

Tools for Portfolio Optimization and Risk Analytics in Charles River IMS

In combination with Charles River's portfolio management, risk and attribution capabilities, Qontigo's portfolio construction tools, in addition to equity, fixed income and multi-asset factor risk models and analytics, enable firms to identify, measure and model risk across the front and middle office on one platform. The Axioma Portfolio Optimizer™ incorporates several patented innovations that allow clients to build and rebalance more robust portfolios across a broad range of strategies and timeframes.

Leveraging Charles River's single data model and portfolio manager workbench, Qontigo's analytics tools provide global investment managers, asset owners, insurers, wealth managers and hedge funds with fit-for-purpose analytics across assets, markets and geographies.

Qontigo's Analytics Tools in Charles River IMS

Axioma Equity Factor Risk Model Suite	<ul style="list-style-type: none"> • Fundamental, statistical and macroeconomic models updated daily • Multiple methodologies provide different ways to combine insights and drivers of risk • Multiple horizons (short and medium) to balance investment horizons and compare results with different forecasting assumptions • Models customized through the Axioma Risk Model Machine can be integrated into Charles River IMS • Transparent factors and robust statistics maintained by experienced researchers
Axioma Portfolio Optimizer™	<ul style="list-style-type: none"> • Flexible objective function and constraint library allowing users to tailor strategies to their own investment process • Choose any combination of Axioma Factor Risk Models and/or third-party and internal risk models for portfolio construction • Incorporate Charles River compliance rules as constraints, including security exclusions, restrictions and category limits
Axioma Fixed Income and Multi-Asset Risk Models	<ul style="list-style-type: none"> • Gain more granular and accurate views of entity-specific risk • Measure and monitor risk budgets • Validate risk assumptions for exposures across similar sectors/ratings • Deconstruct portfolio risk at any required level of granularity • Model corporate and non-corporate credit risk across portfolio

Charles River clients can access significant new capabilities and improved workflows across portfolio construction, risk monitoring and measurement and performance attribution. These include:



Monitor risk in fast changing markets with short and medium horizon models

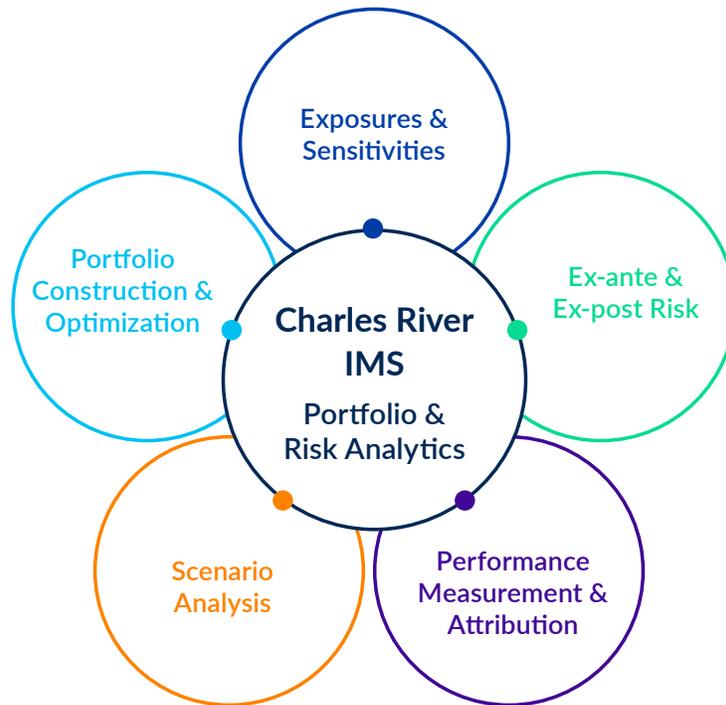


Utilizing Pure Factor Portfolios (PFP) to track factor performance, model portfolios for factor baskets, evaluate hedges and decompose intraday asset P & L



Analyze macro factors and stress test impact of macro events on portfolios

These capabilities support a broad range of investment strategies, products and tax objectives.



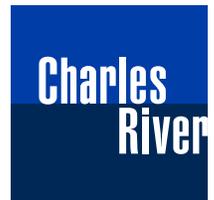
Investment Strategy	Benefit
Actively managed strategies	<ul style="list-style-type: none"> Control portfolio exposures using standard or custom factor exposures in order to deliver results aligned with strategy objectives Construct more efficient portfolios by allocating risk to the factors that portfolio managers believe will outperform, while mitigating undesirable risk exposures
Long/short portfolios	<ul style="list-style-type: none"> Manage unwanted exposure by constructing efficient overlays Isolate risk factors and implement appropriate strategies including factor hedging or pair trading
Index-tracking portfolios account replication & tax-efficient strategies	<ul style="list-style-type: none"> Evaluate and report forecasted tracking error simultaneously Leverage multiple risk models to help minimize tracking error Construct smart beta strategies that closely track benchmark exposures

Qontigo

Qontigo is a financial intelligence innovator and a leader in the modernization of investment management, from risk to return. The combination of the group's indices and analytics, with its technological expertise and customer-driven innovation, helps enable its clients to achieve competitive advantage in a rapidly changing marketplace. Qontigo's global client base includes some of the world's largest financial products issuers, capital owners and asset managers.

Created in 2019 through the combination of Axioma, DAX and STOXX, Qontigo is part of Deutsche Börse Group, headquartered in Eschborn with key locations in New York, Zug and London.

Learn more at www.qontigo.com.



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Investment firms, asset owners, wealth managers, hedge funds and insurers in more than 30 countries rely on Charles River's front and middle office investment management platform to manage more than US\$30 Trillion in assets. Together with State Street's middle and back office capabilities, Charles River's cloud-deployed software technology forms the foundation of State Street AlphaSM. The Charles River Investment Management Solution (Charles River IMS) is designed to automate and simplify the institutional investment process across asset classes, from portfolio management and risk analytics through trading and post-trade settlement, with integrated compliance and managed data throughout.

Charles River's growing partner ecosystem enables clients to seamlessly access external data and analytics, applications and liquidity venues that support the demands of their product and asset class mix. Headquartered in Burlington, Massachusetts, we serve clients globally with more than 1,000 employees in 11 regional offices. (Statistics as of February 2021) For more information, visit www.crd.com.

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