

“The Q-Group”®

THE INSTITUTE FOR QUANTITATIVE RESEARCH IN FINANCE

Seminar Review Spring 2013: “Pricing and Valuation: New Perspectives”

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Overview and Summaries

Spring 2013 Q-Group Meeting Summary

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Introduction

The Q-Group® provides a number of ways for the attendees and their colleagues to access the presentations from past seminar series. First, there are brief overviews of the themes and insights presented during a meeting, such as the ones shown below for the Spring 2013 Q-Group Seminar series. If you want more information about a particular presentation after reading these, you can read the full summaries of each presentation which are also in this report. For even more information, copies of the slides used during each presentation and the paper from which the presentation was derived, as well as the complete audio recordings for each presentation and question and answer period, are available from the Q-Group website at *The Q-Group*: The Institute for Quantitative Research in Finance.

Overview

How many of us have had a puzzle we could not solve only to have an insight that moved us toward a solution years later? Puzzles like these are like a mosquito buzzing in the dark – annoying until we turn on the light and find a fly swatter.

The puzzle that stuck in Steve Ross' mind was how to dissect the equity price return forecasts into risk aversion and the probability of a crash (tail risk). In embracing derivative theory, he says, we lost intuition behind insurance – risk has two components: aversion to it and the probability of a crash. His fly swatter is *The Recovery Theorem*,

which helps unbundle the risks, as using option pricing models do not. As a first step he uses options prices for a particular date to get pure security prices, and second, uses the pure security prices to find contingent prices, and third he applies *The Recovery Theorem* to determine the risk aversion – the pricing kernel – and the market's natural probabilities for equity returns. Using this data he compares the recovered returns and risk to historical returns for the same period. While the full puzzle is not solved, Ross has made a big step forward.

Other puzzles were taken on by those presenting at the Spring 2013 Q-Group Meeting. Some were new, some were newly emerged puzzles and some were conundrums we thought had been solved, but were not.

The price of gold is an enduring puzzle: why is it valuable, how should it be used in portfolios; is the current price of gold too high or low? These are a few of the golden puzzles that Campbell Harvey tried to piece together and on which to shed light. Taking the possible alternative reasons for holding gold, hedges for inflation or exchange rate risk, a fiat currency, a store of value in a world of low returns, he provides evidence that some of the reasons cannot be supported by the data, his research shows that gold is either under- or over-valued. Which is it? Campbell says that depends upon whether investors, particularly large

institutional investors, choose to bring their portfolio allocation of gold up to a market value weight. At present, the portfolio weights are quite low.

Are there too many questions and too little data? Kelly Shue looked at a new source of information in “No News Is News.” She questioned whether there is information in silence. Much like Sir Arthur Conan Doyle’s use of evidence that “the dog did nothing in the night time” to determine the culprit knew the dog, she finds that what appears to be silence is often useful information. Her contention is that if events are expected, but do not occur, that is “news,” information on which we can act. Her analysis of the information contained in “no information,” from the time a merger is announced to the date the date it is closed or abandoned, provides considerable insight as to the probability of the merger’s successful completion. She said that when what we expect to occur does not, that is useful and often actionable information.

Brian Kelly’s puzzle is why EMH adherents are not more concerned about the mounting evidence that returns move in subtly predictable ways. Kelly concludes that return predictability need not be a violation of the EMH and goes on to demonstrate how that can be so. When risks change in a predictable way we should find that expected returns are predictable as well: the same state variables that drive aggregate returns expectations also govern the dynamics of thousands of asset-specific valuation ratios. He posits that the richness of the cross-section of these asset-specific valuation ratios can be exploited in a smart way to generate a super predictor of future stock market returns using a technique called Partial Least Squares and concludes that this approach outperforms previous attempts to predict market returns.

For Erik Stafford the puzzle is whether the high returns of hedge funds cover their cost of capital. The returns earned by hedge funds may not be high enough to compensate for the cost of capital, particularly when tail risk

is measured properly. Stafford says that part of the problem is the use of linear factor models to understand the variation in hedge fund returns. These models appear to do a good job explaining the return variations but not when markets are volatile or extreme. To test this he creates a low cost method of replicating returns using puts. He finds that although the HFRI, the broad hedge fund index, has not generated returns that have reliably exceeded the cost of capital, his put writing replication method has.

During the Financial Crisis, diversification failed to work as expected as correlations between assets and countries rose. Even correlations among U.S. real estate markets, long thought to be separate markets, rose dramatically. But what has happened since that traumatic period? N.K. Chidambaram looks specifically at the co-movements over time and between markets to discover whether co-movement has been changing over time and whether it is permanent. Two things are critical in answering these questions: the choice of the correct model for each country; and determining if there is a common world factor. Using a model he creates, a Weighted-Generalized Canonical method, he finds that co-movement is largely driven by a common world market factor, that structural breaks are related to economic innovations, and the change is driven by investor flows across boundaries.

Systemic risk certainly played a major role in the Financial Crisis. Stress testing has become ubiquitous in estimating whether financial institutions are systemically important. Engle shows us there is a better way to measure systemic risk, and despite the fact that the least squares model is the workhorse in empirical economics and finance, it is not the solution to the problem. He says that rarely is there a credible economic rationale for the assumption that the slope coefficients are time invariant. The puzzle for Engle is why we have not adopted regression models with time varying parameters. He proposes a new approach,

the Dynamic Conditional Beta, and shows how this model can be used to assess financial institutions' systematic risk. He demonstrates its use and then assesses current level of systemic risk for a variety of financial institutions and for countries. He concludes that the current level of systemic risk is serious: in absolute terms Japan has the highest level; relative to GDP, Cyprus is the leader; big European bank betas have been rising as the sovereign debt crisis has grown. The continuing puzzle is what to do.

Bob Korajczk takes on a conundrum that many have considered: Does the investor's horizon impact asset pricing or not and why? Korajczk says that given what we know it might be sensible to consider that investment horizon might impact risk premia. He looks at whether some short-horizon risk factors explain some of the short-term cross-sectional differences in expected returns. He also tests to determine whether longer-term factors uniquely explain longer-term differences. Testing for familiar factors, including such things as liquidity and SMB, he finds factor risk at short horizons is associated with transitory factors such as liquidity. Longer horizons are associated with longer term factors such as the value-versus-growth factor. He does find some of the factors actually act like characteristics (e.g. beta) while others are factors. A few are characteristics over one horizon and a factor over a different horizon.

Martin Leibowitz, long a member of the Q-Group and a favorite presenter, brought an insight that made people scratch their heads and think again about DT, duration targeted, investing and how it should be accomplished. He addresses a vexing and tough problem in a world of low but potentially rising interest rates: bond prices decline as rates rise, thus impacting the value of the portfolio. Leibowitz says that problem does not exist for DT investors who are content with the current

yield levels. He demonstrates that they can rely on yield/price convergence properties: the starting yields exert a "gravitational pull" on returns as price changes and accruals balance each other out over time. This occurs whether rates are rising or falling. Since almost all bond portfolio managers use Duration Targeting to control interest rate risk, Leibowitz says the full implications of this strategy, generally underappreciated, should be reconsidered.

