

# The Future of Market Risk Management

A Global Survey of Institutional Investors



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# The Future of Market Risk Management

## A Global Survey of Institutional Investors

DECEMBER 2009

### EXECUTIVE SUMMARY

In the wake of the 2008 financial crisis, many asset managers and asset owners are reevaluating their risk management practices. MSCI Barra recently surveyed a group of 34 institutional investors around the globe to identify what they see as the most important issues for market risk management today and in the future.

Our survey confirmed the view that, until now, risk management has been largely a reporting and controlling function of investments within asset classes. Many institutional investors calculate a wide range of risk measures such as tracking error, Value at Risk, Beta, and Volatility. However, these measurements are mostly applied within, not across, asset classes, leading to potential overestimation of diversification benefits as the same underlying factors may drive supposedly different asset classes such as public and private equity.

Many participants reported that risk management has traditionally been the responsibility of the CIO, and that in many cases risk managers have little investment expertise and are junior to portfolio managers, potentially limiting the impact risk managers have on investment decisions. A number of plan sponsors interviewed for the survey said that the crisis made them realize that they did not have enough transparency into the activities of their external managers. For example, many did not appreciate how illiquid some hedge funds could become or how levered some investments were.

The biggest surprise to our participants seems to have been the sudden and violent appearance of liquidity and counterparty risk, and their impact on investments across all asset classes. Both types of risk had been largely ignored up until this crisis and are still not well understood. Going forward, almost all survey participants highlighted the need to better understand these two types of risks and are looking for guidance from consultants and risk management vendors.

Based on the responses from the survey a major overhaul appears to be underway across the industry. Participants in our survey identified the following important areas of change:

- A redefinition of the risk management function:
  - risk management will gain seniority within the firm and will be more likely to report to the CEO rather than the CIO
  - in addition to the control function, risk management will develop investment management expertise to offer ‘independent advice’ to the investment management teams
  - multi-asset class institutional investors will develop firm-wide risk management to better understand the dependencies across asset classes.
- Significant investment in an improved risk management ‘toolbox’, with particular focus on:
  - identifying, measuring, and managing counterparty and liquidity risk
  - adding or enhancing stress testing and extreme risk measurement capabilities
  - identifying the underlying drivers of risk and return across asset classes and complementing quantitative risk measures with qualitative, forward looking risk assessments.
- Risk management capabilities will become an important selection criteria for plan sponsors:
  - asset managers with a fully integrated risk and portfolio management process will have the competitive edge
  - counterparty and liquidity management will be scrutinized
  - plan sponsors will require more transparency from hedge funds.

The first section of this report looks at the current risk management practices within the firms surveyed, and the second section will focus on the changes that the survey participants expect to implement going forward. We conclude with a short overview of the major developments for market risk management we expect to see as a result of the recent crisis and the findings of our survey.

## METHODOLOGY AND PARTICIPANTS

We surveyed 34 institutions during August - September 2009. Surveys were carried out in person or over the telephone, and respondents were at the level of Chief Risk Officer or above.

### Type of Firm

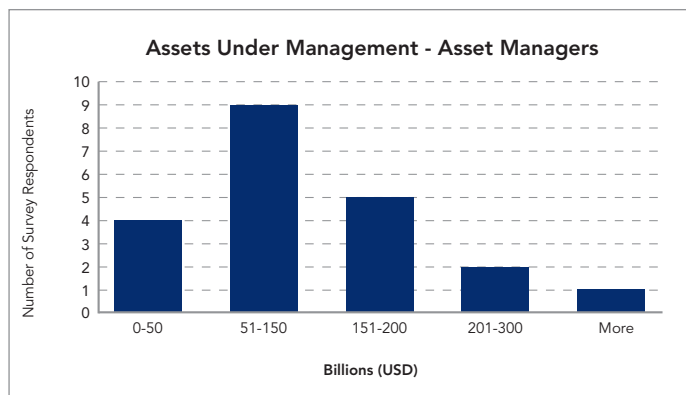
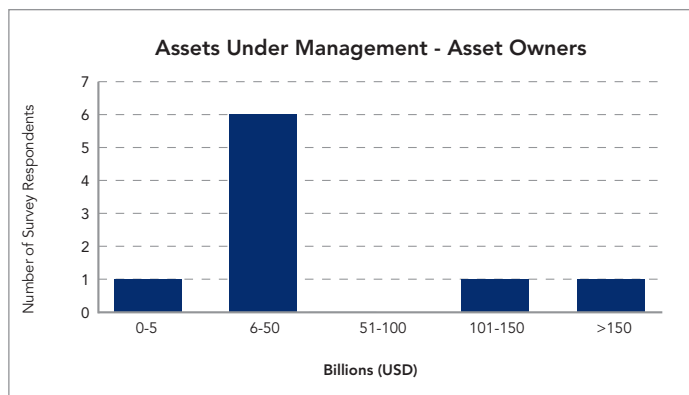
- 11 asset owners (6 corporate and 5 public plan sponsors)
- 23 asset managers

### Geographic Breakdown

- Asset owners - 6 in Asia, 4 in the US, and 1 in Europe
- Asset managers - 11 in Europe, 7 in the US and 5 in Asia

The size of the participants, reflected by assets under management (AUM), is distributed as shown in Exhibit 1. At the time of the survey, the average AUM of surveyed asset owners was USD 57 billion, while the average AUM of surveyed asset managers was USD 157 billion.

**Exhibit 1:** Assets Under Management



\*Exhibit 1 does not include several participants who did not disclose their AUM. Roughly 82% and 87% of plans and asset managers, respectively, reported their AUM.

Many participants wished to remain anonymous, but those who agreed to be named include:

- |  |                                  |  |
|--|----------------------------------|--|
| ■ ABB  | ■ Credit Suisse Asset Management | ■ Pioneer Investments                      |
| ■ AllianceBernstein  | ■ Deka Investments               | ■ Pyramis Global Advisors                  |
| ■ California Public Employees' Retirement System (CalPERS) | ■ F & C Investments              | ■ UC Regents                               |
| ■ California State Teachers' Retirement System (CalSTRS)   | ■ Janus                          | ■ Universities Superannuation Scheme (USS) |
|  | ■ Lombard Odier                  |  |
|  | ■ Nuveen Investments             |  |

# SURVEY RESULTS

## CURRENT RISK MANAGEMENT PRACTICES

### Investment Process

Most of the plans surveyed have an investment horizon of 3-5 years and review their strategic asset allocation between 1-3 years. A sizable amount of domestic equity, and domestic and international fixed income, is managed internally, much of it passively. Private investment asset classes such as private equity and real estate are mostly managed externally.

