EQUITY
Methodology Overview

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OVERVIEW

What is This Document?

> "We understand that some of our insights will never find their way into products, but we provide them in support of investors and the finance community."
>
> — **ROB ARNOTT**
> CHAIRMAN & CEO

This is one in a series of plain-language white papers setting forth Research Affiliates' building block approach to developing long-term capital market expectations by asset class. (For information about the objectives and guiding principles of our asset allocation initiative, please refer to "Capital Market Expectations: Methodology Overview," the first of these white papers.) In working out our risk and return forecasts and making them publicly available, we keep three criteria in mind: transparency, robustness, and timeliness. By describing the conceptual framework and calculations behind the projected asset class risks, returns, and correlations in these papers, we hope to achieve a meaningful level of transparency without excessive details. By constructing simple, economically sound models for major asset classes, we strive to achieve a fitting standard of robustness for forecasting to a 10-year horizon. By initially refreshing our expectations on a quarterly basis, we seek to provide information that is updated with useful frequency. We will continue to refine our methods, extend the scope of our capital market expectations, and improve this documentation over time. The remainder of this document addresses how we think about equity returns from a building block perspective, and provides transparency into the methods employed to develop these return expectations.

Time Horizon

One of the major considerations when embarking on the journey to generate asset class return expectations is the consideration of time horizon. Because the focus here is on generating capital market expectations for strategic asset allocation, and not tactical overlays, a significantly long time horizon of 10 years was selected.

The 10-year time horizon is not meant to imply a 10-year buy-and-hold strategy, but instead incorporates a strategy consisting of asset classes each with a constant duration target. Said another way, for asset classes with shorter durations (e.g., fixed income), these asset classes need to be periodically rebalanced to maintain the constant duration. The rebalance period chosen here is one year which means that a two-year bond, for example, will be held for one year, at which time the bond with one year remaining to maturity would be sold and the proceeds are used to purchase a new two-year bond. Asset classes with significantly long duration (e.g., equities) can be considered buy-and-hold because the change in duration from the passage of 1, 2, or even 10 years on these types of assets is minimal.

Equity

Asset Class Overview

Equity securities represent a major asset class, and, like debt instruments, they provide a way for corporations to raise capital. People who own these securities do not enjoy the highest claim on company earnings; their claims are subordinated to creditors' claims, and the owners of equity securities enjoy distributions from earnings only after the creditors' higher priority claims are satisfied. Today there is a seemingly countless number of equity securities and indices. Research Affiliates currently covers a select set of approximately 30 diversified indices, and the methodology used in the creation of their forecasts can easily be extended to a broader array of equity indices.

TABLE 1

Developed Market Representative Indices

1	U.S. Large Cap	S&P 500
2	U.S. Small Cap	Russell 2000
3	Australia	MSCI Australia
4	Canada	MSCI Canada
5	France	MSCI France
6	Germany	MSCI Germany
7	Hong Kong	MSCI Hong Kong
8	Italy	MSCI Italy
9	Japan	MSCI Japan
10	Spain	MSCI Spain
11	Sweden	MSCI Sweden
12	Switzerland	MSCI Switzerland
13	United Kingdom	MSCI UK

Source: Research Affiliates

TABLE 2

Emerging Market Representative Indices

1	Brazil	MSCI Brazil
2	China	MSCI China
3	India	MSCI India
4	Indonesia	MSCI Indonesia
5	Malaysia	MSCI Malaysia
6	Mexico	MSCI Mexico
7	Poland	MSCI Poland
8	Russia	MSCI Russia
9	South Africa	MSCI South Africa
10	South Korea	MSCI South Korea
11	Taiwan	MSCI Taiwan
12	Thailand	MSCI Thailand
13	Turkey	MSCI Turkey

Source: Research Affiliates

TABLE 3

Composite Representative Indices

1	All Markets	MSCI ACWI
2	Developed Markets	MSCI World
3	Europe	MSCI Europe
4	Dev ex-NA Equity	MSCI EAFE
5	EM Equity	MSCI Emerging Markets

Source: Research Affiliates

Tables 1-3 represent only a small portion of the entire universe of equity indices, and the indices identified aren't the only indices available to represent these countries or regions. For regional and global composites, indices are first modeled country by country, and then combined with each country's current weight in the composite to derive the aggregate return forecast.

Expected Return Methodology

The goal of this modeling framework is to provide a set of mutually exclusive and cumulatively exhaustive components with which to collectively capture drivers of return. As discussed in the corollary methodology overview document, equity returns can be decomposed into a set of building blocks:

1. Income Return

2. Earnings Growth

3. Multiple Expansion[1]

Accordingly, it should come as no surprise that the components used in forecasting equity returns, although named differently, are nearly identical to the decomposition components as described in Grinold and Kroner (2004).

$$\text{Equity Return} = \text{Current Dividend Yield} + \text{Real Earnings Growth} + \Delta\text{Valuation} + \text{Currency Adjustment}$$

The first component, current dividend yield, has proven to be the one reliable component of stock ownership over the last two centuries. It represents the means by which long-term investors earn much of their internal rate of return (Arnott and Bernstein, 2002). The second component is real earnings growth or, conceptually, the portion of a country or region's economic growth in which index constituents participate. In the absence of changes in equity multiples, using the current dividend yield plus a small premium for real earnings growth creates a reasonably accurate measure of future stock index returns.

