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Volatility

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If recent market activity had to be summed up in one word, "volatile" comes to mind. It is not surprising that there is a healthy interest in investing and profiting from volatility. While strategies involving derivatives and bonds that benefit investors in turbulent times have been in existence for a long time, there is an increasing variety of products targeted to those seeking specifically to invest in volatility and they are available not only to the sophisticated investor.

Richard Weiss, senior vice president and senior portfolio manager for American Century Investments, a premier investment manager headquartered in Kansas City, Missouri, provides this issue’s practitioner perspective. He is one among a growing number of investors who consider volatility a separate asset class, similar to stocks and bonds. In his paper, he provides an overview of VIX, discusses the potential diversification benefits of an allocation to volatility in balanced portfolios, explains why volatility diversification may make the most sense for target-date funds (TDFs) in the crucial years around the target date, and assesses applications to global asset allocation portfolios.

The academic perspective is written by Geoff Warren, Senior Lecturer in the School of Finance, Actuarial Studies and Applied Statistics at The Australian National University, who has also held a number of roles in the finance industry. His article reports payoffs from investing long in select volatility products, possible explanations in the academic literature for the magnitude of the variance risk premium (VRP), and presents potentially more attractive long and short strategies using variance swaps and VIX futures.

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Can Investing in Volatility Help Meet Your Portfolio Objectives?

Geoff Warren | Australian National University

Certain derivative products such as variance swaps and VIX futures offer direct exposure to volatility as an investment. This note\(^1\) overviews the payoffs from volatility exposure and how they are viewed in the academic literature. It then discusses how an investor’s approach to volatility exposure should vary across products and investors. Two key features of volatility payoffs stand out. First, (long) exposure to volatility has traditionally provided an equity market hedge, but has been associated with negative payoffs – the so-called volatility or variance risk premium (VRP). Second, the magnitude of the VRP has varied significantly across products, being most clearly manifest in shorter-dated VIX futures and variance swaps. The implication is that differing products might be preferred for return enhancement versus hedging. Further, whether an investor views volatility exposure as a return source or a hedge may depend on aspects such as their objectives, risk aversion, investment horizon and reference portfolio.

While there are a variety of ways to obtain volatility exposure,\(^2\) the focus here is three derivative products based around the S&P 500:

- **VIX futures** – These contracts are based around the VIX index, a measure of implied volatility for S&P 500 index options of one month to expiry. If held to expiry, the payoff reflects the difference between the futures contract price upon entering a position and the VIX settlement price at expiry. VIX futures have been traded on the CFE since March 2004.

- **Variance swaps** – These are swap contracts with payoffs based on the difference between realized variance and an agreed variance strike rate. An over-the-counter market has been conducted by investment banks since the late-1990s.

- **Forward variance swaps** – These swap contracts have payoffs reflecting the difference between an agreed swap rate at which a variance swap may be purchased in the future, and the actual swap rate at contract expiry. The payoff hence reflects changes in the variance swap rate.

One important difference between these products is that variance swaps settle to backward-looking volatility realizations, while VIX futures and forward variance swaps settle to quantities that reflect expectations for future volatility, i.e. implied volatility in option prices, and the price at which volatility exposure can be purchased in future, respectively. There has been a tendency for realized volatility to be much less than implied volatility as inferred from option prices – see Chart 1. From January 1990 to March 2012, the average difference between realized\(^3\) and implied volatility was -4.3\%. The difference was positive in just 16% of months, largely associated with volatility spikes which tend to occur in conjunction with equity market sell-offs. The difference between realized and implied volatility aligns with the VRP. Only variance swaps give direct exposure to this feature, aligned with the fact that these products are priced and hedged by investment banks with reference to a portfolio of options designed to replicate payoffs based on realized variance.

Table 1 reports the payoffs from long positions in selected volatility products. The payoffs and percentage of positive periods for variance swaps broadly mimics the data appearing in Chart 1. Negative payoffs of a much lower magnitude appear for forward variance swaps and 1-month and 2-month VIX futures which are rolled monthly. Largely insignificant payoffs are evident on rolled longer-dated VIX futures. Meanwhile, all contracts have a meaningfully negative correlation with the S&P 500 of between -0.5 and -0.8. The implication is that while all volatility products examined have provided an equity market hedge to a roughly similar extent, the ‘cost’ of that hedge has varied significantly across products. Forward variance swaps and long-dated VIX futures give the appearance of offering a very cheap, if not costless, hedge.

What has the academic literature made of these findings? Most attention has been paid to the VRP, the magnitude of which has been viewed as something of an anomaly. Authors have noted that the VRP appears larger than can be explained by standard risk factors such as exposure to market beta (i.e. CAPM), the three-factor and four-factor models, and after allowing for loadings on factors such as the term structure and default spread (see Bondarenko, 2007; Hafner and Wallmeier 2007; Carr and Wu, 2009). Explanations for the VRP might be classified into two main camps. The first is that it relates to ‘mis-pricing’ in the index options market stemming from supply-demand pressures (Bollen and Whaley, 2004; Gärleanu et al, 2009). Specifically out-of-the-money options, particularly

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1. This note draws upon a recent paper by the author appearing in the Journal of Portfolio Management (Warren, 2012).
2. Other notable avenues include VIX options, variance swaps on various major global indices, ETFs based around VIX futures, and funds specializing in managing or trading volatility.
3. Realized volatility was estimated by annualizing trading day returns, consistent with typical terms for variance swaps.
Academic Perspective

puts, may be 'over-priced' because market-makers like investment banks cannot readily accommodate demand due to capital constraints. The second camp argues that the VRP reflects high aversion to non-normalities in returns, such as jumps or tail risks (e.g. Bollerslev and Todorov, 2011; Dreschler and Yaron, 2011). It seems fair to say that the reason for the large VRP remains an open issue.

The inconsistency in the pricing across volatility products has received less formal attention, although it does surface in the work of Egloff et al (2010), Brière et al (2010) and Warren (2012). These papers highlight the large improvements in portfolio outcomes that might have arisen from 'spread strategies' involving going short in either short-dated VIX futures or variance swaps, and long in longer-dated contracts or forward variance swaps. Such spread strategies appear to capture the bulk of the VRP while hedging out a large portion of the volatility risk, hence approaching something like an arbitrage trade. This is another anomaly that is yet to be investigated in depth.

How might investors respond to the opportunities in volatility derivatives? On one hand, short positions in variance swaps or perhaps short-dated VIX futures provide scope to capture the VRP and hence enhance returns across a majority of periods. However, such positions tend to generate large negative returns when volatility spikes, which typically occurs during equity-market sell-offs. On the other hand, long positions in longer-dated VIX futures or forward variance swaps appear to offer an equity market hedge. While the cost of this hedge as reported in Table 1 seems modest, allowance should be made for transaction costs and the possibility that past payoffs may not persist. Further, long strategies can detract from returns in a majority of periods. Alternatively, spread trades appear tantalizing as a means of capturing the VRP while limiting the risk.

