

What conclusions can be drawn from the EBA 2016 Market Risk Benchmarking Exercise?

Banking Union Scrutiny

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Abstract

The EBA benchmarking exercise shows strong disagreement between different banks both about the value and about the risk of hypothetical test portfolios. If the results of the EBA benchmarking study are correct, and as far as the test portfolio instruments are representative, the internal market risk models currently used by European banks would strongly violate the Level Playing Field Principle (“If different banks hold the same portfolio, they should be required to hold the same amount of regulatory capital.”). In this analysis, I present the EBA results in a non-technical language, and assess the robustness and validity of the study itself, highlighting problematic issues in EBA’s methodological approach. Furthermore, I discuss which follow-up actions ECON Members might consider.

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EXECUTIVE SUMMARY

In March 2017 the European Banking Authority (EBA) (European Banking Authority, 2017) presented the results of the supervisory benchmarking study on internal models for market risk (MR). The exercise was performed on a sample of 50 European banks from 12 jurisdictions that submitted data for 35 market portfolios. In order to screen off differences in bank portfolios, all participating banks were asked to estimate the risk of the same test portfolios.

The aim of the EBA study was (1) to assess the variability in *valuation* of identical portfolios, (2) to assess the variability in *market risk* weighted assets (MRWA) produced by banks' internal models on identical portfolios, and (3) to examine the drivers behind the differences observed.

The EBA benchmarking study shows a surprisingly high variability in risk estimates (VaR numbers) delivered by the different banks for hypothetical (but identical) portfolios. It is not rare for banks to report risk numbers which are three times higher (or ten times lower) than the average (median) reported by other banks. Also, participating banks strongly disagreed about the market value of the test portfolios. Banks often do not even agree whether a test portfolio has a positive or a negative value.

If the results of the EBA benchmarking study are correct, and as far as test portfolio instruments are representative, the internal market risk models currently used by European banks strongly violate the Level Playing Field Principle ("If different banks hold the same portfolio, they should be required to hold the same amount of regulatory capital."). The same implication can be formulated equivalently: If the internal market risk models currently used by European banks respect the Level Playing Field Principle, the results of the EBA benchmarking study cannot be correct.

The disagreement about test portfolio values hints that possibly there was some misunderstanding about the payoff structure of the test portfolio. The EBA itself discusses such data quality issues. But nevertheless, considering the findings of the EBA study, one has to take seriously the possibility that the internal market risk models currently used by European banks may strongly violate the Level Playing Field Principle.

Following up on the EBA benchmarking study and a similar study by the Basel Committee, the ECB announced in February 2017 that it is going to perform a targeted review of internal models, or TRIM. This is a project to assess whether the internal models currently used by banks comply with regulatory requirements, and whether they are reliable and comparable. One major objective of TRIM is to reduce inconsistencies and unwarranted variability when banks use internal models to calculate their risk-weighted assets. This may occur because the current regulatory framework gives banks a certain freedom when modelling their risks and it gives national competent authorities (CA) a degree of discretion in the model approval process.

Another way to save the Level Playing Field Principle would be to end or restrict the use of internal models to determine regulatory capital requirements. This option is also being considered by the Basel Committee's *Fundamental Review of the trading book* and by the ECB's TRIM.

1. INTRODUCTION

In March 2017 the European Banking Authority (EBA) (European Banking Authority, 2017) presented the results of the supervisory benchmarking study on internal models for market risk (MR). The exercise was performed on a sample of 50 European banks from 12 jurisdictions that submitted data for 35 market portfolios in the following asset classes:

- equity
- interest rates
- foreign exchange
- commodities

Additionally, banks were asked to evaluate the risk of portfolios which were particularly sensitive to credit spread changes and to correlation changes.

The EBA report outlines the conclusions obtained from this hypothetical portfolio exercise that was conducted during 2015/16. The aim of the EBA study was:

1. to assess the variability in *valuation of* identical portfolios
2. to assess the variability in *market risk* weighted assets (MRWA) produced by banks' internal models on identical portfolios,
3. to examine the drivers behind the differences observed.

