Pension Consulting Alliance, Inc.
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Developing Expected Return and Risk Assumptions

by

Pension Consulting Alliance, Inc.

John Linder, CFA, CPA
Neil Rue, CFA

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Introduction

A key tenet underpinning the strategic allocation decision-making process is that diversification across major strategic asset classes (asset classes with exposure to distinct compensated risk factors) can enhance a portfolio's risk-adjusted returns. As a result, within our modeling process, we develop expectations for investment returns, risks, and co-movements of and among strategic investment classes. The development of these expectations is the focus of this report.

This report will review our approach for developing expected average annual long-term returns, different type of risk, and correlations for and among several asset classes. While use of these expectations are consistent with the mean-variance approach to strategic allocation optimization that has been relied upon by the investment industry for several decades, the mean-variance approach is being critically examined by a wide spectrum of leading investment practitioners, including ourselves. One conclusion is that, since the mean-variance approach is a single-horizon model, it is limited in its applicability to measuring risk *within* an investment horizon, particularly if correlations between asset classes are non-constant (change during the period). Historically, asset class correlation relationships have not been constant. Therefore, such within-horizon risk analysis is critical for plan sponsors requiring an assessment of how asset allocation might potentially impact the interim funding risks of the overall plan. In spite of these issues, assumptions about investment class behavior are still required for the mean-variance framework, and the framework allows practitioners and users a familiar tool for analyzing portfolios.

Therefore, despite the issues identified above concerning the limitations of mean-variance optimization, the base metrics to be established from this analysis will be the traditional measures of volatility (standard deviation) and co-movement (correlation). Nevertheless, we would implore the user to consider other types of portfolio level and asset class level risks for more complete analysis of portfolio risk including:

Portfolio level risks

1. Shortfall Risk (the risk of the plan being unable to pay out all future beneficiaries)
2. Drawdown Risk (the risk of most assets declining in tandem during a market panic)
3. Cash Flow Risk (the risk that cash will be unavailable to make interim beneficiaries payments without borrowing or forced asset sales)

Asset class level risks

1. Valuation Risk (the risk that asset class cash flows decrease / or uncertainty of the cash flows increase, due to changes in the assumed future level of the factor(s) driving the cash flows or uncertainty regarding the future level of such factor(s) themselves.)
2. Active risk (the risk that active management within an asset class will increase risk or decrease return relative to a passive alternative)
3. Illiquidity Risk (the risk that the market for the asset is or becomes inactive)

Chapter II
Process for Developing Expected Returns, Risks, and Correlations

PCA's approach for developing mean-variance expectations of returns, risks, and correlations combines the use of investment class history, current investment class fundamentals, and factor drivers of investment class correlations. Before reviewing our approach to developing expectations, it is important to recognize that our objective is to establish expectations for investment classes that reflect a general *consensus view* of how such investments and their markets are expected to perform in the future. PCA's focus is not the development of shorter-term investment class expectations (less than 3 years) that might be used for tactical purposes. In addition, it is widely recognized that the entire expectation-setting exercise is highly subjective and may contain significant forecast error. That being said, PCA reviews a broad range of economic, fundamental, and investment industry data when examining and adjusting its forward-looking mean-variance assumptions.

Different procedures are utilized to develop expectations for real returns, risks, and correlations. PCA's approach to developing asset class return expectations is to utilize the well-known "building block" approach (see discussion below). This approach combines both fundamental and historical information and data. Developing expectations for risks and correlations relies more heavily on an analysis of historical data. However, PCA closely examines the trends of these latter measures across investment classes in order to understand their probable drivers. In addition, given the volatility of the trends, PCA may use statistical procedures to smooth data and / or emphasize more recent data rather than utilizing simple computational techniques that treat all asset class history as equivalent in its influence on the future.

A. Developing Expected Returns – The Building Block Approach

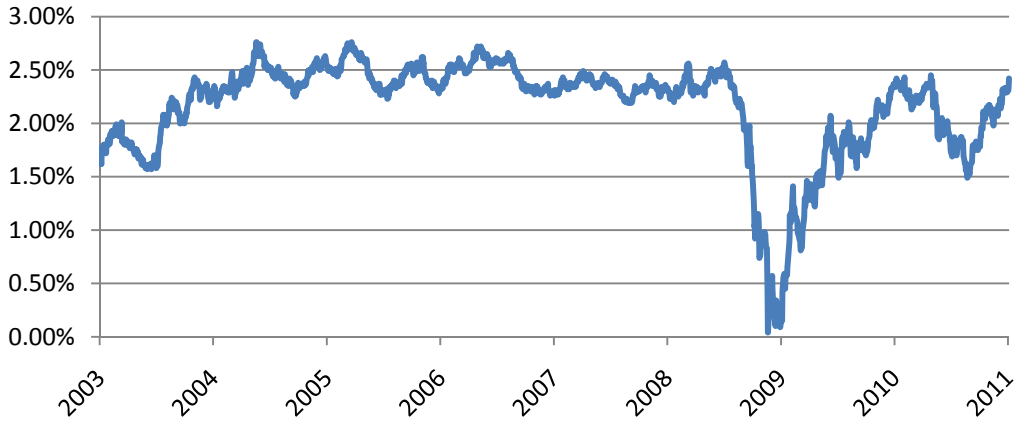
There are three general building blocks used to construct expected asset class returns: (i) an expected long-term rate of inflation, (ii) an expected return above inflation that compensates an investor for making risk free investments (i.e., the "real risk free rate"), and (iii) expected return premiums for each investment class/market, depending on the amount and type of risk the typical investor is expected to bear when investing in such an investment class/market (i.e., the "risk premium"). As one might expect, the largest portion of most investment classes' returns comes from their respective risk premiums. Not surprisingly, the risk premiums are the most difficult to forecast.

Developing expectations for the long-term rate of inflation

PCA uses both market-based fundamentals and other sources to determine an expected long-term rate of inflation. Market-based information includes differences in yield levels between the 10-year U.S. Treasury Note and the analogous real yield of the 10-year Treasury Inflation Protected Security (or TIPS) Note. The difference between the 10-year U.S. Treasury Note yield and the 10-year TIPS real yield is referred to as the "break even inflation rate." Since the 10-year TIPS Note yield is a real yield (because the par value of the bond is reset quarterly based on the CPI-U), the break even inflation rate represents a market-based consensus view on inflation over the next 10-year horizon. As of 12/31/2010, the yield on the 10-year U.S. T-Note was 3.3% while the real yield on the 10-years TIPS Note was 1.0%. Thus, the break even inflation rate was 2.3%.[1] This measure of expected inflation is in line with where it was last year (see the following graph).

[1] The difference (3.3% - 1.0%), 2.3%, represents an initial baseline assumption for inflation.

Figure 1 - Implied Inflation Rate from 10-Year Breakeven Inflation
(10-year nominal Treasury yield minus 10-year TIPS yield)

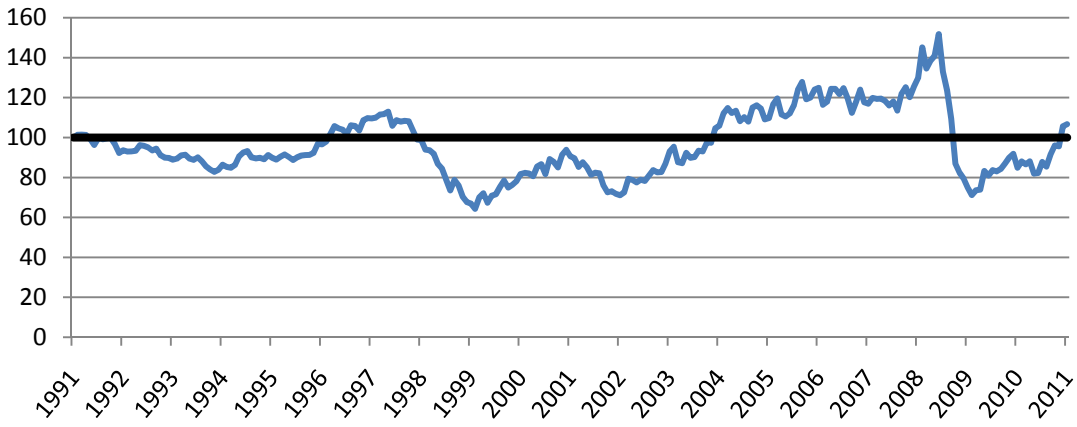


Source: www.ustreas.gov
Daily Yield Curve Rates (10 year nominal treasury yield minus 10 year TIPs yield)

Several short-to-intermediate factors can impact breakeven inflation rates. Such factors include (i) the TIPS carry trade expectations (i.e., selling short TIPS and buying long TIPS), (ii) demand/supply differences between security types, and (iii) price volatility that is associated with headline inflation, but not the core CPI-U inflation (e.g., fluctuations in commodity prices). However, this is a very large and liquid market, second only to the U.S. Nominal Treasury debt market and the developed world stock markets, suggesting that inflation expectations implied by trading in this market should be given serious consideration.

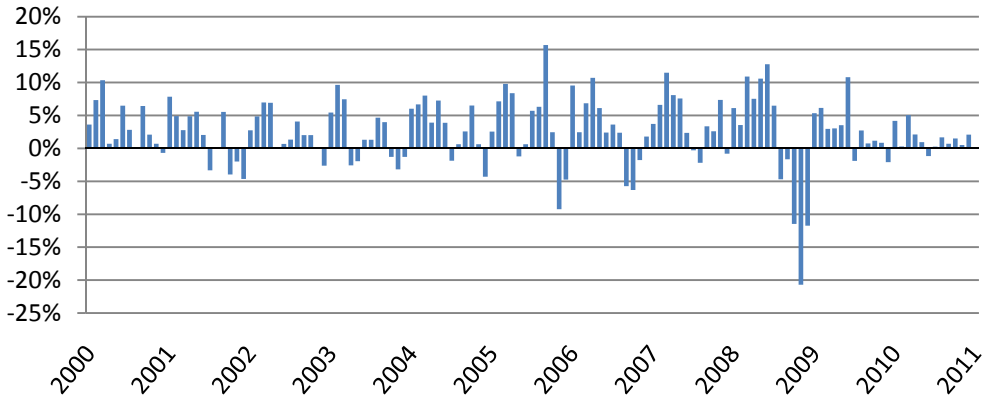
As depicted in the above graph, the breakeven inflation level declined markedly from spring 2010 through fall 2010, but has risen through year end. Nominal Treasury yields rose at year end as the risk of a double dip recession receded, encouraged by commencement of QE2 (the Fed's 2nd round of Quantitative Easing) and a political compromise to extend Bush era tax rates for an additional two years. Nominal Treasury yields rose quickly from October through December, while real yields to TIPS rose more slowly. In addition, commodity prices are trending up as global economic activity has recovered from recessionary levels (below).