To analyze the possibilities, the hypothetical impact was estimated of adding various volatility strategies to a baseline balanced portfolio over the analysis period under differing objectives:

- **Total portfolio performance**, evaluated by studying the distribution

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4 Payoffs have a shape not dissimilar to writing equity market puts.

5 The portfolio comprised 42% US equities, 18% international equities, 10% listed real estate and 30% fixed income.
of 3-monthly portfolio returns as represented by mean, standard deviation and performance in the lower tail; and through estimating the utility associated with total portfolio outcomes over 12-month and 36-month holding periods.\(^6\)

- **Benchmark-relative investing**, with performance evaluated by examining mean active return, tracking error and the percentage of periods of underperformance versus the benchmark.\(^7\)

- **Liability-aware investing**, evaluated by the impact on the funding ratio for a defined benefit pension fund with assets invested in the baseline portfolio and liabilities which track the Citi Pension Fund Index.

Table 2 presents a snapshot of results for the more attractive long and short strategies plus a spread strategy - refer Warren (2012) for further details. Notably all strategies reported in Table 2 improve the risk/return trade-off under a traditional mean-variance perspective, as indicated by increased Sharpe ratios. Nevertheless, a closer look unveils a more intricate picture. The major hedging gains to long volatility exposure and key losses to short strategies occur only in the lower tail of the distribution. Short strategies otherwise generate positive payoffs across the large majority of periods. Such highly non-normal payoffs are not best analyzed using mean-variance techniques. Further, if losses are essentially incurred over short periods while gains accumulate over the longer term, then investment horizon may matter to an investor and their capacity to bear risk. The utility-based analysis – which places a value on each point in the distribution – revealed that an investor’s preference for return-seeking short strategies versus hedge-providing long strategies depends on both the level of risk aversion and investment horizon. Basically, less risk-averse investors with longer horizons (perhaps aided by having security of funding) seemed best positioned to capture the VRP. Hedging would be more beneficial to risk-averse investors worried about incurring short-term losses during equity market sell-offs.

Investors concerned with benchmark-relative performance can have an entirely different perspective. Return-seeking short strategies offer certain attractions for such investors. While short strategies may add to tracking error, they nevertheless generate attractive information ratios and can deliver outperformance over the large majority of periods (see Table 2). Some

<table>
<thead>
<tr>
<th>3-month rolling returns</th>
<th>Return</th>
<th>Total Portfolio Risk</th>
<th>Benchmark-Relative Risk</th>
<th>Return / Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Return</strong></td>
<td><strong>Standard Deviation</strong></td>
<td><strong>Lowest Decile</strong></td>
<td><strong>Max. Loss</strong></td>
</tr>
<tr>
<td><strong>Return</strong></td>
<td><strong>Change vs Baseline</strong></td>
<td><strong>Standard Deviation</strong></td>
<td><strong>Change vs Baseline</strong></td>
<td><strong>Max. Loss</strong></td>
</tr>
<tr>
<td>Variance Swaps (Jan 1990 - Mar 2010)</td>
<td>Baseline Portfolio</td>
<td>8.13%</td>
<td>-</td>
<td>11.24%</td>
</tr>
<tr>
<td></td>
<td>Baseline plus:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long 3-month Forward Variance Swaps</td>
<td>8.23%</td>
<td>0.1%</td>
<td>10.59%</td>
</tr>
<tr>
<td></td>
<td>Short 1-month Variance Swaps</td>
<td>11.36%</td>
<td>3.2%</td>
<td>13.42%</td>
</tr>
<tr>
<td></td>
<td>Spread Strategy: Short 1-month + Long 3-month Forward Variance Swaps</td>
<td>11.75%</td>
<td>3.6%</td>
<td>11.51%</td>
</tr>
<tr>
<td>VIX Futures (May 2004 - Mar 2010)</td>
<td>Baseline Portfolio</td>
<td>4.22%</td>
<td>-</td>
<td>14.9%</td>
</tr>
<tr>
<td></td>
<td>Baseline plus:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long 3-month VIX Futures, Rolled</td>
<td>4.29%</td>
<td>0.1%</td>
<td>13.9%</td>
</tr>
<tr>
<td></td>
<td>Short 1-month VIX Futures</td>
<td>5.06%</td>
<td>0.8%</td>
<td>16.7%</td>
</tr>
</tbody>
</table>

Table 2: Impact of Adding Volatility Exposure

\(^6\)Change in the utility associated with wealth at the end of the holding period was estimated for a range of risk aversion coefficients. A power utility function was used.

\(^7\)The baseline portfolio was adopted as the benchmark, on the basis that it represents either the strategic asset allocation of the investor or their peer group.
March 1996 to June 2010, albeit at the cost of exacerbating any deterioration that occurs during equity bear markets. For liability-aware investors with lower equity weightings in their asset portfolios, the attraction of shorting volatility would be further enhanced.

In summary, volatility derivatives offer intriguing anomalies for researchers to investigate, and interesting opportunities for investors. How investors might respond to these opportunities depends on their circumstances. Considerations include their portfolio objectives, risk aversion, investment horizon, reference portfolio; as well as their ability to implement in what is an emerging but somewhat specialist segment of financial markets.

References


Dr. Geoff Warren is a senior lecturer in the School of Finance, Actuarial Studies and Applied Statistics at The Australian National University (ANU). Warren researches in investment-related areas, including fund management, portfolio construction, asset pricing and valuation, and teaches applied portfolio construction and corporate valuation. Prior to joining ANU, Warren has held a number of roles in the finance industry, including capital markets research at Russell Investments, fund management with AMP Investments and investment banking research at JP Morgan.

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8 This aligns with the notion that equity and bond returns have been negatively correlated over the last 10-15 years.
Investing in volatility as an asset class (VIX®) has been the subject of much discussion in the investment community in recent years because of its potential use as a portfolio diversifier. Defined generally as the 30-day rolling standard deviation of daily stock market returns, volatility’s new-found popularity owes much to the 2008 financial crisis, when the returns on domestic equities and a great many traditional alternative investments became highly correlated. Volatility, however, did just the opposite—it became increasingly negatively correlated with stocks as the crisis deepened.

Volatility diversification has potentially important implications for risk management in multi-asset portfolios, such as target-date and target-risk funds. These strategies are intended to greatly simplify asset allocation decisions for investors, and are based on institutional investment management concepts like broad asset diversification and portfolio risk reduction over time. Volatility diversification is appealing in this context precisely because it holds out the possibility of reducing risk in a more efficient manner than do many traditional portfolio diversifiers.

In this paper, we will discuss the opportunities and challenges associated with incorporating volatility as a hedge in multi-asset portfolios. First, we present material on the history and evolution of the concept of volatility as a portfolio diversifier. Readers familiar with the concept of volatility in multi-asset portfolios may skip this material and begin with Part Two, in which we examine the potential diversification benefits of an allocation to volatility in balanced portfolios. In Part Three, we look at why volatility diversification may make the most sense for target-date funds (TDFs) in the crucial years around the target date, as well as assessing applications to global asset allocation portfolios. Finally, in Part Four, we present potential methods for incorporating volatility as a portfolio hedge, discussing the hurdles associated with each approach.

