by incorporating a statistical technique to complement expert judgement when determining the significance of potential drivers. Annex 4 describes the technique applied.

Finally, two additional pieces of data were collected from banks to provide greater insight into the drivers of variability in model results:

- the historical P&L for each portfolio over a one-year period; and
- IRC results based on a 99% confidence level instead of the prescribed 99.9% level.

These data were used to understand the extent to which variability in model results could decline if VaR models were based on the same historical data period and if IRC was estimated with a lower confidence level.

2.2 Cross-portfolio comparison of variability

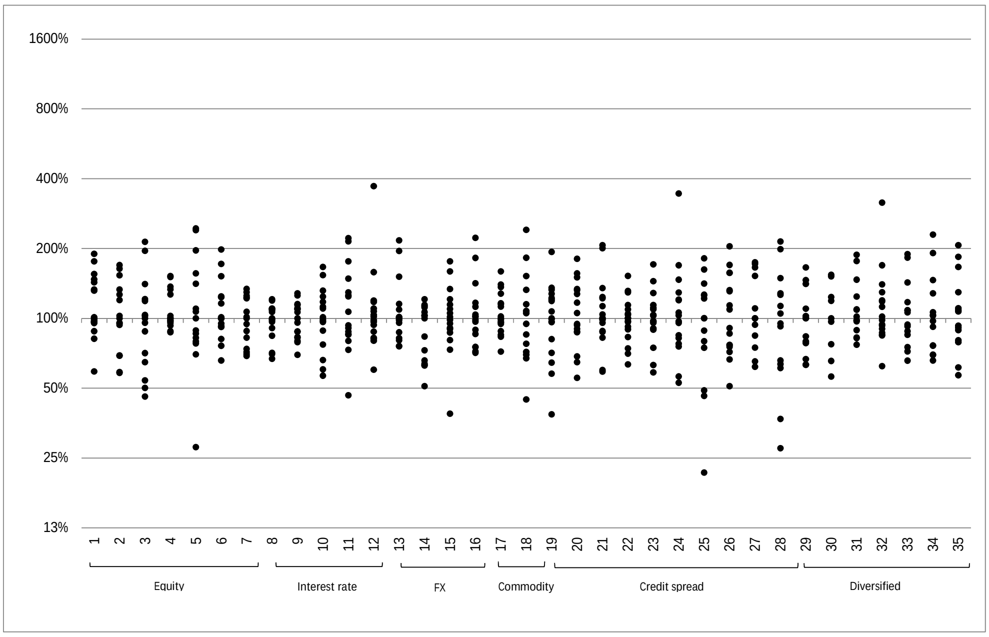
The level of variability in model results across asset classes did not show significant variation (as shown in Figure 17). For IRC, the level of variability relative to Phase 1 has significantly declined and is more comparable to that of VaR and sVaR (although its overall variability is still higher).

In some cases, greater complexity in the portfolios was accompanied by higher variability in risk metrics. For example, P5 had a larger variation than was typical of the equity portfolios, and variation in P11 and P12 was higher than in the other interest rate portfolios. In contrast, P7 was one of the least variable portfolios in equities despite being a relatively complex position.

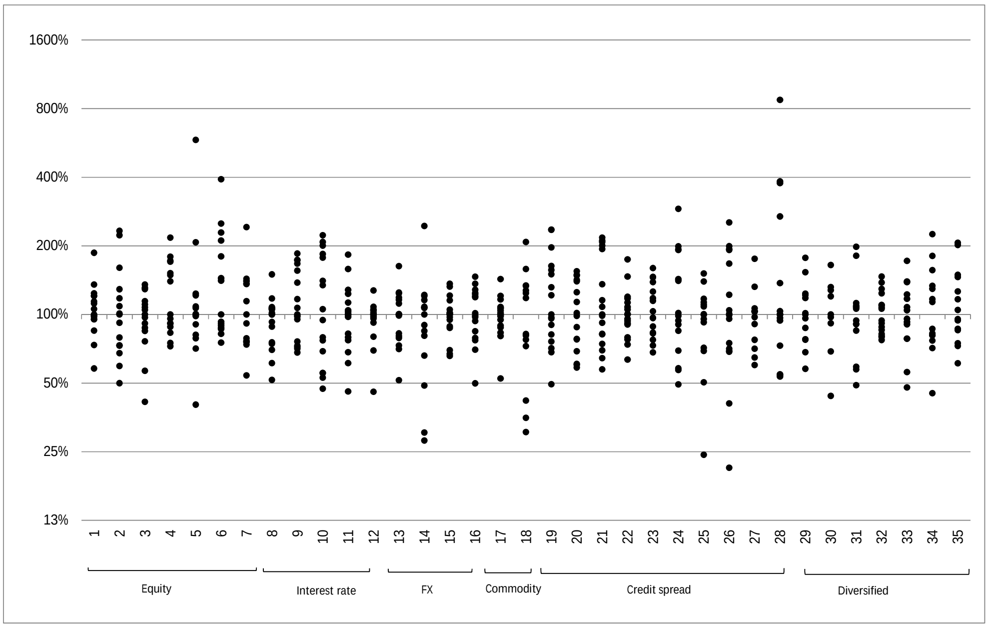
Dispersion of normalised results for all non-CTP portfolios and all risk metrics

Figure 17

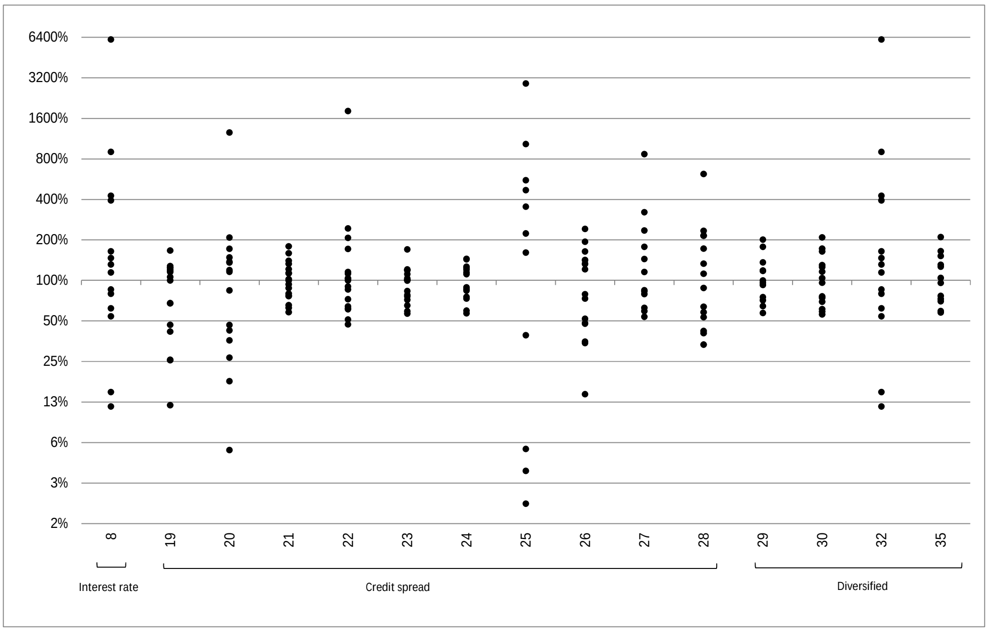
Panel A - Dispersion of normalised VaR results for all portfolios



Panel B - Dispersion of normalised SVaR results for all portfolios



Panel C - Dispersion of normalised IRC results for all portfolios



Note: A normalised metric is defined in this report as the metric divided by its median; hence, each normalised risk metric has its median positioned at 100%. The vertical axis in each panel is a base 2 log scale.

2.3 Variability of Phase 2 results relative to Phase 1

Phase 2 included a number of portfolios that replicated those of Phase 1 (see Annex 3 for a list of the relevant portfolios). Figure 18 shows the normalised results for these portfolios relative to the results in Phase 1.

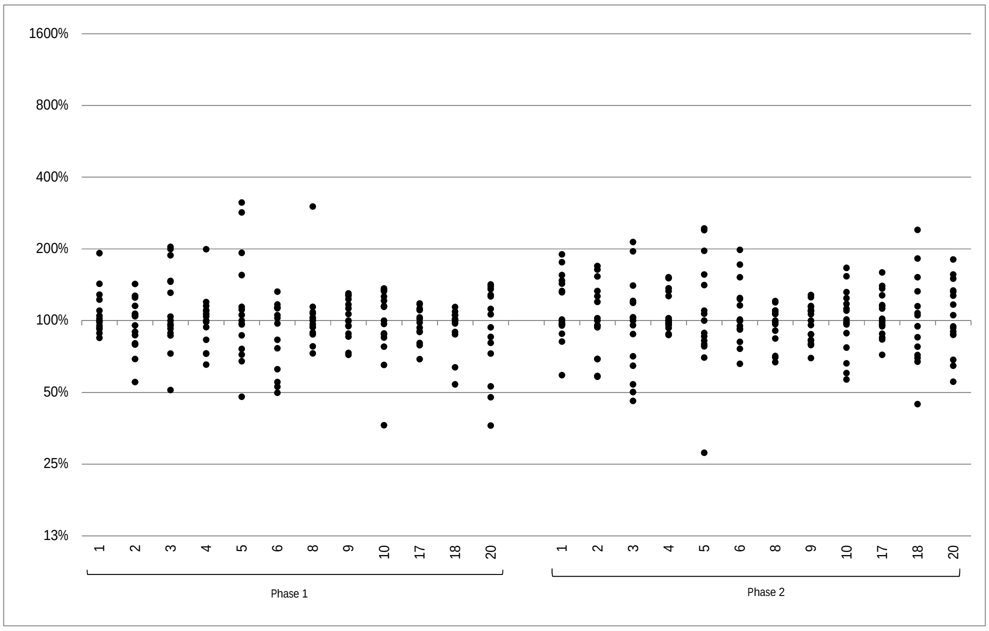
In general the Phase 2 levels of variability of VaR and sVaR results were similar to those in Phase 1, although typically for equity and commodity portfolios there was greater variability in Phase 2 (which for VaR may reflect the more volatile conditions in those markets in the period since Phase 1).

Once extreme values are excluded, the variability of IRC results for the two portfolios that were re-run in Phase 2 declined relative to Phase 1.

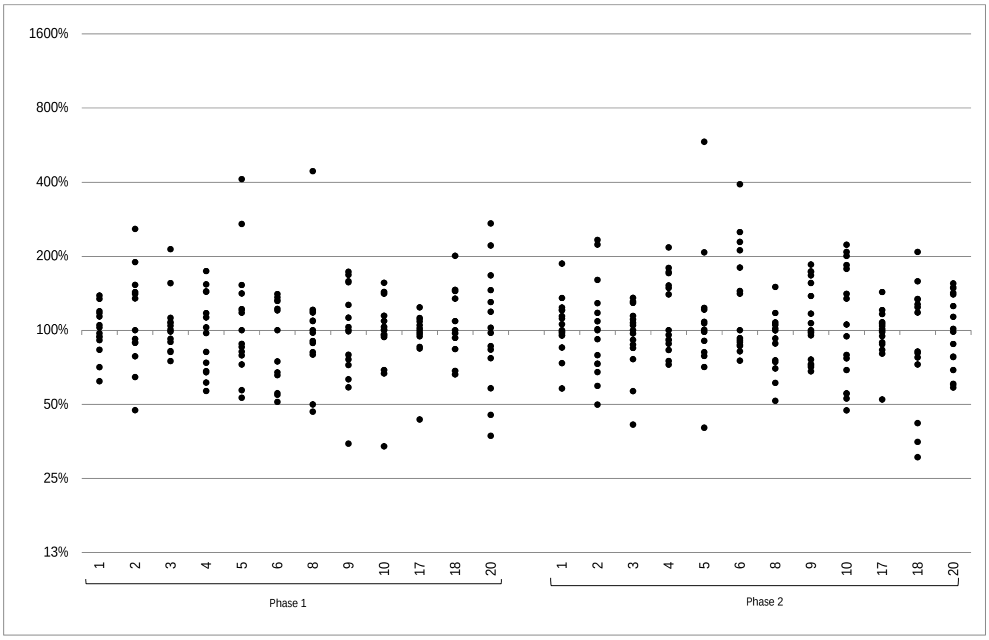
Dispersion of normalised results of risk metrics for re-run Phase 1 portfolios

Figure 18

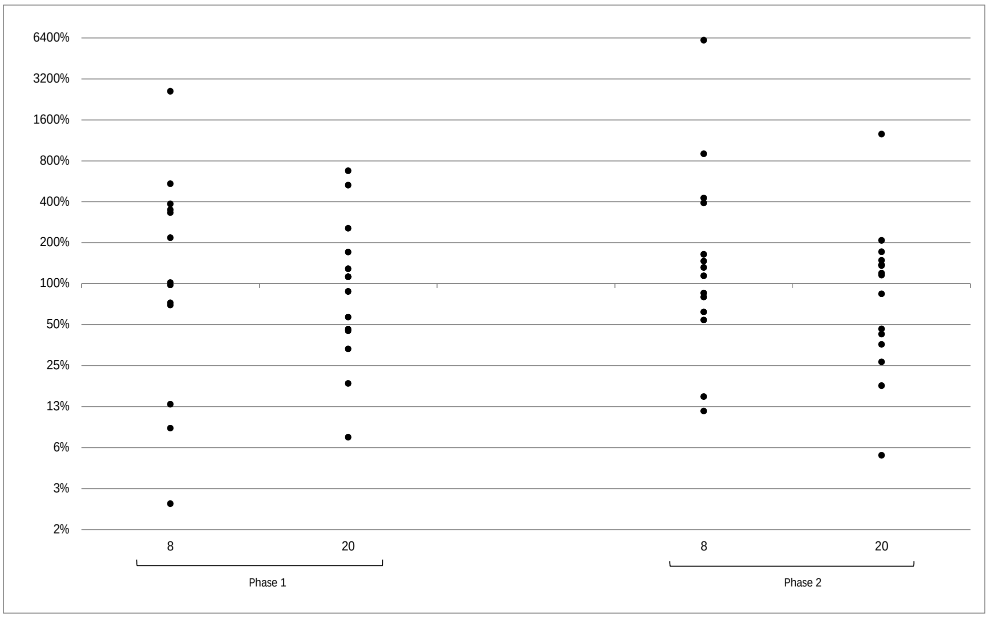
Panel A - Dispersion of normalised VaR results Phase 1 vs Phase 2



Panel B - Dispersion of normalised sVaR results Phase 1 vs Phase 2



Panel C - Dispersion of normalised IRC results Phase 1 vs Phase 2



Note: Normalisation of a metric is defined in this report as dividing it by its median; hence, each risk metric has its median positioned at 100%. The vertical axis in each panel is a base 2 log scale.

2.4 Equity portfolios

2.4.1 Test portfolios description

The non-CTP exercise covered seven equity portfolios (P1–P7) and one all-in diversified portfolio (P31) that aggregated the seven individual portfolios.

Description of the equity portfolios — Table 7

Portfolio number	Description
P1	Equity index futures on FTSE 100
P2	Bullish leveraged trade on Google
P3	Volatility trade: short short-term vega and long long-term vega on S&P 500
P4	Volatility trade: long/short put on FTSE 100
P5	Equity variance swaps on Eurostoxx 50
P6	Barrier option on S&P 500
P7	Quanto index call on Eurostoxx 50
P31	All-in portfolio comprising portfolios P1–P7

The majority of banks (16) provided results for each of the equity portfolios. After the exclusion of erroneous data, the following number of banks were included for each portfolio and risk metric:

	P1	P2	P3	P4	P5	P6	P7	P31
VaR	17	15	15	15	15	15	15	14
sVaR	17	15	15	15	15	15	15	14

2.4.2 Analysis of overall variability

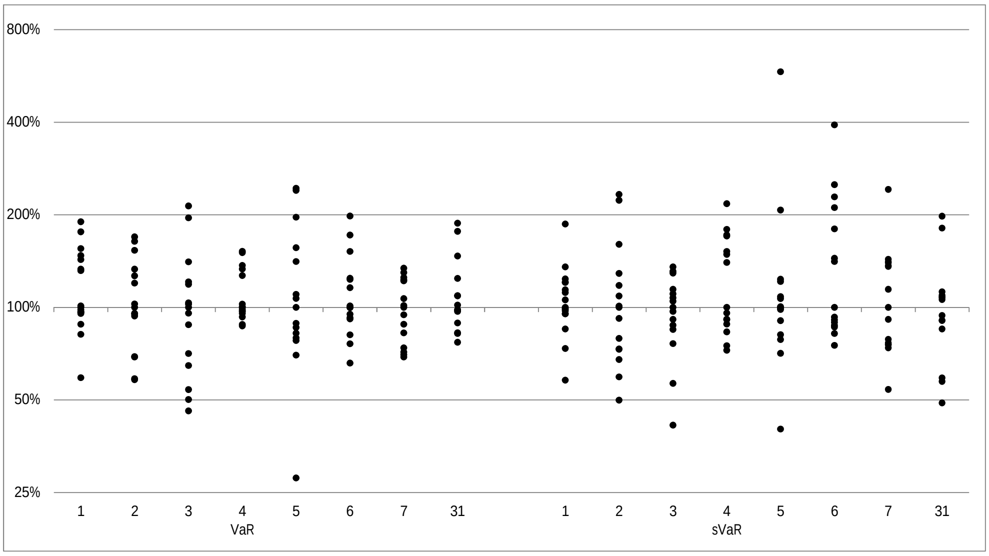
The variability of VaR and sVaR in Phase 2 is comparable to that observed in Phase 1, which means that the dispersion of risk measures remains relatively high even for portfolios with relatively simple products. For example, for P1, the highest VaR is still three times greater than the lowest VaR.

Consistent with Phase 1, the variability of VaR results for five of the eight portfolios is lower than the variability of sVaR results even when all the banks except one used a similar stressed period.

Figure 19 shows scatter plots of the dispersion in VaR and SVaR reported by the participating banks for the equity portfolios.

Dispersion of the normalised VaR and sVaR results for the equity portfolios

Figure 19



The rank correlation between the VaR and sVaR results is high for four equity portfolios (P2, P5, P6 and P31). Hence, the banks that calculated a high VaR for those portfolios also tended to calculate a high sVaR, but not always: the rank correlation between VaR and sVaR figures is very low for the four other portfolios, and even negative for P3.