The third component is change in valuation. Value-oriented investors have always asserted that valuation multiples indicate whether a stock market is over- or undervalued (Campbell and Thompson, 2008). Under the commonly held assumption that valuation multiples are mean-reverting, high multiples (and correspondingly low dividend yields) should lead to lower future returns and vice versa. The final component represents currency returns available through unhedged foreign investments.[2]

YIELD

In this model, the easiest part of forecasting real stock returns is the dividend yield: It's a known fact. The assumption is that current dividend yield is "fair" and is an unbiased estimator of future yields.

$$\text{Dividend Yield} = \frac{\text{Dividend Per Share}}{\text{Price}}$$

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[1] *This component includes expansion/contraction of valuation multiples as well as the second-order interaction of growth and multiple expansion.*
[2] *See the "Domestic and Foreign Cash Methodology" document for details on currency return modeling and forecasting.*

While simple to "forecast" because it is readily observable, the current dividend yield is no less important than the other components of equity return expectations. Moreover, the conventional view is unfounded: It is not the case that equities derive most of their returns from capital appreciation and that income is far less important, if not irrelevant. (Arnott and Bernstein, 2002) In fact, from 1802–2010, 75% of the real return on equities came from the dividend yield, clearly making this component a significant contributor to overall return. Over the last 140 years, the average annual dividend yield in the United States has been 4.4% (see **Table 4**). Over the last 30 years, however, the dividend yield has fallen to less than half that value.

TABLE 4

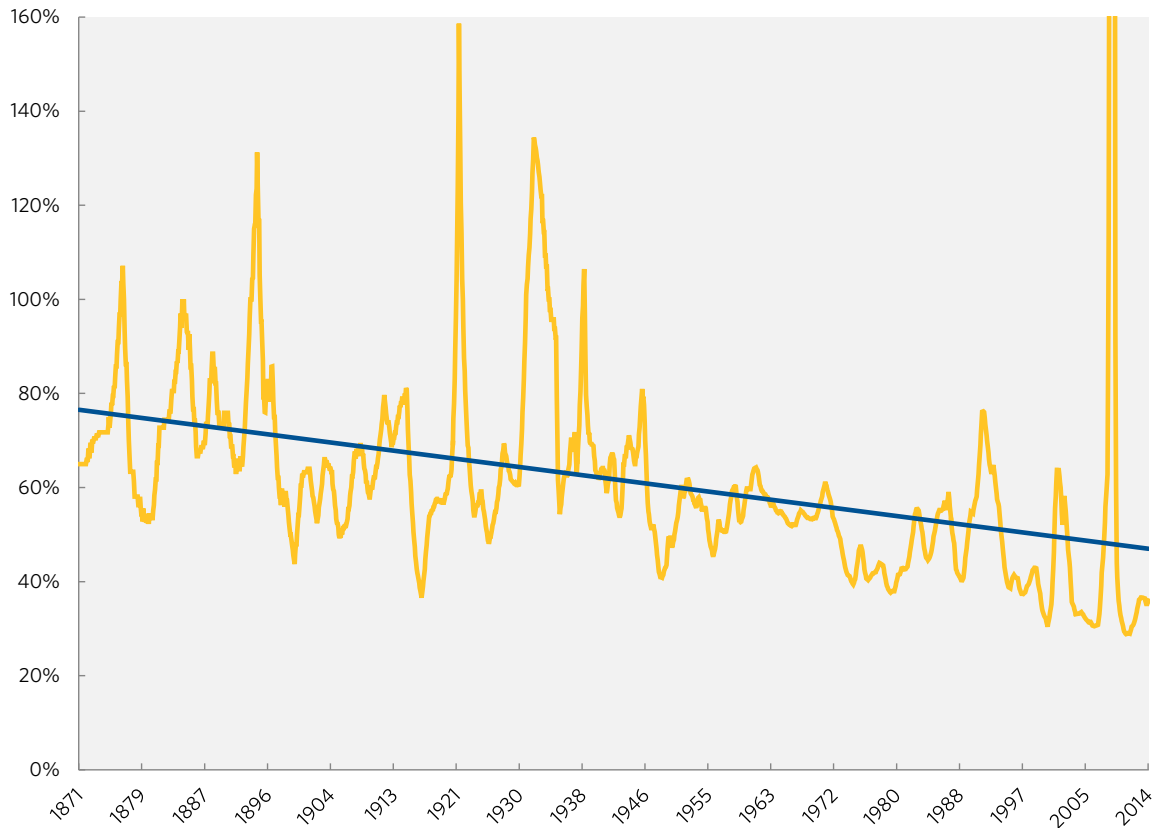*S&P 500 Real Dividend Yield Over Time*

Time Period	Average Dividend Yield
1871 – 2013	4.43%
1900 – 2013	4.24%
1930 – 2013	3.87%
1960 – 2013	3.04%
1990 – 2013	2.10%

