

# RiskMetrics Risk Reporting for Individual Investor Portfolios

With increased volatility in the markets over the past few years and the higher frequency of out-sized events (3+ Sigma), investors of all types are much more interested in understanding the risks inherent in their portfolios. This includes retail investors from the mass affluent to the ultra high net worth, from the self-directed to those in advisory or discretionary relationships.

## *Understanding risk is the first step to managing risk*

RiskMetrics sophisticated institutional-quality risk analyses allow investors to better understand and manage risks in portfolios. RiskMetrics tools and analytics are already the standard for many financial institutions like banks and hedge funds. Since 2000 RiskMetrics has lead the way in providing robust, institutional-quality risk analysis to the retail market place - whether it be directly to the end client or through intermediaries at some of the world's largest wealth management firms.

This paper will help to clarify the offerings and services available to institutions to analyze the risk of individual investor portfolios. First, we will describe how RiskMetrics risk analysis offerings can be used to satisfy several business use cases. Second, we will provide details on the type of market data, instrument modeling and statistics available in our service to underpin the robustness of RiskMetrics methodology. And, finally, we will provide an overview of the various ways in which RiskMetrics risk analytics can be delivered/utilized by an organization.

## Use Case 1: Investor Reporting

### How RiskMetrics can help investors to better understand risk in their portfolio

Using RiskMetrics *Investor Reporting* service, institutions can provide their clients with the ability to analyze the risk of their portfolios, including which positions, asset classes, and sectors are contributing the most risk to their portfolio. Using statistics like Diversification Benefit, investors can understand how well or poorly diversified their portfolio is.

### Portfolio risk statistics: Insights into the volatility of returns of your portfolio

Figure 1 below shows a typical risk report for an individual investor's portfolio. The report is grouped by asset class and depicts some of the risk statistics that are useful to an individual investor. In this example, we highlight the Amazon position and the *Risk Impact* column to show how a relatively small position (in terms of market value) can contribute significantly to the overall risk of the portfolio therefore constituting a true concentrated position.

Risk reporting statistics include, but are not limited to:

- Standard Deviation
- RiskGrades
- Value-at-Risk (VaR)
- Expected Shortfall
- Risk Impact (marginal contribution)
- Diversification Benefit

**Figure 1. Risk Analysis Report**

Description	Percent	Market Value (USD)	Std Dev	Risk Impact	VaR (VAR)	VaR (%) (VAR)	XLoss	XGain
<input checked="" type="checkbox"/> Equity	34.1%	684,340.00	23.3	54.8	12,858.28	1.9%	14,872.83	19,857.29
<input checked="" type="checkbox"/> US Large Cap Equity	18.3%	367,640.00	37.2	39.5	7,523.20	2.0%	10,379.36	15,936.15
Amazon.com, Inc.	6.5%	130,000.00	48.4	19.1	3,336.32	2.6%	5,033.03	11,091.99
Google Inc.	Even though Amazon represents only 6.5% of the market weight of the portfolio, it accounts for over 19% of the overall portfolio risk			26.1	5,701.42	2.4%	6,794.11	7,248.75
<input checked="" type="checkbox"/> US Mid Cap Equity				6.4	1,384.53	3.1%	2,541.77	2,142.55
Teekay Tankers Ltd				6.4	1,384.53	3.1%	2,541.77	2,142.55
<input checked="" type="checkbox"/> US Small Cap Equity	13.6%	272,250.00	19.6	11.8	5,738.61	2.1%	7,779.34	8,510.46
Haemonetics Corporation	13.6%	272,250.00	19.6	11.8	5,738.61	2.1%	7,779.34	8,510.46
<input checked="" type="checkbox"/> Fixed Income	55.9%	1,121,860.72	7.4	-1.9	8,415.90	0.8%	11,254.19	9,557.96
<input checked="" type="checkbox"/> US Gov't (Interm)	28.3%	567,962.04	9.3	1.4	5,367.74	0.9%	6,466.91	6,042.56
GOLDMAN SACHS GROUP	28.3%	567,962.04	9.3	1.4	5,367.74	0.9%	6,466.91	6,042.56
<input checked="" type="checkbox"/> US Corps	27.6%	553,898.68	6.8	0.4	3,049.51	0.6%	5,259.34	4,099.22
WACHOVIA BANK NA 4.8 1	27.6%	553,898.68	6.8	0.4	3,049.51	0.6%	5,259.34	4,099.22
<input checked="" type="checkbox"/> Alternative Investments	10.0%	200,000.00	17.9	13.4	484.56	0.2%	1,001.73	1,324.08
<input checked="" type="checkbox"/> Commodities	10.0%	200,000.00	17.9	13.4	484.56	0.2%	1,001.73	1,324.08
Commodities	10.0%	200,000.00	17.9	13.4	484.56	0.2%	1,001.73	1,324.08
<b>TOTAL</b>	<b>100.0%</b>	<b>2,006,200.72</b>	<b>9.4</b>	<b>-</b>	<b>10,114.88</b>	<b>0.5%</b>	<b>11,868.29</b>	<b>20,972.41</b>
Diversification Benefit	8.6 = 46.2%							

## Stress Testing: What are the potential losses a portfolio might experience due to “event risk”?

Over time, the use of stress testing has become a standard practice for institutional investors as they try to understand the impacts of out-sized market movements on their portfolios.

