Risk Standards Working Group

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RISK STANDARDS

FOR

INSTITUTIONAL INVESTMENT MANAGERS

AND

INSTITUTIONAL INVESTORS

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Foreword

The topic of risk management has commanded ever-greater attention in recent years from the owners of institutional investment funds and those who invest on their behalf. Reports abound of surprises and losses incurred by pension funds, public cash pools, trusts, foundations, endowment funds, institutional investment managers and insurance companies. The fault lay with a variety of causes such as unexpected market moves, failed hedges, insufficient oversight, excessive dependence on theoretical models, too much leverage or credit declines.

Many in the industry realized that guidelines, risk measurement systems and risk management practices required updating. For example, investment guidelines restricting managers to triple-A rated securities had not averted the purchase of highly-leveraged structured notes. Guidelines that restricted average maturity had not prevented the purchase of collateralized mortgage obligations with significant extension risk. The older risk management tools also failed for many in controlling the currency risk from international securities, the high volatility of emerging markets and other alternative asset classes, as well as the illiquidity and lack of transparency of many exotic instruments and private partnerships.

Over the past three years, various financial industry groups published useful guidelines for derivatives. However, no comprehensive document covers the particular problems facing fiduciaries of multi-asset class, multi-manager portfolios. While a few institutions developed their own updated risk standards, it was understandable that their managers, custodians and other providers might resist any single client's demands for costly, complex new systems and procedures—particularly if other clients might soon demand something else. What was needed was a set of widely accepted standards and the clout to give them authority.

To address these issues the Working Group was established in April, 1996 by 11 individuals from the institutional investment community whose mission was:

> *"To create a set of risk standards for institutional investment managers and institutional investors."*

The Working Group consisted of individuals from institutions with varying resources. To properly serve the industry, the proposed Risk Standards had to be general enough so that institutions of *all* sizes could apply them when updating risk measurement and risk management.

The Working Group members reached consensus on all major points and distributed 33 Draft Risk Standards to the Comment Group. Detailed and incisive comments from over 60 respondents provided the basis for a consolidation into the 20 Risk Standards presented herein. All 33 original concepts remain but were regrouped. For example, the Draft Standards on clearly defined organizational structure and key personnel were

combined, as were many of the valuation-related Standards. These Risk Standards thus reflect the thoughts and comments of senior managers from roughly 70 entities—institutional investors of all stripes, as well as money managers, broker-dealers, regulators, academics, consultants, custodians and officers of financial exchanges.

The Working Group recognizes that few, if any, institutional investors or their internal and external managers have implemented all of these Risk Standards. Much work is required to put them in place. Nonetheless, the Working Group believes these Standards provide a solid foundation for institutional investors, as well as for their internal and external managers, to update and apply risk management policies, practices and procedures in an evolving investment industry.

The Working Group also recognizes that implementing these standards will be costly. Technology costs alone for small firms are typically greater than $100,000 per year; for the largest banks and investment managers such costs can run to $100 million per year or more. Technology expenses, moreover, are typically only 10-15% of total risk management implementation costs. Scarce valuable time and attention must be expended to implement these standards even in part. There can be no doubt, however, that the deliberate and disciplined approach to understanding, measuring, monitoring and controlling risk suggested by these Risk Standards will help ensure that risks are identified, understood and acceptable.

The Working Group members wish to thank their respective institutions. The Working Group also thanks the Comment Group and all others who participated in preparing this document.

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Introduction

The Risk Standards that follow provide a guideline which institutional investors and institutional investment managers may use when planning their own risk measurement and risk management practices. Few, if any, institutions comply with all of these Standards today. Some of the Standards are in broad use while others are practices only a few institutions have implemented to date.

The manner in which institutional investors and their managers use these Risk Standards depends, in part, on their role. The “Primary Fiduciary” (e.g. Boards of Directors, Trustees, Plan Sponsors, Supervisors or their equivalent) of institutional funds can apply these standards to their internal operations and to other subcontractors, mandating compliance from both. The “Manager Fiduciary” (e.g. Board of Directors, Trustees, Chief Investment Officer) of internal and external investment managers can use them to update their own risk management and measurement systems, even if not yet required to do so by clients. Implementation of the guidelines also depends on the resources available. For example, small pension plan administrators or other small institutional investors unable to personally verify compliance by subcontractors may need to rely on independent verification by others such as internal or external auditors or consultants.

Implementation should also reflect the risk preferences, resources and capabilities of each organization. Although this document provides explanations and illustrations to help the reader understand the types of issues each Risk Standard is meant to address, the Working Group deliberately left the specifics of implementation for consideration by each organization.

These Risk Standards are only one approach to good risk management; other robust frameworks exist. All require knowledgeable, competent, prudent investment management professionals—although a key point of the Standards is that no organization should rely solely on the knowledge, competence, prudence or honesty of individuals. Even individuals with the best of intentions make mistakes. Sound organization and high-quality systems are crucial; oversight and checks and balances could have prevented many of the well-known mistakes and investment disasters of recent years.

Risk management must include proper identification, management, measurement and oversight of risk. The Risk Standards are therefore grouped into three categories: *Management*, *Measurement* and *Oversight*. Careful identification and understanding of risks, clear definition and acknowledgment of responsibilities and development and exercise of risk containment procedures with built-in protections against error or abuse are explained in the Risk Standards grouped under *Management*. The next group of Standards focuses on *Measurement* of risk in a timely, consistent manner while warning fiduciaries to be aware of the limitations of quantitative measures. The final set of Standards reviews the careful *Oversight* crucial to any investment program.

Throughout this document, references to “Primary Fiduciary” and “Manager Fiduciary” include their designees; both internal and external investment managers are included in the term "Managers."

Summary of the 20 Risk Standards

Note: Throughout this document, references to the “Primary Fiduciary” and/or “Manager Fiduciary” include their designees. References to the “Manager” include both the internal and the external investment manager.

I. Management

Risk Standard 1: Acknowledgment of fiduciary responsibility
Fiduciary responsibilities should be defined in writing and acknowledged in writing by the parties responsible.