Index funds have been an increasingly important low-cost alternative to actively managed-stock funds, and by 2010 they accounted for 22% of AUM worldwide. Cremers seeks to shed some light on the impact that passive investing has had on fees and returns. He compares active investing to index investing whether it is explicit or closet indexing. He finds that outside the most developed markets there is little explicit indexing but considerable closet indexing. When he looks at the impact of indexing, he finds that in markets with a larger percentage of indexed funds, active funds are less index like, charge lower fees and deliver higher returns. The countries with greater explicit indexing have a more liquid and developed stock market, more stringent standards, a larger fund industry.

Karl Case, the dinner speaker for the Spring 2013 Q-Group Meeting, presented an empirically based overview of the housing market. His evidence demonstrates that the housing market has ended its decline and is showing signs of recovery. The recovery has been assisted by the existing low interest rate environment as well as declining foreclosures and distressed sales. However, there are a number of factors that may adversely impact recovery including a stalling national or regional economy, changing demographics, and potential changes in interest rates and tax laws.

Summaries

	Page
1. Stephen A. Ross The Recovery Theorem	2
2. Campbell R. Harvey Global Pricing of Gold	4
3. Kelly Shue No News is News: Do Markets Underreact to Nothing?	6
4. Bryan Kelly Market Expectations in the Cross Section of Present Values	9
5. Erik Stafford The Cost of Capital for Alternative Investments	11
6. N.K. Chidambaran Is the World Stock Market Co-Movement Changing?	13
7. Robert Engle Dynamic Conditional Beta	15
8. Robert Korajczyk Horizon Pricing	17
9. Martin Leibowitz and Stanley Kogelman DurationTargeting: A New Look at Bond Portfolios	19
10. Martijn Cremers The Mutual Fund Industry Worldwide: Explicit and Closet Indexing, Fees, and Performance	21
11. Karl Case Housing and the Marco Economy	23

The Recovery Theorem

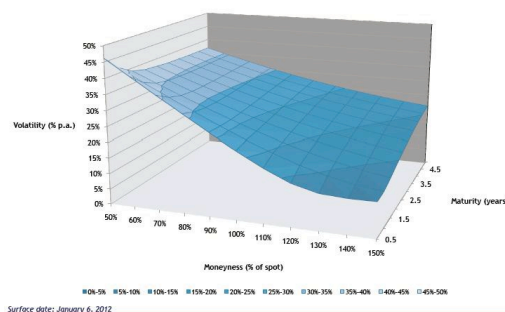
Stephen A. Ross
Massachusetts Institute of Technology

A central tenet of modern option pricing theory is that the value of an option can be computed without reference to the expected return of the underlying asset. This is a well-known feature of the Black-Scholes option pricing model and its extensions. Option prices can and have been used to infer estimates of the market's view of risk (volatility), but a whole generation of academics and practitioners have grown up believing that option prices have very little to say about expected returns or the actual return distribution. Steve Ross kicks off the Spring 2013 Q-group meetings by presenting his work on this problem.

Ross begins his talk by discussing how financial data has been traditionally used. In (sovereign) fixed income markets, the full term structure of interest rates is often used - many times in conjunction with a parametric interest rate model - to back out forward rates. The forward rates are used to help predict anticipated future spot rates, to estimate term premia, and to help calibrate models of the term structure that capture the evolution of the term structure over time. In equity markets, Ross notes there has been virtually no attempt to use forward-looking data aside from implied volatility estimates. We have, he says, largely relied on long periods of historical data to estimate quantities such as expected returns, long-term risk premia, and future expected return differentials. Ross says a good example of this is the use of the dividend yield and Shiller's CAPE ratios to predict ten-year returns.

Ross motivates the potential use of option prices by showing the surface of implied volatilities on S&P put and calls for a particular date with axes of time to maturity

(tenor), moneyness (percentage of spot), and implied volatility, as shown in the chart below.



The surface of the graph displays the following familiar features: a smile with out of the money and deep in the money options having the highest implied volatilities; the curvature is greatest for short-date options. *The Recovery Theorem* is intended to provide a way to go from the contingent prices to the natural probabilities.

Ross develops the intuition for *The Recovery Theorem* using the binomial option structure. In the binomial framework the prices do not depend on the natural probabilities of the up and down states and thus there is no way to infer the market's estimate of expected returns.

Ross notes that the contingent price is the pricing kernel - the marginal rate of substitution that captures risk aversion. Ross' key insight is that the pricing kernel, which determines how risky cash flows are risk adjusted, has the form of a representative agent with state independent and additively separable preferences. This allows for the recovery of the natural probabilities from a known matrix of Arrow Debreu state prices. Because the Black Scholes model's state

space is not finite, Ross needs another approach. He uses *The Recovery Theorem*.

Ross illustrates the use of *The Recovery Theorem* in a three-step process. Using:

1. Option prices to get pure security prices.
2. Pure prices to find the contingent prices.
3. *The Recovery Theorem* to determine the market's risk aversion, the market's natural probabilities for equity returns and the pricing kernel.

Ross uses data from May 1, 2009, a date not far removed from the stock market bottom in March 2009. To test this model, he uses data from the recovered natural probabilities. The results suggest a mean excess return over the next year of 7.13%: the historical mean from a bootstrapped sample suggest an excess return of only 3.06%.

In comparing the recovered natural probabilities, with the risk-neutral probabilities, Ross finds that the risk-neutral distribution has a much fatter left tail and that the natural probability density function is much more symmetric.

In addition, the recovered probability density function has significantly more mass at higher return levels than the density derived from historical returns. Thus, the recovered natural probabilities seem to show much greater upside potential in returns than one would have estimated from historical data.

Ross acknowledges that there are many implications and features of this model that he is still trying to understand. He concludes that his next steps are to:

1. Test the predictive power of the model.
2. Explore the potential benefits of *The*
3. *Recovery Theorem*.
Extend the analysis to the fixed income markets.

Dynamic Conditional Beta

Robert Engle
New York University

Engle starts by reminding those who teach that while the least squares model is the workhorse in empirical economics and finance, students often question the assumptions of exogeneity, homoscedasticity and serial correlation. In practice, the unstable regression coefficients are the most troubling for them. No surprise, he says, since rarely is there a credible economic rationale for the assumption that the slope coefficients are time invariant.

So why do we continue to use this model when econometricians have developed a variety of ways to deal with time series regression models with time varying parameters? Many adaptations are available, and in his presentation, Engle discusses the three most common procedures used to deal with time varying betas: rolling window estimates; interactions with trends; splines or other economic variables; state-space models where the parameters are treated as an estimated state variable. He says that each of these approaches makes very specific assumptions about the path of the unknown coefficients: the first specifies how fast the parameters can evolve; the second specifies a family of deterministic paths for the coefficients; the third requires a stochastic process that is generally unmotivated and rarely based on any economic analysis. None of these approaches has become widely accepted and Engle proposes a new approach to estimating time series regressions that allows for richer time variation in the regression coefficients. He calls this model Dynamic Conditional Beta (DCB).

Using the Dynamic Conditional Beta, he begins with the assumption that a set of observable variables can be described by a multivariate distribution. The objective is to characterize the conditional distribution given the observable variables. Engle notes that econometricians have developed a wide range of approaches to estimate these matrices including dynamic conditional correlations.