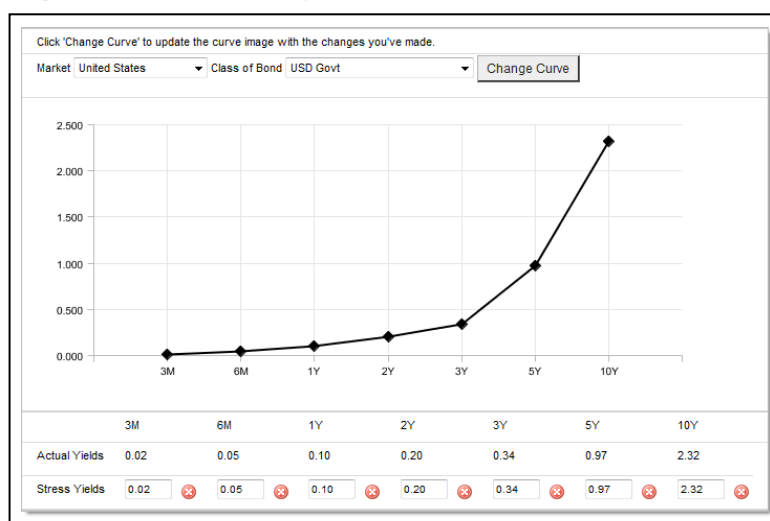
RiskMetrics Investor Reporting services provide individual investors with these same techniques, allowing them to gauge the sensitivity of their portfolio to various market events and specific risk factors, such as a rise in interest rates or changes in commodity prices.

Institutions and advisors can use various RiskMetrics pre-configured Predictive Stress Tests or create their own scenario. The below screenshot depicts one of the risk factor types (yield curves) available for investors to stress when creating a user-defined stress test.

**Figure 2. Illustration of a yield curve shift**

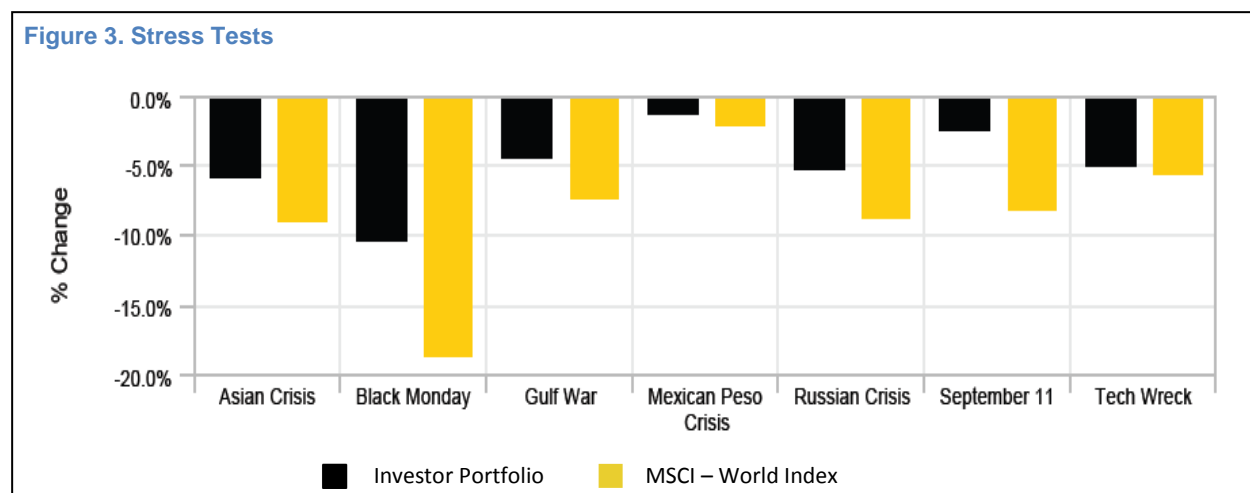
Stress factors may include:

- Indices
- Currencies
- Commodities
- Yield curves/nodes
- Individual instruments



The analysis below shows the impact of various stress scenarios on a client portfolio as compared to a benchmark/model portfolio. This type of analysis can be useful in determining how sensitive an investor portfolio might be based on various stress events and for judging how comfortable an investor might be with potential losses in his/her portfolio.

