

Evidence-Based Investing

A Scientific Framework for the Art of Investing

Science has led to tremendous advances in areas from lifesaving medical breakthroughs to instantaneous communication. However, in the past, science has provided little influence on investing. Instead of keeping pace with advancements in modern portfolio theory and historical and statistical evidence, investors and money managers have relied on conventional wisdom and flawed assumptions. How can investors sort through the vast amount of available data to maximize after-tax return and minimize risk? This paper provides a framework called Evidence-Based Investing that offers investors optimal outcomes based on compelling scientific evidence.



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The Clash of Conventional Wisdom and Science

INTRODUCTION

The progress of science is evident in virtually every area of our lives. From the moment we get up in the morning and through every aspect of our day, the impact of modern science is everywhere. The magnitude of change over the last few decades has been overwhelming in every area except one – the way in which most people make their investment decisions.

Over the last five decades, there has been a truly quantum leap forward in the understanding of how capital markets work and what specific factors drive investment return over time. High-quality research clearly demonstrates which investment approaches are most likely to succeed as well as those that involve unnecessary risk and are more likely to fail.

Even though this research exists and is virtually irrefutable, most investors do not make their investment decisions based on the evidence. To the contrary, fear and greed rather than evidence drive investor decisions. It is amazing how few investors are even aware of the overwhelming body of evidence that exists regarding optimal investing.

There is substantial evidence about how difficult it is to pick individual stocks, trade in and out of them, and fare as well as the market. Likewise, the notion that there is a system by which one can consistently profit by timing the purchase and/or sale of securities has been proven false. The data on this is crystal clear and has been compiled by Nobel laureates and other highly acclaimed thinkers who have created a consensus over the past two decades.

Nevertheless, many brokers and some investment advisors ignore the evidence. They typically follow rather unscientific models based on hypotheses that are untested and unproven. While doing so, they claim that they alone have information

or special knowledge that is unknown to the market and can be used to produce returns in excess of the market, overcoming their already high expenses. To show the many shortcomings of this approach and to provide a road map to investing success, this paper introduces the concept of *Evidence-Based Investing* or EBI.

EBI involves the judicious use of current best evidence to make informed investment decisions. The concept is built around the evidence-based method that has produced such great success in the field of medicine. Evidence-based medicine (EBM) is defined as “the attempt to apply standards of evidence gained from the scientific method to aspects of medical practice in a uniform manner.”¹ (An overview of *evidence-based medicine* can be found in the appendix.)

In the same way, EBI also applies the available evidence to questions and challenges that are specific to each individual investor to formulate optimal investing solutions. The goal of EBI is to maximize after-tax returns for the individual investor while minimizing risk and protecting portfolios from downturns in the market. This decreases the maximum likely loss during bear markets.

EBI involves a series of steps. First, questions are developed. Then, related evidence is located, researched, interpreted, and compared. The third step is the ongoing application of the evidence within the relationship between the investment advisor and an individual investor.

This paper introduces the methods and conclusions of EBI in relation to how an investor can best capture market gains while avoiding the failure of the conventional approach. In this way, the following overview will show the concrete benefits of a scientific approach for the individual investor.

1. Evidence Contradicts the Conventional Approach

Question: *What is the best way to capture market returns?*

Most brokers on Wall Street believe that successful investing involves *beating the market*, and that the best way to achieve this is through *actively managed* investment strategies. Evidence demonstrates, however, that this assumption is without foundation. Both the method (the continuous trading of securities for short-term gains) and the goal (beating the market) add risk and expense while delivering a lower overall return compared to investing strategies that neither actively trade nor seek returns greater than the market. Though this is counter-intuitive for many people, the evidence is simply overwhelming.

Conventional investors have been told by Wall Street that money managers add value by providing expertise in stock selection and market timing. In fact, there is a great quantity of evidence that demonstrates how professional market timing and stock selection actually harm investors. The conventional approach of active management not only fails to deliver returns that outpace the market, but the end result actually lags the market.

A study by *Dalbar* (**Figure 1c**) shows that conventional active money management techniques actually resulted in substantially lower returns for investors. The average stock fund investor earned returns of only 140% over the twenty-year period ending in 2007, while a simple buy and hold strategy in the *S&P 500* returned 833%. The comparison is similar for bond investors.

It is noteworthy that the average stock investor was barely able to realize returns above the level of inflation and the average bond investor was *unable* to even accomplish this feat.

By contrast, equity markets have a long and illustrious history of consistent growth. This history is illustrated in the graph of “Stocks, Bonds, Bills, and Inflation” (**Figure 1a**). The data in the graph show that over the long term, stocks rise significantly.

The invincible long-term growth of capital markets raises the question of how individual investors can capture this growth while minimizing costs. Research conducted in 1986 and then confirmed in 1991 demonstrates that asset allocation is the key determinant in portfolio performance (**Figure 1b**).

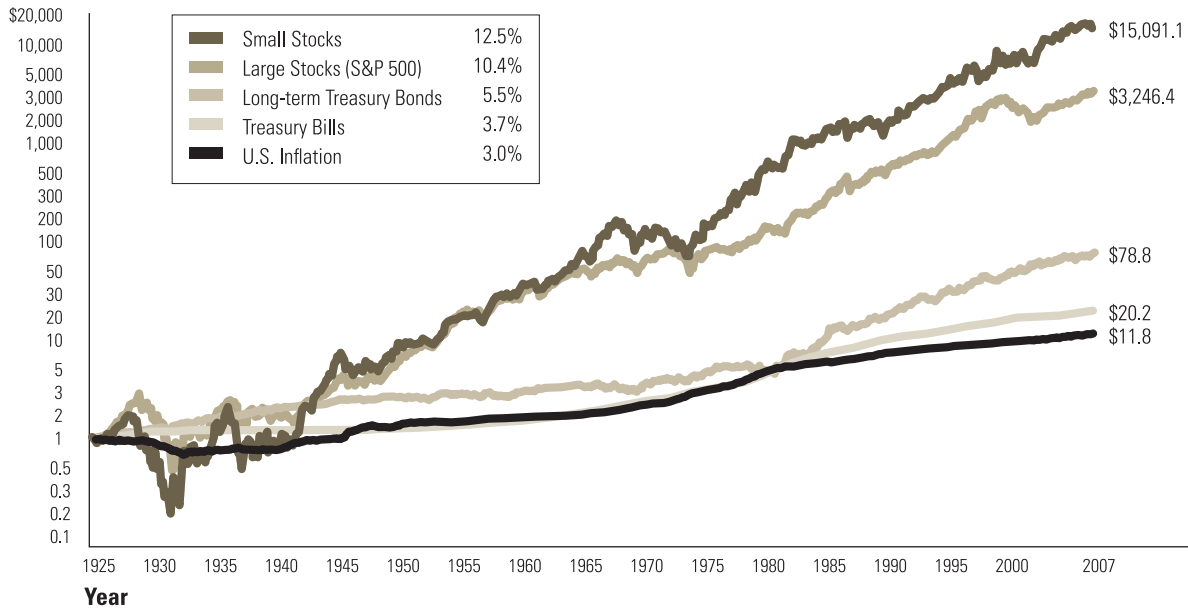
Asset allocation is, by far, the most effective means of capturing market returns. Asset allocation is the strategic mixture of asset classes (e.g., stocks, bonds and cash) in a portfolio to reap the highest returns over the long term given an investor’s acceptable level of risk. As the figure shows, allocation decisions account for 91% of returns earned by investors. An investor’s abilities to select the right stocks and time markets account for only 5% and 2% respectively. Disciplined asset allocation enhances returns, whereas security selection and market timing actually detract from performance more frequently than not. Typically, conventional investors focus on stock selection and market timing while ignoring the primary determinant of future return – optimal allocation between different asset classes.

Stocks, Bonds, Bills, and Inflation

Growth of \$1 (1926-2007)

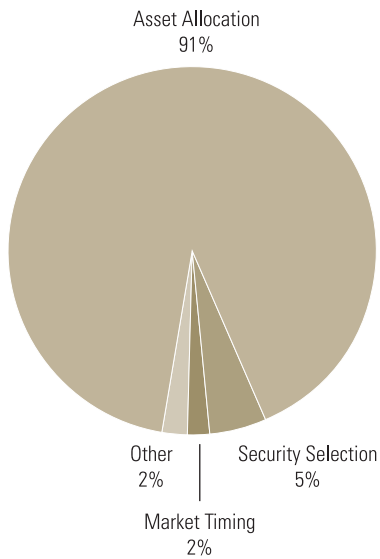
Figure 1a

Growth of \$1



Determinants of Investment Performance²

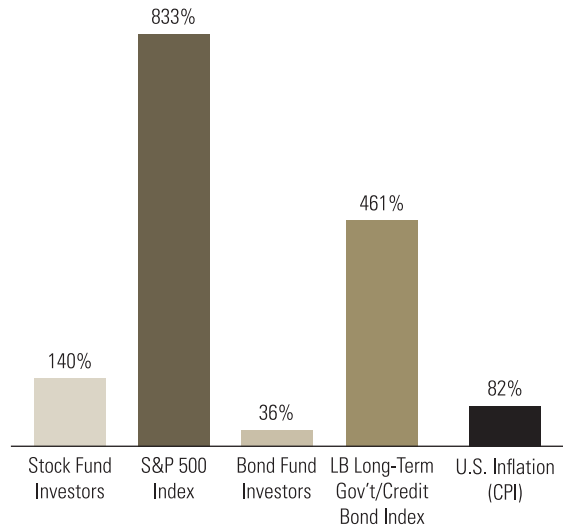
Figure 1b



“Realized” Cumulative Investor Returns

(20 Years Ending 12/31/2007)

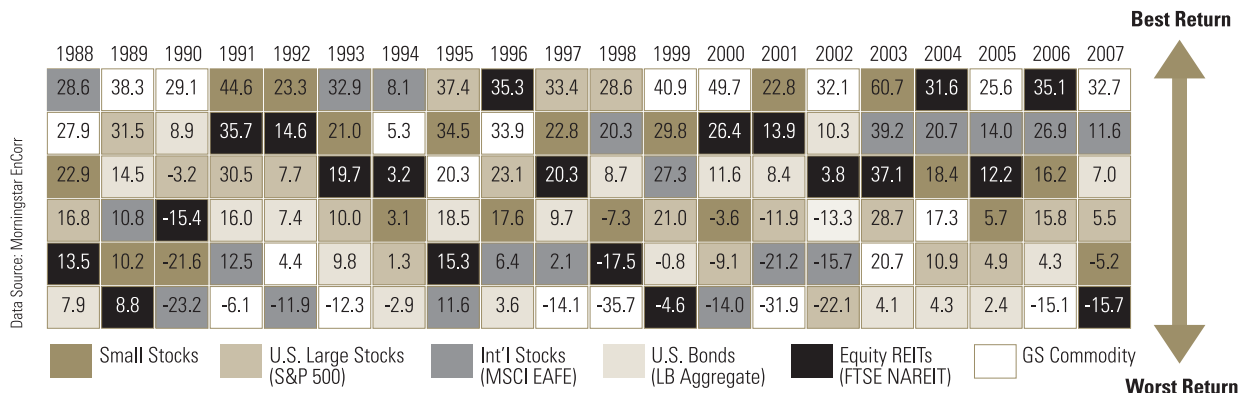
Figure 1c



Can You Pick the Next Winner?

Asset Class Returns 1988 - 2007

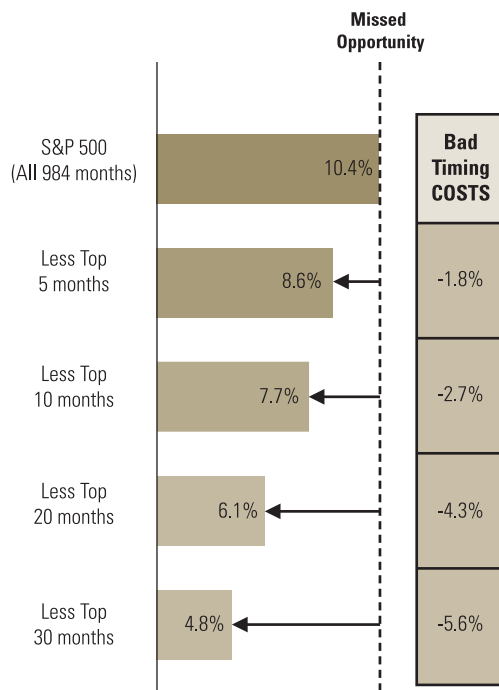
Figure 2a



The Real Problem with Market Timing: Missing the Big Months

(S&P 500 1926 - 2007)

Figure 2b

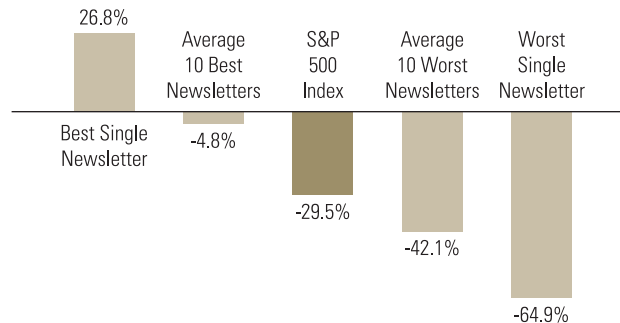


Source: Savant Analysis and Morningstar EnCorr

Best & Worst Surviving Market Timing Newsletters From the 1987 Crash³

(1987 Crash: 9/1/87 - 11/30/87)

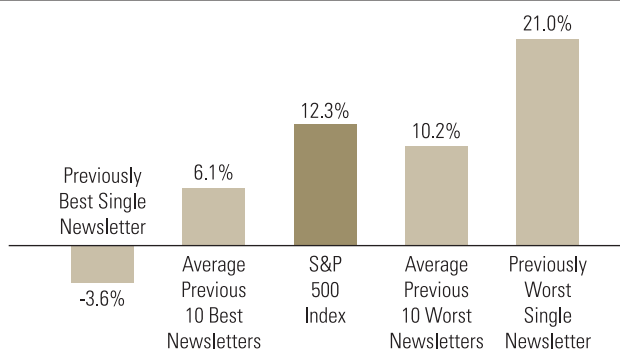
Figure 2c - 1



The Best Newsletters Performed the Worst During the Subsequent 20 Years Since the Crash³

(12/1/87 - 11/30/07)

Figure 2c - 2



Source: Hulbert Financial Digest and Savant Analysis

2. The Allure of Market Timing – Hope Springs Eternal

Question: *Can market timing improve returns?*

A perennial emotion associated with investing is the desire to foresee the next big trend, invest accordingly, and then watch the investment shoot to the sky as the economic climate unfolds as predicted. Yet research over the last two decades strongly supports the hypothesis that markets are more or less efficient. This hypothesis states that at any given time, the market has already taken into account all available information as it sets security prices. There is consensus on this concept. Both evidence and experience suggest that those events that really *do* move the markets are notable precisely because of their unpredictability. For instance, the tragic events of 9/11 and the implosion of Enron truly devastated markets, yet neither of these events could have been included in any list of predictable economic factors before they occurred.