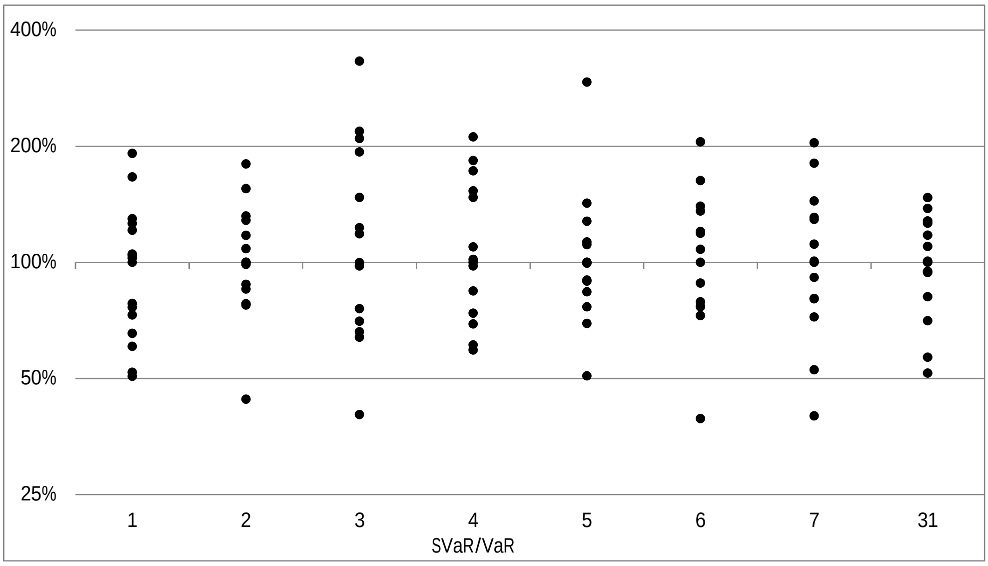
Another way to analyse the relationship between VaR and sVaR is to calculate the ratio of the measures, sVaR/VaR. Figure 20 shows the dispersion of the SVaR/VaR ratios across the equities portfolios.

The dispersion level of the ratio of sVaR to VaR is also significant and comparable with the dispersion levels of VaR and sVaR.

It is notable that only two of the participating banks reported an sVaR/VaR ratio for P31 that was lower than 1. One explanation could be the fact that, at each of these two banks, the scaling approach for calculating the 10-day VaR was different from that used for the 10-day sVaR.

Dispersion of the normalised sVaR/VaR ratios for the equity portfolios

Figure 20



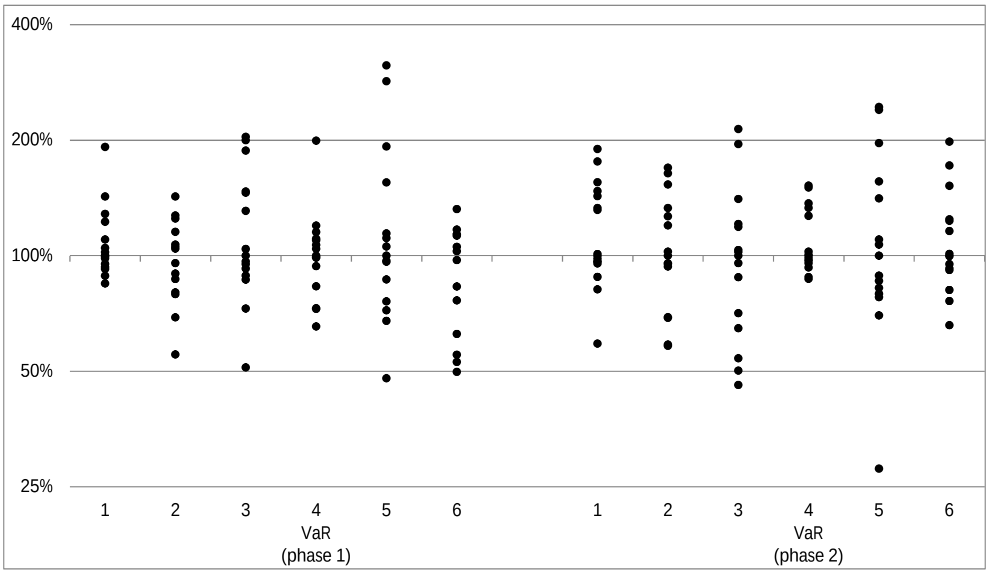
2.4.3 Analysis of variability for the re-run portfolios compared with Phase 1

In Phase 2, P1–P6 replicated Phase 1 portfolios P1–P4, P6 and P7. In some cases, however, the notional of the positions were modified, and the banks were not the same across the two phases.

The dispersion of the results for P1–P6 in Phase 2 is comparable with, or slightly higher than, the dispersion observed in Phase 1. Figure 21 and Figure 22 present the normalised VaR and sVaR reported by the banks during Phase 1 and Phase 2 exercises.

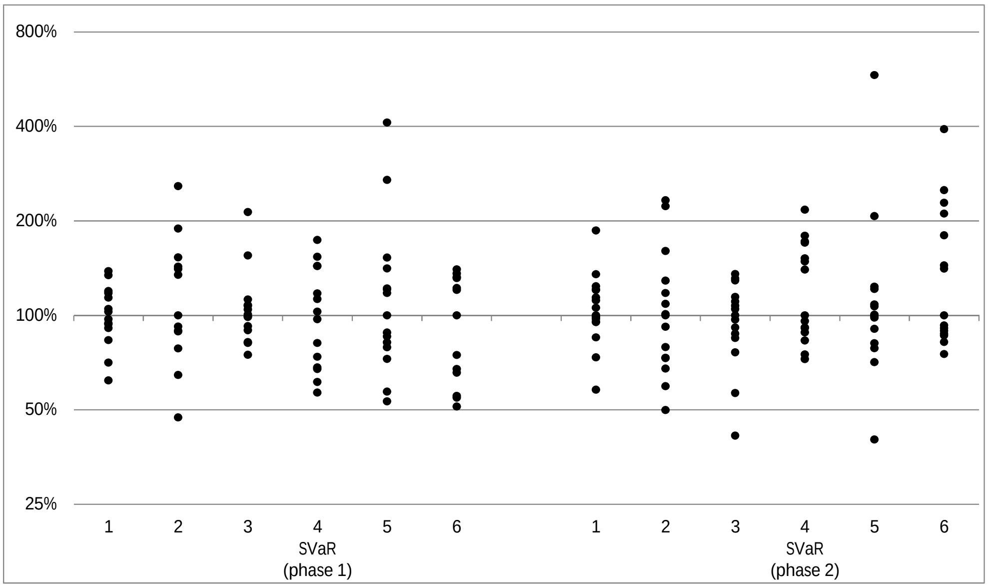
Comparison of dispersion of normalised VaR for Phase 1 re-run equity portfolios

Figure 21



Comparison of dispersion of normalised sVaR for Phase 1 re-run equity portfolios

Figure 22



2.4.4 Analysis of variability of the complex portfolios

Phase 2 added a complex equity portfolio (P7) to the equity portfolios in Phase 1. P7 shows no greater variability than the other equity portfolios; in fact, for VaR and sVaR, its variability is lower.

However, the other complex equity product is the variance swap, P5 (which was P6 in Phase 1). In both phases, this portfolio shows the largest variability of VaR and sVaR. The dispersion is partly due to an outlier bank that reported a very low risk measure for this portfolio (approximately one fourth of the median).

2.4.5 Analysis of drivers of variability

To determine the drivers of variability for the equity portfolios, Phase 2 analysed the diversified equities portfolio (P31). The analysis calculated the rank correlation (Kendall's tau coefficient – see Annex 4) between the set of the possible drivers and the VaR or sVaR outcomes.

The results confirmed that the length of the historical period (taking into account the weighting scheme applied by each bank) is the key driver of the dispersion observed in the VaR results reported by the banks for the equity portfolios.

2.5 Interest rate portfolios

2.5.1 Test portfolio description

The non-CTP exercise covered five interest rate portfolios (P8–P12) and one all-in diversified portfolio (P32) that aggregated the five individual portfolios.

Description of the interest rate portfolios Table 8

Portfolio number	Description
P8	Curve flattener trade: Long long-term and short short-term treasuries
P9	Interest rate swap
P10	2-year swaption on 10-year interest rate swap
P11	Libor range accrual
P12	Inflation zero coupon swap
P32	All-in portfolio comprising portfolios P8–P12

The majority of banks provided results for each of the interest rate portfolios. After the exclusion of erroneous data, the following number of banks were included for each portfolio and risk metric:

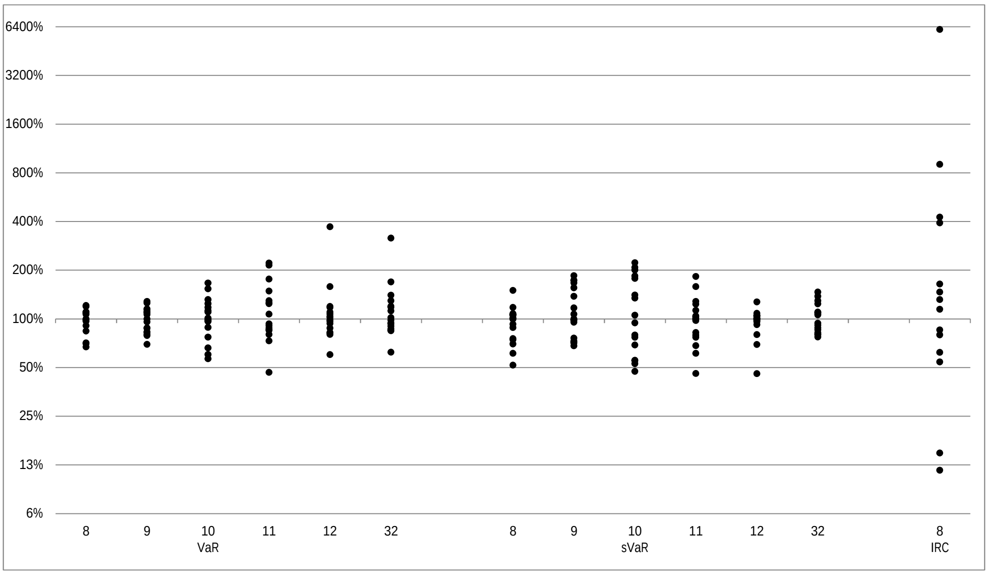
	P8	P9	P10	P11	P12	P32
VaR	17	17	16	16	16	16
sVaR	17	17	16	16	16	16
IRC	16	-	-	-	-	16

2.5.2 Analysis of overall variability

Figure 23 shows scatter plots of the results of VaR, sVaR and IRC for the interest rate portfolios. VaR and sVaR show comparatively similar dispersions, while the IRC for P8 has much higher dispersion. Here, a number of banks produce more extreme outcomes, in part reflecting different approaches to risk modelling of the involved sovereign exposures.

Dispersion of normalised results for the interest rate portfolios

Figure 23

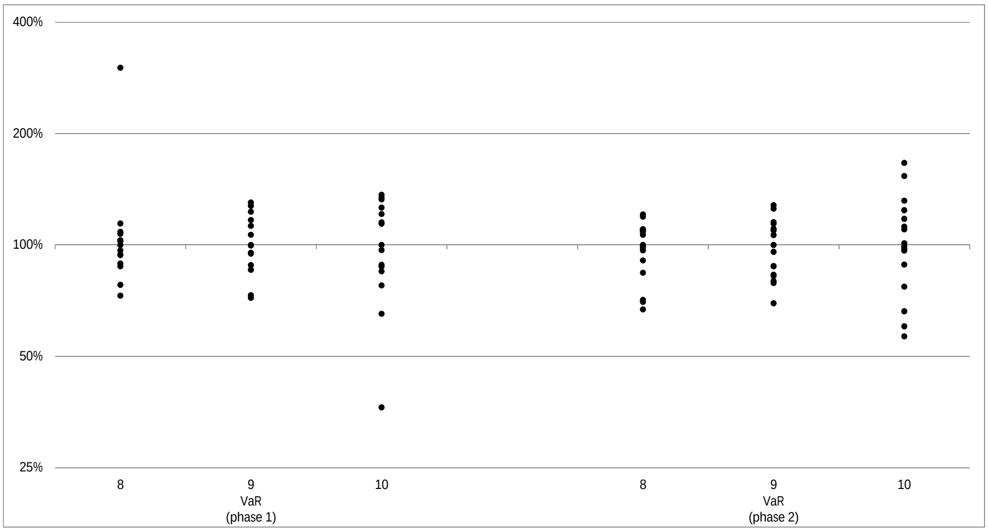


2.5.3 Analysis of variability for the re-run portfolios compared with Phase 1

P8–P10 were re-run in Phase 2 with halved notionals. The following scatter plots for VaR, sVaR and IRC show the comparison of Phase 1 and Phase 2 results. In general, the observed variation is broadly comparable with Phase 1, but with fewer outlier values.

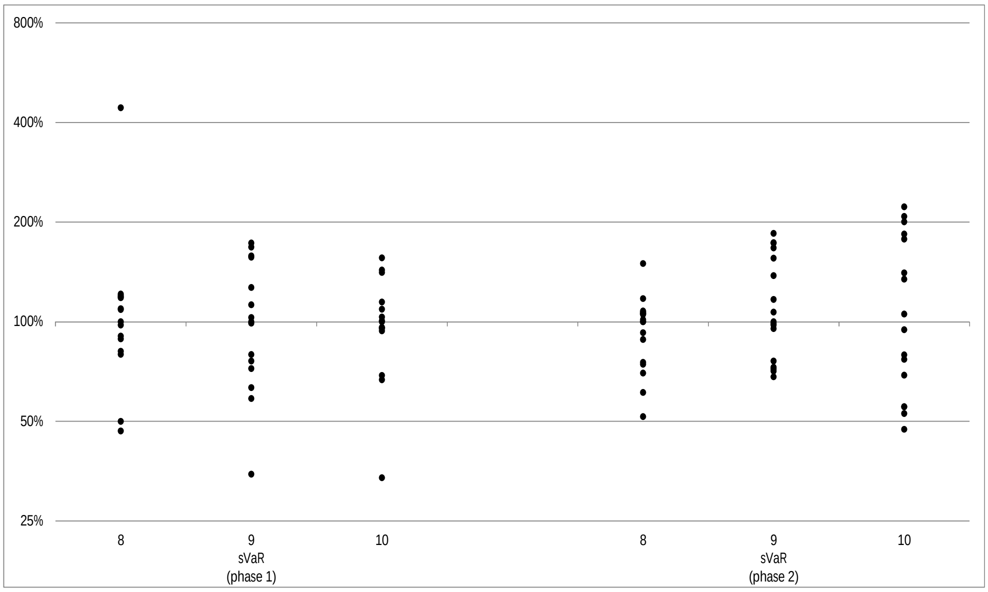
Dispersion of normalised VaR results for the interest rate portfolios: Phase 1 vs Phase 2

Figure 24



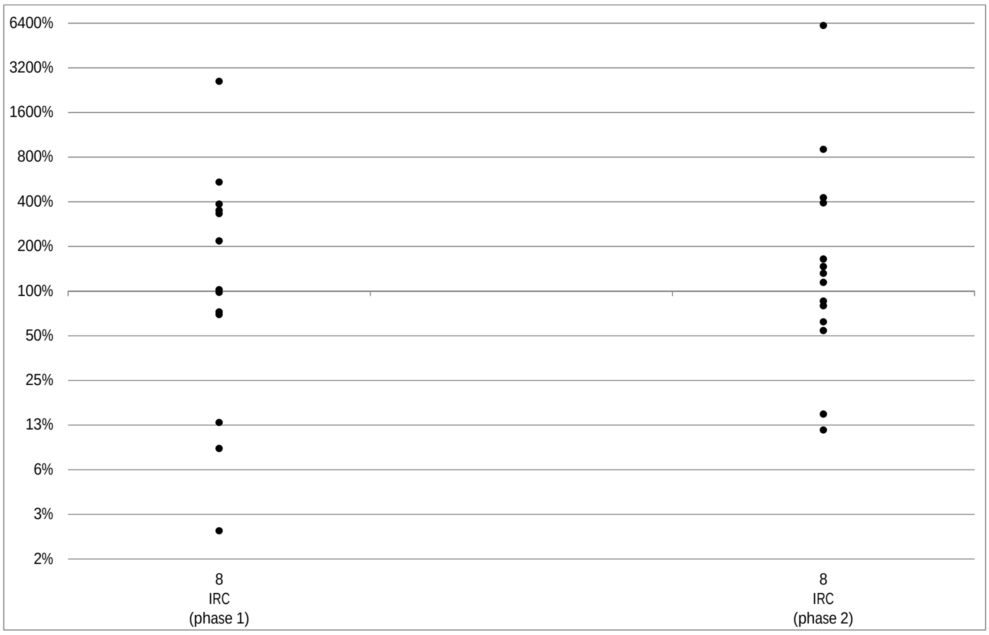
Dispersion of normalised sVaR results for the interest rate portfolios: Phase 1 vs Phase 2

Figure 25



Dispersion of normalised IRC results for the interest rate portfolios: Phase 1 vs Phase 2

Figure 26



2.5.4 Analysis of variability of new Phase 2 portfolios

The variability of the more complex portfolios, P11 (Libor range accrual) and P12 (inflation zero coupon swap), is considerably higher than those of the simpler portfolios, P8–P10. This is the case for both VaR and sVaR, whose risk values were calculated for P8–P12. The high variability of the all-in portfolio, P32, can be explained by the high variability of the more complex underlying portfolios, P11 and P12.

2.5.5 Analysis of drivers of variability

The analysis (described in Annex 4) identified the following drivers for P32, the diversified all-in portfolio:

- For VaR, the length of the data period and the risk return calculation methodology were identified as drivers.
- For sVaR, the risk values were positively correlated with the availability of stress periods fitted to the all-in portfolio P29 and the use of antithetic data.
- For IRC, only one portfolio (P8) was relevant, so the following results are to be interpreted very carefully. The analysis indicated significant dependencies regarding (i) recovery rate assumptions (data source: historical data-based or market-implied LGD) and (ii) calibration of the transition matrix (number of matrices, number of matrices for sovereign and use of internal versus external matrices)

2.6 Foreign exchange portfolios

2.6.1 Test portfolio description

The non-CTP exercise covered four foreign exchange portfolios (P13–P16) and one all-in diversified portfolio (P33) that aggregated the four individual portfolios.

Description of the foreign exchange portfolios Table 9

Portfolio number	Description
P13	Covered foreign exchange call: Short EUR/USD and short put EUR call USD option
P14	Mark to market cross-currency basis swap: 2-year USD 3M Libor vs RUR 3M Euribor swap
P15	Knock-out currency option
P16	Double no-touch binary currency option
P33	All-in portfolio comprising portfolios P13–P16

The majority of banks provided results for each of the foreign exchange portfolios. After the exclusion of erroneous data, the following number of banks were included for each portfolio and risk metric:

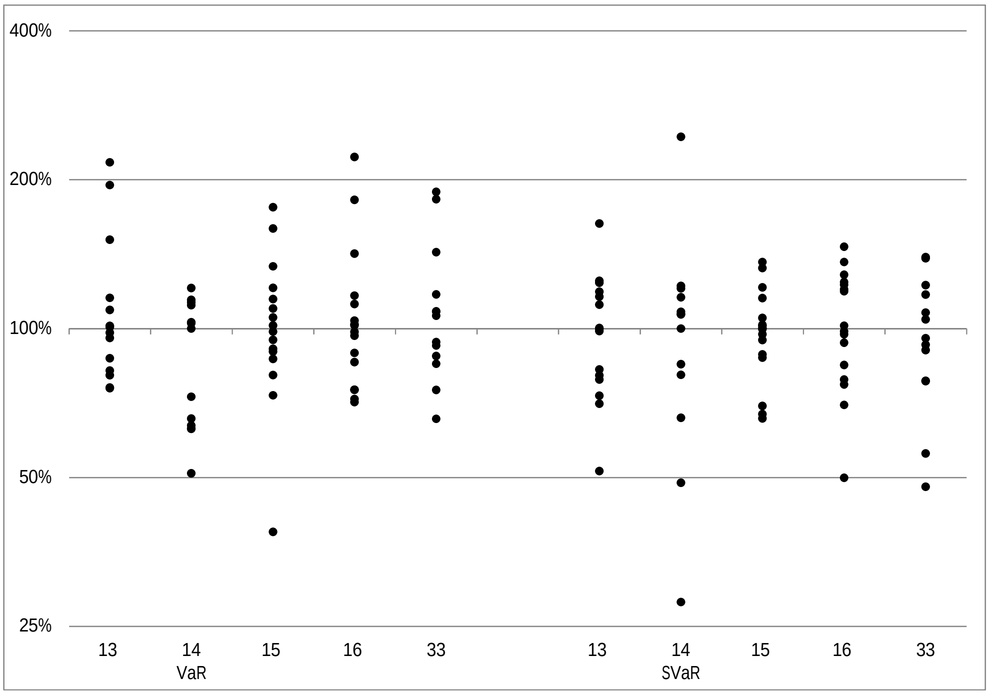
	P13	P14	P15	P16	P33
VaR	16	15	16	16	14
sVaR	16	15	16	16	14

2.6.2 Analysis of overall variability

Figure 27 shows scatter plots of the results of VaR and sVaR for the foreign exchange portfolios. The more complex portfolios, ie the knock-out currency option (P15) and double no-touch binary currency option (P16), do not exhibit any more diverse responses from banks than the less complex ones.