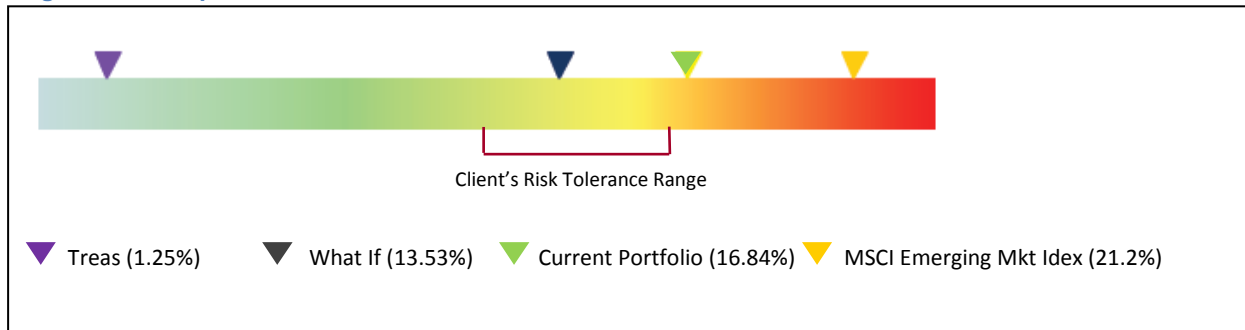
**Figure 3. Stress Tests**



### *Pre-Trade analysis:*

Measuring the impact of potential transactions on a portfolio is an important way for individual investors to maintain control over their investments. What-If capabilities allow investors to perform pre-trade analysis, giving them the ability to assess the impact of potential transactions on the portfolio's risk. Investors can easily modify portfolio weights, add/remove positions, test the effectiveness of hedging strategies, and view the impact of the potential investment decisions side-by-side with the original portfolio.

**Figure 4. Risk Spectrum**



## Use Case 2: Business Intelligence

*How RiskMetrics tools and services help firms to better understand the risk of their client portfolios*

With the worst market collapse in 100 years behind us, many firms are looking back and asking whether anything could have been done to predict and/or protect client portfolios from such huge losses. Also, perhaps more importantly, they are asking what can be done to prevent such losses in the future.

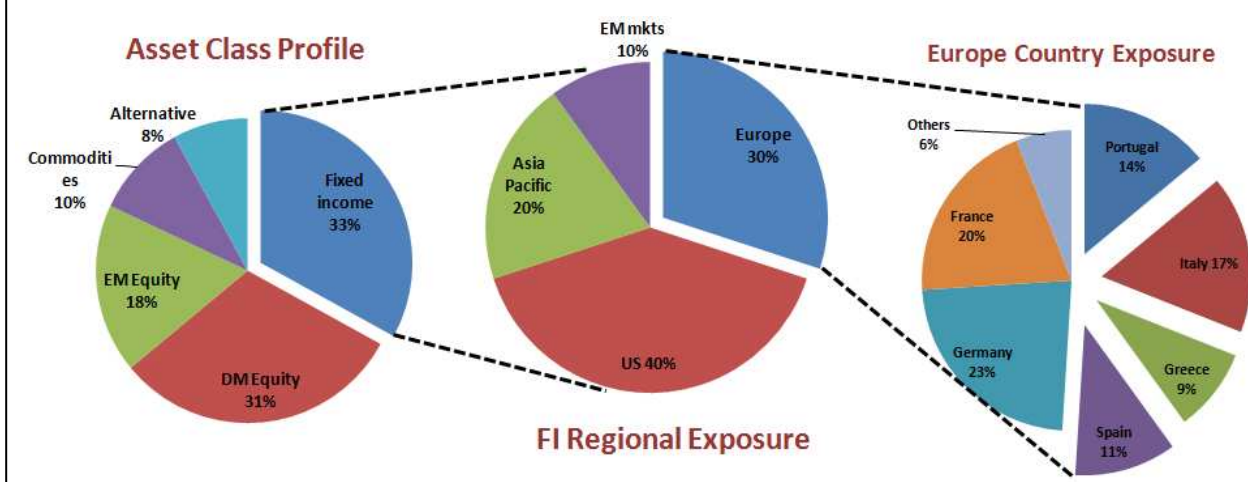
A good understanding of the risk inherent in your clients' portfolios is essential to successful risk management. The goal of this process is not to eliminate losses in client portfolios. Rather, it is intended to allow a greater understanding of the possible losses a portfolio could incur, and to facilitate important dialogue between client and firm about whether those losses are in line with the client's risk tolerance and expectations.

