

# *Long-Term Market Return Estimates*

## **Our Research Commitment**

The charter of the Schwab Center for Financial Research is to provide high-quality, objective research to help investors make better decisions.

## **Overview**

In the late 1990s, many investors got used to seeing double-digit returns on their investments. When the calendar turned, however, the only thing many investors saw in double digits was their losses. Markets that fluctuate to this extent have made it difficult for investors to plan their financial future. A sound financial plan serves as the roadmap to reaching long-term financial destinations, but to get there, you need one key piece of information—reasonable estimates of what long-term returns might be.

If, for example, your return estimates are too optimistic, you run the risk of not being able to retire on time or pay for your children's higher education. Similar to the axiom "garbage in, garbage out," you can't use unrealistic assumptions to determine realistic outcomes, and this is especially true when developing your long-term financial plan.

Having said that, the Schwab Center for Financial Research helps you focus on minimizing the 'garbage in' aspect by providing reasonable long-term return expectations, not just for stocks, but also for bonds and cash investments.

## **Key Findings**

- Large-cap stocks are estimated to return about 7.4 percent per year over the long run, while mid/small-cap and international stocks are estimated to return about 8.7 percent and 7.4 percent, respectively. Bonds are estimated to return about 3.6 percent, while cash investments are estimated to return around 2.4 percent.
- Investors may want to revise their financial plans based on these new long-term return estimates, which are significantly below their historical average returns as measured from 1970 to 2008.
- Stocks are still the investment that has the greatest potential for growth (and the greatest risk to principal), even though future stock returns may not be as high as they have been historically.
- While it's always a good idea to focus on avoiding unnecessary fees and taxes, it's even more important to do so in an environment of single-digit returns.

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### **The Importance of Establishing Reasonable Expectations**

Having reasonable long-term return expectations for your investment portfolio is critical. Not only are they an important component in determining your strategic asset allocation—the target mix of stocks, bonds and cash in your portfolio that’s right for you—they also are essential input into the financial-planning process, as they help you assess the likelihood of meeting your planned objectives.

#### **Long- vs. Short-term Return Forecasts**

For some investors the strategic asset allocation can serve as a starting point to make shorter-term tactical changes to their asset allocation. For example, an investor may target a long-term, strategic allocation of 50 percent stocks and 50 percent bonds. Depending on the market environment, the investor may want to temporarily favor stocks over bonds, or vice versa. Continuing with the example, suppose that the investor thinks that the stock market is currently undervalued. The investor may choose to act on this belief by temporarily adjusting her current allocation to, say, 60% stocks and 40% bonds.

The process of making these shorter-term changes is called tactical asset allocation. These temporary shifts generally occur when estimates of short-term returns deviate from long-term estimates. Short-term return estimates are typically based on current economic and market conditions, whereas current conditions are not as relevant for estimating long-term returns. When it comes to meeting your long-term goals, however, choosing an appropriate long-term, strategic asset allocation is more important than making short-term, tactical bets.

Some people argue that investors should focus exclusively on short-term returns and short-term asset allocation because it’s difficult to accurately estimate long-term returns. The problem is that it’s equally difficult to accurately estimate short-term returns! The fact is, however, that many, if not most, investors have long-term goals, such as retirement. These investors need reasonable long-term return estimates to help them determine how much money they’ll need to fund their retirement lifestyle, and in turn, how much they’ll need to save. For this reason, the focus of this study is on long-term returns.

#### **What is a ‘Long-Term’ Horizon?**

There is no consensus regarding what constitutes long-term, other than that it is generally more than 10 years. For this research, we use a 20-year time horizon, although return estimates over 15- and 30-year horizons are expected to be similar to the 20-year estimates. This provides a good tradeoff between picking a time horizon too close to intermediate-term (i.e., 10 years), and using an extremely long time horizon (i.e., 50 years), in which we have less confidence developing expectations.

#### **The Dangers of Using Unrealistic Estimates**

The power of compounding has been championed as a way of building long-term financial wealth. The basic premise is that in upward-trending markets you can reinvest investment proceeds that, in turn, provide additional investment returns, accelerating wealth accumulation over time. As the table on the next page illustrates, compounding also magnifies the distortions caused by using unreasonably high (or low) return expectations on estimates of future wealth, especially over long-term investment horizons.

