Balance Sheet Risk Management

Prometeia ERMAS

prometeia

We are a leading provider of consulting services and software solutions focused on Enterprise Risk & Performance Management

Founded in 1974 as an independent institute for economic research by a group of young university professors in Bologna, in 1981 Prometeia began offering analysis services to businesses and financial intermediaries. Since the '90s, the company's activities have focused increasingly on the integration of research, analysis, consultancy and software system development. This distinctive mix of services has made Prometeia a leading European company in risk and wealth management solutions, business consulting and advisory services for institutional investors. Prometeia collaborates closely with its clients to help them maximize their performance, whether they are banks, insurance companies, institutional investors, businesses, or public authorities.

Our combination of tech proposition, quantitative advisory, training and economic research makes our business model unparalleled in today's market

Prometeia's approach to Enterprise Risk Management is based on the development of quantitative models and analysis methodologies. The production of highly specialized software applications leverages leading technologies, the knowledge of our subject matter experts and our ability to successfully respond to the growing demands of regulation. Our deep understanding of international markets, derived from proprietary economic research, adds a unique element to Prometeia's business model and value proposition.

-> with over **800** industry experts

-> more than **40** years of economic expertise

-> we serve more than **200** financial institutions, including **50** primary banking groups in EMEA

-> in **20** countries

-> through a network of branches in **Europe**, **Russia**, **Turkey**, the **Middle East** and **Africa**

Our unique business model combines

(**RISK SOLUTIONS**) — (**RISK ADVISORY**) — (**FINANCIAL AND ECONOMIC RESEARCH**) — (**KNOWLEDGE TRAINING**)
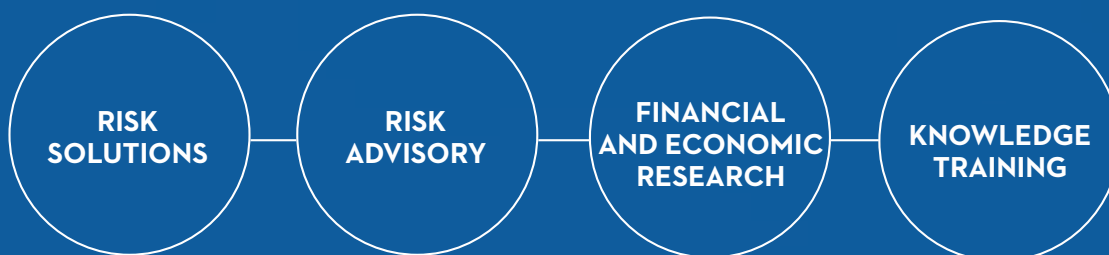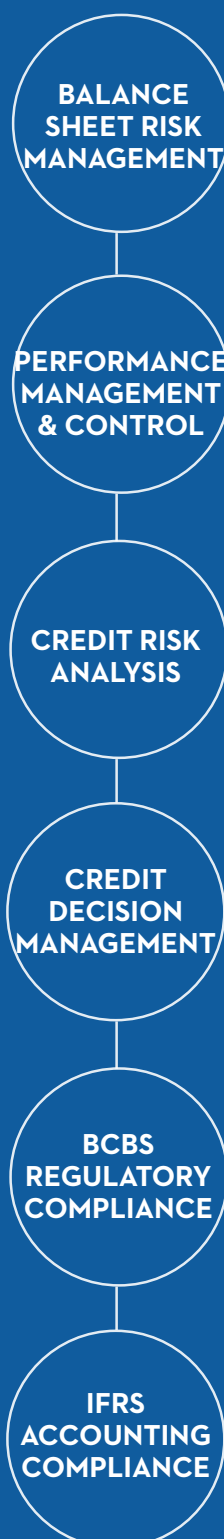
Our flagship Risk Management Suite

ERMAS Suite is our advanced and flexible solution designed to **support the active management of enterprise risks and maximize value generation**, while meeting the requirements set by national and international regulators.

ERMAS modular architecture allows the activation of each module independently to fill a specific gap of the bank's risk infrastructure, as well as the benefits of a single, integrated solution based on a common data warehouse and state-of-the-art technology.

