

Axioma Risk Model Machine™

CUSTOMIZABLE RISK MODELS TAILORED TO YOUR INVESTMENT PROCESS

Axioma Risk Model Machine™ is an innovative tool allowing clients to easily build custom risk models.

Custom risk models enable clients to achieve enhanced results as models can be tailored to specific investment processes. By aligning the factors in the risk model with the factors used in the returns model, unintended risk exposures are avoided. Managers are also better able to provide improved transparency into their investment process by showing where and how they add value to the mandate. And researchers can gain valuable

insights into the performance of the individual components of their particular investment process.

Custom risk models built with the Risk Model Machine (RMM) are used extensively by both fundamental and quantitative firms, from some of the industry's largest institutions to sophisticated boutiques. The Risk Model Machine is a flexible, powerful and easy-to-use tool that provides users with a competitive edge in risk forecasting, portfolio construction, client reporting and alpha research for a broad range of investment processes.



What is the Risk Model Machine?

RMM blends Axioma software, Axioma risk models and Axioma factor libraries into a unique and powerful tool that enables you to build customized risk models tailored to your investment process. RMM incorporates innovative methodologies and techniques used in Axioma's time-tested risk model production system. Axioma's research team has extensive experience developing innovative industry-leading methodologies for constructing risk models. RMM gives you the ability to combine our experience with your own proprietary expertise, all within a fully validated and proven approach to model construction. Customized risk models can be used directly with Axioma Portfolio software or with your own in-house analytical framework.

What are the benefits of custom risk models?

An off-the-shelf risk model is by definition a compromise. Off-the-shelf models must perform well across a broad range of portfolios resulting from diverse construction processes. In contrast, a custom risk model built with RMM and tailored specifically to your process will improve risk-adjusted performance, prevent unintended risk-taking, enhance your internal and external reporting, and refine your alpha research process.

Improve the accuracy of portfolio risk forecasts

Unlike custom risk models, off-the-shelf models do not "see" the risk resulting from exposures to alpha factors that are not part of the risk model. A standard model may also use an industry classification different from your own, and may estimate risk for a much broader universe than the one in which you are interested. Similarly, standard risk models may systematically underestimate risk for portfolios with exposures to missing factors, they may miss industry bets on your industries, and they may fail to focus on risk behavior specific to your investable universe.

Construct more efficient portfolios

A custom risk model allows you to allocate risk to factors you believe will outperform and avoid taking risk where you do not have a view, to incorporate your own industry classification to fully align your construction and alpha-building processes, and to focus your risk budgeting process on the universe of assets you care about.

Communicate your investment approach more effectively

A custom risk model allows managers and asset owners to better understand what is driving portfolio returns. Risk and performance analyses created using a custom risk model identify all the "bets"—exposures in the portfolio—a manager is taking, and calculate returns for all those exposures.

Gain insight into the performance of your alpha signals

With a custom risk model, you can validate alpha factor performance using regression-based returns incorporating all the risk factors—and then view the historical patterns of these "pure" factor returns and understand their long-term and short-term risk-adjusted return profile.



Risk Model Machine's features include onscreen analytics for testing your custom risk models.

Why use RMM to build custom models?

Avoid wasting time and resources cleaning data

Use Axioma's high quality risk models and factor library content as the starting point for creating your own risk models.

Road test and refine your risk models before you deploy

In addition to high quality content and advanced model-building algorithms, RMM provides comprehensive diagnostic reports and interactive analytics views to assess the quality of your custom risk model.

Benefit from state-of-the-art processes

Leverage the proven algorithms created by Axioma's research team to build the Axioma risk models.

Let it flow

With a custom risk model, you can validate alpha factor performance using regression-based returns incorporating all the risk factors—and use custom risk models in both production and research workflows. Easily access custom risk models from all of Axioma's portfolio management software modules.

What aspects of the Axioma Risk Models are customizable?

Axioma's flexible tools to help portfolio managers quickly and accurately implement their investment strategies

Estimation Universe

- Limit the estimation universe to a single sector or a subset of the sectors.
- Limit the estimation universe with a market cap cutoff to create a small cap model, for example.
- Limit the estimation universe to any set of assets you choose: for example, a benchmark, or your investable universe.

Coverage Universe

Limit the coverage universe to any set of assets you choose, such as a benchmark or your investable universe.

Industries

Use Axioma's GICS-based industry classification or provide your own.

Style Factors

Select any combination of "style" factors when customizing a fundamental model. These may include traditional style metrics as well as macroeconomic factors. Use factors from the Axioma Risk Models, factors from an Axioma-provided factor library, factors from a third-party provider, or proprietary factors you provide.

Model Responsiveness

Control the model responsiveness by setting the model half-lives for factor correlations, factor volatilities and specific risks.

Stitched Custom Models

Custom risk models can now be "stitched" together over time, which allows the number of style factors, industries or countries in the model to be increased or reduced. For example, you can include or exclude style factors to reflect different market regimes, add or remove emerging market countries and change industry classification schemes.

The table below summarizes the customization options.

FUNDAMENTAL RISK MODELS

Style factors	Add your own style factors. Remove Axioma style factors.
Industry classification	Replace the Axioma industry classification with your own.
Estimation universe	Limit by sector membership. Limit by market cap cutoff. Limit to any set of assets.
Half-life parameters	Control the model responsiveness.