The EBA benchmarking exercise has to be seen against background of a similar earlier exercise by the Basel Committee for Banking Supervision (BCBS), namely the Regulatory Consistency Assessment Programme (RCAP) (Basel Committee on Banking Supervision, 2013). The Basel Committee observed variability for MRWAs from public disclosures: MRWA as a percentage of trading asset varied hugely between banks, in a range from 10% to almost 80%. These huge differences in MRWA (and subsequently in regulatory capital) can be due to:

1. differences in the riskiness of business models followed by different banks,
2. and/or, differences in the internal market risk models used by different banks.

Differences due to (1) are justified – indeed it is exactly the purpose of internal market risk models to set regulatory capital requirements in dependence of riskiness of bank portfolios. Differences due to (2) are however problematic, in particular if they result from downward risk manipulation by banks. (Other reasons for the differences (2) might be modelling choices offered explicitly by regulation, as the current regulatory framework gives banks a certain freedom when modelling their risks.) In order to determine whether differences are due to (1) or (2) or both, the Basel Committee performed a benchmarking study in which banks were required to apply their models to the same test portfolios.

This exercise excludes (1) as a possible cause for differences. All remaining differences must then be due to differences (2) in internal market risk models. The result of the Basel Committee's benchmarking exercise was that on the identical test portfolios bank models produced capital requirements differing

by a factor of almost three.¹ In other words, *on the same portfolio* the internal risk models of different banks would produce capital requirements differing by a factor of almost three.

In order to analyse the situation for European banks, the EBA performed the benchmarking study discussed here. The main difference to the Basel Committee's benchmarking exercise are the number and location of banks, and in particular the fact that the EBA analysed not just the variability of banks' models in risk assessments, but also in initial market value.

Partially as a follow-up to the BCBS' RCAP and to the EBA benchmarking study, the ECB performs Targeted Review of Internal Models (TRIM). One major objective of TRIM is to reduce inconsistencies and unwarranted variability when banks use internal models to calculate their risk-weighted assets. This effort of the ECB is well taken.

In this study I shall highlight in a non-technical language the main findings of the EBA benchmarking study (Section 2). In Section 3 I assess the robustness and validity of the study itself, highlighting problematic issues in EBA's methodological approach. Section 4 compare the findings with those of the Basel Committee's benchmarking study. Finally, I suggest in Section 5 which follow-up actions ECON Members might consider.

¹ The variability of banks capital requirements on the test portfolios was around 30%. The variability is defined as standard deviation divided by the mean of observations.

2. MAIN FINDINGS OF THE EBA BENCHMARKING EXERCISE

In this section, we present the main findings of the EBA benchmarking exercise. Subsection 2.1 presents the selection of banks taking part. In Section 2.2, I briefly describe the benchmark portfolios to which banks had to apply their internal models. Section 2.3 presents the benchmark results concerning initial market value of the test portfolios, Section 2.4 gives the benchmark results concerning risk assessments of test portfolios. Section 2.5 discusses which drivers the EBA considers as most relevant for the differences in bank models' evaluation and risk assessment of test portfolios. For authenticity, part of the formulations in this section are taken over directly from the EBA report (European Banking Authority, 2017).

2.1 Banks taking part in the benchmark study

Fifty banks from 12 EU countries participated in the benchmarking exercise, see **Table 1**.

The sample comprised notably all EU banks with internal market risk models approved by their competent authorities (CA), even if their models covered different trading desks and risks.

The sample does not necessarily include the 50 largest banks, although large banks would typically have internal risk models approved. Also, the geographical distribution of sample banks need not be representative for the totality of European banks.

Table 1: Banks participating in benchmark study

Erste Group Bank AG	Credit Suisse International
Raiffeisen-Landesbanken-Holding GmbH	Credit Suisse Investments (UK)
Belfius Banque SA	Goldman Sachs Group UK Ltd
KBC Group NV	HSBC Holdings PLC
BHF Bank AG	ICBC Standard Bank PLC (formerly Standard Bank PLC)
Commerzbank AG	Lloyds Banking Group PLC Merrill Lynch UK Holdings Ltd
Deutsche Bank AG	Mitsubishi UFJ Securities International PLC
Deutsche Zentral-Genossenschaftsbank AG	Morgan Stanley International Ltd
Landesbank Baden-Württemberg	Nomura Europe Holdings PLC
Landesbank Hessen-Thüringen	Standard Chartered PLC
Girozentrale NORD/LB Norddeutsche	The Royal Bank of Scotland Group PLC
Landesbank Girozentrale	Alpha Bank SA
Westdeutsche Genossenschafts-Zentralbank AG	Eurobank Ergasias SA
Danske Bank A/S	National Bank of Greece SA
Nykredit Realkredit A/S	Banca Popolare di Milano Scarl
Banco Bilbao Vizcaya Argentaria, SA	Banco Popolare Società Cooperativa
Banco Santander SA	Intesa Sanpaolo SpA
BFA Tenedora De Acciones, SA	UniCredit SpA
Criteria Caixa Holding, SA	Coöperatieve Rabobank UA
BNP Paribas SA	ING Groep NV
Groupe BPCE	NIBC Holding NV
Groupe Crédit Agricole	Banco Comercial Português SA
Société Générale SA	Nordea Bank – group
Barclays Plc	Skandinaviska Enskilda Banken – group
Citigroup Global Markets Europe Ltd	Swedbank – group

