

Notice

30 October 2009

concerning the reporting of back-testing outliers of internal market risk models pursuant to section 318 of the Solvency Regulation

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1. Preamble

The Solvency Regulation regulates the use of internal risk measurement models for determining the regulatory (partial) capital charges for market risk positions. Before an institution may use an internal risk measurement model it must obtain prior confirmation of the model's suitability from the Federal Financial Supervisory Authority (BaFin). Section 313 (3) sentence 1 **of the Solvency Regulation** stipulates that an internal risk measurement model shall be deemed to be suitable only if, *inter alia*, it demonstrates sufficient accuracy.

A risk model's accuracy is reviewed by back-testing. Section 318 (1) **of the Solvency Regulation** stipulates daily back-testing. The value at risk (VaR) calculated by the model, based on a holding period of one business day, is to be compared with the actual

change in value of the individual financial instruments or groups of financial instruments included in the model's calculation (clean P/L). To determine the clean P/L, the financial instruments or groups of financial instruments included in the institution's portfolio at the close of business on the previous day must be revalued using current market prices at the close of business. If a loss occurs and it exceeds the VaR, BaFin and the Deutsche Bundesbank should be notified promptly of this overshooting (back-testing outlier), its scale and its cause.

In addition to determining forecasting quality and reviewing the model's suitability, back-testing also serves to stipulate the weighting factor pursuant to section 314 (3) sentence 2 **of the Solvency Regulation**. For this purpose, the number of back-testing outliers (within the meaning of section 318 (1) sentence 3 **of the Solvency Regulation**) within the last 250 business days are taken as a basis. After five back-testing outliers, a weighting factor (quantitative multiplier) is to be introduced in accordance with Table 25 of Annex 1 **of the Solvency Regulation**. The increase is to be such that the capital charge determined using the increased weighting factor corresponds to the capital charge for a risk measurement model with sufficient accuracy. Pursuant to section 318 (2) sentence 2 **of the Solvency Regulation**, BaFin may disregard individual back-testing outliers when determining this multiplier if the institution can demonstrate that the back-testing outlier was not due to the risk measurement model's inadequate accuracy.

This Notice defines how the back-testing outliers are to be reported and analysed. It is designed to help achieve the prompt reporting of back-testing outliers, as well as a suitable depth of analysis. The future reporting process as described here should enable the implementation of these aims. The instructions set out in this Notice for analysing back-testing outliers aim to enable BaFin to consider the back-testing outlier when gauging the quantitative multiplier. They are also conducive to enabling the institution to test the suitability of its risk measurement model to find possible model shortcomings in the light of the back-testing outlier.

2. Reporting process for the back-testing outliers

The reporting of back-testing outliers pursuant to section 318 (1) sentence 3 **of the Solvency Regulation** will be conducted in two separate steps

- back-testing outlier notification
- back-testing outlier analysis

2.1. Addresses

Both the back-testing outlier notification and analysis should be sent to each of the following addresses

Recipient	Deutsche Bundesbank		
	Bundesanstalt für Finanzdienstleistungsaufsicht		
Via e-mail	Backtesting@bundesbank.de	Reference	<Name of bank>: back-testing outlier from <date of revaluation>
	qrm@bafin.de		
By post	Competent Deutsche Bundesbank Regional Office		
	Bundesanstalt für Finanzdienstleistungsaufsicht - Abteilung QRM - Postfach 1253 53002 Bonn Germany		

The Deutsche Bundesbank and BaFin (hereinafter: supervisory bodies) will arrange further distribution. The institutions are free to decide which type of delivery they wish to use, i.e. electronic or postal.

2.2. Deadlines

The deadlines listed below relate to the latest possible date by which the information must be transmitted to the supervisory bodies.

Back-testing outlier notification	No later than <u>5 business days</u> after the back-testing outlier occurs (start date is the revaluation date)
Back-testing outlier analysis	No later than <u>3 weeks</u> after the back-testing outlier occurs (start date is the revaluation date)

If an institution is unable to meet the 5-day back-testing outlier notification deadline, the back-testing outlier notification is to be submitted late along with the principal reasons for the delay.

If an institution cannot produce the back-testing outlier analysis within 3 weeks, the delay is to be reported promptly to the supervisory bodies and a probable delivery date is to be specified.

3. Report contents

The institution's reports should cover at least the following points. No details need be supplied on individual points which are irrelevant to the respective back-testing outlier. If it is not possible to furnish details on individual relevant points concerning the back-testing outlier, the main reasons for these omissions are to be stated.

