FINASTRA

Consistent, comprehensive real-time pricing and risk capabilities across all asset classes

When all departments see the same pricing and risk data, investment management firms can unlock powerful efficiency and competitive advantage.

"Regardless of where users sit within the organization, they can be sure everyone authorized is seeing exactly the same real-time numbers as they are."

With Fusion Invest, all departments within an investment management company can work together seamlessly, which transforms risk management. Investment managers have consistent, comprehensive, real-time pricing and risk capabilities across all asset classes.

Fusion Invest makes this possible by delivering market-leading analytics and risk figures, computed in near real-time, across the broadest range of asset classes in the marketplace. All calculations use the same underlying data with consistent yet customizable methodologies. So regardless of where you sit within the organization, you can be sure everyone authorized is seeing exactly the same real-time numbers as you are.

This ensures unprecedented efficiency, providing you with a wide range of competitive advantage and aligning management, sales/client service, decision-making, investment risk, performance and compliance departments:

Portfolio managers can see impact on risks and exposures before they validate investment decisions, with pre-trade simulation for all asset classes, including OTC derivatives.

Compliance departments can monitor company or regulatory risk-based limits (including sensitivities, stress tests, VaR / Tracking Error and Solvency ratios) both pre- and post-trade, with alerting functions.

Risk managers can understand exposures and get a clear view of front-office risk. Although risk management, as second line of defence, likely keep a dedicated risk management system - a shared system complements it and eliminates the need for endless debates with the front office.

Middle office staff can collaborate effectively with all departments and with a single system, data input and checking is only needed once.

Performance and reporting managers can produce and publish data and reports that are better understood by other departments who have the same level of access to detailed results.

C-suite and management have a clear overall view of current and past exposures with summary dashboards allowing drill down into investments.
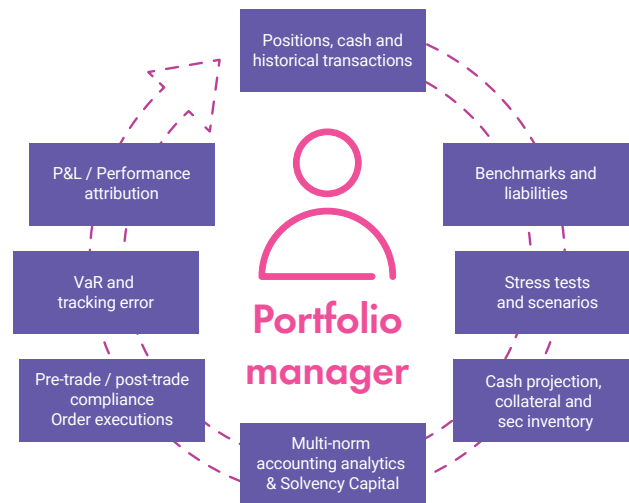
Sales, distribution and client service through the same modern, portable and actionable risk performance dashboards are able to see and illustrate how portfolios and strategies are performing in client-facing interactions.

Investment risk management in Fusion Invest is powered by two core capabilities:

1. **Market-standard quantitative models:** market-leading, customizable pricing models and analytics, consistent across all asset classes and geographies and built by our in-house quant teams.
2. **Extremely broad support for economic and specific risk measures:** sensitivities, risk ladders, stress tests, VaR/TE, FX exposures, liquidity risk, Market Solvency Capital Ratios and limits.

Fusion Invest offers more visibility and control for all investment management users, from the front to the back office and to the risk team.

Pre-trade visibility on all risk analytics helps users make informed investment decisions

Positions, cash and historical transactions

Benchmarks and liabilities

P&L / Performance attribution

Stress tests and scenarios

VaR and tracking error

Cash projection, collateral and sec inventory

Pre-trade / post-trade compliance Order executions

Multi-norm accounting analytics & Solvency Capital

Portfolio manager

Portfolio management front office-centric risk

Portfolio Managers get real-time visibility on portfolio risk and exposure at any level of the portfolio's hierarchy to which they have access. Extensive analytics coverage and full drill down enable them to anticipate any adverse market movements across the risk structure and make sure they are adequately hedged.

