BANCO DE ESPAÑA
Directorate General Banking Supervision

MODEL DOSSIER FOR MARKET RISK MODELS

Structure of the Dossier used to monitor and document internal models for calculating minimum capital requirements for market risk

The Market Risk (MR) Model Dossier is not a manual, but rather is intended to gather relevant information on the internal market risk model to enable review and reasonable monitoring by a third party. Therefore, it may contain links to other files, documents, manuals, etc. which it is not necessary to include in the Dossier.

0. **Institution, author(s), persons responsible for content and date updated.**

1. **Description of the scope of application of the model**.

   1.1. **Identification**: Identify the scope of the model. State the following:

      1.1.1. **Group institutions included.** Describe the Group institutions and indicate the risk covered in the internal model as a percentage of the total risk of the same type in the consolidable Group.

      1.1.2. **Types of risks:** Indicate the risk categories covered by the model: trading book risk, foreign exchange positions outside the trading book, positions in gold and positions in commodities.

      1.1.3. **Types of financial instruments included in the trading portfolio**. Indicate the criteria for inclusion of products in the trading book and the criteria for separation from the banking book.

   1.2. **Description**. List and describe the business units included in the scope of the model. Include (if a policy has been defined in this respect) the policy on authorised products/markets in each business unit.

2. **Risk exposures and levels:**

   2.1. **Exposure by product.** List the exposures (value of positions) by product type and the VaR by product type.

   2.2. **Current distribution of risk:** Current level of risk at business unit level, and treasury desks, together with the disaggregation available (risk factors and/or products).

   2.3. **Historical data:** At business unit level, give quarterly historical VaR data by risk factor and/or product.

3. **Policies and organisation.**

   3.1. **Market risk management policies:** Summarise the market risk management guidelines.

   3.2. **Senior management:** Detail the involvement of senior management in the application of the model. Detail the various committees, giving their composition and responsibilities.

3.3. **Organisational structure:** Organisation chart of the different units involved in market risk management, indicating the functions performed and the number of technically skilled people assigned to them.

3.4. **Procedures for authorising new products**. Describe the units involved, the approval procedure and the post-approval procedures for monitoring market inputs, valuations and sensitivity measurements. List of authorised products.

3.5. **Procedures for changing and improving methodology**: Identify the unit entrusted with monitoring and improving the internal model and describe the procedures for significant changes of the model.

3.6. **Manuals**: List the internal manuals relating to market risk information and summarise the content of each of them.

4. **Measurement system.**

4.1. **Model inputs:**

4.1.1. **Parameters**.

4.1.1.1. **Holding period**:

4.1.1.1.1. Describe the methodology for estimating market risk with the regulatory holding period, indicating whether it is a 1 day calculation scaled up to that holding period or a direct calculation. If market risk for the regulatory holding period is a direct estimate, compare the estimated risk with that which would result from rescaling the estimated 1 day market risk to the holding period.

4.1.1.1.2. Indicate whether it is envisaged considering longer time horizons than the regulatory one for illiquid instruments/markets.

4.1.1.2. **Historical observation period for risk factors.** Describe the procedures used to select the historical observation period for risk factors and specify the frequency with which that historical period is revised. Indicate, where applicable, the application of decay factors.

4.1.1.3. **Confidence interval**

4.1.2. **Market inputs**

4.1.2.1. **Details of market variables captured, indicating their source**. In the case of consolidable groups with local market risk units that capture prices in different geographical locations, detail the market variables captured.

4.1.2.2. **Details of secondary calculations using market inputs and calculation methodology**: valuation of unpriced instruments (illiquid corporate bonds), zero coupon curves, credit spread curves and volatility smile curves.

4.1.2.3. **Manuals relating to market inputs.** Include as annex.

4.1.3. **Position inputs**.

4.1.3.1. **Description of position inputs entered in market risk calculation systems**. If cash flow decompositions and/or mappings are carried out, indicate the methodology, specifying the particulars of each product type. In the case of optional instruments, indicate the method of calculating sensitivities to the various risk factors (underlying, implied volatility and others), stating whether they are calculated using closed formulas

(analytical calculation) or by numerical means. Also, for options in which the models are based on parametric methodology, indicate the types of options with discontinuity problems in their sensitivity measurements.

4.1.3.2. **Position input tables in the market risk calculation system**. List and describe the fields.

4.2. **Methodology**.

4.2.1. **Level of disaggregation of risk measurements** (by business unit/treasury desk, by risk factor and by product).

4.2.2. **Criteria for aggregating business unit risk measurements.** Where applicable, describe the manner of integrating the measurement of risk on positions held in local units whose currency differs from that of the parent company.