### Profile and Understand Your Asset Base

What is the asset allocation across the entire institution or across specific groups? How are assets invested across product types, sectors, credit quality, etc? For many institutions, it is a non-trivial exercise to answer some of these basic questions about their book of business.

RiskMetrics reporting services provides a tool for an institution to consolidate positions from across their client base and generate these types of simple allocation reports. These reports can be generated at all levels of an institution's hierarchical organizational structure (FA, Office, Region, Firm, etc) and for any security-level attribute an institution wishes to provide (Asset Class, Equity Sector, Equity Style, Currency, FI Maturity, etc)

**Figure 5. Exposure Analysis**



While these analyses are rather simplistic, they are very powerful from a management standpoint. These reports help one to better understand trends within the institution. Are certain products being sold more in one region than another? Is there an over-concentration in a particular sector that might leave clients with significant losses if the bet turns out to be incorrect?

## Distribution of risk across the book

In addition to these simple exposure statistics, our analytics engine, RiskMetrics RiskServer, can create dozens of risk statistics to provide institutions with an in-depth view of client risk. For smaller institutions, generating and viewing results at the client or account level may be reasonable. However, for large institutions with millions of client or accounts this level of analysis is simply not practical.

For large institutions, RiskMetrics can provide aggregated reports that take individual portfolio level risk statistics and display them as distributions at various levels of the institution's hierarchy. As an example, let us assume an institution wants to understand the expected shortfall across their entire book of portfolios. First, RiskMetrics reporting service will allow the institution to produce the expected shortfall (CVaR) value for each portfolio. However, unlike a traditional asset manager scenario where you would consider the entire book one giant portfolio, in this case we do not want one client's positions to offset another. So, instead of calculating a single book-level expected shortfall value, RiskMetrics reporting service will allow the institution to produce a distribution of portfolio level expected shortfalls. Looking at the expected shortfall at the 50<sup>th</sup> percentile gives the institution a better indication of types of losses associated with their average client. Looking at the tails of the distribution (5<sup>th</sup> and 95<sup>th</sup> or 1<sup>st</sup> and 99<sup>th</sup> percentiles) will give the institution a look at those clients that may represent the highest and lowest loss potentials.

**Figure 6. Profiling Risk**

	Standard Deviation Distribution					Expected Shortfall Distribution				
	Percentile					Percentile				
	10%	30%	50%	70%	90%	10%	30%	50%	70%	90%
<b>Global Book</b>	2.10	5.00	7.20	9.30	12.50	1.70	4.20	6.40	8.40	11.60
<b>Americas Book</b>	1.80	4.00	6.10	8.90	10.70	1.40	3.90	6.30	8.10	11.20
<b>Europe Book</b>	2.60	5.30	7.80	10.10	13.40	2.10	4.30	6.90	8.90	12.00
<b>Asia Pacific Book</b>	2.10	4.90	6.80	9.50	11.70	1.90	4.40	5.90	7.80	11.90

This information allows the institution to better understand their client risk profiles, and offers the possibility to be more proactive in risk mitigation strategies to certain clients. In addition, keeping track of trends over time gives an indication of where their client portfolio risks may be heading. Historical Trends up/down may be as a result of market movements or product/asset allocation campaigns.

## Stress Testing

Stress testing is another powerful dimension of *business intelligence*. The use of RiskMetrics stress testing across an institution's book of business provides yet another view of the risks associated with client portfolios. For example, an institution might want to understand the possible losses across their book if an event like Black Monday were to occur again today. Further, institutions may want to see that impact by risk tolerance or age bracket or region.

The use of stress testing does not always have to involve showing the impact of 5+ sigma events. Stress testing can be used to explore vulnerabilities and sensitivities across client portfolios as well. How vulnerable are your client portfolios to changes in yields, commodity prices, etc?

Institutions can also use RiskMetrics stress testing as a tool to evaluate whether client portfolios are aligned with their forward-looking market views. Most institutions publish economic and market forecasts on a semi-regular basis. These forecasts – expectations of yield, commodity, equity movements, etc. – can be turned into predictive stress test scenarios. Running these stress tests across a client base will help an institution better understand how well or poorly their clients are aligned with their own views.

Take for example an arbitrary view including the following assumptions:

- Global commodity prices will rise in next 12 months
  - Metals such as gold will see increases of 20 – 30%
  - Agricultural commodities such as corn and wheat will increase by 25%
  - Oil will increase by 50%
- Global equity prices will underperform long-term norms
  - US equities 1 – 2% increase
  - European equities down 5 – 10%
  - Emerging market down 10 – 15%
- US short-term yields to increase by 200 bps
- Euro Sovereign debt spreads to widen

By turning these predictions of near-term market conditions into a predictive stress test or a series of predictive stress tests, institution would be able to better understand which clients are best positioned to take advantage of this future state and which clients are not. Institution could proactively reach out to these clients and take corrective action to bring the portfolio more in line with the institution's view. In addition, the institution may have specific products suited to correct this very scenario.