- Real-time analytics in the portfolio view for sensitivities, sensitivities by buckets, stress tests, VaR and Tracking Error, Solvency Capital Requirements
- Slice, dice and drill down: flexible and dynamic views by criteria including, but not limited to, instrument type, sector, country, rating, currency
- Intraday re-computation and re-aggregation whenever:
  - a new quote is received
  - a change in held quantity is executed
  - newly issued contracts are traded

Portfolio modelling and order raising based on risk analytics

Portfolio Managers can make informed investment decisions through Fusion Invest what-if and simulation tools with the ability to optimize portfolios under risk and regulatory constraints (for instance VaR or Market Solvency Capital Requirements). With pre-trade visibility of the impact of investment ideas before they are sent to market or validated with counterparties, front-office operations are more efficient. This improves control and limits the risk of breaching internal and regulatory limits.

- Rebalancing based on flexible analytics (i.e. exposures, durations) with absolute or relative risk exposure against benchmarks:
- Pre-trade compliance checks:
  - at the position and/or at any aggregation criteria level such as sector, rating, currency
  - based on any analytics available in the solution (pre-computed analytics, intraday re-computation and proxies)
- As for portfolio optimization, risk analytics APIs are available for financial institutions and the Finastra ecosystem of fintechs, partners, integrators, universities to build front-office apps

Visit **Finastra's developer portal** to learn more.

Synchronised risk control with the front office

Risk Managers and Compliance officers have an overview of the analytics driving investment decisions in the front office. This collaboration improves efficiency and limits time-consuming debates between departments and potentially costly regulatory breaches.

- Any portfolio views and dashboards that are available to the front office are available for the risk manager and compliance officers: real-time slice and dice, drill down and simulations
- Management, display and export of historical time series
- Production of reports for sensitivities and durations, stress tests, Value at Risk, expected shortfall, skew and kurtosis of the distribution
- Collateral management dashboards estimating exposures based on independent pricing
- Post-trade compliance checks on risk measures with flexible alert management
- Coping with ever-changing risk and regulatory requirements
- Out-of-the-box and flexible management of Solvency II and C-ROSS regulations based on regulatory stress tests and aggregations matrices
- Customized production of reports in various formats (including XML, XLS, PDF and CSV)

Cross-asset performance attribution and P&L explanation

Portfolio Managers, Risk managers and Performance & Reporting Officers share the same view of how performance/P&L was generated on investment portfolios and strategies. Fully integrated with the investment risk framework and based on shared data that drives investment decisions, Fusion Invest's flexible performance engine accommodates specific calculation methodologies and drills down to the lowest sub-period position and benchmark component results. This makes it possible to explain, potentially correct and report performance and P&L results without having to wait for end-of-period reports.

Performance attribution

- Management of the Brinson performance attribution methodology: Brinson-Fachler allocation/selection effects
- Time-weighted returns and money-weighted returns on portfolios and on benchmarks
- Multiple time periods (month-to-date, quarter-to-date, etc.)
- Look though on internally managed portfolios

- Management of "Fixed Income" or "context-based" performance attribution: explain absolute relative performance through a flexible decomposition of instrument effects based on risk factors (including but not limited to income, carry, shift and twist of rate curve, spread, inflation), trading effect (execution price, fees) and price difference effect (if different data sets are used for portfolio and benchmark)
- Available on any asset type supported by the pricing library

P&L explanation

- Intraday and real-time attribution of the P&L and risk exposures: intraday snapshot of market data, on-demand snapshot per user, intraday P&L effects
- Out-of-the-box market data, deals, instruments and preferences effects based on full revaluation methodology, including but not limited to spot effect, rate effect, volatility effect, new deal effect, time effect, mis-booking effect
- Customization of P&L effects: understand the P&L step by step, drill down and investigate, customize the P&L explanation with granular effects, measure P&L effects on a large number of portfolio indicators
- Available on any asset type supported by the pricing library

Investment committee dashboards
Management, sales and client services benefit from modern, portable and dynamic dashboards consolidating the analytics (current or historical) shared among all users. They leverage either Finastra or in-house business intelligence tools fed via Fusion Invest APIs. Dashboards complement paper reports and help align strategic management decisions with other departments, assist investment committee discussions or engagements with prospective clients.