Risk Standard 2: Approved written policies, definitions, guidelines and investment documentation
The Primary and Manager Fiduciaries should approve formal written policies which reflect their overall risk management objectives. The Primary and Manager Fiduciaries also should approve investment guidelines, management agreements and all other contracts that govern investments. Technical terms should be defined. All policies, definitions, guidelines and investment documentation should be reviewed and updated as appropriate and more often if significant market events or changes in strategy occur.

Risk Standard 3: Independent risk oversight, checks and balances, written procedures and controls
Oversight of compliance with risk policies should be independent of line investment activity and conducted according to up-to-date, written policies and procedures. Front, middle, and back office activities should be separate wherever possible and sufficient checks and balances and appropriate controls should exist. When separation is not possible due to limited staff, alternative checks, balances and controls should be established.

Risk Standard 4: Clearly defined organizational structure and key roles
Organizational structure and reporting lines should be defined clearly and distributed to all parties. Key personnel and their roles in all front, middle and back office areas should be identified. Changes in key personnel should be communicated immediately to all relevant parties.

Risk Standard 5: Consistent application of risk policies
The Primary Fiduciary’s risk policies should apply both to internal and external managers and should be consistent across similar asset classes and strategies.

Risk Standard 6: Adequate education, systems and resources, back-up and disaster recovery plans
The Primary and Manager Fiduciaries should ensure that adequate education, systems and resources are available to implement and administer their risk policies. They should also establish and test back-up procedures and disaster recovery plans.

Risk Standard 7: Identification and understanding of key risks
Risks should be analyzed to determine relevancy. This entails understanding strategies and their vulnerabilities, as well as assumptions built into an instrument, system, process, model or strategy. Key risks should be reviewed periodically as well as when significant events occur.

Risk Standard 8: Setting risk limits
Risk limits should be set for the aggregate portfolio and all individual portfolios. These may include limits on asset classes, individual instruments and specific types of risk.

Risk Standard 9: Routine reporting, exception reporting and escalation procedures
The Primary and Manager Fiduciaries should specify what positions, risks and other information must be reported and to whom. This policy also should define what constitutes required reporting or an exception to guidelines, to whom the exception should be reported, what action must be taken for different levels of violation and what procedures must be followed for ongoing or increased violations.

II. Measurement

Risk Standard 10: Valuation procedures
All readily priced instruments should be valued daily, less-readily priced instruments at least weekly and non-readily priced instruments as often as feasible and whenever a material event occurs. The pricing mechanism and methodologies must be known, understood, follow written policies and be applied consistently by the Primary and Manager Fiduciaries, Managers, custodian and other subcontractors.

Risk Standard 11: Valuation reconciliation, bid/offer adjustments and overrides
Material discrepancies in valuations from different sources should be reconciled following established procedures. A procedure for bid/offer adjustments and overrides to valuations should be established in writing and monitored independently.

Risk Standard 12: Risk measurement and risk/return attribution analysis
The Primary and Manager Fiduciaries should regularly measure relevant risks and quantify the key drivers of risk and return.

Risk Standard 13: Risk-adjusted return measures
Risk-adjusted returns should be measured at the aggregate and individual portfolio level to gain a true measure of relative performance.

Risk Standard 14: Stress testing
Simulation or other stress tests should be performed to ascertain how the aggregate portfolio and individual portfolios would behave under various conditions. These include changes in key risk factors, correlations or other key assumptions and unusual events such as large market moves.

Risk Standard 15: Back testing
Risk and return forecasts and models should be back tested at least quarterly and whenever material events occur to assess their reliability.

Risk Standard 16: Assessing model risk
Dependence on models and assumptions for valuation, risk measurement and risk management should be evaluated and monitored.

III. Oversight

Risk Standard 17: Due diligence, policy compliance and guideline monitoring
The Primary and Manager Fiduciaries should perform frequent, independent reviews of all Managers' risk policies and controls. Where policies and controls fall short of the requirements set forth by the Primary or Manager Fiduciaries, plans for future compliance or corrective action should be documented and communicated. Managers should ensure continuing compliance with their clients' risk policies and guidelines.

Risk Standard 18: Comparison of Manager strategies to compensation and investment activity
The Primary Fiduciary should require each Manager to submit a statement of strategy and ensure that the Manager's activities and compensation are consistent with that strategy. Key risk and return factors should be documented and reviewed at least annually and updated whenever the strategy changes.

Risk Standard 19: Independent review of methodologies, models and systems
All methodologies, models and related systems should be independently reviewed or audited prior to use as well as annually. Significant market moves or changes in market practice should trigger interim reviews.

Risk Standard 20: Review process for new activities
The Primary and Manager Fiduciaries should document the review process for permitting the use of new instruments, strategies or asset classes. Policies for initiating new activities should be consistent with the Primary and Manager Fiduciaries' risk and return goals as well as the Manager's strategy and expertise.

Note: Throughout this document, references to the "Primary Fiduciary" and/or "Manager Fiduciary" include their designees. References to the "Manager" include both the internal and the external investment manager.

I. Management

Risk Standard 1: Acknowledgment of fiduciary responsibility

Fiduciary responsibilities should be defined in writing and acknowledged in writing by the parties responsible.

To avoid misunderstandings, written documents should specify fiduciary assignments made or received. The Primary and Manager Fiduciaries should document the assignment of fiduciary responsibility before the allocation or receipt of assets. Documents should specify and acknowledge in writing the capacity of individuals or organizations to enter into agreements on behalf of the Primary Fiduciary and articulate the nature and limits of each party's status as agent or principal for specific activities. Documents should specify that the Manager Fiduciary has accepted a fiduciary assignment from a Primary Fiduciary and should cover individuals as well as firms.

While the Primary Fiduciary may select a Manager to invest its funds, it *cannot* delegate the responsibilities and liabilities attached to being the Primary Fiduciary. The possibility of lawsuits claiming that a party did not adequately perform its fiduciary responsibilities is a strong motivation to articulate and document fiduciary assignments as well as to monitor compliance carefully.

There are three principal types of accounts with regard to fiduciary responsibility. Each should be defined clearly.