## Use Case 3: Client Suitability

### *How RiskMetrics tools and services help institutions monitor client risk suitability*

The word *suitability* means lots of things to lots of different people.

This can mean everything from:

- Making sure the current disclosures and documentation for a product have been provided to a client before a purchase, or
- Making sure the tenor of the investment meets the client's time horizon (i.e. don't sell a product with a 30 year tenor to an 85 year-old retired person on a fixed income), or
- Ensuring all conflicts of interests are disclosed.

Most of these are regulation based.

There are other practices that fall under the general term of suitability that institutions satisfy with rules-of-thumb. A portfolio must stay within the client's stated investment objective – usually measured by a deviation from an institution model allocation. Or, no position can comprise more than 15% of the client's portfolio to avoid the creation of a concentrated position.

However, over the years we have observed that, while institutions have many regulations and rules-of-thumb to follow, they do not have any way to statistically measure the risk suitability of a client's portfolio. This is where the tools and services of RiskMetrics can be very useful for an institution.

We have previously discussed the ability of RiskMetrics tools and services to generate statistics that allows an institution to quantitatively analyze the risk in client portfolios. Taking this one step further, using limits or thresholds for some of these statistics can provide an institution with a foundation for a quantitative process for monitoring *risk suitability*.

Here are some ways in which the statistics generated by RiskMetrics tools and services can help an institution produce a more effective suitability process.

- Measure the risk of the client's portfolio vs. the stated risk:

Let's assume that an institution, ACME, has a client, Joe. And, Joe has been measured to be a *moderate investor*. The risk bucket *moderate* means something qualitatively – an investor looking for stable growth with a tilt towards income oriented investments – as an example. But, it must also mean something quantitatively as well.

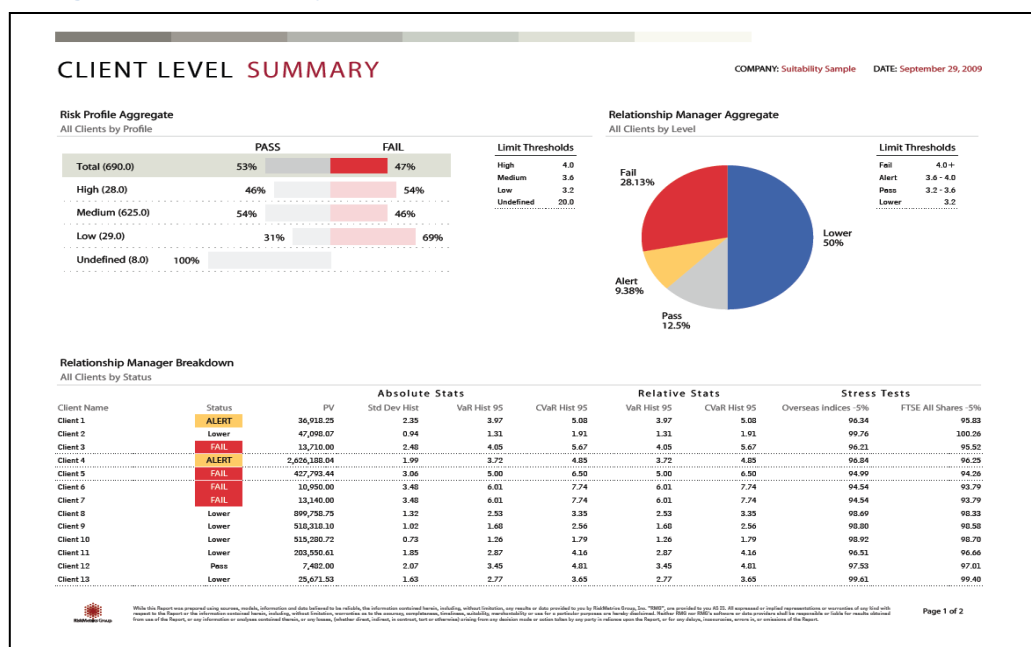
RiskMetrics tools and services can assist an institution in defining the quantitative definition of various risk buckets. In many cases, it is as simple as using the corresponding model portfolios for each risk budget to help define the quantitative risk budget for each risk profile.

In this case, let's assume that we are using standard deviation as the risk measure although, we could use one or more of several dozen statistics to determine the risk budgets. Let's also assume that for risk profile *moderate*, the risk budget is a standard deviation of between 5-8%.