PART ONE: UNDERSTANDING VOLATILITY: VIX® DEFINED

In contrast the actual (or realized) measures of stock market volatility, the concept of VIX® was introduced by Professor Robert Whaley in 1993. At the height of the 2008 Financial Crisis, when VIX was a regular topic on the nightly news, Prof. Whaley wrote a detailed piece titled Understanding VIX. The following paragraph summarizes and paraphrases several of his key points about the history and purpose of the index.

The original index was based on the volatility implied in the prices of S&P 100 Index options, which accounted for about 75% of the total index option volume in 1992. In 2003, the CBOE changed the way it calculates VIX to reflect the evolution of the index option market in the ensuing years. First, they began to use S&P 500 rather than S&P 100 option prices as a result of the much greater volume of index option trades written on the S&P 500 as opposed to S&P 100. Second, the CBOE began for the first time to include out-of-the-money options in the index computation, again reflecting the tremendous growth in the demand for out-of-the-money and at-the-money put options in the period since the original index computation. As Whaley writes, “out-of-the-money put prices, in particular, contain important information regarding demand for portfolio insurance and, hence, market volatility. Including additional option series also helps make the VIX less sensitive to any single option price and less susceptible to manipulation.” Finally, the deeper and more liquid the index options market, the more effective VIX is likely to be as a measure of expected volatility.

Options are forward looking by their nature, and include an estimate of future volatility for the underlying security (in this case the S&P 500). So by using S&P 500 option prices, VIX constitutes a measure of implied or expected stock market volatility. As a result, the VIX is a handy measure of investor sentiment (or “fear gauge” as it is often called) at any given time. Again, Whaley: “It is important to emphasize that [VIX] is forward looking, measuring volatility that investors expect to see. It is not backward looking, measuring volatility that has been recently realized. . . . VIX is implied by the current prices of S&P 500 index options and represents expected future market volatility over the next 30 calendar days.”

Characteristics of VIX

Figure 1 below indicates the actual, historical volatility of stock market returns going back more than a century. Of course, expectational volatility data don’t exist for this entire period, so here we show the realized standard deviation of returns for first the Dow Jones Industrial Average and later the S&P 500. We believe the graphic makes some important points about volatility in general that apply to VIX. Specifically, it varies widely over time—volatility is, in fact, quite volatile. Note too that volatility has no fundamental value of its own—Graham and Dodd have no truck with volatility, which has no earnings, yield, or net asset value. Instead, volatility’s utility as a diversifier comes from its relationship with stocks. At first glance, an investor might question the prudence of purchasing volatility as an asset class which exhibits significant variation in returns, but no apparent long-term compensating return (i.e., the series depicted below in Figure 1 shows no upward trend). For this reason, we would not advocate speculation on volatility in its own right, but only in the context of a diversified portfolio as a hedge against.
equities or other risky assets. In this context, we believe volatility can play a constructive role in multi-asset portfolios.

The data in Figures 2 and 3 below make explicit the relationship between stocks and volatility. The first contrasts the performance of the S&P 500 with that of the VIX Index over the last five years. The subsequent graphic, Figure 3, depicts correlations between VIX and the S&P 500 going back more than 20 years. What is important to note about these graphics is that the negative correlation of VIX to the S&P 500 is not dependent upon the crisis of 2008; rather, the inverse relationship is evident throughout the periods shown.

Crucially, the negative correlation of VIX to equities is greater on days when stocks fall than it is on days when stocks rise. This makes intuitive sense—investors are more fearful and looking for protection when stocks decline than they are eager to sell volatility when stocks are rising. As Whaley describes it, “the S&P 500 index option market is dominated by hedgers concerned about a potential drop in the stock market,” equating buying index puts with buying “portfolio insurance.” “Because of the demand for portfolio insurance,” he goes on, “the relation between rates of change in the VIX and the [S&P 500] is asymmetric. VIX is more a barometer of investors’ fear of the downside than it is a barometer of investors’ excitement (or greed) in a market rally.” This phenomenon helps explain the curvature evident in the relationship of the daily returns displayed in Figure 4. The more negative equity returns (the further left in the graphic below), the more positive VIX returns (represented by the space in the upper left region of the graphic). As equity returns improve (move to the right of the graphic), VIX returns decline, but do so at a comparatively slower pace. This asymmetry is one of the defining characteristics of VIX in contrast with many other traditional portfolio diversifiers—while correlations between stocks and these traditional alternative asset classes have tended to rise when equities sell off sharply, VIX does precisely the opposite.

Figure 1: Historical Stock Market Volatility

Figure 2: VIX and the S&P 500

Figure 3: Correlation between VIX and S&P 500
This graphic presents average daily returns for the S&P 500 Stock Index and the VIX Index for more than 20 years. It is not a one-to-one relationship—VIX performs proportionally better as equities decline. Said differently, correlations become increasingly negative as stock returns go from positive to negative.

Information Embedded in VIX Level and Returns Useful for Forecasting

As quantitative asset allocators, we are continuously evaluating asset classes and investment opportunities for their relative attractiveness. To do this we analyze a host of macro-economic data, including asset prices, which contain vital information about investor perception of the merits of a particular investment. Indeed, efficient market proponents believe that asset prices reflect all relevant information at all times. But
proponents of the school of behavioral finance have mounted a strong challenge to efficient market theory, arguing that investors make both rational and irrational choices. These behavioral inefficiencies are also evident in VIX, primarily because the options prices on which it is based reflect a strong investor “fear factor,” or aversion to loss. As a result, the level and returns of VIX over time provide potentially useful information about the future performance of the index (keeping in mind that VIX is a measure of volatility, not of prices).

The first admirable property VIX displays for forecasting is “autocorrelation.” This means that one period of performance (in terms of the index’s return) provides useful information about subsequent periods. In layman’s terms, this would be analogous to saying that the result of a coin toss today tells you something about the outcome of a coin toss tomorrow. Similarly, the distribution of VIX returns is asymmetric—as we saw above, investor aversion to loss means the index reacts differently to positive and negative stock returns. As a result, positive surprises in VIX returns tend to be big positive surprises, leading to positive skewness and leptokurtosis (“fat tails”) in its time series distribution.

Another characteristic of VIX providing useful information is the term structure of the market for VIX futures. Remember that VIX is not directly investable, but that investors must gain exposure to VIX through futures contracts, or other derivative instruments, such as swaps. The price of VIX futures at different points in time is roughly analogous to the yield curve in the bond market. Just as the yield curve reflects expectations about future inflation and interest rates, the structure of the market for VIX futures tells you about investor expectations for market volatility. Related to this concept is the fact that VIX is “mean reverting.” That is, if it is relatively low at a given point, you can reasonably expect it to rise going forward, and vice versa. So if VIX is “low”, one would expect the pricing structure or curve for VIX futures contracts to point up over time, while a relatively high level of VIX would see the VIX futures curve point down for longer-dated contracts.