The randomness of capital markets is illustrated in **Figure 2a**. This graph has *no pattern*, showing that the behavior and ranking of six basic asset classes defies prediction from year to year. The evidence-based investor looks skeptically at any obsession over what the future holds. The fact is, substantial market growth and loss occur in relatively short periods throughout the year. As **Figure 2b** shows, stock returns come in concentrated pockets of time.

Proponents of market timing often counter that simply avoiding the greatest market declines can substantially increase an investor's return. Maybe the best opportunity to prove this occurred during the market crash of 1987 when the market suffered the largest one-day decline in history. Were investors or professional advisors able to predict this in advance and act accordingly? How have they performed since? Historical evidence is available to answer these questions.

A recent study examined the long-term historical performance of market timing newsletters in existence since 1987 and compared their performance at the time of the crash to their subsequent results over the next 20 years. The findings perfectly validate what most of us consider common sense: There is no evidence that suggests a person can consistently identify the few bad days out of 365 in a year.

Many individual investors fall victim to popular market timing newsletter hype with the hope of avoiding negative markets while remaining fully invested during rising markets. Of course their ultimate objective is to beat the market. **Figure 2c-1** shows that during the three months that encompassed the Crash of 1987, the *S&P 500 Index* lost 29.5%. In sharp contrast, the best single market timing newsletter produced a positive return of 26.8%. On average, the 10 best newsletters were down only 4.8%. With such great results, many investors concluded that these top performing market timing newsletters were worth the money.

As usual however the short time frame was deceiving. Of more than 100 newsletters that existed in 1987, only 38 remain today. The rest performed so poorly they went out of business.

Of those that survived, the one with the very best performance (prediction) back in 1987 actually *lost* money during the 20 years following. By contrast, the newsletter that did the worst in 1987 has done the best since then, earning 21% per year for 20 years. **Figure 2c-2** highlights the subsequent market results of the best and worst newsletters from 1987. The evidence proves that these newsletters have poor forward looking forecasting skills. Market timing exposes investors to high levels of risk, with no accompanying probability of high return. The good news is that this search for the holy grail of predictive power is as unnecessary as it is unrealistic.

3. The Poor Performance of Active Money Managers

Question: *Do professional money managers perform better than market indexes?*

Money managers are hyperactive traders. They execute a variety of trading techniques in an effort to achieve short-term returns that are higher than the return of the stock market as a whole. With the finest information, technology, and research at their disposal, money managers no longer have to be content with simply trading in and out of the market. They can also trade from industry to industry and sector to sector simultaneously.

Their actions are best measured in terms of cost, both explicit (published in the prospectus) and implicit (hidden and not disclosed). These hidden costs are rarely discussed or disclosed. They include the cost of market impact, bid/ask spreads, and direct trading costs that only show up in the net cost of a stock position after the cost of the trade has settled. Truly visible, or admitted costs, include:

- Local broker commissions (loads).
- Expense ratios which include management fees, administrative fees, legal fees, custody costs, and 12b-1 fees.
- Wall Street brokerage commissions (inside the fund).
- Capital gains taxes from excessive trading within the fund. (Few people understand the added cost of taxes, although it may be the single most important expense to overcome.)

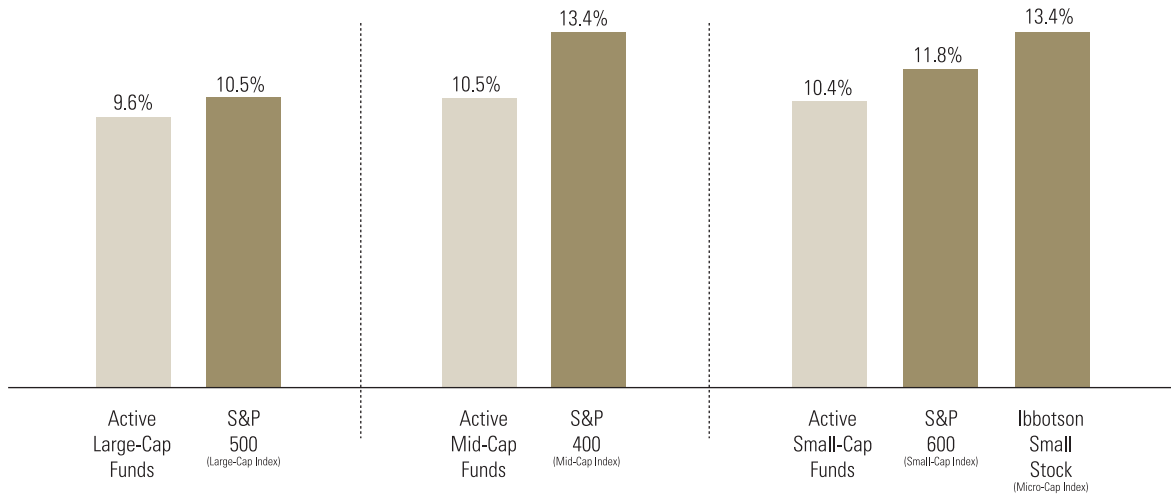
All of these added costs make it very difficult for active managers to outperform their passive benchmarks. **Figure 3a** shows how the average actively managed fund compared to its relevant passive index for the 15-year period ending in 2007. Active large-cap funds underperformed the *S&P 500* by an average of 0.9% per year. The results are even more pronounced for active small and mid-cap funds which trailed their indexes by 2.9% and 3.0% annually.

As **Figure 3b** shows, institutional pension plans also fail to exploit market inefficiencies. Consider that a broadly diversified index portfolio consisting of 70% stocks and 30% bonds outperformed 85% of all of the large pension plans in the study. Even the more conservative 60% equity index portfolio outperformed more than two-thirds of corporate pension plans. This is impressive considering that the companies included in this study (i.e. large firms like IBM & Verizon) have significant resources to hire the best and brightest money managers. Pension plans do not live up to their promise to beat the market for their shareholders. This leaves active managers little justification for their high management costs.

Actively Managed U.S. Stock Funds Fail to “Beat the Market”⁴

(15 Years Ending 12/31/07)

Figure 3a

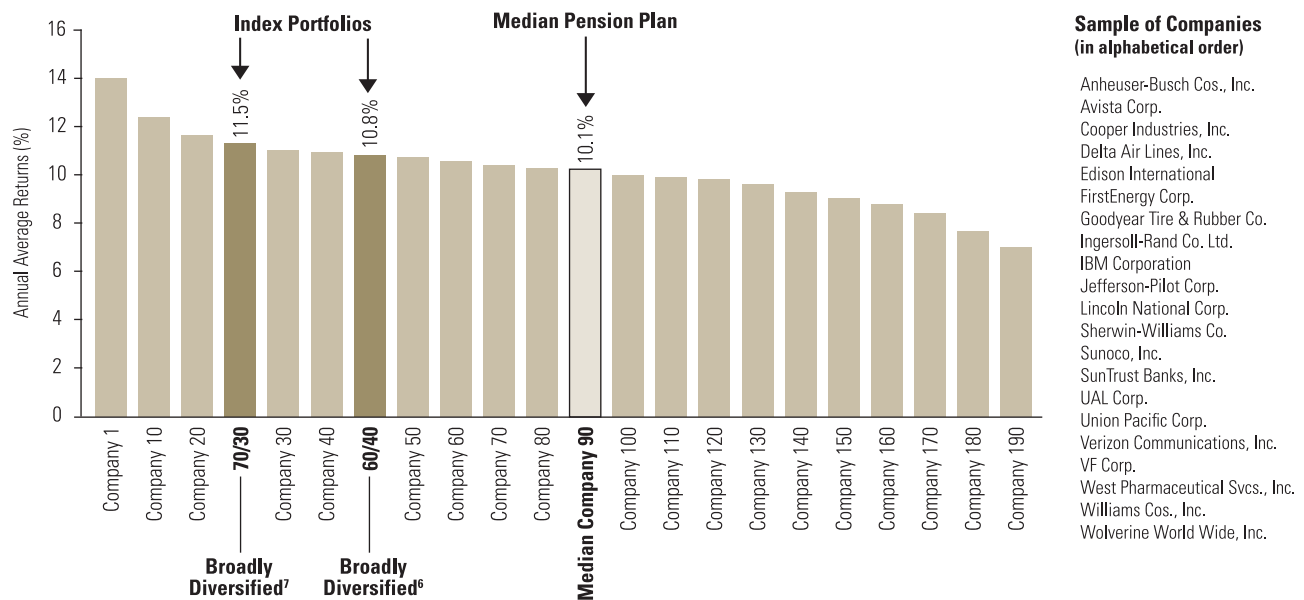


Includes only the funds that survived the entire 15-year period.
Many of the worst performing funds had already been liquidated or merged with better performing funds.

Large Pension Plans Likewise Perform Poorly vs. Index Portfolios⁵

(Results of 192 Large Corporate Pension Plans 1988-2005)

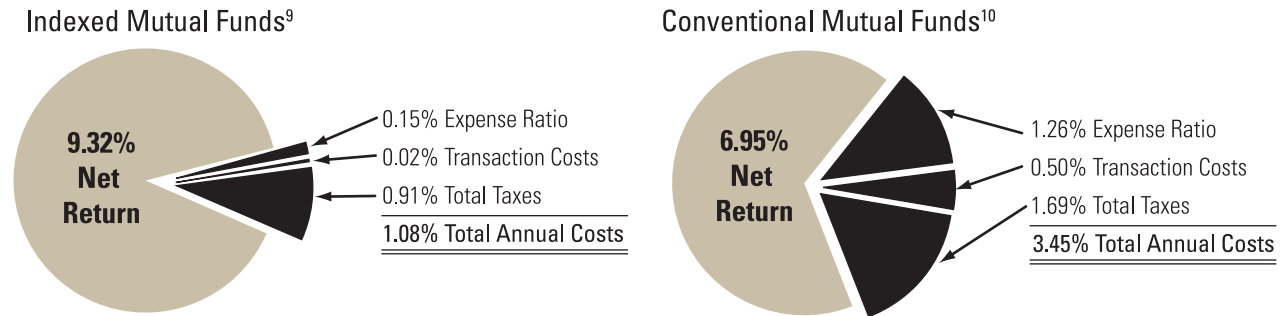
Figure 3b



Internal Fund Expenses Reduce Net Returns

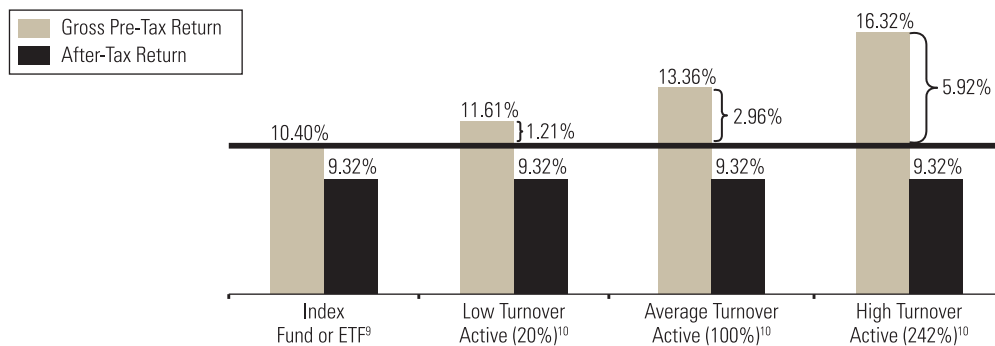
(Assumes 10.4% Gross Annual Return for the S&P 500 From 1926 - 2007)⁸

Figure 4a



Pre-Tax Active Management Performance Required to Match a Buy & Hold Index Fund Strategy^{9,10}

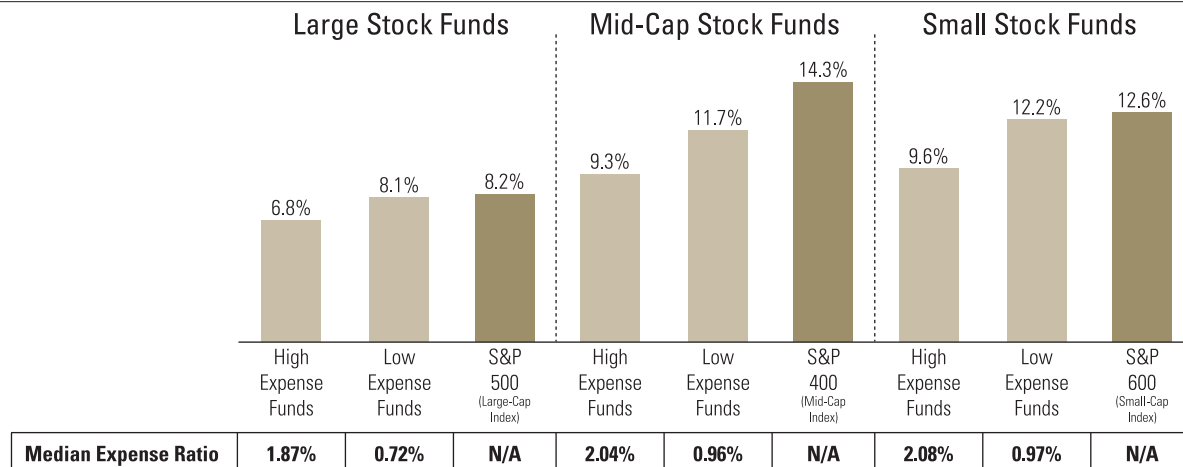
Figure 4b



High Expense Funds Lag Market Indices¹¹

(Annualized Returns 10 Years Ending March 31, 2007)

Figure 4c



4. The Costs of Trying to Beat the Market

Question: *Can money managers overcome their high costs?*

There is an inverse relationship between fund expenses and returns. In short, costs matter. Nobel Laureate Dr. William Sharpe points to this in his landmark article, “The Arithmetic of Active Management.”¹² He asserts:

“If active and passive management styles are defined in sensible ways, it *must* be the case that (1) before costs, the return on the average actively managed dollar will equal the return on the average passively managed dollar, and (2) after costs, the return on the average actively managed dollar will be less than the return on the average passively managed dollar. These assertions will hold for *any* time period. Moreover, they depend *only* on the laws of addition, subtraction, multiplication and division. Nothing else is required.”