Using the model, Engle reports on three streams of research:

1. Estimates and tests of dynamic conditional betas, his new approach.
2. Tests of the importance of dynamic conditional betas in the cross-section of security returns.
3. The use of dynamic conditional betas in computing the amount of capital that financial firms need to hold to survive a crisis.

Engle then examines how dynamic conditional betas can be used to assess global systemic risk. He asks, how much will the total equity value of a financial firm fall when the global equity market falls? The answer, he says, is in the beta and shows plots of his DCB for a number of banks from 2008 to 2012. Those at the most risk are those with particularly high or unstable betas.

His DCB is critical in his computation of one input, LRMES, in his SRISK model. LRMES is the expected equity loss if there is another financial crisis. SRISK, is a measure of how much additional capital a bank must raise to survive a financial crisis and is defined by:

$$SRISK = k * LIABILITIES - (1 - k) * EQUITY * (1 - LRMES)$$

The k represents the capital cushion the financial institution needs to function normally.

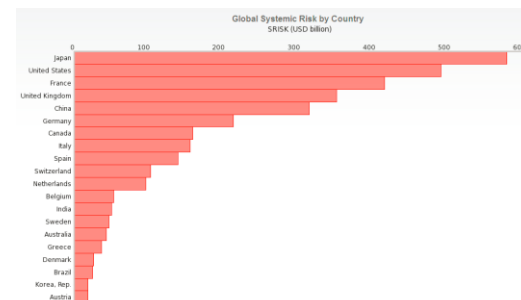
Engle demonstrates the use of SRISK model using Bank of America (BOA) as his example.

1. BOA has a market cap of \$102 billion. Its accounting liabilities are \$1.9 trillion for a leverage ratio of 20.
2. If there were another financial crisis with a fall of 40% in broad US equities over six months, he estimates shares in BOA fall by 66%.
3. The implied Dynamic Conditional Beta today for BOA is 2.5, the beta can change as a result of mean reversion in volatilities and correlations or a rise with downside returns.
4. The SRISK for BOA is \$122 billion and suggests that BOA is undercapitalized today. This undercapitalization would be more severe under the stress of an equity decline.

Engle provides an analysis for other financial institutions, some of which, he says could face bankruptcy if there were another finance crisis. The chart which follows shows aggregate SRISK for a large collection of global financial institutions for the 5 years following the 2008 financial crisis. While not now at an all-time high, the total SRISK has not yet retreated to pre-2008 levels.



He next shows that global systemic risk by country: Japan has the highest level of systemic risk followed by the US.



Surprising results, but he says systemic risk is more insightful and logical when measured relative to GDP: Cyprus is the most vulnerable, followed by Switzerland. Over the past 5 years, Engle shows, that the systemic risk for the US has declined and systemic risk in Asia has risen dramatically.

Engle concludes by saying that the big European banks have had rising betas since 2011 as the sovereign debt crisis has grown in strength. This, he says, is one piece of evidence that shows the serious nature of the current level of systemic risk. Engle argues that the SRISK is superior to stress testing and better shows the level of systemic risk in the financial system.

Global Pricing of Gold

Campbell R. Harvey
Duke University

The goal of Harvey's presentations (and the associated paper "The Golden dilemma" co-authored with Claude B. Erb) is to enhance our understanding of the role of gold in asset allocation. Discussions about gold as an investment generate an almost religious fervor. To show the nature of the debate, Harvey first quotes Warren Buffet (2012):

What motivates most gold purchasers is their belief that the ranks of the fearful will grow. During the past decade that belief has proved correct. Beyond that, the rising price has on its own generated additional buying enthusiasm, attracting purchasers who see the rise as validating an investment thesis. As "bandwagon investors join any party, they create their own truth – for a while."

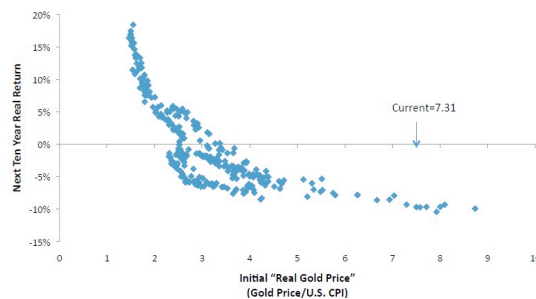
And then, Ray Dalio:

Gold is a very under-owned asset, even though gold has become much more popular. If you ask any central bank, any sovereign wealth fund, any individual what percentage of their portfolio is in gold in relationship to financial assets, you'll find it to be a very small percentage. It's an imprudently small percentage, particularly at a time when we're losing a currency regime.

In his presentation, Harvey debunks a number of myths regarding gold as an investment. He examines six different arguments for holding gold:

1. Gold provides an inflation hedge.
2. Gold is a currency hedge.
3. Gold historically generates good returns in a low real-return world.
4. Gold is a safe haven in times of stress (such as hyperinflations).
5. Gold should be owned because the world may be returning to a de facto world gold standard.
6. Gold is under-owned and hence demand and supply dynamics are compelling.

Harvey addresses each of these reasons starting with inflation and reports the strength of each using charts and graphs to illustrate his conclusions. One such chart is shown below: a scatter plot of year-to-year changes in inflation plotted against gold price changes over the 1975-2011 period. He says that the chart shows no correlation between unexpected inflation, measured by the actual year-to-year changes in the inflation rate, and the price of gold. Harvey says that any perceived relationship is driven by a single year, 1980.



To provide a very long historic context Harvey compares present day military pay to that in Rome at the time of Emperor Augustus. He uses gold as a numeraire to

compare the Roman salaries to those currently paid by the US Army.

	U.S Army Private	Roman Legionary	Growth Rate	U.S Army Captain	Roman Centurion	Growth Rate
Salary	\$17,611	\$3,704	0.08%	\$44,543	\$61,730	-0.02%
Price of Gold	\$1,600	\$1,600		\$1,600	\$1,600	
Ounces of Gold	11.01	2.31	0.08%	27.84	38.58	-0.02%

He finds there is little or no income growth in military pay over 2,000 years, and he concludes that while gold may be a good hedge over a very long time, over shorter time periods it is not.

As to whether gold is an attractive asset when returns are low, he says the likely explanation of its attraction is that when real rates are very low there is the possibility of a tail event, and a surge in the price of gold. Perhaps gold is a “safe haven” investment used for protection in “a time of stress.” If so, Harvey says, how do we define stress?

After examining each of the reasons for holding gold, Harvey concludes that:

1. Gold does not provide a hedge against traditional unexpected inflation.
2. The argument for gold as a currency hedge is really just the inflation hedge argument.
3. Gold is useful in hyperinflation and price can be very sensitive to small probabilities (e.g. tail risk).
4. Low real asset return-gold correlation is spurious.
5. The de facto gold standard argument does little to help us understand gold.

What could make a real difference is a change in demand.

1. Given limited production, a move by developing markets to hold more gold could exert substantial upward pressure on price.
2. If all investors held gold in terms of its weight in “market portfolio,”

there would be substantial upward pressure on price.