We can now compare the risk of Joe's portfolio vs. the risk budget of between 5-8% standard deviation. RiskMetrics reporting service can produce traffic-light reports (red, yellow and green) alerting institutions as to which client portfolios are not in line with their risk budget.



Figure 7. Risk Suitability Report Sample



- Concentrated Positions:

Most institutions use a rule-of-thumb when it comes to analyzing portfolios for concentrated positions. The rule-of-thumb usually states that a position is concentrated and warrants closer scrutiny when the market value of a position exceeds 10% of the overall portfolio market value (sometimes it is 8%, sometimes 15%).

However, simply using market weight to identify concentration is not always sufficient and may lead one to ignore positions contributing more to the portfolio risk. Institutions can use RiskMetrics tools and services to create statistics that will help firms identify concentrated risk positions – those that contribute the most risk to the portfolio regardless of whether they are only a small percentage of the overall market weight.

Using a statistic like risk impact, a statistic that quantifies the marginal contribution to risk of an individual position, institutions can begin to identify client portfolios containing positions with large risk impact scores. Portfolios with large risk impact scores can be more volatile and may warrant further inspection. And, this type of analysis can lead institutions to discuss possible hedging strategies with clients.

While statistics like the above can be very useful in creating a statistically-based suitability process after the fact (on a T+n basis), they can also be used to incorporate further vigor in the point-of-sale process. In a point-of-sale use case, an advisor can better assess the risk appropriateness of an investment decision prior making any purchases or sales therefore avoiding the possibility of a suitability breach down the road.

## Data and Statistics

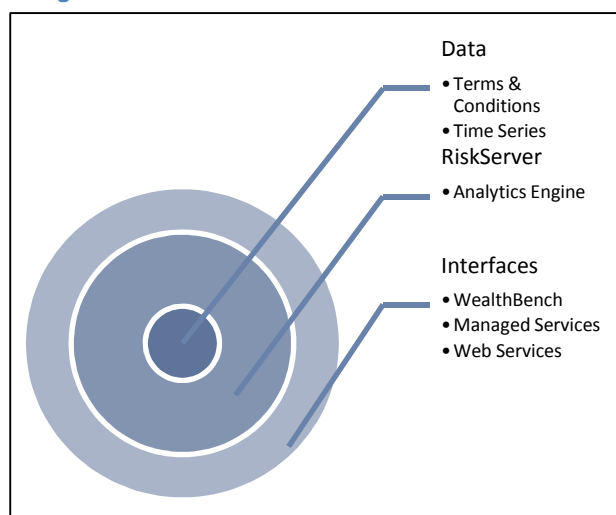
Reliable, consistent, and accurate data is a key ingredient to the risk management process. RiskMetrics data forms the core of all of our analytics.

### Self-Contained Market Data from DataMetrics™

RiskMetrics Risk Server is seamlessly integrated with the market data warehouse DataMetrics, which dramatically reduces the implementation timeframe. This market data warehouse has historical data for more than 85 markets dating back more than 10 years in the following asset classes:

- F/X Rates (e.g. currency spot rates) – All major currencies
- Yield Curves (e.g. EUR 1-month, 3-month, and 1-year swap rates)
- Credit curves (issuer specific and by rating/ industry, CDS Spread curves)
- Equity Prices & Index levels (e.g. NTT, CAC 40, Intel, and IBM stock prices)
- Implied Volatility surfaces (Fx, Equity & IR)
- Commodity (Physical commodities) Futures (e.g. Interest Rate Futures)

Figure 8



These time series are updated daily. Institutions can also provide their own time series data for all risk factors including, but not limited to, equity prices, proprietary product prices, term structures, FX rates, commodities etc. The risk engine would then use client provided risk factor levels during computation of all analytics.

### Data Transmission and Position Modeling

Institutions have two main options when it comes to integrating client portfolio data into RiskMetrics tools and services. Institutions may choose to send client portfolios via Secure FTP to be processed in batch mode or may choose to send client portfolios on-demand via a web service interface. The decision on how to send client portfolios will depend wholly on the ultimate deliverable desired. An institution wishing to implement a tool like WealthBench can choose either method of delivering client portfolios. An institution wishing for a larger risk reporting service will opt for a batch process requiring portfolios to be delivered via Secure FTP.

Institutions can choose to send the positions as fully modelled using the wide-variety of instrument models mentioned below. Alternatively, Institutions can leverage the RiskMetrics Terms & Conditions Enrichment service which provides terms and conditions and modelling parameter information for listed instruments. Subscribers to our Terms & Conditions service need only supply identifiers, such as CUSIP or ISIN and we will enrich the instrument with our terms and conditions, and map it to the appropriate

market risk factors for risk analysis. Holdings can be grouped through an unlimited amount of free-format user-defined tags which enables very powerful “slicing and dicing” of results.

