

# MARKET RISK MANAGEMENT

4.193

30

2.804

512

1.718

2.498

1.072

365

384

135

174

172

286

282

336

367

144

2.4

1.8

2.1

1.6

1.1

2.0

2.196

2.083

1.331

2.757

1.554

1.529

1.238

335

374

FIS BALANCE SHEET MANAGER FORMERLY AMBIT FOCUS

## INTRODUCTION TO MARKET RISK MANAGEMENT

FIS<sup>®</sup> Balance Sheet Manager (formerly Ambit Focus) is a comprehensive balance sheet management solution that offers banks the toolset they need to address growing market and regulatory pressure. The modular architecture of the solution allows combining the management of market risks in both banking and trading book with other risk and finance tasks such as monitoring of liquidity risks, computation of ALM metrics, or hedge accounting.

The Market Risk module of Balance Sheet Manager allows quantifying and monitoring market risks across both trading and banking book. The solution identifies and evaluates market risk wherever it originates, thus allowing to reliably measure and proactively manage the institution's risk exposure. Sophisticated risk analytics include sensitivity analysis, scenario analysis, and the computation of Value-at-Risk (VaR).

Over 220 derivative and cash instruments of all major risk classes, including equities, commodities, credit, foreign exchange, inflation and interest rates are covered by the market risk module. The computational framework is built upon a modular, extensible architecture and leverages the latest financial algorithms in Microsoft's .NET<sup>™</sup> framework.

The major components of the solution include:

- Extensive risk calculations for all major asset classes (including equities, commodities, credit, foreign exchange, inflation and interest rates) for both trading and banking book
- Sensitivity analysis
- Value-at-Risk (VaR) based on historical, parametric and Monte-Carlo approaches
- Stress scenario analysis for all major risk factors
- Multidimensional reporting with drill-down to single position level
- An extensibility-enabled framework which allows new models to be added seamlessly in any .NET compliant language

#### BALANCE SHEET MANAGER ALLOWS QUANTIFYING AND MONITORING MARKET RISKS ACROSS BOTH TRADING AND BANKING BOOK.

The solution combines the strengths of the two worlds:

- Powerful analytics engine, recognized by industry awards;
- Ease of analysis and reporting, enabled by multidimensional reporting framework.



## RISK FACTOR SENSITIVITIES AND STRESS SCENARIOS

#### **Sensitivity Analysis**

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To support effective market risk control, Balance Sheet Manager calculates key risk figures, such as normalized ("Greeks") and unnormalized sensitivities for both trading and banking book positions. Sensitivities computed by Balance Sheet Manager include first and second derivatives against all risk types plus theta values.

Results can be presented at any aggregation level, providing a bird's eye or detailed view of the bank's current risk profile and the origin of its exposures.

#### **Scenario Analysis**

In addition to the calculation of sensitivities, Balance Sheet Manager provides scenario analysis as a tool for risk assessment in a given portfolio. This enables the bank to simulate market movement scenarios in order to analyze the impact of abnormal market conditions on its Profit & Loss.

Stress-tests can be defined at the risk factor level, with the system providing a simple user interface to set up new scenarios. Risk factors including interest and exchange rates, spreads, equity and commodity prices, as well as volatilities may be shifted through applying absolute or relative shifts. Scenarios can be applied to compute sensitivities, or for Stressed VaR metrics calculation.

The solution further provides pre-defined historic scenarios that replicate the market data shifts of specific historic events (e.g. Kuwait Crisis 1991, September 11, Market Crash 2008 etc.) and can be used as a basis for setting up institution-specific scenarios.

#### Figure 1: Sensitivity report



#### Figure 2: Historical stress scenario report



## VALUE-AT-RISK

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Risks arising from complex trading books can best be quantified and monitored using Value-at-Risk (VaR) methods. The advantages of VaR are manifold, including among others comparability among risk types, portfolios, or any other reporting dimensions. Value-at-Risk metrics allow capturing complex risk structures in a single figure which is easy to interpret and communicate.