3.1. Back-testing outlier notification

The initial notification should be limited to details which the institution already possesses in order to identify the back-testing outlier. No analysis is expected at this stage. The details to be supplied are

Forecast date (VaR date)	<i>DD.MM.YYYY</i>	Business day (revaluation date)	<i>DD.MM.YYYY</i>
VaR	€XX m €XX m	Clean P/L	€XX m

In addition, the number of back-testing outliers during the past 250 business days (including the most recent back-testing outlier) and the quantitative multiplier (according to the currently valid BaFin notification) are to be provided.

The revaluation date is to be used as a reference in both cases.

Quantitative multiplier	
Number of back-testing outliers during the past 250 business days	

The template annexed to this Notice can be used to notify the back-testing outlier.

3.2. Back-testing outlier analysis

The detailed analysis should cover the topics of portfolio, market and model analysis. Each institution can freely devise its analysis. However, its structure should be comprehensible and commensurate to the back-testing outlier. The tabulated, listed questions that have been inserted into the following text passages serve as guidelines as to what is to be covered by the detailed analysis. Each institution is to exercise its own discretion in selecting the focus of its analysis within the topic areas.

3.2.1. Portfolio analysis

The detailed back-testing outlier analysis should contain the trading portfolio report from the day the back-testing outlier occurred. Furthermore, the VaR and clean P/L should be compared for suitable sub-portfolio levels. This will serve to identify the trading books that primarily caused the back-testing outlier. If the corresponding trading books have been identified, they are to be specified appropriately.

Was it possible to identify the trading books/portfolio positions which primarily caused the back-testing outlier?

Comparison of VaR and clean P/L at sub-portfolio level.

Identification of significant back-testing outliers at sub-portfolio level.

What trading strategies are being pursued with the identified portfolio positions?

What financial instruments are included?

What risk factors are relevant for these financial instruments?

What sensitivities do the relevant financial instruments have to these risk factors?

3.2.2. Market analysis

If significant market movements have been identified as the cause of the back-testing outlier, the market movements should be described using valuation parameters that can be observed on the market (index levels, interest rates, securities prices, exchange rates, implied correlations, implied volatilities, etc). If interrelated movements in several market parameters primarily caused the back-testing outlier (e.g. in the case of correlation and hedging positions), these should also be described.

Is it possible to identify significant market movements which primarily caused the back-testing outlier?

Description of market movements using observable valuation parameters.

In order to assess the significance of the current market movements, they must be embedded in an historical context. For example, a market movement to be analysed can be given as a quantile in the historical distribution (parametric or non-parametric). The appropriate time series (e.g. 250 business days) or the distribution of the risk factors in question is also to be provided.

Classification of the market movements using the time series of historical market movements.

Particularly, evidence of significance.

If economic causes can be identified which triggered the significant market movements, these are to be explained. An example of such an economic cause would be an unexpected interest rate change by the European Central Bank, triggering a shift in the yield curve. The relationship between economic causes and the observed market movements is to be illustrated. If no economic causes can be identified, a qualitative description of the current market environment should be given.

Description of economic causes

Can individual causes be identified?

Are the markets in a phase of high/low volatility?

Are uncertainties or rumours leading to strong market movements?

3.2.3. Model analysis

The aim of the model analysis is to assess the model's suitability in the light of the back-testing outlier.

If portfolio positions can be identified which significantly contributed to the back-testing outlier, the mapping of these positions in the risk measurement model is to be analysed. The aim is to assess whether the risk factors are appropriate for mapping these positions.

Choice of risk factors

In order to demonstrate the appropriateness of the chosen risk factors, a plausibility test should be carried out on the clean P/L using the sensitivities of the positions to the risk factors and the realised movement in these risk factors ("Clean P/L explain").

Risk factor mapping

Another objective is to examine whether the integration of the relevant risk factors into the risk model is appropriate. In addition, the distribution assumptions used in the risk model for these risk factors must be validated using historical data. The risk model parameters must also be reviewed.

Analysis of the internal risk model's ability to capture the market risks of the relevant portfolio positions.

<i>By what risk factors are the relevant positions mapped in the internal risk model?</i>

<i>Can the Clean P/L be explained using the sensitivities to these risk factors and the realised movement?</i>
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<i>Which of the risk drivers that are relevant for the back-testing outlier are possibly not captured by the internal risk model?</i>

<i>Is the mapping of relevant risk factors in the risk model appropriate compared with the historical distributions?</i>
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Aggregation of the risk factors

If it was not possible to identify any individual portfolio position which primarily caused the back-testing outlier, but rather the back-testing outlier was caused by an aggregation of risk factors, the correlations used and the model assumptions for collating risks are to be reviewed.

Was this back-testing outlier primarily caused by the aggregation of risk factors?

<i>What are the corresponding model assumptions?</i>
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Process analysis

The processes for calculating VaR and clean P/L are to be analysed. For example, back-testing outliers can result from a failure to daily update market prices of financial instruments, either because of insufficient market liquidity or because of process shortcomings.

