The Academy

PROFILING BEST PRACTICES:

Return and Risk Characteristics of Healthcare System Investment Portfolios

The Health Management Academy Benchmarking Series

A White Paper

Reporting on Investment Portfolios of Leading Health Systems

By The Health Management Academy with support from Strategic Investment Group

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The Health Management Academy and **Strategic Investment Group** are pleased to partner on this report analyzing the risk and return characteristics of the portfolios of leading health systems. The findings are designed to be of interest to senior finance and investment officers seeking fresh insights for managing investment risk and navigating through volatile markets.

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Preface

Determining the right asset allocation for a portfolio is a key decision faced by healthcare systems. An allocation is "right" when the portfolio's range of expected returns is compatible with the healthcare system's broader finances and operations and consistent with the system's appetite for risk. The Health Management Academy's (The Academy) quarterly surveys of the investment practices of prominent healthcare systems provide a wealth of information on their asset allocation and return experience. The data comprise widely divergent asset allocations across portfolios, reflecting significant differences in how each system strikes the "right" balance between return objectives and risk. In this paper, we analyze how sample portfolios drawn from The Academy's survey data might perform under different market environments to highlight their divergent expected return and risk characteristics.

This paper was a collaboration between The Health Management Academy and the Strategic Investment Group.

Introduction

This paper analyzes the risk and return characteristics of sample portfolios drawn from The Academy's quarterly survey of the investment practices of The Academy's member healthcare systems.[1] The purpose of the paper is to apply a range of analytical techniques to sample long-term investment portfolios (LTIPs) and pension portfolios to assess the expected risk and return characteristics of these portfolios in different states of the world.* For the sake of brevity, we focus in the body of the paper on a limited number of sample LTIPs and extend the analysis to a broader range of sample LTIPs and pension portfolios in the annexes.

The paper is structured as follows. We first describe the asset allocation of different LTIPs included in The Academy survey data, sorting the various portfolios by risk appetite, size, and credit rating. We then apply a rigorous risk assessment to several illustrative portfolios drawn from The Academy survey data. The analytical techniques used to illustrate how these portfolios would likely perform in different states of the world include a mean-variance analysis that places sample portfolios along an efficient investment frontier, a Monte Carlo simulation of prospective returns over a 10-year horizon, historical scenario analyses, and a short-term forward-looking scenario analysis based on current economic and market conditions and relative asset valuations. We conclude by suggesting possible ways to improve and extend the analysis of sample portfolios. Annexes to the paper provide additional information on a broader range of sample portfolios and their expected risk and return characteristics.

Construction of Sample Portfolios

The sample portfolios are drawn from The Academy's quarterly survey of its member health systems as of the fourth quarter of 2012. There were 34 respondents providing data on LTIPs totaling $43.8 billion in assets, and 25 respondents providing data on pension portfolios totaling $24.2 billion. To preserve anonymity, The Academy organized the data into several aggregate categories. Average allocations of the constituents of each sample group were analyzed. Annex 1 provides additional information on the asset allocation of LTIPs and pension portfolios categorized using different criteria.

We focus on portfolios sorted by quintiles of risk appetite, with the degree of equity exposure used as a proxy for risk. We chose this focus because risk appetite is a key factor in portfolio construction. Each institution's ability to absorb the volatility imparted to its broader operations by investment portfolios and the role of investments in complementing operational income and liability

1 The paper is a collaboration of The Health Management Academy and Strategic Investment Group. We welcome your comments on the data and analysis presented. Please address your comments to Jay Flounlacker (jay@hmacademy.com) or David J. Ordoobadi (dordoobadi@strategicgroup.com).

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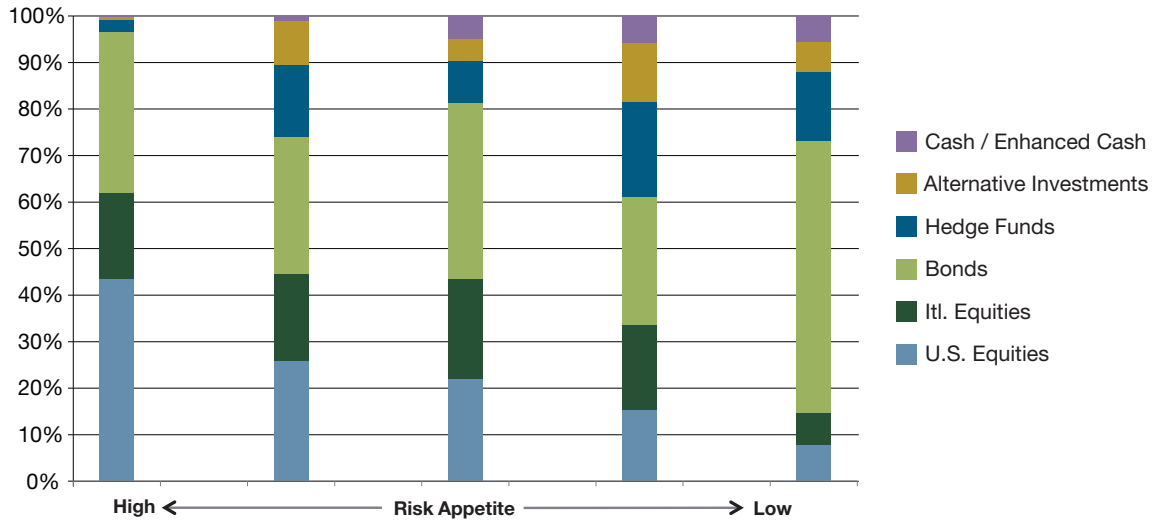
management are likely to be key factors in determining the asset allocations of LTIPs and pension portfolios. Sorting each portfolio by risk appetite thus highlights a fundamental characteristic of the sample portfolios. These portfolios can be interpreted to reflect the revealed risk preferences of the institutions concerned. We use the average asset allocations of the upper and lower quintiles of risk appetite to help frame the subsequent analysis of sample portfolios. The figure below illustrates the average asset allocation for LTIPs sorted by quintile of risk appetite, with the higher quintiles having a higher equity allocation and thus a higher implied risk appetite.

Asset Allocation by Risk Quintile — LTIP



We also considered a number of other sample portfolios sorted by the size of each portfolio, and the credit rating of each healthcare system (see Annex 1). We illustrate where the portfolios sorted using these criteria fall along the range defined by the portfolios in the bottom 20% and top 20% of revealed risk appetite.

Sample Portfolios Along the Efficient Frontier

Capital Market Assumptions

We have calculated the expected risk and return of the asset allocations of selected sample LTIPs using capital market assumptions for the expected risk, return, and correlation characteristics of each asset class. For the sake of brevity, the main body of the paper focuses on sample LTIPs. Annex 2 provides additional information on the analysis undertaken and extends it to sample pension portfolios.

The capital market assumptions used in the analysis are derived from historical experience adjusted to account for secular trends and to compensate for data inadequacies, including those arising from irregular pricing in illiquid markets. We also adjust the equilibrium expected market returns (or beta) to incorporate active return (or alpha) assumptions. We believe that it is appropriate to consider the potential for mispricing and the resulting scope for value added through security selection and structuring tilts across the various asset classes and to incorporate this information into analyses of optimal portfolio construction. The active management returns and risk assumptions are based on historical data and forward-looking assumptions (using conservative information ratio estimates).