Dispersion of normalised VaR and sVaR results for the foreign exchange portfolios

Figure 27



2.6.3 Analysis of variability for the re-run portfolios compared with Phase 1

None of the Phase 2 foreign exchange portfolios were used in Phase 1.

2.6.4 Analysis of drivers of variability

The statistical driver analysis (described in Annex 4) identified a number of risk drivers that had a low impact on the risk measures for P33, the all-in foreign exchange portfolio:

- The VaR results had a strong level of correlation with the length of the look-back period.
- The sVaR results had a strong level of correlation with the scaling approach applied (ie whether a one-day measure was scaled to 10 days or 10 days were calculated directly).

2.7 Commodity portfolios

2.7.1 Test portfolio description

The exercise covered two commodity portfolios (P17–P18) and one all-in diversified portfolio (P34) that aggregated the two individual portfolios.

Description of the commodity portfolios

Table 10

Portfolio number	Description
P17	Curve play from contango to backwardation: long short-term and short long-term gold contracts
P18	Short oil put options
P34	All-in portfolio comprising portfolios P17–P18

The majority of banks provided results for each of the commodity portfolios. After the exclusion of erroneous data, the following number of banks were included for each portfolio and risk metric:

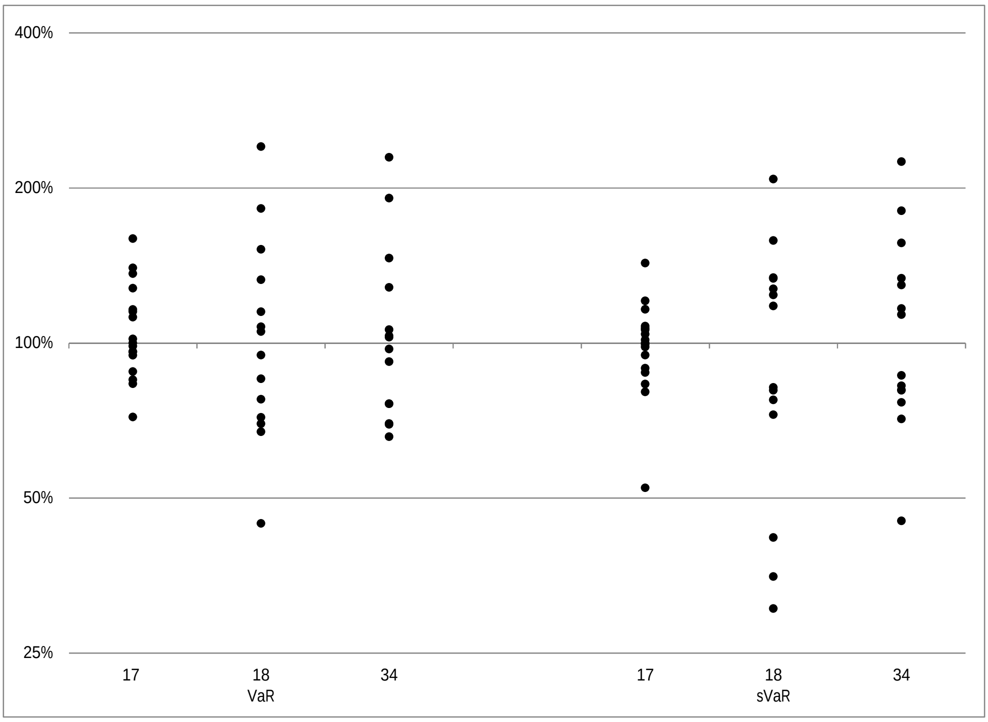
	P17	P18	P34
VaR	17	14	14
sVaR	17	14	14

2.7.2 Analysis of overall variability

Figure 28 shows scatter plots of the results of VaR and sVaR for the commodity portfolios.

Dispersion of normalised VaR and sVaR results for the commodity portfolios

Figure 28

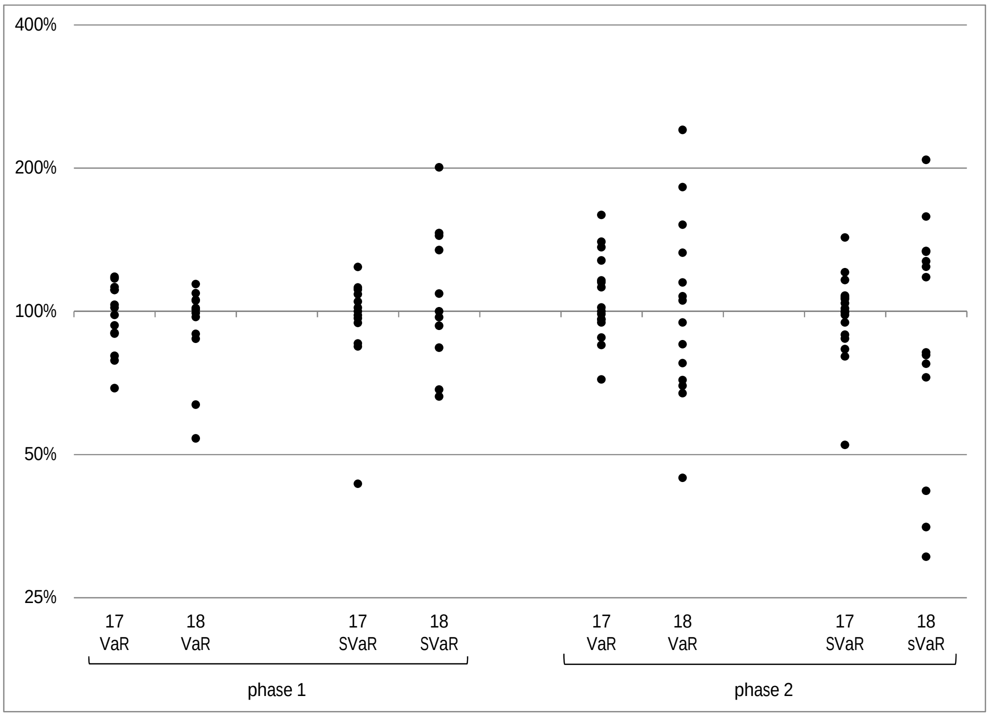


2.7.3 Analysis of variability for the re-run portfolios compared with Phase 1

Both commodity portfolios were scaled versions of the portfolios used in Phase 1. While the variation for P17 remained broadly the same, the variation increased for P18.

Dispersion of normalised VaR and sVaR results for the commodity portfolios, Phase 1 vs Phase 2

Figure 29



2.7.4 Analysis of drivers of variability

The statistical driver analysis (described in Annex 4) identified four risk drivers that had an impact on the risk measures for P34, the all-in commodity portfolio:

- The VaR results had a strong level of correlation with the length of the look-back period and the scaling approach (ie whether a one-day measure was scaled to 10 days or 10 days were calculated directly).
- The sVaR results had a strong level of correlation with the scaling approach applied (ie whether a one-day measure was scaled to 10 days or 10 days were calculated directly), and a low correlation with the use of antithetic data.

2.8 Credit Spread portfolios

2.8.1 Test portfolio description

The non-CTP exercise covered 10 credit spread portfolios (P19–P28) and one all-in diversified portfolio (P35) that aggregated the 10 individual portfolios.

Description of the credit spread portfolios — Table 11

Portfolio number	Description
P19	Sovereign CDS portfolio: Short protection via CDS on 5 countries
P20	Sovereign bond/CDS portfolio: Long protection via CDS on 5 countries
P21	Sector concentration portfolio: Short protection via CDS on 10 financials
P22	Diversified index portfolio: Short protection via CDS index
P23	Diversified index portfolio (higher concentration): Short protection via CDS index
P24	Diversified corporate portfolio: Short protection via CDS on 10 A- to AA- corporates
P25	Index basis trade on iTraxx 5-year Europe index series 19 version 1
P26	CDS bond basis on 5 financials
P27	Short index put on iTraxx Europe Crossover series 19
P28	Quanto CDS on Spain with delta hedge
P35	All-in portfolio comprising portfolios P19–P28

The majority of banks provided results for each of the credit spread portfolios. After the exclusion of erroneous data, the following number of banks were included for each portfolio and risk metric:

	P19	P20	P21	P22	P23	P24	P25	P26	P27	P28	P35
VaR	17	16	17	17	16	16	14	16	12	14	14
sVaR	17	16	17	17	16	16	14	16	12	14	14
IRC	17	16	17	17	16	16	14	16	12	14	12

2.8.2 Analysis of overall variability

As in Phase 1, the analysis shows that sVaR and IRC were more variable than VaR. The level of dispersion of the sVaR and IRC models declined substantially.

For all risk models, variability tends to be lower when considering the all-in credit portfolio. This result is consistent with the evidence that different modelling choices tend to have a higher impact on a specific strategy compared to a well-diversified portfolio.

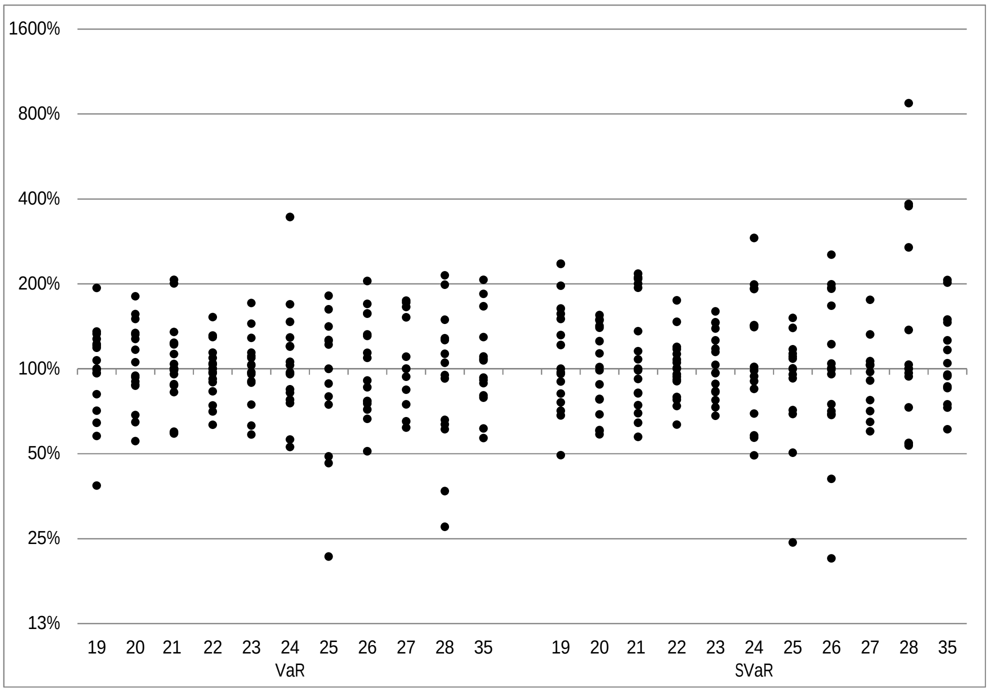
Figure 30 shows the dispersion of normalised results of VaR, sVaR and IRC for the credit spread portfolios (for normalised data, the median is set to 100%).

P25 appears to be an outlier, with an extreme level of dispersion for IRC; however, the median IRC value of this portfolio is relatively low, which causes small absolute differences across banks to show up as wide dispersion. In absolute terms, the dispersion across banks for this portfolio is relatively low.

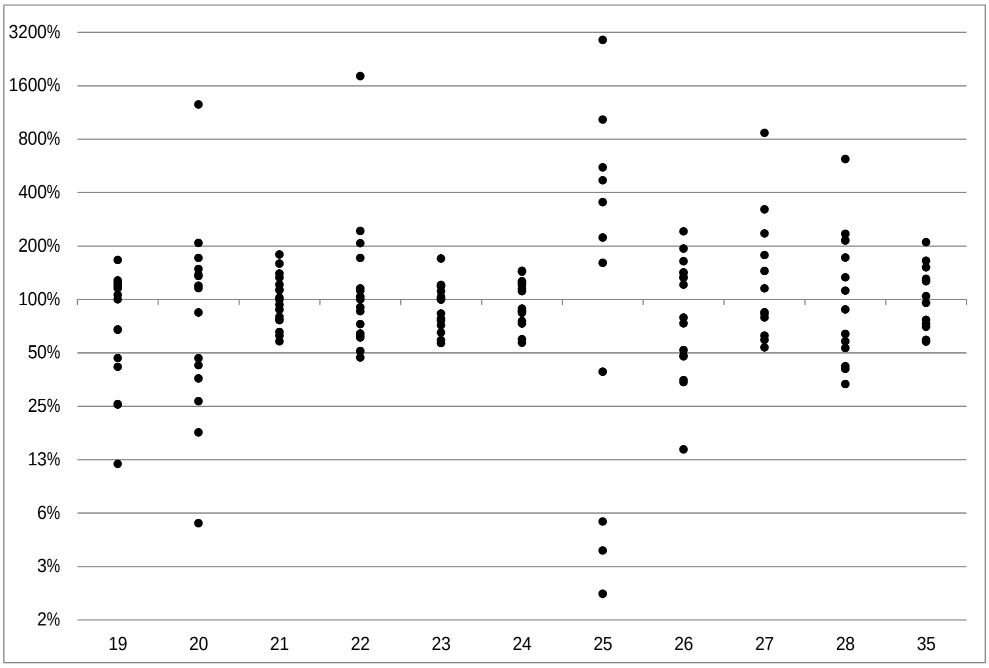
Dispersion of normalised risk metric results for credit spread portfolios

Figure 30

Panel A - Dispersion of normalised VaR and sVaR results of credit spread portfolios



Panel B – Dispersion of normalised IRC results for credit spread portfolios

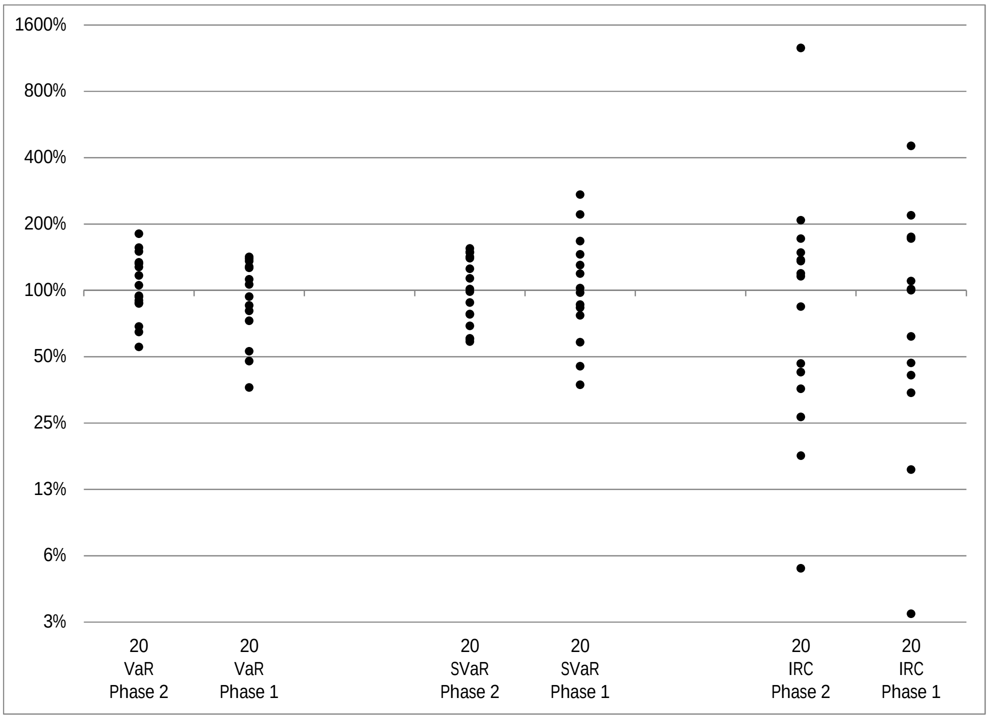


2.8.3 Analysis of variability for the re-run portfolios compared with Phase 1

The majority of credit portfolios do not represent re-runs of Phase 1 portfolios as in many cases Phase 1 portfolios were changed from short to long credit risk. With respect to the only portfolio that is common across the 2 Phases, a similar degree of dispersion for VaR is observed even if the distribution is more skewed to values higher than the median (see Figure 31). The variability of stressed VaR and IRC is substantially lower, with two outlier values for IRC.

Dispersion of normalised risk metrics for portfolio 20:
Phase 1 vs Phase 2

Figure 31



2.8.4 Analysis of variability of new Phase 2 portfolios

There are two complex portfolios for credit spread risk: the first one is a short index put on Itraxx Crossover and the second is a quanto CDS on Spain which is delta hedged.

The level of variability of the short put is comparable to the one observed in simpler portfolio strategies. A higher degree of variability is observed with respect to the quanto strategy: however this result could be connected with an incorrect specification of the portfolio by three banks that report quite different initial market value.

2.8.5 Analysis of drivers of variability

The analysis of the drivers of variability for credit portfolios was performed on the diversified credit portfolio (portfolio 35). This was done by analysing the Kendall's tau coefficient (see Annex 4) that measures the dependency between a possible driver and the VaR or sVaR outcomes.

With respect to VaR the most significant drivers identified are the length of data period, the valuation approach and the calibration methodology of the credit spreads returns (absolute returns, relative returns or mixed approach). For stressed VaR the analysis indicates a moderate correlation between the use of antithetic data and the level of the risk metric.

Concerning IRC the test shows the influence of liquidity horizon granularity, correlation, model approach, calibration of transition matrices and calculation of P&L on migration event (full repricing vs partial repricing with sensitivities or grids).

2.9 Diversified portfolios

2.9.1 Test portfolio description

The non-CTP exercise covered seven diversified test portfolios (P29–P35).