Source: Research Affiliates, based on data from the Robert Shiller Database

Since 1990, both real prices and real dividends per share have increased, but prices have grown at a faster rate. This has lead to multiple expansion, a topic which is covered later in this document. For now it's important to realize that, although dividends per share have risen, they are growing at a slower rate than earnings per share, due to a consistently shrinking payout ratio (see **Figure 1**).

FIGURE 1

S&P 500 Payout Ratio

Source: Research Affiliates, based on data from the Robert Shiller Database

A natural assumption is that the reduced payout ratio, and correspondingly increased retained earnings, lead to higher and higher future growth rates; however, it has been shown that, in fact, the opposite is true. Lower payout ratios do not lead to higher future growth (Arnott and Asness, 2003). Therefore, with history as a guide, a low current dividend yield should imply lower than historically realized future returns.

GROWTH

It is instructive to take a top-down view of growth. Many long-run index-level forecasts ignore the fact that there is an inherent upper bound to aggregate earnings (and dividend) growth, because neither can sustainably grow faster than the economy as a whole over the long-term. Even an investor in the broad public equity market cannot capture total economic growth for a variety of reasons.
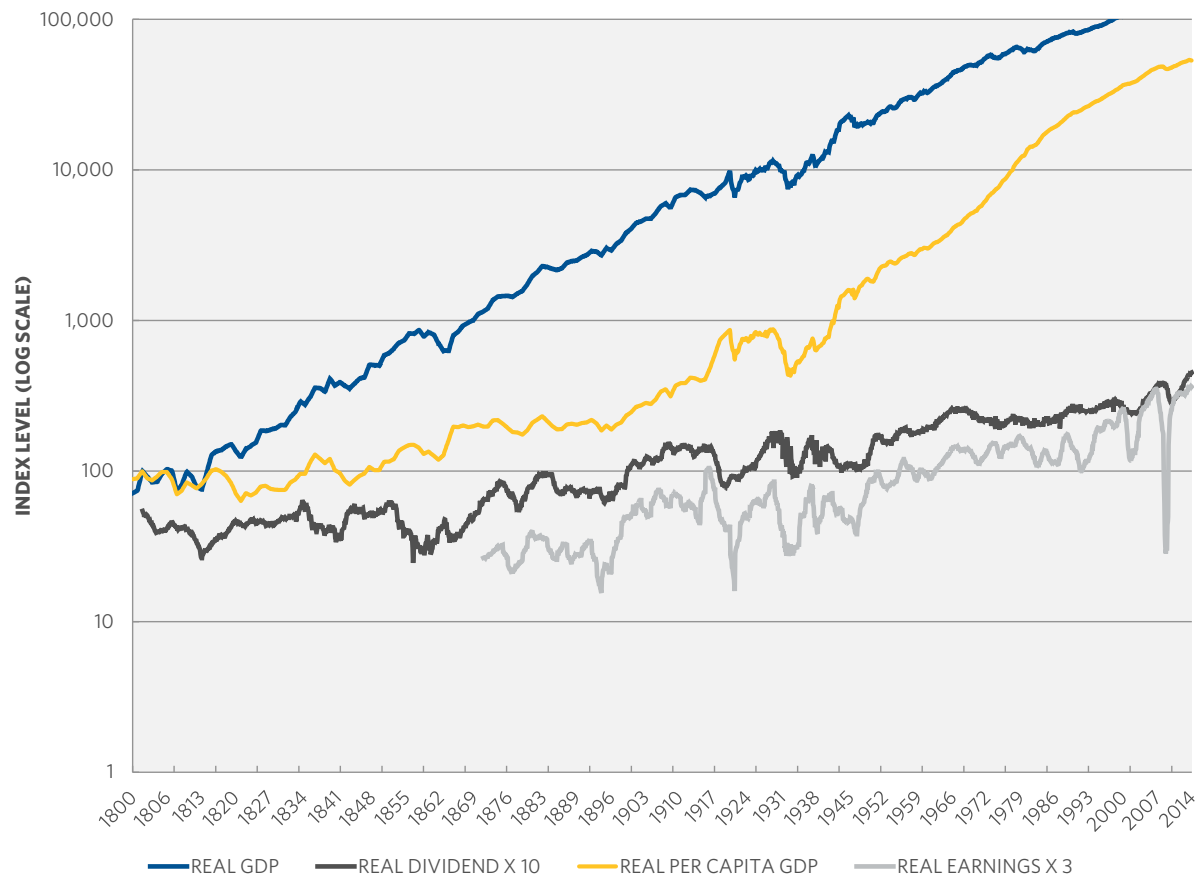
First, more than half of aggregate economic growth comes from new ideas that lead to the creation of new enterprises, not from the growth of established enterprises. As an example, more than half the market capitalization of the Russell 3000® Index consists of enterprises that did not exist 30 years ago (Arnott and Bernstein, 2002). Additionally, an investor in today's public enterprises cannot access the contribution to economic growth delivered

by current or future private enterprises, at least not without making a separate investment of new capital.