**Exhibit 2:** Plan Statistics

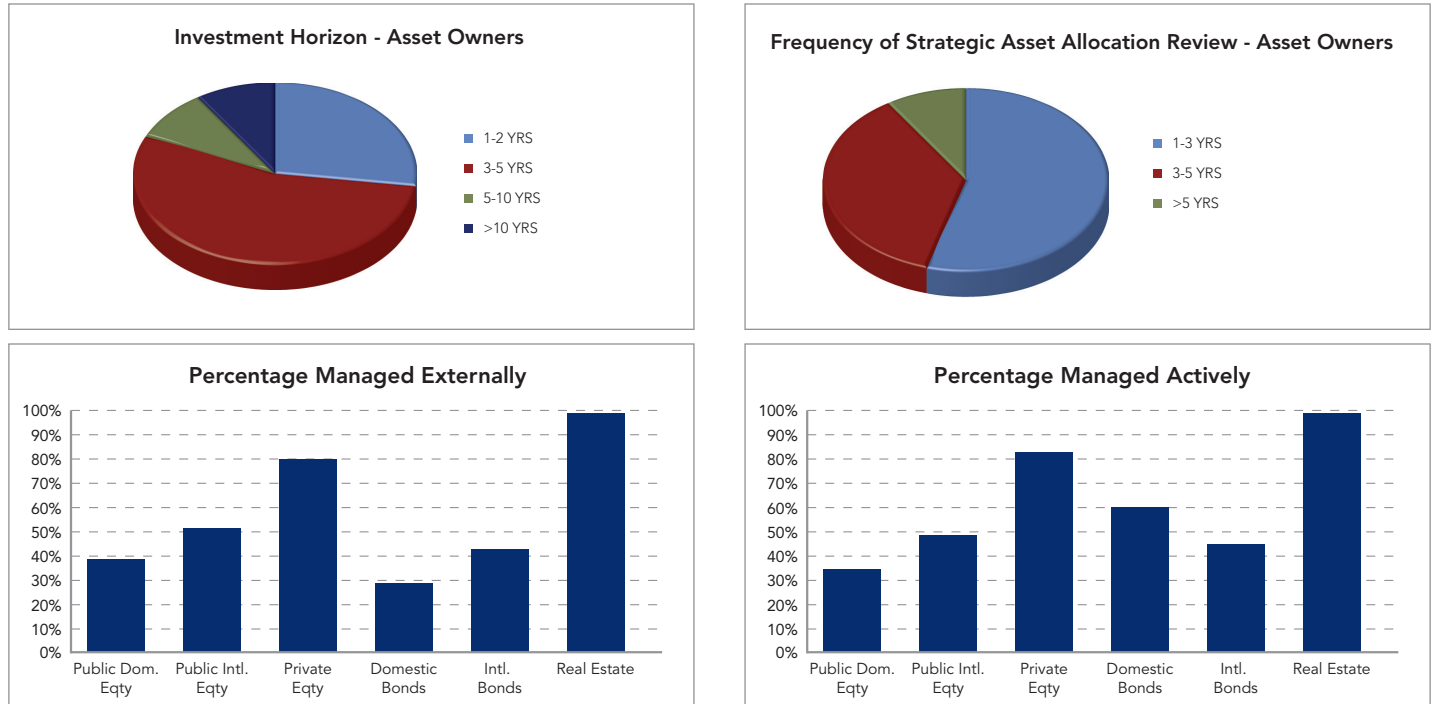
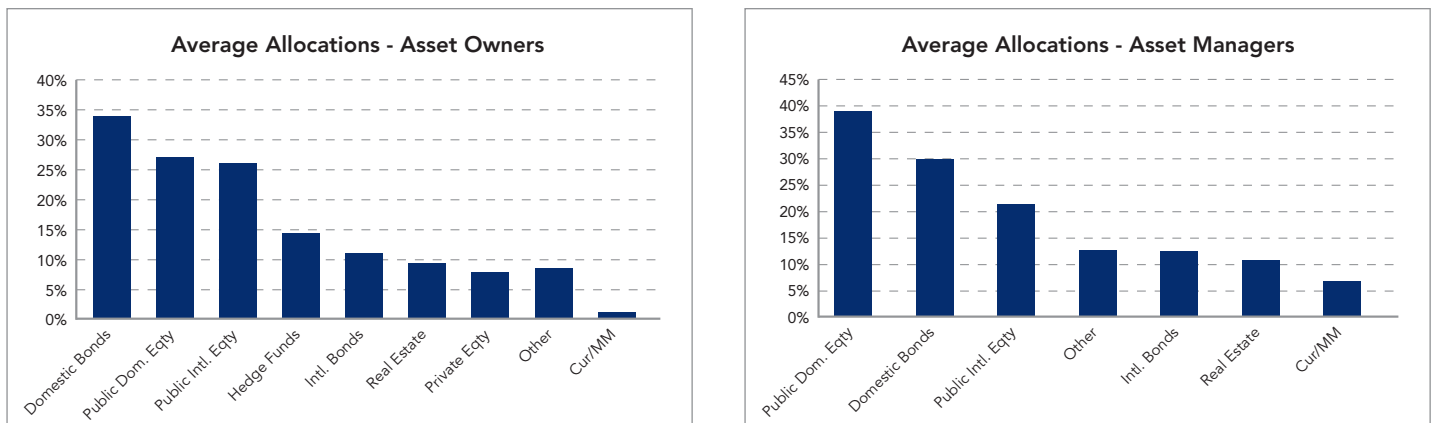


Exhibit 3 shows the average allocations to major asset classes. Domestic bonds and public equity dominate the allocation for surveyed plans. The average hedge fund allocation of 14% is substantial. Other alternative asset classes – real estate and private equity – also have fairly high allocations, 9% and 8% respectively. The asset managers we interviewed manage both equity and fixed income instruments with a moderate proportion allocated internationally. All of the asset managers we interviewed invest in more than one asset class.

**Exhibit 3:** Average Asset Allocations



### The Risk Management Structure

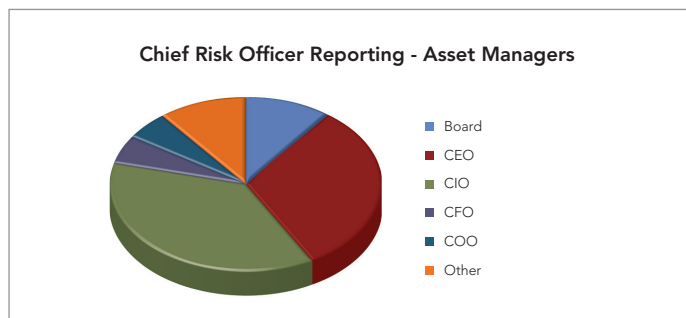
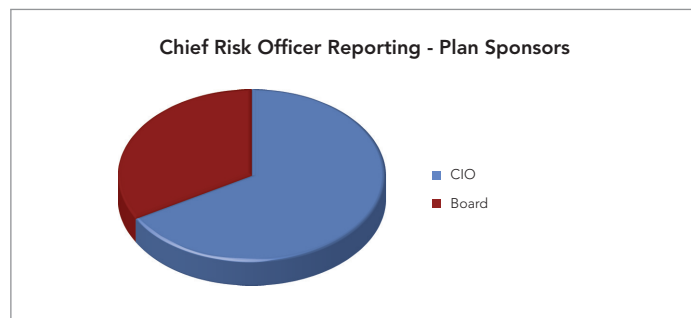
Almost 62% of participants have a Chief Risk Officer function and about 60% have a risk committee. Only 17% of surveyed corporate plans have a Chief Risk Officer function, compared to 80% for public plans and 70% for asset managers. Roughly 60% of surveyed public plans and 74% of asset managers have risk committees; only 17% of surveyed corporate plans have a risk committee.

**Exhibit 4:** Risk Management Authorities



Chief Risk Officers report mainly to CEOs, CIOs, and boards, as shown in Exhibit 5.

**Exhibit 5:** Reporting Structure for Risk Officers



For asset owners, despite the presence of risk managers and risk committees in most of the participants’ organizations, the risk management function has had relatively limited or indirect impact on the investment process to date. Only 10% of surveyed plans give risk managers veto authority on investment decisions and only at the instrument level. About 30% of respondents said the risk manager measures risk and provides reports to the investment committee but does not make investment decisions. Meanwhile, 40% of respondents said that the risk manager indirectly impacts investment decisions in one of the following ways: (1) being able to ask for review of certain investments; or (2) advising the CIO or board directly. Risk committees at surveyed plan sponsors similarly vary in their authority. About 10% of respondents’ risk committees had no decision-making authority while 30% directly affect the asset allocation process.

For asset managers, the risk manager’s role receives slightly more weight in the investment process, with 39% of participants enabling veto power at the instrument level. The risk function is also responsible for performance analysis in many cases, working with portfolio managers to understand the sources of their return and risk. Where surveyed risk managers do not have veto power, they often can indirectly impact investment decisions, similar to plan sponsors. Ways which were mentioned include escalation to senior management of certain decisions, feedback during the product/portfolio design phase, discussions with portfolio managers, setting of risk limits, and validation of new instruments. About 20% of risk committees mentioned explicitly involving the CEO or CIO in discussions. Nearly 20% of risk committees also look at operational and counterparty risks.

**Measuring and Monitoring Market Risk**

*Minimum Risk Capabilities*

The majority of the surveyed plans (90%) require minimum risk management capabilities from their external managers. Likewise, 83% of asset managers reported that their investors require certain minimum risk management capabilities. Asked to list which capabilities are required, plans and asset managers listed a variety of factors. For instance, roughly 20% of asset managers said only qualitative assessments were conducted. In contrast, 14% of asset managers said they provide risk reports with factor level decomposition. Moreover, 9% of asset managers said they provide positions/holdings, while 100% of the plans said they receive position level data. Among the minimum risk capabilities mentioned were:

- Review of risk management systems as part of due diligence visits
  - risk management process
  - resources including tools/systems used internally
  - internal risk organization, such as whether there exists a portfolio control group
- Absolute risk and/or tracking error targets or limits
- Hard/soft limits on certain sources of risk (i.e., concentration limits such as sector limits, and asset class risk budget allocation limits)
- Risk reports, including tracking error, diversification of the portfolio and portfolio characteristics and main risk factors (exposures, contributions to risk). One respondent reports real time risk reports.
- Performance attribution
- Use of leverage
- Position reporting

All of the surveyed plans receive position level information from their external managers. As for the frequency, 54% receive them daily, 45% monthly, and 27% both daily and monthly.