## The Power of Compounding Errors

8 percent vs. 12 percent

		End-of-Period Wealth Estimate*	
Scenario	Return Assumption	5-Year Horizon	20-Year Horizon
Realistic	8 Percent	\$14,700	\$46,600
Overly Optimistic	12 Percent	\$17,600	\$96,500
	Percentage Error	20%	107%

\* Numbers are rounded to the nearest hundred.

The table highlights the end result of using an overly optimistic long-term return estimate over 5- and 20-year time horizons on an initial \$10,000 investment. For the 5-year horizon, the ending wealth estimate is 20 percent higher when using the overly optimistic rate, while the ending wealth estimate for the overly optimistic scenario is more than double the realistic scenario (107%) over the 20-year period.

These results underscore the effect that unrealistic return expectations can have on your assessment of future wealth, especially over the long term. Planning your financial roadmap based on too-high estimates may lead you to believe you have adequately planned for your retirement or other critical goals when, in fact, you haven't. Planning on too-low estimates can be problematic too, since doing so may cause you to sacrifice more of your current lifestyle than needed to meet your long-term goals.

### Long-Run Asset-Class Return Estimates

Given the results highlighted in the table above, it's easy to see just how important it is to use realistic long-term estimates when working on your financial plan. This study provides return estimates for five asset classes: large- and mid/small-capitalization stocks, international stocks, bonds, and cash investments. The appendix lists

the benchmark indexes used to represent each asset class and provides details about how historical return series representing each asset class were created.

Our return estimates contain two parts: a current risk-free rate component that is the same for all asset classes, and an asset-class premium that varies by each asset class because of differences in expected risk.

**Return Estimate =**

**Current Risk-free Rate + Asset Class Premium**

The current risk-free rate is estimated by directly observing Treasury yields in the marketplace during the past 12-month period. As we are estimating returns over a 20-year time horizon, the risk-free rate is measured as the yield of a 20-year U.S. Treasury bond, which averaged 4.2 percent using monthly observations from April 2008 to March 2009.

The asset-class premium is where the action is, as it accounts for differences in return estimates across asset classes. The asset-class premium measures the incremental return (either higher or lower—generally higher for the equity asset classes and lower for the fixed-income asset classes) demanded by investors for investing in that asset class as opposed to a risk-free bond.

## Long-term Inflation Estimate

The current risk-free rate can be further broken down into inflation and inflation-adjusted (i.e., removing the effect of inflation) interest-rate estimates. Inflation estimates are useful when developing wealth projections because they provide a more accurate measure of future purchasing power. The 20-year inflation estimate is derived by comparing the yield of 20-year TIPS (Treasury Inflation Protected Securities) to the yield of U.S. Treasury Bonds of the same maturity. The yield on a conventional Treasury bond must compensate the investor for the expected decrease in purchasing power associated with inflation. Buyers of inflation-protected securities require no such compensation because interest and principal payments are indexed to inflation. T-bonds and TIPS of the same maturity should offer the same inflation-adjusted return because the U.S. Treasury backs both of them. If this were not the case, savvy bond-market investors would buy the security with the higher inflation-adjusted yield, causing its price to adjust, and resulting in both securities offering the same inflation-adjusted yield. Therefore, the yield difference between conventional treasuries and TIPS of the same maturity represents an estimate of the inflation rate expected by market participants. Using 12 monthly yield spread observations from the past year (as of March 2009), this approach resulted in a long-term inflation estimate of roughly 1.8 percent per year for the next 20 years.<sup>1</sup>

<sup>1</sup> An alternative to this approach is to use statistical models and historical data to develop inflation estimates. These estimates, however, are often highly variable and rely heavily on numerous assumptions, making them highly suspect. Our approach prefers the use of directly-observable market yield spreads instead.