Furthermore, what is important to an investor is not aggregate earnings growth, but earnings per share (EPS) growth. EPS has historically had a much lower growth rate than aggregate earnings (Bernstein and Arnott, 2003). If no new shares were created, earnings per share would grow at the rate of aggregate earnings. However, entrepreneurial capitalism leads to new enterprises and new share issuance, so per-share earnings and dividends must grow more slowly than the economy as a whole.

FIGURE 2

Real Earnings and Dividend Growth vs. GDP & Per Capita GDP (January 1800 to June 2014)

Source: Research Affiliates, based on data from Global Financial Data, Ibbotson, and Bloomberg
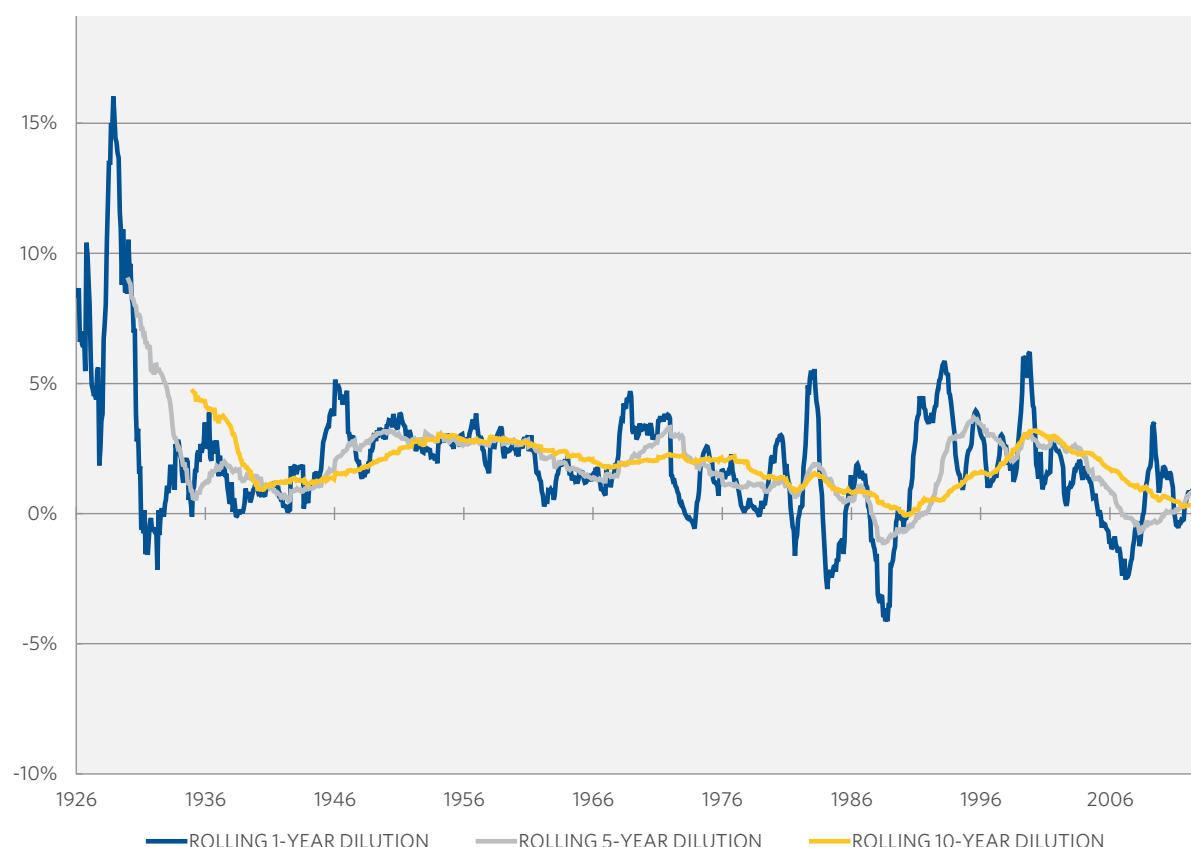
As seen in **Figure 2**, it's clear that earnings and dividend growth have always been meaningfully slower than overall economic growth. In fact, during the 20th century, growth in dividends was 2% slower than underlying macroeconomic growth (Bernstein and Arnott, 2003). The growth of earnings and dividends more closely tracks per capita GDP, albeit with some clear slippage. In fact, the history of dividend growth shows no evidence that dividends have ever grown materially faster than per capita GDP. This shortfall in dividend growth is the steadiest characteristic of any of the components of real stock returns. The difference between the growth rates of dividends

and per capita GDP has never been positive on a sustained long-term basis, and has never risen above 10 bps for any 40-year span since 1810 (Arnott and Bernstein, 2002).