- BALANCE SHEET RISK MANAGEMENT
- PERFORMANCE MANAGEMENT & CONTROL
- CREDIT RISK ANALYSIS
- CREDIT DECISION MANAGEMENT
- BCBS REGULATORY COMPLIANCE
- IFRS ACCOUNTING COMPLIANCE

RiskTech 100
2016 Category Winner
Liquidity Risk & ALM

Risk Technology Awards 2018 Winner | Prometeia Enterprise-wide stress-testing product

Chartis
RiskTech Quadrant®
Category Leader
Technology Solutions for Credit Risk 2.0, 2018

Chartis
FinTech Quadrant™
Category Leader
IFRS 9 Technology Solutions 2017

RiskTech 100
2015 Category Winner
Customer Satisfaction

Risk Technology Rankings 2016 | Winner Liquidity risk management

Chartis
FinTech Quadrant™
Category Leader
Data Integrity and Control in Financial Services 2018

Chartis
RiskTech Quadrant®
Category Leader Credit Risk Management for the Banking Book 2016

Balance Sheet Risk Management Modules

DATA MANAGEMENT

ASSET & LIABILITY MANAGEMENT

LIQUIDITY RISK MANAGEMENT

TRADED AND NON-TRADED MARKET RISK

FUND TRANSFER PRICING

PERFORMANCE MANAGEMENT

INTERACTIVE BALANCE SHEET SIMULATION

HEDGE ACCOUNTING

ERMAS Data Management, the foundation of ERMAS suite, provides banks with a highly flexible, comprehensive tool for effective data governance in full compliance with BCBS 239 principles

DATA
MANAGEMENT

ERMAS Data Management can be easily adapted to the IT infrastructure of each bank, through graphical user facilities, which allow full customization of its relational structure and ETL functionalities. It offers the bank powerful tools to define, load, verify, archive, and synchronize data, as well as to carry out quality checks and generate reports. The ERMAS proprietary data dictionary can be enhanced and expanded to meet any management information need, for a wide catalogue of financial products and instrument types. Explicitly designed for multi-user and multi-geographical connections, rigorous user authorization profiling and comprehensive auditing allow banks to manage data workflows with increased levels of complexity at no sacrifice to security. All data activity from simple importing to sophisticated syntax modelling is streamlined with our advanced ETL application.
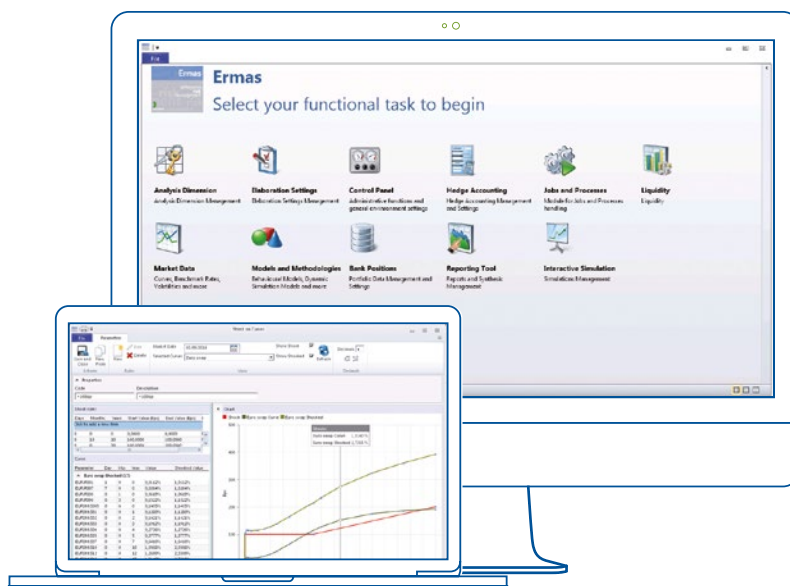
Batch functionalities and storage procedures for automating processing	**Full auditability, with clear visualization and monitoring of all job statuses and log files**
Powerful data processing and management tools, managed through GUIs	**Remediation and normalization features designed to support data integration and cleansing**
Native library of data quality checks, covering all phases of the data workflow	**Customizable procedures for data aggregation, explicitly designed to ensure traceability and drill-down analysis**
Reconciliation facilities of input information with external data and benchmarks, at both aggregated and granular level	**Customizable data entry forms for the manual loading of transactions, supported by default management tool and automatic editors**