- *Directed accounts*, for example: "Invest only in S&P 500 stocks and vote with management."
- *Discretionary accounts*, for example: "Invest in assets of your choice and vote as you wish."
- *Mixed accounts*, for example: "Invest in common stocks and own 200 names. We will retain voting rights."

For directed accounts, the Primary Fiduciary retains all responsibility for the investment decision, choice of asset class, choice of investment instrument and all associated rights. For discretionary accounts, the Primary Fiduciary delegates broad fiduciary rights. This should be documented to reduce misunderstandings as to the Manager's investment latitude, a common area of dispute when investments go awry. For mixed accounts, the Primary Fiduciary delegates only a portion of its fiduciary duties (the selection of stocks).

Each time the Primary Fiduciary hires a new Manager, or changes the investment guidelines or directives to an existing Manager, both the Primary and Manager Fiduciary should re-define and re-document their fiduciary responsibilities.

Risk Standard 2: Approved written policies, definitions, guidelines and investment documentation

The Primary and Manager Fiduciaries should approve formal written policies which reflect their overall risk management objectives. The Primary and Manager Fiduciaries also should approve investment guidelines, management agreements and all other contracts that govern investments. Technical terms should be defined. All policies, definitions, guidelines and investment documentation should be reviewed and updated as appropriate and more often if significant market events or changes in strategy occur.

Written policies should encompass the investment philosophy and risk appetites of the Primary and Manager Fiduciaries. Typically, these require the creation of more detailed documents and standards for the individual Manager, portfolio or asset class which include examples specific to the user. For example, a plan sponsor's internal guidelines should provide examples that relate to the management of a pension fund. A Manager's guidelines should provide examples that relate to its specific instruments, portfolio and particular strategy.

Approved written standards applied consistently and appropriately have several advantages over reliance on culture or apprenticeships:

- Written standards are less prone to intentional or unintentional omission
- Written standards allow those new to an organization to study the risk management policies of the organization, rather than to learn by trial and error
- Written definitions accompanied by pertinent examples reduce the likelihood of incomplete communications, ambiguities or misinterpretations

Poorly specified guidelines can lead to problems. Guidelines that explicitly allow "hedging," but not "speculation," may or may not permit proxy hedging. An example of a proxy hedge is the use of Swiss francs to hedge the currency risk in a German equity investment. Some may consider this a hedge, based on the assumption that the two currencies will move closely together. Others may consider this speculation because there is no guarantee that the Deutschemark and Swiss franc will move together.

Other problems can result from poorly defined permitted investment definitions. A portfolio may satisfy the literal restriction "only government securities are permitted," but violate the intent of the restriction if it contains agency notes whose coupon payment is linked to the return of the stock market. Alternately, two portfolios which meet the guideline requirement that they "maintain an average maturity of five years" may have significant differences in yield curve exposure if one portfolio consists of

five-year instruments and the other of a combination of 3-month Treasury bills and 30-year bonds.

Common terms that require definition include risk, hedging, speculation, derivative, complex, leverage, benchmark, average maturity, government security and high quality. Descriptors such as material, relevant and significant should also be defined.

In many capital markets, documentation has been developed to limit credit and other exposures. For example, master counterparty agreements for derivatives transactions reduce credit exposure by allowing the netting of payments in the case of default. The current trend to include foreign exchange forwards and options contracts under master swap agreements further reduces counterparty exposure.

The Primary and Manager Fiduciaries should update their policies periodically to reflect changing circumstances, new instruments or other relevant changes. Meaningful changes in an institutional investor's or investment manager's business, strategy, goals, risk appetite, capital requirements, markets or products should trigger formal reviews. Amendments to policies and guidelines should re-affirm what remains and what is changed in the previous document to avoid conflicts between the two versions.

Risk Standard 3: Independent risk oversight, checks and balances, written procedures and controls

Oversight of compliance with risk policies should be independent of line investment activity and conducted according to up-to-date, written policies and procedures. Front, middle, and back office activities should be separate wherever possible and sufficient checks and balances and appropriate controls should exist. When separation is not possible due to limited staff, alternative checks, balances and controls should be established.

Unauthorized trading by individuals can go undetected for months or years if audits or other oversight are insufficient or because other checks and balances are not in place. Traders and portfolio managers who oversee themselves or perform their own portfolio valuations can make mistakes or intentionally understate risk, hide losses or overstate their own performance (and perhaps compensation due). These potential conflicts of interest make it crucial to ensure independent oversight for all major activities and separation of the front office (e.g. portfolio management, manager selection, trading, investment research), the middle office (performance and risk measurement, compliance, legal, risk oversight, controllers) and the back office (accounting, administration, operations).

For example, position reports should be monitored by individuals outside the trading group who do not report directly or indirectly to the head of trading. The position reports should verify that investments are as reported by managers, that ownership is

properly documented, cash balances reconciled and exceptions reported and acted upon (Risk Standard 9).

Where possible, an independent internal group or individual should perform oversight. Small institutional investors or Managers without a separate risk oversight function should use random audits and develop other internal checks and balances to make the best use of limited resources. The Primary Fiduciary should supervise its Managers closely in these circumstances. Auditors or independent third parties may also be used. Functions checked independently should include such items as:

- Oversight of investment activity (Risk Standards 17 and 18)
- Limits, monitoring, exception reports and action plans relating to exception reports (Risk Standards 8 and 9)
- Valuations and pricing methodologies (Risk Standards 10 and 19)
- Stress tests and back tests (Risk Standards 14 and 15)

The Primary and Manager Fiduciaries should verify that Managers conduct independent risk oversight of their employees and activities. Further, the individual or unit of an institutional investor that selects external managers should not be charged solely with overseeing them.

Each organization should prepare a written plan that contains cost and time estimates of the systems, personnel, training and data necessary for risk oversight (Risk Standard 6).

Risk Standard 4: Clearly defined organizational structure and key roles

Organizational structure and reporting lines should be defined clearly and distributed to all parties. Key personnel and their roles in all front, middle and back office areas should be identified. Changes in key personnel should be communicated immediately to all relevant parties.