Source: (European Banking Authority, 2017), Table 17.

2.2 Portfolios considered

Table 2 shows which hypothetical portfolios were considered in the benchmarking exercise. The last column of this table indicates how many (out of the 50 banks participating) could evaluate the respective portfolio with their internal models. The test portfolios have been defined as market hypothetical portfolios, as set out in Annex V to the Benchmarking Implementing Technical Standards (ITS)².

Table 2: Portfolios considered in the hypothetical portfolio exercise, and number of submissions out of 50.

	Portfolio ID	Portfolio description	IMV submissions
Equity	1.1	Equity index futures on FTSE 100	41
	1.2	Bullish leveraged trade on Google	39
	1.3	Volatility trade on S&P 500	41
	1.4	Volatility trade on FTSE 100	38
	1.5	Equity variance swaps on Eurostoxx 50	24
	1.6	Barrier option on S&P 500	36
	1.7	Quanto index call on Eurostoxx 50	32
IR	1.8	Curve flattener trade on sovereign treasuries	48
	1.9	Interest rate swap	50
	1.10	2y swaption on 10y IRS	49
	1.11	LIBOR range accrual	34
	1.12	Inflation zero coupon swap	36
FX	1.13	Covered FX call on EUR/USD	48
	1.14	Mtmkt Cross Crcy Basis Swap 2y USD 3m LIBOR vs. EUR 3m EURIBOR swap	44
	1.15	Knock-out currency option	47
	1.16	Double no touch binary currency option	31
Commodity	1.17	Long short-term ATM OTC Ldn Gold fwd & Short long-term ATM OTC Ldn Gold fwd	28
	1.18	Short oil put options	24
Credit Spread	1.19	Sovereign CDS portfolio	35
	1.20	Sovereign bond/CDS portfolio	35
	1.21	Sector concentration portfolio	32
	1.22	Diversified index portfolio	38
	1.23	Diversified index portfolio with higher concentration	34
	1.24	Diversified corporate portfolio	31
	1.25	Index basis trade on iTraxx 5y EU	29
	1.26	CDS bond basis	31
	1.27	Short index put on iTraxx EU Xover	18
	1.28	Quanto CDS on ES with delta hedge	26
Sub All-in portfolio	1.29	All-in (1, 2, 4, 8, 9, 13, 17, 18, 19, 20, 21, 24, 26)**	16
All-in portfolio	1.30	All-in portfolio (1 to 28)**	14
All Equity portfolios	1.31	Equity (1 to 7)**	22
All IR portfolios	1.32	Interest rate (8 to 12)**	27
All FX portfolios	1.33	FX (13 to 16)**	39
All commodity portfolios	1.34	Commodity (17 and 18)**	22
All credit spread portfolios	1.35	Credit spread (19 to 28)**	14
Correlation Trading	2.1	Long position in spread hedged equity tranche of CDX.NA.IG index	10
	2.2	Long position in spread hedged mezzanine tranche of CDX.NA.IG index	10
	2.3	Short position in spread hedged super senior tranche of CDX.NA.IG index	10

Source: (European Banking Authority, 2017), Table 18.

² Commission Implementing Regulation (EU) 2016/2070 of 14 September 2016 laying down implementing technical standards for templates, definitions and IT-solutions to be used by institutions when reporting to the European Banking Authority and to competent authorities in accordance with Article 78(2) of [Directive 2013/36/EU](#) of the European Parliament and of the Council.