Description of the diversified portfolios — Table 12

Portfolio number	Description
P29	All non-CRM portfolios excluding complex portfolios
P30	All non-CRM portfolios
P31	All equity portfolios
P32	All interest rate portfolios
P33	All foreign exchange portfolios
P34	All commodity portfolios
P35	All credit spread portfolios

The majority of banks provided results for each of the diversified portfolios. After the exclusion of erroneous data, the following number of banks were included for each portfolio and each risk metric:

	P29	P30	P31	P32	P33	P34	P35
VaR	13	9	14	16	14	14	14
sVaR	13	9	14	16	14	14	14
IRC	13	14	-	15	-	-	12

The following issues were analysed:

- the variability in the level of diversification benefit (calculated as the percentage difference between the sum of the model results for the underlying portfolios and the model result for the diversified portfolio);
- the variability in the results of each risk metric; and
- the variability in the implied overall capital requirement.

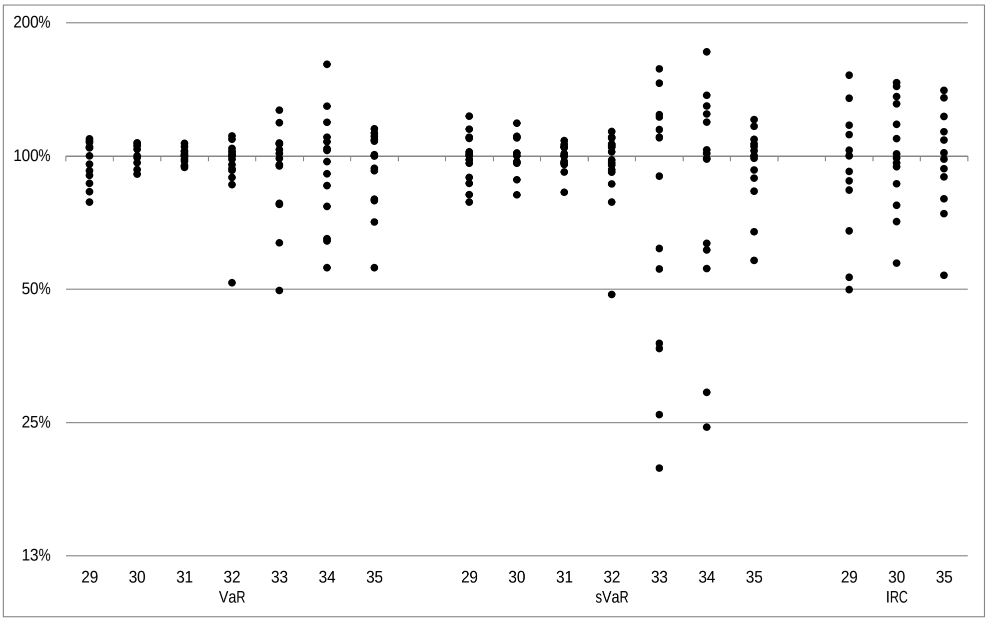
For variability in the implied overall capital requirement, analysis focused on the largest diversified portfolios – P29 and P30.

2.9.2 Analysis of variability in diversification benefit

Figure 32 shows the level of dispersion of the diversification benefit around the median of the distribution.

Dispersion of normalised diversification benefit for all diversified portfolios

Figure 32



Note: P32 is excluded for IRC because it contains only one portfolio for which the IRC is calculated; hence, on an individual model level, P32 is not a diversified portfolio.

The median level of the diversification benefit is relatively consistent for VaR and sVaR, and it is generally higher for those two than for IRC. The variability in diversification benefit, however, is higher for IRC models than for VaR or sVaR – this is consistent with the findings of the Phase 1 exercise and probably reflects the relevance of the correlation assumptions between obligors.

When complex positions are introduced to the diversified portfolio (P30), the median level of diversification benefit rises for all models, but the level of variability declines. The median level of diversification benefit is significantly lower for the foreign exchange and commodity portfolios (P33 and P34) relative to the equity, interest rate and credit spread portfolios (P31, P32 and P35).

The average level of diversification benefit achieved by banks across all models was analysed to understand whether banks that assume high a diversification benefit in one model typically also assume the same thing in other models. The average diversification benefit rank of each bank is shown in Table 13.

As in Phase 1, the relationship between the relative level of diversification benefit in VaR and sVaR models of the same bank appears to be positive (in statistical terms, there was a 46% correlation between the average diversification benefit rank of VaR and sVaR results for each bank).

In contrast to Phase 1, the Phase 2 results showed some positive correlation between banks having high diversification in the VaR/sVaR model and those having high diversification benefit in the IRC model: the correlation of the average ranks between VaR and sVaR and the IRC ranks was 9% (for VaR) and 49% (for sVaR).

Comparison of average ranking of diversification benefit for diversified portfolios of each bank by model type

The table is ordered according to the banks' VaR diversification benefit rank (rank 1 = highest diversification benefit) Table 13

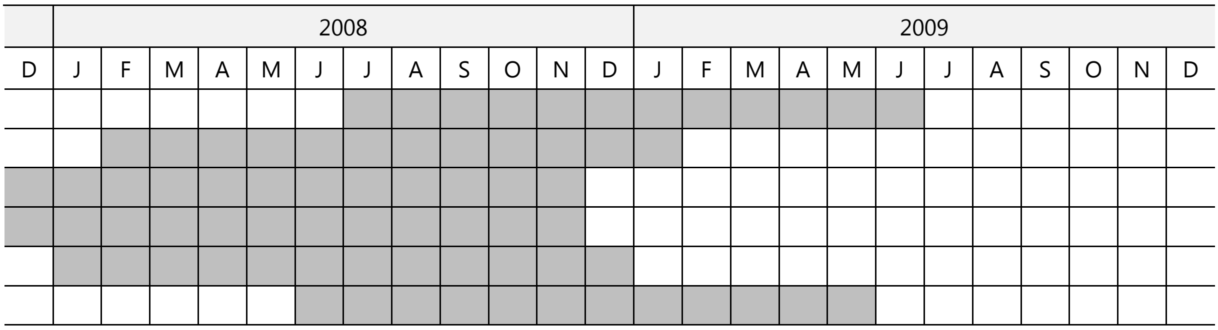
VaR diversification benefit rank	4	4	5	6	6	6	7	7	8	9	9	9	10	10	11	11
sVaR diversification benefit rank	3	9	7	7	6	7	7	7	12	8	5	11	9	7	11	9
IRC diversification benefit rank	3	4	8	11	-	8	2	8	13	8	6	12	2	2	-	8

2.9.3 Analysis of variability in stressed period selection

Banks participating in the exercise were asked to use, if possible, their standard approach for determining a stressed period for the sVaR model to identify a relevant stressed period for the diversified portfolios.

Six banks were able to perform this process. For those banks, the chosen period was broadly consistent and (as in Phase 1) typically included the second half of 2008.

Comparison of selected stressed period for diversified portfolios Table 14



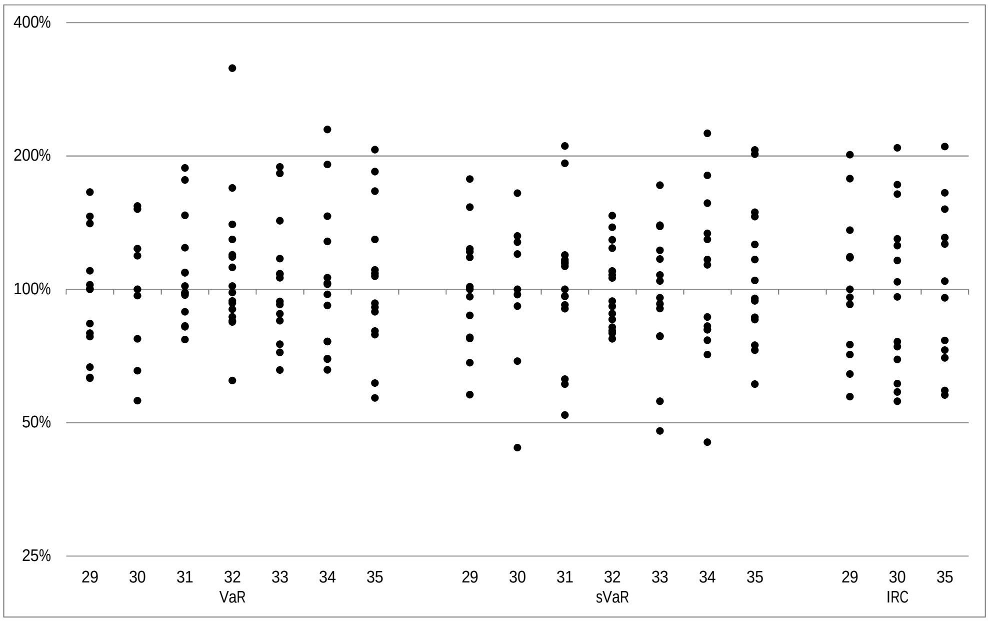
2.9.4 Analysis of variability in risk metric results

Figure 33 shows the dispersion of the normalised risk metric results (median is set to 100%). The level of dispersion of VaR and sVaR results for the diversified portfolios was typically similar. Although greater dispersion was observed for IRC models, the level of dispersion was typically lower than in Phase 1.

The level of dispersion of results was broadly consistent across portfolios for each model, but there was some indication that the inclusion of more complex products, or restriction of positions to a single asset class, increased dispersion.

Dispersion of normalised risk metric results for diversified portfolios

Figure 33



Note: P32 is excluded for IRC because it contains only one portfolio for which the IRC is calculated; hence, on an individual model level, P32 is not a diversified portfolio.

2.9.5 Analysis of variability in the implied overall capital requirement

For the largest diversified portfolios (P29 and P30), a capital requirement can be derived by combining the banks' results for each model with the multipliers their supervisors require them to apply, to imply a capital requirement.

In Phase 1, the multiplier was a significant cause of variability in the capital requirement, and it is possible to determine how much variability this causes by also calculating an implied capital requirement using the standard multiplier of 3 for VaR/sVaR.

Table 15 and Figure 34 show the range and level of variability of the implied capital requirement for P29 and P30. The results are shown both for the supervisory multiplier used to calculate the actual capital requirement (if the bank held the portfolio) and for a multiplier of 3 (which shows only the variability due to the model choices of the banks).

Implied capital requirement for diversified portfolios, P29 and P30

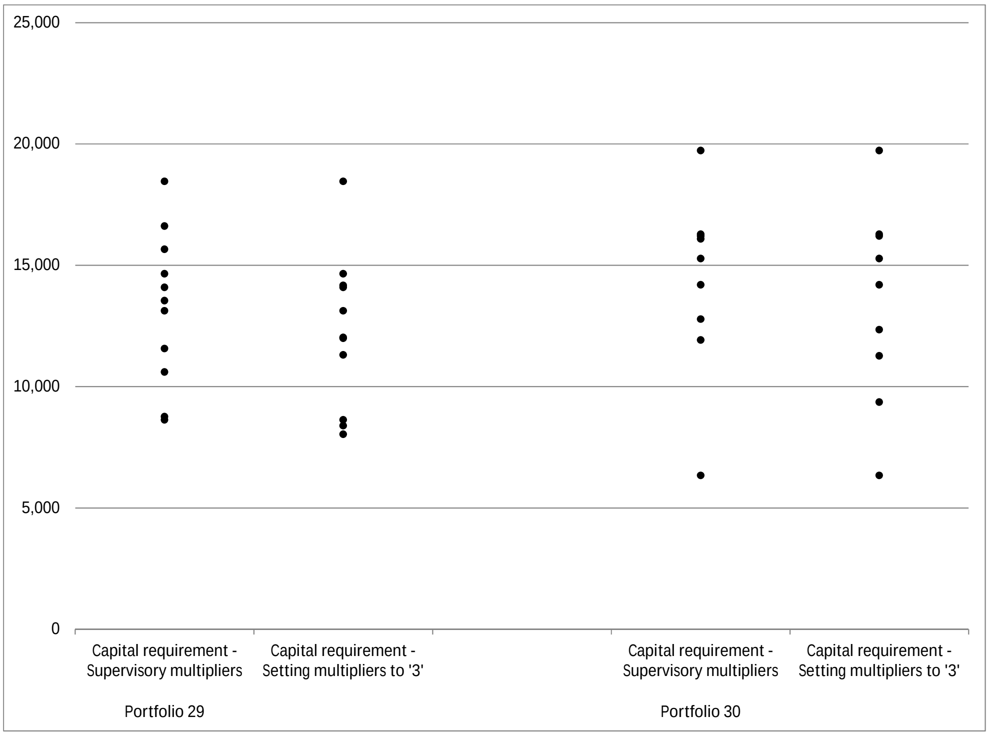
Thousands of euros except as noted

Table 15

	P29		P30	
	Using supervisory multiplier	Setting multiplier to 3	Using supervisory multiplier	Setting multiplier to 3
Min	8,628	8,036	6,337	6,337
Max	18,455	18,455	19,730	19,730
Median	13,541	12,027	15,276	14,193
Mean	13,244	12,260	14,312	13,445
Stdev	3,135	3,144	3,751	4,065
Stdev/mean	24%	26%	26%	30%
IPD (90%)/median	58%	52%	40%	58%

Dispersion of implied capital requirements for diversified portfolios, P29 and P30

Figure 34



The overall level of variability of the implied capital requirements of the diversified portfolios is lower than that of the individual model results (as in Phase 1) because (i) the diversification benefit dampens the impact of individual modelling choices at each instrument level and (ii) the IRC (the more variable model) contributes less to the overall capital requirement than VaR and sVaR.

P30, which includes the complex products, shows a higher variability than P29. In both cases, when the variability of the supervisory multipliers is removed, the range of capital requirements does not change materially. Notably, the impact of harmonising the multipliers is much lower than in Phase 1, in part because the range of supervisory multipliers has declined since Phase 1 (the range in Phase 1 was 3–5.5, and in Phase 2 it was 3–4.5).

2.9.6 Analysis of impact on variability of VaR calibration period and IRC percentile

Using data provided by participating banks for the diversified portfolios, it was possible to:

- calculate the impact on VaR variability when the historical period used for the VaR model is adjusted to one year; and
- calculate the impact on variability in the IRC result when a 99% confidence level is used instead of 99.9%.

Impact of choice of historical period for VaR

Based on the data provided by banks, Table 16 shows the impact on variability of the VaR results for each diversified portfolio when a single calibration approach is applied. The analysis contrasts the results at all banks with those that use historical simulation based on one-day returns of risk factors to calculate a one-day VaR (ie banks that directly calculate a 10-day VaR by using 10-day returns were excluded from this set). The table also shows a standardised VaR calculated (as described in Annex 5) according to the one-year history of daily simulated P&L statements provided by the banks.

Variability declined across all portfolios for the standardised VaR (in some cases by 50%) – which highlights the importance of the historical period for VaR. However, a range of other model choices also drive differences in results.

Statistics on implied capital requirement using one-year historical data for VaR — Table 16

		P29	P30	P31	P32	P33	P34	P35
Reported VaR stdev/mean	All banks	33%	34%	31%	49%	35%	44%	40%
	One-day historical simulation banks	32%	42%	29%	20%	29%	29%	43%
Standardised VaR stdev/mean for one-day historical simulation banks		14%	30%	22%	16%	14%	19%	22%

Impact on variability of calculating IRC at a 99% confidence level rather than 99.9%

A possible inherent driver of variability in IRC results is their very high confidence level, which means that small changes in modelling design or parameters can have a large impact on the result. To determine whether this is a material issue, participating banks were asked to provide the 99% confidence level IRC result for P30.

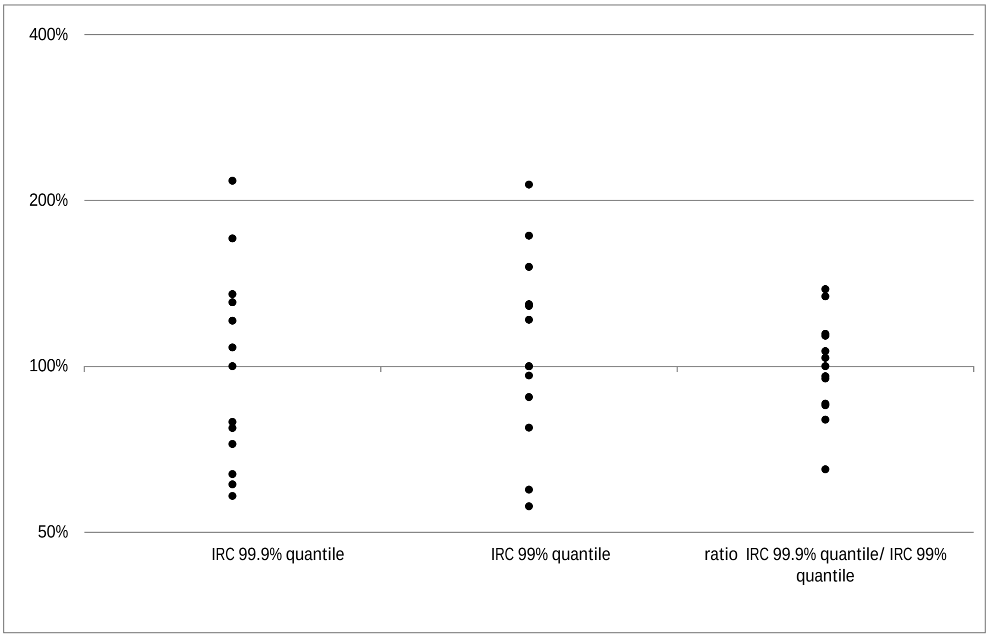
Thirteen banks provided the requested information. The analysis showed that there is only a minor impact on the variability of IRC when the confidence level is lowered (Table 17 and Figure 35). The comparable level of dispersion between the two confidence levels can be explained by the fact that the ratio of the two percentiles is relatively consistent among the banks (between 1.4 and 3, with a stdev/mean equal to 20%).

IRC result variability using different confidence levels — Table 17

	IRC result for portfolio 30 (thousands of euros)	
	99.9% confidence level	99% confidence level
Min	1,614	660
Max	6,027	2,534
Median	2,775	1,185
Mean	2,977	1,362
Stdev	1,317	534
Stdev/Mean	44%	39%
IPD (90%)/Median	102%	105%

Dispersion of IRC results for portfolio 30 at different confidence levels

Figure 35



Annex 3: Hypothetical test portfolio specifications

1. Correlation trading portfolio specification

Common instructions

Overview To ensure accurate and consistent execution of the CRM exercise across all participating institutions, banks are asked to familiarise themselves with the following instructions and assumptions.

Acronyms The following acronyms are used throughout this document:

Acronym	Definition
CRM	Comprehensive Risk Measure as defined per BCBS 193 and clarified in BCBS 208.
CS01	Credit spread sensitivity. Please refer to sections on additional assumptions and instructions for CDS and CDO products for details.
CTP	Correlation Trading Portfolio as defined per BCBS 193.

Submission of Results

Where
Please submit exercise results to your respective national supervisors
How
Please submit exercise results using submission template provided with this document.
What
Please refer to the sections with heading "Required Results" and "Reporting Currency".
When
Please provide all request results by Friday, June 28 2013.

Pre-exercise validation

Please submit the following to your local supervisor by May 17, 2013 using the template provided:
Valuation of each portfolio as of close of business May 10, 2013 (for portfolios 1-4 the valuation should be at 5.00pm New York time, for portfolios 5-7 the valuation should be at 5.00pm London time), together with additional details:

- Source of the valuation (eg front office system, back office system)
- Basis of valuation (market price or model (and if so what model))
- Exact timing of the valuation
- Any material assumptions used when booking each portfolio that were not included in the portfolio specification
- The valuation should exclude the MtM of the CS01 hedges.
  The valuation should also exclude all other valuation adjustments. These should be reported separately in the assumptions for each trade.

