RisKontroller Global Products & Services

[sovereign wealth funds, central banks, reinsurance, pension and hedge funds, banking, etc.].

Worldwide Operations **info@RisKontroller.com**

Overview

RisKontroller Global focuses on bringing to market the technologies necessary to control risks and to preserve and enhance wealth in our complex and volatile financial and economic environment.

These complex situations may require complex innovative products. We designed our technology to integrate these innovations rapidly and efficiently without putting a burden on your resources. We provide the tools necessary to interpret and build intuition from the results of these technologies.

You can utilize these innovations immediately by taking advantage of our online delivery service for asset class alerts, warnings, risk hazards, portfolio warnings, buy/sell/hold analysis, and ALM reports. We develop customized tools and models for analysis and undertake customized analysis, portfolio construction, and trustee guides to asset allocation. We provide a Risk Alert Dashboard with regular feeds of warnings. We develop small tools or install our strategic risk management system, RisKontroller, as a complement to your existing risk management system.

RisKontroller Global, with its origins in the World Bank, has a history of supporting sovereign institutions. We developed risk management technology incorporating macroeconomic indicators like trade, debt, GDP, debt ratios, currencies, etc. We did this long ago before it become necessary and fashionable following the financial crisis.

RisKontroller Global has a long history of developing models and tools for reinsurance firms. We have considerable experience handling extremes.

RisKontroller Global reduces model risk with its validation process and generate of stable trees and scenarios. We bring new models to market in days. Good and up-to-date models are necessary to maintain market leadership, preserve assets, and produce good peer comparisons.

Our portfolio assessment models are dynamic and stochastic with future rebalancing incorporating changes in regimes. They integrate history, theory, views, implied prices, behaviors, and more. They constrain the downside without limiting the upside. They preserve wealth and generate alpha. They hedge against bubbles and exploit rebounds.

RisKontroller Global is working jointly with the Financial Crisis Observatory at ETH Zurich integrating their bubble technology into our strategic risk management technology, RisKontroller.

We provide training and workshops on advanced technologies and their applications and include simple tools and models that you can use immediately. We also produce webcasts.

We work with other firms in partnership on projects to produce the best solutions for you. Our goal is the control of strategic risks. No project is too small or too big for us to achieve this objective.

The RisKontroller Global Advantage

- Generating alpha – preserving wealth
- Hi-speed model development
- Hi-speed implementation to production
- Model updates at light speed
- We develop – you validate
- Open models and systems
- Complexity made simple for you
- We deliver warnings and alerts
- We deliver portfolio analysis
- Tailored models and tools
- We make it easy – we do the hard work

Summary List of Products and Services

We designed our products and services to make it easy on your resources. We deliver packaged risk alerts and analysis of asset classes to make it easy for you to absorb the results of our technology. We customize special tools or models for you or you can use the full RisKontroller System for strategic risk management.

Services

We make it easy for you to utilize advanced technology through our many services.

1. Risk Early Warnings [Delivered reports and tools of early warnings of risks]
2. Portfolio Early Warnings [Delivered early warnings of portfolio risks]
3. Bespoke Scenarios [Scenarios/trees customized and delivered]
4. Bespoke Tools [Customized tools and models developed for you]
5. Custom Analysis [Customized analysis for you]
6. Developmental Programs [Workshops, training, and technology transfer]
7. Partnership Programs [Working together with other firms to deliver best products]

Products

8. Risk Warnings Dashboard [Analysis of delivered warnings and alerts]
9. RisKontroller Scenario/Tree Generator and Analyzer [Analysis of scenarios and trees]
10. RisKontroller Components [Data analysis, process estimation, scenario/tree generation, model building and optimization, solutions analysis, testing, and comparisons]
11. RisKontroller [Full customized system for strategic risk management]

Our products and services are not a replacement for but a complement to your existing risk management system. We provide exceptional value added in the analysis of future perspectives.

Details of Products and Services

Services

1. Risk Early Warnings (global and local) News, analysis, and views

   We send out on a regular basis and as alerts necessitate a comprehensive package of warnings. This package consists of two components: (1) news and analysis, (2) data sets for analysis in our Risk Warnings Dashboard. The alerts come from a variety of sources that we take and analyze for their impact on asset and liability classes. These include:

   - We work with the Financial Crisis Observatory at ETH Zurich.
   - Ziemba's bond stock earning yield differential model.
   - Jarrow's volatility estimation using the arbitrage-free martingale pricing technology.
   - Analysis of the outputs of the Volatility Institute at NYU Stern.
   - Analysis of stock Market Confidence Indices from Yale School of Management.
   - Identifying macroeconomic patterns in the run-up to asset price busts as from IMF.

2. Portfolio Early Warnings
   We prepare an analysis and warnings of some generalized portfolios of asset and liability classes. We prepare the analysis for a customized portfolio of asset and liability classes that you specify. See the table at the end of this document for examples of typical analysis.

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3. <u>Bespoke Scenarios</u>
   We generate scenarios for you of customized asset/liability classes along with economic indicators all interdependent and varying over short and long time periods. These scenarios incorporate information from history, theories, views, implied prices, behaviors, and more. We generate scenarios or trees from these that you can use in your own tools for analysis. We provide a tool (see product 9) for the generation and analysis of these scenarios and trees.