To avoid confusion or misunderstandings, the Primary Fiduciary, Managers and subcontractors (such as custodians) should delineate clearly responsibility and accountability for all functions, including risk measurement, risk management and oversight. Organizational and functional charts that address both line responsibility and oversight responsibility should be compared to reveal areas where there may be a conflict of interest, inadequate checks and balances, lack of assigned responsibility or unofficial authority (Risk Standards 1 and 3). Functional charts should specify who is authorized to do what—and who is not. For example, a functional chart should specify the individuals authorized to trade and those authorized to clear trades and might explicitly forbid traders to clear trades. An organizational chart should specify the reporting lines for internal audit and other checks and balances to ensure oversight exists for each function and is independent of the area overseen.

Functional charts should be used also to identify all individuals who are vital to the functioning of an organization. For an institutional investor, the loss of a sole Manager with particular investment or risk management skills might force the sudden, and perhaps unskilled, liquidation of that portfolio. Senior managers are *not* the only key personnel in an organization. For example, chaos might follow the abrupt resignation of the only person responsible for maintenance and trouble-shooting of software or systems. Risk policies should include specific provisions for immediate notification of the loss or change in any key personnel. The Fiduciary and its subcontractors should document their succession plans for key personnel and train backups.

Risk Standard 5: Consistent application of risk policies

The Primary Fiduciary's risk policies should apply both to internal and external managers and should be consistent across similar asset classes and strategies.

Because internal managers can pose the same risks as their external peers, culture and proximity are unreliable restraints. Therefore, all Managers should be subject to consistent investment management agreements, written objectives and guidelines (Risk Standard 2). Note that these may vary by asset class or strategy, but policies and performance evaluation should be consistent across the same peer group universe.

Each time the Primary Fiduciary establishes a new portfolio or moves a portfolio, it should provide a copy of its current risk policies to the Manager. A separate document should describe how the risk policies apply to that Manager. If a Manager runs several portfolios for a given client, separate policies should govern each.

Risk Standard 6: Adequate education, systems and resources, back-up and disaster recovery plans

The Primary and Manager Fiduciaries should ensure that adequate education, systems and resources are available to implement and administer their risk policies. They should also establish and test back-up procedures and disaster recovery plans.

Successful implementation of these Risk Standards requires a knowledgeable and responsible fiduciary and well-trained and capable professionals in the front, middle and back office (including adequate systems for position-keeping, processing, settlement, compliance monitoring and reporting). Sufficient funds must be allocated for necessary resources in the systems, personnel and risk oversight areas. All relevant employees (both new and existing) should receive copies of the risk policies and should confirm in writing that they have read and understood them. Employees should receive promptly copies of updates or changes and should sign re-confirmations at least annually.

Back-up and recovery plans are crucial, as physical disasters such as the World Trade Center bombing, the Chicago flood, California earthquakes and hurricanes in the Southeastern U.S. made clear. Financial interruptions such as market trading halts or technological disasters such as systems, communications and power failures or software viruses also have proven the need for back-up and disaster recovery plans.

A disaster plan should include access to duplicate records of investment inventory, legal title to positions, master counterparty agreements, authorities and scheduled cash inflows and payments. It should prepare the organization to resume operations off-site in a reasonable amount of time if the primary location shuts down and should include access to contingency financing in case of a liquidity crisis.

Back-up and disaster recovery plans are necessary for the Primary and Manager Fiduciaries, custodians and other subcontractors. Each should conduct trial runs to test the adequacy of its plans as well as the plans of those on whom they rely whether these are to be implemented by trained internal staff or outsourced to a specialty firm.

Risk Standard 7: Identification and understanding of key risks

Risks should be analyzed to determine relevancy. This entails understanding strategies and their vulnerabilities, as well as assumptions built into an instrument, system, process, model or strategy. Key risks should be reviewed periodically as well as when significant events occur.

Risk comes in many forms including market (e.g. price deterioration), credit (default), legal (a contract deemed invalid), operational (systems failure), suitability (sale of inappropriate instruments to a municipal cash pool), asset/liability (mismatch), personnel (loss of a key person), internal liquidity (unexpectedly large demand for cash that forces a fire-sale), market liquidity (wide bid/ask spreads) and dozens of others. The Primary and Manager Fiduciaries should determine which risks are *relevant* to a given portfolio, strategy or instrument by asking such questions as:

- What events, even if unlikely, could cause a large change in market value or risk?
- How likely are such events to occur?
- What risks offset each other? By how much?
- How likely is it that these risks will offset each other as expected?
- What could go wrong and result in losing more money than is acceptable or increasing risk too much?
- What assumptions are built into a model or strategy? Do they make sense?
- How reliable are the models on which your risk analysis is based?
- How different are the results from other available models?

Identification of relevant risks prevents draining scarce resources on monitoring risks that are not relevant (foreign currency risk in a domestic portfolio) or are extremely

improbable (obliteration of a well-established market such as the U.S. equity market). Analyses should distinguish between prohibited risks (currency risk in a domestic bond portfolio), required risks for a strategy or instrument (beta in an equity portfolio), desired risks (credit exposure of a particular name or yield curve risk in a bond portfolio) and those that are subject to established limits (concentration risk).

In order to facilitate the understanding and identification of relevant risks, the Primary and Manager Fiduciaries should clarify what type of risk disclosures it expects from all Managers, subcontractors, counterparties and broker-dealers.

Institutional investors and Managers should re-analyze their risks on a scheduled basis and whenever significant change occurs. Key risks may vary over time due to changes in portfolio composition as well as paradigm changes in markets and economies. For example, the impact of the Mexican peso's collapse on other Latin American markets and even some markets in Asia forced investors to recognize the risk of temporary linkage between falling markets. Parliament's decision that the municipalities of Hammersmith and Fulham were not authorized to enter into certain over-the-counter transactions triggered a review of trade authorization risk throughout the derivatives markets. Other significant changes in portfolio behavior, market practice or models should trigger a re-examination of the key risks in a portfolio.