Even though it’s hard to overcome the high costs of active management, many managers try. The scientific expression for trying to beat the market is “pursuing alpha” and refers to the measure of returns above the market. A large alpha is required in order for an active manager to match the performance of a similar indexed or passive strategy. This is due to the many additional costs that active managers must overcome. High turnover also results in higher taxes. Thus, actively managed funds require a very high alpha in order to simply break even. To put this in perspective, **Figure 4b** illustrates that the average money manager, with a typical turnover of 100% per year, needs to beat the market by 2.96% annually just to equal the after-tax return of the index – a nearly impossible long-term feat.

Of course, certain investors do not pay taxes (i.e. non-profit organizations and pension plans). **Figure 4c** illustrates that even these investors are also hurt by the high costs of active management.

Once hidden costs of trying to beat the market (such as transaction costs discussed below) are added to the disclosed sales expenses and commissions, total costs not only cancel out any gains made by achieving *alpha*, but they usually result in returns that lag the market. Money managers do not have to worry about the taxable events they trigger; they simply pass these costs along to their shareholders.

For most investors, mutual funds with up front *loads* are more or less a thing of the past. Yet, the fund industry has turned to more sophisticated ways of extracting commissions. Wrap accounts, for example, typically charge between 1.5 and 2.5% of assets under management – plus other hidden trading costs. Variable annuities, some with surrender charges up to 9%, have become popular. The 12-(b)1 fee, introduced in the 1970s as a fee for marketing costs, remains hidden in most actively managed funds, scraping off an additional fee each year.

In a recent study entitled *The Role of Trading Costs*, it was found that trading costs pulled more capital from portfolios than commissions or expense ratios. The study found that the bigger the mutual fund, the higher the trading costs. “Trading costs,” say the authors, “have an increasingly detrimental impact on performance as the fund’s relative trade size increases.”¹³

In conventional mutual funds, fees, transaction costs, and taxes can add, on average, 3.45% in imbedded expenses (**Figure 4a**). Assuming 10.4% gross annual return, the difference in net return between conventional active mutual funds and a low cost index fund is 6.95% vs. 9.32% annually. While attempting to outperform the market, active managers actually underperform by a significant margin.

5. The Allure of Hunting for the Great Money Manager

Question: *Can you beat the market by identifying great money managers?*

The section of this paper entitled *The Poor Performance of Active Money Managers* established that the average actively managed fund lags behind its benchmark index. Many advisors acknowledge this is true. However, they don't see it as a reason to abandon the quest to beat the market by picking the right mutual funds. After all, they argue, they plan to select only the *best* money managers — the average money manager need not apply.

The idea is that the advisor recommends only managers with top track records — those with stellar five-year return histories. Find only the top performing money managers and leave the less successful managers to other, less attentive advisors. The SEC has highlighted the first problem with this convention: They mandate that every mutual fund prospectus disclose that “past performance is not indicative of future returns.”

An advisor who ignores the SEC's warning against chasing past performance might suggest: “Tiger Woods' performance over the past 10 years does not guarantee that he will keep winning, but it's a good bet that he will.” This analogy, however, is deeply flawed.

The difference between a money manager's and an athlete's performance is that a streak of above average performance for a money manager often predicts poor performance in the future. The connection between a history of above-average performance and poor future performance is the consequence of the random nature of stock market gains. Tiger Woods can consistently win over time because he is a very talented athlete. Woods can count on his swing, and his fans can too. On the other hand, fund

managers who perform well for a period of time typically do worse than average in subsequent periods.

Figures 5a-1 & 5a-2 trace the performance of mutual funds for an initial 5-year period (1998 to 2002) as well as the performance of the same funds for the subsequent 5-year period (2003 to 2007). The top of the graph arranges funds in order of historical returns, with highest returns on the left and lowest returns on the right. The second figure keeps the funds in their original order and illustrates the return of each fund for the subsequent 5-year period relative to the average. Clearly, there is no pattern evident. It is futile to use past performance to predict future success.

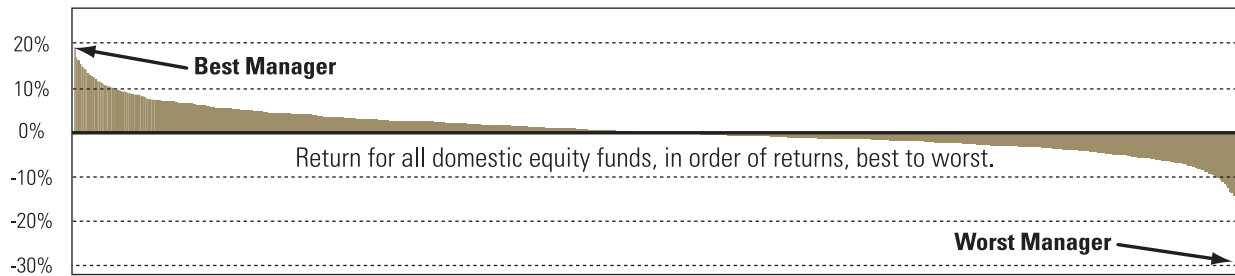
Ironically, good track records attract an influx of new capital that, in turn, often consigns the fund to lower future returns. **Figure 5b** shows how few top 100 growth fund managers were able to maintain a top 100 ranking in the following year. On average, only 17% of the managers were able to remain in the Top 100 from year to year. Notice the range of money managers' annual repeat successes — from 6% to 32%. Such a broad range points to the random nature of a money manager's success and to the difficulty of consistently beating the market.

Figure 5c shows that the very top funds actually do well below average in subsequent periods; 84% of the top quartile funds from 1998-2002 fell below average between 2003-2007. Interestingly, 87% of the bottom quartile funds during the same time period actually did above average in the subsequent five years. No evidence supports the notion of a positive correlation between superior past performance and future returns. If anything, evidence suggests that the correlation is negative. Of course, how many people are willing to buy the worst funds? To summarize, chasing performance is like driving a car while only looking in the rear-view mirror.

A Simple Ranking of Best to Worst Active Managers¹⁴

(1998-2002 Annualized Returns Less Median Manager Performance)

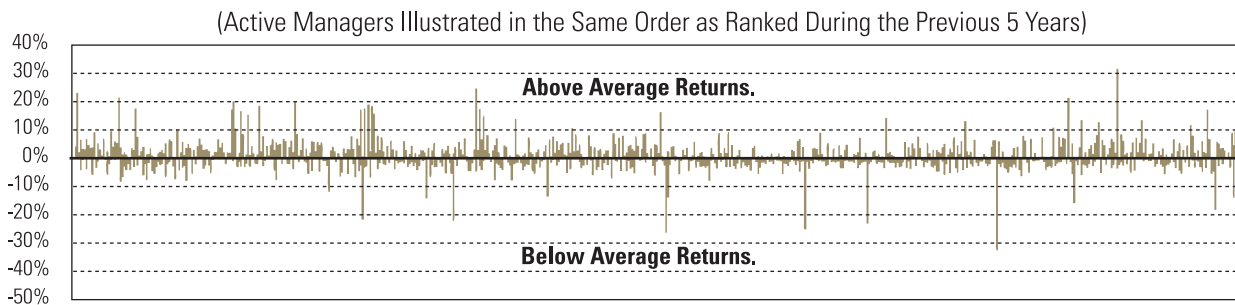
Figure 5a-1



Subsequent Period Ranking of the Same Active Managers—Subsequent Returns are Random¹⁴

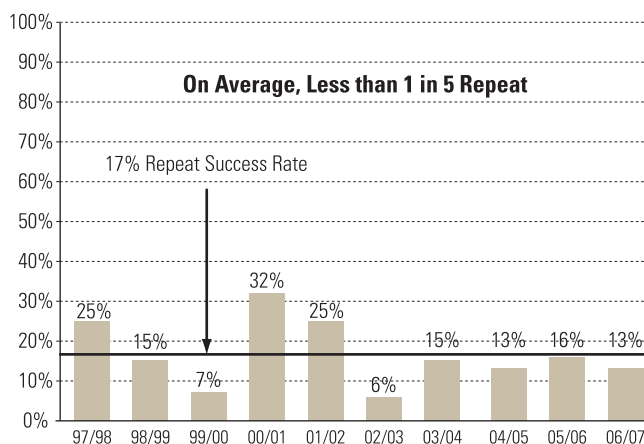
(Next 5 Years: 2003-2007 Annualized Returns Less Median Manager Performance)

Figure 5a-2



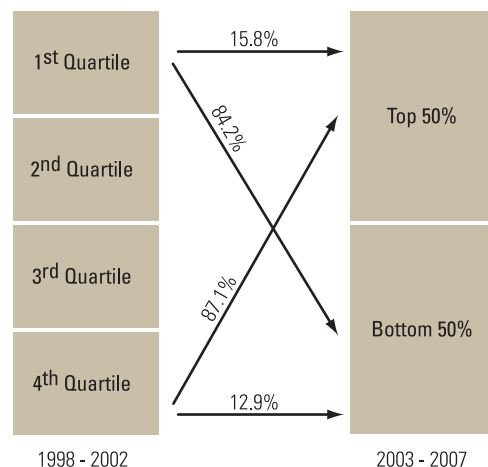
Very Few Top 100 Growth Fund Managers Stayed in the Top 100 the Next Year¹⁵

Figure 5b



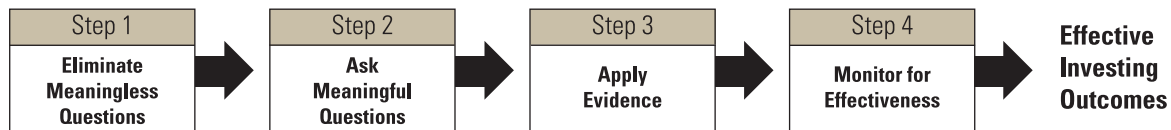
Top Past Performance Fails to Predict a Manager's Future Ability to "Beat the Market"¹⁴

Figure 5c



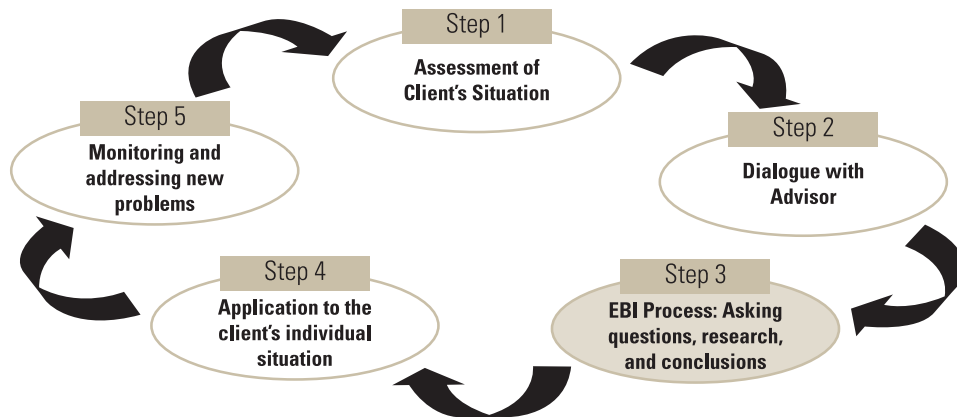
The Stepwise Application of Evidence-Based Investing

Figure 6a



The Integration of Evidence-Based Investing Into the Advisor-Client Relationship

Figure 6b



A Comparison of Conventional Investment Strategies vs. Portfolios Developed Using an Evidence-Based Method

Figure 6c

Strategies	Conventional Methods	EBI Conclusions
Management Style	Active Management - Security Selection	Index / Passive / Structured
Allocation Style	Active Management - Market Timing	Disciplined Rebalancing
Stock Size	Primarily Large	Add Additional Small
Fixed Income	All Bonds	Exclude Long-term, Junk, Exotics
Style	Tilt to Growth	Tilt to Value
Geographic	10 - 15% Foreign	25-30% Foreign
Alternatives	Often focused on hedge funds	Commodities and REITs
Diversification	Limited Diversification - Concentrated	Broad Global Diversification
Tax Management	Tax-Indifferent	Tax-Efficient

6. The Evidence-Based Method: From Medicine to Investment Management

This paper has exposed the three tenets of the conventional approach as resting on spurious assumptions and false hopes. Whether one seeks investing success by picking stocks, timing the market, or by picking skilled money managers, the costs of these speculative techniques are greater than any gains derived by their practice. These conclusions have been reached through an informal application of an evidence-based method – a process developed by examining evidence-based approaches in other fields, particularly the medical field. Evidence-based medicine has a long history, and it has been refined extensively over the past 20 years.

The implications of Evidence-Based Investing or *EBI* are simply enormous. The first purpose of EBI is to provide a clarifying template that, laid across the spectrum of topics confronting today's investor, provides a fixed set of empirical and logical principles that make it possible to better judge the wisdom of investment advice (**Figure 6a**).

The second purpose of EBI is to enhance the investor/advisor relationship by revisiting the individual's goals and personal situation, thus increasing the likelihood of optimal gains in the future. To this end, EBI offers a way to answer investment questions in a systematic, analytical, and scientific manner (**Figure 6b**).

Step One: Eliminate meaningless questions

In Evidence-Based Investing, the only good question is one that can be verified. For example, consider the following question:

“Did the market decline today out of concern over Iranian oil production?”

There would be no way to irrefutably verify either a positive or a negative answer to this question. There are countless unverifiable

questions and statements that permeate investment news on a daily basis. This brings to light the importance of the next step in EBI – the need to develop the right questions.

Step Two: Ask meaningful questions

Meaningful questions need to be formulated. That means asking questions that can be proven or disproven with reference to evidence. The questions must also have significance for the individual investor. This requires the experience and knowledge of an objective financial advisory team.

Step Three: Apply the evidence

Just as important as the rejection of non-verifiable questions and the development of questions that can be verified, is the *application* of the evidence through integration of both advisor expertise and the individual investor's values and goals.

Step Four: Monitor for effectiveness

The final step in EBI is evaluating the effectiveness and efficiency of the process. This involves closely analyzing portfolio performance (after all costs) and revisiting the investor's goals and values. Effective monitoring presumes that the advisor is compensated by pre-determined fees rather than commissions. If commissions influence investment decisions, it is very difficult for an advisor to maintain objectivity.

Data obtained must be applied in the context of an individual's goals, needs, and circumstances. In this way, empirical research becomes more relevant to practical investing; and practical investing is backed by solid theory and economic knowledge. The end result is a client-centered wealth management approach that fights against misinformation and implements asset allocation strategies using highly structured, passively managed index funds across a wide range of broadly diversified global asset classes (**Figure 6c**).