4.2.3. **Type of methodology or methodologies used**. Indicate the type of methodology used (variance-covariance, historical simulation or Monte Carlo simulation).

4.2.4. **Description of methodology.** Detailed description of the methodology indicating expressly the following:

4.2.4.1. **Risk factor categories and factors within each category.** In the case of options, indicate the type of input used as a volatility risk factor (market volatilities/historical volatilities), detailing in the first case the vertices considered in the volatility curve for each type of option.

4.2.4.2. **Criteria for aggregation within and between risk factors.**

4.2.4.3. **Valuation models used.** Select the complex products that are most significant in terms of exposures generated, and attach their valuation models as an annex.

4.2.4.4. **Risk factor simulation models**. Where applicable, explain the models used to simulate the behaviour of risk factors when Monte Carlo simulation techniques are used to estimate market risk.

4.2.4.5. **Treatment of specific risk.** Indicate whether the internal model covers the specific risk of non-government debt securities and of equity securities, stating whether it covers event/default risk. Where applicable, detail the measurement methodology and indicate whether the specific risk component of the positions subject to this risk is kept separate from the measurement of the related general market risk.

4.2.5. **Methodology application period and functioning of the model:**

4.2.5.1. **Period of application.** Time that the current methodology has been in service.

4.2.5.2. **Changes in methodology since the model was approved**. Indicate the reasons why and the dates when these changes took place.

4.2.6. **Manuals relating to methodology.** Attach as annex.

5. **Stress testing programme.**

5.1. **Types of stress testing used**.

5.1.1. **Methodologies used.** Indicate whether the method employed is scenario analysis (historical or hypothetical), sensitivity analysis on model parameters or

systematic analysis based on abrupt movements in risk factors. Whichever of these cases it may be, specify whether **customised analysis of the portfolio** or **independent analysis of portfolio composition** is chosen.

5.1.2. **Risk factors affected.**

5.1.2.1. Indicate expressly whether stress analyses are conducted of the credit spreads on positions in private debt securities and credit derivatives and whether stress analyses are conducted on inputs affecting the valuation of options apart from the underlying (volatility curves, correlation input in options on asset baskets, etc.).

5.1.2.2. Describe the incorporation of the market liquidity risk factor in the stress scenarios, indicating how importance this risk is for the institution's positions.

5.1.3. **Description of overall stress scenarios applied.** Indicate the analyses that take into consideration all the risk factors and that affect the positions of all geographical areas. Describe them.

5.1.4. **Description of local (or specific) stress scenarios**. Give details of stress analyses that specifically affect a certain risk factor and/or positions in a certain geographical area.

5.1.5. **Scenario that has received most attention in the past year.**

5.2. **Frequency of measurement**. Indicate how frequently systematic analyses are conducted, and any isolated analyses. Give details of those conducted in the past year.

5.3. **Frequency of review of stress scenarios**. Specify whether there is a minimum periodicity for reviewing stress scenarios and indicate the last time the current scenarios were reviewed. Specify also the unit responsible for defining the stress scenarios.

5.4. **Results of stress testing**.

5.5. **Reporting to senior management of stress test results and consideration thereof in the setting of policies and limits.**

5.5.1. **Details of periodic and/or non-periodic reports** sent to senior management, describing the attention it gives to these results.

5.5.2. **How stress test results are taken into account in the institution's market risk management** and economic capital allocation.

6. **Backtesting programme.**

6.1. **Types of backtesting**. State whether, in addition to "clean" backtesting (that conducted on the same positions with which risk is estimated), "dirty" backtesting is also carried out.

6.2. **Methodology used in constructing results.**

6.2.1. **"Clean" results.**

6.2.1.1. Specify the procedure used to obtain these results, i.e. whether it is by reevaluating the previous day's positions at the new prices or by stripping out from the day's actual outcomes the portion relating to intraday operations and other result components not linked to price movements (market fees and commissions, customer margins, etc.). Describe the unit

responsible for their calculation and the system with which they are measured.

6.2.1.2. If "clean" results are calculated on a hypothetical portfolio instead of on an actual portfolio, describe the composition of the portfolio, indicating parameters that prove to be a representation of the actual portfolio. Indicate also the frequency established for reviewing its composition.

6.2.2. **Actual results.** Describe, where applicable, possible adjustments made to actual results so that they can be used in cross-checks. Describe the unit responsible for their calculation and the system with which they are measured.

6.3. **Level of disaggregation.** State the level of disaggregation of the tests (by business unit/treasury desk and disaggregations by product and/or risk factor).