When hiring or reviewing a Manager, investors should consider both the individual Manager's risks as well as how those risks fit within the context of the investor's aggregate portfolio of Managers. Exposures to instruments, strategies and individual Managers should be analyzed to ensure they are within limits. A new Manager that trades actively, for example, might increase total trading activity within the aggregate portfolio to a level that the investor or its custodian cannot adequately monitor. On the other hand, a Manager who takes a contrarian, fundamental approach to buying U.S. value stocks may diversify the risk from several managers who trade on momentum.

Risk Standard 8: Setting risk limits

Risk limits should be set for the aggregate portfolio and all individual portfolios. These may include limits on asset classes, individual instruments and specific types of risk.

The Primary and Manager Fiduciaries should establish limits at the instrument, aggregate and individual portfolio level for all relevant risks (Risk Standard 7). Examples of such limits include credit and market risks, net exposure (the combination of long and short positions), tracking error relative to a benchmark (for the individual and the aggregate portfolio), duration risk relative to a benchmark (for a bond portfolio), industry concentration (for an equity or corporate bond portfolio) or the percentage of a portfolio that is "non-readily priced," illiquid or dependent upon theoretical models (Risk Standard 10).

Often, risk limits are expressed in notional terms. For example, "10% of the dollar value of a U.S. bond portfolio may be invested in international bonds." Other limits are expressed through measures of risk such as duration, tracking error or value-at-risk (e.g. "10% of the value at risk can be invested in bonds") (Risk Standard 12). Risk limits should be meaningful in the context of the current portfolio and market environment and not solely based on history.

Risk limits, of course, may at times reduce expected returns. The Fiduciary should examine this risk/return tradeoff.

Risk Standard 9: Routine reporting, exception reporting and escalation procedures

The Primary and Manager Fiduciaries should specify what positions, risks and other information must be reported and to whom. This policy also should define what constitutes required reporting or an exception to guidelines, to whom the exception should be reported, what action must be taken for different levels of violation and what procedures must be followed for ongoing or increased violations.

After identifying relevant risks (Risk Standard 7), the Primary and Manager Fiduciaries should specify what positions, risks and other information should be reported, how often and to whom.

An important lesson from the past is that extraordinary performance can lull investors into a false sense of security. Many U.S. bond investors realized the risk implicit in bull market securities after the bond market crashed in 1994; many emerging markets investors awoke to the event risk in some markets after the Mexican peso crashed in late 1994. Similarly, firms and investors questioned the extraordinary performance of rogue traders only after it was too late. It is as important to be as suspicious of unexpected outperformance as of underperformance. Both may indicate mispriced, unintended or misunderstood risks.

Key to effective risk control is an early warning system for problems and violations. It is crucial to rely on established reports and procedures, rather than culture or single individuals to sound the alarm. Both the Primary and Manager Fiduciaries should decide in advance which risk policies, guidelines or limits, if violated, require exception reports, who is responsible for monitoring and reporting exceptions and to whom they must be reported. Exception policies should also include what corrective actions, if any, should take place and within what time-frame, who will monitor the corrective actions and who is authorized to make exceptions to the exception policy.

A typical escalation procedure requires progressively more senior staff to be notified of exceptions which go unaddressed or exceptions which increase.

Oversight of the exception reporting and response process should be performed by individuals independent of those who are directly responsible for monitoring and reporting exceptions. If that is impossible, adequate checks and balances should be

established (Risk Standard 3). The Primary and Manager Fiduciaries should ensure that all Managers are subject to consistent reporting, exception reporting and escalation procedure requirements (Risk Standard 5).

II. Measurement

Risk Standard 10: Valuation procedures

All readily priced instruments should be valued daily, less-readily priced instruments at least weekly and non-readily priced instruments as often as feasible and whenever a material event occurs. The pricing mechanism and methodologies must be known, understood, follow written policies and be applied consistently by the Primary and Manager Fiduciaries, Managers, custodian and other subcontractors.

Accurate and frequent valuation is a fundamental aspect of measuring risk and monitoring compliance within the stated strategy and established risk limits. As a practical matter, the frequency of valuation depends on the instrument.

Readily priced instruments such as publicly traded securities, exchange-listed futures and options, and many over-the-counter securities and derivatives can be priced daily. These instruments are often tracked and priced by exchanges, data vendors, brokers and dealers. Actual market price information may be obtained either electronically or in published form. Positions or portfolios may be valued or "marked-to-market" on the basis of such quotes.

The Primary and Manager Fiduciaries should each set up procedures for pricing these instruments daily. Often this task is delegated to an external portfolio management service, custodian or pricing service after appropriate procedures, quality controls and checks and balances are established. Pricing may be performed internally, as long as there are appropriate checks and balances and independent verification (Risk Standard 3). The Primary Fiduciary should document and understand the pricing procedures and these should be consistent across all Managers, the custodian and other subcontractors

Less-readily priced instruments, such as complex CMOs, exotic derivatives, many private placement notes and other custom instruments should be priced as often as possible and at least weekly. Often the values of less-readily priced instruments provided by dealers, custodians and third-party pricing services are based on theoretical models. Because these valuations are not based on market sale prices, these instruments are sometimes said to be "marked-to-model."

For such instruments, the model and pricing mechanism must be made explicit so that they may be verified independently (Risk Standard 19). The Primary and Manager Fiduciaries should document the procedures, including key data assumptions and type of model (such as matrix pricing or option-adjusted spread models). They should also analyze the degree of model risk that exists for such instruments (Risk Standard 16).

The Primary Fiduciary should ensure the procedures for similar instruments are consistent across all Managers, the custodian and other subcontractors.

The Primary and Manager Fiduciaries should document the basis of the valuations; for example, firm bid/offers, broker/dealer indications or estimates based on internal models. In all cases, the Primary and Manager Fiduciary should document what methodology will be used, specify the minimum number of brokers or dealers to be polled and establish a policy for selecting a single valuation if there are disparate quotes.

Non-readily priced assets such as real estate and private equity stakes are difficult to price frequently. The Primary and Manager Fiduciaries should make explicit what valuation method (such as theoretical model, appraisal, committee estimate or single-dealer quote) should be used to facilitate independent verification (Risk Standard 19).