*Use of Risk Systems and Models*

To get a sense of how risk systems are used, we asked the plans whether they use a risk system for external managers versus internal managers. Approximately 90% of the surveyed plans have external managers. Of these, 80% have a risk model to aggregate risk from external managers across asset classes. Meanwhile, 82% of plans have internal managers and of these, 90% have a risk model to aggregate risk across asset classes. More than half of plan sponsors have a risk system that aggregates risk across both external and internal managers. The investments not covered by the risk system include private equity, private real estate, and certain hedge funds. Exhibit 6 summarizes the use of risk systems by the plans.

**Exhibit 6:** Adoption of Risk Systems by Asset Owners



Among the asset managers interviewed, 70% said they use a risk model to view risk across portfolios/products. However, the majority use a single risk system only within each asset class. All of the surveyed asset managers invest in multiple asset classes but only 26% use the same risk model across asset classes. Among those that do, they ranged in response from one respondent who only calculates Value at Risk to another who uses full factor-model analytics using the Barra multi-asset class platform, BarraOne. But the majority uses multiple systems, with many respondents saying that accurately modeling different asset classes remains tough and those systems that do so are extremely costly.

Finally, we surveyed plans on their use of internal versus external resources. Most of the plans (82%) have an in-house risk system, with only one respondent out-sourcing their risk system. Many asset managers (57%) have a risk system in-house as well, but one quarter of these respondents say the system is limited to fixed income, real estate and/or private equity. Nearly all of the surveyed asset managers use a third-party risk system like Barra's or its competitors' systems.

*Measuring Risk*

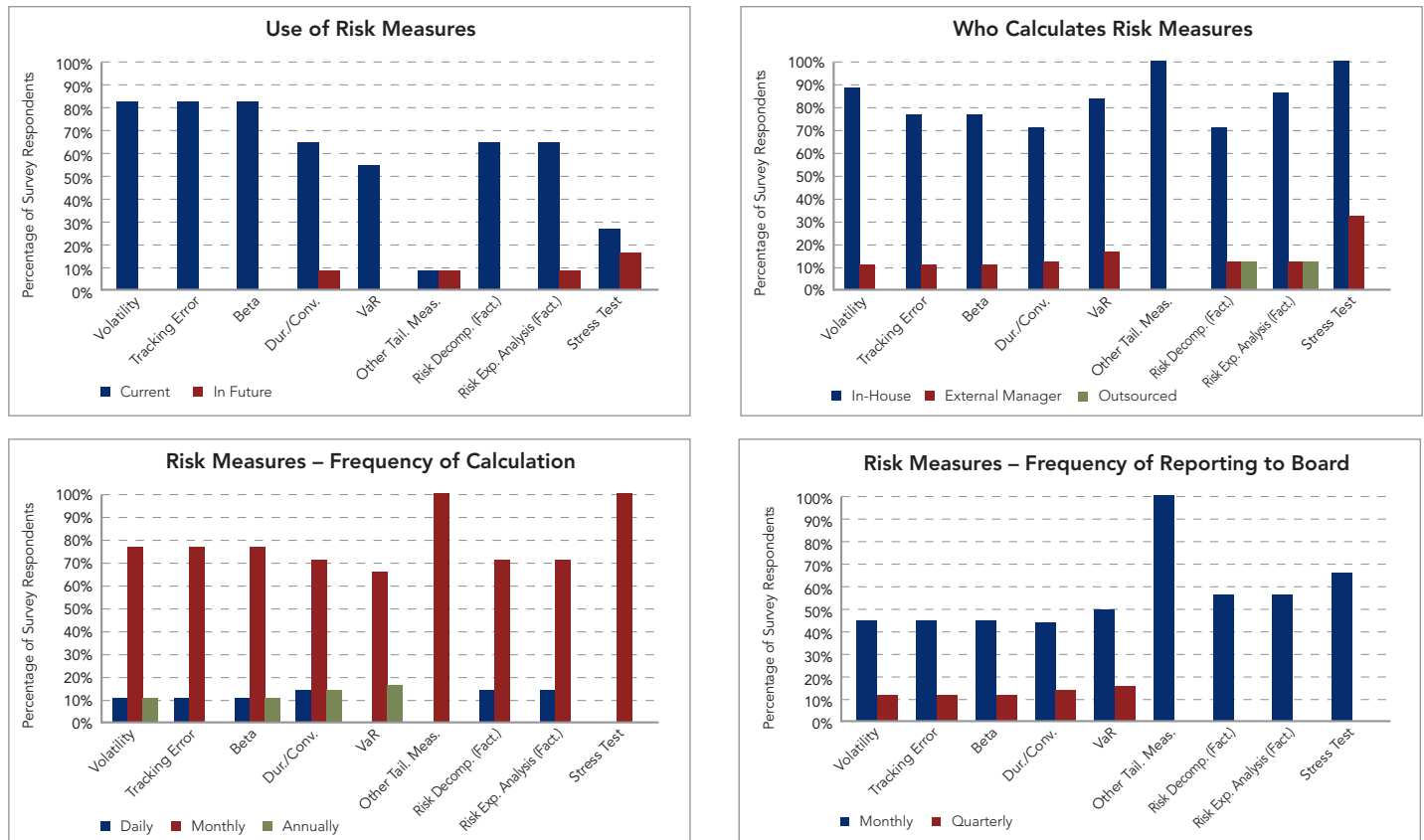
In this section, we look at which risk measures the survey participants use, how often they calculate and report them, and other specifics on their use.

A majority of the plans calculate volatility, tracking error, and beta. More than half use a factor model to analyze the sources of risk via risk decompositions (i.e., how much risk comes from various sources) and risk exposure analysis (i.e., how much the plan is exposed to certain sources of risk). Only a small percentage of the plans perform stress tests (27%) while very few look at tail measures other than Value at Risk.

Most of the plans perform risk measurement in-house. Of the risk measures, stress tests are the type that are most commonly outsourced to external managers.

Most of the plans calculate risk measures monthly with a small percentage measuring risk either daily or annually. These risk measures are also typically reported to the board monthly, with only a small percentage reporting to the board quarterly or annually.

**Exhibit 7:** Risk Measurement Summary for Plans



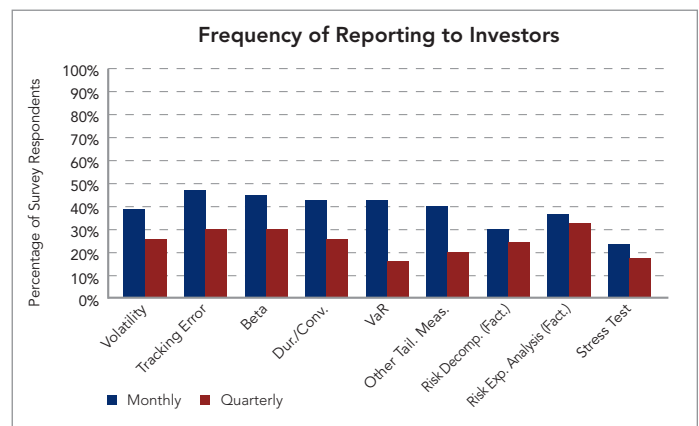
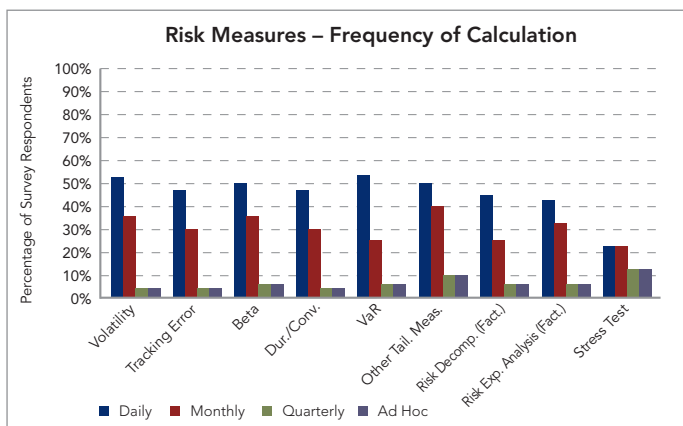
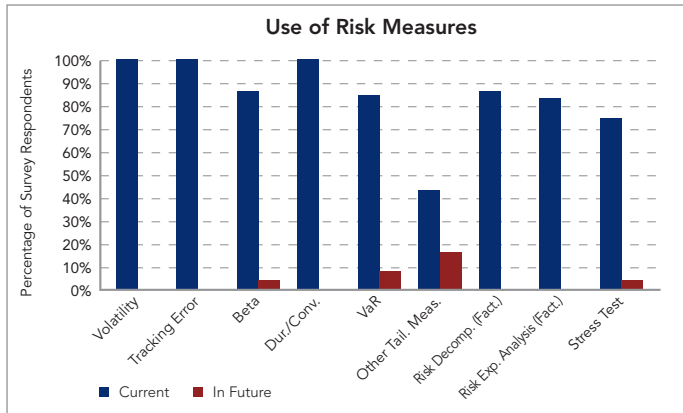