## Methodology for Estimating Asset-Class Premiums

### *Equity Asset Classes*

The asset-class premium for large-cap stocks is called the Equity Risk Premium (ERP), which measures the relative attractiveness of large-capitalization stocks versus a risk-free bond. It also serves as the starting point for estimating the asset-class premium for mid/small-cap stocks, as well as international stocks.

There are two primary ways of estimating the ERP. One common way is to take the historical difference in returns between stocks and risk-free bonds and extrapolate it forward, while the other way relies on fundamental data, such as dividends, earnings, GDP growth, and valuation levels.

### *Comparison of Approaches Used to Estimate the ERP*

The valuation approach uses financial theory to estimate stock market returns and the ERP. As a general rule, it requires estimates of dividend yields and future dividend and earnings growth or, alternatively, GDP growth. The primary criticism of this

approach is that it's very difficult to forecast variables such as dividends, earnings, or GDP growth over the short-run, let alone over long horizons. As such, long-term return forecasts estimated using this approach are highly suspect.

The historical-return approach is based on the realization that it's difficult, if not impossible, to forecast long-run stock market returns using current market or economic conditions. Since current market information is generally not a useful predictor of the long-run ERP, the basis of the historical-return approach is that the best estimate of the future ERP is the historical average ERP calculated over a long history.

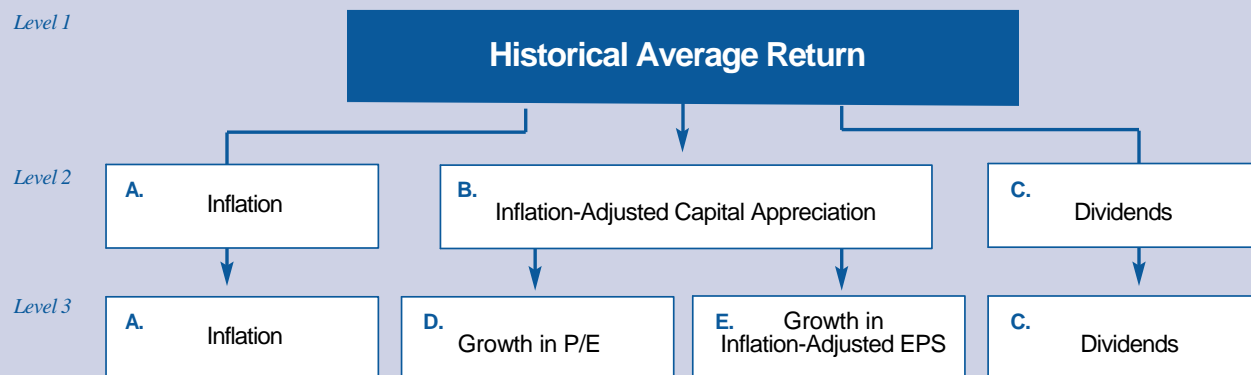
The primary criticism of the historical-return approach is that realized returns over a particular time period can differ, sometimes dramatically, from what was expected. As such, blindly extrapolating these returns into the future can result in unreasonable estimates.

## The Sources of Stock Market Returns

The approach adopted in this study addresses this criticism.<sup>2</sup> To better understand it, we first break down the sources of average returns for large-cap stocks. In doing so, we gain a better understanding of where the

historical returns come from. In other words, we look ‘under the hood’ to help determine which components of average returns may be expected to repeat in the future and, more importantly, which ones may not.

### Decomposition of the Average Returns for Large-Cap Stocks



As you can see, there are three levels in the decomposition.

**Level 1:** Level 1 starts with the return on large-cap stocks, which was about 9 percent compounded annually over the 1926 to 2008 time period.<sup>3</sup> This return is broken down into three primary components in level 2: inflation (A), returns derived from capital appreciation after inflation (B), and returns derived from dividends (C).