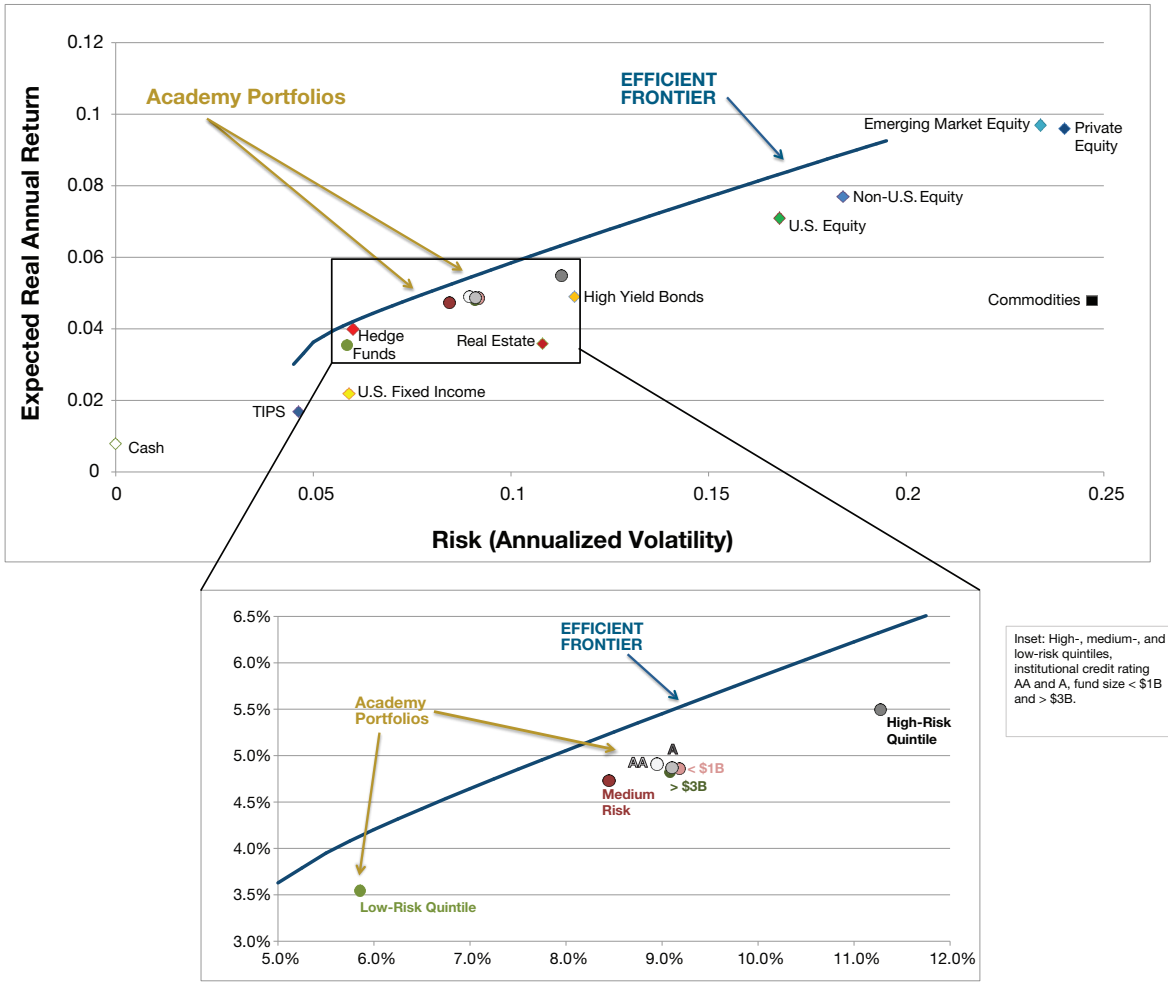
LTIP Efficient Frontier

Having calculated the expected risk and return characteristics of the sample portfolios using the capital market assumptions described above, we plot each sample portfolio in relation to an efficient frontier (see Figure below). The efficient frontier represents the expected risk and return of optimally allocated portfolios. A portfolio on the efficient frontier has the maximum return achievable for its level of risk. Also shown are the risk and return assumptions for each major asset class used to construct the efficient frontier and calculate the expected risk and return of the sample portfolios.

The sample portfolios shown along the efficient frontier fall within a range defined by the top and bottom quintiles of the risk appetite spectrum. We include for illustration the expected risk and return of sample LTIPs with assets of over $3 billion and less than $1 billion and for systems rated AA and A. The sample portfolio representing the low end of the risk appetite spectrum has an expected real return of 3.5% and an expected real volatility of 5.9%, compared to an expected real return of 5.5% and an expected real volatility of 11.3% for the portfolio at the upper end of the risk spectrum.

The Academy — Long-Term Investment Portfolios

Risk and return characteristics of sample portfolios and selected asset classes relative to an efficient frontier.



Inset: High-, medium-, and low-risk quintiles, institutional credit rating AA and A, fund size < $1B and > $3B.

The Academy - LTIP Risk Quintiles	Risk Appetite		
	High	Medium	Low
REAL RETURNS	5.5%	4.9%	3.5%
REAL VOLATILITY	11.3%	9.2%	5.9%
REAL GEOMETRIC RETURN	4.9%	4.4%	3.4%
1 Standard Deviation Loss	-5.8%	-4.3%	-2.3%
2 Standard Deviation Loss	-17.1%	-13.5%	-8.2%
3 Standard Deviation Loss	-28.3%	-22.7%	-14.0%
DISEQUILIBRIUM REAL RETURNS	5.2%	4.5%	3.1%

The 5.5% expected real return of the sample portfolio at the top quintile of the risk appetite spectrum is an average expected annual outcome. The 11.3% expected real volatility of this return quantifies the expected average variability around this return, which can be used to calculate the probability and magnitude of outcomes different from the average. For example, we can expect that this portfolio's real return will fall within the range of +28.1% and -17.1% about 95% of the time, equivalent to a range of ± 2 standard deviations.[2] The comparable range for the sample portfolio at the bottom end of the risk spectrum is +15.3% and -8.3%.

As discussed, long-term, or equilibrium, asset class returns are used as inputs to estimate the risk and return characteristics of the sample portfolios. However, it is certain to be the case that, at the time of analysis, market conditions will not be in equilibrium — some assets may be significantly misvalued. It is typically not useful to adjust for short-term disequilibrium conditions affecting relative asset prices and better to handle such mispricing through tactical asset allocation decisions.

Current conditions in fixed-income assets necessitate a more nuanced approach, however. Because of government intervention, real yields on U.S. government bonds and other safe-haven assets as well as certain corporate securities are at extreme lows. We have estimated the Disequilibrium Real Returns that would result if our expectations that interest rates will revert to more normal levels over the medium term are realized. As illustrated in the above table, the assumption of a reversion to equilibrium yields from current abnormally low levels over the medium term results in lower expected returns for the sample portfolios. The impact of this adjustment falls disproportionately on the real return of the sample portfolio at the bottom of the risk appetite spectrum given its relatively high allocation to fixed-income assets.

Extension to Other Sample Portfolios

In addition to the portfolios categorized by risk appetite quintile, we have analyzed the risk and return characteristics of a number of other sample portfolios, including the average LTIPs of healthcare systems with credit ratings of AA and A (see Annex 2 for more details and additional extensions). As highlighted in the efficient frontier figure above, the average LTIP of healthcare systems with an A rating has risk and return characteristics similar to the medium-risk appetite portfolio, while the sample LTIP of AA-rated systems embodies lower risk. The expected real return and volatility for the AA-rated sample portfolio are 4.9% and 8.9%, respectively, compared with 4.9% and 9.1%, respectively, for the A-rated sample portfolio.

2 Capital market assumptions used as inputs for portfolio optimization are based on the average annual return and standard deviation of each asset class. The compound annualized growth rate (CAGR) likely to be realized will be lower than the expected average annual return as a result of the "volatility drag." The real geometric return incorporating the impact of the volatility drag is shown for each portfolio. The effect of the volatility drag can be approximated as: (1 + average return)2 – (standard deviation)2 = (1 + CAGR)2

The Academy - LTIP Demographics	Credit Rating		Fund Size		
	AA	A	< $1B	$1-3B	> $3B
REAL RETURNS	4.9%	4.9%	4.8%	5.4%	4.7%
REAL VOLATILITY	8.9%	9.1%	9.1%	10.6%	8.4%
REAL GEOMETRIC RETURN	4.5%	4.5%	4.4%	4.9%	4.4%
1 Standard Deviation Loss	-4.0%	-4.2%	-4.3%	-5.1%	-3.7%
2 Standard Deviation Loss	-13.0%	-13.3%	-13.3%	-15.7%	-12.2%
3 Standard Deviation Loss	-21.9%	-22.4%	-22.4%	-26.3%	-20.6%
DISEQUILIBRIUM REAL RETURNS	4.7%	4.6%	4.5%	5.2%	4.5%

Are these the "right" risk and return characteristics for the sample portfolios? We cannot answer that question definitively without a more comprehensive analysis of the interaction between each investment portfolio and the system's broader finances and operations. From the partial perspective of the asset portfolio alone, it is clear that the sample LTIP for AA-rated systems has the same expected return and a slightly lower volatility than the sample portfolio for A-rated systems. This suggests that the sample portfolio for A-rated systems could be made more "efficient", i.e. achieve the same return with less risk, by adopting the portfolio structure of the sample portfolio for AA-rated systems. As shown in Annex 2, the sample LTIP for AA-rated systems is more broadly diversified across assets, contributing to its greater expected efficiency. As suggested by the efficient frontier chart highlighted above, there appear to be other portfolio structures that would increase the efficiency of the expected risk and return tradeoff.

We can also apply the mean-variance data presented above to calculate the probability that the average LTIPs for AA- and A-rated systems at least return their cost of borrowing. Borrowing costs represent a rough proxy for the appropriate hurdle rate for an LTIP. It would be desirable for the average returns of the LTIP to exceed the cost of borrowing over time so that the LTIP can grow with the operations of the healthcare system and continue to play its role as keystone of the balance sheet. The AA- and A-rated sample portfolios appear to satisfy this hurdle rate as both have about a 60% probability of exceeding an indicator of their respective cost of funds.[3]

Risk Analysis

Robust risk analysis is an essential component to good investment governance. Exploring potential negative outcomes helps to set appropriate expectations of portfolio volatility and permits a more focused assessment of the impact of bad outcomes and the system's ability to withstand and adapt to adverse developments. Considering adverse scenarios helps avoid the common mistake of making *ad hoc* decisions in difficult circumstances.