For such instruments, valuations should be performed as frequently as feasible and whenever a material event occurs. Note that the Primary and Manager Fiduciaries should define “material” (Risk Standard 2). The key drivers of value of a non-readily priced instrument should be determined (Risk Standard 12). Changes in key drivers and key events should trigger a valuation update.

The Primary and Manager Fiduciaries should document the accuracy and reliability of pricing data and ensure that all valuations and risk/return measurements are performed consistently across Managers, the custodian and other subcontractors as well as independently of them (Risk Standards 3 and 5). The ultimate authority on valuation for each instrument type should be determined by the Primary Fiduciary and stated in writing. Exceptions to any valuation procedures should be known and reported under established policies (Risk Standard 9). The Primary and Manager Fiduciaries should approve explicitly any valuation process that relies upon the Manager who holds the asset. Investors should also take care that multiple valuations do not ultimately depend on a single pricing source.

The Primary and Manager Fiduciaries should allocate the necessary resources to value non-readily priced instruments. To the degree this increases the cost of holding certain investments, the increased cost should be considered when measuring performance.

For all instrument types, the Primary and Manager Fiduciaries should determine whether the pricing agent has incentives to inflate or deflate valuations. Finally, valuations should be reported and all trades recorded and documented on a timely basis (generally daily).

Risk Standard 11: Valuation reconciliation, bid/offer adjustments and overrides

Material discrepancies in valuations from different sources should be reconciled following established procedures. A procedure for bid/offer adjustments and overrides to valuations should be established in writing and monitored independently.

Differences in valuations between different Managers or between Managers and custodians or other subcontractors should be reconciled under established procedures at least monthly, or more frequently if material differences occur. If consistent valuation procedures are applied by the Managers, custodian and other subcontractors, any price differences can usually be explained by error, bid/offer spread adjustments or valuation overrides.

For all instruments, the Primary and Manager Fiduciaries should approve and document the mechanism for any bid/offer adjustments. For example, complex engineered securities tailored to meet the needs of a specific Manager may contain a substantial bid/offer spread that reflects illiquidity, operational burdens on the dealer, the cost of innovation and a dealer mark-up. The bid/offer adjustment may be proposed by the Manager in order to amortize the bid/offer spread over the life of the asset. Bid/offer adjustments may be required for simple instruments as well. Large positions in readily priced stocks or bonds may be valued by custodians and others based on closing prices for small round lots and thus reflect an inadequate bid/offer spread. The degree to which the bid/offer spread is (or is not) included in initial and ongoing valuations should be established under a written policy and monitored.

Overrides are adjustments made by a Manager to valuations provided by independent parties under established valuation procedures (Risk Standard 10). Typically, overrides occur during periods of market dislocation when a Manager believes the independent valuation is incorrect. Although their belief at times may be well-founded, all overrides should be reported and investigated if the differences in valuation are material.

The Primary and Manager Fiduciaries should establish written policies and procedures that set forth the circumstances, notification and approval process for all overrides. These policies and procedures should be communicated to all relevant parties such as the Primary and Manager Fiduciaries, relevant oversight staff and custodians. In addition, the number and magnitude of overrides should be tracked and reviewed by the Primary Fiduciary on an ongoing basis to confirm that all material adjustments have been investigated and that practices are consistent with the override policy.

Risk Standard 12: Risk measurement and risk/return attribution analysis

The Primary and Manager Fiduciaries should regularly measure relevant risks and quantify the key drivers of risk and return.

The Primary and Manager Fiduciaries should measure the total risk in the overall portfolio, individual portfolio and each instrument. Then, they should perform attribution analyses to determine the various risks and returns posed by each instrument or portfolio.

Value-at-risk (VAR) is one widely used method for creating a common unit of measurement for risk. It is the maximum dollar (or other currency) amount that a position or portfolio is expected to lose within a specified period of time given a specified probability. There are a number of approaches to computing VAR. The results are quite sensitive to the assumptions made and model used, and both should be understood (Risk Standard 16). One common VAR method for which data is widely available is a parametric approach using historical volatility and correlations between assets.

Other risk measures commonly used include duration, beta, standard deviation, semi-variance, tracking error and drawdown size. It is important to verify that the risk measure chosen captures the relevant risks (Risk Standard 7).

Institutional investors and institutional investment managers also should perform both risk and return attribution analyses of all portfolios along all relevant dimensions. A *return attribution analysis* looks at historical performance of a portfolio to determine the key drivers of returns. A *risk attribution analysis* looks at the key sources of risk and the volatility of returns in the current or anticipated portfolio to determine the key drivers of risk. For example, a risk attribution analysis of a U.S. bond portfolio might quantify duration, yield curve, convexity and sector risk in absolute terms or relative to a benchmark. A risk attribution analysis of a U.S. equity portfolio might use a risk factor model to quantify the various sources of absolute and benchmark-relative risk.

The Primary and Manager Fiduciaries also can use risk attribution analysis to monitor whether a Manager is adhering to its stated strategy (Risk Standard 18) and to measure aggregate factor risks from multiple Managers or portfolios. Individual portfolio managers can use risk attribution analysis to make sure they are not taking more of a given risk than their limits allow and to ensure broad diversification of risk.

Risk Standard 13: Risk-adjusted return measures

Risk-adjusted returns should be measured at the aggregate and individual portfolio level to gain a true measure of relative performance.

Investors should compare all Managers on a risk-adjusted basis. By taking into account both the risk and return sides of the equation, risk-adjusted return measures

enable investors to evaluate better the relative performance of two managers. Risk-adjusted measures also highlight instances in which a manager's outperformance is due to incurring misunderstood, mispriced, unintended or undisclosed risks.

Consider, for example, two portfolios that each returned 200 basis points over the same bond index for a given year. The first portfolio manager invested in U.S. Treasury securities; the second purchased distressed debt in emerging markets. A risk-adjusted measure applied to the 200 basis points of outperformance of each one would adjust for the differing market volatility, credit risk and foreign exchange risk between the two portfolios and show that the first portfolio may be more desirable on a risk-adjusted return basis.