ASSET & LIABILITY MANAGEMENT

By unifying funding, credit and interest rate risk into a methodologically consistent framework, ERMAS supports active Balance Sheet Management, in compliance with the latest regulatory standards

ERMAS enables your bank to respond quickly to the evolution of its business, investment strategies and organizational structure. Approached in this way, ALM becomes a key strategic process to steer the banking business and foster the financial performance of the bank. Together with an extensive coverage of financial products, ERMAS offers a wide range of modelling capabilities for demand deposits, prepayable loans, mortgage pipelines, revolving facilities and off balance sheet items. Using these facilities, banks can easily integrate their own behavioral assumptions into the system, or benefit from Prometeia's predefined econometric models. Key Risk Indicators are produced according to both earnings and economic value perspective, backed by comprehensive treatment of pricing rules, embedded optionalities and complex financial structures.

■ At sight
■ Fixed
■ Floating

LIABILITY   ASSET

Advanced cash-flow modelling techniques for the analysis of funding, credit and interest rate risks	Multidimensional views of the balance sheet structure, maturity and composition
Balance Sheet and P&L forecasting, explicitly designed to support strategic planning and portfolio optimization	Interactive simulation of future product and market scenarios, based on alternative business strategies and assumptions
Static and dynamic sensitivity analysis, coupled with parametric and stochastic scenario generation	What-if analysis of alternative hedging strategies and assessment of optimal funding mix
Full coverage of FX Risk through static and dynamic analysis	Flexible system setup supporting group consolidation and complex divisional structures, via Fund Transfer Pricing models

ERMAS enables banks to improve the performance of their Liquidity Management, taking a proactive approach to optimize liquidity costs under BCBS regulatory constraints

LIQUIDITY RISK MANAGEMENT

Leveraging a powerful cash flow engine, ERMAS quantifies the liquidity profile of the bank at present and future time periods. ERMAS provides a comprehensive representation of the bank's liquidity position, which includes Counterbalancing Capacity and Liquidity Buffer analysis in a dynamic vision and under alternative stressed assumptions. Prepayment models and rollover assumptions are fully integrated into the solution, allowing complete flexibility to the bank in defining the product behaviors and related assumptions. Operational liquidity works alongside regulatory liquidity analysis, in a consistent and unified data environment, offering the possibility to use the same hierarchical structure and stress conditions or to adapt the reporting view to complementary managerial needs.

Liquidity Stress Testing

Liquidity Coverage Ratio	
Stock of high-quality liquid assets	971.664
Net cash outflows	666.873
cash outflows	1.262.235
cash inflows	608.104

|	
Graphical user interfaces supporting the definition of liquidity assumptions, business and stress scenarios	**Multidimensional views of the funding structure, in terms of product mix, maturity and concentration**
Detailed monitoring of collaterals, liquid asset buffers, and contingent assets and liabilities	**Static and dynamic projection of funding mismatch and liquidity balances, with flexible time steps and calendar rules**
Projection of forward-looking LCR and NSFR, starting from a standard Basel III chart of accounts or a user-defined product catalogue	**Optimization tools to minimize the expected cost of funding for given levels of regulatory ratios and risk appetite**
Possibility to drill-down into each aggregated result to understand the underlying dynamics, up to single transaction level	**High flexibility in modelling existing products, customer behaviors, new business strategies and market scenarios**

TRADED AND NON-TRADED MARKET RISK

The ERMAS Market Risk Module is designed to cover both Trading and Banking Book portfolios, integrating the functionalities already available in the ALM and Liquidity Risk Modules

Three complementary sub-modules share a common input data structure and a fully distributed market risk engine: ERMAS VaR, ERMAS Stress Testing and ERMAS Back-testing. ERMAS VaR Module covers a wide range instrument types including structured products and exotic derivatives, exposed to the typical risk factors: interest and FX rates, equity and commodity indexes, and credit spreads. Compatible with a wide range of source systems and input formats, ERMAS Back-testing compares VaR measures with external P&L series or, alternatively, MTM data calculated internally. Along with VaR metrics, the Market Risk Module includes a powerful stress test engine with an embedded market scenario-generator. Stress tests can be performed according to hypothetical and historical scenarios.