## SURVEY RESULTS

As shown in Exhibit 8, all surveyed asset managers calculate volatility, tracking error, and duration, and more than 80% perform risk model decomposition and exposure analysis. Stress testing is also widely performed with 74% of surveyed asset managers having some form of stress testing. Between 4% and 12% of the nine measures reported are calculated on an ad hoc basis, with stress tests and tail risk measures being the two most frequent.

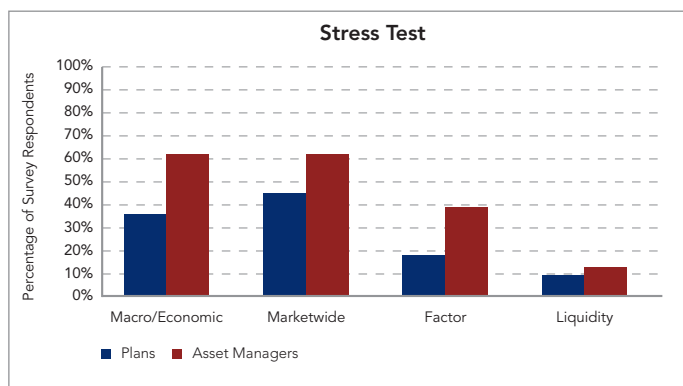
Respondents reported risk measures to their investors either monthly or quarterly, with slightly more reporting monthly.

**Exhibit 8:** Risk Measurement Summary for Asset Managers



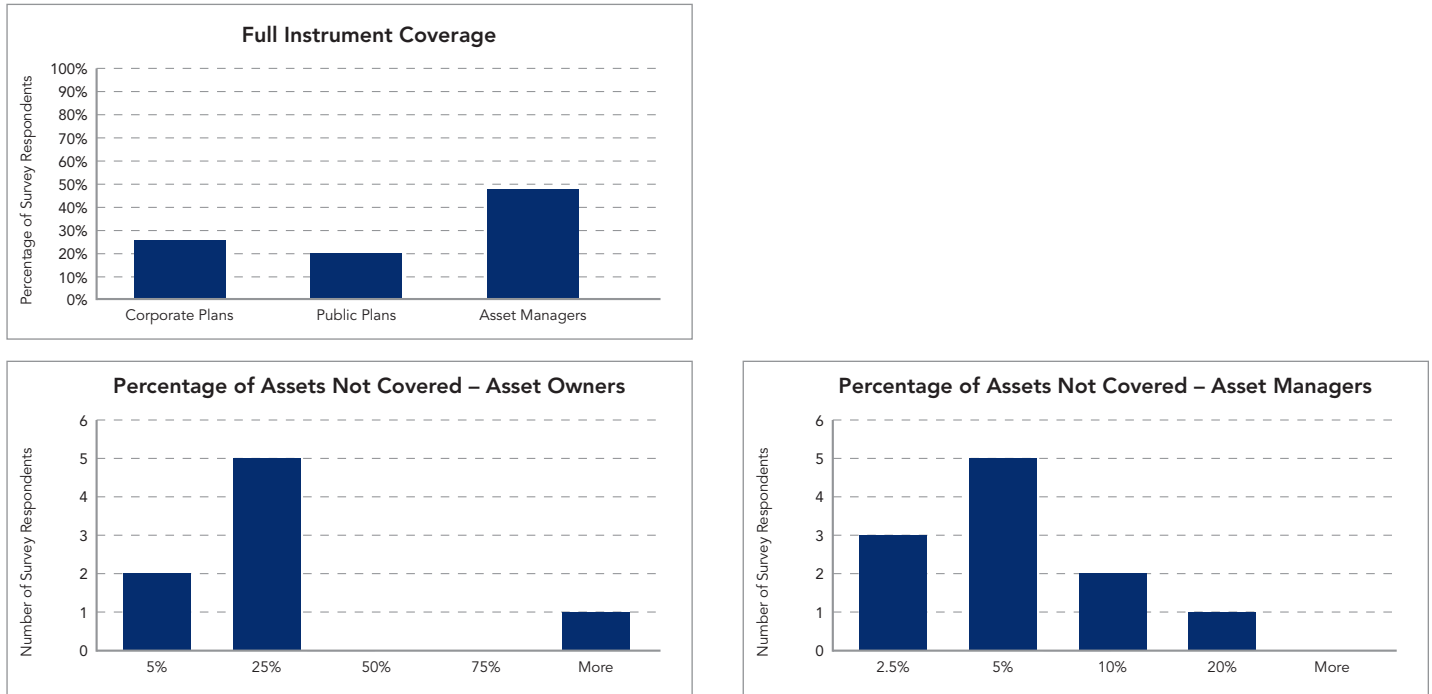
As mentioned above, 27% and 74% of surveyed plans and asset managers, respectively, run stress tests on their portfolios. The most common stress tests were macroeconomic shocks (including shocks to currencies, commodities, interest rates, etc.) and market-wide asset class shocks. About 40% of the asset managers run stress tests by shocking factors within a factor model while only 18% of the plans do so. About 12% of all respondents also run tests of liquidity shocks.

**Exhibit 9:** Stress Tests



Lastly, we asked participants about which assets their risk systems can model. Nearly 50% of asset managers have full coverage of all instruments in the portfolio while only 22% of plans have full coverage. The average percentage of assets not covered by the risk system is around 20% for plans and 8% for asset managers. The key assets not covered include private equity, private real estate, timber, foreign bonds, hedge funds, convertible bonds, structured products, and certain derivatives and asset-backed securities. Of the plan sponsors, 100% of them are planning to add coverage going forward, particularly with respect to hedge funds, private real estate, and private equity. Of the asset managers, nearly two-thirds are also actively working on modeling missing assets with a focus on derivatives and asset-backed securities.