4. <u>Bespoke Tools</u>
   We prepare customized tools and models for individual tasks or analysis. The models can be anything from simple mean-variance to complex dynamic stochastic optimization models. We prepare a graphical user interface for use and analysis and for building intuition. We work with MATLAB tools and the General Algebraic Modeling Language for optimization models. We integrate database systems and apply various programming languages as needed.

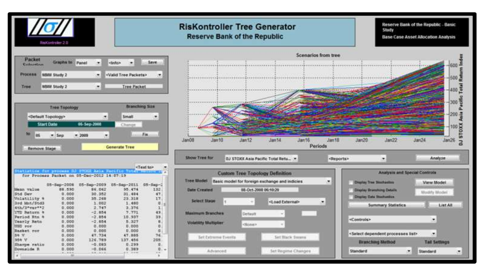
5. <u>Custom Analysis</u>
   We undertake analysis tailored to your specific needs. That can be anything from a buy/hold/sell analysis for an existing portfolio to a Trustee's guide to asset allocation.

6. <u>Developmental Programs</u>
   We provide workshops on the latest developments in risk management technology. Special emphasis is on optimization technologies of all kinds.

7. <u>Partnership Programs</u>
   We work with other firms and businesses to bring your needs to actualization rapidly and efficiently with accuracy and completeness.

<u>Products</u>

8. <u>Risk Warnings Dashboard</u>
   The Risk Warnings Dashboard uses data sets from the Risk Early Warnings for analysis in the dashboard. These data sets are delivered via the internet as crash hazards are identified, when changes in regimes and theories occur, and periodically.

9. <u>RisKontroller Scenario/Tree Generator and Analyzer</u>
   

   The RisKontroller Scenario/Tree Generator and Analyzer is a combination of three components from RisKontroller plus some additional features. The three components are the data analyzer, the stochastic process estimator, and the tree/scenario generator. This product takes the scenario and trees that that we deliver regularly via the internet. It also imports scenarios from external systems, analyzes, and compares them. It can also adjust trees to fit specified sets of imported scenarios or continuous distributions. You can also use it to generate new scenario sets or trees for analysis in an external system.

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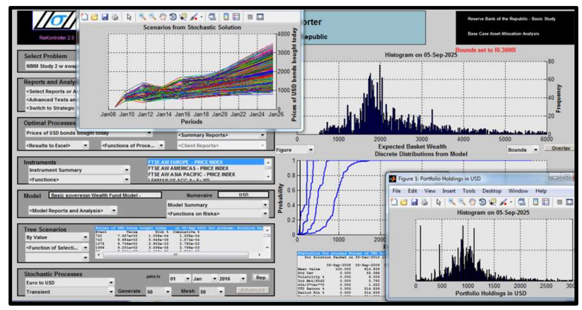
10. <u>RisKontroller Components</u>

You can acquire the components of the strategic risk management system as a whole or in parts. The individual parts consist of:

- Data analysis, risk warnings, and regime identification
- Stochastic process estimation and analysis
- Tree/scenario integration and generation
- Model building/modification and solution
- Analysis of optimal solutions, intuition, and insight
- Backtesting, comparators, and sensitivity analysis
- Future density functions shaping

11. <u>RisKontroller</u>



You will not find the RisKontroller analysis of future perspectives in commercial risk management systems. RisKontroller works with other risk management systems for the innovative analysis of future threats and opportunities. RisKontroller handles the “unusual uncertainty” of current times using stochastics and dynamics. RisKontroller generates trees because these are necessary for future rebalancing and the only way to handle longer-term strategic risk management. RisKontroller can generate trees directly or import scenarios from other systems to generate trees. RisKontroller works best when using trees but its models can also use scenarios. RisKontroller can export scenarios to other systems for analysis.

RisKontroller can answer ad hoc challenging issues and questions formulated by senior management regarding future opportunities and threats in words that they understand. RisKontroller uses broad asset classes, liabilities, derivatives, and general stochastic cash flows. It interfaces with existing risk management databases. It integrates into the stochastic process estimation macroeconomic information such as debt, CDSs, GDP, trade, fiscal deficit, imports/exports, IMF indicators of stability, etc. This gives it the ability to answer tough issues that existing risk management systems cannot. RisKontroller corrects the failures[1] of risk management systems identified in the recent financial crisis.

Some special features include:

- The Portfolio Protector Paradigm controls downside risks and does not constraint upside returns. It can handle very general risk constraints on the tails of the distributions and multiple risk constraints on the same distribution. You can define many risk constraints over time and in a very general form understandable by a senior executive.

[1] Kreuser, Jérôme (2012) “Correcting the Financial Crisis Failures of Asset–Liability Management (ALM) Risk Management”, in Bob Swarup (ed). *Asset Liability Management for Financial Institutions: Balancing Financial Stability with Strategic Objectives. London, UK:* Bloomsbury Information Ltd, May.

