

# Risk Management Revisited – Background

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September 30, 2007

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## Overview

- ❑ A fundamental tenet of finance links the level of investment return with risk. A realistic evaluation of risk extends beyond a simplistic application of mathematical formulas. Within this context, institutions must view risk in a more comprehensive manner, factoring the organization's goals and operating needs.
- ❑ A successful investment plan requires the intelligent design and execution of a risk management program. Effective risk management requires a close linking of the investment strategy with the needs of the organization. Yanni Partners has therefore focused on risk management as a key strategic initiative for many years.
- ❑ Yanni Partners' 2002 research paper *Managing Investment Risk: The Path to Achieving Objectives* provided the foundation for our strategic investment modeling and planning.
- ❑ In 2007, we have written an updated paper *Risk Management Revisited: Building Stakeholder Value*. The 2007 paper incorporates practical applications and insights gleaned since 2002.
- ❑ This presentation summarizes our 2007 risk paper.

## Conclusions from 2002 Risk Paper

- ❑ Risk is the failure to meet investment objectives. Failure might jeopardize organization's mission.
- ❑ Successful risk management requires robust analytical techniques. Many conventional approaches understate markets' downside risks.
- ❑ Certain statistical techniques can model "left tail risk" more effectively than conventional approaches.
- ❑ A sound operations infrastructure will strengthen the investor's capacity to manage risks.

## 2002 Paper Supported New Asset Allocation Platform

- ❑ Modeled downside risks more effectively than conventional approaches.
- ❑ Developed different modules for pension plans, healthcare, endowments, foundations, and operating funds.
- ❑ Incorporated client-specific analytical measures.
- ❑ Built in provisions for organization's cash flows.

# Enterprise Risk Management - Framework

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## Enterprise Risk Management (ERM)

- ❑ Many factors have prompted managements of organizations to strengthen the organizations' risk management practices.
- ❑ Several jarring financial failures such as Enron and the hedge fund Long-Term Capital Management have shaken investors' confidence.
- ❑ Boards of Directors and Trustees have developed a deeper sensitivity to the importance of good corporate governance. The Sarbanes-Oxley Act of 2002 has codified governance obligations.
- ❑ ERM provides a robust, current framework to link effective investment management with the organization's needs.
- ❑ The Committee of Sponsoring Organizations of the Treadway Commission (COSO), has defined ERM:

*“Enterprise risk management is a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives.”*

## COSO's Definition of ERM

- ❑ *Internal Environment* – Management articulates the organization's values, tone, philosophy and “appetite” for risk.
- ❑ *Objectives Setting* – Management defines objectives that support the mission.
- ❑ *Event Identification* – Organization identifies internal and external events, distinguishing between threats and opportunities.
- ❑ *Risk Assessment* – The entity must assess the likelihood of each key risk and its probability of occurrence.
- ❑ *Risk Response* – Management must decide whether to avoid, accept, reduce or share each potential major risk.
- ❑ *Control Activities* – Management implements policies and procedures to manage the risks effectively.
- ❑ *Information and Communication* – Management disseminates pertinent information to execute risk management.
- ❑ *Monitoring* – Entity monitors the full dimensions of Enterprise Risk Management. Entity modifies risk management activities as needed.

# Enterprise Risk Management - Framework

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## Application of ERM to Investment Management

- ❑ *Governance Procedures* – Management must understand the needs the organization, acknowledge its fiduciary obligations, appoint oversight body, secure requisite expertise, and document policies and procedures.
- ❑ *Determine Objectives* - Management specifies portfolio objectives and benchmarks.
- ❑ *Develop Investment Strategy* - Management formulates an investment strategy to achieve the objectives. “Asset allocation” constitutes the key strategy decision. Elements of a sound asset allocation process:
  - ⇒ Reasonable capital market assumptions.
  - ⇒ Accurate measurement and modeling of risk.
  - ⇒ Translate portfolio performance into meaningful measures for organization (such as funded ratio for a pension plan).
  - ⇒ Integrate cash flows into portfolio projections.
- ❑ *Portfolio Construction* – Select vehicles and investment managers to implement asset allocation strategy.
- ❑ *Monitoring Process* – Monitor performance relative to objective. Alert management to needs for corrective action.