**Level 2:** Historical Average Return = A + B + C

The inflation-adjusted capital appreciation component (B) can be broken down into two additional pieces — growth in the historical price-to-earnings ratio (D) and growth in inflation-adjusted earnings per share (E). This is shown in Level 3

**Level 3:** Historical Average Return = A + D + E + C  
Plugging in the historical averages for large-cap stocks into Level 3 yields the following return decomposition:<sup>4</sup>

Historical Average Return  $\approx$  3.0% + 0.8% + 1.3% + 4.0%

In other words, the historical average return on large-cap stocks was approximately comprised of a 3% inflation return, 2.1% in inflation-adjusted capital appreciation that can be further broken down to roughly 0.8% from growth in the P/E ratio and 1.3% growth in inflation-adjusted earnings per share, and 4% from return on dividends.

<sup>2</sup> It is consistent with the approach developed in Ibbotson & Chen, 2003, “Long-Run Stock Returns: Participating in the Real Economy,” Financial Analysts Journal, Volume 59, Number 1, 88-98

<sup>3</sup> Indexes are unmanaged, do not incur management fees, costs, or expenses and cannot be invested in directly.

<sup>4</sup> The symbol  $\approx$  means approximately equals. The decomposition does not exactly equal the total return due to an approximation used to simplify the illustration.

In researching the sources of historical returns, one phenomenon that shouldn't be expected to repeat in the future is the substantial growth in the P/E ratio, amounting to a roughly 0.8% per year average return. This return did not come from earnings growth. Instead, it represents an expansion of the P/E ratio, or what the market was willing to pay for every dollar in earnings, over the 1926-2008 time period. There are a number of possible reasons why the P/E ratio expanded over the 1926 -2008 time period, including higher expectations for future earnings, and less return demanded by investors for holding stocks, either due to the lower costs required to obtain a diversified stock portfolio or investors' increased comfort with stock investing. Regardless, it's not realistic to think that such an expansion will occur again. As a result, we do not include the 0.8% attributed to P/E growth (D) when estimating future returns.

### ***The Equity Risk Premium***

Removing the expansion in the P/E ratio of the 1926-2008 time period results in an adjusted historical return on large-cap stocks equal to the following components:

$$\text{Adjusted Historical Return} = A + E + C$$

$$\text{Adjusted Historical Return} \approx 3.0\% + 1.3\% + 4.0\%$$

The adjusted historical-return number is not our estimate of future returns, as it reflects historical interest rates and inflation. It is used to estimate the Equity Risk Premium. Specifically, we take the adjusted historical return on large-cap stocks and subtract from it the historical income return provided by the risk-free asset (proxied by the Ibbotson 20-Year Government Bond Index) of about 5.2 percent.<sup>5</sup> This produces an ERP estimate of about 3.2 percent, compounded annually.<sup>6</sup>

### ***Mid/Small-Cap***

When estimating the asset-class premium for mid/small-cap stocks, we use the ERP as the starting point, and then make adjustments based on the unique risk level for the mid/small-cap asset class relative to the overall stock market. To do this, we first adjust the ERP, which is the asset-class premium of large-cap stocks, to reflect the premium for the overall stock market. We accomplish this by estimating the historical sensitivity, or 'beta', of overall stock market returns to large-cap stock returns. This beta of 1.01 is then multiplied by the ERP of 3.2% to obtain the asset-class premium for the overall stock market. The result is an asset-class premium for the overall market of just about 3.2 percent.

We then use this overall market premium to assist with estimating the mid/small-cap premium. Specifically, we multiply it by the historical sensitivity between mid/small-cap stock returns to overall stock market returns of 1.4.<sup>7</sup> This results in a mid/small-cap asset premium of about 4.5 percent.

### ***International Stocks***

Data limitations prevent us from analyzing the sources of historical returns for international stocks. As such, we explore two alternate approaches for estimating the international asset-class premium. The first uses the domestic stock market asset-class premium as an 'anchor' in developing the international equity premium. This approach has two steps, where the first step is to estimate the world ERP, which is the return above the U.S. risk-free rate demanded by investors holding a world-stock portfolio. This is estimated by dividing the domestic stock market asset-class premium by the historical sensitivity of domestic stock returns to world stock market returns of 0.94.

In the second step, the world ERP is multiplied by the historical sensitivity of international market returns (excludes U.S. Stocks) to world market returns (includes U.S. Stocks) of 1.03. This results in an asset-premium estimate for the international asset class of just under 3.6 percent.