We attribute the shortfall in dividend and earnings growth relative to per capita GDP to two predominant issues. First, corporate growth usually leads to more shares outstanding as management either capitalizes new technologies or engages in "pirate capitalism," whereby they compensate themselves with equity. This natural ongoing capitalization has reliably produced a net dilution of shares outstanding of slightly more than 2% a year (Bernstein and Arnott, 2003). As **Figure 3** demonstrates, since 1925, rolling 1-, 5-, and 10-year dilution measures have been reliably positive.

FIGURE 3

Annualized Rate of Shareholder Dilution, 1926–2013

Source: Research Affiliates, based on data from CRSP

While sufficient buybacks could allow earnings and dividends per share growth to exceed both productivity and overall economic growth, those who claim it will happen (or has happened) can draw scant support from history. The 10-year average net dilution line in the Figure 3 dips negative (i.e., buybacks exceed issuance) exactly once, by a minimal 0.1% per annum in mid-1991 (Bernstein and Arnott, 2003). Given a dependable history of positive net dilution, a continued drag on the growth in earnings and dividends per share relative to per capita GDP is expected.

The second reason for the shortfall in dividends and EPS growth relative to per capita GDP is management's record of chasing poor reinvestment opportunities. Consistent with the notion of fungible capital, the return on capital reinvested in an enterprise should match the return an investor might have earned on that same capital if it had been distributed as a dividend. In reality, however, retained earnings are often not invested at a return that rivals externally available investments, but are instead reinvested in projects or assets that fail to deliver appropriate internal rates of return.

Largely reflecting poor management decisions, the impact of net share issuance is substantial. In the United States, since 1871, the average earnings yield has been 7.5% while the average dividend yield has been 4.4%, meaning the average retained earnings yield has been around 3%. This should have led to real earnings and dividend per share growth of 3%. Instead, real dividends and earnings per share grew at 1.2% and 1.5%, respectively, approximately half the expected levels (Arnott and Bernstein, 2002).

Sluggish earnings and dividend growth aren't the only drags on traditional capitalization-weighted indices. They are also burdened by rebalancing losses which unavoidably result from the operational rules by which indices periodically reconstitute themselves. For example, consider a large-cap index. During reconstitution, the index will select a preset number of the largest companies by market capitalization. The smallest firms from the previous year are often replaced during this process because other firms are now larger. The stocks that are dropped from the index will commonly be "fallen angels" with depressed prices and elevated dividend yields. The fallen angels will be replaced by newcomers to the roster of large companies, which are typically high-flying growth stocks with high valuation multiples and low dividend yields. This is similar to buying high and selling low, and, predictably, many of the newly added companies then underperform in relation to the dropped firms. From 1983 to 2010, the average rebalancing drag for a 23-country basket of large-cap global market indices was 0.43% per year (Arnott and Chaves, 2012). Small-cap indices suffer a similar effect as measured by Cai and Houge (2008).

All of this information is brought together in the methodology used to forecast earnings per share growth.[3]

$$\text{Earnings Growth} = \text{Median}_{across\ countries}\left[\frac{1}{2}\times\left(\frac{E_{10YrAvg}}{P} - \frac{D_{10YrAvg}}{P}\right)\right] - \text{Rebalancing Effect}$$

The growth forecast is derived by first taking the difference between the 10-year smoothed earnings yield (average 10-year earnings divided by price) and the 10-year smoothed dividend yield (average 10-year dividends divided by price). Earnings and dividends are averaged over 10 years to incorporate two business cycles without anchoring too firmly on recent trends. This historical smoothed retained earnings yield resulting from the foregoing operation is then cut in half to reflect the long-term relationship between retained earnings and future growth. Although each of these calculations is done at the country level, small inter-country differences cannot be distinguished from noise. Therefore, the median growth across similar markets (e.g., developed markets and emerging markets) is used for all markets in that group. Finally, an additional haircut is included to reflect the measurable rebalancing effect in cap-weighted indices.

VALUATION

Change in valuation, also known as multiple expansion or contraction, is the final equity return component to forecast. The basis for modelling this component comes from the fact that, historically, valuation ratios have been

[3]As of 2014, earnings growth in developed markets is forecasted to be 1.4%, consistent with long-term U.S. historical EPS growth. A common critique of the described methodology has been that long-term historical repurchases may not be a good measure of prospective repurchases as buybacks have been dramatically increasing since the mid-1980s. In addition to the broad market data presented in this text, consider that the average rate of buybacks between 1998 and 2009 was 2.2% (Grinold, Kroner, and Siegel, 2011).