Figure 2 - Inflation Adjusted Dow Jones UBS
Commodity Price Index (1991 = 100)



Source: Bloomberg DJUBS Index, St. Louis Fed for US CPI all urban consumers.

Figure 3 - Annualized Monthly Rate of Change in Headline Inflation



Source St. Louis Fed, Annualized Monthly CPIAUCNS

The first quarter of 2010 represented a continuation of the rally in risk assets that had been in force since March 2009. However, in the second quarter of 2010, business as usual came to a stop when the European debt crisis emerged as a significant source of uncertainty regarding world economic growth. Rolling banking crises, and the European Union's incremental response to each such crisis, has been a source of concern throughout the year resulting in slowing European growth and a continuation of the Fed's loose monetary policy stance (near zero policy rate and the implementation of the QE2 monetization scheme). Low interest rates (negative real rates) have made holding cash painful for investors, pushing them towards riskier assets.

For 2010, inflation was 1.5% (CPI for all urban consumers, CPI-U). According to the Bureau of Labor Statistics January 14th release, *"The rate of increase in the CPI slowed in 2010 as the December to December increase fell from 2.7 percent in 2009 to 1.5 percent in 2010. A deceleration in the gasoline index accounted for much of the slowdown, as it increased 13.8 percent in 2010 after rising 53.5 percent in 2009. The index for all items less food and energy also decelerated in 2010. After rising 1.8 percent in both 2008 and 2009, the index increased 0.8 percent in 2010, the smallest December-December increase in the history of the index."*

Given that market expectations for inflation provide a reasonable, but potentially volatile assessment, PCA also typically refers to other credible sources within the marketplace to gain a broader consensus view of inflation. Several of these sources include leading investment management firms and/or investment banks. However, PCA also considers other well-regarded sources such as the International Monetary Fund which projects 5-year average U.S. inflation of 1.5% as of October 2010, and the University of Michigan Survey of median expected annual inflation in 5-to-10 years which was 2.8% for the last three months of 2010. As a result of the countervailing factors mentioned above, but in recognition that they are each pointing to a level below 3%, PCA is lowering its long-term inflation assumption to 2.75%.

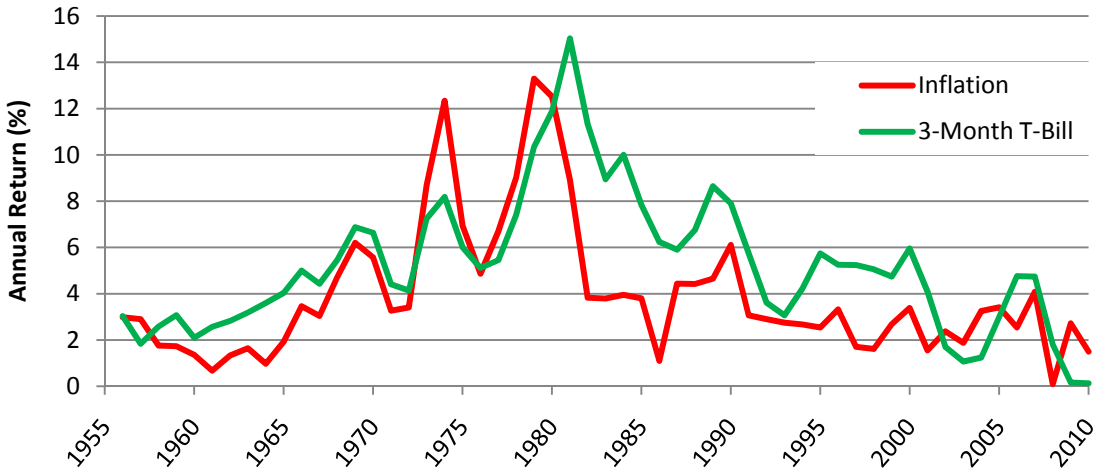
Developing expectations for the real risk-free return

The real risk-free rate can take two forms: (i) a short-term rate of return based on default-free government debt and (ii) a real rate of return or real yield on a default-free zero-coupon bond whose duration closely matches the horizon of an investor's cash flow requirements. PCA

examines the returns of 90-day Treasury Bills to address (i) and examines the yields on 10-year TIPS to address (ii).

Developing expectations for the short-term real risk-free return requires an examination of its history, as well as a qualitative assessment of the trend associated with the Fed's inclination to raise or lower its lending rates for the foreseeable future. Over recent history, linkage between inflation and Fed action has been loose at best (see chart below).

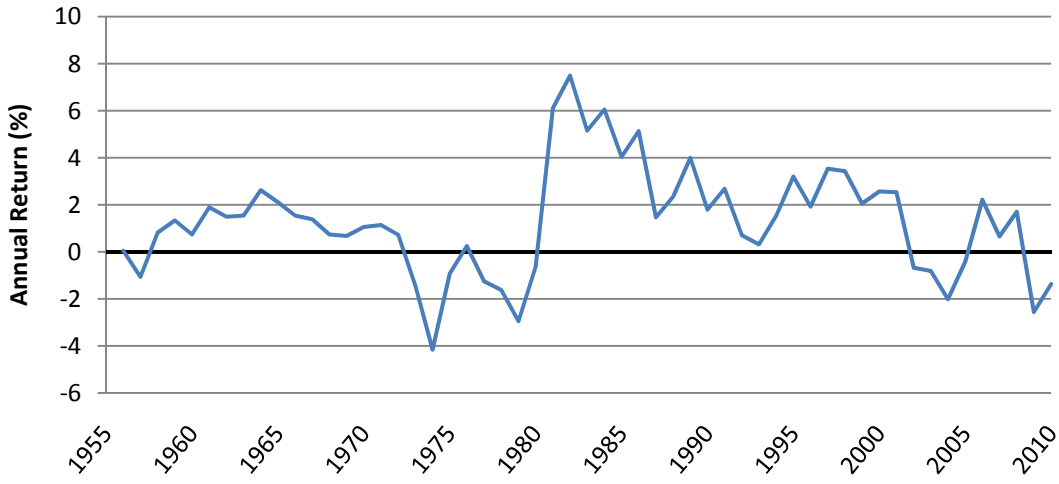
Figure 4 - History of T-Bills returns and Inflation



Source: Federal Reserve, BLS, Citigroup 3 month T-Bill Index

As indicated in the chart above, since the early 1990's, inflation in the U.S. has proven relatively benign, while short-term rates (as measured by the 3-month T-bill returns) have exhibited a wide range. As a result, the real risk-free rate (3-month T-bill minus inflation) has been quite volatile (see chart below).

Figure 5 - History of the Real Risk-Free Cash Rate of Return

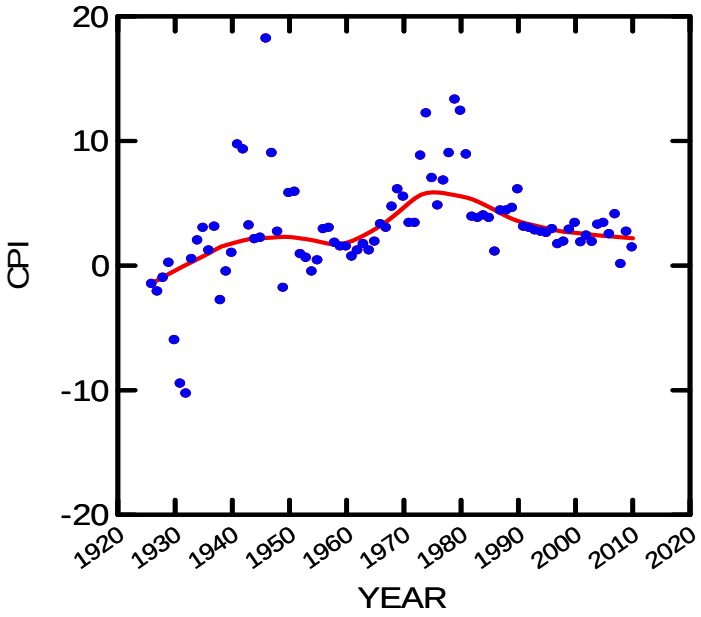


Source: PCA calculation of Citigroup 3 month T-Bill returns minus BLS annual CPI Data.

Furthermore, the real risk-free cash rate of return has averaged 1.1% since 1990 and a mere 0.2% since 2000, with several episodes of negative annual returns to holding cash in the mid 2000's and most recently in 2009 and 2010.

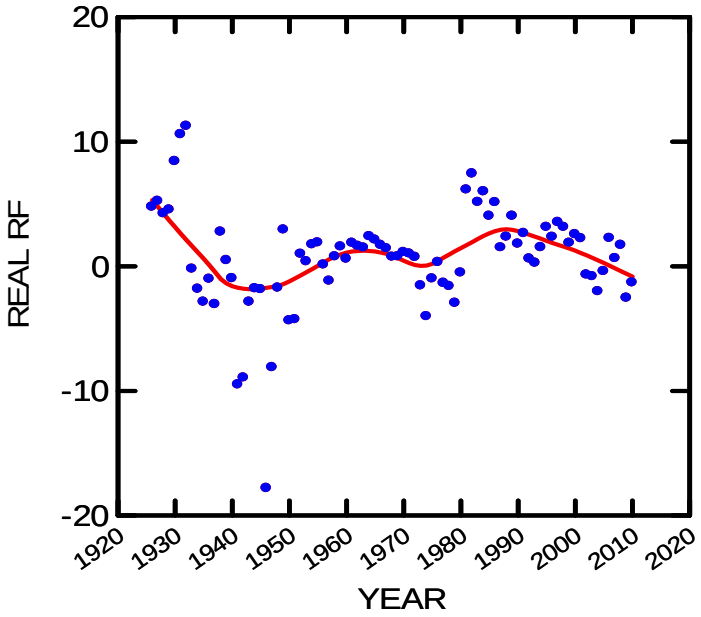
To further develop intuition about inflation and the real risk-free rate, we have examined the trends of their annual time series utilizing exponential smoothing techniques. Interestingly, both series have exhibited declining trends over recent history with no dramatic outliers (see charts below).

Figure 6 – Long-Term Trend of Inflation



Source: PCA

Figure 7 – Trend of the Real Risk Free Return



Source: PCA

At present, Federal Funds Rates, and hence T-Bill rates, are forecasted to maintain a rate close to 0%, likely resulting in negative real short-term interest rates through 2011. The weak U.S. employment picture and housing market continue to warrant exceptionally low levels of interest rates in the near term. In addition, the Fed has indicated they will continue to buy longer dated securities on the open market to hold down long-term rates (QE2) though May of 2011. Since the U.S. economy is currently witnessing uncomfortably high unemployment and excess capacity, it is likely that the Fed will be able to hold short-term nominal rates near zero and short-term real rates in negative territory, for some time. Given current market conditions, PCA believes an appropriate expectation for the annual short-term real risk-free return is 0.25%.