**Figure 5: VIX Level Versus Future VIX Returns**

![VIX level versus future VIX returns](chart)

**Figure 5: VIX levels and returns contain potentially useful information about future VIX levels and returns.**

*January 1990 to June 2011*

*Source: American Century Investments*

- 1-Mo Return
- 3-Mo Return
- 6-Mo Return
- 1-Yr Return

**PART TWO: PORTFOLIO BENEFITS OF VIX**

Next we conduct a hypothetical exercise to assess the diversification benefit derived from including VIX in a multi-asset portfolio. In this example, we examined the effect of incorporating increasing allocations to VIX in a typical balanced (60/40) stock/bond portfolio. Note that in this analysis we have simply used the returns and volatility characteristics of the index itself, which is not directly investable. A more detailed analysis, which includes transaction and other costs, follows later in this paper.

The results of this test, shown in Figures 6 and 7, are striking. Figure 6 explicitly demonstrates the degree to which an allocation to VIX improves the risk/reward trade-off of a traditional 60/40 stock/bond portfolio. These charts display the risk and return characteristics of a nominal 60/40 balanced portfolio along with various allocations to VIX, ranging up to 10% of total assets. Regardless of the exact level, the key benefit is clear—investors may reap significant benefits in terms of both risk and reward through an
allocation to VIX as part of their overall portfolio. The ultimate allocation decision is likely a complex function of several variables, including an investor’s objectives, risk tolerances, and time horizon (time to retirement, for example).

Figure 7 looks at a balanced portfolio with various allocations to VIX in terms of downside risk. Our findings suggest that incorporating a volatility hedge into a typical balanced portfolio provides significantly better risk-adjusted performance. Indeed, volatility allocations ranging from 1% to 10% of an investor’s total portfolio show clear improvement on the downside-risk spectrum and in terms of total return.
PART THREE: POTENTIAL APPLICATIONS FOR VIX AS A HEDGING VEHICLE IN TARGET-DATE FUNDS (“TDFs”) AND GLOBAL ASSET ALLOCATION PORTFOLIOS

Let us turn to the question of diversification and risk-reduction in the TDF space. To this point in the paper, we have focused on diversification, volatility, and risk reduction in terms of standard deviation of returns and downside risk. But assessing risk in TDFs is a complicated analysis that must incorporate not only asset mixes, weightings, and correlations, but also investor wealth and lifecycle considerations. The importance of these latter factors is not to be underestimated. Indeed, the point of greatest risk for any retirement investor is in the crucial years just before and after retirement. This is because they will no longer be making contributions but rather begin drawing down their balance, which is also at its peak value.

You can see this clearly in the accompanying graphic, Figure 8, which indicates the effect of losses on a portfolio near the retirement date. Here we see that a market shock early in retirement can cause significantly more damage to the longevity of the portfolio than a shock later on. Our analysis shows that a 15% downside shock at age 67 shortens the life of the portfolio by five years, depleting the balance at age 85 instead of providing income past age 90. By comparison, the same 15% shock at age 80 has less of an impact (because the remaining account balance is less), shortening the life of the portfolio by two years. Again, the key point is that higher sensitivity to loss occurs early on in retirement.

Given these realities, the attraction of volatility diversification for TDF investors should be self-evident. Volatility diversification in the crucial years around retirement holds out the possibility of reducing risk precisely when it is needed most.

Figure 8: Volatility Diversification May Make Most Sense at Retirement

Retirement Outcomes with Applied VIX

Next we simulated VIX in combination with several real-life TDF portfolios to better understand what volatility diversification can mean in terms of investment outcomes. We start with four popular TDF providers—American Century, Fidelity, T. Rowe Price, and Vanguard—and apply VIX in a 10% allocation to one portfolio. We assume an investor at 50 years of age with a starting balance of $100,000. We then conducted a Monte Carlo simulation of potential market outcomes as the portfolio nears the retirement date. What we end up with are a number of different account balances at retirement, varying with the provider and market return regime, as displayed in Figure 9.

First we present the median account balance across all scenarios. Next are the outcomes further away from the mid-point of the return distribution, reflecting returns for the top 5% and top 25% of all simulations. This would perhaps be analogous to investing in the early- to mid-1980s and retiring in 1999, near the peak of the internet stock bubble—an extraordinarily good period of performance. Similarly, we show what happens to account balances when markets produce an extended period of poor performance. An example here might be Japan’s so-called “lost decade” (a pessimist might call them “lost decades”), wherein equity market returns disappoint over long time periods.

The effect of volatility diversification in this case is readily apparent, particularly at the extremes of the distribution. In very good markets, the VIX allocation acts as a drag on performance, and the combined portfolio significantly underperforms its unhedged peers. But in down markets, the benefit of an allocation to VIX is just as striking. In both examples of below-average performance, the combined portfolio produced better absolute outcomes than did the unhedged portfolios.
For retirement plan sponsors with a high degree of conviction that we will see either significantly below- or above-average stock market returns, the decision to pursue volatility diversification or not will be fairly straightforward. More likely, however, is that over long time periods market returns fall somewhere closer to the median of our performance distribution. In this case, the decision to employ VIX is more nuanced, and will require judgments about plan participant savings and withdrawal characteristics—and most importantly—need to hedge downside risk. Investors with very long time horizons and hardy constitutions might be willing to maximize return at the expense of higher volatility. But it should be abundantly clear why less risk-tolerant plan participants or those nearer the target date, with higher cash balances and the entire expanse of retirement before them, might opt to sacrifice some return for a disproportionate reduction in overall portfolio volatility and downside risk. A case could be made then for an allocation to VIX among more cautious plan sponsors seeking to maximize risk-adjusted—as opposed to absolute—returns, particularly in and around the target date.

**Figure 9: Volatility Diversification Limits Both Up- and Downside**

**Simulation Assumptions:**
- Start with a $100,000 investment at age 50 into corresponding target-date fund
- Asset allocations based on glide path progression of each fund series
- Assumes no alpha or fees
- Asset class annual return assumptions: cash: 2.25%; U.S. high quality bonds: 4.5%; inflation adjusted bonds: 4.5%; international bonds: 5.5%; high yield bonds: 7.0%; U.S. equity: 7.5%; international developed equity: 7.5%; emerging markets equity: 9.5%; VIX: 0.0%; inflation: 2%

**Figure 9: Retirement scenarios in hedged and unhedged TDF portfolios.**

**Source:** American Century Investments

**Important:** The simulated performance results provided here are hypothetical. Hypothetical performance results have many inherent limitations. Hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. In addition, the hypothetical performance results do not represent actual recommendations or trading decisions, and they may not reflect the impact that economic and market factors might have had on the investment decision-making. For example, the ability to withstand losses or to adhere to a particular trading program in spite of losses can adversely affect actual results. There are numerous other factors related 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, but which can adversely affect actual results.
VIX in Global Asset Allocation Portfolios

At this point, let us recall Whaley's assertion that a robust calculation of VIX requires a deep, liquid index options market. Looking globally, we find that a great many markets fit this description. It should be no surprise then that a number of providers have applied the VIX methodology to create volatility indices on a number of equity, commodity, and currency indices across the globe. As a result, it is now possible to speak of an "oil VIX," a "gold VIX," a "German stock market VIX," "a FTSE stock market VIX," "a Euro VIX," and so on. This opens up the possibility of hedging multi-asset portfolios against a number of different risks simultaneously, rather than simply targeting US equity volatility.