Many firms are forecasting real GDP growth in the 2.0% range for the forseeable future. Subtracting a population growth estimate of 0.8% from the United Nations' 2012 Population Estimates and Projections results in per capita real GDP growth of 1.2%. Adding the average level of buybacks from 1998–2009 (2.2%), and subtracting average dilution of 2% and a rebalance drag of 0.20%, results in an EPS growth estimate of 1.2%, not radically different from the 1.4% estimate.

negatively correlated with subsequent returns (i.e., high [low] starting P/E ratios are correlated with low [high] future returns). It has also been shown that the implied predictability of returns becomes more significant at longer horizons (Campbell and Thompson, 2008).

The cyclically adjusted price-to-earnings ratio (also known as CAPE or Shiller P/E), popularized by Yale professor Robert Shiller, is the cornerstone of the repricing forecasts. The Shiller P/E arose from the observation that one-year earnings are: (a) highly volatile, (b) affected by short-run considerations, and (c) likely mean-reverting. Shiller argues that the widespread use of the one-year P/E ratio is "an unfortunate convention recommended by tradition and convenience rather than any logic" (Shiller, 1996). He chose instead to use the average of the prior 10 years of real earnings in the denominator. Shiller points out that the idea of the CAPE ratio was conceived many decades before he adopted it. As long ago as 1934, Benjamin Graham and David Dodd wrote that for the purpose of examining such ratios, one should use an average of earnings of "not less than five years" and preferably "seven or ten years" (Shiller, 1996).

It would be difficult to find a theoretical argument favoring the use of 10 years rather than a different averaging period, like 7 or 15 years. Ten years was intuitively chosen because it not only smoothed out earnings cyclicality, but also spanned two business cycles without going too deeply into the distant past (Asness n.d.). Put simply, instead of using a one-year P/E ratio to determine what an investor is willing to pay for a historically volatile earnings profile, the Shiller P/E ratio states what an investor would pay for the steadier average of the last 10 year's real earnings.

As shown in **Table 5**, the long-term Shiller P/E of the S&P 500 Index is roughly 16.5. At the time of this writing, the CAPE ratio shows prices are nearly 26 times smoothed earnings, indicating the S&P 500 is expensive relative to its historical average and therefore expected to decrease at some point in the future.

TABLE 5
S&P 500 P/E Over Time

Time Period	Simple Average CAPE	Log Average CAPE
1871 – 2013	16.5	15.3
1900 – 2013	16.4	15.1
1930 – 2013	17.5	16.2
1960 – 2013	19.5	18.0
1990 – 2013	25.3	24.4

Source: Robert Shiller Database

For modeling purposes, the current CAPE ratio is measured against a target CAPE ratio to determine if a market is over- or undervalued. For markets with a long history, like the United States, the historical average CAPE ratio is a reasonable reversion target. For other markets with significantly shorter histories, a justifiable reversion target is more difficult to create, particularly when 10 years of earnings data is needed to derive a single Shiller P/E observation. To address this issue, a target CAPE ratio is built using the formula below which can be used for different countries.

$$\text{Country Target CAPE} = \frac{1}{3} \times \text{Country}_{Avg} + \frac{1}{3} \times \text{Region}_{Avg} + \frac{1}{3} \times \text{World}_{Avg}$$