To determine a longer-term real risk-free rate, we examine the yield of the 10-year TIPS Note. As discussed earlier, the TIPS' real yield was 1.0% as of 12/31/2010. This is our expectation for the longer-term annual real risk-free return over the 10-year investment horizon.

Developing expectations for the U.S. Equity risk premium

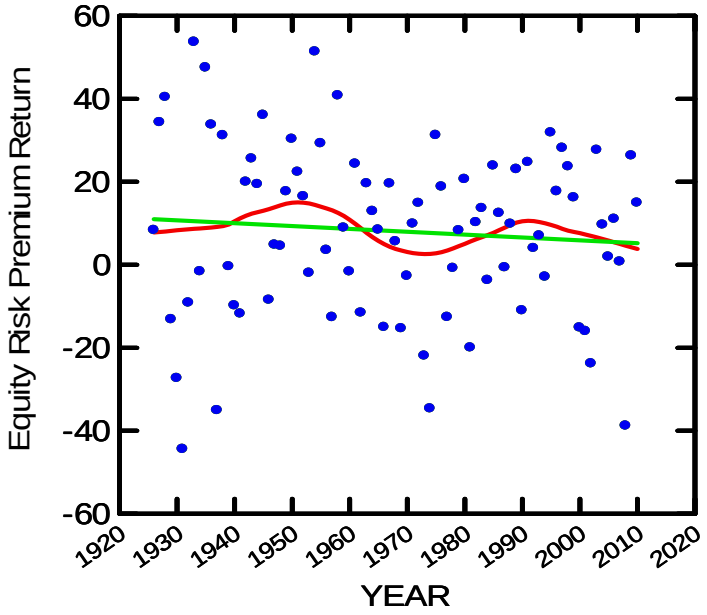
As highlighted earlier, the portion of an investment class's return associated with various risks above and beyond the risk-free return is often the largest and most volatile component of expected return, and the most difficult to forecast. With these caveats in mind, PCA begins its analysis by examining the trends of various risk premium returns over time, not merely their averages. The behaviors of these trends provide two important signals about risk premium returns: (i) whether there is any indication of cyclicality and (ii) whether long-term trends exhibit stability. From a long-term strategic perspective, outlying single-year returns and market events may prove to have only modest influence on long-term trends. Once such trends are confirmed, PCA extrapolates the trend to arrive at an initial estimate of an investment class's projected risk premium return. Confidence in this trend estimate is also a function of investment class return history. The shorter the return history for a specific investment class, the less reliable the trend. For investment classes with less than 10 years of history, more qualitative approaches are used to develop risk premium estimates.

We compare these estimates derived from analysis of historical risk premium returns and risk premium return trend extrapolations to risk premium estimates derived via fundamental models. Furthermore, we examine investment class betas in relation to a global investable capital market portfolio, reconciling expected return to required return (per systematic risk beta exposure) over a 10 year horizon.[2] With estimates of the risk premium returns in hand, we compare those estimates with a spectrum of other practitioners, including investment advisors and other investment consulting organizations. To the extent that our estimates deviate significantly from these other sources, we will make appropriate investigations and adjustments. Again, our effort here is to develop a set of reasonable consensus-based expectations.

As an example, the trend of the U.S. Equity risk premium return appears below.

[2] As determined largely by UBS' Investable Capital Market allocation estimates, which are updated annually.

Figure 8 – Trend of the U.S. Equity Risk Premium Return, Last 85 Years



Source: PCA

Figure 8 shows that the trend of the annual U.S. Equity premium has exhibited a cyclical behavior reaching respective peaks and troughs every 20 years or so. In addition, the linear trend line is nearly flat, but moving downward at a very modest slope likely attributable to decreasing volatility of economic growth during the course of the 20th century. Given these trends, we would expect the trend of return to the U.S. Equity risk premium may begin reverting upward over the next several years as it recovers from its cyclical decline that began 20 years ago at from its early 1990's peak.

Any improvement in the trend line, however, will likely not reach its prior peak, which was supported by the bull markets of the mid-1980's and mid-to-late 1990's. We project the average level of the premium to be in the range of 5.0% to 6.0% per year over the next ten years.

We next examine how this finding reconciles with other analyses. Our first step is to compute estimates of long-term equity risk premium utilizing a basic dividend discount model:

$$RP_e = D/P + g - R_f \pm [\textit{impact due to valuation changes}]$$

where:
RP_e is the estimated equity risk premium
D/P is the current dividend yield
g is the long-term real dividend growth rate, and
R_f is the real risk-free rate.

The last term is more subjective in nature and reflects more of a potential expected penalty/reward that is a function of where current price-earnings (P/Es) multiples are in relation to their historical averages. If P/Es on normalized earnings are relatively high, then one might argue that the equity risk premium will be penalized as the price level of equities decline over time. Conversely, if normalized P/Es are low, then one might expect the equity risk premium to be higher as the price level of equities rises over time.

To determine the inputs for the above model, we relied on several sources to estimate a rough consensus view of each variable (see table below).

Figure 9 – Dividend Discount Model Inputs & Estimated Equity Risk Premiums

Source	Benchmark	Real Earnings Growth Long-Term (5+ Yrs.)	Real Dividend Growth Long-Term (5+ Yrs.)	Current Normalized Dividend Yield Dividend Yield	Normalized Current P/E	Historical Median P/E
JP Morgan	S&P 500	2.25%	2.25%	2.50%	20.7	
Goldman Sachs	S&P 500	3.00%	3.00%	*2.00%*	20.7	16.7
UBS	S&P 500	3.00%	3.00%	*2.00%*	20.7	
Averages		2.75%	2.75%	2.17%	20.7	16.7
Real Short-term risk free rate (1)		0.25%			Valuation Adjustment	
Real Long-term risk free rate (2)		1.00%			-0.20%	
Equity Risk Premium vs. (1)		**4.50%**				
Equity Risk Premium vs. (2)		**3.70%**				

Notes:
Goldman Sachs long-term dividend growth assumed to revert to the long-term earnings growth trend
UBS long-term dividend growth assumed to revert to the long-term earnings growth trend
Current P/Es are based on normalized earnings estimate for the S&P 500 and S&P 500 price as of 12/31/2010
Long-term historical median P/E from Leuthold Group, utilizes normalized earnings
Risk-free rate estimates per PCA, discussed in the "Developing expectations for the real risk free return" section
Valuation adjustment is based on judgment

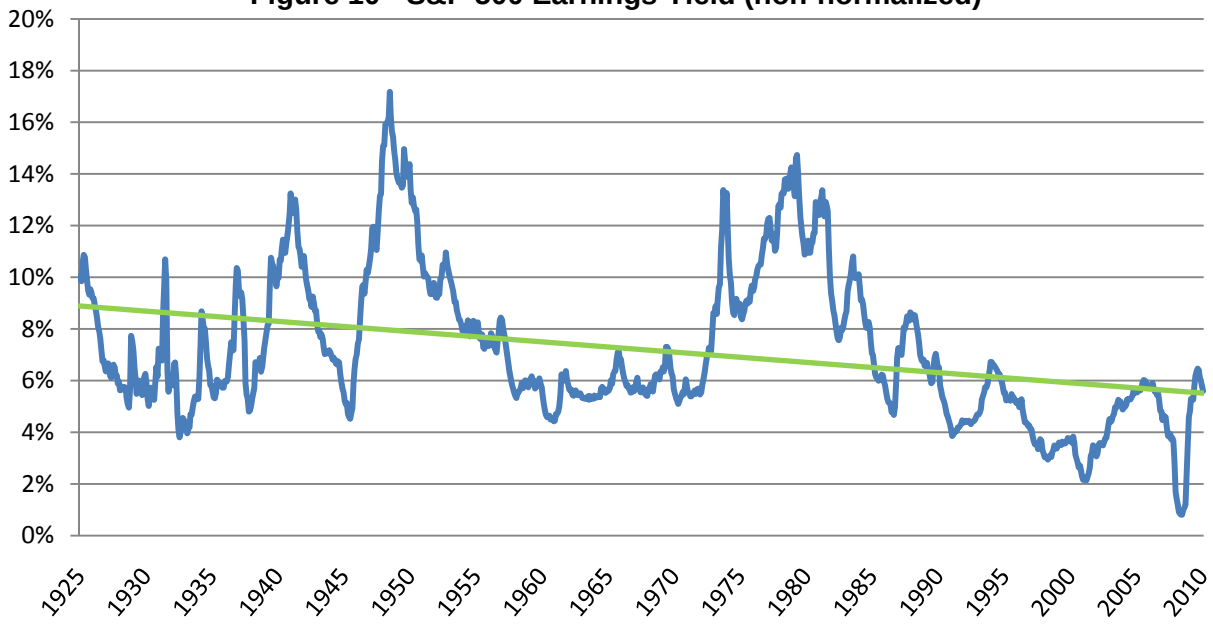
Source: JP Morgan, Goldman Sachs, UBS, PCA

JP Morgan, Goldman Sachs and UBS are three highly regarded investment banks. All of these firms have focused on the S&P 500 as a proxy for U.S. equities. Given the risk premiums estimated using the dividend discount model, U.S. equities are expected to produce approximately 7.5% on a geometric basis over the next 10+ years. Translating this to an arithmetic average return results in an estimate of 8.9% on an arithmetic basis, or an arithmetic equity risk premium of 5.9%.

Another equity valuation methodology is the normalized earnings yield method. Currently normalized earnings for the S&P 500 estimated using a Shiller 10-year real earnings estimation methodology are equal to $60.92. Using the 12/31/2010 S&P 500 closing price, we estimate the earning yield on normalized earnings to be approximately $60.92/$1258 = 4.8%. If these normalized earnings are reasonably correct (a true reflection of the long-term earnings power of the companies underlying the S&P 500), then as long as the price paid for these earnings does not decline or rise over the investment horizon (today's P/E is equal to the P/E at exit), and the shareholders actually receive the earnings, the real return to holding equities over the investment horizon will equal the current normalized earnings yield. Because there is typically some lost earnings due to dilution and restatement, a small adjustment for dilution of 0.5% is made, resulting in an estimate of a 4.3% real return to equities from the normalized earnings yield method. This implies a geometric risk premium (net of real return to cash) of 4.05%, translating to an arithmetic equity risk premium of 5.5%.