Par up-front fee for portfolios 4 to 7. Reported valuation should exclude this up-front fee.
Hedge notional and sign for the hedge notional for all portfolios and hedging instruments used (if different from requirements specified in the portfolio specification).
A summary document showing differences (if any) between your approved CRM model and the Basel Accord definition of the model.

This data will be reviewed in the week commencing 20 May to ensure all participating institutions have correctly understood instructions in this document.

Duration of exercise and key dates

Unless otherwise stated:

The duration and data requirements for the exercise are as follows:
Calculate and report MtM as of: Friday, June 07 2013
Calculate and report daily 10-day VaR figures (do not apply the multiplier) for the period 3-14 June
Calculate and report weekly modelled CRM and standardised charges from
o Friday, June 07 2013 (Start Date) to
o Friday, June 14 2013 (End Date)
Book trades as of May 10 2013 (as required for the pre-exercise validation) and allow the trades to age throughout the CRM exercise without rebooking the trades.

Regulatory Approval of Models

Please refer to the following table regarding usage of models, depending on approval for regulatory capital calculations (a separate tab in the accompanying results template is provided to indicate whether an approved or internal model is used for each portfolio):

If the exercise requires use of model that is...	Then Bank must provide results using...
approved by your national regulator	the approved model.
not approved by your national regulator	the model currently being used for internal management purposes.

Required Results

Please document the following results, as applicable for each portfolio, in the results submission template accompanying this document.
Market Value (MTM) as at 7 June. This follows the same inclusions/exclusions per the instructions in the Pre-exercise validation section of this document.
VaR (general market and specific risk)
Stressed VaR (general market and specific risk)
CRM Modelled Charge
CRM Standardised Charge
Hedge notional for all portfolios.

The modelled CRM charge for the purposes of this exercise is defined as the sum of:
a price risk component covering
o credit spread and index-single name basis,
o implied correlations and index-bespoke tranche basis
o and recovery rate volatility
and a rating migration and default component

If attribution for the CRM modelled charge is available, then please provide additional breakdown of the following results for each portfolio:
Price Risk CRM
Default and Migration CRM

Up-front fees, valuation adjustments, and CS01 hedges should be included for all portfolios when calculation VaR, Stressed VaR, and CRM.

Reporting Currency	For each portfolio, banks are asked to provide the results for each portfolio in two currencies: The Bank's home currency and The base currency of each exercise as specified in the Portfolio Definition section. Two separate tabs in the accompanying results submission template are provided to facilitate the submission of both home and base currency results.
Collateral	Unless otherwise stated, assume that there is neither any margining agreements nor collateralisation of positions associated with the trades entered in the exercise.
Active Management	Assume all hedge positions are static. No rebalancing is allowed on subsequent CRM reporting dates after initial valuation date (ie 10 May 2013) in order to minimise subsequent influences to the result that are external to the model.
CDS contract specific assumptions and instructions	Unless otherwise stated, the following assumptions are applicable for all CDS and index CDS positions: Assume any up-front fee is paid/received to enter the position as per the market conventions. The maturity date follows conventional quarterly termination dates, often referred to as "IMM dates". CS01 is defined as the change in CDS price due to a 1bp widening across all tenors of the single name or index spread. Additional specifications required in order to compute pricing calculations should be done in a way that is consistent with market standards. Refer to section titled "Additional Required Assumptions" for further instructions.
CDO Tranche assumptions and instructions	Unless otherwise stated, the following assumptions are applicable for all CDO tranche positions: For standard index tranches, assume any up-front fee is paid/received to enter the position as per the market conventions Notional specified in each portfolio represents the original tranche notional, unadjusted for any defaults. CS01 is defined as the change in tranche price due to a 1bp widening across all tenors of the single name or index spread. Spread Delta is defined as the ratio of CS01 for the tranche over CS01 of the underlying credit (CDS, index CDS, or bond). In the case of non-index tranches, for the same tranche there will be one spread delta per underlying credit. Additional specifications required in order to compute pricing calculations should be done in a way that is consistent with market standards. Refer to section titled "Additional Required Assumptions" for further instructions.
Additional Required Assumptions	If additional assumptions beyond those specified above are relevant to the interpretation of exercise results submitted, for example: coupon rolls, mapping against indices, weighting of contributions from different indices to a bespoke correlation surface, etc then please submit a separate document containing these assumptions in addition to the results template spreadsheet.

Portfolio definition

<table>
<tr><th>Portfolio # and Name</th><th>Strategy</th><th>Base Currency</th></tr>
<tr><td>1 - 3
Standard Index CDO Tranches</td><td>
These portfolios contain positions in index tranches referencing the CDX.NA.IG index series 9 V4 (RED:2I65BYCG8). The portfolios facilitate quantitative comparison of techniques used in CDO pricing and CRM computation for a standardised product. Only the equity (0-3), mezzanine (7-10) and super senior (30-100) tranches are examined as these tranches provide sufficient coverage of the range of credit spread convexity, leverage, and correlation sensitivity typically encountered in correlation trading.

Notional is 10M USD for each tranche.
The contractual maturity is 7 years, Effective Sept. 21 2007, for each tranche with the actual maturity date of Dec. 20, 2014.
Valuation as of 5pm NY time on each date of valuation.
Assume running spread of 500bps for the tranches in portfolio 1,2, and running spread of 100 bps for portfolio 3.

The following portfolios are constructed by hedging each index tranche with the CDX.NA.IG index series 9 V4 7Y CDS to achieve zero CS01 as of initial valuation date. No further rehedging is required. Please report the hedge notional as of the initial valuation date.
<table>
<tr><th>Portfolio #</th><th>Tranche Position</th><th>Attachment Point (%)</th><th>Detachment Point (%)</th></tr>
<tr><td>1. Spread hedged EQ tranche</td><td>Long</td><td>0</td><td>3</td></tr>
<tr><td>2. Spread hedged Mez tranche</td><td>Long</td><td>7</td><td>10</td></tr>
<tr><td>3. Spread hedged SS tranche</td><td>Short</td><td>30</td><td>100</td></tr>
</table>
</td><td>USD</td></tr>
<tr><td>4
First-to-Default CDS</td><td>
This portfolio contains a First-to-default (FTD) CDS, used to compare risk model differences in a popular non-tranched credit instrument commonly seen in the correlation trading portfolio.
The FTD CDS references the following basket of 5 obligors, with a US tech sector focus, which are all constituents of the CDX.NA.HY S19 (RED: 2I65BRJT8) Index:
<table>
<tr><th>Obligor</th><th>CLIP</th></tr>
<tr><td>ADVANCED MICRO DEVICES, INC.</td><td>007G93AD4</td></tr>
<tr><td>RadioShack Corporation</td><td>7C547BAF9</td></tr>
<tr><td>Seagate Technology HDD Holdings</td><td>8J298RAA0</td></tr>
<tr><td>SunGard Data Systems Inc.</td><td>8EDAAMAE6</td></tr>
<tr><td>Unisys Corporation</td><td>999B35AF1</td></tr>
</table>

2M USD notional is invested in each underlying, Long Protection
The FTD CDS is effective as of May 10, 2013, and has a maturity of 5 years. This means the FTD CDS will mature on May 10, 2018.
The FTD CDS is spread delta hedged with 5 single name CDS corresponding to each obligor to achieve zero CS01, now a vector of 5 elements, as of initial valuation date. No further rehedging is required. Please report the hedge notional as of the initial valuation date. In addition, for each single name hedge, please use the 5 Y maturity CDS effective as of March 20 2013, as the

</td><td>USD</td></tr>
</table>

	hedge if available, and if not, please indicate which hedging instruments you used. • Please calculate the par FTD CDS premium as of the initial valuation date. This premium is paid quarterly, using Act360 day count. Please report this premium along with the initial MtM. The final premium for the exercise will be determined by averaging all the premia contributed by the Banks, after dropping the highest and lowest figures. • Valuation as of 5pm NY time on each date of valuation. • Assume running spread of 1000bps.	
5 *Bespoke Synthetic CDO Tranche (non-standard maturity)*	This is a non-standard index tranche referencing the iTraxx Europe index series 9 (RED:2I666VAI6) with a non-standard maturity, used to study the effect of interpolation used for the base correlation surface. • Notional is 10M EUR, long the tranche • Attachment point is 6% • Detachment point is 9% • The tranche has a contractual maturity of 6 years, effective as of March 20, 2008 (in other words, it will mature on June 20, 2014) • Please calculate and report the par coupon as of the initial valuation date. • Hedge the spread delta using the iTraxx Europe index series 9 7Y index CDS to achieve zero CS01 as of the initial valuation date. No further rehedging is required. Please report the index CDS notional used in the hedge. • Valuation as of 5pm London time on each date of valuation. • Assume running spread of 300 bps.	EUR
6 *Bespoke Synthetic CDO Tranche (non-standard AP/DP)*	This is a non-standard index tranche referencing the iTraxx Europe index series 9 (RED:2I666VAI6) with a non-standard attachment and detachment point, used to study the effect of the interpolation methodology used for the base correlation surface. • Notional is 10M EUR, long the tranche • Attachment point is 5% • Detachment point is 7% • The tranche has a contractual maturity of 7 years, effective as of March 20, 2008 (in other words, it will mature on June 20, 2015) • Please calculate and report the par coupon as of the initial valuation date. • Hedge the spread delta using the iTraxx Europe index series 9 7Y index CDS to achieve zero CS01 as of the initial valuation date. No further rehedging is required. Please report the index CDS notional used in the hedge. • Valuation as of 5pm London time on each date of valuation. • Assume running spread of 500 bps.	EUR
7 *Bespoke Synthetic CDO Tranche (Base correlation mapping + regional mix)*	This portfolio is a synthetic CDO tranche referencing a pool of obligors pulled from popular credit indices just prior to the credit crisis. It is used to assess the risk in legacy bespoke positions where valuation and risk management is complicated by the cross-regional and cross sector composition of the reference pool and the need to integrate correlation information from multiple underlying indices. The CDO tranche is backed by the following obligations : • First 25 (non-defaulted, non-matured, CLIP available) unique obligors in the CDX.NA.IG S9 V4 index • First 25 (non-defaulted, non-matured, CLIP available) unique obligors in the CDX.HY.IG S9 V22 index • First 25 (non-defaulted, non-matured, CLIP available) unique obligors in the iTraxx Europe S9 V1 index • First 17 (non-defaulted, non-matured, CLIP available) unique obligors in the iTraxx Europe S9 V1 Cross-over V8 index • First 8 (non-defaulted, non-matured, CLIP available) unique obligors in the iTraxx Europe S9 V1 HiVol index The full list of obligors is provided below. In case of discrepancies between the reference obligor and the CLIP, please use the obligor and look up the correct CLIP directly from Markit:	EUR

http://www.markit.com/assets/en/docs/products/data/indices/credit-index-annexes/itraxx_europe_series_9(Xover%20v8).pdf

http://www.markit.com/assets/en/docs/products/data/indices/credit-index-annexes/IG%209%20v4.pdf

http://www.markit.com/assets/en/docs/products/data/indices/credit-index-annexes/CDX.NA.HY.9%20V22.pdf

	Obligor	**CLIP**	**Source**
1	ACE LIMITED	0A4848AC9	CDX.NA.IG S9 V4
2	Aetna Inc.	0A8985AC5	CDX.NA.IG S9 V4
3	The Allstate Corporation	0C2002AC1	CDX.NA.IG S9 V4
4	Altria Group, Inc.	0C4291AC8	CDX.NA.IG S9 V4
5	AMERICAN ELECTRIC POWER COMPANY, INC.	027A8AAC0	CDX.NA.IG S9 V4
6	American International Group, Inc.	028EFBAC1	CDX.NA.IG S9 V4
7	Amgen Inc.	0D4278AC3	CDX.NA.IG S9 V4
8	Anadarko Petroleum Corporation	0A3576AD5	CDX.NA.IG S9 V4
9	Arrow Electronics, Inc.	0E69A8AA4	CDX.NA.IG S9 V4
10	AutoZone, Inc.	0F8665AA6	CDX.NA.IG S9 V4
11	Baxter International Inc.	0H8994AA6	CDX.NA.IG S9 V4
12	Boeing Capital Corporation	09G715AD8	CDX.NA.IG S9 V4
13	Burlington Northern Santa Fe Corporation	1D39H2AB2	CDX.NA.IG S9 V4
14	Campbell Soup Company	1E786BAC8	CDX.NA.IG S9 V4
15	Capital One Bank	1F444NAC3	CDX.NA.IG S9 V4
16	Cardinal Health, Inc.	1F55D7AB6	CDX.NA.IG S9 V4
17	CARNIVAL CORPORATION	1F79BDAD1	CDX.NA.IG S9 V4
18	Caterpillar Inc.	15DA35AC1	CDX.NA.IG S9 V4
19	CBS Corporation	136CDCAB6	CDX.NA.IG S9 V4
20	Centex Corporation	1G7543AD7	CDX.NA.IG S9 V4
21	Comcast Cable Communications, LLC	2C02BLAC3	CDX.NA.IG S9 V4
22	Computer Sciences Corporation	2C5899AC5	CDX.NA.IG S9 V4
23	ConAgra Foods, Inc.	225DGFAB6	CDX.NA.IG S9 V4

24	Countrywide Home Loans, Inc.	2E45A1AE9	CDX.NA.IG S9 V4
25	Cox Communications, Inc.	2E6448AC6	CDX.NA.IG S9 V4
26	The AES Corporation	0A143HAB4	CDX.NA.HY S9 V22
27	Allied Waste North America, Inc.	01AED5AC5	CDX.NA.HY S9 V22
28	American Axle & Manufacturing, Inc.	UU2679AA7	CDX.NA.HY S9 V22
29	ArvinMeritor, Inc.	0E7688AB0	CDX.NA.HY S9 V22
30	Beazer Homes USA, Inc.	07CABWAA5	CDX.NA.HY S9 V22
31	Chesapeake Energy Corporation	17B67DAD5	CDX.NA.HY S9 V22
32	CMS Energy Corporation	137DHFAC0	CDX.NA.HY S9 V22
33	Cooper Tire & Rubber Company	237EB4AC8	CDX.NA.HY S9 V22
34	CSC Holdings, Inc.	1D8934AC6	CDX.NA.HY S9 V22
35	Dillard's, Inc.	2H946DAB5	CDX.NA.HY S9 V22
36	DOMTAR INC.	27CCB7AC0	CDX.NA.HY S9 V22
37	EchoStar DBS Corporation	29FFDMAE7	CDX.NA.HY S9 V22
38	First Data Corporation	34AIF9AB9	CDX.NA.HY S9 V22
39	Ford Motor Company	3H98A7AB3	CDX.NA.HY S9 V22
40	FOREST OIL CORPORATION	37A69AAB2	CDX.NA.HY S9 V22
41	GEORGIA-PACIFIC LLC*	3AA64GAA9	CDX.NA.HY S9 V22
42	The Goodyear Tire & Rubber Company	3BA7A5AD6	CDX.NA.HY S9 V22
43	Harrah's Operating Company, Inc.	4F498HAF1	CDX.NA.HY S9 V22
44	The Hertz Corporation	46A844AC6	CDX.NA.HY S9 V22
45	Host Hotels & Resorts, L.P.	4I517NAA0	CDX.NA.HY S9 V22
46	IKON Office Solutions, Inc.	4J6884AD7	CDX.NA.HY S9 V22
47	K. Hovnanian Enterprises, Inc.	4I66CGAA7	CDX.NA.HY S9 V22
48	L-3 Communications Corporation	UZ523AAB1	CDX.NA.HY S9 V22
49	Massey Energy Company	5CD823AD1	CDX.NA.HY S9 V22

50	MGM MIRAGE	5A7BE8AE9	CDX.NA.HY S9 V22
51	Daimler AG	DE7C9QAA4	iTraxx.EU S9
52	VOLKSWAGEN AKTIENGESELLSCHAFT	9BAEC8AD7	iTraxx.EU S9
53	CADBURY SCHWEPPES PUBLIC LIMITED COMPANY	1D9929AC5	iTraxx.EU S9
54	CARREFOUR	FG4CAMAC3	iTraxx.EU S9
55	DIAGEO PLC	2H767TAC4	iTraxx.EU S9
56	EXPERIAN FINANCE PLC	GJ57CTAC9	iTraxx.EU S9
57	SAFEWAY LIMITED	GNEDEUAB4	iTraxx.EU S9
58	Svenska Cellulosa Aktiebolaget SCA	8EFEDFAB4	iTraxx.EU S9
59	E.ON AG	28EFF8AB5	iTraxx.EU S9
60	ELECTRICITE DE FRANCE	FHBD4HAC9	iTraxx.EU S9
61	UNITED UTILITIES PLC	9A442RAC9	iTraxx.EU S9
62	Vattenfall Aktiebolag	W5GGHNAD5	iTraxx.EU S9
63	Aegon N.V.	007GB6AD4	iTraxx.EU S9
64	ASSICURAZIONI GENERALI - SOCIETA PER AZIONI	0E996BAD3	iTraxx.EU S9
65	AVIVA PLC	GG6EBTAD8	iTraxx.EU S9
66	Banco Espirito Santo, S.A.	xx37B2AE7	iTraxx.EU S9
67	BARCLAYS BANK PLC	06DABKAE4	iTraxx.EU S9
68	BNP PARIBAS	05ABBFAF5	iTraxx.EU S9
69	Swiss Reinsurance Company	HPC44AAC3	iTraxx.EU S9
70	THE ROYAL BANK OF SCOTLAND PUBLIC LIMITED COMPANY	GNDEGIAC6	iTraxx.EU S9
71	UNICREDITO ITALIANO SOCIETA PER AZIONI	T2E64UAE6	iTraxx.EU S9
72	Zurich Insurance Company	9HHHARAD0	iTraxx.EU S9
73	Koninklijke DSM N.V.	NS517VAB7	iTraxx.EU S9
74	European Aeronautic Defence and Space Company EADS N.V.	FG8825AB6	iTraxx.EU S9
75	FINMECCANICA S.P.A.	3E9829AB5	iTraxx.EU S9
76	ALCATEL LUCENT	FF1AAKAB8	iTraxx.EU S9 Xover V8
77	BRITISH AIRWAYS plc	1C145AAA4	iTraxx.EU S9 Xover V8
78	BRITISH ENERGY HOLDINGS PLC	GH684NAA6	iTraxx.EU S9 Xover V8
79	CODERE FINANCE (LUXEMBOURG) S.A.	LM9E7LAA4	iTraxx.EU S9 Xover V8
80	Cognis GmbH	DE69AIAA8	iTraxx.EU S9 Xover V8
81	Evonik Degussa GmbH	DD79BOAA5	iTraxx.EU S9 Xover V8
82	Grohe Holding GmbH	DFAE7AAA0	iTraxx.EU S9 Xover V8

83	INEOS GROUP HOLDINGS PLC	GKBDF0AA0	iTraxx.EU S9 Xover V8
84	INTERNATIONAL POWER PLC	4A619UAA8	iTraxx.EU S9 Xover V8
85	ITV PLC	GKDHCEAC8	iTraxx.EU S9 Xover V8
86	Kabel Deutschland GmbH	DJA66EAB0	iTraxx.EU S9 Xover V8
87	NORDIC TELEPHONE COMPANY HOLDING ApS	KN48C9AA2	iTraxx.EU S9 Xover V8
88	NXP B.V.	NTBEFLAC1	iTraxx.EU S9 Xover V8
89	ONO FINANCE II PUBLIC LIMITED COMPANY	GMDC6QAA9	iTraxx.EU S9 Xover V8
90	RHODIA	7D85CGAD9	iTraxx.EU S9 Xover V8
91	SMURFIT KAPPA FUNDING PUBLIC LIMITED COMPANY	GOA86FAC7	iTraxx.EU S9 Xover V8
92	Stena Aktiebolag	W4FCDXAA6	iTraxx.EU S9 Xover V8
93	NEXT PLC	GMB517AA3	iTraxx.EU S9 HVol
94	KELDA GROUP PLC	GJ5578AA9	iTraxx.EU S9 HVol
95	COMPAGNIE DE SAINT-GOBAIN	FG872CAB3	iTraxx.EU S9 HVol
96	LAFARGE	555DE7AB6	iTraxx.EU S9 HVol
97	RENTOKIL INITIAL PLC	GNC59OAA5	iTraxx.EU S9 HVol
98	ThyssenKrupp AG	DLBCG0AB0	iTraxx.EU S9 HVol
99	TELECOM ITALIA SPA	T2B9EFAE5	iTraxx.EU S9 HVol
100	WPP 2005 LIMITED	GPGFFQAC8	iTraxx.EU S9 HVol

- The investment is 10M EUR in each of the reference obligation, which means the total reference pool size of the CDO is 1Bn EUR. The bank will be long these tranches.
- Attachment point is 11%
- Detachment point is 15%
- The tranche has a contractual maturity of 7 years, effective as of March 20, 2008 (in other words, it will mature on June 20, 2015)
- Please calculate and report the par coupon as of the initial valuation date.
- Hedge the spread delta using all 100 single name CDSs to achieve zero CS01 as of the initial valuation date. No further rehedging is required. In this case CS01 is a vector of 100 elements, corresponding to each single name CDS. Please report the CDSs notional used in the hedge. In addition, for each single name hedge, please use the 7 Y maturity CDS, effective as of March 20 2008, as the hedge if available, and if not, please indicate which hedging instruments you used.
- Please do not do any form of correlation hedging
- Valuation as of 5pm London time on each date of valuation.
- Assume running spread of 500 bps.