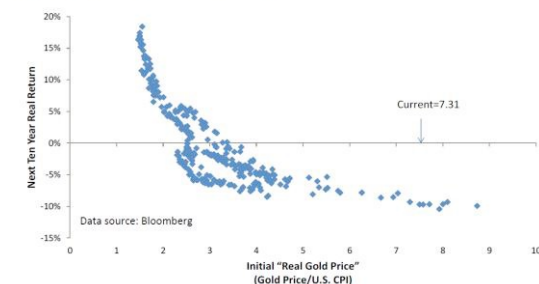
Is gold a good investment today? The exhibit below plots the real price of gold since the advent of U.S. futures trading in 1975.

Exhibit 2: The Real Price of Gold since the Advent of U.S. Futures Trading



The exhibit shows that the real price of gold is quite volatile over time, but tends to mean revert. This is further illustrated by the plot of ten-year returns in gold against the real gold price, that shows the significant negative correlation between the real price of gold and future 10-year real gold returns.

Exhibit 5: Mean Reversion of the Real Price of Gold



The current real price of gold is exceptionally high and would seem to portend lower future returns. Could this time be different? The positive arguments for gold include:

1. Given limited production, a move by developing markets to hold more gold could exert substantial upward pressure on price.
2. If all investors held gold in terms of its weight in “market portfolio,” there would be substantial upward pressure on price.

The global equity and fixed income markets have a combined market value of about \$90 trillion. Institutional and individual investors own most of the outstanding supply of stocks and bonds.

However, at current gold prices investors own only about 20 percent, or less than \$2 trillion, of the outstanding supply of gold. Since the new supply of gold that comes to the market each year has not substantially

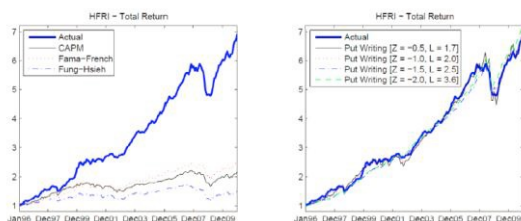
increased over the past decade, a move by individual investors to “market weight” gold in their portfolios would force nominal and real prices higher. Will prices rise based on demand, and should investors have a market weight target for gold in their portfolio? Campbell asks whether investors could achieve “market weight” even if they wanted to.

The Cost of Capital for Alternative Investments

Erik Stafford
Harvard University

Hedge fund performance before fees was very strong from 1996-2010 using standard measures of performance. Over the same time period the Fund Research, Inc. (HFRI) asset-weighted index annual return was 13.6%, the S&P500 of 8.5%, with lower total and systematic risk. While the traditional linear factor models appear to do a good job explaining the variation in hedge fund returns, Stafford argues they are poor at replicating non-local and/or extreme moves in hedge fund returns during volatile times (August 1998 and September-October of 2008).

To gain some insight into hedge fund returns, Stafford creates a low cost method to replicate hedge fund returns. He uses four different naked index put writing strategies. In contrast to most attempts to create a benchmark to replicate the risk, Stafford designs the option strategies to be mean-matching. He compares the put replication returns (to the right in the charts below) to those actual HFRI and linear model returns (shown to the left).



From the charts it is apparent that the put-writing-strategy portfolios:

1. Reliably match the mean of the hedge fund index, while linear factor models consistently produce significant mean return shortfalls.
2. Derivative based replicating portfolios produce feasible residuals that cannot be reliably distinguished from normal, while a majority of the feasible residuals from linear factor models exhibit non-normality.

Stafford discusses seven reasons, in two categories, that hedge funds might have downside exposure similar to the naked put writing strategies:

1. Economic:
 - a. Long only index investor: the index is exposed to downside shocks.
 - b. Merger arbitrage: the probability of deal failure increases following large market declines.
 - c. Convertible arbitrage: the options embedded in convertible securities are exposed to downside shocks.
 - d. Credit: implicit options of credit sensitive securities are exposed to downside shocks.
 - e. Distressed investing: the margin of safety of distressed investments can be eroded by severe market downturns.
2. Institutional:
 - a. Funds with outside capital: investors are likely to be

liquidity constrained after downside shocks and withdraw funds.

- b. Funds using a broker's balance sheet and short-term financing: capital funding, terms, and requirements are highly sensitive to extreme market moves as the broker's financial condition is related to short-term downside shocks.

In the case of investments with downside exposure, the magnitude of the required returns is large relative to those implied by linear models. An accurate assessment of the cost of capital, Stafford says, is fundamental to the efficient capital allocation throughout the economy and investors in alternatives are not exempt.

Using the put-writing strategy, net of fees, investors in equity-related hedge fund strategies have essentially covered their cost of capital, as shown in the following table. He notes one caveat: in practice, many investors have realized lower returns

than those in the survivorship biased indices he examined.

Required Rates of Return for Downside Risks

Panel B: Investor Alphas		
	HFRI Composite	Put Writing
Realized excess return	6.3%	10.2%
CAPM Required Return	3.1%	3.1%
Alpha	3.2%	7.1%
t-statistic	(1.6)	(3.7)
Model Required Return (Risk Tolerant)	5.3%	5.3%
Alpha	1.0%	4.9%
t-statistic	(0.5)	(2.6)
Model Required Return (Endowment)	7.5%	7.5%
Alpha	-1.2%	2.7%
t-statistic	(-0.6)	(1.4)

Stafford concludes:

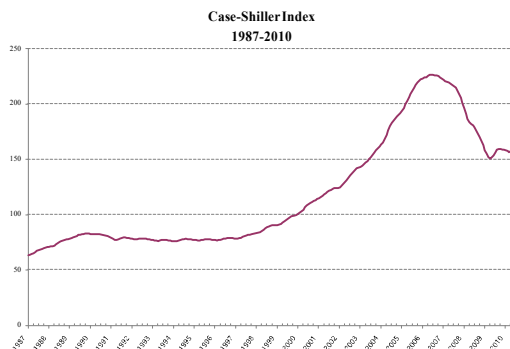
1. The results show that linear factor models tend to understate the cost of capital when assets have non-linear payoffs and allocations are large.
2. The HFRI broad hedge fund index has not generated returns that have reliably exceeded the cost of capital.
3. The put writing strategies show returns above the cost of capital of 4.9% per annum for risk tolerant investors and 2.7% per annum for endowment investors.

Housing and the Macro Economy

Karl Case
Wellesley College

Karl Case was the evening dinner speaker at the 2013 Spring Q-Group Meeting. His long history in history in real estate research and his collaboration with Robert Shiller in creating the well-known Case-Shiller Home Price Index gives him a wealth of history to share. The evidence demonstrates both reasons for optimism and continuing concern.

The precipitous decline in housing prices that began in 2007 slowed and then ended towards the end of 2009. Since then, housing prices seem to have stabilized with prices being similar to those that existed in 2003 and 2004. The following chart tracks housing prices from 1987 through 2010.



The turning point in housing price declines coincides with the improvement in Gross Domestic Product.

The following chart shows the date of the home price peak in a number of markets and the loss from that peak.