- Enterprise consolidation of investment views: risk and performance measures
- Fast aggregation with slice and dice capability across big data sets
- Available in real-time via HTML web interface with standard and custom dashboards
- Accessible from any connected device such as PC, tablet or smartphone
- Risk and performance APIs are available for financial institutions and the Finastra ecosystem of fintechs, partners, integrators, universities to build dashboards.

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Real-time pricing and analytics for multi-asset investments
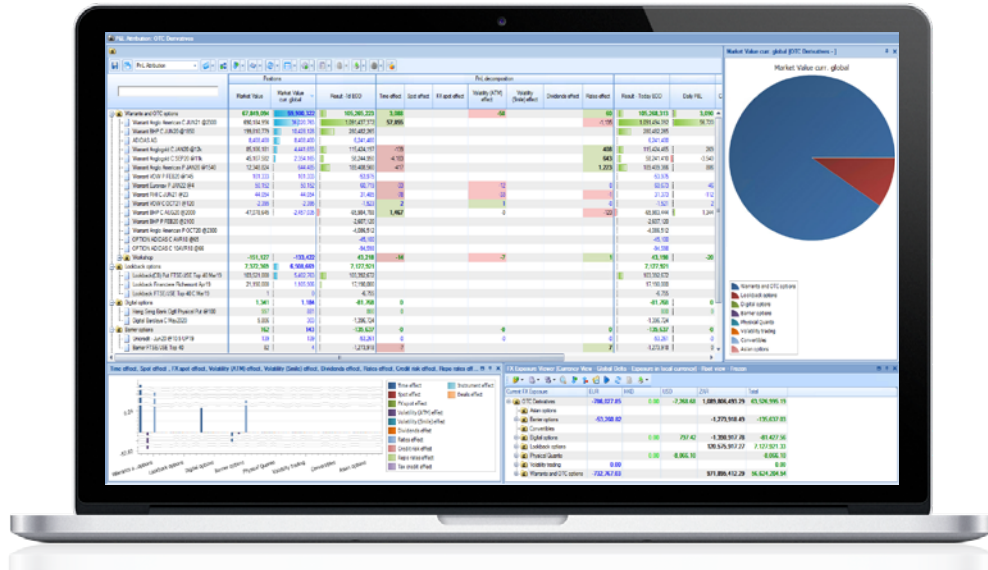
Established in the 1980s as a pricing tool for convertible bonds, Finastra's award-winning solution evolved to support derivatives desks at investment banks before expanding out into hedge funds and investment management. Today, we have 20 years' experience of supporting the complex price/risk computation requirements of buy-side institutions.

Vanilla and complex asset classes

- Fixed income, global equities, treasury, alternative investments, as well as benchmarks and hedging products
- Cash, listed and derivatives
- Broad coverage of fixed income products and markets from investment grade to high yield, developed to emerging markets with country specificities, and corporate to government bonds
- Flow exotics and structured products with multi-underlying and path-dependent payoffs

Pricing library with standard pricing and market data models

- Closed-form formula (Black Scholes, Fourier), lattices / PDE, numerical methods (Monte Carlo, multi-factor models)
- Multi-curve framework: yield curves calibrated from swaps, futures, bonds, FX outrights. OIS and cross-currency support
- Volatility models: parametric, local, stochastic
- Correlations, dividends, repo rates, CDS curves

Pricing outputs

- Theoretical prices, Greeks, cash flow projections, implied spread, yields, default probabilities, FX exposures
- Mark-to-market price valuation with coherent model-based risk analytics in accordance with the market price

Consistent production of analytics

- Detailed open quantitative documentation
- Fully open and customizable pricers via a user-friendly toolkit
- Standard configurations to accelerate value for clients
- Smart pricing model and curve assignments, as well as user-custom choices
- Computation and display of risk analytics based on multiple assumptions for valuation models, curve assignments and user-defined model parameters
- Full control on data integrity and intermediary pricing steps
- Real-time analytics with out-of-the box distribution and multi-threading

Through our experienced quant team, we continuously support and invest in product development to address constantly evolving market challenges for all types of assets, such as management of credit big bang and ISDA conventions, negative interest rate/OIS discounting and most recently the transition from LIBOR to new alternative reference rates. We provide solutions to all challenges that our clients may have when trading new products that reference the new rates and evaluating the P&L impacts of the transition.