7. Buy-and-Hold Indexed Strategies: Better Building Blocks

Question: *How does one avoid the failed methods of Active Managers?*

The conventional approach to investing is anchored in the basic belief that active managers can effectively outperform the market. However, the evidence clearly shows that active management is inefficient, costly, and counter-productive. It is very difficult if not impossible to consistently beat the market over time. There is an abundance of logical, mathematical, and empirical evidence to support this fact.

Indexed strategies recognize that financial markets discover and distribute financial information so quickly that it is difficult or impossible for active managers to consistently outperform the market over the long run. The goal of a basic index fund is to provide a return which matches the performance of a given market index, minus very modest expenses. The strategies are called “indexed” because the intention is to buy and hold all or most of the stocks in a target index.

Index strategies are often referred to as “passive” to denote the rejection of active trading. For instance, one might invest in an *S&P 500* index fund to gain exposure to the 500 U.S. large stocks that make up the *S&P 500* (See **Figure 7a**). The index fund keeps costs low by typically trading only when a stock moves in or out of the index.

Of course, index funds are now available for nearly all asset classes. In addition to the *S&P 500*, index funds now track small stocks, foreign stocks, bonds, and various alternative asset classes. To gain perspective on the index cost savings, **Figure 7a** further illustrates the cost difference between the average U.S. active fund and the largest U.S. total market index fund.

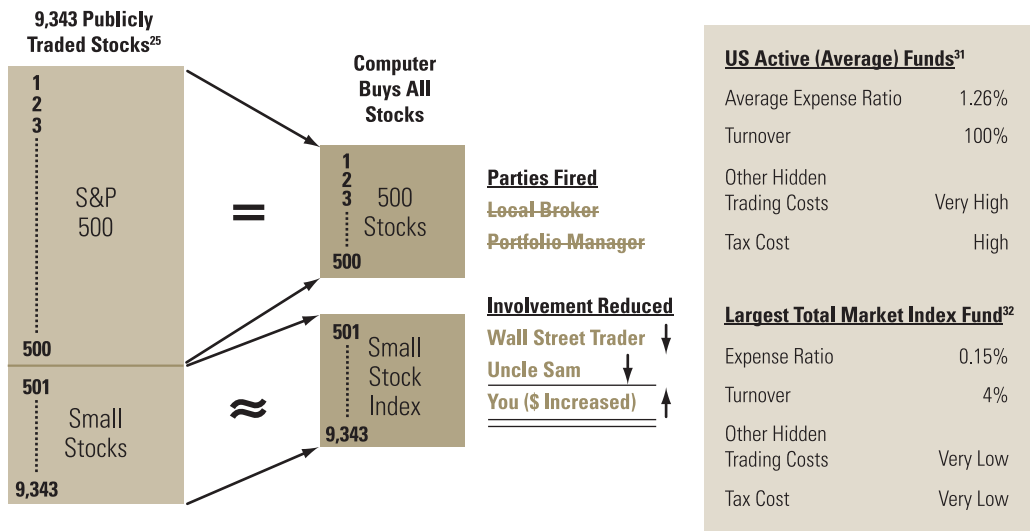
Whereas index funds seek to replicate an index as closely as possible, other index-like investment vehicles are more flexible and do not perfectly emulate a particular index. Whether it is a passive fund, asset class fund, exchange-traded fund, or an exchange-traded note, the essential characteristics of all buy-and-hold index-like investment vehicles are low cost, long-term investments that are tax-efficient and transparent. A comparison of indexed investment options with conventional, actively managed funds can be seen in **Figure 7b**.

It is nearly impossible for active managers to exploit market inefficiencies in such a way as to justify their higher management costs and taxes over time. As previously discussed, there is an overwhelming body of academic and industry evidence that documents the routine failure of active management. Index and other similar funds offer the ideal path to broadly diversified and tax-efficient global portfolios of stocks, bonds, and alternative investments.

“Indexing” Approach to Investing

(As of December 31, 2007)

Figure 7a



Various Index-like Strategies Compared to Active Management Strategies

Figure 7b

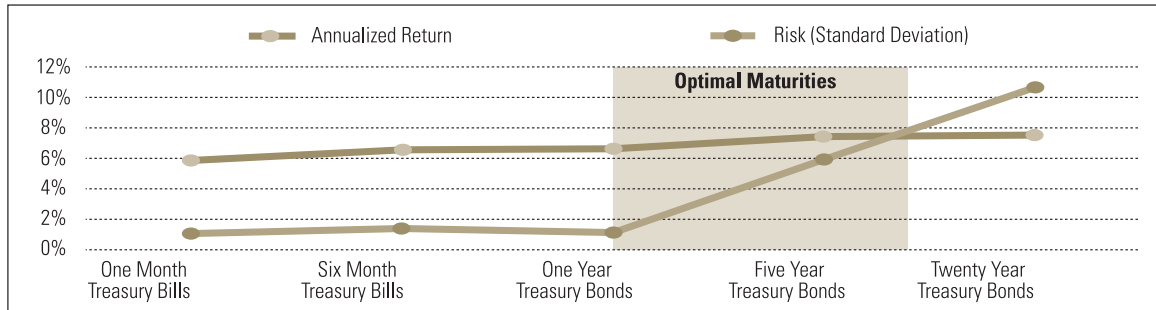
	Fund or Account Type	Tracks An Index?	Can Hold Illiquid Assets?	Tax Efficient?	Fully Transparent?	Overall Expense
Index-Like Strategies	Institutional Index Fund	Yes	No	Typically	Yes	Very Low
	Retail Index Fund	Yes	No	Typically	Yes	Low
	Exchange Traded Fund	Yes	No	Yes	Yes	Low
	Passive Funds	Approx.	Yes	Typically	Yes	Low
	Tax-Managed Funds	Approx.	Sometimes	Yes	Yes	Low
	Structured Funds	Approx.	Sometimes	Typically	Yes	Medium
	Asset Class Funds	Approx.	Sometimes	Sometimes	Yes	Depends
Active Strategies	Separate Account Index	Approx.	No	Yes	Yes	Low
	Actively Managed Funds	No	Typically No	No	Depends	High
	Hedge Funds	No	Yes	No	No/Unregulated	Very High

Source: Savant Capital Management, Inc.

Short & Intermediate-Term Bonds Offer the Optimal Risk/Return Tradeoff¹⁶

(1964 - 2007)

Figure 8a

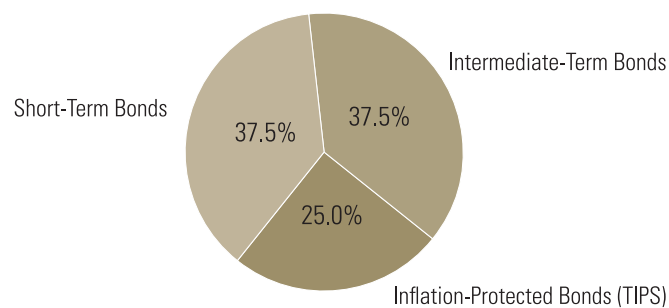


Maturity	1 Month	6 Month	1 Year	5 Year	20 Year
Annual Return (%)	5.8%	6.5%	6.6%	7.4%	7.5%
Risk (Standard Deviation)	0.8%	1.2%	0.9%	5.8%	10.7%

Savant Three-Legged Bond Stool Strategy

(As of 12/31/2007)

Figure 8b



Three-Legged Bond Stool Protects You from Market Turmoil

(Annual Returns 1988 - 2007)

Figure 8c

Growth Markets	Low Inflation (Inflation less than 1% per quarter)	High Inflation (Inflation greater than 2% per quarter)	Low Growth (Gross Domestic Product [GDP] less than 0% per year) ¹⁸	High Growth (GDP greater than 2% per year) ¹⁸
Three-legged Bond Portfolio ¹⁷	6.7%	4.0%	10.3%	5.3%
LB Aggregate Bond Index	8.6%	-0.8%	13.5%	5.6%
S&P 500 Index	15.3%	-17.4%	-13.7%	12.7%

Source: Savant Analysis and Morningstar EnCorr. Prior to March 1997, TIPS data did not exist. Thus, prior to 3/97 the TIPS allocation within the Three-Legged Bond Portfolio consisted of equal parts short and intermediate-term bonds.

8. Bonds Reduce Risk and Protect Income

Question: *Can bonds reduce the risk of bear markets?*

Bonds have always been a preferred means of protecting principal and providing income, especially during flat or negative periods in the market. Recent innovations have brought a wide array of new bond investment vehicles to market; consequently, the current function of bonds is far less straightforward than it was in the past.

In order to protect capital against discouraging markets, it is not enough simply to invest in bonds. It is imperative to understand exactly what types of bonds are involved. For instance, junk bonds, preferred stock, convertible stock, and long-term bonds fail to offer investors sufficient return for their higher levels of risk. While long-term bonds are riskier than intermediate (i.e. five-year) bonds, they have historically earned a similar return (**Figure 8a**). In short, long-term bonds do not compensate investors for extending maturities and taking more risk. Holding cash will not solve the problem; one-month bonds (cash) earned far less than one-year bonds, even though they incurred similar risk. Historically, short and intermediate-term bonds are optimal because they maximize return for their level of risk.

Treasury Inflation-Protected Securities (TIPS) offer additional diversification. They have a low correlation (described below) to other asset classes (including bonds), particularly during periods of high inflation. TIPS have a fixed interest rate at the time they are issued; however, the bond's underlying principal rises and falls with changes in inflation. TIPS actually increase in value during periods of inflation. In the event of a deflationary environment, these bonds still add safety. Even if total payments are lower than anticipated, the investor still receives the full face value at maturity.

Effective asset allocation and diversification within a bond portfolio requires a deep understanding and focus on the correlation of various bond products.

What is correlation? To fully appreciate the power of this statistical term, it is helpful to see it at work in the everyday world. Street vendors often sell seemingly unrelated products such as umbrellas and sunglasses. Initially, that may seem odd. After all, when would a person buy both items at the same time? They probably never would. Umbrellas and sunglasses have a very low correlation. By diversifying the product line, the vendor can reduce the risk of losing money on any given day. Rain or shine, the street vendor prospers. Incorporating asset classes with low correlations allows investors to minimize risk and volatility in a similar way.

In order to create a strong bond allocation, TIPS should be blended with intermediate and short-term bonds, constituting a three-legged bond stool (**Figure 8b**). This three-part bond mix protects against a variety of adverse market conditions, from a weak economy to inflation and/or deflation (**Figure 8c**). While it is true that real returns may be low during periods of high inflation, historically the bond stool provides a higher real return than that of a broad bond market index such as the *Lehman Brothers Aggregate Index*. The bond stool has also provided solid protection against troubled equity markets during periods of slow economic growth.

The decision to include bonds in a portfolio means investing less money in equity markets. While the implication is a lower return, there is an accompanying reduction of risk during challenging markets. Assuming that the three-legged bond portfolio is partnered with a properly allocated stock portfolio, lower bond returns during periods of low inflation and high growth are more than offset by robust stock gains.

9. Small Companies Offer Higher Returns and Broader Diversification

Question: *Can small stocks be safely included in diversified portfolios?*

It is not uncommon for investors and advisors to believe that conservative investing for the long haul should exclude small company stocks. At first glance, this belief may look sound. Yet the evidence strongly suggests otherwise. While it is true that small stocks are more volatile than large stocks (i.e. *S&P 500*), they account for most U.S. stocks. As a result, there is no way to capture overall stock market returns without paying close attention to small stocks.

Small stocks offer higher expected returns. History bears this out. This additional return is often referred to as *the small stock premium*. It is depicted in **Figure 9a**. Note that the superior returns of small stocks hold true around the globe. From 1926 to 2007, U.S. micro-cap stocks (the very smallest companies) provided an average annual return of 12.5% compared with only 10.4% for large-cap stocks. Internationally, small stocks performed even better, returning an average of 14.9% compared to only 11.1% for international large stocks.

To put these returns into perspective, consider the following scenario: An investor who put \$1,000 in the largest stocks in 1926 would have \$1,575,000 today. If the same \$1,000 had been invested in the smallest stocks, the investor would have \$10,292,000. That is a truly stunning difference. The strength of small stocks is consistent over long periods. To take an analogy from nature, small stocks are the acorns in the forest. While not every one will grow into a mature tree, if acorns did not lead to full grown trees, there would be no forest. Likewise, no tree grows to the sky forever. So it is sensible to see comparative limits to the future growth of mid-cap and large stocks.

Figure 9b illustrates the benefit of diversifying into small stocks. Large company stocks make up deciles 1 and 2, mid-cap stocks make up deciles 3 through 5, and small stocks make up deciles 6 through 10.

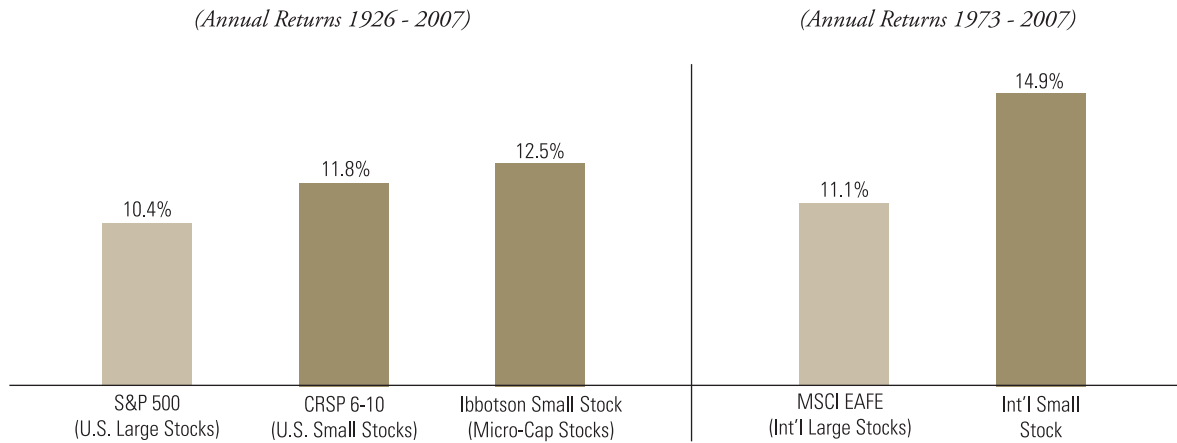
The average annual return is listed for each 3-year period from 1927 to the present for each decile. The largest and smallest stocks tend to act very differently each period. Small stocks provide a key to capturing higher returns and lower risk. The table shows that the vast majority of activity is at the two end-points of the continuum — very large and very small.