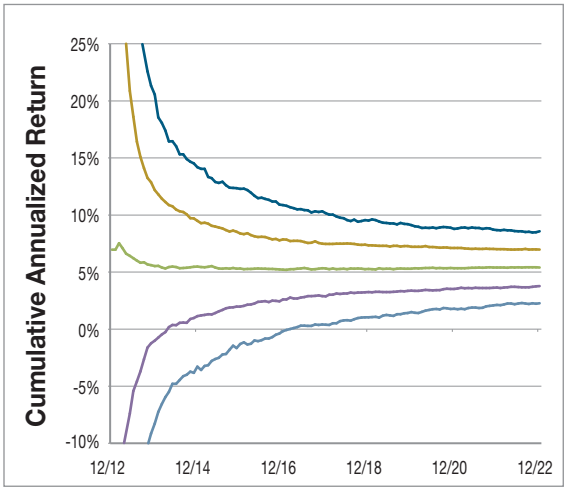
3 Data on hospital-backed municipal bond yields based on Bloomberg Fair Value indices have been used for this analysis. During 2001 – March 2013, the average yield to maturity on AA-rated and A-rated municipal bonds with a 10-year maturity backed by hospital revenue was 4.1% and 4.5%, respectively. We have taken these measures as a rough estimate of borrowing costs. The average asset allocations of the sample portfolios of AA-rated and A-rated healthcare systems have about a 60% chance of exceeding their respective estimated borrowing costs.

With those benefits in mind, we have extended the mean-variance risk analysis of the previous section using a number of additional analytical techniques to assess how the portfolios might respond to different market environments. First, we apply a Monte Carlo analysis based on randomly generated outcomes to produce a cumulative annualized return distribution over a 10-year horizon. We complement this analytical approach to risk measurement with a historical scenario analysis that illustrates how the representative portfolios would have performed in past periods of significant market disruption. Historical scenario analyses have the benefit of providing internally consistent market and economic movements against which to test the robustness of sample portfolios. We also undertake a short-term scenario analysis based on the current constellation of market expectations and relative asset valuations. The main results of the risk analysis are summarized below. Further details and an extension to sample pension portfolios are provided in Annex 2.

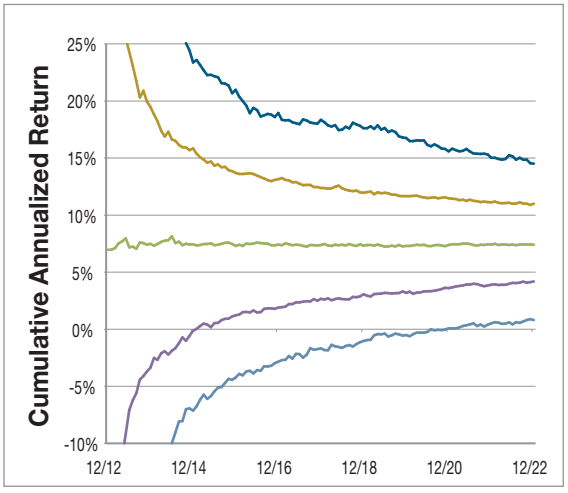
Monte Carlo Simulation

We have performed a Monte Carlo simulation of returns over a 10-year horizon to estimate the probability distributions of long-run annualized returns of the sample portfolios at the top and bottom quintiles of the risk-appetite spectrum. The results of this analysis suggest that there is a tendency over time for the range of randomly generated potential annualized returns to converge toward the mean. However, there is still significant risk that the return over the horizon will diverge significantly from the mean. For example, there is approximately a 2.5% probability of a -2 standard deviation outcome. In such an outcome, the annualized return over a 10-year horizon for the portfolio at the top quintile of the risk-appetite spectrum would be 0.8% (see figure above). In the case of the sample portfolio representing the bottom quintile of risk appetite, the -2 standard deviation outcome would result in a cumulative annualized return of 2.2%. There is also an increasing probability over time that markets will experience episodes — such as the recent financial crisis — of unusually high price volatility in any one period. So, while the probability of meeting an expected average return increases significantly with a longer horizon, the probability of facing a really bad (or really good) scenario in any one year also increases over time.

Top-Quintile Risk Appetite - LTIP



Bottom-Quintile Risk Appetite - LTIP



97.5% Percentile 83% Percentile 50% Percentile 16.6% Percentile 2.5% Percentile

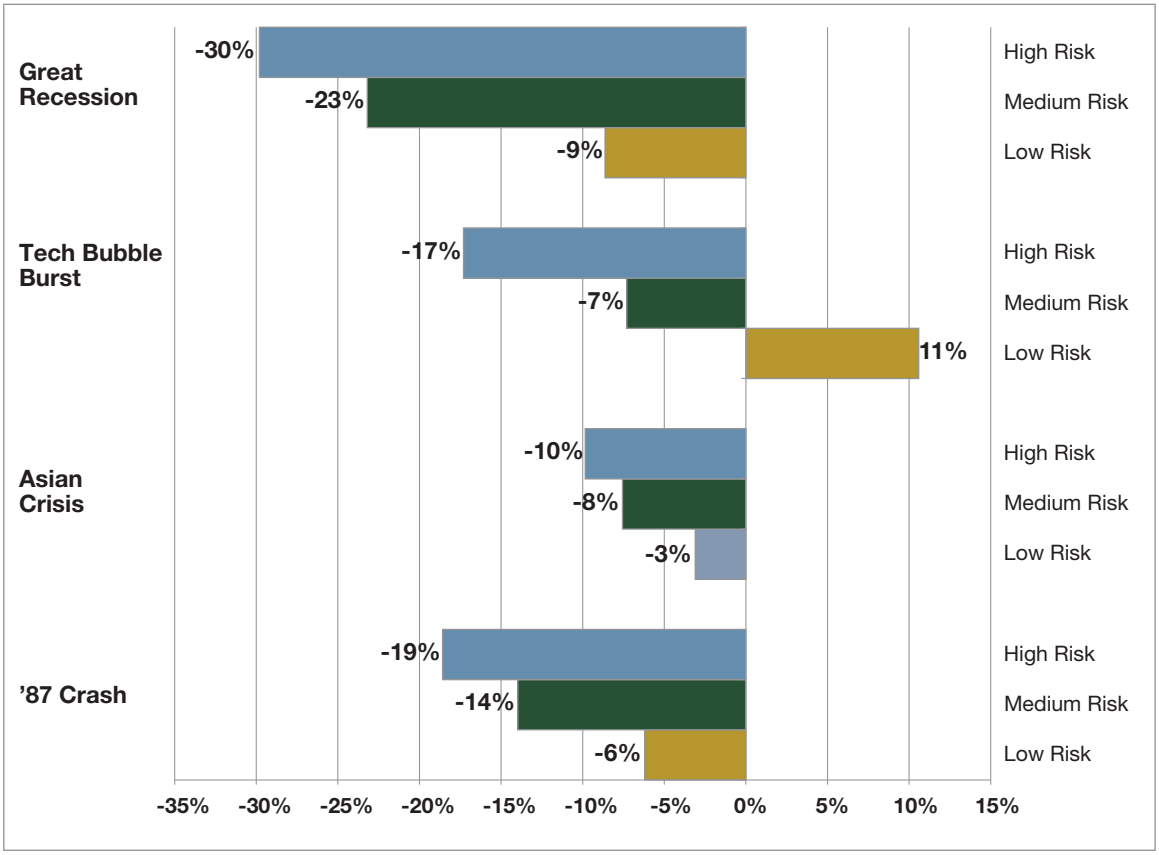
We have also applied a Monte Carlo simulation to calculate the range of end-of-period wealth that would be expected to be accumulated in the top- and bottom-quintile portfolios. The ending value of a dollar invested in the top-quintile portfolio would range between $2.79 and $0.94 95% of the time compared with a range of $1.71 and $1.02 for the bottom-quintile portfolio.

Historical Scenario Analysis

Considering how sample portfolios would have performed in historical episodes of market turmoil provides a further test of portfolio robustness, as these historical episodes encapsulate a wealth of information across economic and financial indicators of how markets have actually behaved under duress. Notably, these crises illustrate how the assumptions of mean-variance analysis can break down and highlight the extent to which return volatility and correlations can be unstable.

The figure below considers the peak-to-trough loss that would be experienced in the event of a recurrence of one of the four most recent financial market crises. It provides an indication of the steepest drawdown in asset value that would have resulted during each crisis in the case of the top-quintile, bottom-quintile, and median-sample portfolios along the risk appetite spectrum. For example, the sample portfolio at the top quintile for risk appetite would have experienced a peak-to-trough drawdown of 30%, or more than a three-standard deviation loss, during the 2007-09 credit crisis, compared to a 9% loss for the sample portfolio at the bottom of the risk appetite range.