This approach assumes that domestic and international stock markets are integrated. That is, it assumes that there are no barriers to financial flows, and the same risk asset commands the same return, irrespective of country. In addition, the approach relies heavily on sensitivities between domestic and international returns that prove to be relatively unstable over time. As an alternative, the international asset-class premium is estimated by taking the historical difference in returns between international and domestic stocks, which results in an estimate of about 2.8 percent.

The historical asset-class premium is substantially less than the estimate that uses the domestic ERP as an anchor. Which approach is better? Unfortunately, at the present time we have no overwhelming theoretical or empirical basis to choose one or the other method, as both are reasonable. Having said that, our estimate of the international asset-class premium is the equal-weighted average of the two estimates, or about 3.2 percent.

### ***Fixed Income Asset Classes***

The asset-class premium for bonds consists of two parts, a horizon premium and a default premium, while the asset-class premium for cash investments consists only of a horizon premium. The horizon premium estimates the return differential derived from holding bonds with a maturity other than a

20-year time horizon. It's negative for bonds with less than a 20-year horizon. The default premium estimates the extra return demanded for investing in corporate and mortgaged-backed securities.

The horizon premium is measured as the historical difference in monthly *income* returns between two government bonds, with the maturity of the first bond matching that of our asset-class benchmark<sup>8</sup> and the maturity of a second bond matching the assumed time horizon of 20 years. The default premium for bonds is measured as the historical difference in monthly *total* returns between the Barclays Capital Aggregate Bond Index and a government bond maturity-matched to the Barclays Capital Aggregate Index.

For cash investments, the asset-class premium equals the cash horizon premium, which is approximately -1.8 percent. For the bonds asset class, the bond horizon and default premiums result in a net asset class premium of -0.6 percent.

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<sup>5</sup>When measuring the historical performance of our risk-free proxy, we use income returns instead of total returns. Income returns are derived from the cash coupon received from holding a fixed-income instrument. We use income returns for the risk-free asset because it provides a better estimate of what investors expected to receive for holding these bonds to maturity.

<sup>6</sup>The rounded 3.2% can also be calculated by subtracting the 5.2% historical income return and the 0.8% historical return from the growth in P/E from the 9.3% return on large-cap stocks over the 1926-2008 time period.

<sup>7</sup>Another approach is to directly estimate the sensitivity of the asset class to large-cap stocks. We don't do this, however, due to data limitations. Specifically, historical benchmark returns for large-cap stocks prior to 1957 are from Wilson and Jones (2002). (See the appendix for more details.) They provide returns on an annual basis. But we prefer to follow common practice and use monthly data, whenever possible, to estimate betas because doing so increases the accuracy of the estimate.

<sup>8</sup>Approximately seven years for the bond asset class and three months for cash investments.

Summary of Long-term Return Estimates							
Asset Class	Annual Compound Return Estimate	=	Current Risk-free Rate	+	Asset-Class Premium	Historical Annual Compound Return (1970 -2008)	Ratio of Expectation to Historical Average
Large Stocks	7.4%		4.2%		3.2%	9.5%	.78
Mid/Small Stocks	8.7%		4.2%		4.5%	9.9%	.88
Intl Stocks	7.4%		4.2%		3.2%	9.0%	.82
Bonds	3.6%		4.2%		-0.6%	8.4%	.43
Cash Investments	2.4%		4.2%		-1.8%	6.0%	.40
Inflation	1.8%					4.5%	

### Summary of Long-term Return Estimates

The table above summarizes the annual long-term return estimates for the five asset classes, along with an inflation estimate. It also includes the annual historical average returns for the 1970-2008 period, based on benchmark proxies for the asset classes (see appendix). The return estimates for all asset classes are lower than their respective historical averages. This is due, in part, to lower inflation expectations compared to that seen historically, along with the impact of estimating no expansion in the P/E ratio going forward for the equity asset classes. To put this comparison in perspective, we report, in relative terms, how much lower the estimates are when compared to their respective 1970-2008 averages. While the return estimate for large stocks is about three-quarters its 1970-2008 average, the return estimates for bonds and cash investments are much lower (less than half). This is because the return estimates for

bonds and cash investments are consistent with the level of current and expected interest rates observed in the market during the twelve months ending March, 2009. These levels are much lower than what has been experienced historically, especially in the high interest-rate environment of the early 1980's. Consequently, in addition to the lower stock-return estimates, fixed income returns are also expected to be much lower in the future as well, at least when compared to their historical averages.