The RiskMetrics risk engine supports a wide variety of instruments types ranging from simple equities to complex structured products. Below is a sample list of supported instrument types:

ADR,	Equity Spot / Future / Swap	Year-on-Year Inflation Swap,
Bond (Amortizing, Callable, Puttable, Sinking, Vanilla),	Equity Option (Average Rate, Double Barrier, Single Barrier),	Securitized Product (Generic MBS, US MBS, US CMO),
Bond Future / Option,	BMA Muni Swap,	Inflation Linked Swap,
Cap, Floor, Collar	Commodity Basis Swap,	Interest Rate Future,
Cash, Cash flow Stream,	Commodity Option (Average Rate, Barrier, Spread)	Option on Futures (Bond, Equity, Interest Rate, Commodity),
Commodity Spot / Future / Swap	Forward Rate Agreement,	Money Market,
Hedge Fund,	Floating Rate Agreement,	Mutual Fund,
Correlation Swap,	FX Forward,	Overnight Indexed Swap,
Credit Default Swap,	FX Options (Average Rate, Barrier, Digital),	Swaption,
CDS Index / CDS Option	Mortgage Backed Security,	Variance Swap,
Convertible Bond,	Inflation Indexed Bond,	Range Accrual Note,
Convertible Bond Option,	Interest Rate / Inflation Swap,	UK Index-Linked Gilt
Double Strike Caps & Floors,	Break Even Inflation Swap,	
Multi-Asset Option,		

There are also two models to assist clients with modelling securities not directly covered by one of the above instrument types – the Generalized Sensitivity Instrument and Drop-In Scenario Instrument. The Generalized Sensitivity Instrument allows clients to enter first and second order sensitivities to market factors, while the Drop-In Scenario Instrument allows clients to enter sample prices of an asset in a range of market scenarios.

### *Industry Standard Methodologies*

RiskMetrics offerings are the standard in financial risk management. Since its publication in 1994, the RiskMetrics open-source methodology has been proven and time-tested in an ever-changing financial market. More than ten years later, this continually evolving methodology remains widely accepted by risk practitioners and regulators as the language of risk.

The RiskMetrics methodology is based on representing each security in terms of the risk factors that drive it. The factors cover all asset classes and all types of market risk, and include equity prices, commodity prices and curves, exchange rates, interest rate curves, and credit spread curves, together with implied volatility surfaces for multiple asset types. For example, for a 10-year treasury bond, the risk factors are points on the corresponding treasury curve up to 10 years out. For an equity option, the risk factors are the equity price, the discount curve, and, if specified, the implied volatility.

## Reporting Statistics

The risk engine, RiskMetrics RiskServer, has a vast library of risk statistics to choose from. Below table provides a snapshot of risk statistics used by wealth firms and asset managers globally.

Notional exposure	Extreme Gain	Beta to benchmark
Standard Deviation	Diversification Benefit	Downside potential
Marginal Standard Deviation	Tracking error to benchmark	Duration
Value at Risk	Sharpe Ratio	Yield to Maturity
Marginal Value at Risk	Capture ratio	Yield to call
Risk Grade	Upside potential	Time to maturity
Expected Shortfall	Alpha to benchmark	Predicted Stressed PV

Apart from absolute risk statistics, clients can also use marginal statistics which depict contribution by each position to the overall portfolio risk stats.

The computation of risk statistics can be parameterized to your firms' specification. For example, the risk engine supports the following three methodologies which are industry standards:

- **Parametric:** The "Classic RiskMetrics" delta method which assumes lognormal price distributions. Volatilities and correlations are calculated directly from time series data over client-specified historical period with optional decay effect.
- **Historical:** Full-valuation repricing simulation based on historical time series according to client-specified start and end dates.
- **Monte Carlo:** Full-valuation repricing simulation based on randomly generated market moves, assuming lognormal price distributions. Volatilities and correlations are calculated directly from time series data over client-specified start and end dates with optional decay effect. Clients can also specify the number of simulations to compute the statistic.

Statistics can be aggregated for an entire portfolio or position group like asset class, country, sector or any free-format client-provided dimensions like region, branches, advisors etc. When Institutions are analyzing the statistics against a benchmark, they answer questions like how much may an investor portfolio underperform the benchmark.

## Stress Testing

Stress testing is a technique to determine potential losses due to "event risk" which cannot be analyzed using distributional statistics. These events might be related to crises produced by major displacements such as wars, political instability, natural catastrophes, or speculative attacks on currencies; they could also be linked to changes in return expectations or the risk appetite of investors, possibly leading to the burst of a speculative bubble; or they could be attributable to events that are somewhat foreseeable such as shifts in monetary policy, inflationary pressures etc. Stress testing analysis helps identify portfolio-specific weaknesses and vulnerabilities to such events. They can also provide sensitivity analysis by identifying a portfolio's sensitivity to specific risk factors such as a rise in interest rates or changes in implied volatility.