Obviously, if the current normalized earnings yield is high relative to the normalized earnings yield at the end of the investment horizon, the investor's real return over the investment horizon will be higher than the current normalized earnings yield. If the current normalized earnings yield is low relative the normalized earnings yield at the end of the investment horizon, real return will be lower than the current normalized earnings yield. Below, are non-normalized observations of historical earnings yield over the last 85 years. While there are huge fluctuations over the years, the trend line indicates that earnings yields have declined over the course of the century. Nevertheless, the earnings yield level has tended to mean-revert to this declining trend over time. According to this chart, at an estimated normalized earning yield level of 4.8% (estimated above) equity market valuations look reasonable, indicating that only a small (negative) valuation adjustment to the fundamental dividend discount method is warranted.

Figure 10 - S&P 500 Earnings Yield (non-normalized)



Sources: http://www.econ.yale.edu/~shiller/data.htm, S&P, PCA

Combining previously highlighted trends in the U.S. Equity risk premium return, as well as a fundamental estimates of the current equity risk premium, and a simple earning yield analysis, PCA believes that an expected annual risk premium return over risk-free short-term assets of 5.75% and an annual risk premium return over the risk-free longer-term asset of 5.0% is reasonable. As a result, utilizing the building block approach highlighted earlier, PCA projects that the average annual (arithmetic) return of U.S. equities will be 8.75% for the next 10-year horizon.

Other practitioners have taken similar views as PCA about the level of the equity risk premium as reflected in their expected total nominal returns for U.S. equities (see the following table). Four of the five other consulting firms highlighted have expected returns within 40 basis points (0.4%) of the 8.75% level. Returns are single-annual-period, arithmetic returns and do not take into account the impact of projected volatility. As a result, there may be further differences when computing expected returns on a compound-return basis.

Figure 11 – Expected Domestic Equity Returns, Various Organizations

Firm	Expected Nominal Avg. Annual U.S. Equity Return
ING Investment Mgmt	8.40%
JP Morgan Asset Management	9.00%
Blackrock	9.30%
Goldman Sachs	8.20%
Wilshire Associates	8.40%
Cliffwater	9.10%
PCA	*8.75%*
Callan	9.35%
Ennis Knupp Consulting	8.70%
Russell	7.30%

Source: Various Firms

Developing expectations for the Non-U.S. Equity risk premium

For strategic asset allocation purposes, PCA believes that it is difficult to predict whether one large public equity capital market (multi-trillion dollar market with thousands of publicly-held companies) will outperform another over an extended investment horizon. However, we do believe that the rate of economic growth in developing markets will continue to outpace that of developed markets for the foreseeable future. Therefore, the equity risk premium for non-U.S. equities is set to be 0.25% higher than the U.S. equity premium, and the global equity risk premium is set to be 0.15% higher, both pulled up by the developing markets. In addition, regional, capital-size, and growth-value factors are not considered from a strategic allocation perspective. Such market segments are typically highly correlated to one another and, from a modeling perspective, may introduce multicollinearity error issues into the optimization process. From a more practical standpoint, the relative weightings of such underlying segments often reflect more tactical views that should be viewed as being outside the scope of the strategic allocation process.

Developing expectations for the Fixed Income risk premium return

PCA applies the same general approach for estimating the expected fixed income risk premium return as that applied in establishing equity risk premium returns: (i) examine trends of the historical fixed income risk premium and (ii) assess market-based fundamentals. Within fixed income, cash flows and cash flow growth are less uncertain than in the equity markets and long-term appreciation of underlying principal does not occur under equilibrium conditions. As a result, current yields-to-maturity across the fixed income spectrum provide key baselines from which to begin projecting long-term returns. From this point, analyses of risk premium trends and the current interest rate environment are then used to adjust the yield-to-maturity to arrive at a final estimate for the Fixed Income risk premium return.

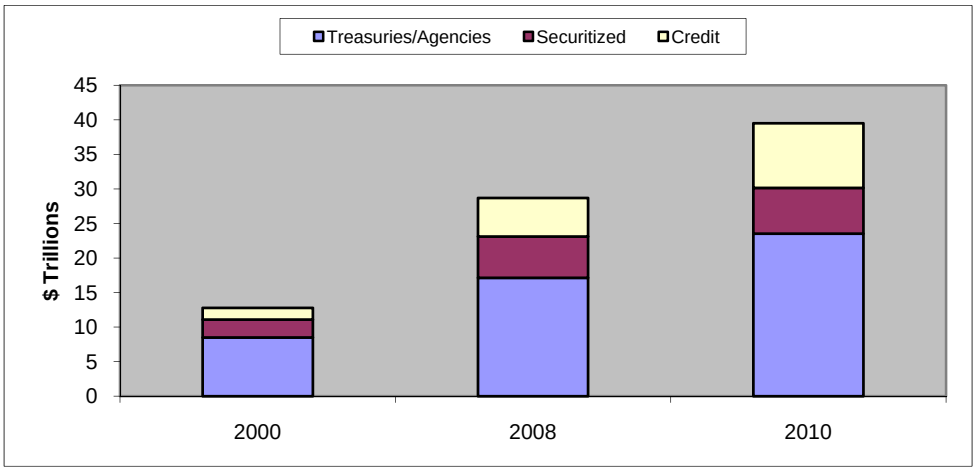
A few words about market structure

The global fixed income markets have evolved rapidly over the last several years. This evolution has occurred on three broad fronts: (i) the significant increase in global fixed income issuance, (ii) the increasing scale of the global credit markets, and (iii) the growth of Euro-based issues

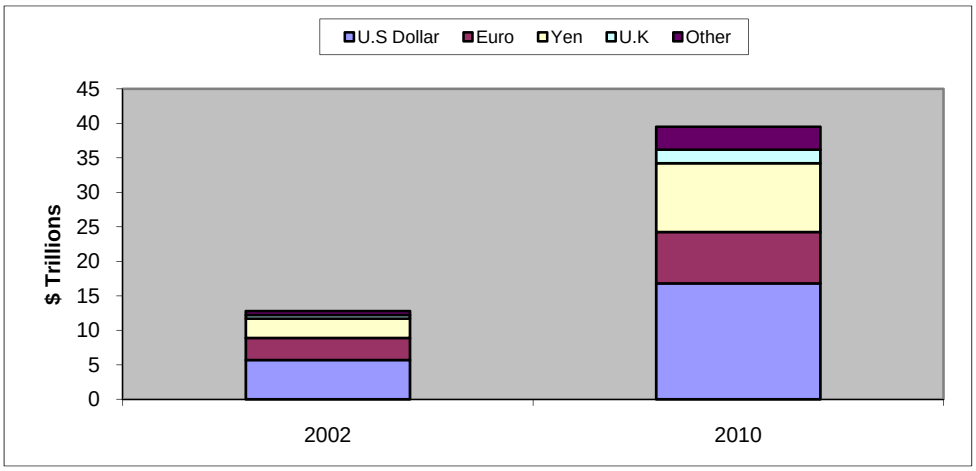
(see charts, next page). What these trends highlight is that the Euro-based fixed income markets are evolving toward a broad structure that is analogous to U.S. Dollar-based structure. While 2008 produced a significant crimp in fixed income issuance trends as global issuance of corporate fixed income virtually came to a halt during the latter parts of 2008, 2009 and 2010 saw a huge resurgence in issuance. However, this issuance was in Treasury and traditional credit market bonds. Levels of securitized debt outstanding actually fell, compared with large jumps in Treasury and traditional bond issuance. While it looks like globalization trends are continuing despite the traumatic events of 2008, the growth in securitization has stalled. It is likely that securitized fixed income will rebound over time, but possibly under a new regulatory regime.

Figure 12 – Global Fixed Income Trends

Panel A – By Security Type



Panel B – By Currency Type



Source: Barclays Capital

In light of developments discussed above, developing risk premium expectations first for the U.S. bond market and then using those assumptions as a baseline for other fixed income asset classes is a reasonable approach. Similar to developing assumptions for the equity asset classes, PCA focuses on developing expectations only for the broadest segments of the fixed income markets (U.S., non-U.S., global). For strategic asset allocation purposes, PCA considers

other fixed income categories as components of these broader asset classes. Also, given the rapid convergence of global issuance, PCA believes that long-term global bond risk premiums will be equivalent across the major regions.

Fixed income risk premium return expectation development procedure

As discussed above, PCA begins its development of the expected long-term fixed income risk premium by examining current yields-to-maturity of the investment-grade U.S. fixed income market. As of 12/31/2010, the yield on the Barclays Capital Universal Index and its key components were as follows:[3]

Figure 13 – Yields to Maturity – Barclays Universal and its Components

	12/31/2010	
Barclays Universal	3.31	
Major Segments		
U.S. Treasuries	1.88	Barclays Aggregate Yield = 2.97
Other Govt.-related	2.22	
Corporate Credits	4.02	
Securitized	3.69	
Extended Segments		
High Yield	7.51	
Eurodollar	2.44	
Emerging Market	6.61	
144A	4.03	

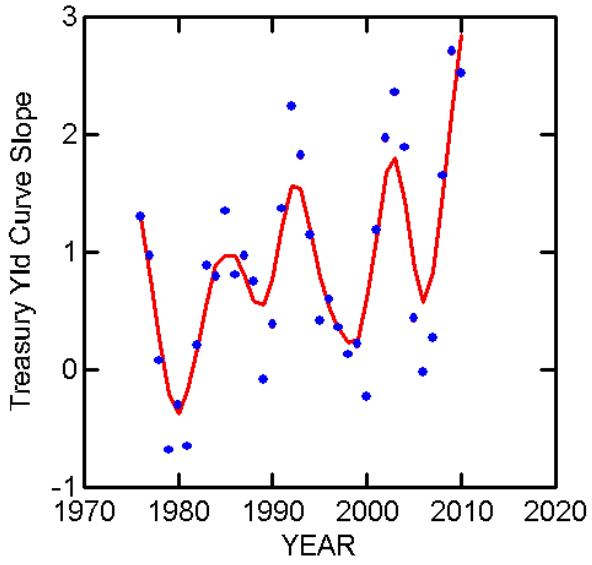
Source: Barclays Capital

Assuming interest rates remain constant, a core-oriented fixed income portfolio represented by the Barclays Capital Universal offers investors a projected yield of approximately 3.3%. The average maturity of bonds held in the Barclays Capital Universal is 7.1 years, making the 3.3% yield a reasonable initial estimate of an expected return from fixed income over an appropriate investment horizon. 2010 witnessed a broad bond market rally, with the resulting drop in yields across the market. At the end of December 2010, the yield for the Barclays Capital Aggregate Index was 2.97%, and the yield on the 10-year Treasury was 3.30%.

Longer-term fixed income returns will be influenced by the future shape in the yield curve as much as the current level of yields. In addition, future credit spreads will also have an impact. To explore these impacts, PCA examines both (i) the trend in the slope of the Treasury yield curve and (ii) the trend in credit yield spreads utilizing the same statistical procedures used when assessing the long-term trend of the equity risk premium return (see the following charts).