Historical Scenario Analysis — LTIP Risk Quintiles

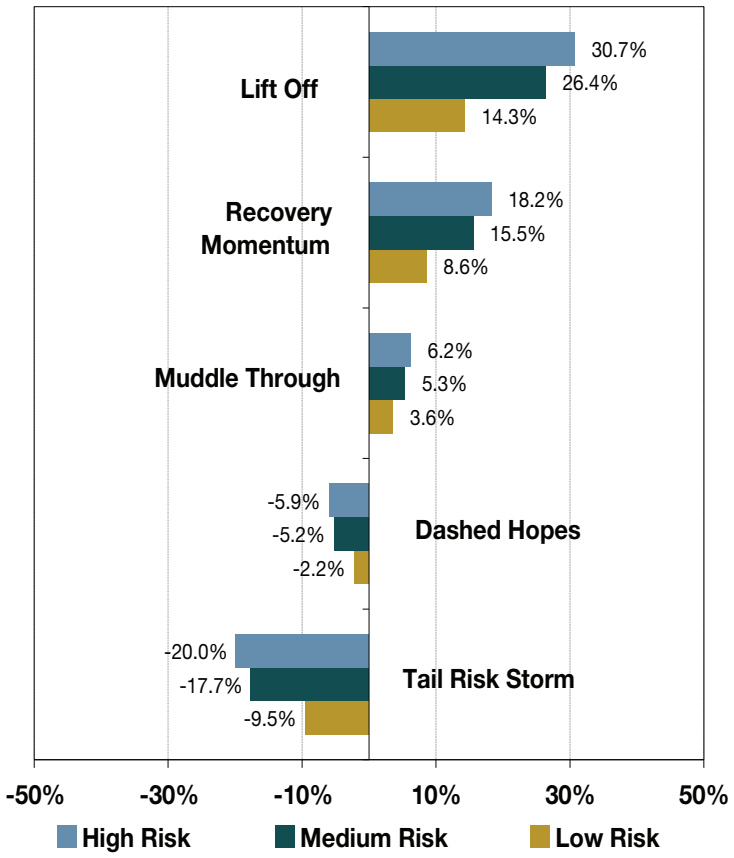


Short-Term Scenario Analysis

The short-term, forward-looking scenario analysis provides an indication of the range of plausible portfolio returns given current market conditions and limits the time horizon to the next 12 months. The key purpose of the short-term scenario analysis is to retest the appropriateness of portfolios and risk budgets structured for the long-term in the context of current market conditions and relative valuations. The short-term scenario analysis sets out a range of plausible outcomes for portfolio performance and the factors likely to drive these outcomes.

At present, a key factor influencing markets and an important source of potential instability is the ongoing deleveraging process. Accordingly, the scenario analysis illustrates how the deleveraging process affects expected short-term returns and the inherent fragility of recovery from a large debt overhang. The inherent fragility of the deleveraging process is compounded by significant uncertainty created by the possibility of policy missteps, notably fiscal dysfunction in the U.S. and the continued sovereign and banking crisis in the euro area.

Short-Term LTIP Scenarios



We consider five short-term scenarios, a base case and two downside and two upside scenarios (see Annex 2). In the base case "Muddle Through" scenario, we expect asset returns to be below long-term equilibrium levels, as real interest rates on safe haven assets remain negative well out the maturity spectrum. The two downside scenarios, "Dashed Hopes" and "Tail Risk Storm," consider the economic and market impact if the deleveraging process is derailed by policy missteps or other factors. The two upside scenarios, "Recovery Momentum" and "Lift Off," consider the investment landscape if the deleveraging process proceeds much more rapidly than anticipated as a constructive policy environment gives corporations and banks the confidence to put idle cash balances to work.

In the base case, the sample portfolio in the top quintile of risk would be expected to earn a nominal return of 6.2%, equivalent to a real return of 4.2%, compared with nominal and real returns of 3.6% and 1.6%, respectively, in the bottom-quintile sample portfolio. In the very good "Lift Off" scenario, the nominal and real returns of the top-quintile portfolio are 30.7% and 27.2%, respectively, compared to 14.3% and 10.8%, in the case of the bottom-quintile portfolio. However, the "Tail Risk Storm" scenario results in significant nominal and real declines of 20% for the top-quintile sample portfolio and about 10% for the bottom-quintile portfolio.[4]

4 The inflation assumptions differ across scenarios. See Annex 2 for further details.

Conclusions and Extensions

The sample portfolios drawn from The Academy's survey of the investment practices of its member healthcare systems illustrate a wide range of asset allocations and divergent revealed risk preferences across respondents. As illustrated in the results of the risk analytics undertaken, the sample portfolios would generate substantially different mean returns over time. The expected variability of returns is also quite divergent across sample portfolios. Although the analysis presented here gives an insight into how these divergent portfolios would perform in different market conditions, there is considerable scope for extending the analysis.

The markedly divergent revealed preferences for risk embodied in the sample portfolios drawn from The Academy survey data begs a fundamental question: What are the key factors determining the ability and willingness of each healthcare system to bear risk? One might speculate that these differences are driven by the simple risk tolerance of the decision-makers, by the general financial health of the system, by the requirements of lenders, or, in the case of the pension portfolios, by the characteristics and funded status of the plan. The analysis presented here, focusing as it does on the asset side of the equation, cannot provide a full answer to the question. Such a response requires a comprehensive asset/liability management (CALM) approach, which provides an analytical framework for integrating a healthcare system's investment decisions across multiple multi-asset pools with its operational and financial decisions. Ultimately, a judgment on whether investment strategies embody the "right" level of risk for an institution must be based on the impact of variable investment performance across all portfolios on the broader finances and key financial metrics of the system. A key extension to the analysis presented here is thus the undertaking of an institution-specific CALM analysis that incorporates other elements of a healthcare system's finances, including debt levels and related covenants, borrowing costs, credit rating metrics, the stability of operating income, liquidity requirements, the duration of pension liabilities, and the funded status of the pension plan.

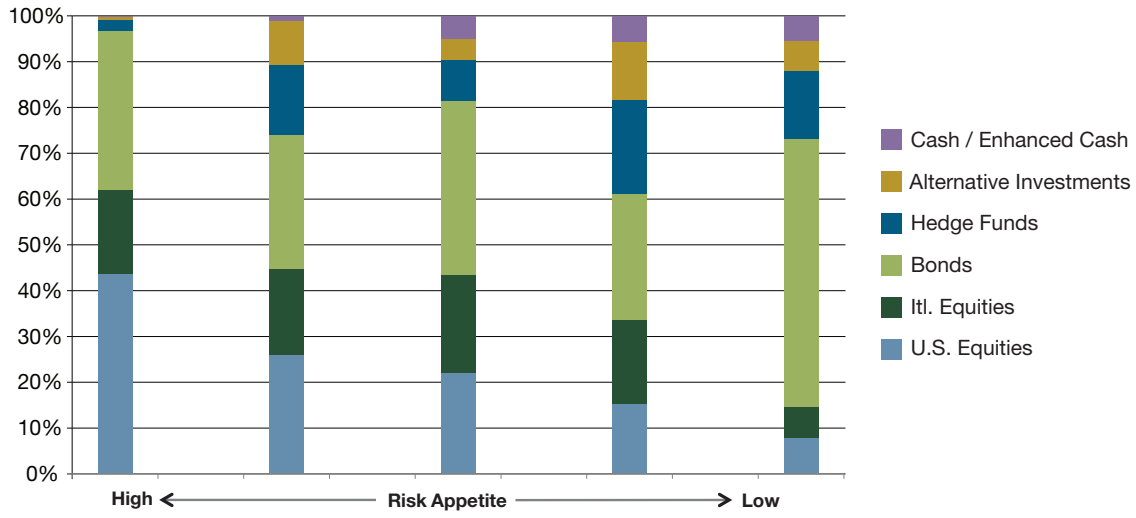
Appendix

Annex 1. The Academy Healthcare System Sample Portfolios

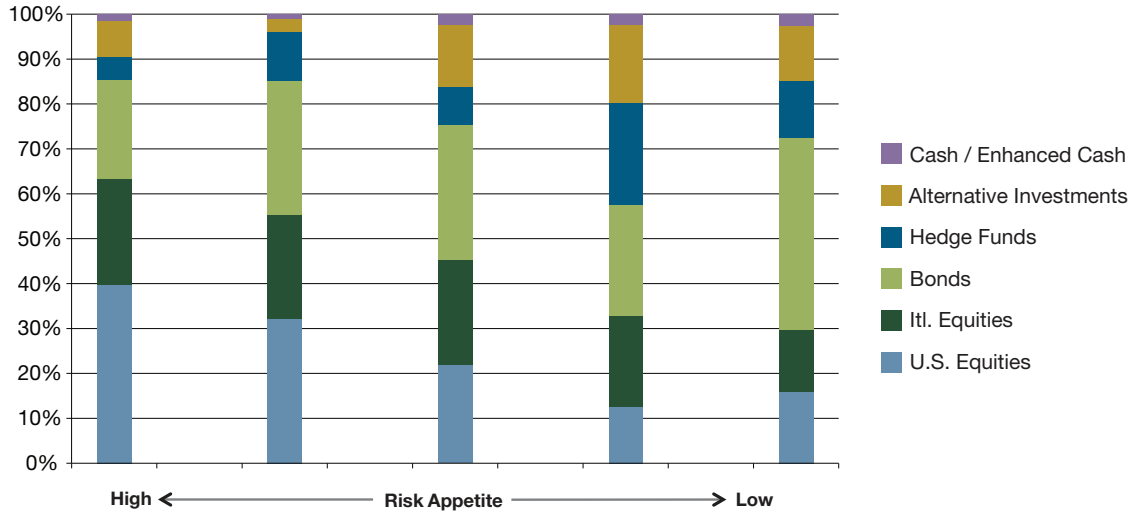
We considered a number of ways to sort the portfolios included in The Academy's survey of its member healthcare systems.