Risk-adjusted return measures also permit a more meaningful comparison of a Manager's performance relative to its benchmark. If a Manager exceeds the benchmark return by 20%, but takes 30% more risk, his performance is less impressive than if he achieved the same excess return with risk equal to or less than the benchmark.

Common measures of risk-adjusted returns include the information ratio, Sharpe Ratio, Treynor Measure and Sortino Ratio. It is important to verify that the risk-adjusted measure chosen captures the relevant risks (Risk Standard 7).

Risk Standard 14: Stress testing

Simulation or other stress tests should be performed to ascertain how the aggregate portfolio and individual portfolios would behave under various conditions. These include changes in key risk factors, correlations or other key assumptions and unusual events such as large market moves.

All investors, internal managers and external managers should test the likely impact of various market conditions or other events on the value of an instrument, portfolio or strategy by performing stress tests. These are typically simulations, which may be performed on a scenario, historical, simulation or random sampling basis (Monte Carlo analysis).

Strategies that pose little risk under normal market conditions may fall apart when the abnormal occurs. Alternately, strategies that hold up under large market moves (stock market crashes, huge interest rate swings) may fall apart under more subtle changes. Investors and managers should test both the impacts of large market moves and of combinations of small market moves to identify those that are likely to affect the portfolio. For example, a relative value trade that involves selling the 10-year Treasury and buying the 5-year is much more sensitive to the spread between 10-year and 5-year rates than to equal increases or decreases in both rates (parallel shifts of the yield curve). Other relevant stress tests include how risk and return change under the use of different assumptions or models (Risk Standard 16). Emphasis should be

placed on stress testing the key risk factors identified in Risk Standard 7. Events that would breach risk limits, strategy goals, liability targets or asset allocation ranges should be monitored and acted upon.

Stress tests should be performed at least quarterly and whenever material events occur at the aggregate fund and manager portfolio level, incorporating asset/liability issues as relevant. “Material events” include significant changes in the market as well as in the strategy or composition of a Manager’s portfolio or a change in Managers. The Primary Fiduciary should ensure that a consistent, well-defined process is used by all Managers as well as at the portfolio level. Assumptions embedded in the stress testing process should also be stress tested. The stress testing process should also be back tested to see whether the process would have forecasted accurately past outperformance, past underperformance and performance under past market shocks (Risk Standard 15).

Note that the same stress test on a portfolio with stable composition may reveal little impact at one time and great impact at another without any change in market conditions. This is most often true of options-based and mortgage portfolios, whose risk characteristics change over time.

Finally, stress tests should take into account all types of leverage and related cash flows, including such items as:

- Loans (reverse repurchase agreements)
- Instruments that control leveraged market positions (options)
- Instruments with internal leverage (structured notes with embedded leverage or high-Beta stocks)
- Initial and variation margin requirements (exchange-traded or over-the-counter futures, forwards or options)

Risk Standard 15: Back testing

Risk and return forecasts and models should be back tested at least quarterly and whenever material events occur to assess their reliability.

Institutional investors and Managers should back test all models and forecasts of expected risk, return and correlations for instruments, asset classes and strategies. Back tests involve evaluating how a strategy, instrument or model actually performed for a given period versus what was predicted by a risk or return forecast. Comparing back testing results to actual experience also helps to evaluate the robustness of an estimate for a strategy, instrument or model. This provides a useful framework for assessing the strategy’s, instrument’s or model’s value as an investment or risk management tool.

Typical questions a back test helps to answer include:

- How would the strategy, instrument, risk forecast or model have performed under certain past stressful market conditions (such as the Mexican peso devaluation, the stock market crash, the European currency crisis, the Federal Reserve rate hikes during 1994 or the 1973 oil shock)?
- Was past performance or risk due to the presence of a sustained bull or bear market condition or other market condition (steep yield curve, strong technology sector, large cap performance)?
- What economic conditions provide the best environment for the strategy, instrument or model?
- When has the strategy, instrument or model not performed well?

Back tests should also be performed in the overall portfolio or fund context. This may help the investor to assess the risk of multiple strategies failing under similar market or economic conditions.

Risk Standard 16: Assessing model risk

Dependence on models and assumptions for valuation, risk measurement and risk management should be evaluated and monitored.

Virtually all market participants are exposed to mark-to-model risk. The degree of exposure depends upon the type and concentration of less-readily priced and non-readily priced instruments (Risk Standard 10) in individual and aggregate portfolios and on the type of valuation, risk and strategy models used. The Primary and Manager Fiduciaries should evaluate and monitor both the extent to which their management of risk and return changes under different models and assumptions that are widely used in the market place, as well as the degree to which the percentage of assets changes from readily priced to other valuation categories (see Risk Standard 10) from period to period. Dependence on assumptions within models should be stress tested (see Risk Standard 14). Important dimensions of model risk to analyze include:

- Data integrity (e.g. curve construction, differing sources of data, representativeness and statistical significance of samples, time of day data is extracted, data availability and errors)
- Definition and certainty of future cash flows (formula-driven cash flows or flows that depend on an option)
- Formula, algorithm or other mathematical engine (Black-Scholes versus Hull & White for options valuation)
- Liquidity assumptions (length of time to liquidate and bid/ask spreads)
- Model parameter selection (selection of spreads, discount rates, scenario and stress test parameters, probability intervals, time horizon, correlation assumptions)

III. Oversight

Risk Standard 17: Due diligence, policy compliance and guideline monitoring

The Primary and Manager Fiduciaries should perform frequent, independent reviews of all Managers' risk policies and controls. Where policies and controls fall short of the requirements set forth by the Primary or Manager Fiduciaries, plans for future compliance or corrective action should be documented and communicated. Managers should ensure continuing compliance with their clients' risk policies and guidelines.