While reviewing the correlation values at the bottom of the table, keep in mind that it is on a scale from 1 to -1. A value of 1 indicates perfect correlation (no diversification benefit). Here the various stock sizes (based on deciles) are being correlated with the *S&P 500* (large stocks). A positive correlation means that the two investments tend to rise and fall together over time. A low or negative correlation indicates that the investments act differently, and when one investment is rising, the other may fall or go sideways.

It is noteworthy that mid-cap stocks act more like large stocks. This is evidenced by their high correlations ranging from 0.90 to 0.93. Thus, they provide comparatively little diversification benefit. In contrast, small stocks act quite differently, which is to say their correlation is lower. Their correlation to the *S&P 500* falls as low as 0.71. The benefit of diversification occurs at the size extremes, not in the middle.

Both in the U.S. and Internationally, Small Stocks Offer Investors Higher Long-term Returns

Figure 9a



Blending Large & Small Stocks Enhances Diversification

(Three-year Rolling Returns - Highest & Lowest Returns Since 1927)

Figure 9b

Size Decile	Largest										Smallest				
	1	2	3	4	5	6	7	8	9	10					
1927-29	18.52	18.26	12.47	7.12	16.02	-1.94	4.55	0.37	-4.05	0.31					
1930-32	-26.70	-32.07	-30.57	-32.57	-33.53	-30.96	-34.62	-35.90	-35.16	-28.39					
1933-35	28.30	42.86	44.08	51.25	52.17	53.99	58.90	80.49	74.28	98.57					
1936-38	3.40	4.30	1.89	2.53	5.00	4.16	1.62	0.45	6.23	-5.26					
1939-41	-4.52	-6.86	-5.74	-4.58	-3.86	-3.46	-3.45	-6.52	-7.63	-12.81					
1942-44	17.93	28.00	25.43	31.03	36.31	36.38	45.48	49.05	61.70	94.02					
1945-47	9.39	12.47	12.41	13.42	13.04	13.49	11.21	11.45	15.49	16.69					
1948-50	16.53	17.36	17.84	15.43	16.58	16.81	17.53	15.06	16.16	22.47					
1951-53	11.96	12.16	10.88	8.78	7.24	7.44	8.36	4.58	4.81	0.12					
1954-56	27.22	25.03	26.41	25.19	25.85	27.52	26.38	24.60	27.84	28.10					
1957-59	12.77	14.45	15.12	17.95	17.21	13.76	18.83	16.68	20.88	17.67					
1960-62	4.96	6.62	5.97	4.47	1.89	1.09	0.87	2.69	1.31	1.64					
1963-65	15.67	18.28	20.37	19.15	20.09	23.96	22.26	22.84	19.73	24.39					
1966-68	5.58	9.89	14.41	17.34	21.49	24.10	23.60	32.52	34.99	45.92					
1969-71	3.43	0.13	3.08	-1.10	-2.90	-2.17	-6.42	-9.51	-12.27	-13.22					
1972-74	-8.47	-12.96	-13.96	-17.05	-16.74	-18.97	-20.72	-20.63	-23.99	-25.12					
1975-77	13.17	22.35	28.96	32.95	36.65	38.35	42.31	47.20	44.59	49.74					
1978-80	17.60	20.96	24.05	24.60	26.09	31.55	31.33	31.10	32.78	33.35					
1981-83	9.76	11.37	16.63	18.20	20.07	20.26	17.87	21.36	21.38	24.09					
1984-86	18.89	20.54	15.48	14.47	13.66	13.42	12.60	9.48	7.97	0.56					
1987-89	17.06	16.08	16.75	15.26	13.12	12.34	10.18	11.69	5.85	2.82					
1990-92	10.62	12.55	13.10	12.53	17.07	14.08	13.31	10.01	12.38	10.88					
1993-95	15.03	14.58	14.61	14.97	15.29	14.30	15.45	14.11	15.11	16.71					
1996-98	31.14	20.61	16.39	17.13	9.74	15.16	15.52	14.07	12.88	8.15					
1999-01	-3.06	2.88	6.51	5.06	4.62	9.86	8.02	13.53	15.30	15.08					
2002-04	1.70	10.90	10.10	12.15	10.78	12.68	11.35	15.44	16.36	29.17					
2005-07	8.71	11.66	10.06	8.84	11.19	7.62	8.01	6.06	3.77	5.87					
Correlation w/ S&P 500	.99	.96	.93	.90	.90	.87	.88	.81	.79	.71					

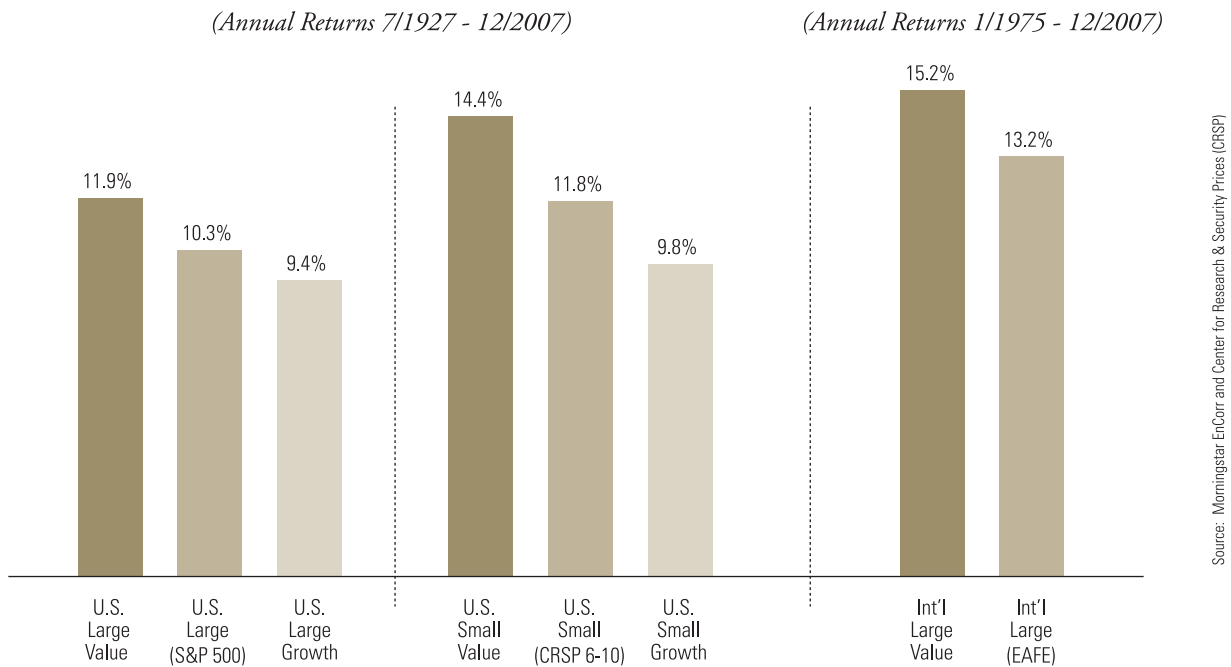
Highest Return Lowest Return

Source: Morningstar EnCorr, Dimensional Fund Advisors, and Savant Analysis

Value Stocks Outperform Growth Around the World²⁰

(Annualized Returns)

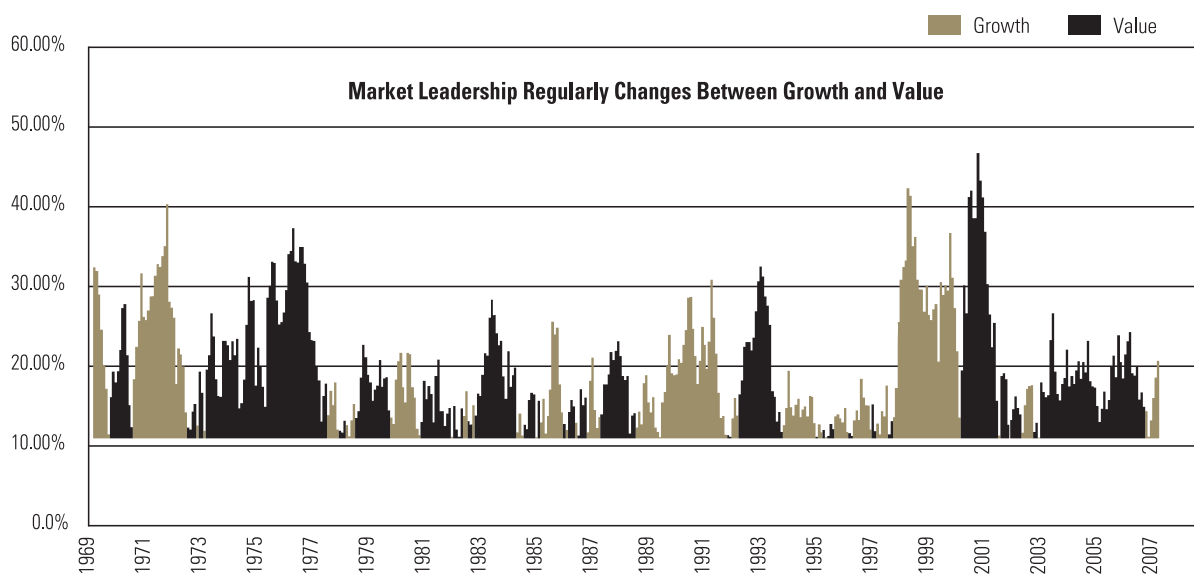
Figure 10a



Investors Should Still Own Some Growth Stocks Since at Times They Perform Well

(One-Year Growth & Value Trends 1969 - 2007)

Figure 10b



Source: Morningstar

10. Value Stocks Outperform Growth Stocks

Question: *Are value stocks preferable to growth stocks?*

As their name suggests, value stocks are generally thought to be a bargain: The price is low relative to company assets, sales, and earning potential. Value stocks often tend to be older companies that, for one reason or another, have fallen out of favor with the financial media. They no longer generate *buzz*.

Value stocks can be described as *on sale* or even *beat up*. Growth stocks, sometimes called *glamour stocks*, are splashed across the headlines of magazines and newspapers. Typically, these *cocktail party stocks* have had very good runs and thus attract a lot of attention. Growth stocks are winning stocks. Naturally, there are plenty of investors willing to buy them. However, as the evidence suggests, there is a catch. The high expectations generated by heavy media coverage often cause growth stocks to be overpriced.

Both history and evidence vindicate the value investor over the growth investor. Since 1927, value stocks have outperformed growth stocks. This holds true in large, small, and international categories. The margins are sizeable across the board. U.S. large value stocks beat large growth stocks by 2.5%, and U.S. small value stocks beat small growth by 4.6% (**Figure 10a**).

In their breakthrough study, *Value versus Growth: The International Evidence*, Eugene Fama & Kenneth R. French

demonstrated that value stocks have higher returns than growth stocks outside the U.S.¹⁹ They demonstrated that “value stocks have higher returns than growth stocks in markets around the world.” For the 20-year period covered by their study, the difference “between the average returns on global portfolios of growth and value stocks is 7.68% per year. Furthermore, value stocks outperformed growth stocks in 12 of 13 major markets.” Value stocks only lagged in Italy, a market notorious for its poor accounting data.

Faced with the historical superiority of value over growth stocks, it can be tempting to consider investing exclusively in value. But once again the evidence warns against too much concentration in one area of the market. In fact, there are some periods of time, such as the late 1990s, when growth stocks outperformed value stocks by a wide margin (**Figure 10b**). The graph illustrates the variation in value and growth trends over an extended period of time. While value stocks are preferable, an asset mix that includes both value and growth provides the diversification necessary to reduce risk.

Of course, investing in value stocks does not require the selection of individual stocks any more than investing in small stocks. Value stocks, like small stocks, are a distinct class of securities that can be quantifiably defined, captured using a specialized index fund, and added to a portfolio to maximize return for an investor’s appropriate level of risk.

11. The Importance of International Investing

Question: *Is it advantageous to diversify overseas?*

Given the immense size of the U.S. capital markets and the unpredictability of many foreign economies, many investment professionals limit their clients' portfolios to domestic securities. In the past, it was indeed possible to invest in the domestic stock market and be quite well diversified. With changes in the global economy, following this approach today results in the loss of significant return and diversification opportunities.

As **Figure 11a** illustrates, the U.S. market now makes up less than half of the world's market capitalization. It is important to note that some countries lack stability and represent significant risk to investors. Accordingly, not all of the 114 countries with stock markets have securities available for U.S. investors.²³ The companies listed on foreign stock exchanges number more than 46,000²⁴ compared to roughly 9,300 in the U.S.²⁵

The global economy is now substantially larger than that of the U.S., with 79% of world gross domestic product presently generated outside the United States.²⁶ Recently, China and India have experienced economic growth that has been much more rapid than in the U.S. Today, nearly 20% of U.S. consumer dollars go overseas (**Figure 11b**). Foreign companies now dominate several global industries such as energy and textiles. It

should come as no surprise that foreign stocks behave differently than U.S. stocks, making them an excellent source of broad portfolio diversification.

Research shows that from 1970 to 2007, the correlation between international stocks and U.S. stocks was very low, with even lower correlation between international stocks and U.S. small stocks.²⁷ In the 1980s, foreign markets provided the highest returns. In the 1990s the U.S. market dominated. Overseas markets have again outperformed so far in the 2000s (**Figure 11c**).

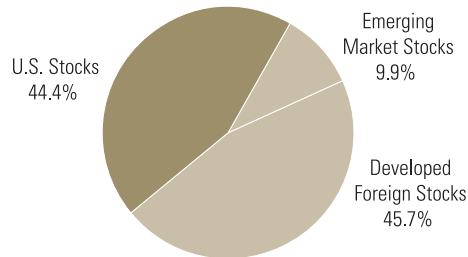
There are significant advantages to a global investment strategy that includes Europe, the Pacific, the Americas, and emerging markets. International investing broadens exposure to opportunities, allowing the investor to diversify over a much larger number of stocks. It is sensible for U.S. investors to make investment choices that mirror their global consumption habits and invest in companies with whom they do business.

As illustrated in **Figure 11d**, a portfolio that includes both domestic and international equities has experienced higher returns and lower risks than a portfolio composed solely of either U.S. or international stocks. In the end, there is no more compelling evidence for the inclusion of international stocks in a diversified portfolio.

Where is the World's Wealth Located?