# ERM Applications – Pension Plan

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## Pension Plan Management Framework

- ❑ Plan sponsor manages the trust to fund benefits over the plan's life.
- ❑ The actuary computes the liability based on projections of annual benefit payments.
- ❑ The sponsor focuses on ratio of assets to liabilities (funded ratio). Potential decline in the funded ratio is a key risk.
- ❑ A shortfall in the funded ratio will require additional cash contributions from the sponsor.
- ❑ Sponsor bears economic and demographic risks of the plan. Sponsor needs to recognize these risks when developing a comprehensive risk plan for the enterprise in general.
- ❑ Two developments have further re-enforced the importance of integrating the management of the plan with the overall financial management of the enterprise.
  - ⇒ Pension Protection Act (PPA)
  - ⇒ FAS 158

## Determinants of Plan's Funded Status and Costs

- ❑ Benefit payments and capital market performance are the two key drivers of the plan's funded ratio and economic costs.
  - ⇒ Inflation, productivity and economic growth will affect benefit levels. Increases in these factors will generally raise benefits, thereby increasing the sponsor's costs.
  - ⇒ Favorable capital market performance will generally raise the funded ratio and reduce contributions over time.
  - ⇒ Liability values respond inversely to changes in interest rates. A plan's funded ratio is exposed to a decline in interest rates due to the resulting increase in liability value.

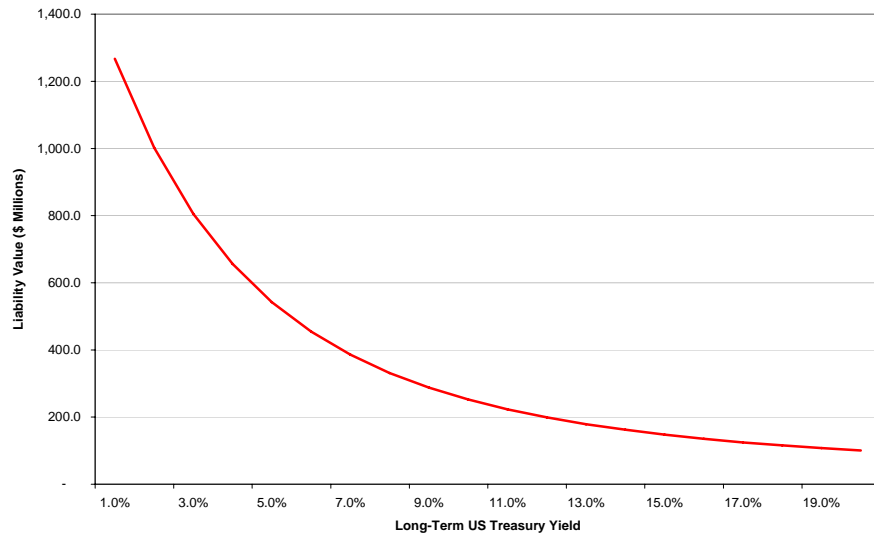
# ERM Applications – Pension Plan

- ❑ The liability value for a typical plan is highly exposed to a decline in interest rates. (Chart below)
- ❑ The basis for discounting the liability, the long-term interest rate, has fluctuated significantly over time. Changes in interest rates subject the funded ratio to risk. (Upper right chart)
- ❑ Investment returns have also fluctuated over time, providing another source of risk to funded ratios. (Lower right chart)