6.4. **Backtesting analysis procedures.** Describe the type of analyses conducted, detailing whether, in addition to recording the number of overshootings, complementary analyses are carried out (examination of size of exceptions, symmetry studies of profit and loss exceptions, tests of normality of results, analyses of ratios of variability of results to variability of VaR, etc.). State also the type of analysis conducted to identify the causes of exceptions.

6.5. **Backtesting results for the previous year**.

6.5.1. **"Clean" backtesting results for the previous year (250 observations).** Provide the number of overshootings at all available disaggregation levels, with an explanation of each.

6.5.2. **"Dirty" backtesting results for the previous year (250 observations).** If complementary cross-checks against actual results are being conducted, provide the number of overshootings at all available disaggregation levels, with an explanation of each.

6.6. **Historical data (from the date of initial use of the model) of the plus-factor** applied quarterly to calculate the regulatory capital derived from the backtesting results.

6.7. **Procedures for taking backtesting results into account in the VaR measurement methodology.** Description, from the model authorisation date, of changes in methodology made using backtesting analyses.

7. **Uses of VaR within the institution.** Description of the processes for which the model outputs are used, for example, control of risk exposures, internal allocation of economic capital, risk-adjusted financial performance, pricing of transactions, etc. Specifically, the following should be stated:

7.1. **Structure of limits.**

7.1.1. **Types of limits.** Classification into limits designed to cap future losses (limits based on VaR, on stress results or on risk factor sensitivity measures) or limits calculated on losses borne, and the relationship between them.

7.1.2. **Hierarchical structure and approval, change and control procedures.**

7.1.3. **Procedures for establishing the level of limits**. Detail the methodology used to ensure that the limits at hierarchically lower levels are consistent with the market risk limits at higher levels in a business unit. Attach as an annex the consistency study on the latest structure of limits.

7.1.4. **Limits structure during the previous year.** Attach as an annex the latest limits structure defined in the model scope.

7.1.5. **Exceptions to limits in the previous year.**

7.1.5.1. Exceptions to the limits in place at the higher hierarchical level.

7.1.5.2. Exceptions to the limits in place at the lower hierarchical level.

7.2. **Information system.** Enumeration and brief description of the reports generated using model data, giving details of their periodicity and recipients.

7.3. **Action plans for market crisis situations**. Specification, where applicable, of action plans for market crisis situations that affect activities within the model's scope, describing the events that trigger them and the planned actions.

8. **Technological environment and information integrity controls.**

8.1. **Description diagram of information systems and of information flows between them.**
Prepare a diagram setting out all the systems involved in the market risk measurement and control process (market variable input systems, systems for entering position inputs and systems for calculating VaR and results. Explain in detail the calculations in each system (in line with points 4.1.2 4.13 and 4.2). The scheme should also specify estimates, which are made on spreadsheets (valuations of out-of-systems transactions, measurement of sensitivities, partial calculation of VaR) that can be used as inputs to other processes. Describe also the information flows between systems, specifying whether the transmissions are automatic or manual.

8.2. **Description of controls.** Detail the internal procedures (include manual as annex) established to ensure the consistency and reliability of positions and of market sources, indicating who is responsible for these controls and how regular they are. Explain explicitly the following:

8.2.1. **Reconciliation of front-office positions with accounting.**

8.2.2. **Procedures for identifying the scope** of portfolios included in the model, both for calculating market risk and for calculating results.

8.2.3. **Reconciliation of positions between the front-office systems and the market risk calculation systems.** Description of the type of reconciliation and of its level (total by business unit/treasury desk/product).

8.2.4. **Daily analysis of risk exposures** enabling errors to be detected in the data on positions. Indicate the lowest level that this analysis goes down to.

8.2.5. **Procedures (automatic and manual controls) for validating market sources and for calculating volatilities and correlations.** In the case of institutions with Local Units in different geographical locations, state the procedures for validating captured market variables, indicating whether the validation is to be done by the Local Units or by the Central Risk Unit.

8.2.6. **Automatic procedures in systems for calculating risk on captured position inputs and market variables.** (Controls of file receipt, of file size, of levels of change in market variables and volatilities/correlations, control of uncaptured market inputs, etc.).

9. **Independent assessments.** Inventory of independent reviews (internal audit, external audit, consultants), aims of the reviews and the conclusions drawn.

10. **Weaknesses and future developments.**

    10.1. **Knowledge of weaknesses**. Description of any known weaknesses of the model and the anticipated timetable for remedying or improving them.

    10.2. **Future changes.** Details of expected changes or future plans relating to the models and systems used to measure and control the risks arising from this portfolio.