We believe that there can be a portfolio benefit to "diversifying the diversifiers" and incorporating not only a VIX position but also these VIX offshoots into a "volatility insurance package," for lack of a better term. To test this hypothesis, we mock up a global balanced portfolio—whose asset allocation and weights you see described in Figure 10—and compared its performance with that of a similar portfolio incorporating just such a volatility hedging package. In this test, our volatility diversification grouping was an equally weighted combination of VIX, oil VIX, gold VIX, and euro VIX. Again, we could have chosen from a whole host of other possible combinations, but for the purposes of our test, a hedge to equities, commodities, inflation (via gold), and currencies seemed reasonable. The results appear in the table below. For comparison purposes, we have included the return and volatility statistics for the S&P 500 and MSCI World Stock Index.

What we find is that incorporating this diversified volatility hedge led to dramatic improvement in both return and risk measures. This explains the significant increase in the hedged portfolio's Sharpe ratio—a measure of risk-adjusted return—compared with the unhedged portfolio. Everything we know about investing says that risk and return are inextricably linked, and that to generate additional return requires additional risk. But in this limited test, we find that the hedged portfolio generated approximately 180 basis points in additional return (a basis point equals 0.01%, so 180 basis points equal 1.80%), while improving standard deviation (portfolio volatility) and downside risk by almost 450 basis points. Skewness and kurtosis are measures of the shape of the distribution of portfolio returns. What we find is that the hedged portfolio improves the symmetry of the distribution of returns (skewness is less negative and has less "fat tails" (lower kurtosis).

Now, a note about the time period. The critical reader will note that our test includes 2008, and perhaps assume that this skews the results in favor of any and all volatility hedging instruments. In reality, however, three of the four volatility indices included in our insurance package had negative returns for the time period in question. It turns out that the advantage of combining volatility hedges is that they provide a diversity of payouts. So even though only one of the four appears to have "worked" for the time period in question, the reality is that each of the four provided positive performance at some point, smoothing returns and improving the overall effectiveness of the volatility hedge. Of course, past performance cannot guarantee future results, and more rigorous analysis across different market regimes will be required. Nevertheless, we are encouraged that our initial findings match our intuition about the potential effectiveness of a diversified volatility hedge.

Figure 10: Global Applications

<table>
<thead>
<tr>
<th>Hypothetical Portfolio</th>
<th>Return</th>
<th>Std. Dev.</th>
<th>Downside Risk</th>
<th>Sharpe Ratio</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Balanced</td>
<td>2.31%</td>
<td>16.92%</td>
<td>13.28%</td>
<td>0.11</td>
<td>-1.16</td>
<td>2.49</td>
</tr>
<tr>
<td>Global Balanced with 10% &quot;Volatility Insurance Package&quot;</td>
<td>4.12%</td>
<td>12.47%</td>
<td>9.82%</td>
<td>0.30</td>
<td>-1.08</td>
<td>1.47</td>
</tr>
<tr>
<td>MSCI World Stock Index</td>
<td>-1.19%</td>
<td>23.72%</td>
<td>17.90%</td>
<td>-0.07</td>
<td>-0.65</td>
<td>0.32</td>
</tr>
<tr>
<td>S&amp;P 500 Index</td>
<td>0.91%</td>
<td>21.79%</td>
<td>16.80%</td>
<td>0.02</td>
<td>-0.72</td>
<td>0.10</td>
</tr>
</tbody>
</table>

June 2008 – May 2011

Weights: Global Balanced: 22% Citigroup World Big Index, 5% Barclays Intermediate High Yield, 17.5% Russell 3000, 5.5% MSCI EM, 10% S&P GSCI, 5% Gold, 16% MSCI EAFE, 7% Citigroup 3-month Tbill, 10% MSCI US REIT "Volatility Insurance Package": Equally weighted portfolio comprised of VIX, Oil VIX, Gold VIX and Euro VIX.

Global Balanced and Global Balanced w 10% Volatility Insurance Package are not actual portfolios available for investment. Performance results provided are hypothetical. Hypothetical performance results have many inherent limitations. Hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. In addition, the hypothetical performance results do not represent actual recommendations or trading decisions, and they may not reflect the impact that economic and market factors might have had on the investment decision-making. For example, the ability to withstand losses or to adhere to a particular trading program in spite of losses can adversely affect actual results. There are numerous other factors related 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, but which can adversely affect actual results.
PART FOUR: HURDLES TO IMPLEMENTATION

Armed with this understanding of the potential benefits of volatility diversification in multi-asset portfolios, now we turn to the question of implementation. A number of these considerations we have introduced earlier; we will elaborate on them here.

First, recall that VIX is not directly investable—it's a complex equation, not a security. As a result, investors who want exposure to VIX must use futures, options, swaps, or exchange-traded products to trade volatility. This is a crucial consideration, because VIX’s desirable hedging characteristics do not translate in a one-for-one manner to the VIX-linked instruments available to investors. In effect, investors have access to a diluted version of VIX.

Second, VIX is about four times as volatile as the stock market. Of course the asymmetry of that volatility and its desired effect on a larger, diversified portfolio is a key reason why VIX-linked securities are such a potentially compelling hedge; nevertheless, investors in volatility should expect a wild ride—technical term—from this portion of their portfolio.

Third, each of the VIX-linked instruments available to investors has its own VIX beta (degree to which it mimics movements in VIX), cost, and liquidity characteristics. A discussion of these traits for each instrument is beyond the scope of this paper. Our analysis suggests, though, that VIX futures are currently the most cost-effective way to gain volatility exposure. Institutional asset managers or experienced financial advisors with sophisticated trading tools are likely to use this approach. Individual investors, however, may want to utilize any of the number of more easily bought and sold exchange-traded VIX-linked instruments that have come to market in recent years.

What Cost VIX?

Earlier we introduced the notion of VIX’s mean-reverting properties and its relation to the term structure of the market for VIX futures. Let’s revisit that topic now through the lens of Figure 11, a simple cost/benefit analysis of VIX futures contracts over time. First notice that VIX futures have a time-dependent beta to VIX. The mean reversion priced into the VIX futures term structure means that different futures maturities show varying responsiveness to spot VIX. The longer the maturity of the contract, the higher is the probability of mean reversion. As a result, shorter-dated VIX contracts are more sensitive to spot VIX because there is less time for volatility to mean revert.