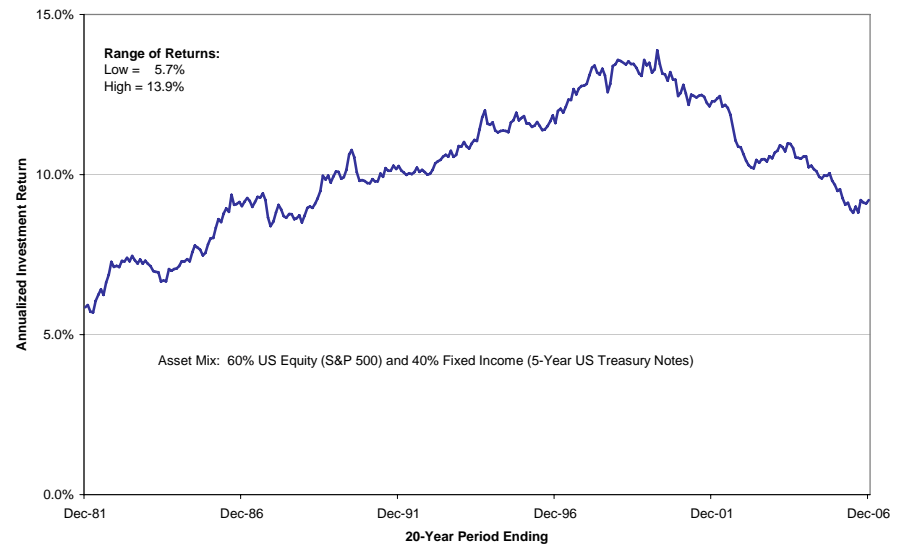
History of 20-Year US Treasury Bond Yield: April 1953 - June 2007



Relationship Between Interest Rates and Pension Plan's Liability



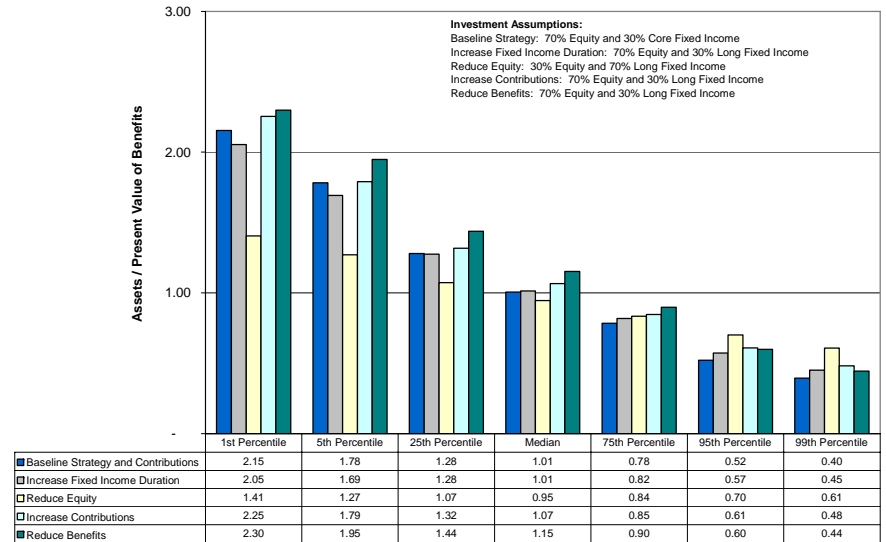
Annualized 20-Year Balanced Fund Investment Returns: December 1961 - December 2006



# ERM Applications – Pension Plan

- The sponsor can influence the level and risks of the plan’s funded ratio by adjusting the following management levers:
  - ⇒ *Duration of fixed income portfolio.* An increase in duration will generally help to align the interest rate sensitivities of both assets and liabilities, thereby stabilizing the funded ratio over time.
  - ⇒ *Portfolio’s allocation between equities and fixed income.* An increase in the equity target will generally increase the level and variability of the funded ratio over time. A fund’s asset allocation is likely to drive the vast portion of the fund’s total return. The aggregate contribution from active management is not likely to be significant for most plans. A sound management approach should not assume a significant performance contribution from “alpha.”
  - ⇒ *Increase contributions.* Higher contributions will strengthen the funded ratio.
  - ⇒ *Reduce benefits.* Lower benefit levels will raise the funded ratio.
- The chart to the right illustrates the effects of these management levers in stochastic terms.

Laurel Ridge Company  
Pension Plan Funded Ratio as of June 2012



# ERM Applications – Endowments

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## Endowment Management Framework

- ❑ Endowed institutions typically include non-profit entities such as colleges, universities, museums, and medical research organizations.
- ❑ The organization spends a portion of the endowment each year to support the operating budget.
- ❑ Two pivotal sets of legal guidelines underpin the investment and spending practices of endowments: the Uniform Prudent Management of Institutional Funds Act (UPMIFA) and the Uniform Prudent Investor Act (UPIA). (See text box to the right for provisions)
- ❑ The principle of “intergenerational endowment equity” guides the management of endowments. The institution bears a fiduciary obligation to each donor to preserve the purchasing power of the gift.
- ❑ An institution can enhance its financial strength by increasing gifts, reducing spending and raising investment returns.
- ❑ Sound financial management of the organization requires a balancing of gift, spending, investment, capital spending and debt management practices.