2.3 Disagreement about Initial Market Value

Participating banks were asked to provide an Initial Market Value (IMV) for all modelled portfolios. The intention behind this request was to ensure data quality: If a bank disagrees considerably with other banks concerning the initial market value of a portfolio, the risk numbers of this bank probably also have to be interpreted with care. A preliminary IMV analysis was necessary to spot anomalies or misunderstandings regarding the interpretation of each portfolio. Where the price of the portfolio lay outside a certain range, more investigation had to be done by the NCA, which could if necessary ask the bank for a repricing and a resubmission. This process should guarantee that all the risk measures are provided according to a correct interpretation of the portfolios.

If a bank's IMV was found to be an extreme value³ for a particular portfolio, then all the risk measures related to that particular portfolio were removed from the computation of the final statistics. This approach has further increased the quality of the data, but, at the same time, it has led to a reduction in the observations available for the computation of the benchmarks. On the other hand, this removal of outliers has reduced the reported disagreement about IMV and risk. Without it results would have been even more alarming.

Table 3 gives an idea about how different banks estimated the IMV of the test portfolios. The disagreement is stunning indeed. Banks often do not even agree whether a test portfolio has a positive or a negative value.

Table 3: Disagreement about the Initial Market Value of hypothetical test portfolios

Port.	Min	Max	Port.	Min	Max
1.1	-806,530	1,931,665	1.19	10,336	353,020
1.2	140,096	11,025,824	1.20	8,628,961	12,467,656
1.3	-5,992,468	1,044,280	1.21	82,424	861,738
1.4	-315,503	-188,585	1.22	-141,651	205,254
1.5	-126,353	53,065	1.23	3,035	366,966
1.6	50,397	172,028	1.24	116,289	554,135
1.7	-135,096	50,903	1.25	-16,472	47,933
1.8	-17,333,638	-15,985,261	1.26	7,364,181	9,843,593
1.9	-12,036	75,197	1.27	-890,493	2,563
1.10	-272,079	103,000	1.28	-78,701	-6,160
1.11	925,696	1,222,933	1.29	1,575,197	6,775,361
1.12	-779,890	-346,475	1.30	3,731,926	8,775,797
1.13	-1,019,958	98,020	1.31	-424,360	3,481,183
1.14	-1,941,790	737,160	1.32	-17,136,687	-16,200,268
1.15	-254,784	486,221	1.33	-525,048	1,280,051
1.16	0	0	1.34	-1,002,635	-59,181
1.17	-941,730	72,000	1.35	19,901,150	22,849,940
1.18	-219,141	-117,535	2.1	-4,764,826	6,617,265
			2.2	-1,416,272	1,220,059
			2.3	-386,661	386,433

Source: (European Banking Authority, 2017), Table 1

³ Extreme values were defined as values differing by twice the truncated standard deviation or more from the median.