In summary, stocks are estimated to provide higher returns than bonds and cash investments over the long term, but not as high as historically seen. Stocks, however, are still the investment that has the greatest potential for growth, but how much of your portfolio you should allocate to stocks depends on factors like your risk tolerance, time horizon, and liquidity needs.

### Some Caveats

It's important to note that these estimates are just that—estimates—and that it is extremely difficult to accurately forecast exact returns over the long-term. Therefore, these estimates should be viewed only as a **general guide** to assist you in your long-term, financial-planning needs.

The second thing to keep in mind is that these estimates are meant to provide a general idea of what the **average** annual return may be over the next 20 years. The actual return can and probably will be significantly different from this average in any given year. For example, our estimated return for large-cap stocks over the next 20 years is 7.4 percent annually, on average. However, in any year the actual return may be, for example, up 25 percent or down 25 percent! Also, stocks come with more risk to principal invested than other asset classes. And certain stock types, such as small cap and international, carry additional risks. As an investor, you need to be aware of this uncertainty when developing your financial plans, especially for shorter-term goals.

### What Should You Do?

Thanks to the power of compound returns, what you do or don't do today can have big implications on your ability to meet your long-term goals. Therefore, one of the most important things you can do is to resist the temptation to do nothing in hopes that market returns will be higher than anticipated. If they are, that's a great bonus. But it's better to plan for a more realistic scenario.

Here are a couple of things you can do. First, while it's always wise to focus on avoiding unnecessary fees and taxes, it's even more important to do so in a lower-return environment. Second, if you don't have a long-term financial plan, it's a good time to put one together. If you already have one, you should consider revising it based on the market estimates provided in this study. By incorporating reasonable return assumptions into the financial-planning process, you are better able to more effectively plan for reaching your long-term financial goals – the main reason you developed a financial plan in the first place.

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International investing may involve greater risk than U.S. investments due to currency fluctuations, unforeseen political and economic events, and legal and regulatory structure in foreign countries. Such circumstances can potentially result in a loss of principal. Small-cap funds also are subject to greater volatility than other asset categories.

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The Schwab Center for Financial Research, a division of Charles Schwab & Co., Inc., provides individual investors with professional-quality research and decision-making tools. Schwab's experts are widely published in respected business and academic journals, and regularly cited by the media on investing issues.

# Appendix

The table lists the benchmarks assigned to each asset class. In cases where the benchmark has a short history, it's extended by using a statistically similar longer-lived proxy.

Asset-Class Benchmarks <sup>a</sup>				
Asset Class	Benchmark	Inception Date	Benchmark Extension	Period Used
Large Stocks	S&P 500 Index	1957	Wilson and Jones <sup>b</sup>	1926 - 1956
Mid/Small Stocks	Russell 2000 Index	1979	CRSP 6-8 Deciles	1926 - 1978
International Stocks	MSCI EAFE	1970	n.a. <sup>c</sup>	n.a.
Bonds	Barclays Capital Aggregate Bond Index	1976	Portfolio of Ibbotson Government Bond Indexes with similar current maturity as the Barclays Aggregate <sup>e</sup>	1970 - 1975 <sup>d</sup>
Cash Investments	Citigroup U.S. Domestic 3 Month T-Bill Index	1978	Returns from 30 Day T-Bill Index adjusted to exhibit characteristics of Citigroup Domestic 3 Month T-Bill Index <sup>f</sup>	1970 - 1977 <sup>d</sup>
Overall (Domestic) Stocks	Russell 3000 Index	1979	Portfolio of stock indexes with similar market capitalization as the Russell 3000 Index <sup>g</sup>	1926 - 1978
World Stocks	MSCI World	1970	n.a. <sup>c</sup>	n.a.