Sorting the asset allocations by **risk appetite** using the degree of equity exposure as a rough proxy of risk is a useful way to construct sample portfolios to help frame the analysis. This approach highlights the importance of understanding the objectives of each institution in

Asset Allocation by Risk Quintile — LTIP



Asset Allocation by Risk Quintile — Pension

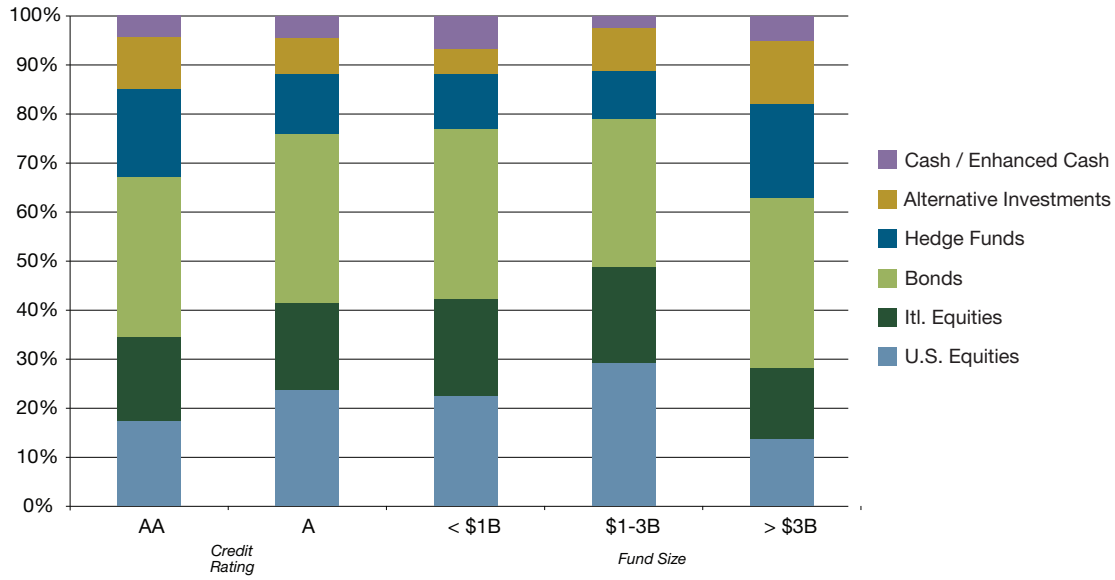


managing investment portfolios. Each institution's ability to absorb the volatility imparted to its broader operations by investments and the role of investments in complementing operational income and liability management are likely to be key factors determining the asset allocations of LTIPs and pension portfolios. The average asset allocations of each quintile for the LTIPs and pension portfolios are shown in the figures above.

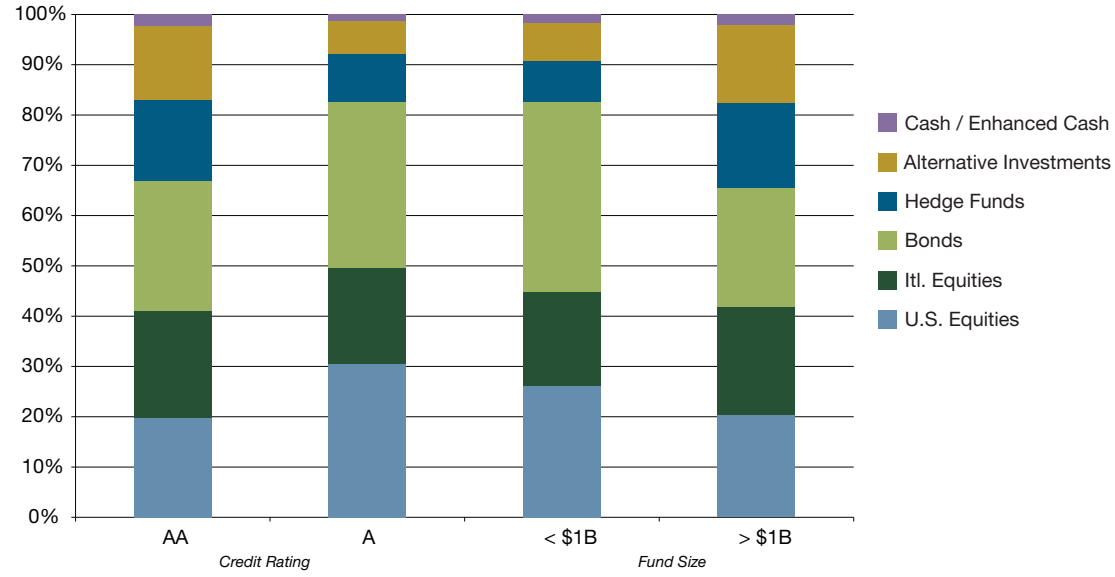
The average asset allocations of LTIPs sorted by **credit rating** highlight the tendency of AA-rated healthcare systems to maintain a smaller allocation to equities and bonds, and higher allocations to hedge funds and other alternatives than their A-rated counterparts. In the case of pensions, AA-rated healthcare systems also have smaller allocations to equities and bonds, and higher allocations to hedge funds and other alternative investments than A-rated systems.

Illustrated below are the average asset allocations of LTIPs with assets of less than $1 billion, $1-3 billion, and over $3 billion and pension portfolios with assets above or below $1 billion. Sorting the portfolios by **size** reveals no consistent pattern of preferred asset allocation.

Asset Allocation - LTIP Credit Rating and Fund Size



Asset Allocation - Pension Credit Rating and Fund Size



Annex 2. Risk Analytics

The main features of **sample LTIP's** drawn from The Academy's survey data organized by quintile of risk appetite and other characteristics are presented in the two tables that follow.

The Health Management Academy - LTIP Risk Quintiles					
Asset Class	**High Risk**	**20-40%**	**40-60%**	**60-80%**	**Low Risk**
Equity	62%	45%	43%	34%	15%
U.S.	44%	26%	22%	15%	8%
Developed Non-U.S.	17%	14%	17%	13%	5%
Emerging Markets	2%	4%	4%	5%	2%
Alternatives	3%	20%	10%	25%	17%
Private Equities	1%	5%	1%	5%	2%
Hedge Funds	2%	15%	9%	21%	15%
Real Assets	0%	5%	3%	8%	4%
Real Estate	0%	4%	2%	3%	2%
Fixed Income	35%	29%	38%	27%	58%
U.S. Fixed Income	34%	27%	38%	26%	46%
U.S. Investment Grade	34%	27%	36%	21%	45%
U.S. High Yield	1%	0%	2%	5%	1%
Non-U.S. Fixed Income	0%	2%	0%	2%	13%
Cash	0%	1%	5%	6%	5%
Total	100%	100%	100%	100%	100%
REAL RETURNS	5.5%	5.3%	4.9%	5.0%	3.5%
REAL VOLATILITY	11.3%	9.9%	9.2%	9.1%	5.9%
REAL GEOMETRIC RETURN	4.9%	4.8%	4.4%	4.6%	3.4%
1 Standard Deviation Loss	-5.8%	-4.7%	-4.3%	-4.1%	-2.3%
2 Standard Deviation Loss	-17.1%	-14.6%	-13.5%	-13.2%	-8.2%
3 Standard Deviation Loss	-28.3%	-24.6%	-22.7%	-22.3%	-14.0%
DISEQUILIBRIUM REAL RETURNS	*5.2%*	*5.0%*	*4.5%*	*4.8%*	*3.1%*