S & P Case-Shiller Index – Through January 2012
Released March 27, 2012

Metro Area	Peak	% ↓ Since Peak	% ↓ Last Year	% ↓ from December to January	% ↓ from November to December	% ↓ 2000 to January 2012
NV-Las Vegas	Aug 2006	-61.6%	-9.0%	-0.5%	-0.8%	-9.8%
AZ-Phoenix	Jun 2006	-54.8%	1.3%	0.9%	0.8%	2.8%
FL-Miami	Dec 2006	-50.7%	-1.9%	0.6%	0.2%	38.6%
MI-Detroit	Dec 2005	-45.8%	1.7%	-1.1%	-3.1%	-31.2%
FL-Tampa	Jul 2006	-47.9%	-3.8%	-0.8%	-0.2%	24.1%
CA-Los Angeles	Sep 2006	-41.3%	-5.4%	-0.8%	-1.1%	60.8%
CA-San Francisco	May 2006	-42.5%	-5.9%	-2.5%	-0.8%	25.5%
CA-San Diego	Nov 2005	-40.6%	-5.3%	-1.1%	-0.7%	48.7%
DC-Washington	May 2006	-28.2%	-0.6%	0.7%	-1.2%	80.2%
MN-Minneapolis	Sep 2006	-34.9%	-1.8%	-0.8%	-1.2%	11.4%
WA-Seattle	Jul 2007	-32.4%	-4.0%	-0.7%	-1.3%	30.0%
IL-Chicago	Sep 2006	-35.9%	-6.6%	-1.9%	-2.0%	8.2%
OR-Portland	Jul 2007	-30.3%	-4.3%	-2.1%	-0.4%	30.0%
NY-New York	Jun 2006	-25.3%	-2.9%	-0.8%	-1.4%	61.2%
GA-Atlanta	Jul 2007	-37.4%	-14.8%	2.1%	-1.8%	-14.5%
MA-Boston	Sep 2005	-18.9%	-2.8%	-0.4%	-1.2%	47.9%
OH-Cleveland	Jul 2006	-22.4%	-3.3%	-2.0%	-1.1%	-4.2%
NC-Charlotte	Aug 2007	-19.2%	-1.0%	0.0%	-0.5%	9.8%
CO-Denver	Aug 2006	-12.4%	0.2%	-0.6%	-0.9%	22.9%
TX-Dallas	Jun 2007	-10.9%	-1.2%	-0.4%	-0.7%	12.7%
Composite-10	Jun 2006	-34.4%	-3.9%	-0.8%	-1.2%	48.4%
Composite-20	Jul 2006	-34.4%	-3.8%	-0.8%	-1.1%	35.5%

The housing bubble and bust of the past decade was not unique in history. It has happened before, most recently in the 1980s when the Greenspan Fed increased the inflow of money into the economy. That action fueled an era when house prices rose, and rose, and home owners expected them to keep rising. Home ownership became an investment with little perceived downside.

Case annually surveyed homeowners from 2003 to 2012. Through 2007 most homeowners expected high returns from home ownership. The following chart captures those expectations. It is interesting to note that expectations fell dramatically in 2008 but also turned positive again in 2009. Still, the survey shows that since 2008 expectations have moderated and homeowners do not expect the same increases in value that they anticipated from 2003 through 2006.

Q6: Expected Increase in Home Value Over the Next 12 Months

	Alameda	Boston	Milwaukee	Orange
Mean-trimmed 10%				
2003	7.6	4.4	5.5	9.4
2004	9.3	7.6	6.4	13.1
2005	9.6	6.3	6.6	8.7
2006	7.4	1.9	5.9	6.0
2007	4.9	2.9	6.1	-0.1
2008	-1.6	-0.7	2.4	-2.6
2009	2.4	2.0	1.5	0.7
2010	4.4	2.2	3.7	3.8
2011	2.3	2.3	1.7	0.3
2012	4.4	2.3	2.3	3.6

Housing starts are on the rebound. With interest rates at record lows, and prices still at 2003 levels, affordability has increased. Combined with a decline in foreclosures and distressed sales and very low vacancies levels, the housing market is well positioned for a recovery. However, these

positive indications must be balanced against a number of factors including tight credit markets, changes in the national and regional economies, possible movement in interest rates, changing demographics and potential tax law changes.

The data provided by Case sheds light and provides insight on whether we are past the debilitating decline in home prices and their impact on the overall economy and at the same time highlights the still existing concerns that might adversely impact the future of the housing market.

Horizon Pricing

Robert Korajczyk
Northwestern University

Korajczyk starts his presentation with two questions: should the assessment of risk be related and why? To provide background to the research he reviews what others have found and focuses on three potential effects that horizon can have on pricing. First, prices of certain stocks have a delayed reaction to news about systematic factors. Second, risk and risk premia estimates exhibit autocorrelation and hence seem to depend on horizon. Third, there is evidence that the investment horizon varies across investors.

Given what we know, Korajczyk says that if the investment horizon affects the measurement of systematic risk, it is sensible that it might impact risk premia. In this presentation, he examines whether short-horizon risk factors exist that explain some of the short-term cross-sectional differences in expected returns but have no impact when measured over long horizons; and whether there are long-horizon factors whose risk measured over short horizons does not explain short-term cross-sectional differences in expected returns whereas they do over long horizons.

Korajczyk uses NYSE/AMEX/NASDAQ data from 1963–2010 to unravel this horizon question. Many of the key results of the paper are summarized in the table presented below. In this table, he shows the average monthly return spread over different horizons and between decile portfolios created on the basis of five well-known systematically-priced risk factors. His factors include market (MKT); small minus large (SMB); high minus low (HML); up minus down (UMD); liquidity(LIQ). He compares the mean

return differences for horizons ranging from one-month to sixty months. From this analysis he concludes that LIQ is a short-run factor, market is a medium-run factor and HML is a long-run factor. Further he finds that neither SMB nor UMD are priced risk factors.

Horizon (q)	Market Beta Return Spread	SMB Beta Return Spread	HML Beta Return Spread	UMD Beta Return Spread	Liq Beta Return Spread	Liq Beta FF4 Alpha Spread
1	1.50 [0.58]	-1.20 [-0.35]	1.82 [0.65]	-2.74 [-1.17]	3.35 [1.73]	4.67 [2.33]
[5,6,7]	4.56 [2.34]	-1.41 [-0.48]	2.54 [1.05]	0.46 [0.23]	4.17 [2.33]	4.81 [2.63]
[11,12,13]	3.51 [1.94]	-1.13 [-0.41]	3.81 [1.69]	-0.58 [-0.29]	-0.23 [-0.14]	0.02 [0.01]
[23,24,25]	0.73 [0.39]	1.73 [0.74]	4.95 [2.29]	0.41 [0.22]	-0.68 [-0.44]	-0.83 [-0.52]
[35,36,37]	2.22 [1.14]	0.50 [0.24]	4.53 [2.17]	-0.94 [-0.48]	0.89 [0.54]	0.94 [0.55]
[47,48,49]	1.83 [0.94]	1.39 [0.65]	2.02 [1.13]	-3.04 [-1.57]	0.27 [0.17]	0.40 [0.25]
[59,60,61]	0.19 [0.09]	1.88 [0.89]	1.56 [0.81]	-2.63 [-1.44]	0.53 [0.34]	0.47 [0.30]

Further, he notes the evidence of time-varying risk premia based on variance ratio tests for the traded factors.