## Key UPMIFA Provisions

- ❑ *Investment Flexibility.* No limits on potential types of investments.
- ❑ *Distribution of Funds.* Acknowledges the concept of a total return spending formula.
- ❑ *Elimination of Historical Dollar Value Limitation.* Eliminates the previous prohibition against spending if the current gift value falls below historical cost.
- ❑ *Annual Spending.* States can approve guidelines characterizing spending greater than 7% as imprudent.

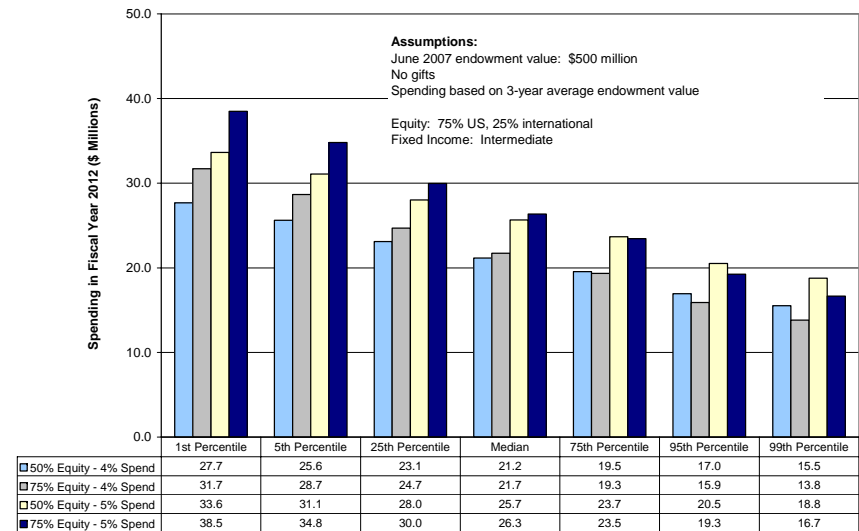
## Key UPIA Provisions

- ❑ *Standard of Care.* Trustees should exercise “care, skill and caution” and beneficiary’s pertinent circumstances.
- ❑ *Diversification.* Trustees should diversify the assets.
- ❑ *Loyalty.* Trustees should manage the assets for the exclusive benefit of the beneficiary.
- ❑ *Impartiality.* Trustees should manage the assets to balance competing interests of multiple beneficiaries.
- ❑ *Delegation.* Trustees may delegate investment and management functions if they exercise “care, skill and caution.”

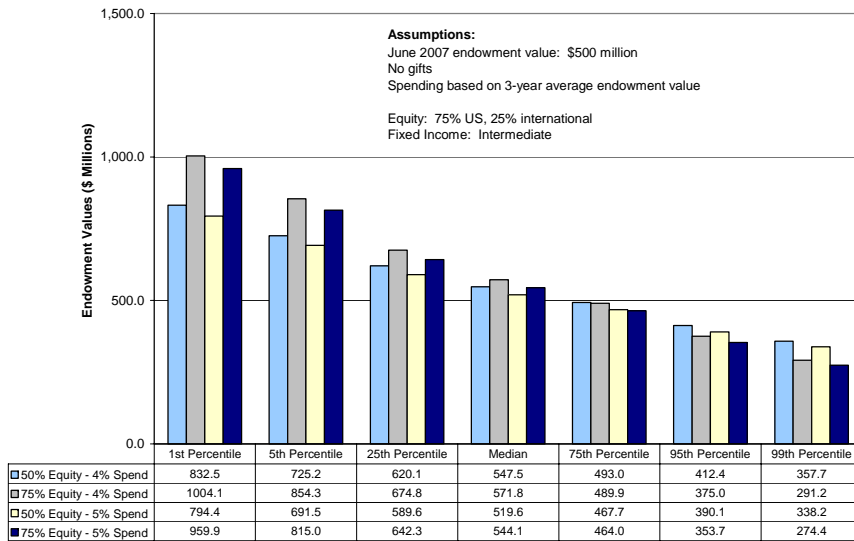
# ERM Applications – Endowments

- ❑ An analytical framework that integrates investment and spending variables can help the endowment to achieve long-term growth in purchasing power.
- ❑ The three charts test changes in investment and spending policies in stochastic terms.
  - ⇒ The chart below projects fund values.
  - ⇒ The upper right chart projects spending.
  - ⇒ The lower right chart projects net growth rates.