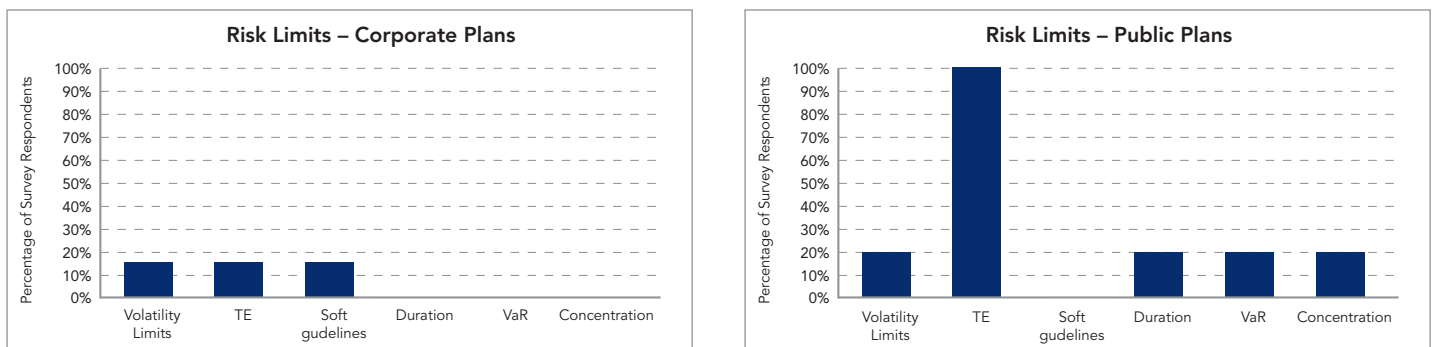
**Exhibit 10: Instrument Coverage**



**Risk-Induced Adjustments: Risk Limits and Hedging**

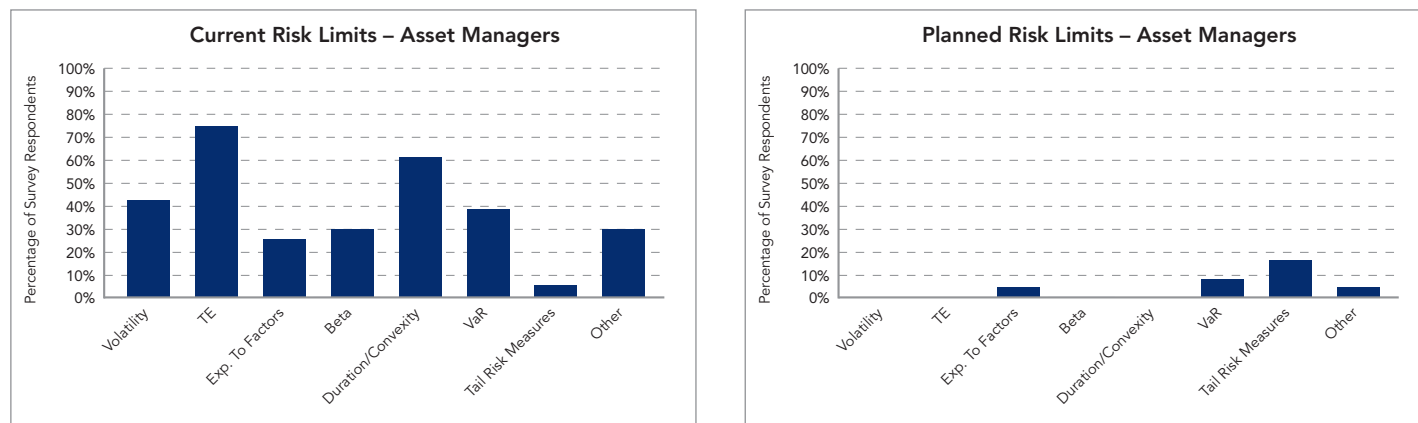
We surveyed the participants on their use of risk limits and vehicles for hedging. All the public plans interviewed had tracking error targets while very few of the corporate plans had risk limits in place. Actions undertaken in the event risk limits are breached include internal discussion of the reason for underperformance (often with the management committee and CIO), external discussion with the asset manager, and hedging or asset reallocations, if appropriate. About 60% of the plan respondents use overlay (tactical hedging) strategies but the majority uses them only for currencies. Only two respondents use overlay strategies to hedge equity risk. One plan sponsor uses a beta overlay on hedge funds and has a target hedge ratio of 15% on total funds. Another uses swaps to quickly get access to emerging markets or other capacity constrained public equities. None of the plans currently hedge against tail risk, although two mentioned they are thinking about it.

**Exhibit 11: The Use of Risk Limits - Plans**



In line with the plans, the majority of the surveyed asset managers also have limits on tracking error (75%). About 60% of asset manager respondents also have risk limits on duration/convexity for their fixed income investments while 40% have limits on Value at Risk. Exhibit 12 summarizes the risk limits currently used by the surveyed asset managers. Risk limits planned for the future are also shown, which are primarily more tail risk measures and Value at Risk. Only 9% have no risk limits in place.

**Exhibit 12:** The Use of Risk Limits – Asset Managers



If risk limits are breached, discussions are held with the appropriate portfolio manager and steps are taken to resolve the breach. Portfolio managers usually are given a set amount of time to resolve the violation. For a handful of survey respondents, issues are escalated to the CIO or board of directors. None of the asset managers currently use active hedges to address breaches though a few are considering them as a way to bring the portfolio back in line more rapidly.

About 40% of the surveyed asset managers have some form of overlay strategies in place to hedge risk on a tactical basis. Nearly all of these have overlays not just for currencies but also for equity market risk and more granular sources of risk, including style factors. Other overlays mentioned were active overlays on Global Tactical Asset Allocators (GTAAAs), fixed income risk including duration mismatches, and local solvency risk. Of those respondents who don't currently have overlay strategies, only one said it was considering them.

Regarding tail risk, only one respondent currently has a hedging policy in place although many are looking at ways to protect against tail risk. Nearly 10% of respondents are looking into hedging tail risk at the enterprise level while another 10% may do so at the portfolio level.

## THE FUTURE OF MARKET RISK MANAGEMENT

Our survey results indicate an industry-wide shift in the perception and role of risk management. The expected change among the surveyed asset managers and asset owners is significant and widespread. Some of the changes are well-known – the focus on due diligence for example. Other changes have received less attention in the media but are equally important, such as the focus on enterprise-level risk management. While some of these changes in risk management were already in process, there is now urgency for change.

Based on the survey responses, we identified six key areas in the future of risk management. These are:

- Redefining the risk management function
- Integrating qualitative judgment with quantitative analytics
- Assessing liquidity and counterparty risks
- Assessing risk at the enterprise level
- Enhancing risk analytics, including stress testing, factor analysis, tail risk, and multiple-horizon models
- Enhancing risk controls and responses

## Redefining the Risk Management Function

*“Traditionally risk management was a reporting role but now it is moving towards managing, policing and intervening.” – Plan Sponsor*

*“Risk management needs to be involved in product design up-front, doing stress-testing as you would crash-testing for cars.” – Asset Manager*

The first area of change is the role of risk management. Only a minority of the institutions we surveyed currently actively incorporate risk in the investment process. Traditionally, risk management has had a passive role, focused on after-the-fact reporting, and was sometimes seen as a back-office function.

The current trend is to give more authority to the risk management function and more weight in the investment process. All the plan sponsors interviewed indicated that risk management is now receiving a more prominent role; among asset managers, one-half mentioned the role is expanding beyond the reporting function. Several respondents said their risk management function is now being moved to a more senior position in the organization, such as the CEO.

Plans are also now asking their managers for more extensive risk management capabilities. Several plans mentioned that managers should ideally have a risk management process that is fully embedded within the investment process. One-third of the asset managers mentioned that investors are seeking a more detailed understanding of risk management during the due diligence process. One asset manager mentioned that “RFPs are now focusing 15 to 20% on risk management capabilities instead of 5% before the crisis.” Another asset manager reported that clients are now requiring risk managers to be in product presentations. A few survey participants highlighted the fact that asset owners are now more interested in issues such as governance processes, oversight of portfolio managers, and risk-related compensation. Additionally, many plans are requiring more information from their managers, even hedge fund managers. For example, they are requiring more frequent and detailed risk reports, and an assessment of liquidity and counterparty risks.

The demand by plans for more extensive risk management is affecting the role of risk management by asset managers. About two-thirds of the surveyed asset managers said they are increasingly integrating risk management into the investment decision-making process. According to one respondent, “[we are] addressing how to use risk management in the risk control process, bringing it closer to the investment management process”, a sentiment echoed by many other respondents.

Several asset managers said they are also emphasizing risk awareness in the design of their products. One participant mentioned that they conduct stress tests during the product design, before it is introduced. “Risk management needs to be involved in product design up-front, doing stress-testing as you would do crash-testing for cars.”

Other asset managers mentioned they see a need for greater collaboration and improved dialogue between risk managers and portfolio managers. According to one, “Risk management needs greater collaboration with fund managers in order to integrate the function within the investment process more fully. This means that risk management needs to be more systematic in its process to convince investment managers that what risk does is credible, systematic and user friendly for the fund manager.”

Generally, there is renewed interest in the link between risk and return – the idea that return cannot be earned without appropriate risk and there is no free lunch. Several asset managers mentioned the importance of putting risk and performance attribution side-by-side.