From this and other analysis, Korajczyk finds the following:

1. Factor risk measured at short horizons might be more relevant for more transitory factors since that may match the relevant horizon for short-horizon investors. Conversely, risk measured at longer horizons might be more relevant for other factors since that may match the relevant horizon for long-horizon investors.
2. He finds short-horizon measures of risk to be important for the pricing of liquidity. This, he says, is consistent with its more transitory nature. The premium for liquidity is significantly larger later in the sample period. This is consistent with a shift toward higher frequency trading later in the sample.
3. Long- horizon measures of risk seem to be important for the pricing

of the market and value/growth risk factors.

4. The value-versus-growth factor behaves like a characteristic when risk is measured at a monthly horizon and has both risk factor and characteristic-like behavior at longer (2- to 3-year) horizons when historical OLS betas are used.
5. HML seems to be priced as a risk factor when estimating a model that conditions betas on the various characteristics.
6. The size and momentum variables exhibit characteristic-like behavior at all horizons.

Korajczyk concludes by saying that these results highlight the importance of considering investment horizon in determining whether a cross-sectional return spread is alpha, due to a firm characteristic, or a premium for systematic risk. Some factors, he says, that are risky from the perspective of short-term investors may not be from the perspective of long-term investors, and vice versa. In particular, liquidity risk may be of particular concern for short-horizon investors while HML risk is important for long-horizon investors.

Market Expectations in the Cross Section of Present Values

Bryan Kelly
University of Chicago

Kelly starts by reminding us that until 30 years ago we thought of the equity premium as a constant. This has changed. Theory and data suggest returns move in subtly predictable ways. Although the debate continues about whether this is true, the dominant view is that equity returns are predictable. Kelly asks, “Why are EMH disciples OK with this?” To which he answers, predictable returns need not be a violation of the EMH.

Kelly posits that investors require compensation for assets that are risky. Investors, he says, demand high returns for assets that do poorly in bad times when the marginal utility of consumption is high: they demand low expected returns for assets that do well in bad times (such as Treasuries or OTM puts). When risks change in a predictable way, he says the compensation investors require should change as well. This sets up Kelly’s key thought, if risk is predictable, so are returns.

Kelly notes that there have been three major approaches taken in trying to predict aggregate market returns: historical analyses which assume the unconditional returns distribution in the future will look like the returns distribution in the past; theoretical calibrations based on preference-based models; what he calls leading indicator models that combine theory with historical data.

One of the primary examples of leading indicator models are those based on such aggregate valuation ratios such as book to market, price to dividend, and price to earnings.

While these models have shown modest predictive ability in-sample, Kelly finds they have negative R-squares out-of-sample. Thus, the predictive information has a negative impact.

Kelly argues that much more powerful predictive models can be constructed by exploiting the information in the cross-section of asset-specific valuation ratios. He says the intuition is that the same state variables that drive aggregate returns expectations also govern the dynamics of thousands of asset-specific valuation ratios. He posits that the richness of the cross-section of these asset-specific valuation ratios can be exploited in a smart way to generate a super predictor of future stock market returns. Using this, Kelly proposes using market valuation ratios to predict market returns.

Kelly uses Partial Least Squares, an easily implemented OLS-based approach, to estimate the latent factor that is optimal for forecasting. Rather than one thing to make the predictions, he forms what he calls a “super predictor,” from the weighted average of all the predictors. He then creates predictions by applying PLS to the cross section of:

1. Portfolio level book to market ratios.
2. Stock level book to market ratios.
3. Stock level moving average price ratios.
4. Country level book to market ratios.

He then predicts:

1. Aggregate US market returns for 1 month and 1 year.
2. Aggregate US cash-flow growth for 1 year.
3. Characteristic-sorted US portfolio returns for 1 month and 1 year.
4. World index returns (ex-US).

He relates the estimated returns to macro-economic variables. The results of this analysis are shown in the following chart.

Kelly concludes that the expected returns from his model:

1. Significantly outperform previous attempts to predict market returns.
2. Possess sensible correlations with suspected macroeconomic drivers of discount rates.

Estimated Expected Returns and Macro Variables

	One Year		One Month	
	Corr.	t	Corr.	t
Macroeconomic Activity				
IP Growth	-10.3	-2.6	-11.5	-2.9
GDP Growth	-7.8	-1.1	-7.6	-1.1
CFNAI	-3.6	-0.8	-11.2	-2.6
Unemployment	41.2	11.2	32.1	8.4
Agg. book-to-market	65.7	21.5	55.6	16.5
Surp. Cons. Ratio	-8.3	-2.1	-6.8	-1.7
CP Recession	8.9	2.0	16.5	3.8
SPF Recession	19.9	2.6	21.4	2.8
Macroeconomic Uncertainty				
GDP Gr. Volatility	28.1	4.1	32.5	4.8
SPF Uncertainty	43.2	6.1	36.5	5.0
Uncertainty Index	17.2	2.4	23.6	3.4
Cons. Gr. Volatility	28.5	7.4	18.5	4.7
Sentiment				
Index	-26.8	-6.5	-21.4	-5.1
Index (orth.)	-22.7	-5.4	-18.1	-4.3
IPO Volume	-17.9	-4.5	-21.1	-5.3
Equity New Issues	-32.3	-8.4	-33.6	-8.8
Closed-end Discount	31.7	7.8	27.0	6.5
Credit				
Baa-Aaa Spread	31.2	8.1	21.9	5.5
Term Spread	-0.8	-0.2	-2.9	-0.7

No News is News: Do Markets Underreact to Nothing?

Kelly Shue
University of Chicago

Shue asks whether, absent news, the passage of time contains information and whether the market incorporates this information. To illustrate the point she references the Sir Arthur Conan Doyle quote: “The dog did nothing in the night time ... that was the curious incident.” She mentions other examples where the absence of news implies information:

1. A citizen who lives through a sustained period without terrorist attacks should update positively on the government’s anti-terrorism programs effectiveness.
2. A manager who observes that an employee has executed a difficult task without incident should update the employee’s quality positively.

“No news” also can be news in many financial contexts. For example, if:

1. A firm does not lay off workers or declare bankruptcy after a macroeconomic shock, investors should update positively on the firm’s underlying strength.
2. A firm repeatedly fails to announce new investment projects, investors may be justified in updating negatively on the firm’s growth prospects.
3. Investment returns that seldom display newsworthy variation can reveal information about the underlying investment or, if overly consistent, may be suggestive of fraud, as in the case of Bernie Madoff’s investment fund.

In this talk, Shue uses the context of mergers to examine whether markets fully incorporate the information content of “no news.” Mergers provide a convenient empirical setting for the analysis because each merger has a defined starting date, the announcement date, and the returns to merger arbitrage depend heavily on a definitive and stochastic ending point.

If markets fully incorporate this information, expected returns should be sufficient to compensate for the probability of a failed merger and reward investors for the use of their capital. In particular, Shue says, there is no reason for hazard rates and realized rates of return to be strongly related. However, Shue describes finding a strong relation between the hump shape of the hazard rates and the hump shape of mean merger arbitrage returns - with cash financed mergers earning a mean return of 20bp per week in the first weeks after a merger announcement. Returns peak at 40bp per week around event week 25, and then decline sharply over time.

Shue posits two possible explanations for the findings. First, she suggests that the positive correlation between returns and hazard rates can be explained by a behavioral model in which the agents underreact to the passage of time. If agents do not fully appreciate the variation in hazard rates associated with the passage of time, they will behave as if hazard rates are less time-varying (flatter) than they are. The second plausible explanation is that it is a rational reaction to changes in risk or trading frictions over time.