2. Non-correlation trading portfolio specification

Common instructions

In order to ensure the accurate and consistent execution of the exercise across all participating institutions, banks are asked to familiarise themselves with the following instructions and assumptions:

(a) Banks should assume they enter all positions on 10 May 2013, and once positions have been entered, each portfolio ages for the duration of the exercise. Furthermore, assume the Bank does not take any action to manage the portfolio in any way during the entire exercise period. Unless explicitly stated otherwise in the specifications for a particular portfolio, strike prices for options positions should be determined relative to prices for the underlying as observed at market close on 10 May 2013.

(b) For the purpose of pre-exercise validation banks should provide to their local supervisor on 17 May 2013 the valuation of each portfolio and the 10-day VaR based upon end of day prices observed on 10 May using the pre-exercise validation data template provided. Where possible, the exact timing of the valuation should be as per the table below:

Portfolio number	Valuation time
1 and 4	4.30pm London
2, 3 and 6	4.00pm London
5 and 7	4.30pm London
8-12 and 14	5.00pm London
13 and 15	4.30pm New York
16	4.30pm New York
17	1.30pm New York
18	2.30pm New York
19-28	5.00pm London

(c) The following additional details should also be provided in the pre-exercise validation data template:

(i) Source of the valuation (eg front office system, back office system)

(ii) Basis of valuation (market price or model (and if so what model))

(iii) If the valuation included in the template incorporates any adjustment to the valuation produced by the bank's systems, the value of those adjustments

(iv) Exact timing of the valuation

(v) Any material assumptions used when booking each portfolio that were not included in the portfolio specification

(d) For the purpose of the test portfolio exercise, banks should provide the valuation of each portfolio on 3 June, together with the relevant required risk metrics as described in the accompanying results reporting template and explained below.

(e) Banks should calculate the risks of the positions without taking into account the funding costs associated to the portfolios (ie no assumptions are admitted as per the funding means of the portfolios).

(f) Banks should exclude to the extent possible counterparty credit risk when valuing the risks of the portfolios.

(g) Banks should calculate 10-day 99% VaR on a daily basis. If a participating bank also calculates VaR by risk factor, it may elect to separately provide an additional breakdown of total VaR, GMR

(General Market Risk) VaR, DSR (Debt Specific Risk) VaR, and ESR (Equity Specific Risk) VaR for each portfolio as applicable.

(h) Stressed VaR and IRC are to be calculated on a weekly basis. It is preferred that banks calculate Stressed VaR and IRC based on end of day prices for each Friday in the time window for the exercise. However, flexibility will be granted to banks preferring to use results from another day of the week if required.

(i) For each portfolio, banks are asked to provide results in two currencies; one in the Bank's home currency and one in the base currency of the portfolio as provided in the table below.

(j) In addition to VaR, stressed VaR and IRC risk metrics, banks should also provide the initial market value of each portfolio on day one of the exercise, and indicate the stress period used in the calculation of each portfolio. For the selection of the stress period, the following applies:

- o In order to facilitate a quantitative assessment of the impact of different choices for stress periods across banks, stressed VaR for portfolios other than any "all-in" portfolios will be calculated using the top-of-the-house stressed period currently used by each bank for its actual trading portfolio.
- o For the "all-in portfolios", each bank is asked to use its own internal process for stress period selection to identify the appropriate stress period. Banks are not required to identify a separate stress period for each "all-in" portfolio, instead the stress period for portfolio 29 should be used for all of the "all-in" portfolios.

(k) For transactions that include long positions in CDS, assume an immediate up-front fee is paid to enter the position as per the market conventions as indicated by Markit Partners (25, 50, 100bps for investment grade, 500bps for high yield).

(l) Assume that the maturity date for all CDS in the exercise follow conventional quarterly termination dates, often referred to as "IMM dates".

(m) Additional specifications required in order to compute pricing calculations required for CDS positions should be done in a way that is consistent with commonly used market standards.

(n) Use the maturity date (ie some options expire on third Saturday of the month, etc) that ensures the deal is closest to the term-to-maturity specified. For any material details of the product specification that are not explicitly stated in this document, please provide the assumptions you have used along with the results (ie day count convention, etc).

(o) The acronyms ATM, OTM and ITM refer to an option's moneyness: ATM stands for "at the money", OTM stands for "out of the money", and ITM means "in the money".

(p) Assume that all options are traded over-the-counter unless explicitly specified in the portfolios

(q) Follow the standard timing conventions for OTC options (ie expiry dates are the business day following a holiday)

(r) Assume that the timing convention for options is as follows: The time to maturity for a n-month option entered on 10 May is in n months. For example, a 3-month OTC option entered on May 10, 2013 expires on August 10, 2013. If options expire on a non-trading day, adjust the expiration date as per business day conventions consistent with common practices. Also provide explicit details on the nature of the adjustment made.

(s) Assume that the exercise style for all OTC options specified is as follows:

- o **American** for single name equities and commodities, and,
- o **European** for equity indices, foreign exchange and Swaptions.

(t) For all options exclude the premium from the initial market value calculations (ie options are to be considered as "naked").

(u) In the case that a bank is required to make additional assumptions beyond those specified above that it believes are relevant to the interpretation of its exercise results (eg close of business timing, coupon rolls, mapping against indices, etc), it should submit a description of those specifications in a separate document accompanying its return template.

Portfolio definition

Equity Portfolios					
Portfolio # ***Risk Factor***	**Strategy**	**Base Currency**	**VaR**	**Stressed VaR**	**IRC**
1 *Equity*	**Equity Index Futures** ***Long delta*** -Long 30 contracts ATM 3-month front running FTSE 100 index futures ** Futures price is based on the index level at NYSE Liffe London market close on Friday, 10 May 2013.* *1 contract corresponds to 10 equities underlying*	GBP	×	×	
2 *Equity*	**Bullish Leveraged Trade** ***Long gamma & long vega*** -Long 100 contracts OTC Google (GOOG) OTM 3-month call options (1 contract = 100 shares underlying) ** Strike price is out-of-the-money by 10% relative to the stock price at market close on Friday, 10 May, 2013.*	USD	×	×	
3 *Equity*	**Volatility Trade #1** ***Short short-term vega & long long-term vega*** -Short straddle 3-month ATM* S&P 500 Index OTC options (30 contracts) -Long straddle 2-year ATM S&P 500 Index OTC options (30 contracts) *1 contract corresponds to 100 equities underlying* *- effective date 10 May 2013* ** Strike price is based on the index level at NYSE market close on 10 May 2013.*	USD	×	×	
4 *Equity*	**Volatility Trade #2 (Smile effect)** **Long/short puts on FTSE 100** - Long 40 contracts of 3-month put options on FTSE 100 index (*with a strike price that is 10% OTM* based on the end-of-day index value*) - Short 40 contracts of 3-month put options on FTSE 100 index (*with a strike price that is 10% ITM* based on the end-of-day index value*) ** Strike price is based on the index level at NYSE Liffe London market close on 10 May 2013.* *1 contract corresponds to 10 equities underlying*	GBP	×	×	
5 *Equity*	**Equity Variance Swaps on Eurostoxx 50 (SX5E)** - Long ATM variance swap on Eurostoxx 50 with a maturity of 2 years, Vega notional amount of €50 k. The payoff is based on the following realised variance formula: $\frac{252}{n-2}\sum_{i=1}^{n-1}[\ln(\frac{S_{i+1}}{S_i})]^2$, where n = number of working days until maturity. **Fixing dates are provided in annex 2-0.** The strike of the variance swap should be defined on the trade date (10 May 2013) to cancel the value of the swap. (Please provide the strike you determined on the pre-	EUR	×	×	
6 *Equity*	**Barrier Option** - Long 40 contracts of 3-month ATM* S&P 500 down-and-in put options with a barrier level that is 10%	USD	×	×	

	OTM* and continuous (monitoring frequency. *1 contract corresponds to 100 equities underlying* ** Strike price is based on the index level at NYSE market close on 10 May 2013.*				
7 *Equity*	**Quanto index call** - 3Year USD Quanto Call on Eurostoxx 50 ***See details in annex 2-1***	USD	x	x	
Interest Rate Portfolios					
Portfolio # Risk Factor	**Strategy**	**Base Currency**	**VaR**	**Stressed VaR**	**IRC**
8 *Interest Rate*	**Curve Flattener Trade** ***Long long-term & short short-term treasuries*** -Long €5MM 10-year German Treasury bond (ISIN: DE0001102309 Expiry February 2nd 2023) -Short €20MM 2-year German Treasury note (ISIN: DE0001137404 Expiry December 12th 2014)	EUR	×	×	×
9 Interest Rate	**Interest rate swap** • *Bloomberg code eusw10v3 curncy* Receive fixed rate and pay floating rate • Fixed leg:, pay annually • Floating leg: 3-month Euribor rate, pay quarterly • Notional: €5mm, • Roll convention and calendar: standard • Effective date 10 May 2013 (ie rates to be used are those at the market as of 10 May 2013) • Maturity date 10 May 2023	EUR	×	×	
10 *Interest Rate*	**2-year swaption on 10-year interest rate swap** ***See details in annex 2-8***	EUR	×	×	
11 *Interest Rate*	**LIBOR Range Accrual** Structured coupon indexed on the number of days in the interest rate period when the Libor fixes in a predetermined range ***See details in annex 2-2***	USD	×	×	
12 *Interest Rate*	**Inflation zero coupon swap** EURHICPX index 10Y maturity par zero coupon swap ***See details in annex 2-3***	EUR	×	×	
Foreign Exchange Portfolios					
Portfolio # Risk Factor	**Strategy**	**Base Currency**	**VaR**	**Stressed VaR**	**IRC**
13 *F/X*	**Covered F/X Call** ***Short EUR/USD and short put EUR call USD option*** - Short 3-month EUR/USD forward contracts (ie long USD short EUR) with US$20MM notional purchased at the EUR/USD ECB reference rate as of end of day 10 May 2013 - Short 3-month put EUR call USD option notional US$ 40MM (ie short USD against EUR) with strike price corresponding to the three-month forward exchange rate as of end of day 10 May 2013 - effective date 10 May 2013 - expiry date 12 August 2013	EUR	×	×	
14 F/X	***Mark-to-market Cross-Currency Basis Swap*** ***2 Year USD 3M LIBOR vs EUR 3M EURIBOR Swap*** ***See details in annex 2-9***	EUR	×	×	
15 *F/X*	**Knock-out option:** Vanilla option that ceases to exist if the underlying spot breaches a predetermined barrier before maturity ***See details in annex 2-4***	EUR	×	×	
16 *F/X*	**Double no touch option** Digital option that pays a predetermined amount if the spot does not touch any of the barriers during the life of the option ***See details in annex 2-5***	EUR	×	×	
Commodities Portfolios					

<table>
<tr><th>Portfolio #
Risk Factor</th><th>Strategy</th><th>Base Currency</th><th>VaR</th><th>Stressed VaR</th><th>IRC</th></tr>
<tr><td>17
Commodity</td><td><u>Curve Play from Contango to Backwardation</u>
Long short-term and Short long-term contracts
- Long 3,500,000 3-month ATM OTC London Gold Forwards contracts (1 contract = 0.001 troy ounces, notional: 3,500 troy ounces)
- Short 4,300,000 1-year ATM OTC London Gold Forwards contracts (Notional: 4,300 troy ounces)</td><td>USD</td><td>×</td><td>×</td><td></td></tr>
<tr><td>18
Commodity</td><td><u>Short oil put options</u>
-Short 30 contracts of 3-month OTC WTI Crude Oil puts with strike = 6-month end-of-day forward price on 10 May 2013 (1 contract = 1000 barrels, total notional 30,000 barrels)</td><td>USD</td><td>×</td><td>×</td><td></td></tr>
<tr><th colspan="6">Credit Spread Portfolios</th></tr>
<tr><th>Portfolio #
Risk Factor</th><th>Strategy</th><th>Base Currency</th><th>VaR</th><th>Stressed VaR</th><th>IRC</th></tr>
<tr><td>19
Credit Spread</td><td><u>Sovereign CDS Portfolio</u>
Short Protection via CDS on 5 countries- Short €2MM per single-name 5year CDS (total 10MM notional) on the following countries:
effective date: 10 May 2013
restructuring clause: FULL
<table>
<tr><th>Country</th><th>RED Code</th><th>currency</th></tr>
<tr><td>Italy</td><td>4AB951</td><td>USD</td></tr>
<tr><td>UK</td><td>9A17DE</td><td>USD</td></tr>
<tr><td>Germany</td><td>3AB549</td><td>USD</td></tr>
<tr><td>France</td><td>3I68EE</td><td>USD</td></tr>
<tr><td>US</td><td>9A3AAA</td><td>EUR</td></tr>
</table></td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td>20
Credit Spread</td><td><u>Sovereign Bond/CDS Portfolio</u>
Long Protection via CDS on 5 countries- Long €2MM per single-name 5 year CDS (total 10MM notional) on the following countries: Italy, UK, Germany, France, US as in portfolio #19.
Long €2MM per single-name 5 year bonds (total 10MM notional) on the following countries: Italy, UK, Germany, France, US (as identified in the following table)
effective date 10 May 2013
to convert the notional of the non-Euro bonds use the FX spot as at end of day 10 May 2013
<table>
<tr><th>Identifier</th><th>Description</th></tr>
<tr><td>IT0004907843</td><td>BTP January 2018</td></tr>
<tr><td>DE0001135341</td><td>BUND January 2018</td></tr>
<tr><td>GB00B8KP6M44</td><td>GILT July 2018</td></tr>
<tr><td>FR0011394345</td><td>OAT May 2018</td></tr>
<tr><td>US912828HZ65</td><td>TBOND May 18</td></tr>
</table></td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td>21
Credit Spread</td><td><u>Sector Concentration Portfolio</u>
Short Protection via CDS on 10 financials
Equivalent of Short 1MM notional per single-name 5 year CDS (total €10MM notional) on the following 10 companies
effective date 10 May 2013
<table>
<tr><th>Name</th><th>RED Code</th><th>Ccy</th><th>Doc Clause</th></tr>
<tr><td>Met Life</td><td>5EA6BX</td><td>USD</td><td>MR</td></tr>
<tr><td>Allianz</td><td>DD359M</td><td>EUR</td><td>MM</td></tr>
<tr><td>Prudential</td><td>7B878P</td><td>USD</td><td>MR</td></tr>
<tr><td>AXA</td><td>FF667M</td><td>EUR</td><td>MM</td></tr>
<tr><td>ING BANK</td><td>48DGFE</td><td>EUR</td><td>MM</td></tr>
</table></td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
</table>

<table>
<tr><td></td><td><table><tr><td>Aegon</td><td>007GB6</td><td>EUR</td><td>MM</td></tr><tr><td>Aviva</td><td>GG6EBT</td><td>EUR</td><td>MM</td></tr><tr><td>Swiss Re</td><td>HOB65N</td><td>EUR</td><td>MM</td></tr><tr><td>Principal Financial Group</td><td>7B676W</td><td>USD</td><td>MR</td></tr><tr><td>Suncorp Group</td><td>8ED955</td><td>USD</td><td>MR</td></tr></table></td><td></td><td></td><td></td><td></td></tr>
<tr><td>22
Credit Spread</td><td><u>Diversified Index Portfolio</u>
Short protection via CDS index

• Short €10MM notional iTraxx 5-year Europe index Series 19, Version 1 – Maturity 20 June 2018 (RED Pair Code: 2I666VAZ8)
• effective date 10 May 2013</td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td>23
Credit Spread</td><td><u>Diversified Index Portfolio (higher concentration)</u>
<u>Short protection via CDS index</u>

• Short €5MM notional iTraxx 5-year Europe index Series 19, Version 1 – Maturity 20 June 2018 (RED Pair Code: 2I666VAZ8)
• Short €5MM notional (equally weighted) on the following 5 Financials belonging to the iTraxx 5-year Europe index Series 19, Version 1 – Maturity 20 June 2018 (RED Pair Code: 2I666VAZ8):
• Effective date: 10 May 2013

<table><tr><th>CDS NAME</th><th>RED Code</th><th>CCY</th><th>Doc Clause</th></tr><tr><td>ING BK CDS EUR SR 5Y</td><td>48DGFEAH6</td><td>EUR</td><td>MM</td></tr><tr><td>CMZB CDS EUR SR 5Y</td><td>2C27EGAG9</td><td>EUR</td><td>MM</td></tr><tr><td>AXA SA CDS EUR SR 5Y</td><td>FF667MAD8</td><td>EUR</td><td>MM</td></tr><tr><td>AEGON CDS EUR SR 5Y</td><td>007GB6AD4</td><td>EUR</td><td>MM</td></tr><tr><td>SANTAN CDS EUR SR 5Y</td><td>EFAGG9AF6</td><td>EUR</td><td>MM</td></tr></table></td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td>24
Credit Spread</td><td><u>Diversified Corporate Portfolio</u>
<u>Short Protection via CDS on 10 A- to AA-corporate</u>
• Short equivalent of €2MM notional per single-name 5 year CDS (total €20MM notional) on the following 10 companies (for USD CDS use the exchange rate at 10 May 2013):