The Health Management Academy - LTIP Demographics							
Asset Class	Credit Rating		Academic Satus		Fund Size		
	AA	A	Academic	Non-Academic	< $1B	$1-3B	> $3B
Equity	34%	41%	39%	34%	42%	49%	28%
U.S.	17%	24%	20%	19%	23%	29%	14%
Developed Non-U.S.	13%	13%	14%	11%	16%	15%	9%
Emerging Markets	4%	5%	5%	3%	4%	4%	5%
Alternatives	22%	16%	25%	16%	12%	15%	24%
Private Equities	4%	3%	5%	2%	1%	5%	5%
Hedge Funds	18%	12%	19%	13%	11%	10%	19%
Real Assets	6%	4%	5%	7%	4%	4%	8%
Real Estate	2%	3%	2%	3%	3%	1%	3%
Commodities	4%	1%	3%	3%	1%	3%	5%
Fixed Income	33%	34%	28%	38%	35%	30%	35%
U.S. Fixed Income	31%	32%	25%	37%	33%	26%	33%
U.S. Investment Grade	25%	32%	22%	34%	32%	26%	26%
U.S. High Yield	5%	0%	3%	3%	1%	0%	7%
Non-U.S. Fixed Income	2%	3%	3%	2%	2%	4%	1%
Cash	4%	4%	3%	6%	7%	2%	5%
Total	100%	100%	100%	100%	100%	100%	100%
REAL RETURNS	4.9%	4.9%	5.2%	4.5%	4.8%	5.4%	4.7%
REAL VOLATILITY	8.9%	9.1%	9.6%	8.2%	9.1%	10.6%	8.4%
REAL GEOMETRIC RETURN	4.5%	4.5%	4.7%	4.2%	4.4%	4.9%	4.4%
1 Standard Deviation Loss	-4.0%	-4.2%	-4.4%	-3.7%	-4.3%	-5.1%	-3.7%
2 Standard Deviation Loss	-13.0%	-13.3%	-14.1%	-11.9%	-13.3%	-15.7%	-12.2%
3 Standard Deviation Loss	-21.9%	-22.4%	-23.7%	-20.1%	-22.4%	-26.3%	-20.6%
DISEQUILIBRIUM REAL RETURNS	*4.7%*	*4.6%*	*5.0%*	*4.2%*	*4.5%*	*5.2%*	*4.5%*

The main features of sample **pension portfolios** drawn from The Academy's survey data organized by quintile of risk appetite and other characteristics are presented in the two tables that follow.

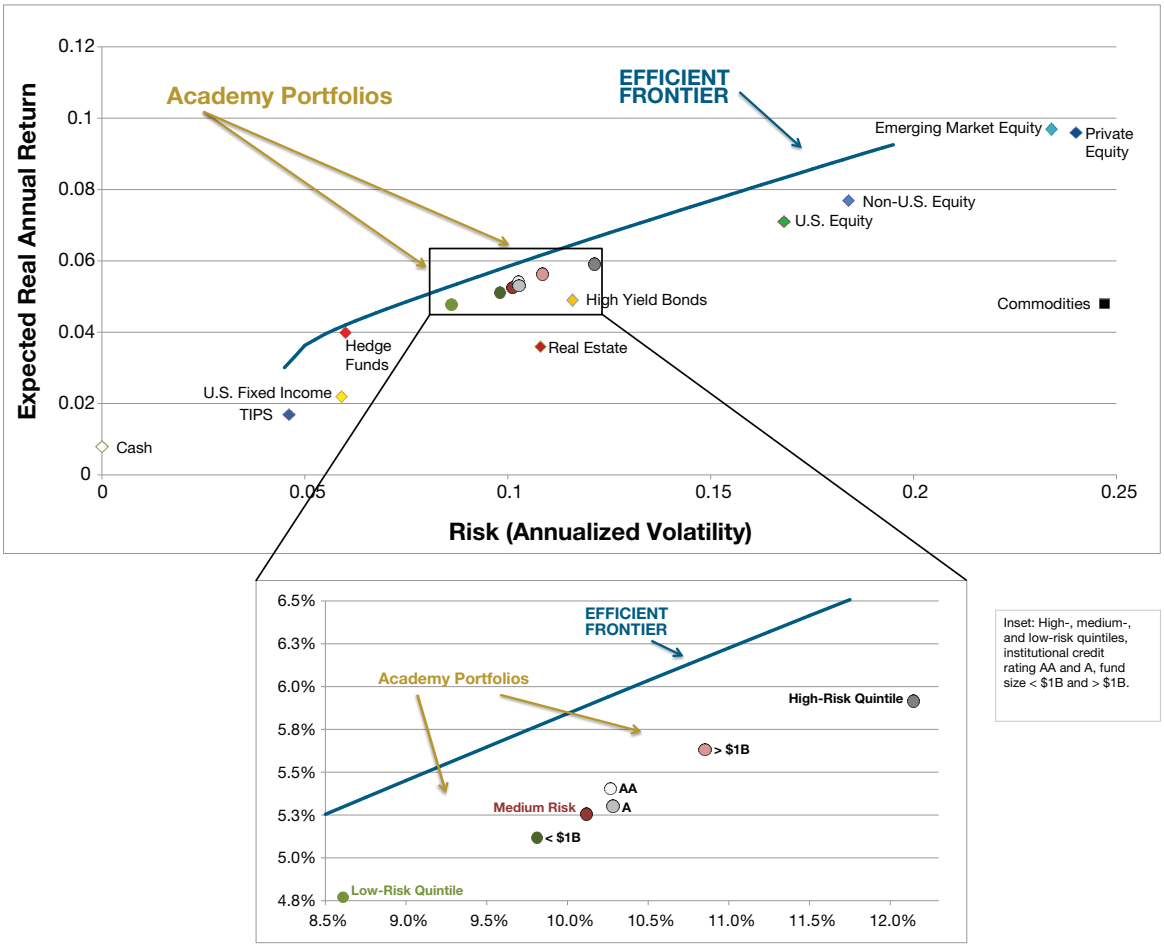
The Health Management Academy - Pension Risk Quintiles					
Asset Class	**High Risk**	**20-40%**	**40-60%**	**60-80%**	**Low Risk**
Equity	63%	55%	45%	33%	29%
U.S.	40%	32%	22%	13%	16%
Developed Non-U.S.	20%	16%	16%	14%	11%
Emerging Markets	3%	7%	7%	6%	3%
Alternatives	9%	12%	13%	29%	21%
Private Equities	4%	1%	5%	6%	8%
Hedge Funds	5%	11%	8%	23%	13%
Real Assets	4%	2%	9%	11%	4%
Real Estate	2%	1%	7%	4%	2%
Commodities	1%	0%	2%	8%	2%
Fixed Income	22%	30%	30%	25%	43%
U.S. Fixed Income	16%	29%	27%	24%	40%
U.S. Investment Grade	16%	27%	27%	17%	38%
U.S. High Yield	0%	2%	0%	7%	2%
Non-U.S. Fixed Income	6%	1%	4%	1%	3%
Cash	2%	1%	2%	2%	3%
Total	100%	100%	100%	100%	100%
REAL RETURNS	5.9%	5.6%	5.3%	5.3%	4.8%
REAL VOLATILITY	12.1%	10.9%	10.1%	9.8%	8.6%
REAL GEOMETRIC RETURN	5.2%	5.0%	4.7%	4.8%	4.4%
1 Standard Deviation Loss	-6.2%	-5.4%	-4.9%	-4.5%	-3.8%
2 Standard Deviation Loss	-18.4%	-16.3%	-15.0%	-14.3%	-12.4%
3 Standard Deviation Loss	-30.5%	-27.2%	-25.1%	-24.1%	-21.1%
DISEQUILIBRIUM REAL RETURNS	*5.8%*	*5.3%*	*5.0%*	*5.1%*	*4.4%*

The Health Management Academy - Pension Demographics						
Asset Class	Credit Rating		Academic Satus		Fund Size	
	AA	A	Academic	Non-Academic	< $1B	> $1B
Equity	41%	49%	48%	41%	45%	42%
U.S.	20%	31%	24%	22%	26%	20%
Developed Non-U.S.	15%	16%	15%	15%	16%	15%
Emerging Markets	6%	3%	8%	4%	3%	6%
Alternatives	22%	14%	22%	17%	12%	23%
Private Equities	6%	4%	5%	5%	4%	6%
Hedge Funds	16%	10%	17%	12%	8%	17%
Real Assets	9%	2%	5%	9%	4%	9%
Real Estate	3%	2%	1%	4%	3%	3%
Commodities	6%	0%	3%	4%	1%	6%
Fixed Income	26%	33%	23%	32%	38%	24%
U.S. Fixed Income	23%	31%	20%	30%	36%	20%
U.S. Investment Grade	18%	30%	16%	26%	34%	16%
U.S. High Yield	5%	1%	3%	4%	2%	4%
Non-U.S. Fixed Income	3%	2%	3%	3%	2%	3%
Cash	2%	1%	3%	2%	2%	2%
Total	100%	100%	100%	100%	100%	100%
REAL RETURNS	5.4%	5.3%	5.7%	5.2%	5.1%	5.6%
REAL VOLATILITY	10.3%	10.3%	10.9%	9.8%	9.8%	10.9%
REAL GEOMETRIC RETURN	4.9%	4.8%	5.1%	4.7%	4.6%	5.0%
1 Standard Deviation Loss	-4.9%	-5.0%	-5.2%	-4.6%	-4.7%	-5.2%
2 Standard Deviation Loss	-15.1%	-15.3%	-16.2%	-14.4%	-14.5%	-16.1%
3 Standard Deviation Loss	-25.4%	-25.5%	-27.1%	-24.1%	-24.3%	-26.9%
DISEQUILIBRIUM REAL RETURNS	*5.2%*	*5.0%*	*5.5%*	*4.9%*	*4.8%*	*5.5%*

The risk and return characteristics of **sample pension portfolios** are plotted along an efficient frontier in the figure below. The efficient frontier represents the expected risk and return of optimally constructed portfolios. A portfolio on the efficient frontier has the highest possible return for its level of risk. We also plot the risk and return of the asset classes used to construct the efficient frontier and calculate the expected risk and return of the sample portfolios.