NVDA Local Volatily Surface

Legend:
- 40-50%
- 30-40%
- 20-30%
- 10-20%
- 0-10%
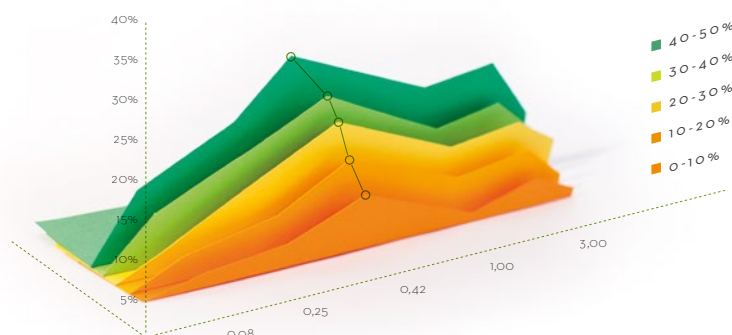
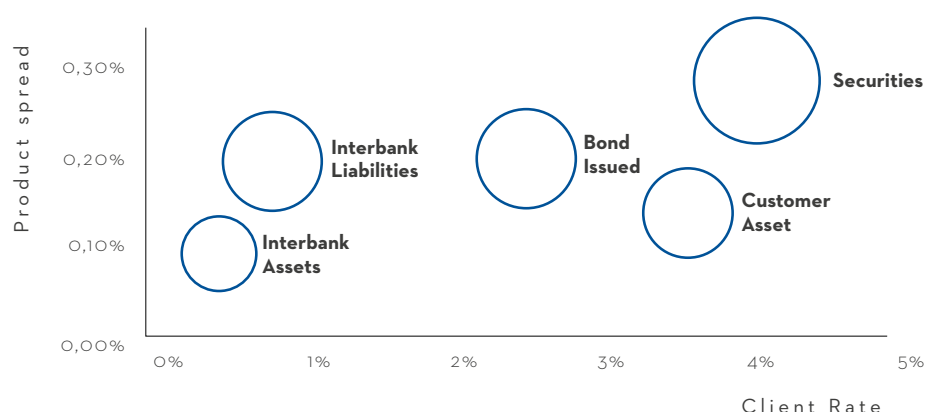|	
Extensive coverage of Trading Book products, via integration with external pricing libraries	**Full coverage of Banking Book products, including multi-phase pricing rules, administrative rates and irregular amortization structures**
Full integration with behavioral models configured and used for ALM analysis regarding prepayments, volume attrition and rate stickiness	**Assessment of the multiple period default probabilities for the calculation of counterparty risk**
Flexible system setup supporting multidimensional analysis, cross-sectional views, and historical projections of VaR and P&L data	**User-oriented data environment offering open database access, easy connection with external reporting tools and full Excel compatibility**
Flexible and multiple chart of accounts to guarantee complete support of data processing, analysis and results consolidation	**Predefined and customizable reporting structures for all regulatory and managerial analyses, with breakdown capability and alternative formatting options**

Fund Transfer Pricing plays a key role in steering multiple strategic processes of the bank such as performance measurement, risk allocation and external pricing

FUND TRANSFER PRICING

ERMAS FTP Module supports the allocation of financial costs and revenues to different risk taking centers, enabling each organizational unit to evaluate its profitability and take responsibility for its own risks. ERMAS FTP solution is designed to ensure full transparency and a consistent methodology across the banking organization. By transferring interest rate, liquidity and other risks to those who actively manage them, business units can focus on their final goal: maximizing risk-adjusted returns. The solution combines the rigorous application of financial rules and a deep granularity in data processing and output generation in a flexible end-user application.

