Office of the Treasurer of The Regents

University of California

I-5
Investment Risk Management Update

Committee on Investments / Investment Advisory Group
September 10, 2009

Outline

- **Overview of Pension / Endowment Risk Management**
- **Risk Management at UC**
- **State of Risk Management today**
- **Future Directions for Risk Management**

What Is Investment Risk?

- **Investment Risk is the potential for loss accepted by an investor in order to earn a return**

- **Risk is characterized by**
  - **The range of possible negative outcomes (losses)**
  - **The likelihood of those outcomes**
  - **The impact of loss on the organization**

- **Risk tolerance articulates the magnitude of loss an investor is willing to sustain in order to generate an acceptable return**

Framework for Risk Management

- Bearing risk is an essential part of investing
- Risk in itself is intrinsically neither good nor bad; risk is a scarce resource used to generate investment returns
- Risk management is not about eliminating risk, but balancing risk and expected return
- "The essence of investment management is the management of risks, not the management of returns"
- "You can't control outcomes, you can only manage risk"
- "Risk forecasts are not forecasts of losses; they are conditional forecasts of *potential* loss"

Risk Management Value-Added

- **Ensure that sources of risk ("risk factors") are identified, understood, and quantified**
- **Ensure that assumption of risk is intentional and consistent with investment objectives**
- **Ensure that risks are adequately compensated (expected return is commensurate with risk)**
- **Enable fiduciaries to assume the amount of risk consistent with investment objectives and standards of prudence**

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Mission/Objectives

- **Mission**
  - **To ensure that the investment activities do not expose the University to potential or unexpected losses beyond the Regents risk tolerance levels**

- **Objectives**
  - **Identify and bound possible losses for all portfolios**
  - **Develop and monitor guidelines and limits on the investment process to maintain the probability of loss within acceptable limits**

Risk Management Roles

- Fiduciaries approve investment policy
  - Express tolerance for risk
  - Asset allocation, benchmarks, guidelines

- CIO/staff implements policy
  - Maintain asset weights within set ranges
  - Select strategies and managers
  - Allocate risk to various strategies

- Risk management ensures policy is followed
  - Risk exposures are appropriate and properly diversified
  - Risk is adequately rewarded

Risk Measurement and Models

- **Measuring risk is not as simple as computing past ("realized") volatility of returns**
- **However, volatility is useful to know: it indicates the range of past outcomes**
- **A risk measure is an estimate of future potential losses, given current conditions**
- **A risk model is a methodology to measure risk for portfolios based on the current holdings**

Risk Measurement and Models *continued*

- We use "factor models" which identify common sources of risk among similar securities
  - E.g., common movement of all stocks in an industry
  - E.g., credit quality of corporate bonds

- Risk measurement consists of:
  - Exposure to risk factors
  - Volatility of those factors
  - Co-movement of risk factors

- Risk and risk measurement is multi-dimensional

A Common Language

- The innovation of risk management is a common framework and uniform metric to quantify all investment decisions
- Allowing us to trade-off risk in one area with risk in another
- A risk budget is an optimal allocation of a given level of risk to various investment choices
- If we have "used up" our risk budget, we must reduce risk in one or more strategies in order to take risk in another one

Traditional Management of Risk

- Managing investments has always been about managing risk
- Traditionally done with inefficient guidelines and constraints, e.g.,
  - Position and sector limits
  - Limits on manager size
  - Long only constraint
  - No derivatives
  - Credit limits
- These are all examples of risk proxies
- Why not manage the risk factors directly, and link risk to expected return?

Why Is This Inefficient?

- Constraints are proxies for risk; crude (but sometimes effective) risk controls
- They don't account for actual contribution to risk of different positions
- Constraints don't account for volatility, correlations, or hedges
- Constraints cannot be combined or traded off against each other

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Are the Risk Models "Broken?"

- The risk models used at the Office of the Treasurer are not the same as the models the Rating Agencies used to give AAA ratings to CDO's backed by sub-prime mortgages
- However, all risk models use the past volatility of securities and markets as inputs to generate forecasts
- The period preceding the 2007-9 decline experienced low volatility, and so most risk models underestimated the range of possible outcomes
- "Experience is a hard teacher; she gives the test first and the lesson afterwards"

Emerging Consensus

- Risk measures should be somewhat counter-cyclical
  - To enable Buffet-type contrarian strategies

- Develop risk measures which are less dependent on price movements
  - Incorporate macro-environmental signals
  - Focus on avoiding loss, rather than reducing volatility
  - Use models appropriately, to ask questions not to give answers

- Continually question
  - What assumptions are built into our models?
  - What if we are wrong? (to balance overly optimistic portfolio managers)

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What Can't We Do Better?

- **Predict when market indexes will decline precipitously**
- **Predict turning points in market indexes**
- **Predict how long trends will continue**
  - **Trends in return**
  - **Trends in volatility**
  - **Trends in co-movement of risk factors**

What Can We Do Better?

- Combine economic and asset valuation signals in risk forecasts
- Focus more on total risk, as well as risk relative to the benchmark
- Recognize the limits of the normal distribution in measuring and interpreting risk (e.g., “fat tails”)
- Replace correlations with more general measures of return co-variation
- Focus more on downside risk, and on the explicit trade-offs of adopting a more conservative position when risk measures decrease but risk seeking behavior increases