The Academy — Pension Portfolios

Risk and return characteristics of sample portfolios and selected asset classes relative to an efficient frontier.



Inset: High-, medium-, and low-risk quintiles, institutional credit rating AA and A, fund size < $1B and > $1B.

Main Features of the Short-Term Scenarios

Short-term scenario analysis provides a framework to retest the appropriateness of investment portfolios and risk budgets designed for the long term in the context of current market conditions and relative asset valuations. We consider five scenarios—a base case and two upside and two downside scenarios—constructed to provide a realistic assessment of a range of possible short-term outcomes. Key assumptions for economic variables and asset class returns, as well as the expected returns of sample LTIP and pension portfolios under each of these five scenarios are set out in the tables below.

The **Base Case** "Muddle Through" scenario reflects current market expectations. These suggest a continued recovery in growth and earnings, albeit at a slower rate than typical cyclical recoveries, and subdued inflation. Deleveraging and fiscal retrenchment dampen growth, while countervailing central bank accommodation supports economic recovery and asset prices. Stable, if lackluster, growth and abundant liquidity support U.S. and non-U.S. equities, which generate high single-digit returns. Real yields on safe-haven assets remain negative well out the maturity spectrum. Nominal returns on investment-grade and high-yield bonds are modest as there is no impetus for inflation expectations or credit spreads to change significantly.

In the **Bad Case** "Dashed Hopes" Scenario, the U.S. economy approaches stall speed as pressures of deleveraging constrain banks and households. A vicious cycle of capital flight, recession, austerity, and unstable debt dynamics grips the euro area. With the global recovery derailed, global equity markets decline, but not dramatically. U.S. equities outperform foreign markets, with emerging shares lagging developed. Yields on safe haven assets fall even further, while credit spreads widen modestly. High-yield bonds underperform investment-grade counterparts.

In the **Very Bad Case** "Tail Risk Storm" Scenario, one or more tail risks combine to derail a fragile global economic recovery, undermine confidence, and trigger a stampede out of risky assets to safe havens. Global equities fall sharply. Bank shares, especially in Europe, are hard hit as are cyclical industries and firms reliant on credit from banks or capital markets. Emerging market equities underperform developed markets as foreign inflows are reversed. A rising dollar compounds local currency losses on foreign assets. Yields on safe haven assets plumb new lows, while credit spreads spike. High-yield and emerging market bonds underperform other credit sectors.

In the **Good Case** "Recovery Gathers Momentum" Scenario, the U.S. economic recovery gathers momentum, the euro area crisis remains stabilized, and emerging markets prove resilient. Fiscal consolidation proceeds at a deliberate pace and central banks remain accommodating, despite a slight uptick in inflation. Global equities rise. Cyclical shares and highly geared companies outperform as credit conditions ease with renewed bank lending. Emerging markets outperform their developed counterparts. A declining dollar boosts returns on non-U.S. assets. Yields on safe-haven assets rise, but the increase is limited by continued quantitative easing by central banks and only modest inflationary pressure. Yield spreads narrow as credit quality is perceived to improve.

In the **Very Good Case** "Lift Off" Scenario, credit conditions unexpectedly ease as banks put excess reserves to work. Easier credit and balance sheet repair spur household demand and corporate capital expenditure. Fiscal policies are contractionary, but not draconian, and monetary policy remains easy, perhaps overly so. Global equity markets surge, with the riskiest and most cyclically sensitive firms leading the way. Emerging markets outperform. A declining dollar boosts returns on foreign assets. Safe-haven assets suffer as investors throw caution to the wind. Credit spreads tighten significantly with high-yield bonds outperforming.

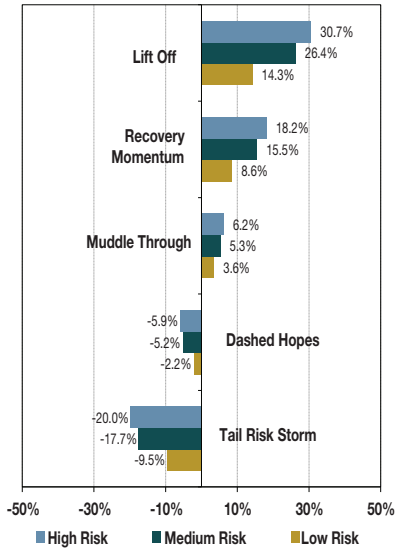
LTIP — 2013 Investment Scenarios

	– –	–	*Base Case*	+	++
	Tail Risk Storm	**Dashed Hopes**	**Muddle Through**	**Recovery Momentum**	**Lift Off**
Scenario Assumptions					
World GDP Growth	-2.0%	2.0%	2.6%	4.0%	5.0%
U.S. GDP Growth	-5.5%	1.0%	1.9%	3.0%	4.0%
U.S. Inflation	-0.5%	1.5%	2.0%	3.0%	3.5%
Ending U.S. 10 Year Bond Yield	0.7%	1.3%	1.9%	2.6%	2.9%
U.S.$ Change	10.0%	4.5%	0.0%	-4.0%	-10.0%
Expected Nominal Market Returns in US$					
Equities					
U.S. Equities	-28.0%	-9.0%	8.6%	26.6%	44.1%
Developed Non-U.S. Equities	-37.3%	-12.7%	9.4%	31.5%	55.1%
Emerging Market Equities	-45.7%	-16.7%	9.8%	36.3%	64.3%
Alternative Investments					
Private Equities	-39.2%	-13.6%	10.5%	35.1%	59.2%
Hedge Funds	-14.3%	-3.9%	5.5%	14.4%	23.4%
Opportunistic	-18.8%	-2.8%	2.6%	5.5%	8.3%
Real Assets					
Real Estate	-19.3%	-6.5%	4.8%	13.9%	22.5%
Commodities	-47.4%	-20.8%	4.3%	29.9%	55.0%
U.S. TIPS	1.6%	1.4%	0.9%	0.1%	-0.1%
Fixed Income and Cash					
U.S. Investment Grade	0.1%	1.8%	1.6%	0.3%	0.2%
U.S. High Yield	-18.8%	-2.8%	2.6%	5.5%	8.3%
Non-U.S. Sovereign Hedged	1.0%	1.7%	2.0%	0.5%	0.2%
Cash	0.8%	0.4%	0.3%	0.2%	0.2%
Expected Portfolio Returns Risk Appetite					
High Risk	**-20.0%**	**-5.9%**	**6.2%**	**18.2%**	**30.7%**
Medium Risk	**-17.7%**	**-5.2%**	**5.3%**	**15.5%**	**26.4%**
Low Risk	**-9.5%**	**-2.2%**	**3.6%**	**8.6%**	**14.3%**

Portfolio Asset Allocation

	Risk Appetite		
	High	**Medium**	**Low**
Equities	**62.1%**	**43.5%**	**14.7%**
U.S. Equities	43.6%	22.0%	7.8%
Developed Non-U.S. Equities	16.8%	17.1%	4.8%
Emerging Market Equities	1.7%	4.5%	2.1%
Alternative Investments	**3.0%**	**10.5%**	**17.3%**
Private Equities	0.6%	1.4%	2.3%
Hedge Funds	2.4%	9.1%	15.0%
Opportunistic	0.0%	0.0%	0.0%
Real Assets	**0.2%**	**3.2%**	**4.1%**
Real Estate	0.1%	1.8%	1.6%
Commodities	0.1%	1.4%	2.5%
TIPS	0.0%	0.0%	0.0%
Fixed Income and Cash	**34.7%**	**42.8%**	**63.9%**
U.S. Investment Grade	33.8%	36.1%	44.6%
U.S. High Yield	0.6%	1.8%	1.0%
Non-U.S. Sovereign Hedged	0.2%	0.0%	12.8%
Cash	0.0%	4.9%	5.5%
Total	**100.0%**	**100.0%**	**100.0%**