Before committing new or additional funds, the Primary Fiduciary should establish an ongoing due diligence process for reviewing a prospective investment strategy or Manager, including risk management, risk measurement and risk oversight capabilities and compliance with these Risk Standards. The process should be documented to avoid incomplete, inadequate or inconsistent reviews (Risk Standards 2 and 5). The due diligence process may be carried out through a combination of meetings, telephone interviews and written questionnaires.

The Primary and Manager Fiduciaries should independently verify compliance with risk policies and other requirements at least annually at both the aggregate and individual portfolio level and whenever a material change or exception occurs (Risk Standard 9). The Primary and Manager Fiduciaries should require Managers to provide notification of any material change and affirm in writing at least annually that they are in compliance with these requirements and other investment guidelines. Guideline compliance monitoring should be an ongoing and possibly daily task, its frequency depending on the nature of the guidelines and limits.

One form of compliance review is a risk audit by an independent third party. If this is not practicable or affordable, the Primary and Manager Fiduciaries should internally verify compliance with guidelines and regulations, ensuring that staff members performing this task are independent of those whose compliance they review (Risk Standard 3).

Risk Standard 18: Comparison of Manager strategies to compensation and investment activity

The Primary Fiduciary should require each Manager to submit a statement of strategy and ensure that the Manager's activities and compensation are consistent with that strategy. Key risk and return factors should be documented and reviewed at least annually and updated whenever the strategy changes.

Typically, the Primary Fiduciary selects a Manager based on the Manager's perceived skill and value of the strategy. The Primary Fiduciary should understand each Manager's strategy and rationale for trades. If, in the case of a discretionary "black box" strategy, the Primary Fiduciary decides to go ahead without a full understanding

of the strategy and trade rationale (Risk Standards 7 and 12), it should recognize and document it is doing so. In all cases, the Primary Fiduciary should require each Manager to draw up a strategy statement that explains the strategy's key risk and return features.

For example, an international equity manager should explain the degree to which the strategy seeks risk and return from country, stock and currency selection (Risk Standards 7, 12 and 13). A provider of portfolio insurance or of a currency overlay strategy should explain the risk and return expected from dynamic hedges or options and the degree to which it needs stable, continuous or highly liquid markets to succeed. A contrarian value manager or asset allocater should explain the risk that positions may do nothing, or even lose value, for some time before gaining value.

The Primary and Manager Fiduciaries should perform risk and return attribution analysis to verify that activity is consistent with the stated strategy and to reveal any style drift. Marked deviation from the performance of similar strategies executed by other Managers should be reported and investigated (Risk Standard 9). The Primary and Manager Fiduciaries also should review the strategy statement to ensure consistency with its objectives and its overall risk and return goals in context of its asset allocation and Manager concentration.

Finally, the Primary and Manager Fiduciaries should understand how each Manager's compensation structure aligns (or does not align) with the Fiduciary's interests and whether the compensation encourages or discourages the Manager to stick to the stated strategy.

The Primary and Manager Fiduciaries should require Managers to verify periodically that strategy statements are accurate and to update them whenever a material change occurs. This should be accompanied by random or other reviews of investment activity and portfolio holdings to verify compliance with the stated strategy. The Primary and Manager Fiduciaries should require Managers to record and report all transactions on a timely basis (Risk Standard 9) and should obtain an independently verified current statement of positions at a frequency appropriate to the strategy (Risk Standard 3). If position information is not available, as may be the case for certain commingled funds and hedge funds, the investor should request verifiable risk information.

Risk Standard 19: Independent review of methodologies, models and systems

All methodologies, models and related systems should be independently reviewed or audited prior to use as well as annually. Significant market moves or changes in market practice should trigger interim reviews.

The Primary and Manager Fiduciaries should appoint an independent third party to review the soundness of valuation methodologies, models and related systems. If this

is not possible, an internal group should perform such assessments, with appropriate checks and balances. Reviews should follow established procedures and be documented to reflect their scope and completion.

Reviews of methodologies, models and related systems should be specific to the instrument, asset class or individual Manager's style. Examples of items to address include:

- How appropriate are the models chosen to value the instrument?
- How do the valuations compare with those calculated by others?
- How appropriate are the assumptions and data to the model of choice?
- How thorough is the effort to independently verify the choice of model and assumptions?
- How sensitive is the portfolio to the timing of data capture and the valuation calculation? How does this affect risk and return measurement and related reporting?
- Does the methodology provide a consistently high or low picture of an instrument's or portfolio's risk and return characteristics?
- How would the risk and return picture change under alternative assumptions (including stress scenarios), models and methodologies?

Risk Standard 20: Review process for new activities

The Primary and Manager Fiduciaries should document the review process for permitting the use of new instruments, strategies or asset classes. Policies for initiating new activities should be consistent with the Primary and Manager Fiduciaries' risk and return goals as well as the Manager's strategy and expertise.

Typically, no new instrument, asset class or strategy should be permitted without review. Alternatively, the Primary and Manager Fiduciaries should set pre-established limits as to the degree of new activity allowed and specify interim reporting required prior to formal review. The review process should set forth the risk and return dimensions on which the new activity will be evaluated and require the manager to submit all relevant information. The Primary and Manager Fiduciaries should consider additional items such as Manager skill and whether additional valuation, back office/settlement, counterparty oversight, execution, authorities/resolutions and reporting capabilities are needed to engage in the new activity.

One advantage of the review process for new activities is that it sets a time frame for responding to new ideas. This manages expectations, ensures consistent review across opportunities and limits the likelihood of too little scrutiny during busy periods and too much during slow periods.

To avoid excessive reliance on a Manager and unexpected or unintended levels of risk, the Primary and Manager Fiduciaries should weigh carefully the risks of an

excessively broad or permissive policy such as, “If an investment is not banned, you may make it.” To avoid missing opportunities and reducing returns, however, the Primary and Manager Fiduciaries should be careful not to be too prohibitive. An excessively narrow or restrictive policy might state, “If the specific investment is not listed here, you may not make it.” To avoid missing special opportunities and to enable managers to make reasoned judgments, some Primary and Manager Fiduciaries allow a small amount of “new” activity (or a maximum amount of “new” activity) outside of the official review process. That activity, however, should become part of the official review process within a stated period of time.