After controlling for other kinds of risk, Shue concludes that event time variation in selling pressures and asymmetric information are unlikely to explain the observed returns patterns. Shue concludes that aggregate hazard rates of merger completion predict merger returns because markets underreact to the information content of the passage of time. Importantly she finds under reaction is concentrated in the subset of deals with lower liquidity and higher transaction costs, suggesting that trading frictions prevent sophisticated investors from arbitraging away the mispricing.

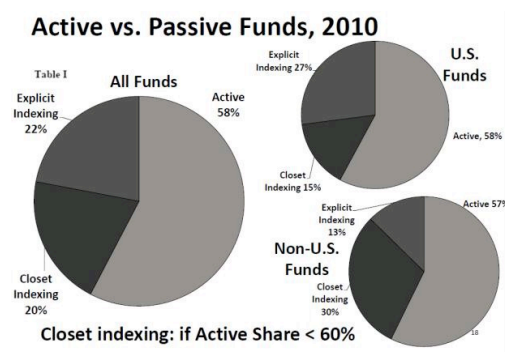
Shue goes further when she concludes that evidence of under-reaction in mergers markets also is suggestive of a more general phenomenon in which agents underreact to the passage of time because it is often less salient than explicit news stories. Under reaction to no news can be persistent, and can potentially exacerbate asymmetric information problems in many other contexts. As to future research, she wants to explore the extent to which under reaction to no news pervades other contexts such as the interactions between voters and politicians, managers and employees, or investors and insiders.

The Mutual Fund Industry Worldwide: Explicit and Closet Indexing, Fees, and Performance

Martijn Cremers
University of Notre Dame

Mutual funds have become one of the primary investment vehicles for households worldwide over the last half century. As of December 2010, there were nearly 28,000 equity funds with \$10.5 trillion in assets under management (AUM). Index funds have been an increasingly important low-cost alternative to actively managed stock funds. By 2010 they accounted for 22% of AUM worldwide. Cremers reports on his study of whether increased competition from passively managed funds globally increases competition and efficiency in the mutual fund industry. In particular, he wonders whether this change pushes active funds to increase their product differentiation, lower their fees, and whether it has led to improved performance.

In the United States, the market share of index funds and ETFs has grown from 16% of AUM in 2002 to 27% in 2010. In other countries indexing is much less prevalent, but has grown from 6% in 2002 to 13% in 2010. Although the amount of explicit indexing is small outside of the U.S., Cremers finds that closet indexing is close to 30%, twice the level of closet indexing in the U.S. The 2010 breakdown is depicted below.



Cremers says that the rise of explicit and closet indexing globally raises some important questions:

1. What explains the existence and growth in market share of passive funds?
2. What could have spurred that growth: regulation; competition; market development?
3. What impacts have passively managed alternatives had on active funds?
4. Have low-cost alternatives put pressure on active funds; how has the performance impacted that of low-cost alternatives and active funds.
5. How passive are the passive funds?

Before discussing the methods he used to answer these questions, Cremers previews some findings.

1. In markets with more low-cost explicit index funds, active funds deviate more from their benchmarks, charge lower fees, and deliver higher returns.
2. Outside the most developed markets there is little explicit indexing but considerable closet indexing.

In his research Cremers uses information from the Lipper Hindsight and Factset/Lionshares databases to create a sample of 11,776 funds with \$7.9 trillion total net assets (TNA) from 32 countries. The sample contained global, regional, country and sector funds from 2002-2010. Cremers reports that only 22%

of TNA were explicitly indexed worldwide in 2010, and only 13% of them were explicitly indexed outside the US. Switzerland had the highest proportion of explicitly indexed funds at 80%. While a low proportion of funds are explicitly indexed, Cremers notes that in most countries investors cannot invest in index funds with their attendant lower fees funds, however, many active fund managers are effectively closet indexers charging active fees. To determine which funds were closet indexers, he used a measure he developed previously, Active Share: the share of portfolio holdings that differ from the benchmark index holdings.

Cremers determined that there were three things that explain indexing in a particular market:

1. More stringent standards.
2. A larger fund industry.
3. More liquid and developed stock markets.

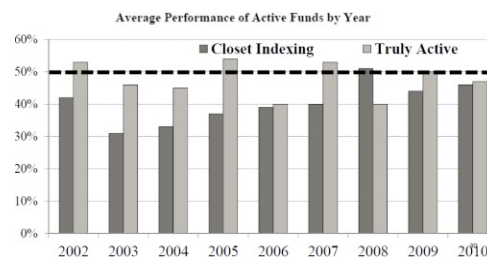
As an illustrative example, Cremers compares the domestic funds benchmarked to the Madrid SE stock index to the domestic funds benchmarked to the S&P 500. He notes that there are about 75 domestic Spanish funds in the sample. The average Active Share of those funds is 37%. The average market cap of the stocks in those funds is about \$630MM, and there are roughly 150 stocks in the Spanish universe. This contrasts with over 200 U.S. active funds in the sample with an average Active Share of 70%. There are over 9,000 stocks in the U.S. universe and average market cap is \$14.6BB.

In his sample of funds, Cremers finds that the competitive pressure from indexing makes active funds:

1. Deviate more from benchmark and have a higher Active Share.
2. Charge lower fees.
3. Deliver higher returns.

Outside the most developed markets there is little explicit indexing but considerable closet indexing, as in those markets, active funds tend to charge higher fees.

The chart below depicts the difference in performance between closet indexers and truly active funds.



The chart shows that in four of the nine years, slightly more than 50% of the active funds outperformed their benchmarks whereas in all years well below 50% of the closet indexers outperformed their benchmarks - in large part due to their high fees.

Overall, he says that it is clear that explicit indexing improves the levels of competition and efficiency of the mutual fund industry in a country.

Duration Targeting: A New Look at Bond Portfolios

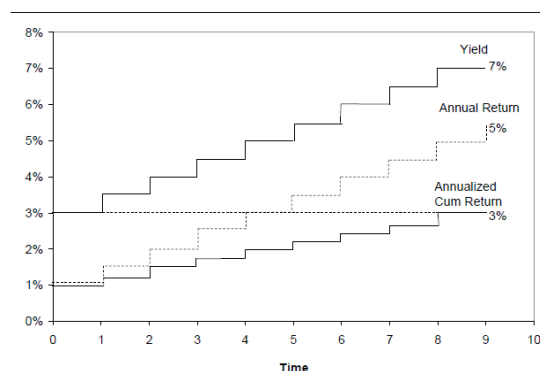
Martin Leibowitz, Morgan Stanley
Stanley Kogelman, Advanced Portfolio Management

Almost all bond portfolio managers control interest rate risk through a Duration Targeting (DT) process. As bonds age and interest rates shift, managers typically maintain, either explicitly or implicitly, a specific duration target through periodic portfolio rebalancing. Not only are most bond portfolios characterized by DT, but most fixed income indices also have very narrow duration ranges and hence are effectively targeted. Despite the wide use of either explicit or implicit DT in building and managing portfolios, the full implications of this strategy generally have been underappreciated.