Expected Portfolio Returns



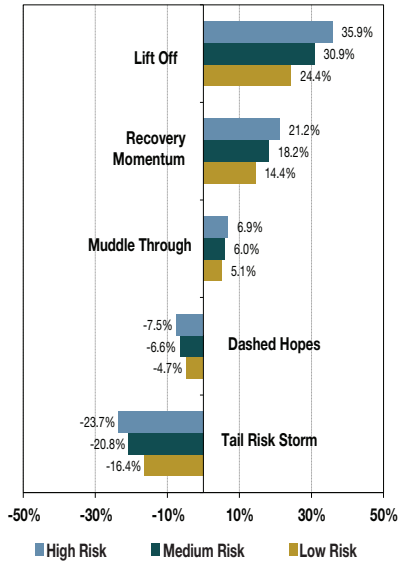
Pension — 2013 Investment Scenarios

	– –	–	*Base Case*	+	++
	Tail Risk Storm	**Dashed Hopes**	**Muddle Through**	**Recovery Momentum**	**Lift Off**
Scenario Assumptions					
World GDP Growth	-2.0%	2.0%	2.6%	4.0%	5.0%
U.S. GDP Growth	-5.5%	1.0%	1.9%	3.0%	4.0%
U.S. Inflation	-0.5%	1.5%	2.0%	3.0%	3.5%
Ending U.S. 10 Year Bond Yield	0.7%	1.3%	1.9%	2.6%	2.9%
U.S.$ Change	10.0%	4.5%	0.0%	-4.0%	-10.0%
Expected Nominal Market Returns in US$					
Equities					
U.S. Equities	-28.0%	-9.0%	8.6%	26.6%	44.1%
Developed Non-U.S. Equities	-37.3%	-12.7%	9.4%	31.5%	55.1%
Emerging Market Equities	-45.7%	-16.7%	9.8%	36.3%	64.3%
Alternative Investments					
Private Equities	-39.2%	-13.6%	10.5%	35.1%	59.2%
Hedge Funds	-14.3%	-3.9%	5.5%	14.4%	23.4%
Opportunistic	-18.8%	-2.8%	2.6%	5.5%	8.3%
Real Assets					
Real Estate	-19.3%	-6.5%	4.8%	13.9%	22.5%
Commodities	-47.4%	-20.8%	4.3%	29.9%	55.0%
U.S. TIPS	1.6%	1.4%	0.9%	0.1%	-0.1%
Fixed Income and Cash					
U.S. Investment Grade	0.1%	1.8%	1.6%	0.3%	0.2%
U.S. High Yield	-18.8%	-2.8%	2.6%	5.5%	8.3%
Non-U.S. Sovereign Hedged	1.0%	1.7%	2.0%	0.5%	0.2%
Cash	0.8%	0.4%	0.3%	0.2%	0.2%
Expected Portfolio Returns **Risk Appetite**					
High Risk	**-23.7%**	**-7.5%**	**6.9%**	**21.2%**	**35.9%**
Medium Risk	**-20.8%**	**-6.6%**	**6.0%**	**18.2%**	**30.9%**
Low Risk	**-16.4%**	**-4.7%**	**5.1%**	**14.4%**	**24.4%**

Portfolio Asset Allocation

	Risk Appetite		
	High	**Medium**	**Low**
Equities	**63.4%**	**45.3%**	**29.6%**
U.S. Equities	39.6%	22.0%	15.9%
Developed Non-U.S. Equities	20.7%	16.3%	10.8%
Emerging Market Equities	3.1%	7.1%	2.9%
Alternative Investments	**9.4%**	**13.1%**	**20.6%**
Private Equities	4.1%	4.8%	7.9%
Hedge Funds	5.3%	8.3%	12.7%
Opportunistic	0.0%	0.0%	0.0%
Real Assets	**3.7%**	**9.1%**	**4.3%**
Real Estate	2.4%	6.9%	2.4%
Commodities	1.3%	2.3%	1.9%
TIPS	0.0%	0.0%	0.0%
Fixed Income and Cash	**23.4%**	**32.4%**	**45.5%**
U.S. Investment Grade	15.7%	26.5%	38.2%
U.S. High Yield	0.4%	0.0%	2.1%
Non-U.S. Sovereign Hedged	5.8%	3.5%	2.6%
Cash	1.6%	2.3%	2.6%
Total	**100.0%**	**100.0%**	**100.0%**

Expected Portfolio Returns



DISCLOSURES

Expected returns and risk are based upon Strategic's estimates of equilibrium asset class returns, volatility and correlations.

Expected Returns Limitations

It is important to note that the expected returns should not be interpreted to represent a promise of future performance under any of the scenarios described herein. Because the capital market statistics and expected return data were constructed with Strategic's judgment and knowledge of history in mind, they may not adequately capture the influence of future market conditions on investment returns. As a result, actual returns may differ substantially from the returns shown in this analysis. In addition, the expected returns do not represent actual trading and, therefore, do not account for the impact of financial risk on actual trading, such as the ability to adhere to a particular strategy in spite of significant trading losses.

Hypothetical or simulated performance results have certain inherent limitations, some of which are described below. In fact, there are frequently sharp differences between hypothetical performance results and the actual results subsequently achieved by any particular trading program. One of the limitations of hypothetical performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or to adhere to a particular trading program in spite of trading losses are material points that can also affect actual trading results. There are numerous other factors relating to the markets in general or to the implementation of any specific trading program that cannot be fully accounted for in the preparation of hypothetical performance results and all of which can adversely affect actual trading results. Furthermore, the hypothetical results do not contain any calculations of transaction costs that may be applicable to the described strategies.

Scenario Analysis Methodology

The scenario analysis explores potential asset class and portfolio returns associated with five economic scenarios – a base case (Muddle Through), a potential positive alternative to the base case (Recovery Momentum), a potential negative alternative to the base case (Dashed Hopes), a more extreme and less likely positive alternative (Lift Off), and a more extreme and less likely negative alternative (Tail Risk Storm).

The scenario analysis is designed to provide a risk assessment that may be more accessible than statistical summary measures. Scenario analysis augments and complements the monthly output of Strategic's statistical risk management system, which estimates and monitors portfolio risk in terms of ex-ante estimates of the standard deviation of portfolio returns (portfolio volatility) and the standard deviation of the difference between portfolio returns and policy targets (tracking error).

The point estimate of the coming year's portfolio return (its expected value) is based on Strategic's estimates of equilibrium asset class expected returns, adjusted by Strategic's assessment of the present deviation of market conditions from equilibrium levels. Return expectations contain a component representing manager skill, which is based on historical returns and managers' expectations of forward-looking opportunities. This component is incorporated to illustrate how the potential for value-added would impact risks and returns; it is not a promise of value-added. In the case of hedge funds, client returns may differ from policy and peer estimates as a result of differences in exposure to liquid markets. For portfolios with a

portable alpha allocation, the estimated market exposures in the hedged strategies as well as in the overlay have been incorporated in the analysis. The base case scenario is constructed to represent Strategic's estimate of the market's present expectations. The alternative scenarios portray asset class and portfolio return outcomes that vary around the base case, in magnitudes approximately equal to one and three standard deviations above and below the base case expected values. Portfolio returns relative to policy targets are similarly calibrated based upon Strategic's assessment of historical relative performance and ex-ante estimates of portfolio tracking error from Strategic's risk management system.

Strategic's Equilibrium Capital Market Statistics

- Strategic's capital markets statistics are based on real historical returns for each asset class, adjusted to be consistent with Strategic's assessment of equilibrium economic growth and to remove distortions caused by valuation anomalies. In effect, returns assume that asset classes start from a point of average historical valuation.
- Actual historical measures of return volatility and correlation were used except where Strategic believes that future conditions are unlikely to follow distant historical patterns. Upward adjustments to risk estimates are made for asset classes with appraisal-based returns, including real estate and private equity.
- For asset classes without long-term history (e.g., emerging market equity and high yield debt), estimates of the returns that may have been generated over a long-term history were based upon shorter-term relationships with asset classes that have long-term histories.
- Detailed statistics are available upon request.

Scenario Analysis Limitations

It is important to note that the scenario analysis, including the Expected Market Returns and Expected Portfolio Returns, should not be interpreted to represent a promise of future performance under any of the scenarios described herein. Because the Equilibrium Capital Market Statistics and expected return data were constructed with Strategic's judgment and knowledge of history in mind, they may not adequately capture the influence of future market conditions on investment returns. As a result, actual returns may differ substantially from the returns shown in the scenario analysis. In addition, the expected returns do not represent actual trading and, therefore, do not account for the impact of financial risk on actual trading, such as the ability to adhere to a particular strategy in spite of significant trading losses.

The Academy

The Health Management Academy

The Health Management Academy (The Academy) is a knowledge-based company exclusively for executives of the largest integrated health systems and prominent health and medical-technology companies. The Academy has a material record of independent research and policy analysis and it is the definitive trusted source of information about the largest integrated health systems. The Academy was formed in 1998, the same decade as many of these leading health systems were created.

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About Strategic Investment Group

Strategic Investment Group provides *Integrated Portfolio Solutions*, a comprehensive approach for managing customized portfolios for institutional and private investors. Our proprietary process combines active portfolio management, rigorous risk management, and open architecture manager selection. As a provider of Outsourced CIO services, Strategic has more than 25 years of experience serving as a co-fiduciary with day-to-day investment discretion and oversees $33.2 billion in assets under management (as of March 31, 2013). Collaborative relationships have led to long-term partnerships with clients, including some of the largest healthcare systems in the United States.