a. All benchmark returns are from Ibbotson Associates, except for the returns prior to 1957 for large-cap stocks, which are obtained from Wilson and Jones, 2002, "An Analysis of the S&P 500 Index and Cowles's Extensions: Price Indexes and Stock Returns, 1870-1999," *Journal of Business* 75, 505-533. Fundamental data for large-cap stocks (P/E ratio, dividend yield, etc.) from 1925 through 1999 are obtained from Wilson and Jones, and directly from Standard & Poor's website for the years after 1999.

b. Although S&P 500 return data are available, we use returns from Wilson and Jones for the 1926-1956 time period because they provide a return series that represents a more diversified portfolio of large-cap stocks over this time period. This results in a compound annual return over the 1926-2008 time period that's about 1/3 percentage point lower than the average return on the S&P 500.

c. No international benchmark series were available for years prior to 1970.

d. For bonds and cash investments, we use returns that begin in 1970, even if we have access to a longer return history. This is because

changes in the market structure and bond pricing in the fixed income markets make data prior to the 1970s not relevant when developing future prospects. These changes include the Federal Reserve changing its operating procedures from targeting interest rates to managing money-supply growth, the change from fixed—to floating—rate regimes, and the abolishment of the gold standard.

e. The composition for the bonds' benchmark extension is 18% Ibbotson 1 Yr Govt Bond Index, 56% Ibbotson IT Govt Bond Index, and 26% Ibbotson LT Govt Bond Index.

f. The returns are adjusted by multiplying the return on the 30 Day T-Bill Index for each month in the 1970-1978 time period by the historical sensitivity, or beta, between the 3 Month T-bill index and the U.S. 30 Day T-Bill Index, estimated over the 1978 to 2008 period.

g. The portfolio consists of 70% CRSP 1 Decile, 12% CRSP 2 Decile, 12% CRSP 3-5 Deciles, and 6% CRSP 6-8 Deciles.

## Asset-Class Benchmark Definitions

The S&P 500<sup>®</sup> Index is a market-capitalization weighted index that consists of 500 widely traded stocks chosen for market size, liquidity and industry group representation.

Russell Indexes are subsets of the Russell 3000<sup>®</sup> Index, which contains the largest 3,000 companies incorporated in the United States and represents approximately 98% of the investable U.S. equity markets.

Russell 2000<sup>®</sup> Index is a market-capitalization weighted index composed of the 2,000 smallest companies in the Russell 3000.

CRSP Cap-Based Portfolios data tracks micro, small, mid and large-cap stocks on monthly and quarterly frequencies. CRSP ranks all NYSE companies by market capitalization and divides them into 10 equally populated portfolios. AMEX and NASDAQ stocks are then placed into the deciles determined by the NYSE breakpoints, based on their market capitalization. CRSP portfolios 1-2 represent large-cap stocks, portfolios 3-5 are mid caps, and portfolios 6-8 represent small caps. Portfolio Assignments are available as a CRSPAccess stock module. The stock and indices types must match (monthly).

MSCI EAFE Index<sup>®</sup> (Europe, Australasia, Far East) is a free float-adjusted market capitalization index that is designed to measure developed market equity performance, excluding the U.S. and Canada. As of April 2009, the MSCI EAFE Index consisted of the following 21 country indices: Australia, Austria, Belgium, Denmark, France, Finland, Germany, Greece, Hong Kong, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland and the United Kingdom.

The MSCI World Index<sup>SM</sup> is a free float-adjusted market capitalization index that is designed to measure global developed-market equity performance. As of April 2009 the MSCI World Index consisted of the following 23 developed market country indices: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom and the United States.

Barclays Capital Aggregate Bond Index includes fixed-rate debt issues rated investment grade or higher by Moody's Investors Service, Standard & Poor's,<sup>®</sup> or Fitch Investor's Service, in that order. (It also includes commercial mortgage-backed securities.) Bonds or securities included must be fixed rate, must be dollar denominated and non-convertible, and must be publicly issued. Bonds included span the maturity horizon, although all issues must have at least one year to maturity. All returns are market-value weighted inclusive of accrued interest.