- The absolute return strategy does not mark to a benchmark but creates one. It can also optimize perturbations from an existing benchmark.
- The regime predictor strategy creates an uncertainty structure with changing regimes like momentum changing to mean-reversion. This is the optimal way to handle crashes and stresses because portfolios are rebalanced between regime changes.
- The optimal solution analysis contains a long list of actionable information much of which can only be obtained by considering both stochastics and dynamics.

Contents of a Typical Report as part of Portfolio Early Warnings or RisKontroller

We provide this analysis (and more) whether you choose the RisKontroller system or our service of delivering Portfolio Early Warnings or Custom Analysis.

Typical Analysis of Future Perspectives	
Analysis	**Description**
Analysis related to dynamics	
Predictions of portfolio changes and rebalancing	We identify the future portfolio rebalancing distributions and relate them to scenario movements.
Mean-reversion analysis	We quantify the impact of mean-reversion on the portfolio.
Excess returns on fundamentals	We identify the distribution of returns above fundamental prices, attribute them to scenarios, and quantify them over time
Analysis of transaction costs	We analyze the transactions costs on asset classes in the future events and identify them with problem scenarios.
Analysis of sales	We analyze the full or partial sales of assets in future events, identify their distribution, and attribute them to scenarios.
Dynamic correlations	We graphically show how correlations change over time and provide some analysis.
Short-term versus long-term process analysis	The stochastic processes blend from the short-term to the long-term. This is an excellent way to handle risk management for the long-term.
Mean and expectation returns	The stochastic processes change over time. We analyze how the mean values and expectations vary over time with graphics and implications.
Sample paths and trees	We generate sample paths (scenarios) and compare them against the tree generation with graphics and analysis.
Dynamic slicing analysis	We slice the distribution or density into intervals and present with graphics and analysis the impact on the resulting scenarios.
Analysis related to stochastics	
Attribution to regime changes	We present through graphics and analysis the factors (prices, etc.) affecting regime changes.
Relative value of scenarios	We examine the scenarios and determine and order those that have the greatest impact on the portfolio and for which the portfolio is most sensitive to changes.
Distribution of trades	We examine the distributions and densities of trades; Buys, sells, holds We do this at each future rebalancing time.
Diversification analysis	We examine through graphics and analysis the level of diversification at each time.
Analysis related to tail-risk constraints	
Impact of tail controls	We examine here through graphics and analysis the impact on the portfolio caused by controls or risk limits on the tail of the distributions.
Cost of control	We examine here the cost of the tail risk controls.
Risk budgets	The cost of control leads us naturally to risk budgets. We calculate appropriate risk budgets based on multiple tail risk controls.
Marginal adjustments	We examine here the marginal adjustment to risk controls.
Risk measures analysis	We compare and contrast our tail risk measures with several other risk measures on the optimal portfolio.
Asset class analysis	

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Relative buy, sell, hold on current portfolio	We examine here the relative buy, sell, and hold options in the current portfolio today. We rank the asset classes, provide sensitivity on pricing, and some graphical analysis.
Risk adjusted returns of asset classes	We examine the risk-adjusted returns of asset classes in today's portfolio.
Equity risk premiums	We examine the equity risk premiums today and in the future on the asset classes and include graphics and analysis.
Excess to fundamental value	We examine the excess price to fundamental value today and the future. This is another useful indictor to the ERP and we compare such.
Fair price analysis	We examine the "fair" price to the institution and the sensitivity to make the price "fair". The fair price is that price that would motivate the institution to buy or sell the asset class given its policies, risk constraints, and objectives. Not the market price.
Risk to new asset classes	We examine the risks or benefits to new asset classes such as from emerging markets bonds or equities.
Distribution of asset classes	We provide graphics and analysis on the distribution of asset classes over time on expectations, on subsets of scenarios, and on the tails.
Analysis of contrarian stance or a wait-and-see approach	The model is able to take a contrarian stance or a wait-and-see approach. We analyze that situation through graphics and analysis.
Marginal price of holdings	We examine the marginal price of holdings.
General solution analysis	
Stability: at risk and its cost	We examine how sensitive the portfolio solution is with respect to perturbations in the scenario tree. We seek a structure that is relatively stable and we modify the tree to achieve that. This is also called model risk; more stable = less model risk.
Passive/aggressive analysis	The model will find some portfolio allocations that tend to be stable over time and some that are more aggressively traded. We examine that situation graphically and analytically.
Sensitivity factors	We examine how the solution is sensitive to other (than the tree) factors.
Attribution analysis	We illustrate graphically and analytically the attribution of returns and risks to several different factors.
Balance sheets	We analyze the balance sheets over time and stochastically. We provide expected balance sheets and balance sheets on important subsets of scenarios and extremes.
Cash flows	We do a cash flow analysis over time and stochastically illustrate important factors.
Cost of liquidity and liquidity at risk	We examine graphically and analytically the cost of liquidity and distributions on liquidity at risk.
Comparison analysis	We compare the portfolio to others such as a 60:40 and a 70:40 stock:bond portfolio.
Efficacy of views	We examine the different views taken in several ways both graphically and analytically.

Email, call, fax, write or contact us for any queries or additional information.

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