[3] The Barclays Universal index is a benchmark consisting of all U.S. Dollar-denominated bonds globally, subject to certain liquidity constraints.

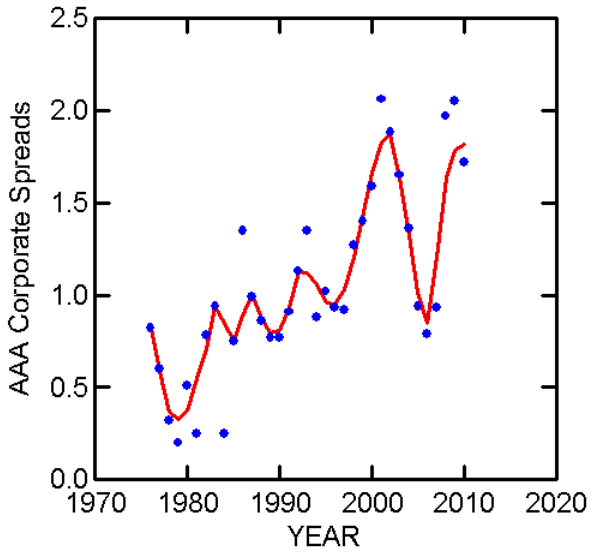
Figure 14 – Trend of Treasury Yield Curve Slope



Source: PCA, Federal Reserve

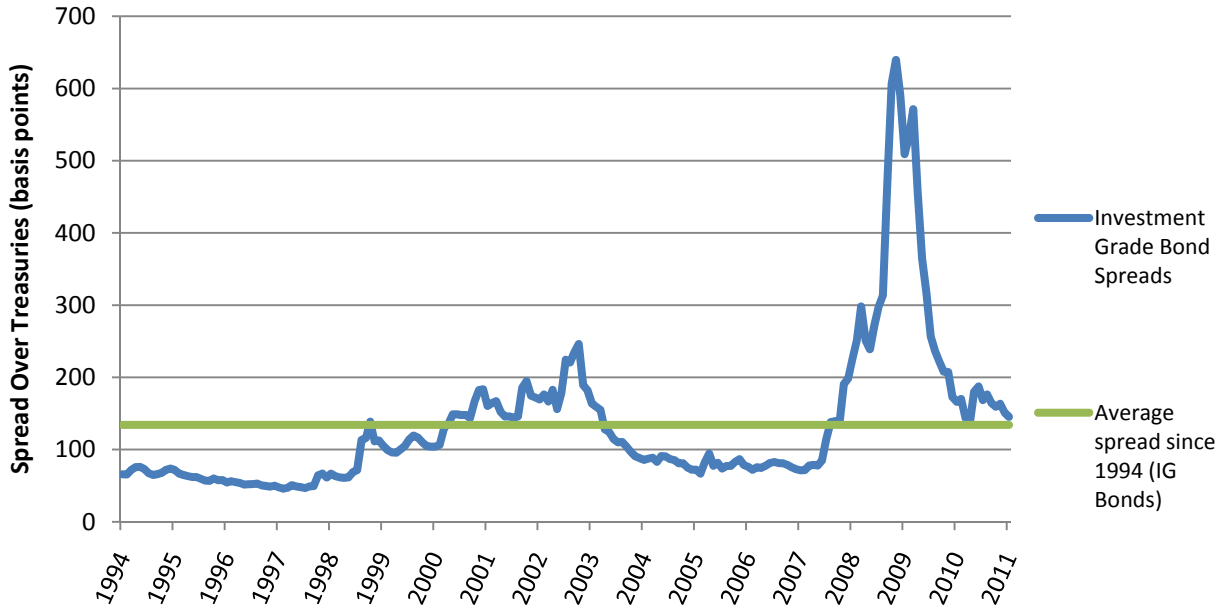
The yield curve has steepened, with the difference between the 10-year Treasury and the 2-year Treasury averaging 252 basis points during the year and ending the year at 270 basis points as of December 31, 2010. For comparison, the average slope since 1976 has been 84 basis points. This yield curve slope is steeper than anytime during the last 30 years (Figure 14), indicating that the markets believe interest rates will be higher in the future.

Figure 15 – Trend of High-Grade Corporate Spreads



Source: PCA, Federal Reserve

Figure 16 - Investment Grade Corporate Bond Spreads



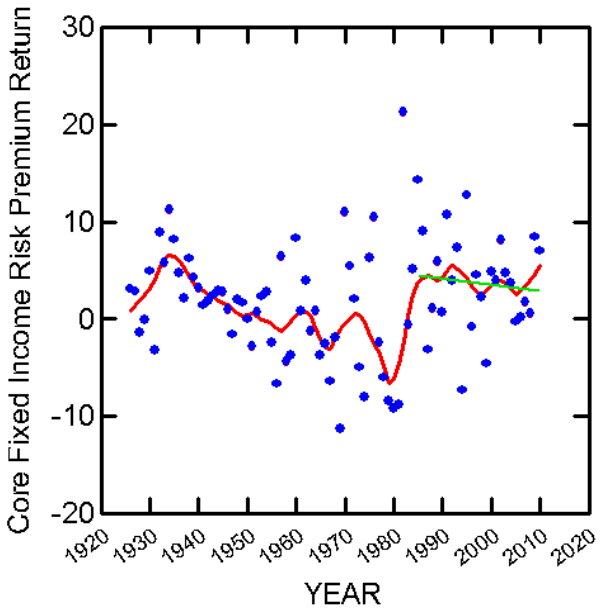
Source: LehmanLive: Barclays Capital US Corporate Investment Grade Index Intermediate Component.

The trend for corporate bond spreads as highlighted in Figure 15 had been increasing through the mid-2000's. In addition, However, despite the recent widening of spreads in 2008, peaking in 2009, and the subsequent retracement through the end of 2010, the cyclical trend for spreads appears to have stabilized, per Figures 15 and 16. The trend pattern for corporate spreads indicate that while there may be some additional spread tightening from here, investors should be quite wary of assuming yields will tighten to pre-crisis levels.

Rising yields impact long-term fixed income returns in two ways: (i) through higher reinvestment rates of current coupon payments and (ii) through lower values due to higher discount rates. Fixed income returns are reduced compared to last year due to several factors: (i) valuation: nominal U.S. Treasury bonds and government-backed agency bonds are richly priced (yields are low relative to expected inflation); (ii) over the intermediate-term, inflation is expected to rise, which will hurt bond returns; and (iii) yields on private issuance (corporate bonds, private mortgages and asset-backs, etc.) are not expected to decline significantly from their current levels after the significant spread tightening in 2009. For these reasons, PCA believes an expected annual return of 3.3% is warranted. Given the expected short-term risk free rate of 3.0%, PCA estimates the fixed income risk premium return to be a skinny 0.3% per year.

To verify the above risk premium estimate PCA again examined the trend of the fixed income risk premium return (see Figure 17, below).

Figure 17 – Trend of Core Fixed Income Risk Premium Return



Source: PCA

As Figure 17 highlights, the fixed income risk premium was high during the 1980's and 1990's as the overall level of interest rates exhibited a long-standing declining trend. Since the absolute levels of inflation and interest rates today are at very low levels, the drivers of the return premium for investing in fixed income over the last 30 years are no longer available. The premium for investing in fixed income over the next 10 years is likely to be very low starting from today's levels, with probable negative real and / or nominal returns in the interim.

Therefore, we expect that the trend of the risk premium return will continue its decline. We believe extrapolation of the trend is consistent with the fundamentals cited earlier, relating the fixed income market's current yield-to-maturity, yield curve structure, and spread trends. Therefore, it is our view that the fixed income markets will offer a risk premium of just 0.3% over the short-term real risk free rate and -0.45% over commensurate maturity U.S. TIPS for the next 10 years or so.

Developing expectations for other major fixed income risk premiums

As discussed earlier, PCA typically develops expectations for non-U.S. fixed income and therefore, by default, global fixed income. As we highlighted earlier, PCA believes the convergence of global fixed income markets is occurring rapidly and that institutional investors will continue to expand mandates to give practitioners broader global-oriented mandates in the future. Given this broad trend, similar-risk fixed income instruments across at least the developed markets should offer equivalent risk-adjusted returns, after taking potential currency fluctuations into account. Therefore, PCA sets the risk premium return expectations at the same level for all fixed income asset classes, but risks and correlations can still vary significantly depending on whether currency hedging is allowed.

Other practitioners have taken a similar view to that of PCA about the level of the fixed income risk premium as reflected in their expected total nominal returns for the fixed income asset class (see table below). PCA's expectations reside in the middle of a wide range that has a minimum

expected return of 2.1% and a maximum expected return of 4.5%. Typically there is more agreement among practitioners in their estimates for fixed income expected returns, relative to their estimates for equity return expectations. However, currently the dispersion of estimates for fixed income returns is unprecedented, with a difference between the highest and lowest estimates of over 240 basis points. This is likely due to the significant uncertainty regarding inflation, as well as the extremely low, untenable levels of real interest rates. As with the expected equity returns, these expectations are single-annual-period, arithmetic returns and do not take into account the impact of projected volatility. As a result, there may be further differences when computing expected returns on a compound-return basis.

Figure 18 – Expected Domestic Fixed Income Returns, Various Organizations

Firm	Expected Nominal Avg. Annual Fixed Income Return
ING	3.4%
JP Morgan Asset Management	3.8%
Blackrock	2.1%
Wilshire Associates	3.9%
Cliffwater	3.1%
PCA	*3.3%*
Callan	3.8%
Ennis Knupp Consulting	4.5%
Russell	4.4%

Source: Various Firms

Developing expectations for other asset class risk premiums

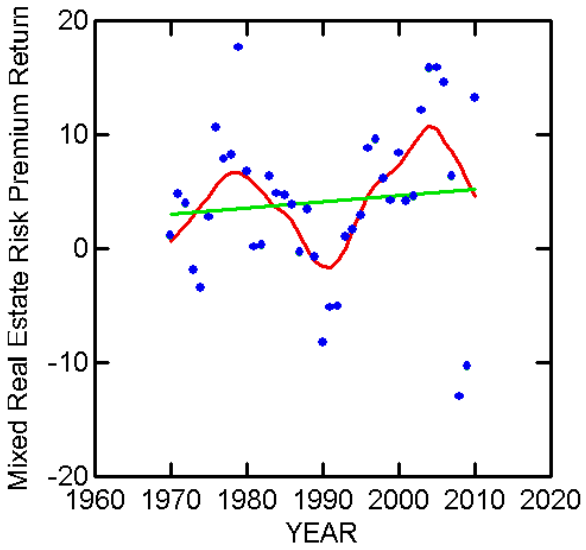
With expected risk premium returns developed for the publicly-traded equity and fixed income asset classes, we can now turn to developing expected risk premium returns for the other major asset classes, namely Real Estate and Private Equity.