Broad support of risk measures and scenarios

Inflation sensitivity dashboard
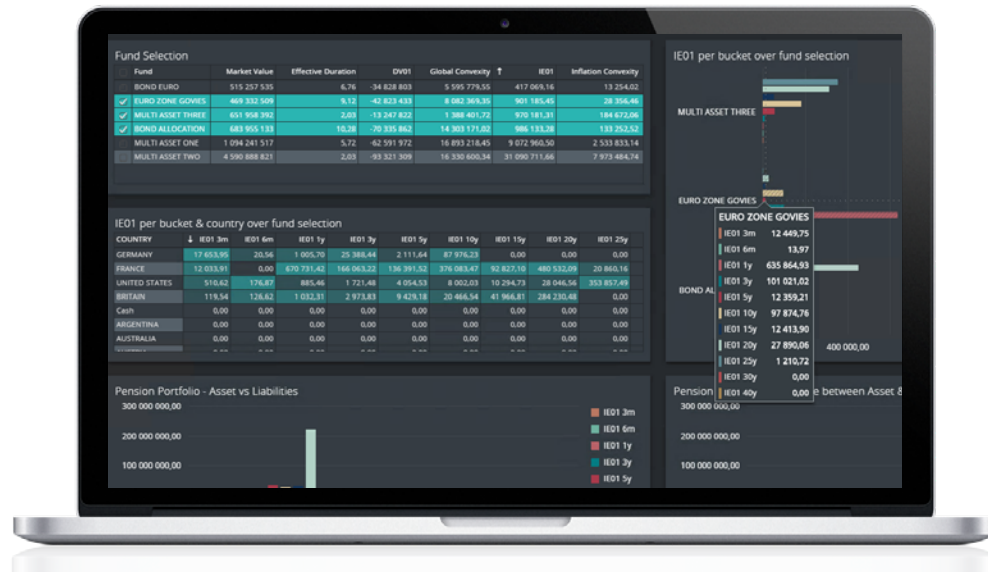
Fusion Invest comes with pre-packaged but flexible analytics which allows for the precise decomposition of risks and the production of multi-flavored analytics across all assets, strategies and portfolios.

Time management

- Theta computed on all listed and derivatives products, by shifting or rolling market data, with selection of the next calendar or business day
- Time effect and cost of carry, with ability to include or exclude dividends and coupons in the theta

Greeks

- First-and second-order sensitivities based on closed-formula or finite difference method, including but not limited to delta, gamma, vega
- Computation of the unitary and cash sensitivities
- Dedicated cross-asset underlying view with position grouped by risk source

Interest rates, inflation & credit

- DV01, IE01, CS01 and corresponding convexity, vega and durations by curves on the market and zero-coupon curves (rate curve, inflation curve, credit curve and volatility surfaces)
- DV01, IE01, CS01, vega with a user defined maturity grid, bump size and unit, bump shape
- Effective duration (interest rates, inflation and credit) at the position level and aggregated levels
- Yield to maturity and computation of the corresponding sensitivity
- Sensitivities for callable instruments (DV01, IE01, CS01, Effective Duration): option-adjusted, to 1st clause, to expiry
- Decomposition of the fixed income risk into interest rates risk, sector and issuer risk
- Interest rates and inflation par risk:
  - computation of the hedging nominal of par-instruments that need to be traded to hedge the risk
  - user-defined par-instruments and maturity grid for the hedging process

Foreign exchange

- FX risk for derivatives and book consolidation
- FX delta and gamma
- FX volatility risk:
  - FX volatility sensitivities: vega, vanna, volga
  - FX smile risk analysis on market points: ATM, risk reversal, butterfly
- Breakdown and aggregation of FX and volatility sensitivities by currency, by FX curve and by maturity buckets
- Monitoring of FX exposures with FX risk projected by currency in a dedicated portfolio widget