Changes are also taking place at the organizational level for asset managers; for instance, one asset manager has set up a new risk committee below the level of its capital markets committee.

## Integrating Quantitative and Qualitative Risk Analysis

*“At the board level risk assessment is qualitative, whereas at the asset class level it is quantitative. We need a way to marry the two.” – Plan Sponsor*

*“Intuition and experience matter as much as the results of the models.” – Asset Manager*

A second important theme raised by survey participants was the importance of aligning quantitative and qualitative information. For many plan sponsors, their current quantitative risk systems are divorced from senior decision-makers. The senior decision-makers tend to assess risk from a qualitative perspective, which can be difficult to tie in with quantitative risk outputs. This integration can be especially challenging when there is no enterprise-wide risk system.

For example, boards may form qualitative assessments of potential economic and market risks that translate into concerns over certain investments or allocations. But the risk manager who forecasts equity or fixed income risk will often rely on quantitative

systems with measurable outputs. Ideally, plans would complement the board's qualitative risk assessment with quantitative risk measures and/or add a qualitative overlay at the asset class level.

Asset managers also raised the issue of tying quantitative information to subjective judgment. Specifically, respondents with a fundamental approach wanted to combine the quant technique of the risk manager with the intuition of the portfolio manager. One asset manager highlighted the importance of subjective judgment in interpreting various risk measures with respect to normal versus extreme measures of risk by saying, "Human interaction needs to be brought at the center of the risk function. We should not rely on any single measure of risk, but instead look at different measures simultaneously."

Stress testing or scenario analysis was seen by some as a natural way to combine qualitative and quantitative information. For instance, if a plan's board is worried about the risks of an inflationary scenario, risk managers can conduct stress tests to assess the potential impact.

### Assessing Liquidity and Counterparty Risks

*"If all private equity commitments were called at the same time, we would have to significantly reduce our global public equity investment."* – Plan Sponsor

*"When Bear Stearns collapsed, we were surprised by how high our exposure truly was."* – Asset Manager

During the recent crisis, not accounting for liquidity and counterparty risks was a major issue for many institutions. Approximately 50% of respondents mentioned the importance of liquidity risk and 35% mentioned a new focus on counterparty risk.

Liquidity is a big concern for plan sponsors. Many pointed out that little, if any, risk management with respect to liquidity is currently in place. Liquidity problems emerged during the crisis with respect to the ability to fund pre-existing obligations or liquidate certain assets in the portfolio. A few respondents pointed to private equity commitments and hedge fund lock-up periods as specific examples. One plan sponsor mentioned that "if all private equity commitments would be called at once, we would have to reduce our global public equity by 85%." Plan respondents mentioned wanting estimates of liquidity risk for different asset classes, scenario testing for potential outflows, and probable scenarios for liquidity shocks.

Liquidity is also a concern for many asset managers. Asset managers faced liquidity issues in the form of an increase in redemptions and problems with pricing illiquid instruments. Several asset managers pointed out the problem of defining and measuring liquidity risk. Generally, respondents agreed that liquidity risk issues are difficult to define and plan sponsors and other clients do not completely know what they are looking for. A third of the asset managers mentioned they currently have some assessment of liquidity risk, though many admit they are limited to certain rudimentary instruments. One respondent pointed out the difficulty of assessing enterprise-wide liquidity by saying "Internally we monitor day trading volumes to determine days needed to trade out of position, but for the complete portfolio or firm-level this is a very different problem." In particular, several respondents noted the challenges with assessing liquidity for many bond instruments, where data problems can be significant.

Both plan sponsors and asset managers expressed interest in warning signals that indicate broader liquidity problems. In addition to liquidity risk, many felt counterparty risk was poorly managed during the crisis. Many were surprised by the exposure to the financial sector when large banks collapsed in September 2008.

Controlling counterparty risk is at the top of the list for many asset managers. Several respondents said they would like to impose a minimum number of counterparties. One respondent has installed a counterparty credit risk committee; another said they would begin stress testing for counterparties.

Among the plans, a few said they have started initiatives to aggregate counterparty exposure and concentration levels within and across asset classes. Some have asked external managers to disclose their counterparty policies. One respondent mentioned that since the collapse of Bear Stearns, they ensure on a daily basis that they have no overnight exposure to any single counterparty.

### Assessing Risk at the Enterprise-Level

*"Suddenly the fact that we didn't have risk forecasts for our private investments was a big problem."* – Plan Sponsor

*"We needed a better understanding of our risk across asset classes, for example the exposure we had to the same companies, markets and regions in fixed income and equity."* – Asset Manager

Approximately 30% of participants included managing enterprise risk in their risk management objectives. Unexpected correlations between investments caught many investors by surprise, underscoring the need for enterprise-wide risk management.

For asset owners, issues arose regarding liabilities mismatches (for public plans) and corporate balance sheet effects (for corporate plans). Many institutions had risk structures that were disaggregated, i.e., separate risk systems for equity, fixed income, etc. A majority of plans acknowledged having rudimentary risk systems, if any, for private investments. Estimating risk for asset classes without frequent observable returns, such as private equity, is a significant priority going forward.

For asset managers, enterprise risk management means a better understanding of firm-wide risk across multiple product lines and departments. One asset manager said “it’s not the tools – it’s the aggregation of data across everything.” While another mentioned they want to establish a consistent framework across all asset classes: “We need a better understanding of our risk across asset classes, such as exposure to the same companies, markets and regions in fixed income and equity.” The priorities of several respondents included the integration of multiple risk systems and scenario analysis to see how typically diverse investments may be similarly impacted in times of market distress.

### Enhancing Risk Analytics

*“We would like to put more emphasis on scenario analysis, in particular historical scenarios and macroeconomic scenarios. We are also looking at modeling fat tails in the return distribution and alternative measures of risk.” – Asset Manager*

*“We need a better understanding of how risk across asset classes interplays (e.g. exposure to the same companies, markets and regions in fixed income and equity). We also would like to integrate views across different horizons.” – Asset Manager*

*“We should not rely on any single measure of risk, but instead look at different measures simultaneously... A two-phased approach has some value—a different treatment of normal events and extremes. The two require different models, different horizons and different risk measures.” – Asset Manager*

Several important risk tools were repeatedly mentioned by survey respondents as the most critical for risk management going forward. These were:

- Stress testing or scenario analysis
- Analyzing the sources of risk
- Analyzing tail or extreme risk
- Using multiple horizon models

### Stress Testing and Scenario Analysis

There is strong interest in stress testing and scenario analysis for both asset owners and asset managers. Stress testing was mentioned as a critical component for integrating qualitative and quantitative information, enterprise risk management, and liquidity and counterparty risk analysis. As previously noted, a majority of asset managers perform stress tests (74%) but only 27% of plan sponsors. However, many asset managers and most of the public plans indicated they are looking to add or improve their stress testing capabilities. Survey respondents were most interested in macroeconomic scenarios, both historical and hypothetical. There were many reasons cited for the new focus on macroeconomic scenarios. These included the rapid change in oil prices, housing, and interest rates during the last few years resulting in unexpected relationships between otherwise uncorrelated asset classes — equities, certain credit segments, private equity, real estate, and commodities. One plan sponsor is planning to implement stress testing at the enterprise level and mentioned that scenarios will come from risk committee and asset class heads.

### Sources of Risk

A main objective for both plans and asset managers is to understand the sources of risk to which the portfolios are exposed. This includes portfolios from the enterprise level down to individual portfolios. Currently, 82% perform some kind of factor-based analysis, either decomposing risk along factor sources or calculating exposures to certain risk portfolio. The main focus seems to be in understanding these sources of risk – potential scenarios for how these risks could evolve, conducting stress tests with exposures, etc. Using factor models in an effective way was mentioned several times by respondents. According to one asset

manager, "Our main objective is making sure we're getting compensated for risks. This means understanding the bets we are taking and avoiding any unintended bets by managing our exposures to different sources of return and risk." Performance attribution – the decomposition of realized risk and return – was widely mentioned.

### Tail Risk

For both asset owners and asset managers, there is an increased emphasis on guarding against extreme losses. This involves setting new measures of event risk, developing early warning systems for systemic events, and improving communication with senior management about potential threats. One asset manager noted that a main goal of risk management going forward is to "try to anticipate reactions to market environments for our products and prevent bad surprises." A majority of respondents said that avoiding critical or permanent losses was a main objective of risk management. Approximately 20% of respondents are planning to add tail risk measures where none previously existed. According to one asset manager, "A two-phased approach has some value – a different treatment of normal events and extremes. The two require different models, different horizons, and different risk measures."