Both these asset classes do not lend themselves well to statistical procedures utilized by the Capital Asset Pricing Model. A key reason for this problem is that these asset classes are not marked-to-market on a near-continuous basis as is the case with the other publicly-traded asset classes. As a result, more reliance on qualitative and fundamentals-based procedures is necessary for developing return and risk expectations for these classes.

Real Estate risk premium return expectation development procedure

As with the other asset classes, PCA examines the trends in each of these asset classes' risk premium returns. The trend of the real estate risk premium return has been to exhibit highly cyclical characteristics, largely attributable to the trending behavior associated with real estate appraisals and capital discount rates that fluctuate only modestly over time compared to other market-based rates (see following chart).

Figure 19 – Trend of Real Estate Risk Premium Return

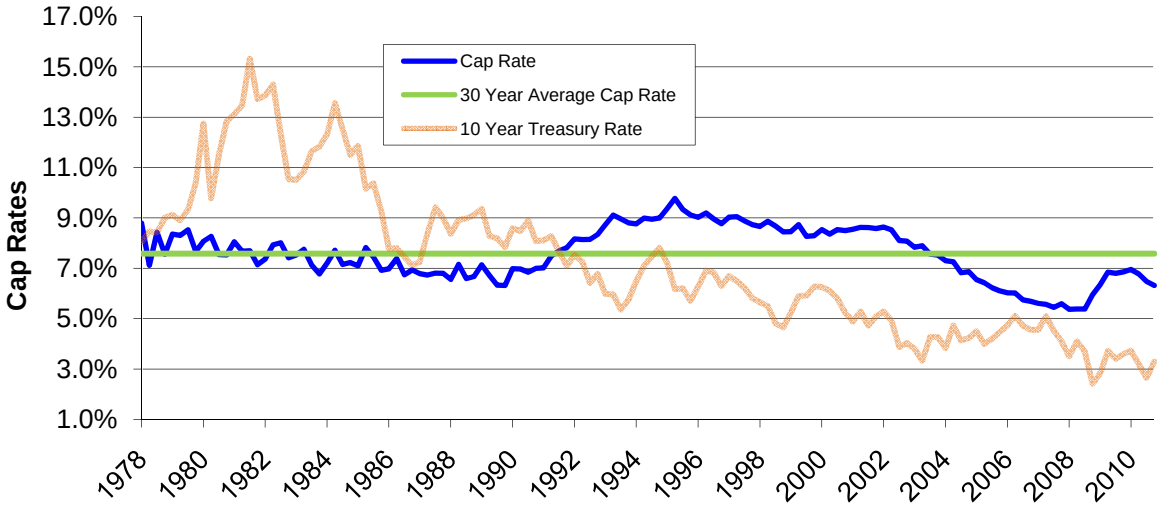


Source: PCA

Long-term core real estate returns (high occupancy, low leverage, high quality properties) exhibit long-term cyclical patterns. While 2008 and 2009 were the two worst years on record, 2010 saw a positive return to the real estate risk premium. The fundamental occupancy picture for real estate will likely not improve significantly until the employment picture brightens. Given the cyclical swings of return to the real estate risk premium over the last three decades, there is reason to believe there may be some more pain to endure in real estate.

Though returns for real estate in 2008 and 2009 we devastating, these price declines allowed cap rates to rise toward historical levels, indicating that future returns to the real estate risk premium will be positive again, much like after the cyclical trough of the late 1980's / early 1990's. However, price appreciation in real estate is tied to financing, which is inexorably linked to interest rates. Cheap financing has allowed a rapid recovery in real estate prices, pricing that is very vulnerable to rising interest rates.

Figure 20 - Current Value Cap Rates[1]



Source: NCRIEF

[1]A cap rate is the current annual income of the property divided by an estimate of the current value of the property . It is the current yield of the property. Low cap rates indicate high valuations.

For the core real estate asset class (which is typically assumed to be included as an investment class within a strategic allocation study), PCA models its risk premium return as falling between the risk return premiums of stocks and bonds. This approach reflects the common acceptance that real estate is a hybrid asset class offering both potentially high levels of current income (greater than fixed income), while also providing for potential long-term capital appreciation. One other attractive aspect of real estate is that since leases on commercial real estate are typically re-negotiated over time, lease cash flows should grow along with inflation. Thus, the analyses above indicates to PCA whether the future expected return of real estate should be above or below the midpoint between the equity and fixed income risk return premiums. Despite the above trends and findings with respect to real estate cap rates, PCA believes the expected risk premium return for real estate should be above this midpoint, owing to the inflation protected nature of long-term real estate cash flows, and their economic sensitivity. Given that publicly-traded equities are expected to produce an annual risk premium return of 5.75% and that fixed income is expected to generate an annual risk premium return of 0.3%, PCA believes an appropriate annual risk premium for real estate is 4.00%.

Private Equity risk premium return expectation development procedure

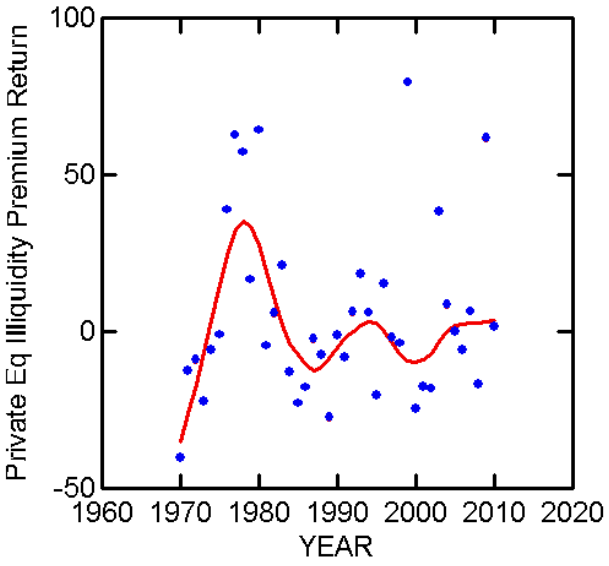
Like real estate, private equity is an appraised asset class, not amenable to capital asset pricing model-type modeling processes. In addition, investors' primary motivation for entering the private equity asset class is to produce returns significantly above those for publicly-traded equities. The excess returns expected from private equity typically range from 3.0% to 5.0% annually over public equity counterparts. This premium is often associated with an "illiquidity premium" required by investors. Such premiums are often realized through establishing illiquidity discounts at the time of private purchase.[4]

As with the real estate asset class, PCA begins by assigning a "default position" for the private equity illiquidity premium. PCA then adjusts this illiquidity premium based on its current trend

[4] See, for example, Pratt, Shannon, "Discount and Premia," Valuation of Closely Held Companies and Inactively Traded Securities, ICFA, December, 1989.

and any key fundamental factors impacting the asset class. The long-term trend of the private equity illiquidity premium has declined cyclically over the last 40 years (see following chart).

Figure 21 – Trend of Private Equity Illiquidity Premium

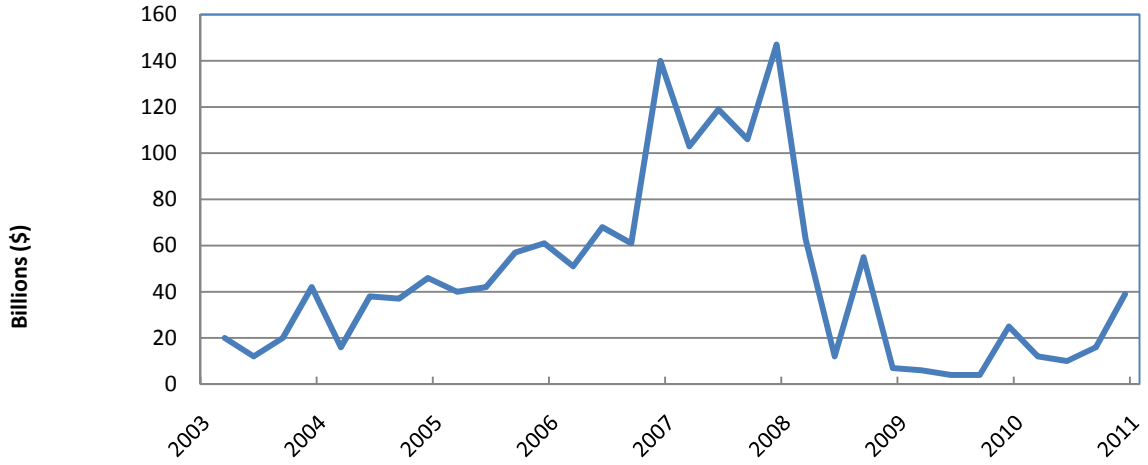


Source: PCA

The figure above indicates that private equity return premium has trended upward over the last decade or so, driven largely by results after the equity bear market of the early 2000's, and a large return number in 2009. When the credit bubble burst in 2008, many industries and companies went from irrational exuberance to abject despair. Nevertheless, the dramatic recovery in private markets in 2009 was somewhat surprising.

Leveraged buyout deals -- by far the biggest part of the private equity industry -- slowed to a trickle in the wake of the credit crisis, as banks tightened the reins on lending. However, deal volume was back on the rise, toward the tail end of 2010.

Figure 22 - Disclosed U.S. Quarterly Deal Volume*



Source: Thomson Reuters Buyouts
* quarterly total deal size (both equity and debt)

What the figures above suggests is that private equity could continue to produce favorable risk premiums for the next several years, but that, over time, the risk premium could decline materially. The industry's future deals probably won't be quite as grand as those seen in the past decade, but there's still significant capital in private equity hands to fund potential deals. The industry has evolved over time, and now that the credit markets have stabilized, the buyout business should return to "normal". The difference is that the deal size most likely will not be the same as in 2006 or 2007, because the credit markets probably won't return to its frothy pre-crunch heights. Also, regulators could crack down on the industry, resulting in more oversight.

The long-term private equity return premium versus public equity is estimated at 3.0%. In addition, a growing number of M&A deals are closing globally, and this trend is likely to accelerate. This level suggests a total annual risk premium return for private equity should be developed off of the *global equity risk* premium of 5.9%, implying a private equity risk premium return of 8.9%.

Similar to real estate, while PCA expects that private equity exits may be challenging, it is PCA's view that such re-valuation in the private equity and real estate markets may prove to be relatively attractive for new and long-term investors in these classes. Also, given the higher level of information inefficiency associated with these asset classes, implementation and manager selection are highly critical factors that will impact an investor's long-term results. In other words, investors cannot hope to capture the risk premium returns associated with these assets through an indexing approach.