Figure 11: Cost/Benefit Analysis for VIX Futures

<table>
<thead>
<tr>
<th>Futures Contract Duration</th>
<th>Benefit (Beta vs. VIX)</th>
<th>Cost (Avg. roll cost in vol pts.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term (1-month)</td>
<td>0.43</td>
<td>1.00</td>
</tr>
<tr>
<td>Second month</td>
<td>0.30</td>
<td>0.70</td>
</tr>
<tr>
<td>Three-month</td>
<td>0.25</td>
<td>0.36</td>
</tr>
<tr>
<td>Four-month</td>
<td>0.23</td>
<td>0.27</td>
</tr>
<tr>
<td>Five-month</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>Six-month</td>
<td>0.17</td>
<td>0.13</td>
</tr>
</tbody>
</table>

So, what does it cost us, and what benefit do we derive from holding a one-month VIX contract, for example? The “benefit” or beta to VIX is expressed as a fraction of VIX, so if the headline VIX index changes by one point, then one month futures contract would move by 43 basis points, or 0.43%. But note that it costs you one full “volatility point” to gain those 43 basis points. (A note on futures returns: A portion of futures returns comes from the effect on performance generated from rolling forward an expiring contract into a future-dated contract. Futures prices can be in a state of “backwardation” or “contango.” When futures markets are in a state of backwardation, roll returns are generally positive, and when in contango, roll returns tend to be negative. VIX futures markets are currently in a state of contango. This is in part a result of the significant capital inflows into this space from investors looking to utilize volatility hedging. As a result, roll return across VIX futures markets is currently negative.)

The shape of the VIX futures term structure gives insight into the holding costs of VIX futures. For example, if VIX futures are priced two volatility points above spot VIX, then one would expect to pay two volatility points at maturity if VIX is unchanged. Since VIX futures typically trade at a premium to spot VIX,
particularly in a low-volatility regime, VIX futures holders will lose this premium most of the time. Similar to paying an insurance premium for a policy you will use only in case of emergency, holders of VIX futures contracts will pay this premium most of the time, looking to be compensated by gains in the event that volatility spikes.

There are a number of other things we can glean from this table. For example, note that an investor can move out the term structure and buy multiple longer-dated futures contracts to achieve the same or greater beta to VIX at a lower cost than shorter-dated contracts. So, an exposure to five-month futures scaled to give the same exposure to spot VIX as a one-month futures contract would have only about 40% of the holding cost of the one-month future on average. However, the lower cost per unit of spot VIX exposure of longer-dated futures has to be counterbalanced with the considerably lower liquidity in these contracts.

**Portfolio Benefits of Using Medium-Term Futures as a Proxy for VIX**

Now that we have a better idea of the cost to implement a trade using VIX futures, let’s go back and repeat our experiment, asking how effectively VIX-linked instruments can hedge a balanced portfolio. Do the same diversification benefits we saw earlier endure once we take into account roll costs and time-dependent beta to VIX?
To find out, we used actual VIX futures costs, betas, and hedge ratios going back to the creation of the VIX futures market in 2004, and then modeled those characteristics back to 1990, such that the data presented in Figures 6 and 7 cover the same period as Figures 12 and 13.

What we find, as evident in Figures 12 and 13, is that the risk-reduction benefit is still readily apparent, but the “free lunch” of higher returns with less risk is no longer evident. In terms of both standard deviation of return and downside risk, we find that allocations to medium-term VIX futures significantly improved the portfolio’s risk profile. Also note the improvement in risk-adjusted returns, reflected in incrementally higher Sharpe ratios. For example, the 60/30/10 portfolio gives up about 60 basis points in return, while improving standard deviation (portfolio volatility) by about 170 basis points and downside risk by more than 140 basis points.

**Closing Thoughts on VIX Applications in Multi-Asset Portfolios**

Volatility hedging has exploded in popularity in recent years. This is because VIX and its derivative instruments demonstrate several attractive characteristics for portfolio hedging, primarily driven by asymmetric negative correlations with equities. In addition, the nature and structure of the market for VIX futures contains valuable information for forecasting future VIX returns. This suggests an opportunistic, active approach to VIX investing is possible.

Our own analysis on this topic leads us to conclude that a systematic approach to volatility trading can succeed. But because of the complexities and dynamism of the market for VIX futures, we would argue that the attempt to trade volatility be left to sophisticated investors with the tools and flexibility to take informed, active positions in volatility as opportunities arise—do not try this at home.

With respect to multi-asset portfolios, volatility diversification can significantly improve risk-adjusted performance over time, both in a target-date and global asset allocation context. In particular, an allocation to VIX can provide significant risk-reduction benefits in the crucial years around the target date, when market losses can prove particularly damaging to retirement outcomes. Indeed, while volatility diversification comes at a cost, many investors approaching or just into retirement may do well to pay that premium in order to reduce the risk from a stock decline and potentially catastrophic hit to their total wealth.

Prospective volatility investors may also want to consider the efficacy of a broad “volatility insurance package.” It appears that combining several different volatility hedges has the effect of improving the diversity of volatility payouts and can further enhance risk-adjusted portfolio performance. As additional volatility-related data, new investment vehicles, and increased liquidity emerge, this topic represents a promising avenue for future research and merits further study.

The opinions expressed are those of the Richard Weiss, Senior Portfolio Manager, and are no guarantee of the future performance of any American Century Investments portfolio. Statements regarding specific holdings represent personal views and compensation has not been received in connection with such views. This information is for educational purposes only is not intended to serve as investment advice.

Richard Weiss is senior vice president and senior portfolio manager for American Century Investments, a premier investment manager headquartered in Kansas City, Missouri.

Weiss is co-portfolio manager for the firm’s asset allocation strategies, including LIVESTRONG® Portfolios, One Choice Portfolios and Strategic Allocation. He also serves as a member of the American Century Investments’ Asset Allocation Committee, which is responsible for establishing investment policy and reviewing investment decisions for all of our asset allocation products.

Prior to joining the firm in 2010, Weiss was executive vice president and chief investment officer of City National Bank, where he was responsible for its $12 billion investment management group and directed investment policy and strategy. Previously, he was executive vice president and chief investment officer at Sanwa Bank California, where he managed all aspects of its investment department. Earlier in his career, Weiss held senior investment positions at Vantage Global Advisors, TSA Capital Management, PaineWebber and Mellon Bank. He has worked in the investment industry since 1984.

Weiss holds a bachelor’s degree in finance from the Wharton School at the University of Pennsylvania and an MBA from the University of Chicago. He has authored several academic papers and is well known for his advanced work in the field of global investing.
Private Equity Industry Leaders and Academics Gather for Second Annual UCLA Anderson Summit

On March 2, 2012, the Fink Center at UCLA Anderson hosted 80 of the world’s most influential private equity investors, academics and consultants at its annual Private Equity Summit, the second annual conference focused on furthering discussions and examining critical questions facing the industry, such as how to improve the study of private equity from largely anecdotal to an increasingly scientific approach.