In this formula, the country average is the historical average CAPE ratio of the country itself, the regional average is a weighted average CAPE ratio for a set of like countries (e.g., developed markets or emerging markets), and the world average CAPE ratio considers all countries. There are benefits to creating the target CAPE using this methodology. First, it enables the formation of long-horizon reversion expectations for countries with shorter earnings histories by anchoring to the historical experience of similar countries.[4] At the same time, it still accounts for the cross-sectional differences in average multiples supported by each country, many of which can vary based on the sectoral composition of each country's index, among other things.
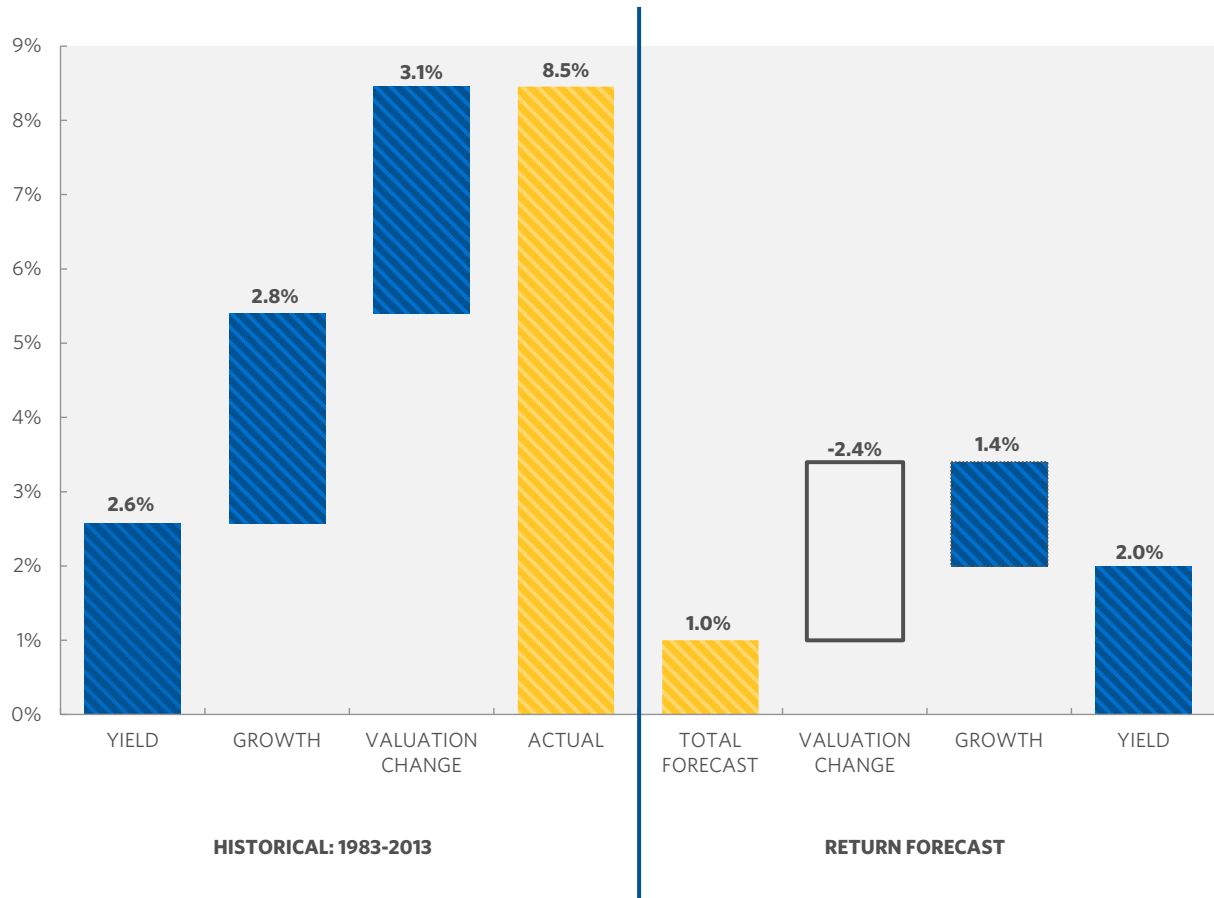
The final step in deriving the expected change in valuation comes from choosing the time horizon over which the current CAPE ratio will revert to its long-term target. Because the implied predictability of returns from valuation ratios is higher at longer forecast horizons, the reversion to the target CAPE ratio is assumed to be halfway accomplished over 10 years. Said another way, the current CAPE ratio is assumed to fully revert to its long-term target over 20 years.

Results

Putting this all together, **Figure 4** shows the realized annual decomposition of returns over a 30-year period from 1983 to 2013 versus the forecast for the next 10 years. From the figure, the future looks much different than the past with an expected difference of 7.5% in total real return. Most of this difference comes from a slower growth rate and the expectation of multiple contraction versus the expansion realized over the past 30 years.

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[4]*Countries are weighted based on the market capitalization of the indices used to model each country.*

FIGURE 4

Realized vs. Forecasted Real Returns

Source: Research Affiliates, based on data from Bloomberg

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All projections provided are estimates and are in U.S. dollar terms, unless otherwise specified. Given the complex risk-reward trade-offs involved, one should always rely on judgment as well as quantitative optimization approaches in setting strategic allocations to any or all of the above asset classes. Please note that all information shown is based on qualitative analysis. Exclusive reliance on the above is not advised. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Note that these asset class and strategy assumptions are passive only–they do not consider the impact of active management. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell any securities, commodities, derivatives or financial instruments of any kind. Forecasts of financial market trends that are based on current market conditions or historical data constitute a judgment and are subject to change without notice. We do not warrant its accuracy or completeness. This material has been prepared for information purposes only and is not intended to provide, and should not be relied on for, accounting, legal, tax, investment or tax advice. There is no assurance that any of the target prices mentioned will be attained. Any market prices are only indications of market values and are subject to change.