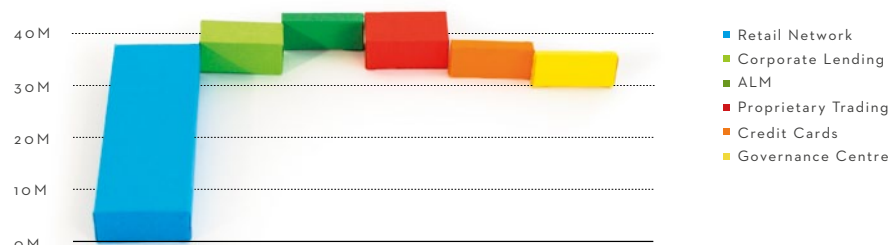| Calculation of internal transfer rates through user-defined pricing methods and yield curve models	Possibility to break down FTP results at any organizational and product level
Proprietary building block approach for evaluating separately each relevant interest rate and liquidity risk component	Complete set of tools to manage agreed and conventional FTP rates such as loans to employees, credit facilities, etc.
Full integration with the behavioral models defined and used for ALM analysis, regarding prepayments, volume attrition and rate stickiness	Unparalleled flexibility in customizing pricing libraries and equation builders both for interest and liquidity risk factors
Integration with other ERMAS analytical modules to support net interest income analysis with both a forward looking and a retrospective approach	Possibility to expand the functionalities of the module and support Credit Pricing, including cost credit and operational risks

PERFORMANCE MANAGEMENT

The Performance Management Module complements the FTP functionalities to provide a comprehensive picture of the bank's profitability and analyze the main drivers behind it

Profitability analysis is vital for improving the economic performance of the bank, not only because it allows to measure the results of specific funding and investment strategies, but also because it quantifies the contribution of each product and business unit to the overall P&L. Compared to more traditional systems, ERMAS Performance Management Module provides a comprehensive

and financially-consistent view of managerial profitability, based on a sophisticated combination of accrual and mark-to-market based metrics. ALM managers can rely on the ERMAS ALM solution to simulate the effects of alternative hedging strategies on the bank's Net Interest Income, and monitor the result of their action using the ALM Profitability Module.

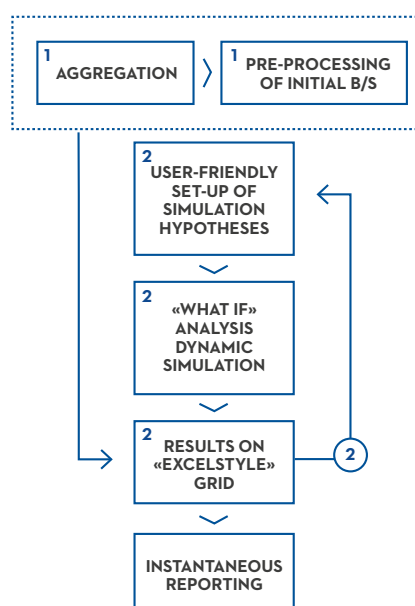**The contribution of business units to overall profitability**

- ■ Retail Network
- ■ Corporate Lending
- ■ ALM
- ■ Proprietary Trading
- ■ Credit Cards
- ■ Governance Centre

Possibility to replicate exactly the organizational structure of the bank	**Full integration with ERMAS FTP Module for the acquisition of internal transfer charges**
Capability to measure the P&L of each individual risk factor such as risk-free rates, liquidity spreads and other elements	**Full integration with behavioral models set for ALM analysis, regarding prepayments, volume attrition and rate stickiness**
Possibility to define the transfer rules for the various risk components	**Quantification of the net profitability for each commercial unit and the ALM pools**
Automatic calculation of the cost of funding and cost of hedging for unbalanced portfolios	**Multidimensional and multi-period view of Key Performance Indicators, both for accrual and MTM variables**

A holistic view of the business and market dynamics affecting the balance sheet evolution has become a strategic necessity, more than a pure regulatory requirement