Equity

- Equity delta and gamma, equity vega, equity repo sensitivity, dividend sensitivity, correlation sensitivity
  - on the full curve
  - by time buckets and strike ladders
- Vanna, volga, dVegadTime, speed, zomma
- Split of index risk into component risk

Cross-asset stress tests

- Pre-packaged regulatory stress test and aggregation for European Solvency II and Chinese C-ROSS
- Stresses applied on interest rate curves, inflation curves, CDS curves and instrument spreads, foreign exchange rates, equity spots, dividend curves, volatility surfaces, repo margin curves, commodity curves, correlation curves
- Start-up kit stress tests based on historical crises (including Asian crisis, September 11th, subprime crisis, Gulf war, black Monday) as well as user-defined stresses
- Relative or absolute shocks applied on the zero-coupon curves or market curves
- Stresses on curves are configurable and defined point-by-point on maturity and strike dimensions
- User-defined flattener and steepener shocks on the curves
- Constraints application on the shocks including but not limited to currency, sector, country, rating
- Risk ladders combining multiple stressed dimensions: computation of risk matrices along several dimensions (spots, rates, volatility or credit risk) with the ability to select the initial starting point, number of steps and size of the steps
- Computation of the corresponding resulting indicators and variation of indicators such as market value, P&L, DV01, CS01, equity delta, vega, theta

On-the-fly what-if analysis

- Ad-hoc queries in the portfolio and simulation for new trades and market data
- Direct comparison with the current results on a large set of P&L and risks metrics
- Ability to define market data perimeters to be shocked

Factor models

- Ability to define beta (equity versus index) and aggregate the equity delta accordingly
- Import APT and Axioma factors model definition and display of the risk on the risk factors provided
- Ability to compute Parametric VaR variance / covariance and sensitivities according to APT and Axioma factor models

Liquidity risk

- Cash projections for listed securities and derivatives: certain cash flows as well as optional flows
- Adjustment of the Value at Risk based on the liquidity of the assets using a Jorion bid-ask spread adjustment or a liquidation days methodology
- Computation of the estimated liquidation number of days based on held quantities and daily market volumes

Value at risk and tracking error

Parametric

- Management of the equity, volatility, interest rate, inflation risk sources in the parametric VaR
- Import of the variance/covariance matrix from external sources or computation of the variance / covariance matrix
  - based on historical market data
  - calibrated with the EWMA or GARCH (1,1) models
- Computation on any user-defined criteria of:
  - VaR and the Expected Shortfall of the book and the benchmark
  - tracking error on the official benchmark or any selected benchmark
  - risk budgeting
- User definition of the holding period and confidence level

Historical

- Stresses applied on interest rates curves, inflation curves, CDS curves and instruments spreads, foreign exchange rates, equity spots, dividend curves, volatility surfaces, repo margin curves, commodity curves, correlation curves
  - ability to import the shocks or compute them based on historical market data
  - use of proxies to apply stresses when missing shocks data
  - filtering of the shocks based on risk factor classification

- Grid-distributed computation of:
  - VaR with user defined quantile, holding period, scenarios weights (equal / exponential), estimation method (interpolated, on a given scenario or estimated by a model: normal or Extreme Value Theory distribution)
  - computation of the back testing with hypothetical P&L or real P&L and check exceptions with the Wald, Kupiec and binomial methods
  - incremental and marginal VaR
  - VaR and Tracking Error at any level: book, position or any criteria

Monte Carlo

- Import of the variance/covariance matrix from external sources or computation of the variance / covariance matrix
  - based on historical market data
  - calibrated with the EWMA or GARCH (1,1) models
- Management of the equity spots, forex spots and interest rates curves
- Generation of the shocks based on the user-defined number of scenarios

For more information contact us at capitalmarkets@finastra.com
or visit finastra.com/fusion-invest

About Finastra

Finastra is building an open platform that accelerates collaboration and innovation in financial services, creating better experiences for people, businesses and communities. Supported by the broadest and deepest portfolio of financial services software, Finastra delivers this vitally important technology to financial institutions of all sizes across the globe, including 90 of the world's top100 banks. Our open architecture approach brings together a number of partners and innovators. Together we are leading the way in which applications are written, deployed and consumed in financial services to evolve with the changing needs of customers. Learn more at **finastra.com**

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