<table><tr><th>Name</th><th>RED Code</th><th>CCY</th><th>Doc Clause</th></tr><tr><td>P&G</td><td>7B6989</td><td>USD</td><td>MR</td></tr><tr><td>Home Depot</td><td>47A77D</td><td>USD</td><td>MR</td></tr><tr><td>Siemens</td><td>8A87AG</td><td>EUR</td><td>MM</td></tr><tr><td>Royal Dutch Shell</td><td>GNDF9A</td><td>EUR</td><td>MM</td></tr><tr><td>IBM</td><td>49EB20</td><td>USD</td><td>MR</td></tr><tr><td>Met Life</td><td>5EA6BX</td><td>USD</td><td>MR</td></tr><tr><td>Southern Co</td><td>8C67DF</td><td>USD</td><td>MR</td></tr><tr><td>Vodafone</td><td>9BADC3</td><td>EUR</td><td>MM</td></tr><tr><td>BHP</td><td>08GE66</td><td>USD</td><td>MR</td></tr><tr><td>Roche</td><td>7E82AF</td><td>EUR</td><td>MM</td></tr></table></td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td>25
Credit</td><td><u>Index basis</u></td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
</table>

<table>
<tr><td>Spread</td><td>Short € 5MM notional iTraxx 5-year Europe index Series 19, Version 1 – Maturity 20 June 2018 (RED Pair Code: 2I666VAZ8)
Effective date: 10 May 2013
Long €5MM notional on all Constituents of iTraxx Series 19, Version 1 – Maturity 20 June 2018 (RED Pair Code: 2I666VAZ8) (ie the aggregate notional is €5MM and all names are equally weighted)
Effective date: 10 May 2013</td><td></td><td></td><td></td><td></td></tr>
<tr><td>26
Credit
Spread</td><td><u>CDS bond Basis</u>
Long Bonds €2MM per single-name 5 year bonds on 5 Financials (3 EU, 2 North America).
<table><tr><th>ISIN</th><th>SECURITY NAME</th></tr><tr><td>US59217GAG47</td><td>MET 3.65 14 June 2018</td></tr><tr><td>DE000A1HG1J8</td><td>ALVGR 1 3/8 13March 2018</td></tr><tr><td>US74432RAN35</td><td>PRU 0 10 August 2018</td></tr><tr><td>FR001132266</td><td>AXASA 1 7/8 20 Sept 2019</td></tr><tr><td>XS0368232327</td><td>INTNED 5 ¼ 5 June 2018</td></tr></table>
Long Protection via CDS on the same names (€2MM per single-name 5 year).
<table><tr><th>Name</th><th>RED Code</th><th>CCY</th><th>Doc clause</th></tr><tr><td>Met Life</td><td>5EA6BX</td><td>USD</td><td>MR</td></tr><tr><td>Allianz</td><td>DD359M</td><td>EUR</td><td>MM</td></tr><tr><td>Prudential</td><td>7B878P</td><td>USD</td><td>MR</td></tr><tr><td>AXA</td><td>FF667M</td><td>EUR</td><td>MM</td></tr><tr><td>ING</td><td>49BEBA</td><td>EUR</td><td>MM</td></tr></table></td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td>27
Credit
Spread</td><td><u>Short Index put on ITraxx Europe Crossover series 19</u>
See details in annex 2-6</td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td>28
Credit
Spread</td><td><u>Quanto CDS on Spain with delta hedge</u>
See details in annex 2-7</td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
<tr><th colspan="6">Diversified Portfolios</th></tr>
<tr><th>Portfolio #</th><th>Strategy</th><th>Base Currency</th><th>VaR</th><th>Stressed VaR</th><th>IRC</th></tr>
<tr><td>29</td><td><u>All-in Portfolio (1)</u>:
All non CRM portfolios excluding portfolios 5, 7, 11, 12, 15, 16, 27, 28.</td><td>EUR</td><td>×</td><td>×</td><td>x</td></tr>
<tr><td>30</td><td><u>All-in Portfolio (2)</u>:
All non CRM portfolios</td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td>31</td><td><u>All-in Portfolio (3):</u>
All Equity portfolios (ie comprising portfolios from #1 to #7</td><td>EUR</td><td>×</td><td>×</td><td></td></tr>
<tr><td>32</td><td><u>All-in Portfolio (4):</u>
All Interest Rate portfolios (ie comprising portfolios from #8 to #12</td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td>33</td><td><u>All-in Portfolio (5):</u>
All F/X portfolios (ie comprising portfolios from #13 to #16</td><td>EUR</td><td>×</td><td>×</td><td></td></tr>
<tr><td>34</td><td><u>All-in Portfolio (6):</u>
All Commodity (ie comprising portfolios from #17 to #18</td><td>EUR</td><td>×</td><td>×</td><td></td></tr>
<tr><td>35</td><td><u>All-in Portfolio (7):</u>
All Credit Spread portfolios (ie comprising portfolios from #19 to #28</td><td>EUR</td><td>×</td><td>×</td><td>×</td></tr>
</table>

2-0 Fixing schedule dates for variance swap on Eurostoxx 50

10-May-13	26-Jun-13	12-Aug-13	26-Sep-13	12-Nov-13	3-Jan-14	19-Feb-14	7-Apr-14	27-May-14	11-Jul-14	27-Aug-14	13-Oct-14	27-Nov-14	20-Jan-15	6-Mar-15	24-Apr-15
13-May-13	27-Jun-13	13-Aug-13	27-Sep-13	13-Nov-13	6-Jan-14	20-Feb-14	8-Apr-14	28-May-14	14-Jul-14	28-Aug-14	14-Oct-14	28-Nov-14	21-Jan-15	9-Mar-15	27-Apr-15
14-May-13	28-Jun-13	14-Aug-13	30-Sep-13	14-Nov-13	7-Jan-14	21-Feb-14	9-Apr-14	29-May-14	15-Jul-14	29-Aug-14	15-Oct-14	1-Dec-14	22-Jan-15	10-Mar-15	28-Apr-15
15-May-13	1-Jul-13	15-Aug-13	1-Oct-13	15-Nov-13	8-Jan-14	24-Feb-14	10-Apr-14	30-May-14	16-Jul-14	1-Sep-14	16-Oct-14	2-Dec-14	23-Jan-15	11-Mar-15	29-Apr-15
16-May-13	2-Jul-13	16-Aug-13	2-Oct-13	18-Nov-13	9-Jan-14	25-Feb-14	11-Apr-14	2-Jun-14	17-Jul-14	2-Sep-14	17-Oct-14	3-Dec-14	26-Jan-15	12-Mar-15	30-Apr-15
17-May-13	3-Jul-13	19-Aug-13	3-Oct-13	19-Nov-13	10-Jan-14	26-Feb-14	14-Apr-14	3-Jun-14	18-Jul-14	3-Sep-14	20-Oct-14	4-Dec-14	27-Jan-15	13-Mar-15	4-May-15
20-May-13	4-Jul-13	20-Aug-13	4-Oct-13	20-Nov-13	13-Jan-14	27-Feb-14	15-Apr-14	4-Jun-14	21-Jul-14	4-Sep-14	21-Oct-14	5-Dec-14	28-Jan-15	16-Mar-15	5-May-15
21-May-13	5-Jul-13	21-Aug-13	7-Oct-13	21-Nov-13	14-Jan-14	28-Feb-14	16-Apr-14	5-Jun-14	22-Jul-14	5-Sep-14	22-Oct-14	8-Dec-14	29-Jan-15	17-Mar-15	6-May-15
22-May-13	8-Jul-13	22-Aug-13	8-Oct-13	22-Nov-13	15-Jan-14	3-Mar-14	17-Apr-14	6-Jun-14	23-Jul-14	8-Sep-14	23-Oct-14	9-Dec-14	30-Jan-15	18-Mar-15	7-May-15
23-May-13	9-Jul-13	23-Aug-13	9-Oct-13	25-Nov-13	16-Jan-14	4-Mar-14	22-Apr-14	9-Jun-14	24-Jul-14	9-Sep-14	24-Oct-14	10-Dec-14	2-Feb-15	19-Mar-15	8-May-15
24-May-13	10-Jul-13	26-Aug-13	10-Oct-13	26-Nov-13	17-Jan-14	5-Mar-14	23-Apr-14	10-Jun-14	25-Jul-14	10-Sep-14	27-Oct-14	11-Dec-14	3-Feb-15	20-Mar-15	11-May-15
27-May-13	11-Jul-13	27-Aug-13	11-Oct-13	27-Nov-13	20-Jan-14	6-Mar-14	24-Apr-14	11-Jun-14	28-Jul-14	11-Sep-14	28-Oct-14	12-Dec-14	4-Feb-15	23-Mar-15	12-May-15
28-May-13	12-Jul-13	28-Aug-13	14-Oct-13	28-Nov-13	21-Jan-14	7-Mar-14	25-Apr-14	12-Jun-14	29-Jul-14	12-Sep-14	29-Oct-14	15-Dec-14	5-Feb-15	24-Mar-15	13-May-15
29-May-13	15-Jul-13	29-Aug-13	15-Oct-13	29-Nov-13	22-Jan-14	10-Mar-14	28-Apr-14	13-Jun-14	30-Jul-14	15-Sep-14	30-Oct-14	16-Dec-14	6-Feb-15	25-Mar-15	14-May-15
30-May-13	16-Jul-13	30-Aug-13	16-Oct-13	2-Dec-13	23-Jan-14	11-Mar-14	29-Apr-14	16-Jun-14	31-Jul-14	16-Sep-14	31-Oct-14	17-Dec-14	9-Feb-15	26-Mar-15	15-May-15
31-May-13	17-Jul-13	2-Sep-13	17-Oct-13	3-Dec-13	24-Jan-14	12-Mar-14	30-Apr-14	17-Jun-14	1-Aug-14	17-Sep-14	3-Nov-14	18-Dec-14	10-Feb-15	27-Mar-15	18-May-15
3-Jun-13	18-Jul-13	3-Sep-13	18-Oct-13	4-Dec-13	27-Jan-14	13-Mar-14	2-May-14	18-Jun-14	4-Aug-14	18-Sep-14	4-Nov-14	19-Dec-14	11-Feb-15	30-Mar-15	
4-Jun-13	19-Jul-13	4-Sep-13	21-Oct-13	5-Dec-13	28-Jan-14	14-Mar-14	5-May-14	19-Jun-14	5-Aug-14	19-Sep-14	5-Nov-14	22-Dec-14	12-Feb-15	31-Mar-15	
5-Jun-13	22-Jul-13	5-Sep-13	22-Oct-13	6-Dec-13	29-Jan-14	17-Mar-14	6-May-14	20-Jun-14	6-Aug-14	22-Sep-14	6-Nov-14	23-Dec-14	13-Feb-15	1-Apr-15	
6-Jun-13	23-Jul-13	6-Sep-13	23-Oct-13	9-Dec-13	30-Jan-14	18-Mar-14	7-May-14	23-Jun-14	7-Aug-14	23-Sep-14	7-Nov-14	29-Dec-14	16-Feb-15	2-Apr-15	
7-Jun-13	24-Jul-13	9-Sep-13	24-Oct-13	10-Dec-13	31-Jan-14	19-Mar-14	8-May-14	24-Jun-14	8-Aug-14	24-Sep-14	10-Nov-14	30-Dec-14	17-Feb-15	7-Apr-15	
10-Jun-13	25-Jul-13	10-Sep-13	25-Oct-13	11-Dec-13	3-Feb-14	20-Mar-14	9-May-14	25-Jun-14	11-Aug-14	25-Sep-14	11-Nov-14	2-Jan-15	18-Feb-15	8-Apr-15	
11-Jun-13	26-Jul-13	11-Sep-13	28-Oct-13	12-Dec-13	4-Feb-14	21-Mar-14	12-May-14	26-Jun-14	12-Aug-14	26-Sep-14	12-Nov-14	5-Jan-15	19-Feb-15	9-Apr-15	
12-Jun-13	29-Jul-13	12-Sep-13	29-Oct-13	13-Dec-13	5-Feb-14	24-Mar-14	13-May-14	27-Jun-14	13-Aug-14	29-Sep-14	13-Nov-14	6-Jan-15	20-Feb-15	10-Apr-15	
13-Jun-13	30-Jul-13	13-Sep-13	30-Oct-13	16-Dec-13	6-Feb-14	25-Mar-14	14-May-14	30-Jun-14	14-Aug-14	30-Sep-14	14-Nov-14	7-Jan-15	23-Feb-15	13-Apr-15	
14-Jun-13	31-Jul-13	16-Sep-13	31-Oct-13	17-Dec-13	7-Feb-14	26-Mar-14	15-May-14	1-Jul-14	15-Aug-14	1-Oct-14	17-Nov-14	8-Jan-15	24-Feb-15	14-Apr-15	
17-Jun-13	1-Aug-13	17-Sep-13	1-Nov-13	18-Dec-13	10-Feb-14	27-Mar-14	16-May-14	2-Jul-14	18-Aug-14	2-Oct-14	18-Nov-14	9-Jan-15	25-Feb-15	15-Apr-15	
18-Jun-13	2-Aug-13	18-Sep-13	4-Nov-13	19-Dec-13	11-Feb-14	28-Mar-14	19-May-14	3-Jul-14	19-Aug-14	3-Oct-14	19-Nov-14	12-Jan-15	26-Feb-15	16-Apr-15	
19-Jun-13	5-Aug-13	19-Sep-13	5-Nov-13	20-Dec-13	12-Feb-14	31-Mar-14	20-May-14	4-Jul-14	20-Aug-14	6-Oct-14	20-Nov-14	13-Jan-15	27-Feb-15	17-Apr-15	
20-Jun-13	6-Aug-13	20-Sep-13	6-Nov-13	23-Dec-13	13-Feb-14	1-Apr-14	21-May-14	7-Jul-14	21-Aug-14	7-Oct-14	21-Nov-14	14-Jan-15	2-Mar-15	20-Apr-15	
21-Jun-13	7-Aug-13	23-Sep-13	7-Nov-13	27-Dec-13	14-Feb-14	2-Apr-14	22-May-14	8-Jul-14	22-Aug-14	8-Oct-14	24-Nov-14	15-Jan-15	3-Mar-15	21-Apr-15	
24-Jun-13	8-Aug-13	24-Sep-13	8-Nov-13	30-Dec-13	17-Feb-14	3-Apr-14	23-May-14	9-Jul-14	25-Aug-14	9-Oct-14	25-Nov-14	16-Jan-15	4-Mar-15	22-Apr-15	
25-Jun-13	9-Aug-13	25-Sep-13	11-Nov-13	2-Jan-14	18-Feb-14	4-Apr-14	26-May-14	10-Jul-14	26-Aug-14	10-Oct-14	26-Nov-14	19-Jan-15	5-Mar-15	23-Apr-15	

2.1 Details for portfolio 7

3 Year USD quanto call on EUROSTOXX 50

Party A: counterparty
Party B: participating Bank
Equity Notional Amount (ENA): USD 5,000,000
Trade Date: 10 May 2013
Strike Date: 10 May 2013
Effective Date: 10 May 2013
Valuation Date: 10 May 2016
Termination Date: 10 May 2016
Underlying Index: EURO STOXX 50 (Bloomberg: SX5E Index)
Floating Rate Payer: Counterparty
Notional Amount: USD 5,000,000
Floating Rate: USDLIBOR3M as determined at 11.00 am London time two (2) business days prior to the start of the relevant interest period
Spread: + 300 bps
Floating Rate Day Count Fraction: act/360
Floating Amount Payment Dates: n / Floating Amount Payment Date
1/9 August 2013
2/11 November 2013
3/10 February 2014
4/9 May 2014
5/11August 2014
6/10 November 2014
7/10 February 2015
8/11May 2015
9/10 August 2015
10/10November 2015
11/10 February 2016
12/10 May 2016
Equity Amount Payer: participating bank
Equity Amount: On the Termination Date, Party B will pay Party A the following Cash Settlement Amount:

$$\mathbf{ENA} \times \max\left(0\%, \frac{\mathbf{Index}_{\mathrm{Final}} - \mathbf{Index}_{\mathrm{Initial}}}{\mathbf{Index}_{\mathrm{Initial}}}\right)$$

Where:
$\mathbf{Index}_{\mathbf{Initial}}$ is the official Closing Level of the Underlying Index on the Strike Date.
$\mathbf{Index}_{\mathbf{Final}}$ is the official Closing Level of the Underlying Index on the Valuation Date.
Settlement Terms
Settlement Currency: USD Quanto
Business Days: New York

2.2 Details for portfolio 11

3M Libor USD Range Accrual

Party A: Participating bank

Party B: Counterparty

Notional Amount: USD 10,000,000.0

Trade Date: 10 May 2013

Effective Date: 10 May 2013

Termination Date: 10 May 2023

Party A pays: 4% *n/N

n: Number of days when the Range Accrual Index fixes between the Lower Barrier and the Upper Barrier (inclusive) during the relevant Interest Period

N: Number of days in the relevant Interest Period

Range Accrual Index: 3 month USD Libor as quoted on Reuters page LIBOR01, 11:00 London Time

USD 3M Libor: 3 month USD Libor as quoted on Reuters page LIBOR01, 11:00 London Time, fixed 2 business days prior to the first day of each interest Period

Lower Barrier: 2.50%

Upper Barrier: 4.00%

Day Count Fraction: Actual/360

Payment Dates: Quarterly

Business Day Convention: Modified Following

Business Days for Fixing: London and New York

Business Days for Payment: London and New York

Party B pays: USD 3M Libor

USD 3M Libor: 3 month USD Libor as quoted on Reuters page LIBOR01, 11:00 London Time, fixed 2 business days prior to the first day of each interest Period

Day Count Fraction: Actual/360

Payment Dates: Quarterly

Business Day Convention: Modified Following

Business Days for Fixing: London and New York

Business Days for Payment: London and New York

Interest Period: From the previous payment date (inclusive) to the next payment date (exclusive)

2.3 Details for portfolio 12

EURHICPX index 10Y maturity zero coupon swap

Contract date: 10 May 2013
Payer of Fixed: participating bank
Payer of HICP XT Float: counterparty
Notional amount: EUR 10,000,000.00
Start date: 10 May 2013
Maturity date: 10 May 2023
Fixed Rate Details
Fixed Rate: 2.000 per cent
Payment day convention: Modified Following
Payment Days: Target
Fixed payment dates: 10 May 2023
HICP XT Float Rate Details
Float rate: Target
Frequency: At Maturity in arrears
Reference: REUTERS OATEI01
Payment days: 10 May 2023
HICP XT Fixed rate calculation method: Notional amount*[((1+Fixed rate)^n)-1]
HICP XT Floating rate calculation method: Notional amount*[Index(end)/Index(start)-1]
Index (end) = HICP XT Feb 2023 Index unrevised
Index (start) = HICP XT Feb 2013 Index unrevised
There is no floor