In previous work, Leibowitz [with Bova] found that as the portfolio's holding period approaches its "effective maturity" the volatility of cumulative returns dramatically decreases such that the starting yield exerts a "gravitational pull" on returns. This robust convergence pattern is the result of the balance between price changes and accruals and it exists whether yields are rising or falling although it is important to note that the accrual component of returns is highly path dependent. For a bond portfolio with a five-year duration, the effective maturity is about nine years. For investors who hold a five-year duration targeted portfolio for nine years the effective duration - the annualized return of that portfolio converges to the starting yield.

To illustrate how yield changes impact returns, Leibowitz provides a simple example. You first buy a five-year pure discount bond at the beginning of the first

year. At the end of the year you sell it at the fair market price using the proceeds to buy a new five-year bond. Over the 9-year period yields on a 5-year zero rate bonds rise 50 bp per year. The final yield is 7%. The graph below plots the scenario over its life.



As annual rates increase the bond price declines. At the same time the annual rate of return increases and the capital losses on the bonds are offset by the higher rates on the new bonds and reinvestment. The excess accruals build over time and offset the series of price losses such that the bond ends up earning its initially promised 3% yield, but over the longer effective maturity.

Using an analytic expression for the excess return over any path, Leibowitz refers to another paper where he showed that the effective maturity for a trend line-based DT path is equal to twice the target duration minus one: the effective maturity depends only on the duration and is independent of the size and direction of the yield changes.

Leibowitz said that the theoretical model

developed to represent this convergence effect has generally stood up well in a series of tests involving simulation-based yield paths derived from Monte Carlo simulations, and with historical constant maturity Treasury and investment grade corporate debt data.

In conclusion he says that these findings have a number of investment implications:

1. The DT process is far more widespread than generally recognized.
2. A DT bond portfolio has a much lower multi-year volatility than generally believed.
3. Over an appropriate horizon, depending only on the duration target, the annualized mean return will converge to the starting yield, subject to a modest standard deviation.
4. In scenario analysis, the TL formula can provide a reasonable estimate for the return to a given terminal yield.
5. In an asset allocation framework, the overall fund level volatility contributed by the bond component will generally be far less than that derived from a standard mean/variance model.
6. For DT investors who are content with the current yield levels, the convergence properties suggests that they need not be overly worried about the impact of higher rates on their multi-year returns.
7. DT investors committed to a fixed duration target should not count on the prospect of higher or lower yields to augment their multi-year return above the current level of yields.

Is The World Stock Market Co-Movement Changing?

N. K. Chidambaran
Fordham University

Research Supported by The Q-Group

One characteristic of the 2008 Financial Crisis was the dramatic shift to high correlations between asset prices worldwide. Diversification strategies designed to shield the investor from risk did not work as all asset prices fell. This was shocking, but was it transitory? Chidambaran says that the increase in worldwide market co-movement may be more than transitory: capital market liberalization and the expansion of free trade agreements have ushered in a tremendous increase in world trade and capital flows since the mid-1990s. This leads to increased cross-country investments and a demand for portfolio diversification beyond what is available within the home market. These forces could drive individual national stock markets, traditionally segmented by national boundaries and regional agglomeration, to increasingly co-move.

Chidambaran says there are four questions to answer about co-movement:

1. Has co-movement been changing over time?
2. If there has been an increase in co-movement, is this temporary or the new reality in global markets?
3. Do stocks in emerging countries co-move with those in developed countries?
4. Is the co-movement investor driven or firm cash flow driven?

The answers to these questions are important and can impact international investment diversification strategies. Low co-movement supports diversification and creates opportunities in international sourcing of capital. However, if

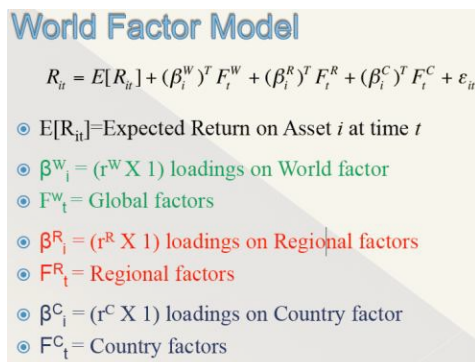
co-movement is high, diversification is difficult.

Chidambaran notes that there are two essential aspects to any study of co-movement. First, measures of co-movement depend upon the model used to measure them. Second, if there is a change in levels of co-movement, there must be a way to understand its cause. In particular, if co-movement is assumed to be driven by world events, testing procedures need to allow for structural breaks in long-term relationships.

At the heart of international stock co-movement studies is the identification of the correct factor model for each country and whether there is a common world factor. Two approaches have commonly been used to examine the stock returns across countries in a segmented world: 1) an extended version of the Fama-French model; and 2) an APT style factor model with principal components as factors.

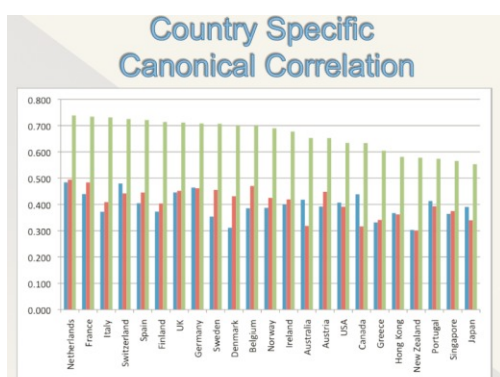
Both approaches, Chidambaran says, are biased and misstate factors that are common across all countries. This is largely due to the fact that world capitalization is skewed toward the US and Japan, leading to bias when using value-weighting and equal-weighting in estimating the common world market proxy. After showing the bias using simulation, he develops a Weighted-Generalized Canonical (W-GCC) method that identifies the factors and is free from value-weighting and equal-weighting biases. Chidambaran identifies a set of Principal Components that explain variation of returns in each country using the W-GCC to identify the “Canonical Variates” that are highly

correlated across all countries. His model is shown below.



Factors that are not common, he says, are either regional or country-specific factors. He examines all countries simultaneously to identify the common drivers of returns. He uses a weighting process that improves on the efficiency of the methodology in the presence of confounding effects of regional and country factors.

Using weekly stock returns data from 23 countries in the Morgan Stanley Index from 1981 to 2010, Chidambaran finds that stock price co-movements are stable through the mid-1990s and then increased to a high of 70% by 2010. He calculates the country specific canonical correlations as shown below:



He says that co-movement is largely driven by a common world market factor and co-movement from regional factors is small and decreased to negligible levels by 2010. There are no differences between the co-movement of small and large stocks and the bias in the model is less important in recent times when world co-movement of developing and emerging countries has soared to over 70%.

To understand the source of co-movement and co-movement change he studies the co-movement of the Chinese A (Chinese investors only) and Chinese B (open to non-Chinese investors) stock markets as they have different investor bases. The Chinese B stock market shows a dramatic increase in co-movement over the time period while the Chinese A stock market does not. This suggests to him that co-movement is more likely driven by investment cash flows.

In conclusion he says that integration, relative to the world factor is increasing in developed and emerging countries. Structural breaks are related to economic innovations, and, by 2010, world markets are well integrated, less segmented across country lines, more segmented by sub-groups of stocks and are driven by investor flows across boundaries.