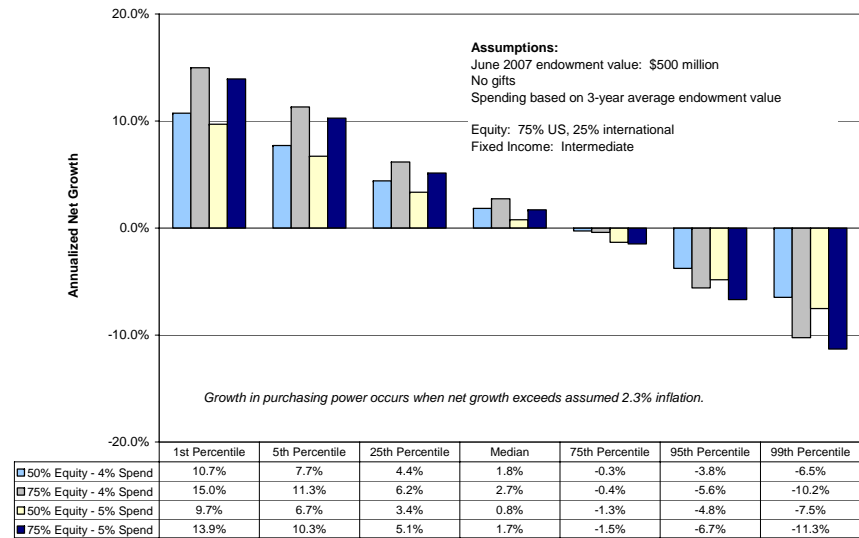
Central College: Annual Spending in Fiscal Year Five as of June 2012



Central College: Five Year Endowment Values as of June 2012



Central College: Five Year Annualized Net Growth (Reflects Investment Returns and Spending)



# ERM Applications – Healthcare Organizations

## Healthcare Management Framework

- ❑ An integrated healthcare financial planning model will show how the performance of the capital markets affects an institution's overall financial position.
- ❑ The capital markets impact an institution's financial structure: short-term reserves, funded depreciation pools, restricted assets, outstanding debt and the defined benefit pension plan.
- ❑ The model quantifies how changes in the capital markets affect the entity's financial position.
- ❑ This approach will compute measures and ratios that a particular organization finds meaningful. The categories of ratios are for liquidity, profitability, and capital structure. Following are examples of key ratios.

## Healthcare Liquidity Ratios

$$\text{Days Cash on Hand} = \frac{\text{Unrestricted Investments}}{\text{Daily Cash Expenses}}$$

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

## Healthcare Profitability Ratios

$$\text{Excess Margin Ratio} = \frac{\text{Excess of Revenues over Expenses}}{\text{Operating + Non-operating Revenues}}$$

$$\text{Return on Total Assets} = \frac{\text{Excess of Revenues over Expenses}}{\text{Total Assets}}$$