2.4 Details for portfolio 15

Knock-out Currency Option

Trade Date: 10 May 2013
Buyer: Participating Bank (Party B)
Seller: Client [Party A]
Currency Option Style: European
Currency Option Type: EUR Call USD Put
Call Currency and Call Currency Amount: EUR 15, 000,000.00
Put Currency and Put Currency Amount: equivalent amount of EUR 15, 000,000.00 based on EUR/USD exchange rate on 10 May, NY closing time
Strike Price: EUR/USD exchange rate on 10 May, NY closing time
Expiration Date: 12 May 2014
Expiration Time: 10:00 AM (local time in NEWYORK)
Automatic Exercise: Applicable
Settlement: Deliverable
Settlement Date: 12 May 2014
Barrier Event: Applicable
Event Type: Knock-Out
Spot Exchange Rate Direction: Greater than or equal to the Barrier Level
Initial Spot Price: Value of USD / EUR on 10 May 2013
Barrier Level: 1.5000 USD / EUR
Event Period Start Date and Time: Trade Date at the time of execution hereof
Event Period End Date and Time: Expiration Date at the Expiration Time

2.5 Details for portfolio 16

Double No Touch Binary Currency Option

Trade Date: 10 May 2013
Buyer: participating bank (Party B)
Seller: Client [Party A]
Currency Option Style: Binary
Expiration Date: 12 May 2014
Expiration Time: 10:00 AM (local time in NEWYORK)
Automatic Exercise: Applicable
Settlement: Non-Deliverable
Settlement Amount: EUR 1, 000,000.00
Settlement Date: 10 May 2014
Barrier Event: Applicable
Event Type: Double No-Touch Binary
Initial Spot Price: level of USD/EUR on 10 May 2013
Upper Barrier Level: 1.5000 USD / EUR
Lower Barrier Level: 1.2000 USD / EUR
Event Period Start Date and Time: Trade Date at the time of execution hereof
Event Period End Date and Time: Expiration Date at the Expiration Time
Business Day Convention: Following

2.6 Details for portfolio 27

Index put on ITraxx Europe Crossover series 19

Buyer: Counterparty
Seller: Participating bank
Option type: Put
Trade date: 10 May 2013
Maturity: 18 December 2013
Ticker: ITRAXX-Xover19
Underlying end: 20 June 2018
Option Style: European
Option Strike: 500.00 Bps
Notional: EUR 10,000,000.00

2.7 Details for portfolio 28

Quanto CDS on Spain with delta hedge

Quanto CDS General Terms

Trade Date: 10 May 2013
Effective Date: 10 May 2013
Scheduled Termination Date: 20 June 2018
Protection Seller: Counterparty
Protection Buyer: Participating bank
Business Day: London
Business Day Convention: Modified Following
Reference Entity: Kingdom of Spain
Notional: EUR 10,000,000.00
Red Code: 8CA965
Coupon Payment Dates: 20 March, 20 June, 20 September and December 20 in each year
Coupon spread: 1.00%
Fixed Rate Day Count Fraction: Actual/365 (Fixed)
Floating Payment
Floating Rate Payer Calculation Amount: EUR 10,000,000.00
Conditions to Settlement: Credit Event Notice: Notice of Publicly Available Information Applicable
The following Credit Events shall apply to this Transaction: Bankruptcy, Debt Restructuring (CR), Failure to Pay
Settlement Currency: EUR

Delta Hedge CDS General Terms

Trade Date: 10 May 2013
Effective Date: 10 May 2013
Scheduled Termination Date: 20 June 2018
Protection Seller: Participating bank
Protection Buyer: Counterparty
Business Day: London
Business Day Convention: Modified Following
Reference Entity: Kingdom of Spain
Notional: USD 10,300,000.00
Red Code: 8CA965
Coupon Payment Dates: March 20, June 20, 20 September and 20 December in each year from and including 20 September 2012
Coupon spread: 1.00%
Fixed Rate Day Count Fraction: Actual/365 (Fixed)
Floating Payment
Floating Rate Payer Calculation Amount: USD 10,300,000.00
Conditions to Settlement: Credit Event Notice: Notice of Publicly Available Information Applicable
Settlement Currency: USD

2.8 Details for portfolio 10

2-year Swaption on 10-year IRS

1. *Swaption terms*

Swaption Trade Date: 10 May 2013
Swaption Notional Amount: EUR 5.000.000
Option Style: European
Swaption Seller: Party A, participating bank - the Swaption Seller
Swaption Buyer: Party B, counterparty - the Swaption Buyer
Option Type: Receiver
Underlying Buyer: the Swaption Seller
Underlying Seller: the Swaption Buyer
Quoting Style: Spread
Strike Price: 1.538% per annum
Business Days for Payment: London
Exercise Business Days: London

2. *Procedure for exercise*

Expiration Date: 11 May 2015
Earliest Exercise Time: 9:00 a.m. London time
Expiration Time: 11:00 a.m. London time
Partial Exercise: Not Applicable

3. *Settlement terms*

Settlement: Cash. In the event that Swaption Buyer effectively exercises this Swaption Transaction, then: not later than the third Business Day for Payment following the Expiration Date, (i) if the Settlement Payment is a positive number, the Underlying Buyer shall pay the Settlement Payment to the Underlying Seller or (ii) if the Settlement Payment is a negative number, the Underlying Seller shall pay the absolute value of the Settlement Payment to the Underlying Buyer.

Settlement Payment: An amount (which may be positive or negative), in the Settlement Currency of the Underlying Swap Transaction, equal to the Strike Adjustment Amount minus the Accrued Amount.

Strike Adjustment Amount: the present value, as of the Expiration Date, of a stream of payments equal to (a) (i) the Strike Price minus (ii) the Fixed Rate for the Underlying Swap Transaction multiplied by (b) the Swaption Notional Amount calculated in accordance with the following assumptions:

(a) such payments are made with the same frequency, on the same basis, on the same dates and for the same term as the Fixed Amounts payable with respect to the Underlying Swap Transaction, except that the initial Fixed Rate Payer Calculation Period shall commence on and include the calendar day immediately following the Expiration Date;

(b) calculations are to be made assuming (i) a single "Deal Spread" equal to the Fixed Rate for the Underlying Swap Transaction, , (iii) a "Curve Date" equal to the Expiration Date and a "Settlement Date" equal to the calendar day immediately following the Expiration Date, (iv) a "Benchmark Swap Curve"

Accrued Amount: An amount equal to:

(a) if the calendar day immediately following the Expiration Date falls on a day that is a Fixed Rate Payer Payment Date (as defined in the Underlying Swap Transaction), zero; and

(b) if the calendar day immediately following the Expiration Date falls on a day that is not such a Fixed Rate Payer Payment Date, (i) the Fixed Rate for the Underlying Swap Transaction multiplied by (ii) the Adjusted Swaption Notional Amount multiplied by (iii) the Partial Exercise Factor multiplied by (iv) the actual number of days in the period from, and including, the later of the Effective Date of the Underlying Swap Transaction and the Fixed Rate Payer Payment Date falling immediately prior to the calendar day immediately following the Expiration Date to, and including, the Expiration Date divided by (v) 360.

4. Underlying swap transaction terms

Swap of the Portfolio 9 (ie ten years fixed for variable IRS) but with an effective date of 11 May 2015 and a maturity date of 12 May 2025.

2.9 Details for portfolio 14

Mark to Market (resettable) Cross-Currency Basis Swap

Trade Date: 10 May 2013

Maturity Date: 11 May 2015

Business Day Convention: Modified Following

Reset dates: each quarter starting from 10 May 2013

Payment dates: quarterly

Notional Amount in EUR (Constant Currency Amount): EUR 20.000.000

Notional Amount in USD (Variable Currency Amount): An amount corresponding to EUR 20.000.000 according to the EUR/USD spot exchange rate at the beginning of each Interest Period

Mark-to-Market Amount: The difference between the Variable Currency Amount of the current Interest Period and the Variable Currency Amount of the previous Interest Period.

Interest Period: From the previous payment date (inclusive) to the next payment date (exclusive)

Party A (Variable Currency Payer): Counterparty

Party B (Constant Currency Payer): Participating bank

Party A pays: USD 3M Libor on the Variable Currency Amount (USD)

USD 3M Libor: 3 month Libor flat as quoted on Reuters page Libor01, 11:00 London Time, fixed 2 business days prior to the first day of each interest period

Party B pays: EUR 3M Euribor minus 20 basis points on the Constant Currency Amount (EUR)

EUR 3M Euribor: 3M Euribor as quoted on Reuters page Euribor01, 11:00 London Time, fixed 2 business days prior to the first day of each interest period

At each reset date Party A will pay to Party B the Mark-to-Market Amount, if negative.

At each reset date Party A will receive from Party B the Mark-to-Market Amount, if positive.

Initial Exchange

Initial Exchange Date: Trade Date

EUR Initial Exchange Amount: EUR 20 000 000

USD InitialExchangeAmount: USD 25.876.000 (EUR/USD Initial Exchange Rate: 1.2938)

Final Exchange

Final Exchange Date: Maturity Date

EUR Final Exchange Amount: EUR 20,000,000.00

USD Final Exchange Amount: The Variable Currency Amount determined for the final Calculation Period

Annex 4: Driver identification methodology – statistical approach

In Phase 2, the dependency between risk values and potential drivers was measured with the help of a statistical metric suitable for significance testing.

Pairs of risk values and driver characteristics were available only for smaller sample sizes (17 banks, and in some cases fewer), and the distribution of the risk values was not known. Therefore, rank correlation was considered adequate for measuring (non-linear) dependencies between risk values and potential drivers. From different rank correlation measures, Kendall's rank correlation, version B, meets the above requirements[13] and allows also for ties in the driver characteristics.[14] Furthermore it operates on any driver value instead of ranks, provided that the given or classified (coded) driver values are ordered subject to their (negative or positive) effect on the risk values. Bimodal driver characteristics can be used as can multiple-valued potential drivers. Stratification of driver characteristics is also possible.

For testing Kendall's rank correlation under different significance levels (alpha = 5%, 10% and 20% assigned to level labelling of strong, moderate and low), one-sided p-values were calculated for the null hypothesis that the ordered risk value series are not correlated to the series of corresponding driver characteristics. If the p-values fall beneath the predefined significance levels, the one-sided test rejects the null hypothesis, and dependency is indicated (alternative hypothesis).

Once the test statistics were run for each diversified portfolio (P29–P35), the overall classification was derived as follows: if one of the all-in portfolios, P29 or P30, had a p-value corresponding to the low, moderate or strong level of significance, then the higher of both classifications was taken for the overall classification (eg strong). As a fallback in case the all-in portfolios do not show a low, moderate or strong p-value, the highest impact from the asset classes equity, interest rate or credit spread is chosen for the overall classification. The asset classes foreign exchange and commodities are not considered here, as these classes have only very few underlying single portfolios. For some drivers (eg risk factor return calculation type: relative/absolute/mixed type) which are related to a specific asset class, the overall classification is derived from the result for this asset class.

$$\boldsymbol{Overall\ classification}_{\boldsymbol{low,moderate,strong}}$$

$$= \begin{cases} \boldsymbol{max(pf29_{class}, pf30_{class})} & if\ driver\ is\ not\ asset-class\ specific\ and\ (pf29_{class}\ or\ pf30_{class} = low, moderate, strong), \\ \boldsymbol{max(IR_{class}, EQ_{class}, CS_{class})} & if\ driver\ is\ not\ asset-class\ specific\ and\ (pf29_{class}\ and\ pf30_{class} \neq low, moderate, strong), \\ \boldsymbol{All-in\ pf^{i}_{class}} & if\ driver\ is\ asset-class\ specific, i = 31 \dots 35 \end{cases}$$

Note: overall classification of driver impact (class refers to “low”, “moderate” or “strong” significance levels, ie p-values <=5%, 5-10%, 10-20%)

For the work on the CTP, statistical classification of importance is slightly modified, as there is no all-in portfolio. Across the seven test portfolios, there are three standardised products and four bespoke products. If a driver registers as strong for at least one portfolio in both categories, then it is considered strong overall. If the driver registers as strong for most of the portfolios in one category but

13 Version B of Kendall’s statistics includes correction terms for ties.

14 See Alan Agresti, *Analysis of Ordinal Categorical Data*, 2nd ed, Wiley Series, Sec 7.1.3, p 188; MG Kendall, "A new measure of rank correlation", *Biometrika*, 1938, vol 30, no 1/2, pp 81–93; and MG Kendall, "The treatment of ties in ranking problems", *Biometrika*, 1945, vol 33, no 3, pp 239–51.

not in the other, then it is classified as strong for that category only. The same logic is repeated for moderate and low. Expert judgement based on feedback from institutions and our observations in the benchmarking exercise is then overlaid on the raw statistical analysis to arrive at the final conclusion.

Caveats

Statistical tests cannot prove the hypothesis. For example the classification of driver impact as "low" does not prove a low impact but rather indicates a low observed correlation. A low correlation could result from low variability of the driver characteristics (eg when only a few observations are available). Also, spurious correlation might be detected – ie significant correlations might be identified, whereas in reality the result is driven by a hidden third variable. To address this risk, expert judgement was overlaid on the raw statistical analysis to arrive at the final conclusion

Annex 5: Process for calculating one-year VaR from bank data

One of the strongest conclusions of the Phase 1 exercise was that the overall RWA variability was tightly connected to the participating banks' modelling choices, including the calibration period of the VaR model. Other methodological choices that theoretically might drive variability in RWA are the exponential weighting of dates in historical simulation, the use of antithetic data, and the precise method for calculating the 99th percentile (eg interpolating between the 2nd and 3rd largest losses).

To quantify the importance of these drivers, the Phase 2 exercise asked banks that use a historical simulation approach to provide a one-year data series of the *end-of-day* valuation of each portfolio in the exercise. A standardised method was used to calculate a 99% VaR measure (standardised VaR) from these P&L series. Standardised VaR was calculated by equally weighting each day from the series of one-day P&L over the one-year lookback period, and taking the 99% by averaging the second and third largest losses, and scaling to 10-day by the square root of time.

Nine banks submitted P&L vectors representing one-day returns (five other banks submitted vectors of 10-day returns, while the remaining three use Monte Carlo simulation and could not provide historical vectors). Standardised VaR was calculated for each portfolio from these nine banks. The dispersion of standardised VaR can be compared to the dispersion of the internally calculated VaR that these nine banks reported. For reference, the dispersion of reported VaR across all 17 banks is included in the tables below.

Overall the reported VaR dispersion from the nine banks is similar to the dispersion from the entire set of 17 (the average of the ratios of sample dispersion to the full set is 0.97). For some portfolios, there is a large decrease in dispersion when the standardised VaR method is used, but for most portfolios the reduction is around a third (the average ratio of dispersion of standardised VaR to the dispersion of reported VaR from these nine is 0.67).

Equity portfolios

	P1	P2	P3	P4	P5	P6	P7	P31
Reported VaR stdev/mean (all banks)	30%	34%	47%	20%	52%	32%	23%	31%
Reported VaR stdev/mean (9 banks w/ 1-day P&L)	27%	33%	35%	25%	49%	34%	24%	29%
Standardised VaR Stdev/mean (9 banks w/ 1-day P&L)	3%	24%	12%	9%	24%	19%	13%	22%

Interest rate portfolios

	P8	P9	P10	P11	P12	P32
Reported VaR stdev/mean (all banks)	17%	18%	30%	42%	61%	49%
Reported VaR stdev/mean (9 banks w/ 1-day P&L)	17%	14%	19%	42%	23%	20%
Standardised VaR stdev/mean (9 banks w/ 1-day P&L)	14%	16%	22%	21%	7%	16%

Foreign exchange portfolios

	P13	P14	P15	P16	P33
reported VaR stdev/mean (all banks)	37%	27%	31%	38%	35%
reported VaR stdev/mean (9 banks w/ 1-day P&L)	16%	29%	34%	37%	29%
standardised VaR stdev/mean (9 banks w/ 1-day P&L)	11%	16%	19%	12%	14%

Commodity portfolios

	P17	P18	P34
Reported VaR stdev/mean (all banks)	21%	47%	44%
Reported VaR stdev/mean (9 banks w/ 1-day P&L)	23%	46%	29%
Standardised VaR stdev/mean (9 banks w/ 1-day P&L)	19%	26%	19%

Credit spread portfolios

	P19	P20	P21	P22	P23	P24	P25	P26	P27	P28	P28	P35
Reported VaR stdev/mean (all banks)	35%	33%	37%	23%	28%	59%	45%	40%	37%	52%	40%	35%
Reported VaR stdev/mean (9 banks w/ 1-day P&L)	38%	39%	40%	19%	28%	34%	41%	41%	34%	56%	43%	38%
Standardised VaR stdev/mean (9 banks w/ 1-day P&L)	32%	38%	23%	21%	25%	36%	39%	40%	28%	43%	22%	32%

All-in portfolios

	P29	P30	P31	P32	P33	P34	P35
Reported VaR stdev/mean (all banks)	33%	34%	31%	49%	35%	44%	40%
Reported VaR stdev/mean (9 banks w/ 1-day P&L)	32%	42%	29%	20%	29%	29%	43%
Standardised VaR stdev/mean (9 banks w/ 1-day P&L)	14%	30%	22%	16%	14%	19%	22%

Annex 6: Phase 1 portfolios re-run in Phase 2

The following Phase 2 portfolios are re-runs of Phase 1 portfolios
(however in many cases the notional size has altered as described below):

Equity

Phase 2 Portfolio No.	Action required to convert Phase 1 results to equivalent basis	Equivalent Phase 1 portfolio
1	Multiply Phase 1 results by 3	1
2	Divide Phase 1 results by 5	2
3	Multiply Phase 1 results by 3	3
4	Multiply Phase 1 results by 4	4
5	Divide Phase 1 results by 5	6
6	Multiply Phase 1 results by 4	7

Interest Rate

Phase 2 Portfolio No.	Action required to convert Phase 1 results to equivalent basis	Equivalent Phase 1 portfolio
8	Divide Phase 1 results by 2	8
9	Divide Phase 1 results by 2	9
10	Divide Phase 1 results by 2	10

FX

No portfolios were re-run

Commodities

Phase 2 Portfolio No.	Action required to convert Phase 1 results to equivalent basis	Equivalent Phase 1 portfolio
17	Multiply Phase 1 results by 10	16
18	Multiply Phase 1 results by 0.3	17

Credit Spread

Phase 2 Portfolio No.	Action required to convert Phase 1 results to equivalent basis	Equivalent Phase 1 portfolio
20	No adjustment required	22

Glossary

Basis risk	The risk that prices of financial instruments in a hedging strategy will move in a way that reduces the effectiveness of the strategy
Correlation trading portfolio (CTP)	Defined in BCBS 193 (*Revisions to the Basel II market risk framework*, February 2011).
Comprehensive risk measure (CRM)	The internal model of specific risk charge for the CTP as defined in BCBS 193 and clarified in BCBS 208 (*Interpretive issues with respect to the revisions to the market risk framework*, November 2011).
First-to-default (FtD)	A basket default instrument in which the trigger event is the first default of any reference exposure.
Jump-to-default risk (JtD risk)	Risk that a referenced obligor underlying a credit instrument defaults in an idiosyncratic fashion, starting from the current credit state.
Liquidity horizon	The time required to exit or hedge a risk position without materially affecting market prices in stressed market conditions.
Risk factor	A principal determinant of the change in value of a transaction that is used for the quantification of risk.
Standardised specific risk charge (SSRC)	The standardised charge of specific risk for the CTP as defined in BCBS 193.
Tranche	Portion of a collateralised debt obligation (CDO) defined by an attachment point (at which losses on default begin to affect valuation) and a detachment point (at which losses on default no longer affect valuation).

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