INTERACTIVE BALANCE SHEET SIMULATION

Forecasting the evolution of balance sheet, P&L and capital requirements is a compelling need in any financial organization. In the current market scenario, a robust simulation approach must consider the intrinsic relationship between market, credit and liquidity risk factors, in order to identify potential "spiral" effects and evaluate the possible mitigation actions. The ERMAS Dynamic Simulation Module complements the silo-based analyses of individual risk drivers with an integrated and interactive forecasting tool, which facilitates the modelling of the interrelation between market scenarios, new business strategies, and credit risk parameters. Prometeia's solution is unique in ensuring a real-time, interactive generation of scenario-based simulations, built on an "in memory" processing technology.
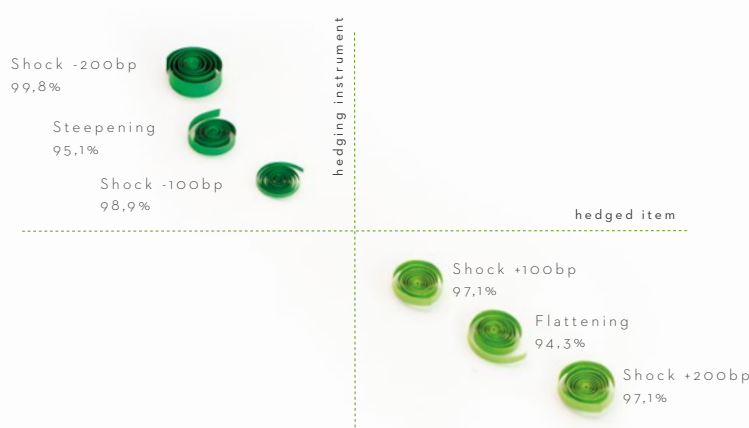
NII Simulation process

```
1 AGGREGATION  >  1 PRE-PROCESSING
                     OF INITIAL B/S

2 USER-FRIENDLY
  SET-UP OF
  SIMULATION
  HYPOTHESES

2 «WHAT IF»
  ANALYSIS
  DYNAMIC
  SIMULATION

2 RESULTS ON        2
  «EXCELSTYLE»
  GRID

  INSTANTANEOUS
  REPORTING
```

Market scenarios configuration based on user-defined libraries of setup parameters	**External input of simulation volumes and sector-based dynamics of credit risk parameters such as PD and LGD**
Product catalogue with customized trees enabling multiple waterfall logic to insert strategies on new volumes and spread	**User friendly tools to model volume and pricing assumptions, aligned with the commercial strategies of the bank**
New business trends defined with alternative techniques such as new volumes, target point / average amounts, growth percentages	**Accurate definition of the financial characteristics of new products, using replication algorithms based on the current balance sheet mix**
Credit and liquidity risk adjusted pricing tools, allowing the users to simulate different pricing strategies based on risk parameter evolution	**Automatic generation of optimal hedging portfolio, designed to stabilize or maximize a predefined risk indicator**

HEDGE ACCOUNTING

ERMAS Hedge Accounting Module is designed to cope with the overwhelming complexities of IFRS schemes, ensuring an easy implementation and full compliance with industry best practices

Retrospective test delta FV

Shock -200bp
99,8%

Steepening
95,1%

Shock -100bp
98,9%

hedging instrument

hedged item

Shock +100bp
97,1%

Flattening
94,3%

Shock +200bp
97,1%

ERMAS provides a fully adaptable, comprehensive and easy to use solution that meets all Hedge Accounting needs, from the selection of the eligible hedged items, through the definition of the optimal hedging strategies, to the final execution of the effectiveness tests. ERMAS Hedge Accounting offers advanced methodologies for pricing, behavioural modelling, fair value calculations and regulatory reporting. The solution covers all the dynamics of interest and exchange rate hedges in accordance with IAS39 and IFRS9 principles. Within this module, banks can manage hedging transactions related to either specific items or portfolios of assets and/or liabilities, leveraging functionalities designed for both micro and macro hedging. An "optimal fit" functionality enables the definition of the target hedging percentage in order to maximize the effectiveness of the hedging test.

Specific functionalities for the identification of homogeneous assets and liabilities	**Fully automated workflow management for hedging portfolios and data logging of changes in FV**
FV calculation of the hedged item and instrument based on a multi curves approach, including the valuation of embedded options	**Calculation of the hedging ratios with both a prospective and retrospective approach**
Recalibration of the hedging relations in order to take into consideration prepayments, defaults, derivatives unwinding	**Possibility to apply what-if and stress scenarios to test the hedge effectiveness under different assumptions**
Utilities for interactive reporting and production of customized output for external accounting systems	**Production of the hedging card and reporting for managerial and auditing purposes**

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