## Healthcare Capital Structure Ratios

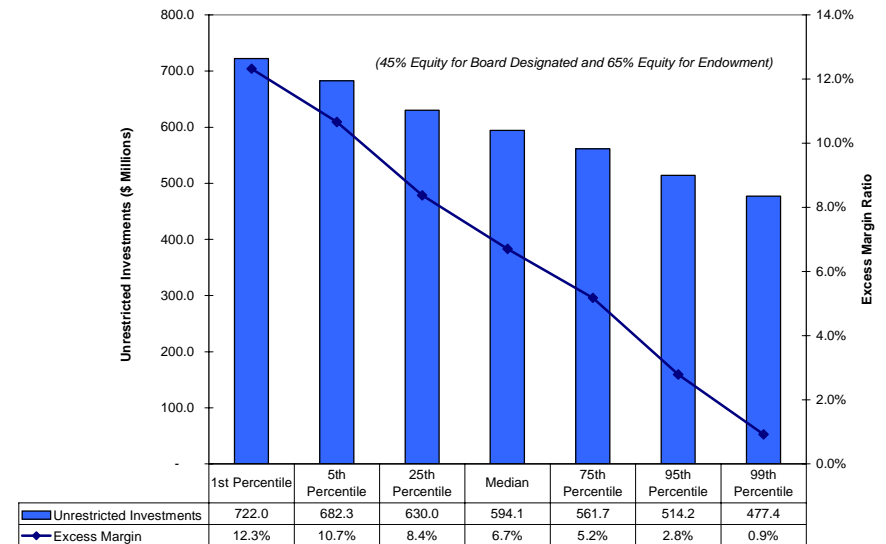
$$\text{Debt Service Coverage Ratio} = \frac{\text{Excess of Revenues over Expenses} + \text{Interest Expense} + \text{Depreciation}}{\text{Interest Expense} + \text{Principal Payments}}$$

$$\text{Long-Term Debt to Net Assets Ratio} = \frac{\text{Long-Term Debt}}{\text{Net Assets}}$$

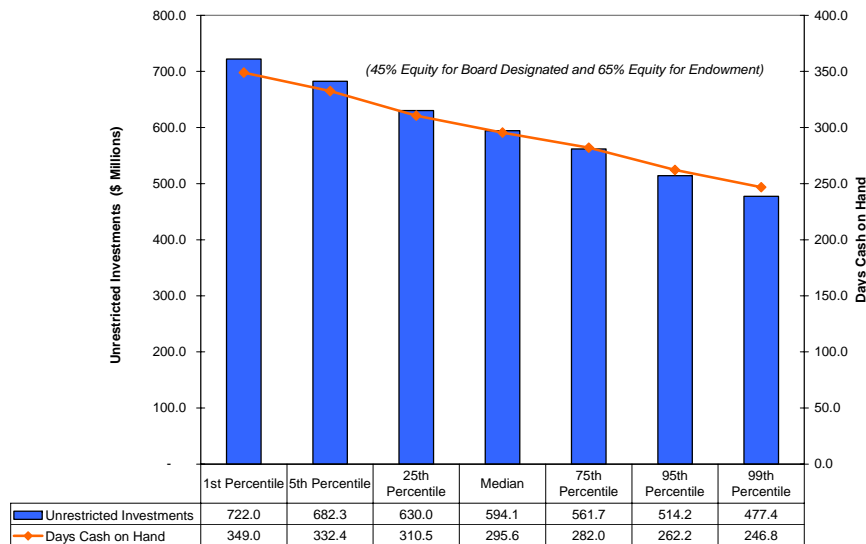
# ERM Applications – Healthcare Organizations

- ❑ The following charts illustrate tests of an investment strategy on an organization’s liquidity, profitability and capital structure. The examples assume the organization has a board designated pool and an endowment.
- ❑ The chart below measures liquidity. Days Cash on Hand indicates how long unrestricted investments could support operations.
- ❑ The upper right chart measures profitability. Excess Margin Ratio computes the “profit margin.”
- ❑ The lower right chart evaluates the capital structure. The Debt Service Coverage Ratio measures the operating budget’s ability to support debt.