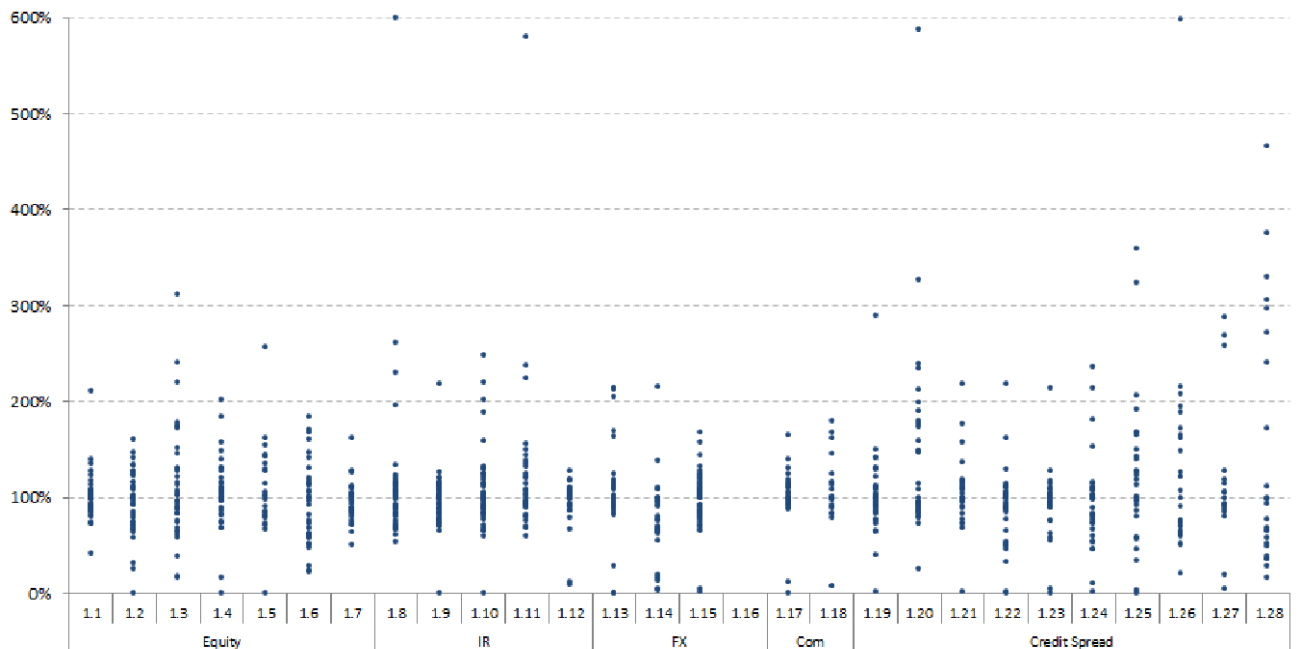
2.4 Disagreement about Risk

Risk numbers – such as Value at Risk (VaR), stressed Value at Risk (sVaR), Expected Shortfall, the Incremental Risk Charge (IRC), and All Price Risk (APR) – quantify financial outcomes for a bank if unexpected events happen. All banks participating in the EBA Benchmark Study quantify the risk of portfolios by internal risk models. In order to protect against the consequences of unexpected bad events, banks are required to hold regulatory capital. To fulfil this function, riskier portfolios should require more regulatory capital. This desideratum of bank regulation is the Risk Sensitivity Principle.

For Value at Risk (VaR) and stressed Value at Risk (sVaR), variability was assessed by using the banks' reported risk numbers over a 2-week period. Banks submitted weekly or daily observations, depending on their models, and the final risk measures by portfolio were obtained by averaging the observations over the two weeks. In addition to value based VaR, EBA produced profit and loss (P&L) VaR values using the data from banks using an historical simulation approach. Those banks delivered a yearly 1-day P&L vector for each of the individual and aggregated portfolios modelled, and these were used to compute the P&L VaR. Additionally, all price risk, the incremental risk charge, and an empirical estimate of expected shortfall were reported by some sample banks for some portfolios.

Figure 1 shows the variability in risk estimates (VaR numbers) delivered by the different banks. This variability is stunning as well. It is not rare for banks to report risk numbers which are three times higher (or ten times lower) than the average (median) reported by other banks.

Figure 1: VaR numbers of banks' internal models (normalized by the median)



Source: (European Banking Authority, 2017), Figure 2.

2.5 The drivers of disagreement

The EBA names several possible drivers for the differences in valuation and in risk estimates – apart from the discretionary model choice options granted by regulation.

First, many data quality issues were found and tentatively addressed to reduce spurious dispersion; therefore, the results should be treated with caution. The analysis shows high dispersion in the initial market valuation (IMV) results from different interpretations and market practices adopted by banks. Some of these issues have been addressed and the quality of the data has improved thanks to successive resubmissions. Still, misunderstandings about the payoff structure of the test portfolio seems to be a prime driver of differences. It is not clear, whether in day to day use of internal models outside the benchmarking exercise, such different interpretations and market practices remain.

In the same vein, a lack of consistent practice among banks for modelling some of the risk factors was found during some EBA interviews with banks, especially with the most sophisticated ones. In particular, this is the case for the basis risk between a credit default swap (CDS) and its equivalent bond⁴, the basis risk between an index and its components, the forward equity volatility surface and, in general, portfolios including sovereign risk.

Other drivers might be 'risks not captured in the model', which can explain further variability in the results. If the value or the future payoff of a test portfolio depends on risk factors which are absent from the bank's risk model, there is no way how the bank can capture that risk. Risk models are not the perfect image of an objectively given reality. Rather they reflect abstractions made specifically by a bank intending to capture its own specific risk.

Counteracting the drivers of disagreement is the procedure of removing outliers from the data set, which reduces variability of results reported.

⁴ The CDS-basis is defined as the difference between the CDS premium and the asset swap spreads of bonds of the same legal entity and the same maturity, see (Wit, 2006).