“The purpose of the summit is to discuss key issues facing investors and to facilitate the evolution of private equity by exploring the latest research,” said Jonathan Rosenthal, the Summit Founder/Co-Chair and Co-Managing Partner at Saybrook Capital. It is designed to spur dialogue between industry thought leaders and institutional private equity investors, many of whom were in attendance at this year’s event, including Washington State Investment Board, Meketa Group and the CIO of Fire and Police Pension Commissioners of the City of Los Angeles.

According to UCLA Anderson Professor and Summit Co-Chair Mark Garmaise, the Private Equity Summit is a unique event.

“Here, leading academics and investors are able to consider the future of private equity by wrestling with hard data,” Garmaise said. “The industry has been the subject of close attention in the last few months, but many of the popular descriptions are catchy sound bites rather than considered judgments. The PE Summit delves into the nuances of private equity from a research-based perspective.”

Andy Rice, chairman of the Association for Corporate Growth and a senior vice president at The Jordan Company, echoed Professor Garmaise’s observations.

“The PE Summit is different, almost entirely focused on building better partnerships between limited partners, managers and the academic researchers who study the industry,” he said. “This effort could do much to improve the long-term return for investors and result in more private capital for growing companies.”

Summit presentations covered a variety of critical topics, ranging from the current state of raising funds in the private equity sector and the effect private equity has on employment to challenges of complying with the Dodd-Frank Wall Street Reform and Consumer Protection Act. Among the presenters were Harvard Professor Josh Lerner, who delivered the keynote address with his research on private equity’s impact on employment. Mark O’Hare, CEO of Preqin, the industry’s leading data provider, led a discussion on the creation of a private equity index, which may help investors assess the role and performance of private equity in their portfolios, supporting the trend toward increased allocations and returns. Purdue Professor Mara Faccio presented evidence that returns to private equity in Europe are significantly higher than returns to publicly traded equity. University of Virginia Professor David Smith examined the ramifications of leverage on private equity sponsored companies.

“This is the kind of dialogue private equity professionals ought to be engaged in,” said Tim Recker, chairman of the Institute of Limited Partners Association (ILPA). “I am looking forward to participating next year.”
First Annual Fink Center AIA Stock Pitch Competition

UCSANDER TEAM “BUY LOW” TAKES TOP PRIZE IN THE FINK CENTER AIA STOCK PITCH COMPETITION!

1st place, $5,000: UCLA Anderson, Team “Buy Low”: John Hertzer, Darren Wan, Jesse Pemstein

2nd place, $3,000: Columbia Business School, Team “Guepard”: Cecilia Danhua, Vladimir Yuzhakov, Eugene Hsiao

3rd place, $2,000: NYU Stern, Team “Hagin”: Brendan Munson, Joshua Lanning, Ari Welcher

Congratulations to all the winners of UCLA Anderson’s first national stock pitch competition!

On March 9, 2012, UCLA Anderson hosted teams from top MBA schools around the country. The competition was sponsored by the Fink Center and designed to showcase the finest of the next crop of talent entering the investment community through a real-world simulation of the Wall Street decision-making process.

Each team consisted of three students interested in pursuing careers in investment research/asset management. Teams made stock pitch presentations to a distinguished panel of judges from the industry. Pitches involved rigorous analyses for a long or short investment from a pre-defined industry list selected by the judges in the first round.

In the final round, teams pitched long/short/do not own positions for Netflix (NFLX) and fielded tough questions under intense scrutiny by investment professions. Team school affiliations were not revealed until the awards ceremony. The winning teams were awarded $10,000 in total. A huge thank you to our judges for their time and dedication:

Brian Massey, Portfolio Manager, Mar Vista Investment Partners
John Francis, Principal and Portfolio Manager, Francis Capital Management
Gil Luria, Senior Vice President of Equity Research, Wedbush Securities
Iman Brivanlou, Senior Vice President, Trust Company of the West

First place Anderson Team “Buy Low”: Darren Wan, Jesse Pemstein, John Hertzer (all MBA ’13)

Second place Columbia Business School Team “Guepard”

Third place NYU Stern Team “Hagin”
Private Equity Roundtable

The UCLA Anderson Private Equity Roundtable — co-sponsored by the Fink Center for Finance and Investments, the Investment Finance Association and the Entrepreneur Association — took place on March 15, 2012 at the Hyatt Regency Century Plaza Hotel. The roundtable featured a special Q&A with Joseph A. Dear, chief investment officer of CalPERS, and was hosted by Anderson's senior associate dean, Dr. Al Osborne, Jr.

From his perspective as one of the largest limited partners for private equity funds, Dear covered a wide-ranging list of topics, including the changing of fee structures in the past five years and the future of the private equity industry as a whole. The event was attended by more than 40 professionals from various funds in the Southern California region and more than 70 students from the UCLA Anderson School of Management. In addition to hearing Dear’s insights on the industry, the event provided attendees the opportunity to ask him questions during the interactive Q&A segment and to network with each other over three roundtable sessions.

4th Annual Southern California UCLA-USC-UCI FINANCE DAY

On April 27, 2012, the UCLA Anderson Finance Group hosted academics from USC and UCI to discuss relevant and groundbreaking research. Topics presented by Anderson finance faculty included “Financial Flexibility for Households” (Mark Garmaise), “Systemic Sovereign Credit Risk: Lessons from the U.S. and Europe” (Francis Longstaff) and “Search Fatigue” (Bruce Carlin). More than 60 faculty were in attendance. Copies of working papers can be provided upon request.

Investment Banking Fellows Dinner

On May 7, 2012, Associate Professor Mark Garmaise and his wife Jennifer hosted an intimate dinner at their home honoring Fink Center Investment Banking Fellows and thanking mentors for their time and support. Attendees included 2011 IB Fellows Todd Holman, Guillaume Hotelin, Nathan True-Daniels; 2012 IB Fellows Matthew Cautero, Rob Michlovich, Jordan Weitzman; mentors Anish Aswani ’05 (Moelis), Dan Kim ’04 (Macquarie), James Meehan ’05 (Barclays); and Pansy Yang, FCFI’s executive director.

FINK CENTER ANDERSON STUDENT ASSET MANAGEMENT (ASAM) SPEAKER SERIES

This speaker series is held regularly on Monday evenings at 7:00 p.m. Prominent investment managers are invited to speak to a select group of MBA students interested in pursuing a career in investment management. The students are members of ASAM, which manages an investment fund that aims to provide a competitive rate of risk-adjusted return to its investors, and engage in experiential learning through firm visits and guest speakers.