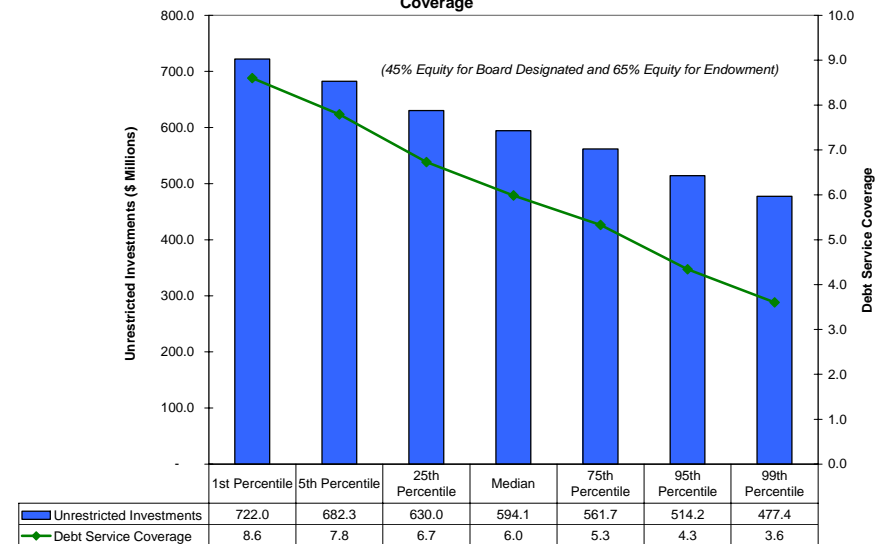
Keystone Hospital: One-Year Effects of Current Investment Strategy on Excess Margin Ratio



Keystone Hospital: One-Year Effects of Current Investment Strategy on Days Cash on Hand



Keystone Hospital: One-Year Effects of Current Investment Strategy on Debt Service Coverage



# ERM Applications – Insurance Companies

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## Insurance Company Framework

- ❑ Insurance companies accumulate assets through the underwriting of policies to protect policyholders against risks. The liabilities arise from the company's guarantees against these risks.
- ❑ The types of risks that companies guarantee affect the characteristics of the liabilities.
  - ⇒ Life insurance offers reasonably stable risk characteristics given the fairly predictable nature of mortality experience.
  - ⇒ Property and casualty insurance subjects companies to more volatile risks given the unpredictable nature of catastrophes such as terrorism and natural disasters such as hurricanes, floods, droughts and tornados.
- ❑ Key challenges for insurance companies are to:
  - ⇒ Price risks appropriately.
  - ⇒ Understand the risks inherent in the liabilities.
  - ⇒ Manage assets in accordance with liability risks.

## Financial Measures

- ❑ The insurance industry has developed methods to manage extreme downside risks. Enterprise Risk Management has gained traction in the insurance industry. Key insurance industry financial measures include:
  - ⇒ *Economic capital* – assets minus liabilities. The capital must be adequate to prevent the “probability of ruin.”
  - ⇒ *Risk-Adjusted Return on Risk-Adjusted Capital* – net income divided economic capital. The numerator is adjusted for risk based on factors such as the volatility of net income. The denominator is also adjusted based on the risk of the investments.
  - ⇒ *Risk Based Capital* – the National Association of Insurance Commissioners has formulated a standard for minimum capital to establish a threshold for regulatory response.

# Risk Management Revisited - Conclusions

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## Conclusions

- ❑ Every organization relies on financial resources. An organization's ability to generate additional resources will advance the organization's mission.
- ❑ An organization can generate additional resources by increasing the economic return on its assets.
- ❑ The pursuit of capital growth requires the intelligent design and execution of a risk management program.
- ❑ Modern risk management practices have embraced a comprehensive integration of asset and liability management.
- ❑ This holistic approach to managing the risks of an enterprise will continue to build value for stakeholders.