Other practitioners' expectations for the private asset classes vary around PCA's (see table below). PCA's expectations for real estate are in the middle of a range that has a minimum expected return of 6.3% and a maximum expected return of 9.0%. Likewise, PCA's expectations for private equity are slightly below the middle of the range that has a minimum of 9.6% and a high of 15.1%. As with the expected equity returns, these expectations are single-annual-period returns and do not take into account the impact of projected volatility. As a result, there may be further differences when computing expected returns on a compound-return basis.

Figure 23 – Expected Private Asset Class Returns, Various Organizations

Firm	Expected Nominal Avg. Annual Real Estate Return	Expected Nominal Avg. Annual Private Equity Return
ING	9.0%	---
JP Morgan Asset Management	7.4%	10.9%
Blackrock	6.3%	14.8%
Wilshire Associates	7.0%	12.7%
Cliffwater	8.9%	12.9%
PCA	*7.0%*	*12.0%*
Callan	7.9%	13.1%
Ennis Knupp Consulting	6.8%	15.1%
Russell	6.7%	9.6%

Source: Various Firms

B. Developing Expected Risks and Correlations

In PCA's survey of other practitioners' forecasts, PCA found that the overwhelming majority simply used historical averages of risk and correlations to arrive at their forward-looking estimates. The argument for not spending significant energy on utilizing more sophisticated approaches to developing expectations for these variables lies in the notion that risks and correlations are more stable than investment returns. As a result, simple averaging of history is an appropriate forecast for the future.

While we agree that these attributes are more stable than investment returns, they are not constant variables. Therefore, we believe that automatic defaulting to forecasts that are a simple linear extrapolation of history is inappropriate. At a minimum, for several asset classes and asset class relationships, we believe there are potential long-term trending patterns that should not be taken for granted and, instead, incorporated into the expectation setting process.

One challenge is that the investment markets have continued to evolve, allowing new, often broader, investment classes to become accepted. Several such classes have limited history, which can leave one guessing how a specific class might perform. In such instances, the average of history (assuming the history sample is reasonable) is *at least* an unbiased estimate of what might occur in the future.

Where adequate history exists, however, there is potential to improve upon using the historical average when assessing risks and correlations. This section reviews PCA's approach to examining the risk and correlation data (The approach used is analogous to our examination of risk premium return trends in prior sections.). As might be expected, for certain asset classes, there is enough evidence of trends and fluctuations in the risk and correlation data to consider making adjustments, rather than merely using historical averages as a proxy for the future.

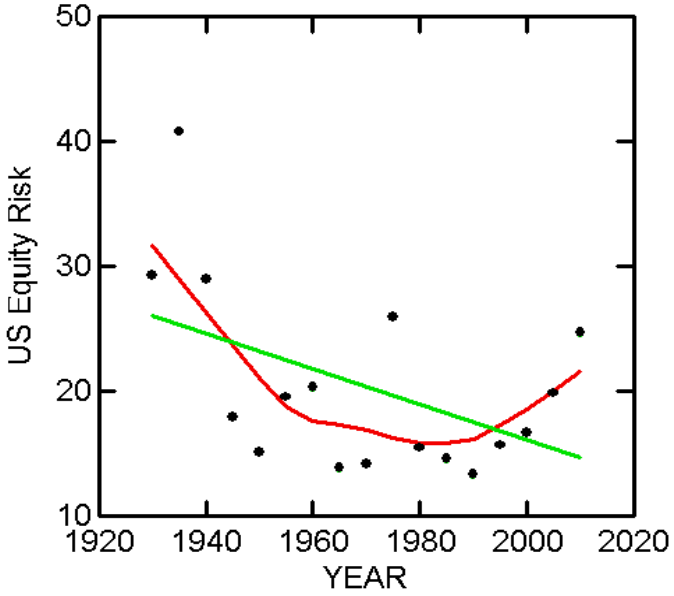
Developing expectations for asset class risk

To begin analyzing risk patterns among various asset classes, PCA examines asset class volatility across discrete 5-year holding periods. PCA believes five years is a minimum horizon required to consider investing in an asset class. In addition, the 5-year horizon allows for a minimum amount of observations for a few of the key asset classes (e.g., 85 years of data provides 17 observations). For each 5-year period, PCA computes a standard deviation of returns for each asset class with an appropriate amount of history. Once PCA has computed a set of five-year data points, we map out the time series of 5-year risks to determine patterns and trends in the data. We then use information gathered from this process to adjust the historical standard deviation of an investment class's entire return history. The result is an expectation of an investment class's risk for the next investment horizon.

<u>Examples: Risk of U.S. Equities and Core Fixed Income classes</u>
To begin our risk projection process, we first review asset classes' historical volatilities. For the 85 years ending 2009 (beginning with 1926), the standard deviation of annual returns for U.S. Equity and U.S. Core Fixed Income asset classes were 20.4% and 6.0%, respectively.

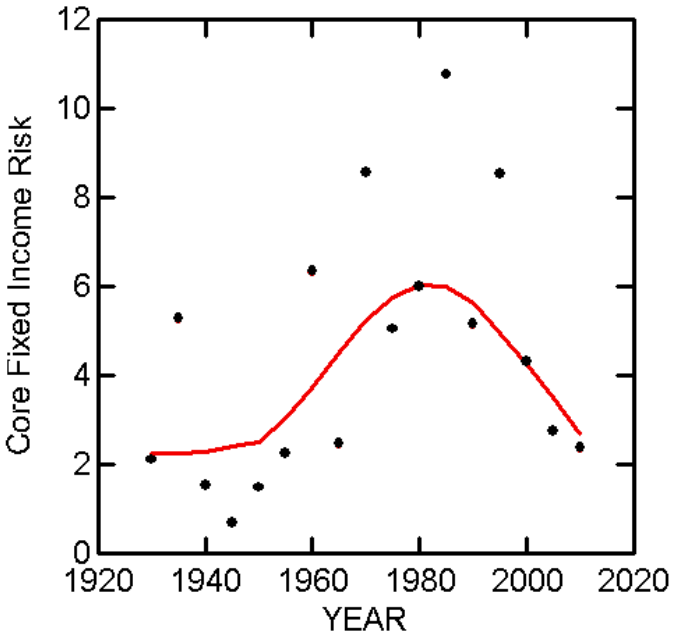
We then compute standard deviations for each discrete 5-year period ending with 2006-2010. Using statistical procedures, we then map out the trend of those discrete observations. Interestingly, the trends of risk behaviors of the two above asset classes exhibit unique patterns (see Figures below). While the secular trend for U.S. Equity risk appears to be downward, U.S. Core Fixed Income risk appears to be cyclical.

Figure 24 – Risk Trend of U.S. Equities



Source: PCA

Figure 25 – Risk Trend of U.S. Core Fixed Income

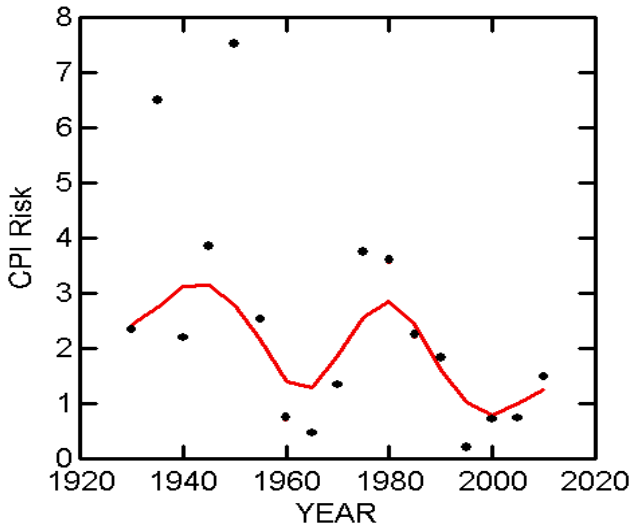


Source: PCA

As the above charts highlight, historical averages are likely biased by extended periods of dramatic volatility that may or may not have a direct influence on current forward-looking expectations. For U.S. equities, two key periods were the late-1920's through the 1930's and now the most recent five years; for U.S. core fixed income, such a period was the late-1970's through the early-1980's. While we believe we should not exclude the distant historical data from the analysis, trend analysis at least provides a more appropriate indication of how these periods are, or are not, impacting the current environment.

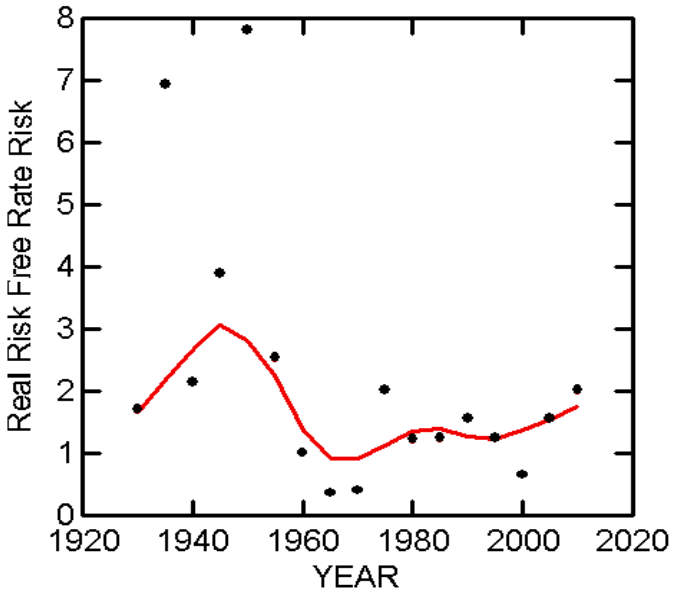
We expect the long-term secular trend of lower equity risk to continue as the volatility of global output continues to moderate. However, we believe the volatility of U.S. core fixed income has bottomed and will begin rising in response to a more volatile (less predictable) level of inflation.

Figure 26 - U.S Inflation Risk Trend



Source: PCA

Figure 27 – Real Risk Free Rate Risk Trend



Source: PCA

The three preceding graphs look very similar after 1950. It should be understood that they would have looked much more similar had the bond rate in the 1940's not been pegged. Therefore, it is reasonable to assume that future volatility of the fixed income markets will be driven to a large extent by the volatility of inflation.

Figure 24 highlights our expectation for a continued gradual decline in the long-term risk of US Equity. Conversely, it is probable that US core fixed income risk will rise as inflation becomes less predictable. Given these indications, PCA believes that both asset classes' average risks should be set to reflect forward-looking expectations. For U.S. Equities, PCA believes 17.0% (versus its long-term average of 20.4%) is an appropriate level of risk. For U.S. core fixed Income, PCA believes a risk level of 4.5% (higher than recent history of less than 3%, but lower than the long-term average of 6.0%) is appropriate.