Balance Sheet Manager provides VaR calculation based on historical, parametric, and Monte-Carlo simulations, covering all relevant risk factors that affect trading and banking book positions.

**Historical VaR** method derives a portfolio's loss distribution based on historical market data movements. The scenarios are generated by applying historical shifts of risk factors (interest rates, exchange rates, equity prices etc.) to current market data. For each of these scenarios the portfolio is revalued and the P&L computed. VaR as well as other risk measures can be computed on the basis of the resulting P&L distribution. Historical simulation allows setting a decay factor in order to provide higher weights to recent observation values.

**Parametric VaR** computation generates the loss distribution of a portfolio for market risk analysis based on the statistics derived from the historical market data movements. The calculation is based on the sensitivities (deltas, and, if requested, gammas) of the portfolio, historical volatilities of price factor points, and the historical correlations between the points.

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#### Figure 3: Customized VaR dashboard

**Monte-Carlo VaR** method derives the portfolio loss distribution, based on the simulation of multiple correlated random market scenarios. The portfolio is revalued under each of these market scenarios. The resulting P&L distribution is further used to calculate VaR and other risk. The solution's high-performance Monte-Carlo simulation engine allows to configure the complete scenario generation, down to the processes driving the returns of each individual risk factor.

For all calculation frameworks, VaR can be calculated under any confidence level for any holding period. Factor drill-downs may be used to automatically isolate and independently calculate the risk from individual factor groups. This provides a better insight into correlation effects, marginal and component contributions.

In addition to VaR (the loss value that will not be exceeded for a given confidence level), the solution computes the following related metrics:

- **Shortfall VaR (Expected Shortfall)**: The expected loss conditional on the portfolio loss being bigger than the VaR, i.e. the average of all losses greater or equal than VaR.
- **Marginal VaR**: The sensitivity of the VaR to small changes in portfolio composition. It is calculated as the VaR of the portfolio multiplied by the weighted average of the standard deviations of value changes to an increase in the size of the sub-portfolio. The weighted sum of Marginal VaRs is thus equal to the VaR of a portfolio.
- Incremental VaR: The incremental risk of a sub-portfolio with respect to the portfolio is defined as the change in risk that would occur if the subportfolio were removed from the portfolio. Thus, incremental risk is the change in risk due to a discrete change in the portfolio content; whereas marginal risk is the sensitivity of the risk to small changes in the portfolio composition.
- **Contribution VaR** of a sub-portfolio is the value of the positions composing the sub-portfolio in question in the scenario corresponding to the selected percentile. This metric disregards diversification effects in computation.
- VaR Backtesting: To keep track of model risk, VaR models must be validated periodically. Thus, a backtesting framework is embedded in the solution. Balance Sheet Manager allows for both clean (hypothetical returns) and dirty (actual returns) backtesting.

#### Why choose Balance Sheet Manager?

Our solution provides the following benefits:

- Full integration of balance sheet management, empowering risk measurement across different departments
- Best of breed balance sheet management solution, enabling banks to take risk management beyond compliance and focus on performance
- Modular platform, allowing combinations of out of the box functionalities for:
  - ALM

- Stochastic ALM
- Liquidity Risk
- Market Risk
- Hedge Accounting
- IFRS 9 Impairment and Credit Adjusted ALM
- Funds Transfer Pricing
- Intuitive and user-friendly interface
- Multi-dimensional planning and reporting

### **About FIS**

FIS is a leading provider of technology solutions for merchants, banks and capital markets firms globally. Our employees are dedicated to advancing the way the world pays, banks and invests by applying our scale, deep expertise and data-driven insights. We help our clients use technology in innovative ways to solve business-critical challenges and deliver superior experiences for their customers. Headquartered in Jacksonville, Florida, FIS is a Fortune 500<sup>®</sup> company and is a member of Standard & Poor's 500<sup>®</sup> Index.

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