Analysis of the processes for calculating VaR and clean P/L.

Is the portfolio position in the VaR and clean P/L calculation processes identical?

For which securities are no valid daily prices available, and which clean P/L amount is attributable to this?

Did process shortcomings trigger/contribute to the back-testing outlier?

Scenarios for stress tests

The qualitative requirements of an internal risk measurement model include the regular calculation of stress tests. When calculating stress tests, large losses in value are identified due to unusual changes in market parameters and their interaction. In addition, the stress tests serve to identify possible value losses which are not caused by risk factors included in the model.

The occurrence of a back-testing outlier therefore offers a good basis to review the underlying scenarios of the stress tests (stress scenarios). If the back-testing outlier can be attributed to unusual market movements, it is to be examined whether these types of market movements are incorporated in the stress scenarios. Furthermore, it is to be examined whether the extent of the hypothetical loss that occurred in the back-testing outlier has been captured by the stress scenarios.

Review of the scenarios of the stress tests based on the back-testing outlier.

Are the observed market movements included in the stress scenarios?

Is the extent of the incurred losses captured by the stress scenarios?

Will the stress scenarios be adjusted as a result of the back-testing outlier?

3.3. Application by the institution to disregard a back-testing outlier

Pursuant to section 318 (2) sentence 2 **of the Solvency Regulation**, BaFin may disregard individual back-testing outliers when assessing the quantitative multiplier if the institution can demonstrate that the back-testing outlier was not due to the risk measurement model's inadequate accuracy.

BaFin requires a formal specific application from the institution to disregard a back-testing outlier. This application is to be submitted along with the detailed back-testing outlier analysis. If no such application is submitted, BaFin will take the respective back-testing outlier into account when assessing the quantitative multiplier.

4. Annex

4.1. Back-testing outlier notification template

Template

30 October 2009

for the notification of back-testing outliers of internal market risk measurement models pursuant to section 318 of the Solvency Regulation

1. General information

Name of institution		Reporting date	<i>DD.MM.YYYY</i>
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2. Back-testing outlier notification

Forecast date (VaR date)	<i>DD.MM.YYYY</i>	Business day (revaluation date)	<i>DD.MM.YYYY</i>
VaR	€XX m	Clean P/L	€XX m

VaR – value-at-risk measure calculated using the internal risk measurement model, based on a holding period of one business day

Clean P/L – hypothetical change in value of the individual financial instruments or groups of financial instruments included in the model's calculation pursuant to section 318 (1) **of the Solvency Regulation.**

3. Details on the current quantitative multiplier

Quantitative multiplier	
Number of back-testing outliers during the past 250 business days	

Quantitative multiplier - according to the currently valid BaFin notification

Number of back-testing outliers during the past 250 business days – including the most recent back-testing outlier

The **revaluation date** is to be used as the reference in both cases.

4.2 Compilation of analysis questions

Is it possible to identify trading books/portfolio positions which primarily caused the back-testing outlier?
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Comparison of VaR and clean P/L at sub-portfolio level.

Identification of significant back-testing outliers at sub-portfolio level.

What trading strategies are being pursued with the identified portfolio positions?
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What financial instruments are included?
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What risk factors are relevant for these financial instruments?

What sensitivities do the relevant financial instruments have to these risk factors?
--

Is it possible to identify significant market movements which primarily caused the back-testing outlier?

Description of market movements using observable valuation parameters.
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Classification of the market movements using the time series of historical market movements.

Particularly, evidence of significance.

Description of economic causes

Can individual causes be identified?

Are the markets in a phase of high/low volatility?
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Are uncertainties or rumours leading to strong market movements?
--

Analysis of the internal risk measurement model's ability to capture the market risks of the relevant portfolio positions.

By what risk factors are the relevant positions mapped in the internal risk measurement model?
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Can the Clean P/L be explained by the sensitivities to these risk factors and the realised movement?
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Which of the risk drivers that are relevant to the back-testing outlier are possibly not
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captured by the internal risk measurement model?

Is the mapping of relevant risk factors in the risk measurement model appropriate compared with the historical distributions?

Was the back-testing outlier caused primarily by the aggregation of risk factors?

What are the corresponding model assumptions?

Analysis of the processes for determining VaR and Clean P/L.

Is the portfolio position in the VaR and clean P/L calculation processes identical?

For which securities are no valid daily prices available, and which clean P/L amount is attributable to this?

Did process shortcomings trigger/contribute to the back-testing outlier?

Review of the crisis scenarios based on the back-testing outlier.

Are the observed market movements included in the stress scenarios?

Is the extent of the incurred value losses captured by the stress scenarios?

Will the stress scenarios be adjusted as a result of the back-testing outlier?