STATISTICAL RISK MODELS

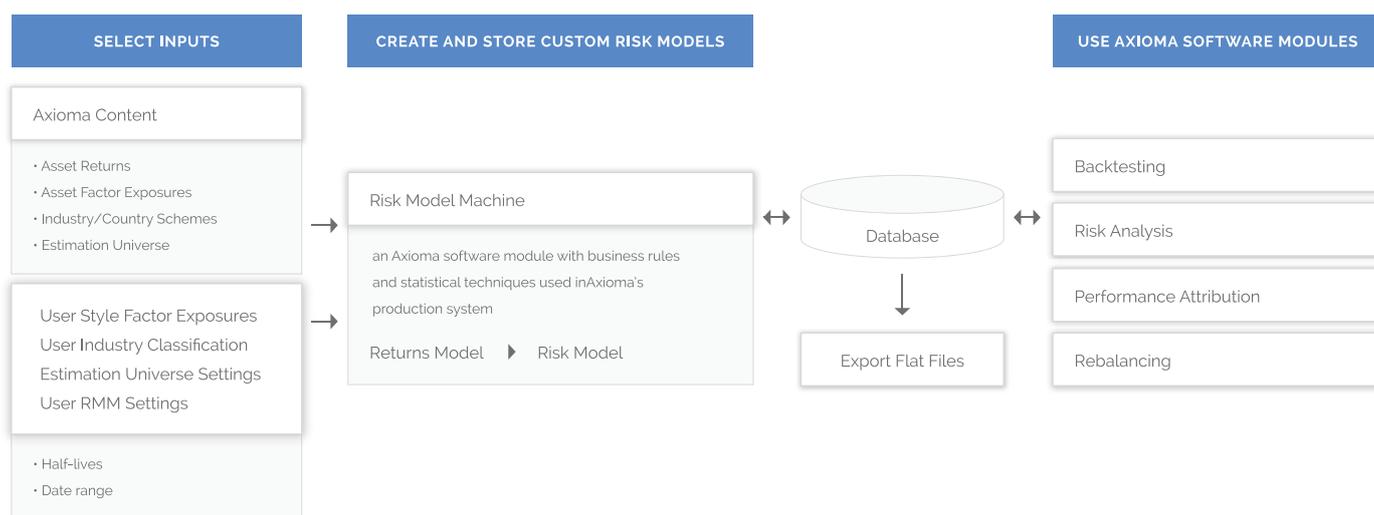
Style factors	Specify the number of systematic factors to estimate.
Industry classification	Limit to any set of assets.
Estimation universe	Control the model responsiveness.

How does RMM work?

The locally deployed RMM software builds new risk models from the ground up by combining Axioma risk model content with user data. Users select an Axioma risk model to customize—leveraging Axioma’s expertise in creating, managing and delivering content—before selecting parameters to customize with RMM.

For fundamental models, RMM runs daily cross-sectional returns regressions over a specified time period to estimate factor returns, then builds a custom risk model each day using these new factor returns, new specific risk estimates, and the pre-specified asset factor exposures.

For statistical models, RMM uses Asymptotic Principal Components factor analysis to estimate asset factor exposures and factor returns. Users select the number of systematic factors.



Custom risk models enable you to build better portfolios and to gauge more accurately the performance and risks of your investment approach. Period. Axioma Risk Model Machine gives you the power to build risk models tailored for your firm by combining Axioma's research and our exhaustively tested model engine with the unique insights of your organization.

How can I access the Axioma Risk Model Machine?

The Risk Model Machine is deployed on users' PCs. Users have full control over the environment that runs RMM and do not need to send sensitive data off-site when using it.

Where can I use custom risk models built with RMM?

Custom risk models generated with the Risk Model Machine are fully compatible with Axioma Portfolio Optimizer™, Axioma Portfolio Backtester™, and Axioma Portfolio Analytics™. The models can also be exported to a common file format for use with third-party software.

Can I automate production of custom risk models built with RMM?

After identifying a custom risk model that meets your objectives, you can use a "catch up" capability to easily update it with the latest inputs. These model updates can be scheduled for a more streamlined workflow.

What analytics are available for testing my custom risk model?

With a custom risk model, you can validate alpha factor performance using regression-based returns incorporating all the risk factors—and then view the historical patterns of these "pure" factor returns and understand their long-term

and short-term risk-adjusted return profile.

- Measure the explanatory power of your model through time series views of its adjusted R2.
- Assess the significance of individual factors by viewing their T-statistics.
- Detect co-linearity between factors using the Variance Inflation Factor.
- Compare your model's risk predictions with realized risk levels for both factors and portfolios.
- View time series plots of factor returns and factor volatilities.
- Compare your model with Axioma's standard models.

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Axioma Risk™ is a breakthrough tool that allows clients to build custom risk models easily.

Custom risk models enable clients to achieve enhanced results because the models are tailored to the client's own investment process. By aligning the factors in the risk model with the factors used in the return model, unintended risk exposures are avoided. Managers are able better able to provide improved transparency into their investment process by showing where and how they add value to the portfolio. And researchers can gain valuable insights

into the performance of the individual components of their particular investment process.

Custom risk models built with the Risk Model Machine (RMM) are used extensively by both fundamental and quantitative firms, from some of the industry's largest institutions to sophisticated hedgefunds. The Risk Model Machine is a flexible, powerful and easy-to-use tool that provides users with a competitive edge in risk forecasting, portfolio construction, client reporting and alpha research for a broad range of investment processes.

Axioma
Flexible is better.®

Axioma Risk Model Machine™

IS PART OF A COMPLETE SUITE OF AXIOMA PORTFOLIO CONSTRUCTION TOOLS THAT ALSO INCLUDES:

- Axioma Portfolio Optimizer™
- Axioma Portfolio Analytics™
- Axioma Backtester™
- Axioma Risk Models™
- Axioma Risk Model Machine™

Contact us to learn more about how Axioma Risk™ can bring more information and insights to your investment process.

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