(Global Market Capitalization as of 2007)

Figure 11a

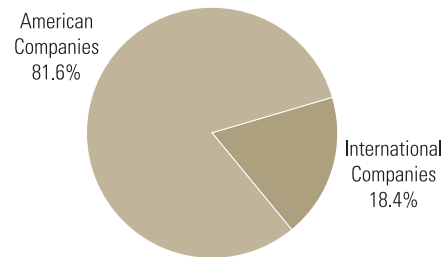


Source: Dimensional Fund Advisors

Where Americans Spend their Money²¹

(As of December 2007)

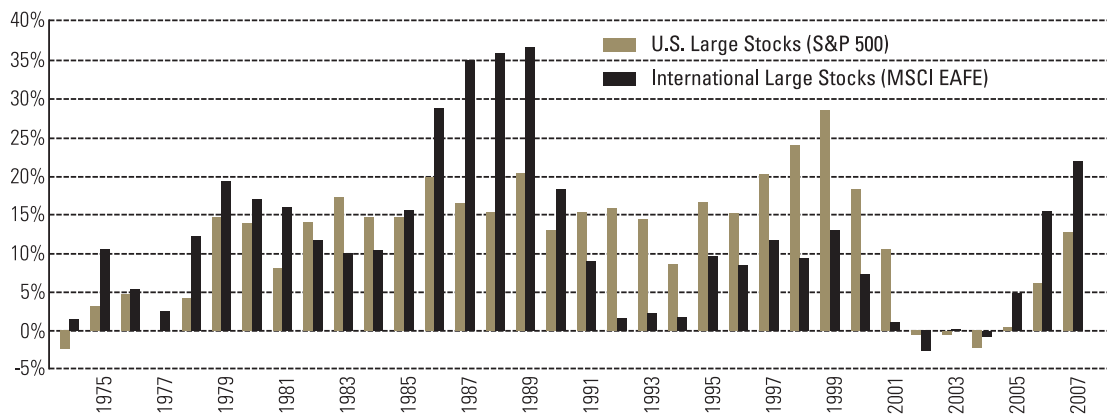
Figure 11b



Comparing U.S. & International Stock Performance

(Five-year Holding Periods Between 1970 - 2007)

Figure 11c

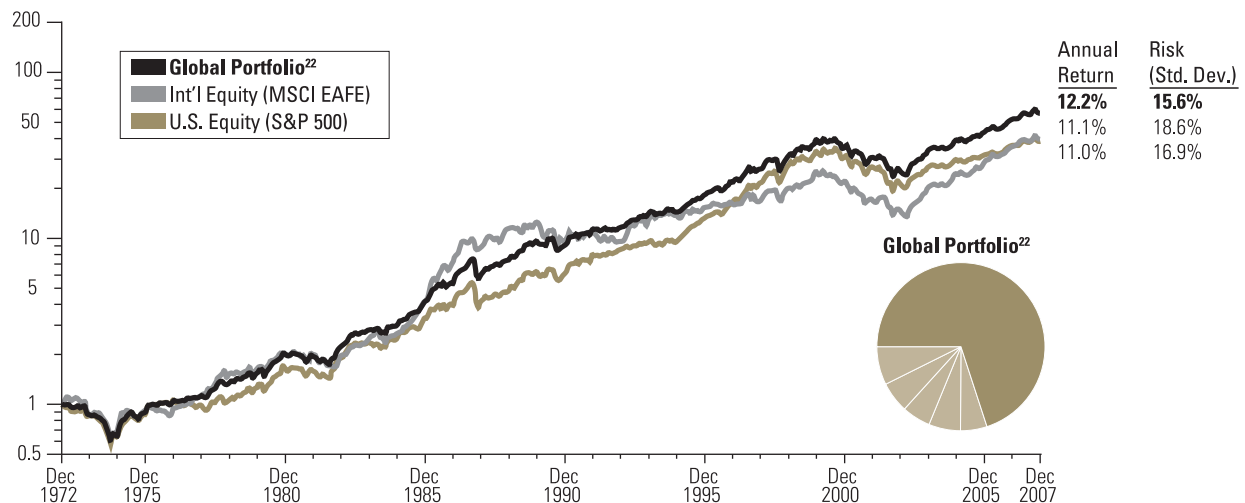


Source: Savant Analysis and Morningstar EnCorr

Global Strategies Earned More with Less Risk

(Growth of \$1 and Annual Returns 1973 - 2007)

Figure 11d

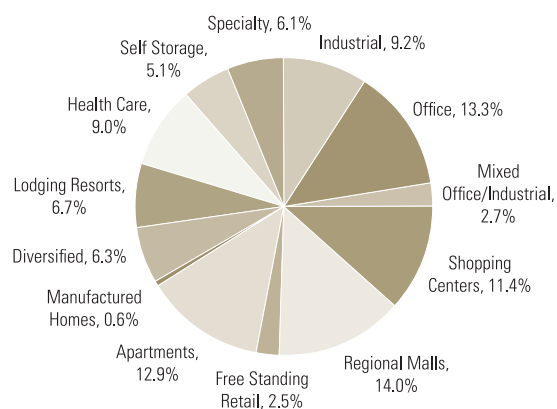


Source: Savant Analysis and Morningstar EnCorr

Equity REITs Invest Across a Broad Array of Real Estate Sectors³⁰

(Index Components as of December 2007)

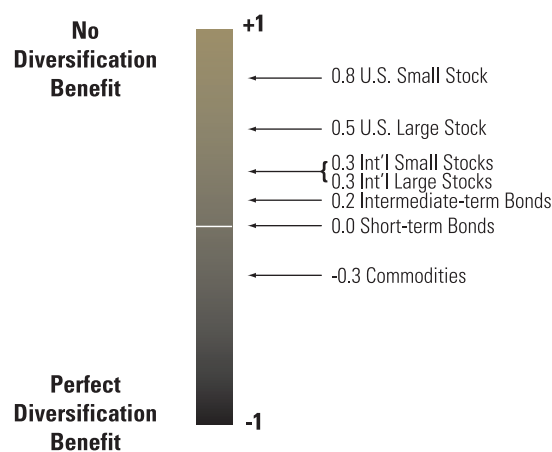
Figure 12a



REITs Offer Unique Diversification

Correlation of REITs vs. Other Asset Classes (1973 - 2007)

Figure 12b

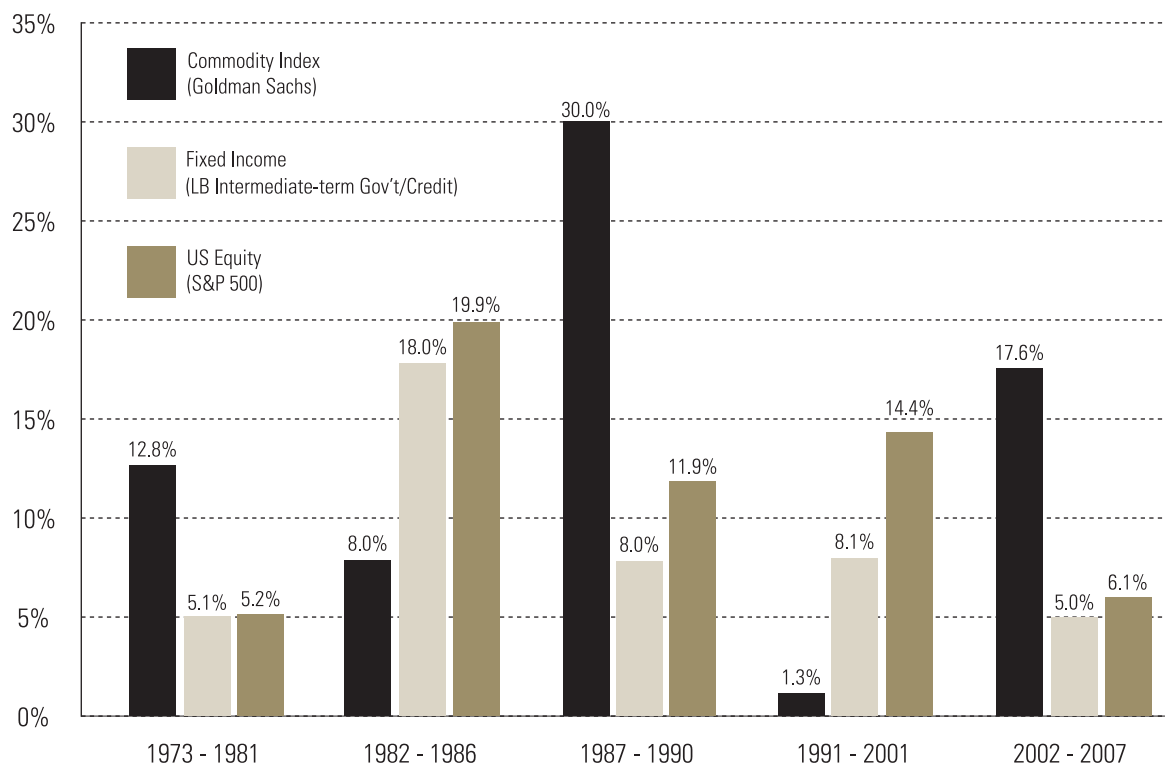


Source: Savant Analysis and Morningstar EnCorr

Commodity Cycles Vary Significantly from Stock and Bond Asset Classes

(Annual Returns For Selected Cycles 1973 - 2007)

Figure 12c



Source: Savant Analysis and Morningstar EnCorr

12. Reinforcing Diversified Portfolios with Alternative Investments: REITs & Commodities

Question: *Should diversified portfolios invest in assets other than stocks and bonds?*

REITs (real estate investment trusts) and commodities add a dimension of portfolio protection by virtue of their low correlation with stocks and bonds. The section on bonds illustrated the impact of diversification with an example of a vendor selling umbrellas and sunglasses. His two wares had very low correlation to one another. The vendor reduced the risk of losing money on any given day. In portfolio design, correlation describes this relationship in terms of the rise or fall of different investments or, more precisely, different asset classes.

REITs are publicly traded stocks that invest in various real estate projects. As can be seen in **Figure 12a**, equity REITs invest across a broad array of real estate sectors. Historically, equity REITs have outperformed both traditional U.S. large stocks and bonds.²⁸ The correlation scale in **Figure 12b** illustrates the relationship between REITs and various other asset classes since 1973. REITs have a low to moderate correlation with small stocks, large stocks, and bonds. They are negatively correlated with commodities.

For most investors, REITs are superior to other alternative investments like private equity and hedge funds. Their availability, low costs, liquidity, and transparency make them a great addition to the portfolio. In contrast, private equity

investments are illiquid and often difficult to access. Hedge funds are extremely expensive, secretive, risky, and unregulated.

Commodities – which include energy, precious and industrial metals, and agricultural assets – are another type of alternative investment offering diversification benefits. The vendor in the previous example is a shrewd businessman because his umbrellas and sunglasses have a negative correlation, which reduces risk. As depicted in **Figure 12c**, commodity returns are very different compared to stocks and bonds during a variety of market cycles. In fact, commodities actually exhibit negative correlation to the traditional asset classes. For example, the *Goldman Sachs Commodity Index* and the *S&P 500 Index* (U.S. large stocks) have exhibited a negative correlation of -0.3 since 1973.²⁹ Commodities are also negatively correlated to bonds.

The evidence shows that adding REITs and commodities to a basic portfolio results in a clear diversification benefit. Measured allocations of REITs and commodities enhance diversification and limit risk by exposing the portfolio to asset classes that behave differently than regular stocks and bonds.

Portfolios benefit from alternative investments when they are transparent and accessible and also have low correlations to other major asset classes. REITs and commodities demonstrate these traits and are the logical completion of a broadly diversified portfolio designed to maximize returns and minimize risk.

13. Broadly Diversified Global Portfolios Achieve Better Returns

Question: *Can globally diversified index portfolios improve long-term returns and reduce risk?*

This paper draws on a wide array of the best available evidence to demonstrate the failure of active money management, building a case against stock selection, money manager selection, and market timing.

While repudiating the conventional approach to investing, this paper provides evidence in support of indexed investing, passive management, and broad global diversification guided by scientific methods. The findings include the following:

- Indexed investment strategies work.
- Asset allocation has a strong impact on returns.
- Owning a multitude of asset classes offers the dual benefit of increasing return while decreasing overall portfolio risk.
- Costs, which include published costs, hidden fees, and tax consequences, have a substantial impact on return.

Evidence shows that basic index funds outperform actively managed funds. This is true for the classic *S&P 500* index fund as well as simple stock/fund combinations such as the simple balanced index portfolio shown in **Figure 13a**.

An index portfolio using broad global diversification performed even better. The addition of a much wider range of asset classes increased returns and reduced risk.

While even the simple balanced index portfolio outperformed the average actively managed balanced fund by 0.6% (**Figure 13b**), the broadly diversified balanced index portfolio outperformed the simple version by an additional 1.9%. In total, the broadly diversified global index investor earned 2.5% more annually than the active investor (12.1% vs. 9.6%). At the same time, indexing decreased risk. Notice the maximum one-year loss of -33.2% for active balanced managers vs. -28.3% for the simple index option and -18.5% in the case of the broadly diversified 60/40 balanced index option.

Evidence clearly shows that the added wealth generated by the broad, globally diversified index option is substantial. As **Figure 13c** illustrates, since 1973, investors who saved \$1,000 in the broadly diversified global index portfolio accumulated more than twice the wealth of investors owning actively managed funds. It paid to defy conventional wisdom and follow the evidence.

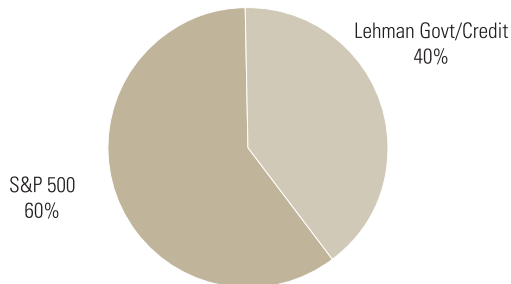
Simply put, the broadly diversified global index portfolio is a superior investment solution. This approach can be used to create broadly diversified global portfolios ranging from 100% stocks to 100% bonds, depending on the goals and risk tolerance of the individual investor. Broad global diversification reduces risk and generates better risk-adjusted returns. True diversification requires allocation among every viable asset class the market makes available to investors. Asset mixes without a broad and global reach close the door to effective diversification in today's global economy.