### Risk Models with Different Horizons

Since the recent crisis, there has been an emphasis on models that account for rapid changes in the market environment. A third of asset managers mentioned needing shorter term views of risk. Several asset managers highlighted their interest in risk models of different horizons. In times of sudden market regime shifts, shorter term models (typically with shorter half-lives or calibrated using a shorter span of history) pick up the changes quicker than longer term models. One participant mentioned wanting to "integrate views across different horizons." The goal of using multiple horizon risk models is to balance short-term risk movements with longer-term investment horizons.

## Enhancing Risk Controls and Responses

*"Protecting the franchise is our main objective. Portfolios need to be in line with client expectations and we need to ensure that investments are taken within predefined limits." – Asset Manager*

*"We would like to significantly increase the number of overlays, as it would give us an ability to react quickly when we identify unexpected risk." – Asset Manager*

One of the most important ways risk management is likely to change is in the emphasis on risk controls, monitoring resources, and responses to rapidly changing market conditions. For plan sponsors, the key word has been 'transparency'. By requiring more transparency from their managers in the form of detailed and frequent position reporting, risk controls and monitoring have become more important. One plan noted that it fired several hedge funds that did not offer more transparency.

For asset managers, protecting the client against unexpected losses was mentioned as a key objective for risk management by many respondents. This renewed mandate is being executed in three ways:

- Stricter risk controls
- Short-term risk monitoring
- Use of hedging and overlays

First, risk controls in the form of risk budgets, risk limits, risk constraints, etc. are used more widely. The goal is to ensure that portfolios are managed according to guidelines and are consistent with the clients' risk appetite and tolerance.

Secondly, the ability to monitor rapid changes in risk is another main component of this area. One-third of asset managers mentioned needing shorter term views of risk and being able to act on them. One asset manager said it is working on a "light-weight infrastructure that allows it to plug in different models... and look at different horizons in parallel." Another said it is setting up market monitors to include in weekly investment meetings.

Thirdly, hedging and overlays are used to respond to quick changes in the risk environment. One-quarter of asset managers either use or want to use equity overlays to adjust exposures to various sources of return. According to one respondent, "We would like to significantly increase the number of overlays, as it would give us an ability to react quickly when we identify unexpected risk." Another respondent mentioned that factor exposures could potentially be addressed by factor swaps.

# CONCLUSIONS

Risk management has become a high priority for plan sponsors and asset managers alike in the aftermath of the 2008 financial crisis. From our survey of over 30 institutional investment firms worldwide, we have identified three key areas that we believe will contribute to the ongoing evolution of risk management:

- A redefinition of the risk management function
- Significant investment in an improved 'risk management toolbox'
- Risk management capabilities becoming an important manager selection criteria for plan sponsors

The redefinition of the risk management function is largely up to the individual companies and asset managers, many of whom are already moving aggressively towards increasing the investment expertise and seniority within their risk management teams. Some are hiring fixed income valuation experts into the risk teams to be able to value fixed income instruments. Other participants in our survey mentioned the need to hire senior investment professionals into the risk teams, aligning them with portfolio managers to offer investment advice from a risk perspective. As one participant said: "The portfolio manager may be a very talented stock picker but when it comes to combining his ideas into an efficient portfolio, a risk manager may be able to offer good advice."

Many of the participants in our survey experienced first-hand the dependencies across asset classes and "the failure of diversification when it is needed most". As a result, future risk management resources are likely to be spent on understanding the interdependencies and the underlying sources of risk and return in different types of investments. For example, hedge funds and private equity have often been classified as alternatives, whereas in fact many hedge funds have large equity biases and often significant beta to equity market indices. Private equity can be viewed as "public equity on steroids" or, to put it more accurately, highly levered public equity-like investments; except they are illiquid and contain significant capital commitments that may be called at the most inopportune time.

Vendors of risk management systems, such as MSCI Barra, are likely to continue to invest significantly in the enhancement of multi-asset class risk models. These can offer insights into the underlying sources of risk and return across a wide range of investments, including so called alternatives like private equity, hedge funds and real estate.

Further work is also needed to enhance the 'risk manager's toolbox'. In particular, the development of liquidity and counterparty risk management tools and data is a key requirement for the industry going forward. Stress testing and scenario analysis will become mainstream tools across the industry but first there is a need to educate users and define best practices for stress testing and scenario analysis. Open questions include the type of scenarios one should perform and, most importantly, how should worst case scenarios impact asset allocation, portfolio construction, and risk management.

Finally, many asset managers believe that their risk management capabilities will become a very important success factor going forward.

## Contact Authors

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## APPENDIX 1: KEY SURVEY STATISTICS

- 30% of the surveyed asset managers have no Chief Risk Officer function
- Only 17% of surveyed corporate pension funds have a Chief Risk Officer function, compared to 80% of surveyed public plans and 70% of surveyed asset managers
- 10% of surveyed pension funds give risk managers veto authority, while 10% of surveyed pension funds have no minimum risk management capabilities from their external managers
- Though all surveyed asset managers invest in multiple asset classes, only 26% use the same risk model across asset classes.
- 73% of surveyed pension funds and 26% of surveyed asset managers do not run stress tests currently but cite this as a key focus area going forward
- Only 40% of surveyed asset managers and 18% of surveyed pension funds run stress tests by shocking factors within a factor model, while the most common stress tests were macroeconomic shocks (including shocks to currencies, commodities, interest rates, etc.) and/or market wide asset class shocks
- 20% of respondents are planning to add tail risk measures where none existed previously

## APPENDIX 2: ASSET MANAGER SURVEY

Recent events have highlighted the need for guidance on what constitutes “best practices in market risk management.” Risk management requires a structure which tackles multiple aspects of risk, and is not just limited to a single measure like Tracking Error or Value at Risk. It requires a clear understanding of the different functions within risk management. We are seeking feedback on the current practices on the three pillars of risk management: Risk Measurement, Risk Monitoring, and Risk Management (or Risk-Adjusted Investment Management – RAIM). Risk Measurement refers to the tools institutional investors use to measure risk. Risk Monitoring focuses on the process of evaluating changes in portfolio risk over time. RAIM refers to how investors adjust their portfolios in response to these changes in risk. This survey will try to explore issues related to risk management among institutional investors, focusing on ongoing/future changes in risk management practices as they relate to measurement, monitoring and managing market risk.

### Basic Information

#### 1. What is your AUM?

< \$10 Billion \_\_\_\_\_ \$50-250 Billion \_\_\_\_\_  
 \$10-50 Billion \_\_\_\_\_ > \$250 Billion \_\_\_\_\_

#### 2. What is your current product mix?

	U.S.	Non-U.S.
EQUITIES		
BONDS		
CURRENCY/MONEY MARKET		
OTHER		

### Risk Management Structure

1. What is the main purpose/goal of investment risk management at your company? Is there a specific outcome you would most like to guard against or plan for?

2. Do you have a Chief Risk Officer function and if so who is the CRO reporting to (CEO, CIO, etc.)?

YES \_\_\_\_\_ NO \_\_\_\_\_ Reporting to: \_\_\_\_\_

3. How would you describe your job? What is the key goal of your function within the organization and its investment process?

4. Does the risk manager have veto authority on investment decisions?

YES \_\_\_\_\_ NO \_\_\_\_\_

If not, what is the extent to which the risk manager is involved in investment decisions?

5. Do you have a risk committee consisting of senior members across different functions (i.e., governance, legal, investments, trading, etc.)?

YES \_\_\_\_\_ NO \_\_\_\_\_

If so can you describe its purpose and responsibilities?

6. Do your investors require certain minimum risk management capabilities from you?

YES \_\_\_\_\_ NO \_\_\_\_\_

a. If yes, what are the requirements?

b. Are you expecting more extensive risk management requirements coming from your investors? Please detail:

8. Given the recent environment do you see a need for change?

If yes, what is the most important change you are planning to introduce?