<table>
<thead>
<tr>
<th>Date</th>
<th>Speaker</th>
<th>Title, Firm</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 9</td>
<td>Kevin Schmidt</td>
<td>Director, iShares, a division of BlackRock</td>
<td>Discussion of ETFs</td>
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<tr>
<td>April 23</td>
<td>Eric Sussman</td>
<td>Lecturer, UCLA Anderson</td>
<td>Overview of REITs</td>
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<td>May 7</td>
<td>Jon Bailly</td>
<td>Partner, Dorchester Capital Advisors</td>
<td>The Practicalities of Tactical Asset Allocation</td>
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<td>May 14</td>
<td>James Doyle</td>
<td>Director, Causeway Capital Management</td>
<td>Quantitative Investing</td>
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<td>May 21</td>
<td>Loren Sageser</td>
<td>Senior Vice President, PIMCO</td>
<td>Discussion of the Current State of Emerging Economies</td>
</tr>
</tbody>
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FINANCE AREA SPEAKER SERIES

The Anderson finance faculty regularly hosts renowned academics visiting from leading universities all over the world. Seminars are open to the public and held at UCLA Anderson on Fridays from 11:00 – 12:15 p.m.

<table>
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<tr>
<th>Date</th>
<th>Speaker</th>
<th>School</th>
<th>Paper</th>
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<tbody>
<tr>
<td>April 20</td>
<td>Mikhail Chernov</td>
<td>London School of Economics</td>
<td>Crash Risk in Currency Returns</td>
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<td>May 4</td>
<td>Lars Lochstoer</td>
<td>Columbia</td>
<td>Parameter Learning in General Equilibrium: The Asset Pricing Implications</td>
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<td>May 11</td>
<td>Peter Bossaerts</td>
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<td>May 16</td>
<td>Sheridan Titman</td>
<td>University of Texas, Austin</td>
<td>Urban Vibrancy and Corporate Growth</td>
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<tr>
<td>May 25</td>
<td>Konstantin Milbrandt</td>
<td>MIT</td>
<td>Endogenous Liquidity and Defaultable Bonds</td>
</tr>
<tr>
<td>June 1</td>
<td>Lukas Schmidt</td>
<td>Duke</td>
<td>Innovation, Growth and Asset Prices</td>
</tr>
</tbody>
</table>
Professors Jason Hsu and Richard Roll Receive Graham and Dodd Awards

Jason Hsu, adjunct assistant professor of finance at UCLA Anderson and Research Affiliates chief investment officer, received a Graham and Dodd Scroll Award, recognizing other outstanding articles. This award was for his September/October FAJ article, “A Survey of Alternative Equity Index Strategies,” joint work with Research Affiliates Vice President Vitali Kalesnik and Research Associate Tzee-man Chow; and Bryce Little, graduate student at Texas A&M University.

Richard Roll, Joel Fried Chair in Applied Finance at UCLA Anderson and principal of Consultant Compensation Valuation, was named winner of the Graham and Dodd Best Perspectives Award, which recognizes timely, thought-provoking opinion, for his article, “The Possible Misdiagnosis of a Crisis” in the March/April issue of the Financial Analysts Journal (FAJ), a publication of the CFA Institute.

The FAJ Advisory Council and Editorial Board selected the winners. The award, created in 1960, honors “the enduring contributions of Benjamin Graham and David L. Dodd, legendary investors, to the investment analysis field,” according to another CFA Institute statement.

Professor Andrea Eisfeldt Awarded Research Grant from Bank of France

Andrea Eisfeldt, associate professor at UCLA Anderson, was awarded a 30,000 euro grant from the Bank of France for her project on “Liquidity and Fragility in OTC Credit Derivatives Markets,” joint work with Andrew Atkeson and Pierre-Olivier Weill. In the paper, they develop and search a matching model of a derivatives trading network that illustrates some of the costs and benefits of the current structure of the OTC credit derivatives market. They find that the concentrated market provides liquidity, but can be fragile because banks’ private benefits to trading are less than the social benefits their intermediation provides.

Professor Hanno Lustig's Research Receives Honorable Mention from AQR Capital Management

On May 29, 2012, AQR Capital Management, LLC today presented its first annual AQR Insight Award to Bryan Kelly of the University of Chicago and Seth Pruitt of the Federal Reserve Board of Governors for their innovative and practical unpublished research in predicting market returns more accurately over one-month and one-year time horizons.

The AQR Insight Award is designed to encourage and honor academics who are impacting the world of investing.

Among hundreds of submissions from 24 countries, the AQR Insight Award Committee chose five finalists, who presented their research on April 27, 2012 in Greenwich, Connecticut.

“It was a privilege to host these talented academics, and the interactive exchange was compelling and productive,” said David Kabiller, founding principal at AQR. “We were inspired by the innovation and insights of the work. It is our hope that this engagement will also make us better investors.”

Hanno Lustig, associate professor at UCLA Anderson, earned an honorable mention for his research, “Countercyclical Currency Risk Premia”, joint work with Nikolai Roussanov of University of Pennsylvania and Adrien Verdelhan of MIT.

AQR Capital Management is a global investment management firm employing a disciplined and analytical research process to macroeconomic and fundamental data. As of March 31, 2012, AQR manages approximately $51.8 billion worldwide for institutional investors, including pensions, insurance companies, endowments, foundations and sovereign wealth funds, as well as registered investment advisors. Founded in 1998, AQR is based in Greenwich, Connecticut, with offices in Chicago, London and Sydney.
WAYS TO SUPPORT THE FINK CENTER

- Serve as a guest speaker at a Fink Center conference or event.
- Sponsor a student scholarship.
- Volunteer to speak to a student organization (e.g., Investment Finance Club, Anderson Student Asset Management, Student Investment Fund).
- Hire an Anderson MBA or MFE for an internship or full-time position.
- Serve as a guest lecturer for a finance class at Anderson.
- Contribute financially to the Fink Center and the Anderson finance program.

Finance Area Faculty

Antonio Bernardo, Professor
Michael Brennan, Professor Emeritus
Bruce Carlin, Associate Professor
Bhagwan Chowdhry, Professor
William Cockrum, Adjunct Professor
Andrea Eiseleit, Associate Professor
Stuart Gabriel, Arden Realty Chair
Mark Garmaise, Associate Professor
Robert Geske, Associate Professor
Mark Grinblatt, Japan Alumni Chair in International Finance
Jason Hsu, Assistant Adjunct Professor
Francis Longstaff, Allstate Professor of Insurance and Finance
Hanno Lustig, Associate Professor
Marc Martos-Vila, Assistant Professor
Richard Roll, Joel Fried Chair in Applied Finance, Finance Area Chair
Eduardo Schwartz, California Chair in Real Estate and Land Economics
Avanidhar Subrahmanyam, Goldyne and Irwin Hearst Chair in Money and Banking
Geoffrey Tate, Assistant Professor
Walter Torous, Lee and Seymour Graff Professor
Ivo Welch, J. Fred Weston Professor of Finance
Liu Yang, Assistant Professor
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