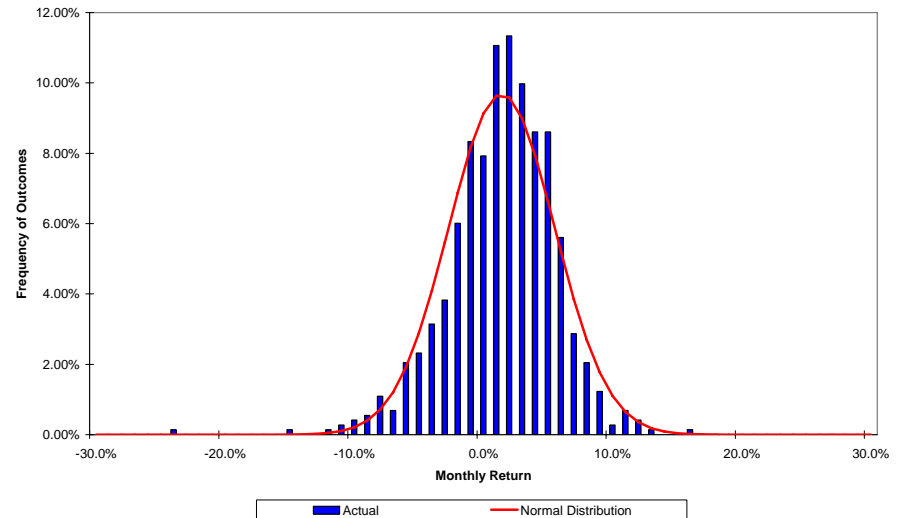
## Next Steps

- ❑ Yanni Partners will support clients to accomplish the following steps:
  - ⇒ Determine appropriate investment management solutions to advance organizational goals and objectives
  - ⇒ Craft an Investment Policy to achieve relevant organizational goals
  - ⇒ Complete asset allocation modeling to determine the portfolio's strategic direction
  - ⇒ Execute portfolio structure analysis to support the fund's investment policy

# Appendix - Risk Modeling Techniques

- ❑ Our 2002 paper cautioned against the reliance on certain traditional risk measures. The following charts illustrate limitations of some traditional techniques.
- ❑ The chart below shows that historical capital market returns have not forecasted future returns well. It is important to develop a forward-looking framework.
- ❑ The upper right chart shows that US equity returns have not conformed to a “normal” distribution. Reliance on this assumption might understate downside risks.
- ❑ The lower right chart further illustrates how a normal distribution model might understate downside risks.

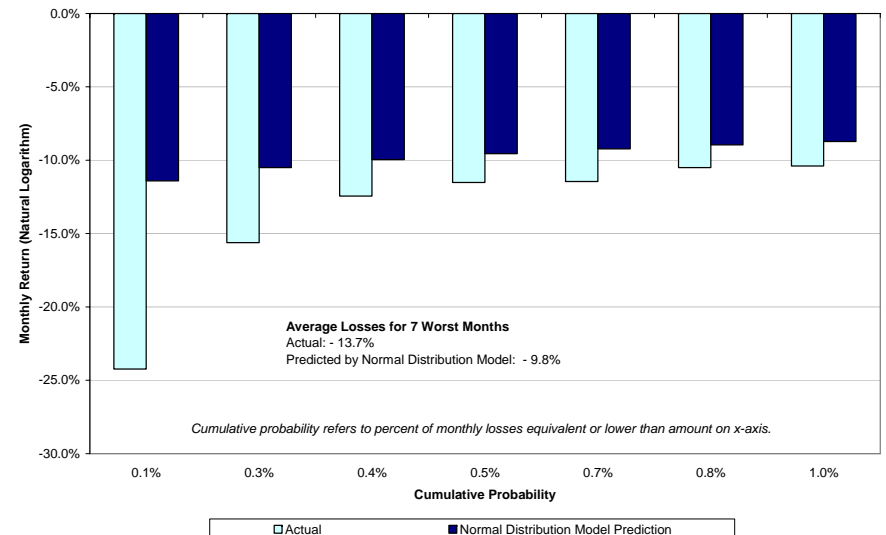
S&P 500 Monthly Returns: Frequency of Outcomes  
January 1946 - December 2006



Past and Future Five-Year Returns for US Equities (S&P 500)  
January 1962 - December 2006



1% of Worst S&P 500 Monthly Losses: Actual and Predicted  
January 1946 - December 2006



# Appendix - Risk Modeling Techniques

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## Analytical Remedies for Traditional Risk Modeling Limitations

- ❑ Conventional analytical approaches might lead to an unsuitable investment plan for an organization, potentially jeopardizing its solvency.
- ❑ The field of statistics offers analytical remedies. A parametric approach relies on simplifying assumptions of means, volatilities and correlations among asset types. A parametric approach offers computation ease. Yet this approach can distort key dimensions of risk due to the simplicity of the inputs.
- ❑ Various non-parametric techniques can perform simulations to accommodate cash flows and the complex risk characteristics of the markets.
  - ⇒ Non-parametric techniques avoid simplifying assumptions regarding the characteristics of the market data in the modeling process.
  - ⇒ Non-parametric techniques are computationally intensive yet they can help institutions to make more informed investment judgments.
  - ⇒ Yanni Partners has incorporated such non-parametric techniques into its asset allocation modeling platform.