Broad Global Diversification Increases Return & Reduces Risk

(1973 - 2007)

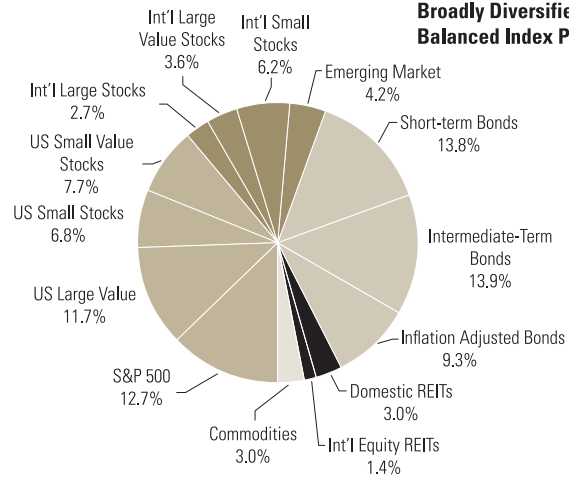
Figure 13a

Simple 60/40 Balanced Index Portfolio



Annual Return	10.2%
Standard Deviation	10.9%
Largest Decline	-28.3%

Broadly Diversified 60/40 Balanced Index Portfolio



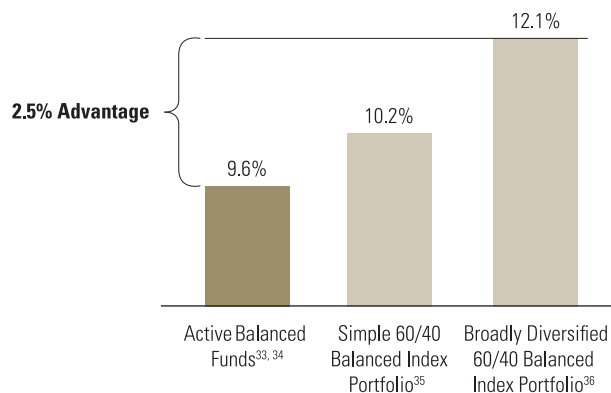
Annual Return	12.1%
Standard Deviation	9.6%
Largest Decline	-18.5%

Source: Savant Analysis and Morningstar EnCorr

Broadly Diversified Portfolios Deliver Higher Returns & Less Risk

(1973 - 2007)

Figure 13b



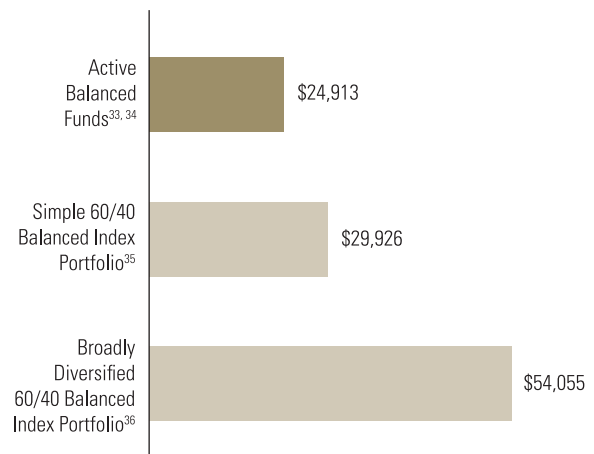
Standard Deviation	10.9%	10.9%	9.6%
Maximum Loss (1973-07)	-33.2%	-28.3%	-18.5%

Source: Savant Analysis, Morningstar Principia as of 12/31/07 and Morningstar EnCorr

Higher Returns Increase Wealth Over Time

(Growth of \$1,000, 1973 - 2007)

Figure 13c



Source: Savant Analysis, Morningstar Principia as of 12/31/07 and Morningstar EnCorr

The Evidence is Clear

SUMMARY

The purpose of this evidence-based approach to investing is to benefit the investor, whether individual or institutional. This paper demonstrates that the correct use and analysis of evidence can benefit the field of investing in much the same way as it has benefited the field of medicine. Approaching a problem or a set of questions from an evidence-based point of view has profoundly affected the field of medicine, and now investing.

Evidence-Based Investing - Negative Findings:

This paper has reviewed and analyzed the arguments supporting the conventional approach to investing. The best empirical data available has been analyzed to determine that:

- Market timing fails.
- Active money management fails.
- High costs cause money managers to fail.
- High taxes negate much of the return generated by active money management, causing even many “winners” to fail.
- Using past performance to pick money managers fails.

Evidence-Based Investing - Its Impact on Client/Advisor Relations:

Investing resembles the field of medicine in another aspect – there is an art to the practice. There cannot be one “cookbook” answer for each individual investor. Rather, an advisor should work to tailor an investment approach to each investor’s individual circumstances.

EBI processes are ongoing. Analysis of pertinent data should have a direct impact on current investment options and approaches. Changes in investment recommendations should be based on the most recent empirical data with the simple goal of increasing investor return while reducing risk.

Evidence-Based Investing - The Positive Results

The broad application of Evidence-Based Investing in the preceding overview has yielded seven investment propositions:

1. Index-based investing optimally delivers market returns.
2. An effective bond strategy, like the three-legged bond stool, reduces risk. Short, intermediate, and inflation-protected bonds protect against most adverse economic scenarios.
3. Small stocks add return and provide diversification benefits.
4. Value stocks offer a return premium globally.
5. Investing overseas enhances diversification and return.
6. Alternative investments, namely REITs and commodities, protect investors from inflation and challenging stock and bond markets.
7. Broad global diversification increases return and reduces risk.

In spite of the growing consensus and clear evidence against active management, the conventional active approach to investing is here to stay. Hopefully, armed with evidence and logic, the number of individual investors who get caught up in this unscientific approach will decrease. Why does the conventional view have such strong staying power? This question was asked by Nobel Laureate William Sharpe in his piece, “The Arithmetic of Active Management.” His answer follows:

More often, the conclusions (in support of active management) can only be justified by assuming that the laws of arithmetic have been suspended for the convenience of those who choose to pursue careers as active managers.³⁷

For us, the evidence is clear. This evidence presents a scientific framework investors can use to enhance the art of investing.

Appendix: Evidence-based Medicine: History and Methodology

The term *evidence-based medicine*, or EBM, was first used in the early 1990s. It is an attempt to apply the standards of evidence gained from the scientific method to certain aspects of medical practice in a uniform manner. EBM also seeks to judge the quality of specific evidence as it is applied to the assessment of the potential risks and benefits of a given treatment. According to the Centre for Evidence-Based Medicine at the University of Oxford, “Evidence-Based Medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients.”³⁸

Historically, testing the efficacy of medical interventions has existed for centuries. Alexandre Louis, a French physician, introduced an initiative called “*medecine d’observation*” in 1830. Louis stated to his colleagues that “physicians should not rely on speculation and theory about causes of disease, nor on single experiences, but they should make large series of observations and derive numerical summaries from which real truth about the actual treatment of patients will emerge.”³⁹ Unfortunately, Louis met with strong resistance from his fellow physicians, who practiced in an era of medicine that lacked the solid basic science and experimental background of modern medicine. “*Medecine d’observation*” failed shortly after its appearance.

A Scottish epidemiologist, Archie Cochrane, set forth much of the groundwork for EBM in his 1972 book *Effectiveness and Efficiency: Random Reflections on Health Services*. His work has been honored through the naming of centers of evidence-based medical research – Cochrane Centers. Cochrane’s efforts also led to the establishment of the *Cochrane Collaboration*, an international organization dedicated to tracking down, evaluating, and synthesizing randomized controlled trials in all areas of medicine.⁴⁰ The concept and terminology of EBM originated with David Sackett and his colleagues at McMaster University, with the term first appearing in the medical literature in 1992. An article in the 1992 *Journal of the American Medical Association* first used the term “evidence-based medicine”.⁴¹

In the 1980s there were several studies examining the utilization of various operations in the healthcare system in the northeastern United States. There were large variations noted in the amount and type of care provided to similar populations. Nearby counties with similar populations were found to have variations in the rates of prostate surgeries and hysterectomies of up to 300%. Variation in the rate of cataract surgeries was noted to be up to 2000%. Researchers concluded that physicians must use very different standards to determine the need for surgery in a given patient. With the same body of information and medical research available to all practitioners, wouldn’t one expect more uniformity in medical practice? On a daily basis,

clinicians are asked questions regarding the interpretation of a diagnostic test, the potential harm of a given medicine, the effectiveness of a preventive measure, the prognosis for a specific patient, and the cost effectiveness and consequences of a course of action. EBM gives physicians the ability to find a proven therapy for a patient.⁴²

The Methodology of EBM

EBM is an evolving methodology. There are a series of steps by which the method is used:

1. Formulation of a question that is to be answered.
2. Finding the best evidence of outcomes available.
3. Critical appraisal of the evidence.
4. Application of the evidence, including integration with clinical expertise and patient values.
5. Evaluation of the effectiveness and efficiency of the process.⁴³

Once evidence has been gathered, it is stratified according to the quality of the evidence. A commonly used system is the one developed by the U.S. Preventive Services Task Force:

- Level I: Evidence obtained from at least one properly designed randomized controlled trial.
- Level II-1: Evidence obtained from well-designed controlled trials without randomization.
- Level II-2: Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.
- Level II-3: Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled trials might also be regarded as this type of evidence.
- Level III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.⁴⁴

There are other alternative systems to categorize levels of evidence, such as the Oxford CEBM system:

- Level A: consistent Randomized Controlled Clinical Trial, Cohort Study, All or None, Clinical Decision Rule validated in different populations.
- Level B: consistent Retrospective Cohort, Exploratory Cohort, Ecological Study, Outcomes Research, Case-Control Study; or extrapolations from level A studies.
- Level C: Case-series Study or extrapolations from level B studies.
- Level D: Expert opinion without explicit critical appraisal, or based on physiology, bench research, or first principles.⁴⁵

Appendix: Continued

After evidence has been obtained, analyzed, and categorized, a recommendation can be given. A taxonomy has been developed to rate a recommendation, based on both the balance of the risk vs. benefit as well as the level of evidence upon which this evidence is based. The U.S. Preventive Services Task Force uses the following system:

- Level A: Good scientific evidence suggests that the benefits of the clinical service substantially outweigh the potential risks. Clinicians should discuss the service with eligible patients.
- Level B: At least fair scientific evidence suggests that the benefits of the clinical service outweigh the potential risks. Clinicians should discuss the service with eligible patients.
- Level C: At least fair scientific evidence suggests that there are benefits provided by the clinical service, but the balance between benefits and risks are too close for making general recommendations. Clinicians need not offer it unless there are individual considerations.
- Level D: At least fair scientific evidence suggests that the risks of the clinical service outweigh potential benefits. Clinicians should not routinely offer the service to asymptomatic patients.
- Level I: Scientific evidence is lacking, of poor quality, or conflicting, such that the risk versus benefit balance cannot be assessed. Clinicians should help patients understand the uncertainty surrounding the clinical service.⁴⁶

Example 1: Corticosteroids for Preterm Birth⁴⁷

The need for EBM, including the dissemination and use of the latest medical information, is illustrated by the case of corticosteroid use in the treatment of preterm birth. In 1972, a randomized controlled trial (RCT) was reported showing the improved outcomes for preterm infants whose mothers received corticosteroid treatment just prior to birth. From 1972 to 1989, six more RCTs were done on this subject, and all confirmed the findings of the 1972 study. During this time, most obstetricians were unaware of these studies, and corticosteroid treatment for mothers about to give birth to preterm infants did not become the accepted practice or standard-of-care. The first systematic review of the issue was published in 1989, and seven new studies were reported in the following two years. This treatment has been found to reduce the odds of a preterm baby dying from complications of immaturity by 30 to 50%, but thousands of babies did not benefit from this treatment because doctors did not know about the effectiveness of the treatment.

Example 2: Flecainide for the Treatment of Arrhythmias⁴⁸

The use of the drug flecainide in the treatment of heart patients during the 1980s demonstrates another instance of the dangers of the gap between research and clinical practice. At an address to the American College of Cardiology in 1979, Bernard Lown, the inventor of the defibrillator, pointed

out that one of the most common causes of death in young and middle aged men (20 to 64 years old) was heart attack. Moreover, he pointed out that arrhythmias, which often appeared as a result of a heart attack, were often the cause of death. He suggested that a safe and effective antiarrhythmic drug that protects against ventricular fibrillation could save millions of lives.

In response to this challenge, a paper was published in the *New England Journal of Medicine* regarding a new antiarrhythmic drug, flecainide. In a well designed randomized placebo-controlled cross-over trial, this local anesthetic was found to decrease the number of premature ventricular contractions (PVCs). The conclusions reached were quite straightforward: flecainide reduces arrhythmias, arrhythmias in heart attack patients cause death, therefore people who have had a recent heart attack should be given flecainide. Flecainide was approved shortly by the United States Food and Drug Administration, and this treatment soon became standard treatment for heart attack in the United States.

As flecainide became the standard of care, information about its use was published in medical textbooks. At the same time, researchers started gathering information on the survival of patients instead of the rate of PVCs. In other words, they started to actually measure the outcome as opposed to the mechanism. These subsequent studies showed that in the 18 months following a heart attack, more than 10% of the patients treated with flecainide died, which was about twice the number of deaths in the placebo group. Despite a useful mechanism of action – reducing cardiac arrhythmias – the drug was clearly toxic and overall did much more harm than good. Unfortunately, these subsequent studies received much less publicity than the original studies regarding the benefits of flecainide.

The widespread use of flecainide continued and actually expanded, and by 1989, about 200,000 people were being treated with the drug. Although good medical evidence to the contrary was available, the inappropriate use of flecainide continued due to the poor dissemination of the good quality outcome-based research studies.

The flecainide story demonstrates the importance of the dissemination of quality medical research. The initial information may have been more widely and readily accepted because it offered “a cure.” The follow-up studies were counterintuitive in their conclusions and negative with respect to a potential treatment. Doctors continued to prescribe flecainide because they believed it worked. They did not know that there was contrary information available. It is especially difficult to obtain information when one is unaware of its existence.

References, Notes, Sources of Data and Methodology:

Indexes used in analysis throughout the paper, except where otherwise noted.