3. IMPLICATIONS AND NON-IMPLICATIONS OF THE EBA BENCHMARKING EXERCISE

In this section, I briefly discuss what the EBA Benchmarking study implies and what it does not imply.

3.1 Are test portfolios representative of banks' real portfolios?

The Basel Committee observed variability for MRWAs from public disclosures. That difference in MRWA (and subsequently in regulatory capital) can be due (1) to differences in the riskiness of business models followed by different banks, or (2) to differences in the internal market risk models used by different banks. Differences due to (1) are justified – indeed, it is exactly the purpose of internal market risk models to set regulatory capital requirements in dependence of riskiness of bank portfolios. In order to determine whether differences are due to (1) or (2) or both, a benchmarking study requires banks to apply their models to the same test portfolios. This exercise excludes (1) as a possible cause for differences. All remaining differences must then be due to differences (2) in internal market risk models.

The test portfolios used in the EBA benchmarking exercised have been specified by EU authorities, see Footnote 2. A potential but wrong criticism of the EBA benchmarking study could argue that the benchmarking results are irrelevant because they concern test portfolios and not the real portfolios of banks.

While it is true that probably no bank holds exactly the instruments and quantities of the test portfolios, most financial instruments in the test portfolios are not exotic and are probably held by many banks.⁵ If banks disagree about the value and the risk of the test portfolios, they also disagree about the value and the risk of at least some of the financial instruments in the test portfolios. These are largely the same instruments they hold in their real portfolios.

3.2 Do banks evaluate portfolios consistently?

The disagreement about the initial market value of test portfolios is surprising, see Section 2.3. Banks often do not even agree whether a test portfolio has a positive or a negative value. Test portfolio values given by different banks vary often by more than 100%. If test portfolios are market traded, their value should be marked to market. This should give an “objective”, i.e. bank-independent, portfolio value.

If test portfolios are evaluated with the help of models, there are two possible sources of error:

1. The input to the model is not correctly specified, perhaps because there is some misunderstanding about the payoff structure of the test portfolio.
2. The model is based on assumptions, statistical or structural, which are violated in reality.

Whatever the source, both sources can cause objective errors. The large variability in IMV estimated by different banks suggest there are objective valuation errors – assuming that test portfolios have at least approximately some objective value.

⁵ This is supported by the observation that for most test portfolios (except perhaps test portfolio 1.27 and the correlation trading portfolios 2.1-2.3) a large number of banks submitted market values and risk numbers, see the last column of Table 2.

Both, banks and supervisory authorities (the EBA and national competent authorities) cooperated in the benchmarking exercise. If the source of evaluation errors are of type (1) above, both share responsibility.

Also, both, banks and competent authorities (CA) play an important role in the development and the approval of models. If the source of evaluation errors are of type (2) above, again both share responsibility.

3.3 Do banks measure risk consistently?

The disagreement about the risk and capital requirements of test portfolios is stunning indeed, see Section 2.4. It is not rare for banks to report risk numbers which are three times higher (or ten times lower) than the average (median) reported by other banks. Since risk numbers of test portfolios cannot be observed directly, it is more difficult to speak of an objective risk of test portfolios. Risk is model-dependent. Models are the devices through which we observe risk. The risk perceived depends on both, the model and the portfolio.

When the risk of test portfolios is evaluated with the help of models, there are two possible sources of error:

1. The input to the model is not correctly specified, perhaps because there is some room for interpretation about the payoff structure of the test portfolio.
2. The model is based on assumptions, statistical or structural, which are violated in reality.

Whatever the source, both sources can cause variability in risk estimates of different banks. The large variability in risk numbers estimated by different banks suggest that there are inconsistencies in the risk estimation procedures of different banks. Not all banks can be correct in their risk estimates.

Both, banks and supervisory authorities (the EBA and national competent authorities) cooperated in the benchmarking exercise. If the source of risk estimation errors are of type (1) above, both share responsibility. Also, both, banks and competent authorities (CA) play an important role in the development and the approval of models. If the source of risk estimation errors are of type (2) above, again both share responsibility.

3.4 Implications and Non-implications

The conclusion can be formulated with two principles for banking supervision.

- **Level Playing Field Principle:**
If different banks hold the same portfolio, they should be required to hold the same amount of regulatory capital.
- **Risk Sensitivity Principle:**
Riskier portfolios require more regulatory capital.