**Market Risk Measurement Practices**

1. Do you use your risk model to view risk across your portfolios/products?

YES \_\_\_\_\_ NO \_\_\_\_\_

2. Do you invest in multiple asset classes?

YES \_\_\_\_\_ NO \_\_\_\_\_

3. Do you use the same risk model across multiple asset class?

YES \_\_\_\_\_ NO \_\_\_\_\_

If no, why not?

4. Did you develop your own risk model and system in-house or do you use a third party provider for risk management?

Risk System In-House:

Third Party:

YES \_\_\_\_\_ NO \_\_\_\_\_

YES \_\_\_\_\_ NO \_\_\_\_\_

Provider: \_\_\_\_\_

	C=Currently Calculate F=Plan to Calculate in the Future	Frequency of Calculation	Frequency Reported to Investors
Volatility			
Tracking Error			
Beta			
Duration/Convexity			
Value at Risk			
Other Tail Measures			
Risk Decomposition with a Factor Model			
Risk Exposure Analysis with a Factor Model			
Stress Testing			

5. Please fill out the following table. In particular, we would like to get a sense of the following – What risk measures do you currently calculate/receive or plan to use in the near future?

6. Stress Testing: If you run stress tests, what type of stress tests do you run?

Macroeconomic \_\_\_\_\_

Market wide \_\_\_\_\_

Factor level \_\_\_\_\_

Other (please specify): \_\_\_\_\_

7. Do you have complete instrument and portfolio coverage in your risk system across all asset classes?

YES \_\_\_\_\_ NO \_\_\_\_\_

If not,

a. How much is missing as a percentage of plan assets (for derivatives please consider the notional amount)?

b. What are your main missing instruments types or asset classes?

c. Are you planning to model the missing instruments?

YES \_\_\_\_\_ NO \_\_\_\_\_

If yes, how?

8. Going forward, what change(s), if any, would you like to make regarding your risk measurement capabilities?

**Risk-Induced Adjustments**

1. Do you have risk limits in place?

YES \_\_\_\_\_ NO \_\_\_\_\_

2. Please check the types of risk measures used for risk limits currently or planned for the future:

	Currently	Future
Volatility		
Tracking Error		
Dollar Exposure to Factors		
Beta		
Duration/Convexity		
Value at Risk		
Other Tail Measures (i.e. Conditional VaR or Expected Shortfall)		
Other Risk Measures		

3. If risk limits are breached or risks become too high, what actions do you undertake (i.e., discuss with portfolio managers to resolve the violation, actively hedge/eliminate the violation, etc.)

4. Do you have overlay strategies in place to hedge certain types of risk on a tactical basis? If so, which types of risk and how do you hedge them?

5. Do you hedge against tail risk events? If so, how? If not, are you looking into doing so in the future?

6. Going forward, what change(s), if any, would you like to introduce to safeguard against rapid changes in the risk environment? Of these, what change(s) are you planning to make in the near future?

**Basic Information**

1. What is your investment horizon?

<1yr \_\_\_\_\_ 1Yr – 2Yr \_\_\_\_\_ 3Yr – 5Yr \_\_\_\_\_ 5Yr – 10Yr \_\_\_\_\_ Other \_\_\_\_\_

2. What is your current strategic asset allocation? What is the percentage of assets managed by external managers per asset class? Please fill in with percentages.

Asset Classes	Total Percentage	Percentage allocation	Internally Managed		Externally Managed	
			Active	Passive	Active	Passive
Public Equity _____		U.S. _____				
		Non-U.S.				
		Developed Market _____				
		Emerging Market _____				
Private Equity _____						
Fixed Income _____		U.S. _____				
		Non-U.S.				
		Developed Market _____				
		Emerging Market _____				
Alternatives _____		Real Estate _____				
		Hedge Funds _____				
		Others (specify) _____				

## APPENDIX 3: PLAN SPONSOR SURVEY

### 3. How often do you review your strategic asset allocation?

Short Term (1–3 years) \_\_\_\_\_

Short Term (3–5 years) \_\_\_\_\_

Other (specify) \_\_\_\_\_

### 4. What is your AUM?

<\$5 Billion \_\_\_\_\_

\$5 – \$15 Billion \_\_\_\_\_

\$15 – \$50 Billion \_\_\_\_\_

>\$50 Billion \_\_\_\_\_

### Risk Management Structure

1. What is the main purpose/goal of investment risk management at your company / in your plan? Is there a specific outcome you would most like to guard against or plan for?

2. Do you have a Chief Risk Officer function and if so who is the CRO reporting to?

YES \_\_\_\_\_ NO \_\_\_\_\_ Reporting to: \_\_\_\_\_

3. How would you describe your job? What is the key goal of your function within the organization and its investment process?

4. Does the risk manager have veto authority on investment decisions?

YES \_\_\_\_\_ NO \_\_\_\_\_

If not, what is the extent to which the risk manager is involved in investment decisions?

5. Do you have a risk committee consisting of senior members across different functions (i.e., governance, legal, investments, trading, etc.)?

YES \_\_\_\_\_ NO \_\_\_\_\_

If yes, can you describe its purpose and responsibilities?

6. Given the recent environment do you see a need for change? If yes, what is the most important change you are planning to introduce?

### Market Risk Measurement Practices

1. Do you use a risk model to aggregate risk from external (and internal) managers across asset classes?

Externally managed	Internally managed	Aggregate Ex- and Internal
YES _____ NO _____	YES _____ NO _____	YES _____ NO _____

2. Do you have a risk system in-house, do you outsource risk measurement?

Risk System In-House	Outsourced
YES _____ NO _____	YES _____ NO _____

3. Please fill out the following table. In particular, we would like to get a sense of the following – What risk measures do you currently calculate/receive or plan to use in the near future? Which are measured in-house vs outsourced?

	C=Currently Calculate F=Plan to Calculate in the Future	In-House	Provided by External Manager	Outsourced (If so, to consultant or service provider?)	Frequency of Calculation	Frequency Reported to Board
Volatility						
Tracking Error						
Beta						
Duration/Convexity						
Value at Risk						
Other Tail Measures (i. e. Conditional VaR or Expected Shortfall)						
Risk Decomposition with a Factor Model						
Risk Exposure Analysis with a Factor Model						
Stress Test Results						

4. Stress Testing: If you run stress tests, what type of stress tests do you run?

- a. Macroeconomic scenarios \_\_\_\_\_
- b. Market wide scenarios \_\_\_\_\_
- c. Factor level scenarios \_\_\_\_\_
- d. Other (please specify) \_\_\_\_\_

5. Do you have complete instrument and portfolio coverage in your risk system across all asset classes?

YES \_\_\_\_\_ NO \_\_\_\_\_

If not,

- a. How much is missing as a percentage of plan assets (for derivatives please consider the notional amount)?
- b. What are your main missing instruments types or asset classes?
- c. Are you planning to model the missing instruments?

YES \_\_\_\_\_ NO \_\_\_\_\_

If yes, how?

6. Going forward, what change(s), if any, would you like to make regarding your risk measurement capabilities?

## Monitoring External Managers

1. Do you require certain minimum risk management capabilities from external managers?

YES \_\_\_\_\_ NO \_\_\_\_\_

a. If yes, what are the requirements (i.e., how extensive do you require your managers' own risk management systems to be)?

b. Are you planning to require more extensive risk management capabilities from your managers in the future?  
If yes, please detail:

2. Do you receive position level information from external managers?

Daily \_\_\_\_\_ Monthly \_\_\_\_\_ Quarterly \_\_\_\_\_

a. If yes, how frequently do you receive position level data?

b. If not, what do you receive as the bare minimum from external managers in regards to their portfolio profile?

3. What change(s), if any, would you like to make concerning your process of monitoring external managers?

## Risk-Induced Plan Adjustments

1. Please specify the types of risk measures used for risk limits

Risk Limits for	Currently	In the Future
Volatility		
Tracking Error		
Dollar Exposure to Factors		
Beta		
Duration/Convexity		
Value at Risk		
Other Tail Measures (e.g., Expected Shortfall)		
Other Risk Measures:		

2. If risk limits are breached or risks (stress tests) become too high, what actions do you undertake (i.e., discuss with external managers to resolve the violation, actively hedge/eliminate the violation, etc.

3. Do you have overlay strategies in place to hedge certain types of risk on a tactical basis? If so, which types of risk and how do you hedge them?

4. Do you hedge against tail risk events? If so, how? If not, are you looking into doing so in the future?



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