U.S. Inflation – Consumer Price Index – Bureau of Labor Statistics

Treasury Bills – Ibbotson U.S. 30 Day T-Bill Index

Short-Term Bonds – Ibbotson U.S. 1 Year Treasury Constant Maturity Appreciation Index

Aggregate Bond – Lehman Brothers Aggregate Bond Index

Intermediate-Term Bonds – Lehman Brothers Intermediate Government/Credit Bond Index

Long-term Treasury Bonds – Ibbotson U.S. Long-term Government Index

Inflation Protected Bonds – 50% Lehman Brothers Intermediate Government/Credit Bond Index and 50% Ibbotson U.S. 1 Year Treasury Constant Maturity Appreciation Index (1/73 – 2/97), Merrill Lynch U.S. Treasury Inflation-Linked Securities Index (after 2/97)

U.S. Large Stocks – Standard & Poor's 500 Total Return Index

U.S. Large Value Stocks – Fama-French Large Value Index

U.S. Small Stocks – Ibbotson Small Stock Index

U.S. Small Value Stocks – Fama-French Small Value Index

Int'l Large Stocks – MSCI EAFE Index

Int'l Large Value Stocks – MSCI EAFE Index (1/73-12/74), MSCI EAFE Value Index (after 12/74)

Int'l Small Stocks – DFA International Small Company Index (1/73 – 9/96), S&P/Citigroup EPAC EMI Index (after 9/96)

Emerging Markets Stocks – 50% MSCI EAFE and 50% DFA International Small Company Index (1/73 – 12/84), IFC Emerging Markets Composite Index (1/85 – 12/88) IFCI Emerging Markets Composite Index (after 12/88)

REITs – FTSE NAREIT Equity REIT Index

Commodities – GS Commodity Index

[1] Centre for Evidence-Based Medicine. (n.d.). What is EBM? Retrieved August 4, 2008, from <http://www.cebm.net>

[2] Brinson, G., Singer, B., & Beebower, G. (1991, May/June). The Determinants of Portfolio Performance II, an Update. *Financial Analysts Journal*

[3] Hulbert Financial Digest (October 2007) and Savant analysis.

[4] Active fund returns are an average of domestic growth, blend, and value categories for each capitalization group in Morningstar Principia as of 12/31/2007. Averages exclude index funds, exchange-traded funds, and funds of funds. Study includes only the funds that survived the entire 15-year period. Many of the worst performing funds had already been liquidated or merged with better performing funds.

[5] FutureMetrics (2006, December); all companies with fiscal year ending December, with complete return data from 1988-2005. Provided by Dimensional Fund Advisors.

[6] Broadly diversified 60/40 is an index portfolio that consists of 12.7% S&P 500 Index, 11.7% U.S. Large Value Stocks, 6.8% U.S. Small Stocks, 7.7% U.S. Small Value Stocks, 2.7% Int'l Large Stocks, 3.6% Int'l Large Value Stocks, 6.2% Int'l Small Stocks, 4.2% Emerging Markets Stocks, 13.8% Short-Term Bonds, 13.9% Intermediate-Term Bonds, 9.3% Inflation Protected Bonds, 3.0% Domestic REITs, 1.4% Int'l REITs, 3.0% Commodities. See above for index definitions.

[7] Broadly diversified 70/30 is an index portfolio that consists of 15.0% S&P 500 Index, 13.7% U.S. Large Value Stocks, 8.0% U.S. Small Stocks, 9.1% U.S. Small Value Stocks, 3.1% Int'l Large Stocks, 4.2% Int'l Large Value Stocks, 7.3% Int'l Small Stocks, 5.0% Emerging Markets Stocks, 10.1% Short-Term Bonds, 10.1% Intermediate-Term Bonds, 6.8% Inflation Protected Bonds, 3.0% Domestic REITs, 1.6% Int'l REITs, 3.0% Commodities. See above for index definitions.

[8] We assumed a gross equity return (before expenses) of 10.40% for all equity performance calculations. This applies to index funds and actively managed funds. This return is based on the total return of the S&P 500 Index from 1926-2007 from Morningstar EnCorr. While there is some debate regarding the possibility of reduced expected equity returns in the future, it is beyond the scope of this paper to address that possibility. Accordingly, we simply assumed that equities perform at their historical return levels.

[9] The after-tax return for index funds or exchange-traded funds (ETFs) assumes investors earn gross equity returns of 10.4% (see endnote #8). We assumed a turnover of 4% and a dividend yield of 1.70%, based on actual values for the Vanguard Total Stock Market Index (Investor Class) from Morningstar Principia as of 12/31/2007. We assumed an expense ratio of .15% again based on the Vanguard Total Stock Market Index (Investor Class), which we took directly from Vanguard's website at www.vanguard.com as of 12/31/2007. We also assumed the entire position is liquidated at the end of twenty years and that low turnover would generate very small capital gains that would all be taxed at long-term rates. We believe this is a reasonable assumption based on the historical experience of index funds. We further estimate that additional trading costs are equal to .50% per annum per 100% portfolio turnover.

[10] To calculate the after-tax return and excess alpha needed by active strategies to match the index strategy, we assumed that investors earn gross equity returns of 10.4% (see endnote #8) reduced by fund expenses, trading costs, and taxes. The estimated after-tax returns are calculated using an algorithm developed in Working Paper 7007 in the National Bureau of Economic Research by John B. Shoven titled "The Location and Allocation of Assets in Pension and Conventional Savings Accounts (March 1999)." Using Morningstar Principia as of 12/31/2007, active domestic equity funds (excluding index funds, exchange-traded funds, funds of funds, and balanced funds) were divided into quartiles. Funds that did not report a turnover ratio were also excluded. "Low Turnover Funds," reflect an average of the funds in the lowest quartile in terms of turnover. "High Turnover Funds" reflect an average of the highest quartile. "Average Turnover Funds" reflect the total average of all active funds in the study. These groupings were used to calculate average values used throughout the study:
Low Turnover Funds – Turnover = 20%, Expense Ratio = 1.17%, Dividend Yield = 1.02%
High Turnover Funds – Turnover = 242%, Expense Ratio = 1.37%, Dividend Yield = .64%
Average Turnover Funds – Turnover = 100%, Expense Ratio = 1.26%, Dividend Yield = .74%
We further estimate that additional trading costs are equal to .50% per annum per 100% portfolio turnover. We also assumed that investors realized both long and short-term capital gains each year, and they are taxed accordingly.
Low Turnover Funds – assumed 90% long-term / 10% short-term
High Turnover Funds - assumed 10% long-term / 90% short-term
Average Turnover Funds – assumed 75% long-term / 25% short-term

For all actively managed strategies, we assumed the entire position is liquidated at the end of twenty years, and the investor pays the maximum long-term capital gains tax on any unrealized appreciation based on 2007 tax rates.

[11] The Vanguard Group (2008), Morningstar EnCorr, and Savant Analysis.

[12] Sharpe, William F. (1991, January/February). The Arithmetic of Active Management. *Financial Analysts Journal*.

[13] Edelen, Roger M., Evans, Richard B. and Kadlec, Gregory B. (2007, March). Scale Effects in Mutual Fund Performance: The Role of Trading Costs.

[14] Morningstar Principia as of 12/31/2007. All domestic equity funds, less REITs and balanced funds (distinct portfolios) = 1,268 funds that survived from 1998 – 2007. Funds without a record over the entire period were excluded. Many of the worst performing funds had already been liquidated or merged with better performing funds.

[15] Domestic Large Growth Funds (distinct portfolios) ranked by calendar year performance. The data was pulled for each individual year separately from Morningstar Principia's database as of December for each year. Percent represents the number of funds that were able to remain in the top 100 from one year to the next.

References, Notes, Sources of Data and Methodology Continued:

- [16] One Month Treasury Bills = Ibbotson U.S. 30 Day T-Bill Index
Six Month Treasury Bills = Merrill Lynch Six-month U.S. Treasury Bill Index
One Year Treasury Bonds = Ibbotson U.S. 1 Year Treasury Constant Maturity Appreciation Index
Five Year Treasury Bonds = Ibbotson U.S. Intermediate-term Government Index
Twenty Year Treasury Bonds = Ibbotson U.S. Long-term Government Index
- [17] Three-Legged Bond Portfolio = 50% Ibbotson U.S. 1 Year Treasury Constant Maturity Appreciation Index / 50% Lehman Brothers Intermediate Government/Credit Bond Index (1/88 – 2/97), 37.5% Ibbotson U.S. 1 Year Treasury Constant Maturity Appreciation Index / 37.5% Lehman Brothers Intermediate Government/Credit Bond Index / 25% Merrill Lynch U.S. Treasury Inflation-Linked Securities Index (after 2/97)
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U.S. Large Growth = Fama-French Large Growth Index
U.S. Small Value = Fama-French Small Value Index
U.S. Small = CRSP Deciles 6-10 Index
U.S. Small Growth = Fama-French Small Growth Index
Int'l Large Value = MSCI EAFE Value Index
Int'l Large = MSCI EAFE Index
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Used the following calculations:
$$\text{International Consumption \%} = \frac{\text{Total U.S. Imports}}{\text{Total American Consumption}}$$
$$\text{Total American Consumption} = \text{National Income} - \text{Exports} + \text{Imports}$$
- [22] U.S. Equity Portfolio = 100% S&P 500 Index International Equity Portfolio = 100% MSCI EAFE Index. See above for index definitions.
Global Portfolio = 70% U.S. Large Stocks, 4.8% Int'l Large Stocks, 6.3% Int'l Large Value Stocks, 11.2% Int'l Small Stocks, 7.6% Emerging Markets Stocks.
- [23] Central Intelligence Agency. (2008, March 20). Rank Order – Market Value of Publicly Traded Shares. *The World Fact Book*. Retrieved April 2008, from <https://www.cia.gov/library/publications/the-world-factbook/rankorder/220rank.html>
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- [25] As of 12/31/07, BigCharts.com listed 9,343 stocks on the NYSE, AMEX, NASDAQ, and Bulletin Board Exchanges.
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- [27] From 1970-2007, the correlation between the MSCI EAFE Index and the S&P 500 Index was .55. The correlation between the MSCI EAFE Index and the Ibbotson Small Stock Index was .44. Source: Morningstar EnCorr.
- [28] From 1973-2007 the annualized total return of the FTSE NAREIT Equity REIT Index was 13.2% compared to 11.0% for the S&P 500 Index and 8.2% for the Lehman Brothers Government/Credit Index. Source: Morningstar EnCorr.
- [29] Morningstar EnCorr.
- [30] National Association of Real Estate Investment Trusts. (2007, December). Investment performance by Property Sector and Subsector. Retrieved January 2008, from <http://www.nareit.com>
- [31] U.S. active funds turnover and expense ratio reflects average of all domestic equity funds in Morningstar Principia as of 12/31/2007 (excluding index funds, exchange-traded funds, funds of funds, and balanced funds).
- [32] Largest Total Market Index reflects Vanguard Total Stock Market Index (Investor Class) from Vanguard's website at <http://www.vanguard.com> as of 12/31/2007
- [33] Calculated using monthly historical returns from Morningstar Principia as of December 2007 for the Moderate Allocation Category. Returns from 9/1993 – 12/2007 are adjusted for survivorship bias per Morningstar's methodology. Returns from 1/1973 – 8/1993 include only the funds that survived the entire period. Many of the worst performing funds had already been liquidated or merged with better performing funds.
- [34] Active Balanced Funds Allocation = 49% U.S. Stocks, 11% International Stocks, 29% Bonds, 9% Cash, 2% Other. Source: Moderate Allocation Category from Morningstar Principia as of 12/31/2007
- [35] Simple Balanced (Index) Allocation = 60% U.S. Stocks, 40% Bonds. See above for index definitions.
- [36] Broadly Diversified Balanced (Index) Allocation = 39% U.S. Stocks, 17% International Stocks, 37% Bonds, 4% REITs, 3% Commodities. See above for index definitions.
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- [38] Centre for Evidence-Based Medicine.
- [39] Liberati, A. and Vineis, P. (2004) Introduction to the Symposium: What Evidence Based Medicine is and What it is Not. *Journal of Medical Ethics*.
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- [47] Glasziou et al
- [48] Glasziou et al

Savant Capital Management, Inc.

Savant Capital Management, Inc. (www.savantcapital.com) is an independent, fee-only wealth management firm headquartered in Rockford, IL. Since 1986, Savant has provided integrated investment management, financial planning, and family office services to financially established individuals, trust funds, retirement plans, and non-profit organizations.

Savant provides insight, wisdom, and perspective to clients. We provide direction and confidence regarding your financial decisions. Savant serves you in a manner that is fully transparent. This leads to greater peace of mind, simplicity, and clarity.

As a fee-only advisor, Savant does *not* receive benefits from brokerage services, commissions, or finder's fees. This independence allows Savant to remain impartial. Additionally, Savant does not sell products and thus delivers objective fiduciary advice and services that do not create conflicts of interest. We serve *only* you, our client. To assure that Savant adheres to industry best practices, we became one of the nation's first investment advisors to attain CEFEX Fiduciary Certifications from the Center for Fiduciary Excellence.

Savant provides much-needed wisdom and focus in an era of information overload. We offer a personalized, comprehensive, and integrated approach to clients' financial needs and help align your assets and decisions to achieve your ideal future.

Team Savant is comprised of highly educated, experienced, understanding, and responsible individuals who remain avidly alert for events, issues, or opportunities that may affect our clients' lives. The team understands the intricacies of how financial markets work and is proactive in conveying information to assist you in making decisions to meet your goals.

Savant is regularly recognized among the top wealth managers in the United States. In March of 2008, Savant was named the top independent advisor in Chicagoland by *Chicago* magazine. Recently, Savant was named by *Barron's* magazine as one of the 100 best independent financial advisors in the United States. *Inc.* magazine named Savant as the fastest growing Registered Investment Advisor in Illinois. Savant has also been recognized as one of the nation's top 100 financial advisors by *Worth* magazine each year since 1997. Since 2004, Savant has been selected by *Medical Economics* magazine as one of the 150 best financial advisors for doctors in the nation. In addition, Savant has regularly been included in other prestigious top advisor lists published by *Wealth Manager*, *Financial Advisor*, *Registered Representative*, *CPA Wealth Provider*, *J.K.Lassers*, and *Family Wealth Alliance*. Finally, in 2006, Savant was included in *The Wealth Factor—A Team Approach*, a book profiling ten of the most innovative and respected wealth management firms in the nation.

How Savant Maximizes Your Wealth

Savant's clients are not speculative, high-risk investors. All are concerned with preserving capital, growing assets, and avoiding the myriad of risks that abound in today's investment environment. To meet these objectives, Savant helps clients use the same Nobel Prize winning strategies traditionally reserved for the nation's largest institutional investors.

At Savant, your account is tailored to your individual needs, yet all clients share the common goal of maximizing after-tax returns at controlled levels of risk. Broad global diversification, based on sound asset allocation principles, is one of the most effective means toward this end.

Using comprehensive investment planning tools, Savant assists clients in determining the mix of financial assets best suited to their investment objectives, risk tolerance, and financial goals. For individual investors,

Savant considers income and estate tax to identify the most advantageous apportionment of investment assets among personal, family, charitable, and tax-deferred retirement accounts

Savant follows highly structured, systematic, and disciplined investment strategies designed to maximize wealth in a conservative and well thought-out manner. Our investment process intuitively makes sense because it is based on investment theory and evidence that has stood the test of time.

Savant's planning and client oriented approach allow you to more effectively maximize your assets, enhance the quality of your life, and realize your personal and financial goals.



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