The admission of internal risk models aimed at better fulfilment of the Risk Sensitivity Principle. But this progress comes at the price of weakening the Level Playing Field Principle.

If the results of the EBA benchmarking study are correct, the internal market risk models currently used by European banks strongly violate the Level Playing Field Principle. The same implication can be formulated equivalently: If the internal market risk models currently used by European banks respect the Level Playing Field Principle, the results of the EBA benchmarking study cannot be correct.

An important non-implication is about downward risk manipulation by banks. The EBA benchmarking study allows no conclusions, neither positive nor negative, whether or not banks engage in downward risk manipulation. The EBA benchmarking study analysed hypothetical test portfolios, not the actual portfolios of banks. Therefore, risk estimations on the test portfolios did not have any consequences for banks' capital requirements. Banks did not have any incentive for downward risk manipulation. If any, there might have been incentives not to produce outliers, i.e. risk numbers which are not too far away from the numbers reported by other banks.

4. COMPARISON TO BASEL COMMITTEE'S BENCHMARKING EXERCISE

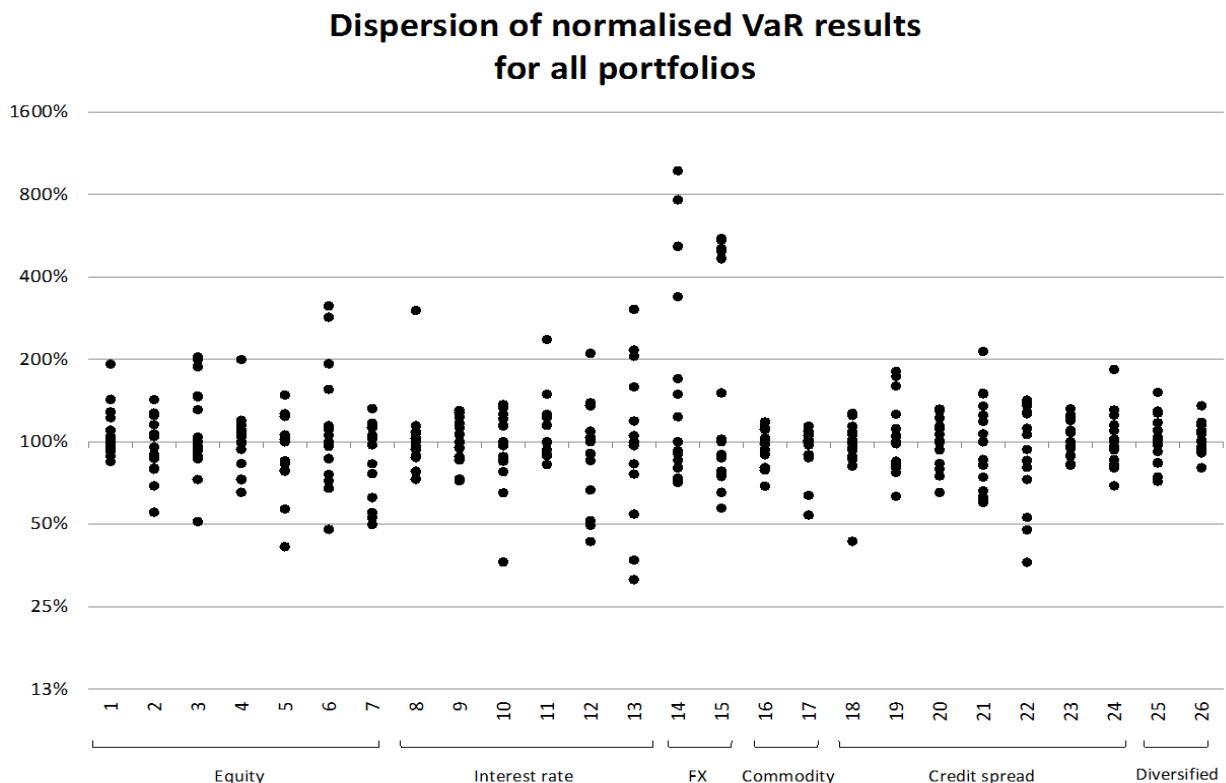
Preceding the EBA Benchmarking Study, in February 2013 the Basel Committee on Banking Supervision (BCBS) published its Analysis of risk weighted assets for market risk within the Regulatory consistency assessment programme RCAP, see (Basel Committee on Banking Supervision, 2013b). This section briefly summarises the similarities and differences between the EBA Benchmarking Study and the Basel Committee's RCAP.