Hypothetical or simulated performance results have certain inherent limitations. Unlike an actual performance record, simulated results do not represent actual trading, but are based on the historical returns of the selected investments, indices or investment classes and various assumptions of past and future events. Simulated trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. Also, since the trades have not actually been executed, the results may have under or over compensated for the impact of certain market factors. In addition, hypothetical trading does not involve financial risk. No hypothetical trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or to adhere to a particular trading program in spite of the trading losses are material factors which can adversely affect the actual trading results. There are numerous other factors related to the economy or markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical performance results, all of which can adversely affect trading results.

The asset classes are represented by broad-based indices which have been selected because they are well known and are easily recognizable by investors. Indices have limitations because indices have volatility and other material characteristics that may differ from an actual portfolio. For example, investments made for a portfolio may differ significantly in terms of security holdings, industry weightings and asset allocation from those of the index. Accordingly, investment results and volatility of a portfolio may differ from those of the index. Also, the indices noted in this presentation are unmanaged, are not available for direct investment, and are not subject to management fees, transaction costs or other types of expenses that a portfolio may incur. In addition, the performance of the indices reflects reinvestment of dividends and, where applicable, capital gain distributions. Therefore, investors should carefully consider these limitations and differences when evaluating the index performance.

No investment process is risk free and there is no guarantee of profitability; investors may lose all of their investments. No investment strategy or risk management technique can guarantee returns or eliminate risk in any market environment. Diversification does not guarantee a profit or protect against loss. Investing in foreign securities presents certain risks not associated with domestic investments, such as currency fluctuation, political and economic instability, and different accounting standards. This may result in greater share price volatility. The prices of small- and mid-cap company stocks are generally more volatile than large-company stocks. They often involve higher risks because smaller companies may lack the management expertise, financial resources, product diversification and competitive strengths to endure adverse economic conditions.

Bond prices fluctuate inversely to changes in interest rates. Therefore, a general rise in interest rates can result in the decline of the value of your investment. High-yield bonds, also known as junk bonds, are subject to greater risk of loss of principal and interest, including default risk, than higher-rated bonds. Investing in fixed-income securities involves certain risks such as market risk if sold prior to maturity and credit risk especially if investing in high-yield bonds which have lower ratings and are subject to greater volatility. All fixed-income investments may be worth less than original cost upon redemption or maturity. Income from municipal securities is generally free from federal taxes and state taxes for residents of the issuing state. While the interest income is tax-free, capital gains, if any, will be subject to taxes. Income for some investors may be subject to the

federal alternative minimum tax (AMT).

There are special risks associated with an investment in real estate, including credit risk, interest-rate fluctuations and the impact of varied economic conditions. Distributions from REIT investments are taxed at the owner's tax bracket.

Hedge funds or alternative investments are complex, speculative investment vehicles and are not suitable for all investors. They are generally open to qualified investors only and carry high costs and substantial risks and may be highly volatile. There is often limited (or even nonexistent) liquidity and a lack of transparency regarding the underlying assets. They do not represent a complete investment program. The investment returns may fluctuate and are subject to market volatility so that an investor's shares, when redeemed or sold, may be worth more or less than their original cost. Hedge funds are not required to provide investors with periodic pricing or valuation and are not subject to the same regulatory requirements as mutual funds. Investing in hedge funds may also involve tax consequences. Speak to your tax advisor before investing. Investors in funds of hedge funds will incur asset-based fees and expenses at the fund level and indirect fees, expenses and asset-based compensation of investment funds in which these funds invest. An investment in a hedge fund involves the risks inherent in an investment in securities as well as specific risks associated with limited liquidity, the use of leverage, short sales, options, futures, derivative instruments, investments in non-U.S. securities, junk bonds and illiquid investments. There can be no assurances that a manager's strategy (hedging or otherwise) will be successful or that a manager will use these strategies with respect to all or any portion of a portfolio. Please carefully review the Private Placement Memorandum or other offering documents for complete information regarding terms, including all applicable fees, as well as other factors you should consider before investing.

Buying commodities allows for a source of diversification for those sophisticated persons who wish to add commodities to their portfolios and who are prepared to assume the risks inherent in the commodities market. Any purchase represents a transaction in a non-income producing commodity and is highly speculative. Therefore, commodities should not represent a significant portion of an individual's portfolio. Buying gold, silver, platinum and palladium allows for a source of diversification for those sophisticated persons who wish to add precious metals to their portfolios and who are prepared to assume the risks inherent in the bullion market. Any bullion or coin purchase represents a transaction in a non-income-producing commodity and is highly speculative. Therefore, precious metals should not represent a significant portion of an individual's portfolio.

Trading foreign exchange involves a high degree of risk. Exchange rates between foreign currencies change rapidly do to a wide range of economic, political and other conditions, exposing one to risk of exchange rate losses in addition to the inherent risk of loss from trading the underlying financial product. If one deposits funds in a currency to trade products denominated in a different currency, one's gains or losses on the underlying investment therefore may be affected by changes in the exchange rate between the currencies. If one is trading on margin, the impact of currency fluctuation on that person's gains or losses may be even greater.

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