Risk estimates for classes with shorter track records

Admittedly, several asset class benchmarks have 40 years or less of history (e.g., international equities, non-U.S. and global bonds, real return, private real estate, and private equity). As a result, the number of 5-year risk data points is too few to perform any meaningful statistical analysis. Furthermore, the most recent five-year period has been strongly (perhaps unduly) impacted by the global financial crisis, which dominates historical average measures of risk. In these cases, PCA computes historical standard deviations, weighting the most recent periods heavier than prior decades, and combines these estimates with visual inspection of shorter trends to develop future expectations for risk of the strategic class. These procedures are applied to all other asset classes lacking ample history for further statistical trend analysis.

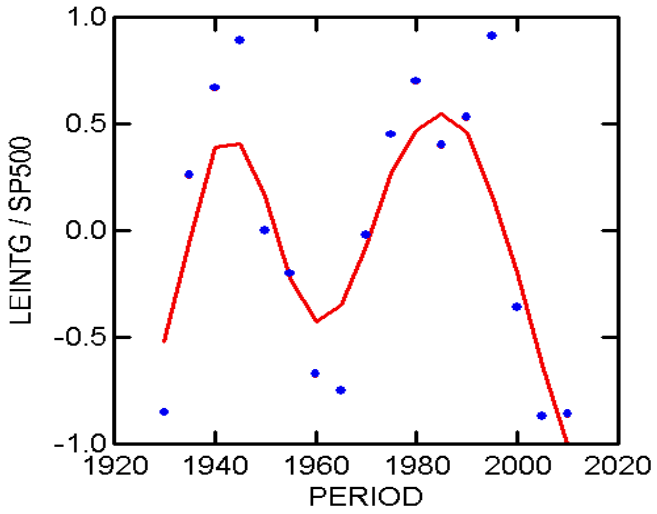
Developing expectations for asset class correlations

In developing expected correlations, PCA applies a process that is equivalent to that used to develop expected asset class risks. Again, most practitioners assume future correlations will be equivalent to their historical averages. This approach is counter to recent investment industry analysis that indicates that correlations fluctuate significantly over an investment cycle (e.g., the U.S. equity/non-U.S. equity correlation, the U.S. equity/U.S. core fixed income correlation). Given the potential of fluctuating correlations, PCA again (i) assesses the trends of discrete 5-year correlations, and (ii) adjusts historical correlations appropriately to account for evident trends and recent abnormalities which may unduly skew historical correlation relationships in a way that is unlikely to repeat in the future.

Example: Estimate for the U.S. Equities/U.S. Core Fixed Correlation

The historical correlation between U.S. Equities and U.S. Government Fixed Income, based on data going back to 1926, is 0.18 using annual return history. However, correlations have oscillated from over 0.8 to under -0.8 during this period.

Figure 28 – Trend of U.S. Equities/U.S. Government Fixed Income Correlation



Source: PCA

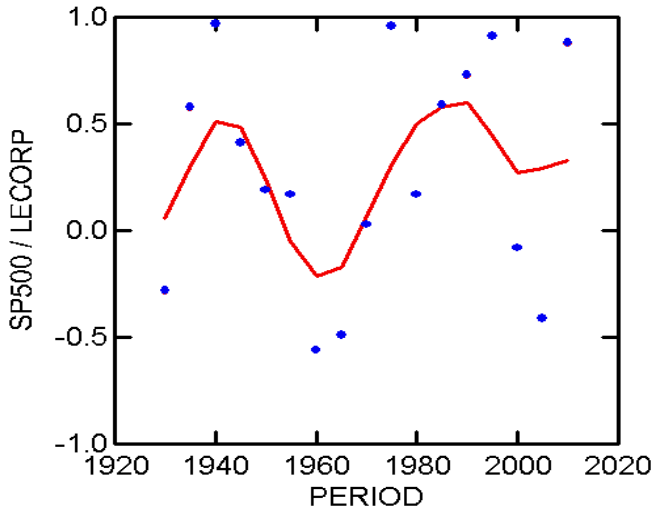
The historical correlation between U.S. Equities and U.S Corporate Bonds (those with credit risk) is 0.27. As one might expect, on average equities have a significantly higher correlation to instruments that have corporate risk, than to those with interest rate risk alone.

Given these findings, PCA believes an estimated forward looking average correlation of 0.30 is appropriate. Such an estimate implies that returns of U.S. equities will typically be largely unrelated to returns of U.S. core fixed income. Nevertheless, the shortcomings of a framework that requires constant correlation relationships is apparent. The traditional mean-variance framework assumes constant correlations, and requires a static correlation matrix as an input. As the graph above indicates, this just doesn't comport with our historical experience.

While we know that the mean-variance framework is flawed, it is a reasonable starting point for analysis that is relatively simple to run, and is fairly well understood. That said, decision makers should keep in mind the framework's sensitivity to problematic assumptions as highlighted.

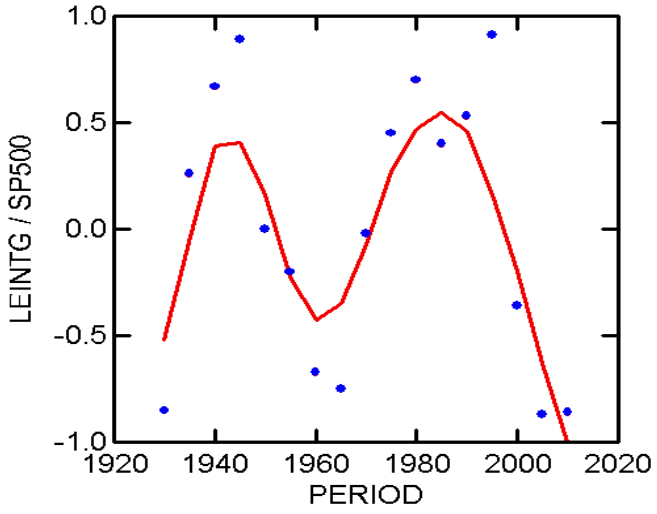
Finally, looking at this particular correlation relationship more closely is instructive. If the correlation between US fixed income and US equity is non-constant, then perhaps the dominant factors driving returns to these asset classes are different during different time periods. We postulate that the dominant common factor driving returns in the early 70's was the oil shock, during the late 1970's and early 1980's was rising U.S. inflation, during the 1980's and mid 1990's was declining inflation and declining real interest rates, and in the late 2000's was exposure to global growth. If we're right, then the correlation between U.S. equities and fixed income with credit exposure and without credit exposure should be very different in the most recent period, and it was (see the following charts).

Figure 29 – Trend of U.S. Equities/U.S. Corporate Bonds Correlation



Source: PCA

Figure 30 – Trend of U.S. Equities/U.S. Government Bonds Correlation



The important conclusion to take from this example is that fixed income with credit risk will be more correlated with equities during a crisis that impacts growth expectations, than with government bonds. While outside of a crisis most investment grade fixed income generally behaves similarly (Treasuries and corporate bonds behave similarly), if the dominant factor driving returns during a period is an exposure to growth (default risk), then the performance and correlation relationship of these asset class may be very different.

Annex I
PCA Mean-Variance Expected Asset Class Returns, Risks, and Correlations

Average Annual Risk Premiums - %

Real Risk-Free Rates	
Shorter-term	0.25
Longer-term (10-year TIPS yield)	1.00
Risk Premiums over Short-term Real Risk-free Rate:	
Domestic Core Bonds	0.30
International Bonds	0.30
Global Bonds	0.30
Core Real Estate	4.00
Domestic Stocks	5.75
International Stocks	6.00
Global Stocks	5.90
Hedged International Stocks	5.90
Private Equity	9.00

Nominal Return and Risk Estimates (in %) — 2.75% Long-term Inflation Assumption

	Expected Avg. Nominal Annual Return (Arithmetic)	Expected Risk of Nominal Returns (Annlzd. SD)
Cash	3.00	2.0
Treasury Inflation Protected Securities	3.75	6.0
Domestic Core Bonds	3.30	4.5
International Bonds	3.30	10.0
Global Bonds	3.30	8.0
Core Real Estate	7.00	10.0
Basic Real Return	6.50	8.0
Domestic Stocks	8.75	17.0
International Stocks	9.00	20.0
Global Stocks	8.90	17.5
Hedged International Stocks	8.90	19.0
Private Equity	12.00	25.0

Nominal Return Correlation Assumptions

	Cash	TIPS	CoreBds	IntlBds	GlblBds	CoreRE	RealRet	USStks	IntlStks	GlblStks	HIntlStks	PrivateEq
Cash												
TIPS	0.20											
USD Bds	0.30	0.60										
IntlBds	-0.10	0.40	0.40									
GlblBds	0.00	0.50	0.60	0.95								
CoreRE	0.30	0.00	0.00	-0.20	-0.20							
RealRet	0.20	0.60	0.30	0.00	0.00	0.25						
USStks	0.00	0.00	0.30	0.00	0.00	0.40	0.25					
IntlStks	0.00	0.00	0.10	0.10	0.10	0.40	0.25	0.85				
GlblStks	0.00	0.00	0.20	0.05	0.05	0.40	0.25	0.90	0.90			
HIntlStks	0.10	0.00	-0.10	-0.10	-0.10	0.50	0.35	0.90	0.90	0.90		
PrivateEq	0.00	0.00	0.00	0.00	0.00	0.40	0.25	0.90	0.80	0.85	0.90	
CPI	0.50	0.50	-0.20	-0.15	-0.20	0.40	0.60	0.20	0.20	0.20	0.20	0.10

Annex II

Asset Class Benchmarks Used for Analysis

When establishing expectations for future asset class returns and risks, PCA utilizes numerous indices that cover a broad spectrum of investable asset classes (see table below).

Selected Asset Classes Utilized by PCA

Asset Class	Benchmarks Utilized
Cash	Citigroup 3 month US Treasury Bill Index
TiPS	Barclays Capital TIPS Index, simulated TIPS series per Bridgewater
Domestic Core Fixed	Barclays Capital Intermediate Govt. Index Barclays Capital Corp/Credit Index Barclays Capital G/C Index Barclays Capital Aggregate Index Barclays Capital Universal
International Fixed Income	Barclays Capital Global Treasury ex-US Unhedged Index Solomon/Citigroup World Government Bond Index
Global Fixed Income	Barclays Capital Global Treasury Index Salomon/Citigroup World Government Bond Index
Real Estate	NCREIF Property Index NAREIT Equity REIT Index Prior Indicies
Real Return	Barclays Capital TIPS Index, simulated TIPS series per Bridgewater HFRI FOF Index TRA (Bloomberg) NCREIF Timber Index Dow Jones UBS Commodiity Index
US Equities	Standard & Poors 500 Index Russell 3000 Index
Non US Equities	MSCI EAFE Index MSCI EMF Index MSCI ACWI ex-US Index MSCI Hedged EAFE Index
Global Equities	MSCI/Barra ACWI Index
Private Equity	Prior Brinson Venture Capital Index (discontinued) VCJ Post-Venture Capital Index