The BCBS' study comprised 15 international banks, some of them based outside the EU. By contrast, the EBA Benchmarking Study comprised 50 banks, namely all EU banks with internal models for market risk approved. The test portfolios were similar in both exercises except that the BCBS did not include correlation trading portfolios. Furthermore, the BCBS did not evaluate risk numbers from the Comprehensive Risk Measure (CRM).

Additionally, the BCBS also performed an analysis of observed variability for mRWAs from public disclosures. That part of the BCBS study investigated market risk weighted assets and capital requirements for the banks' actual portfolio. The result was that MRWA as a percentage of trading asset varied hugely between banks, in a range from 10% to almost 80%. Such a comparison of mRWAs of real portfolios from public disclosures was not done by the EBA, which analysed test portfolios which were the same for all banks. The TRIM effort of the ECB is a suitable reaction to the EBA benchmark results.

On the other hand, the BCBS did not analyse banks' estimates of initial market value (IMV) for the test portfolios. Trivial as the valuation may seem, the EBA Benchmarking Study revealed stunning disagreement between banks about the initial value of test portfolios. The variability in the VaR numbers reported to the BCBS and EBA is overall roughly comparable, see Figure 1 and Figure 2.

Figure 2: Results of the Basel Committee's benchmark study



Source: (Basel Committee on Banking Supervision, 2013b), Figure 9

5. CONCLUSIONS AND POSSIBLE FOLLOW-UP ACTION

Let us come back to the conclusion formulated in Section 3: If the results of the EBA benchmarking study are correct, the internal market risk models currently used by European banks strongly violate the Level Playing Field Principle.

There are grounds for doubting the if-clause in this conclusion: The disagreement about test portfolio values discussed in Section 3.1 hints that possibly there was some misunderstanding about the payoff structure of the test portfolio. The EBA itself discusses such data quality issues. But nevertheless one has to take seriously the possibility that the internal market risk models currently used by European banks strongly violate the Level Playing Field Principle.

The ECB announced in February 2017 that it is going to perform a targeted review of internal models, or TRIM. This is a project to assess whether the internal models currently used by banks comply with regulatory requirements, and whether they are reliable and comparable. One major objective of TRIM is to reduce inconsistencies and unwarranted variability when banks use internal models to calculate their risk-weighted assets. This may occur because the current regulatory framework gives banks a certain freedom when modelling their risks.

The inconsistencies and unwanted variability diagnosed in the EBA benchmarking exercise could also be due to different supervisory approaches being taken by different national competent authorities. For example, (Döme, 2017) find statistically significant and economically important differences in risk weights relating to the country where the bank is headquartered. This finding provides evidence for different implementation standards across national jurisdictions in the EU. This is further justification of ECB's effort to create a level playing field by harmonising supervisory practices across the euro area.

Another way to save the Level Playing Field Principle would be to end or restrict the use of internal models to determine regulatory capital requirements. One way the Basel Committee proposes in order to improve consistency of internal models is the introduction of constraints on internal models' estimates ("input floors") and "output floor" tying the capital requirements generated by internal ratings to those that would emerge from the standardised approach. In 2016 the European Parliament already asked for expert opinions on one aspect of this issue, namely internal rating models.

(Resti, 2016) argues that floors would represent a technically flawed answer, since banks would adapt their portfolios to the modified regulatory framework. Instead, Resti suggests a number of supervisory actions that may be pursued, instead, to restore internal models' credibility. (Haselmann & Wahrenburg, 2016) argue for the continued use of internal rating models for regulatory capital calculations. In their view an abolishment or restriction of internal rating models use would endanger the Risk Sensitivity Principle. (Huizinga, 2016) favours a system of floors because it could prevent wholesale bank-level downward risk weight manipulation, which gives rise to effective bank undercapitalization and a heightened probability of bank failure.

Another, more radical way to restore the Level Playing Field Principle would be to completely end the use of internal models for regulatory capital calculation and return to the uniform use of the standard approach. This is one option on the table of the Basel Committee. Within the Basel Committee the EU might consider to support such a position informed by the inconsistencies revealed in the EBA benchmarking study.

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