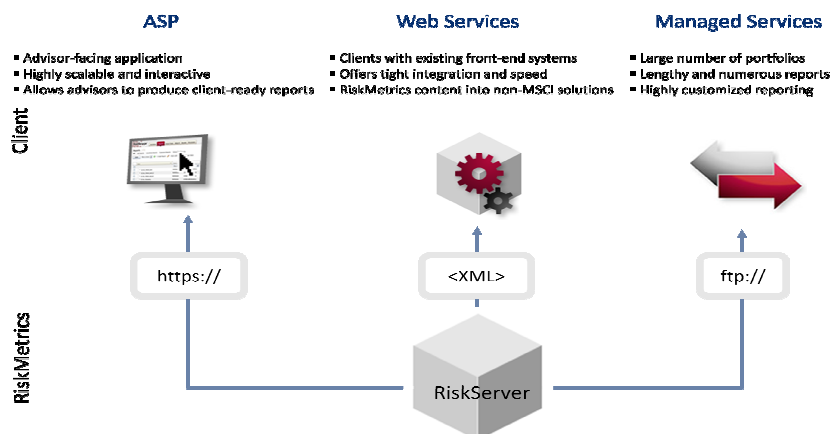
RiskMetrics risk engine allows firms to define stress scenarios in the following ways:

- **Historical stress test by date:** Institutions can define a stress situation as a period to simulate market conditions during historical events. Such periods may be adverse market conditions or periods of bullishness. The complete set of prices and risk factors are taken from the historical market returns over the client-specified historical period. The returns are applied on the current level of risk factors and the investor portfolio is revalued with the simulated risk factor levels.
- **Predictive stress test by Risk factors:** Institutions can use RiskMetrics tools and services shock individual or multiple risk factors and view the impact on investor portfolios. RiskServer supports stressing market risk factors like equities, indices, interest rate curves, currencies, commodities etc. The RiskServer runs a regression analysis of the risk factors being shocked against all the risk factors in the portfolio. The correlations in the regression are computed based on client-defined period. The investor portfolio is revalued with the new levels of risk factors as predicted by the regression. Institutions can use various preconfigured predictive stress scenarios defined by MSCI research.

The P&L in the portfolio value can be sliced and diced by the user across dimensions like asset classes, countries, sectors, currencies or any client-specific custom dimension.

## RiskMetrics Offerings: Delivery Solutions

RiskMetrics offers several ways to integrate these risk analytics into your business processes.



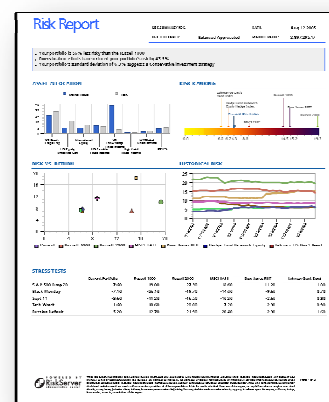
### ASP Application

RiskMetrics WealthBench is a highly scalable ASP application allowing users to generate risk reports and stress tests in order to explore the risks in their portfolios (or their client portfolios in the case of an advisor). The WealthBench What If module allows users to test trade ideas and see the impact of these decisions on the various aspects of their portfolio's risk.

Apart from the risk analytics, WealthBench also provides a host of forward looking wealth analytics tools such as wealth projections, goal probability, cash flow planning and retirement planning.

WealthBench reports can be highly customized to reflect your firm's brand and messaging.

WealthBench can also be integrated into existing portals / intranet via single sign-on.



**Figure 8: Example of Risk Report generated from WealthBench or RiskManager Managed Services**

### Managed Services

RiskMetrics Managed Services allows an institution to systematically generate risk analytics for a large set of portfolios on a regular basis via a batch process. Results from this service can be in the form of pdfs or raw data (.csv) where an institution could then use their own report generation capabilities to produce reports on behalf of their clients or distribute internally to senior management / risk monitoring committee / branches / advisors for necessary action.

### Web Services

Using RiskMetrics Web Services an institution can more tightly integrate RiskMetrics risk analytics into existing client and/or advisor portals. Web Services provides access to a wide variety of risk statistics available in risk server (discussed in Data and analytics section above). Institutions choosing Web Services can create interactive applications allowing users to perform pre-trade scenarios.



## Client Service Information is Available 24 Hours a Day

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<sup>1</sup>As of June 30, 2011, based on eVestment, Lipper and Bloomberg data.