Index Funds
The 12-Step Recovery Program for Active Investors

Mark T. Hebner
Foreword by Harry M. Markowitz
Praise for previous editions of Index Funds:

“Hebner gives us good advice presented in a very appealing manner. Index Funds remains one of the most valuable investment guides available.”

– Burton G. Malkiel, Ph.D.
Professor of Economics, Princeton University and author of

“It is really beautiful and really well done. I plan to use it as a reference guide.”

– David G. Booth
Founder and Executive Chairman, Dimensional Fund Advisors, Inc.,
Benefactor of the University of Chicago Booth School of Business

“...as this book documents so well, a foolish attempt to beat the market and get rich quickly will make one’s broker rich and oneself much less so.”

– Harry Markowitz, Ph.D.
Nobel Laureate in Economics, Professor of Economics at the
University of California at San Diego, Rady School of Management

“THIS BOOK IS WONDERFUL!”

– Theodore R. Aronson
Founder of Aronson Johnson Ortiz,
Institutional Investment Manager

“It is a valuable reference, and it benefits from many perspicacious commentaries.”

– Paul A. Samuelson, Ph.D.
Nobel Laureate in Economics and author of
Inside the Economist’s Mind: Conversations with Eminent Economists, 2006
Mark T. Hebner is a highly regarded authority on investing, author and creator of and is featured in an award winning documentary film on index funds. This is the condensed, updated and revised version of his original and widely praised first book, Index Funds.

Like many investors, Hebner’s conversion to passive investing was sparked by his realization that the traditional brokerage paradigm had substantially hampered his own investment success — causing him to significantly underperform a risk-appropriate index portfolio by as much as $30 million. This striking revelation about just how much damage Wall Street inflicts on unwitting individual and institutional investors has served as the impetus for his tireless efforts to educate and inform investors so they can make better investment decisions.

Hebner is on a mission to change the way the world invests by replacing speculation with an education. With this in mind, he leads a team of writers, artists, graphic designers, mathematicians, statisticians and researchers to build as well as maintain ifa.com — considered one of the Internet’s most comprehensive websites on investing. Hebner’s website, book, and documentary film, elegantly set forth long-term data and research that educate and empower investors to make sound investment choices.

This book is arguably the most artistic ever written on investing. It contains more than 65 original oil paintings created by distinguished artist, Lala Ragimov. It also includes more than 115 color charts and graphs, many of which reflect as much as 90 years of stock market data. This one-of-a-kind little jewel is an eye-pleasing manifestation of hundreds of studies, decades of research, and clearly represents Hebner’s ongoing commitment to educate investors throughout the world. It is destined to emerge as the go-to handbook for intelligent, evidence-based investing.

The financial services industry has a dark secret, one that costs global investors nearly $2.5 trillion each year. This secret quietly drains the investment portfolios and retirement accounts of almost every investor. In 1900, French mathematician Louis Bachelier unsuspectingly revealed this disturbing fact to the world. Since then, hundreds of academic studies have supported Bachelier’s findings. Unfortunately, investors pay little attention to academics and Nobel Laureates.

The dark secret is that managers don’t beat markets. The fact is that markets outperform managers by a substantial margin over long periods of time. This book offers overwhelming proof of this and shows investors how to obtain optimal rates of return by matching their risk capacity to an appropriate risk exposure. A globally diversified portfolio of index funds is the optimal way to accomplish this.

Index Funds: The 12-Step Recovery Program for Active Investors is the treatment of choice for wayward investors. It has been praised by Harry Markowitz, Burton Malkiel, David Booth and Theodore Aronson, among others. Investment advisor Anders Oldenburg of Seligson & Company nominated the previous version as one of the three “All-time Greatest Investment Books,” along with the writings of John Bogle and Warren Buffett.

Most investors continue to embrace an active investing strategy, despite the extensive academic research demonstrating its futility. Market timing or speculating on the next winning stock, fund manager or investment style are all akin to gambling. Below-market returns in investment portfolios and pension accounts are the result of investors gambling with their hard-earned money. This 12-Step Program will put active investors on the road to recovery. Each step is designed to bring investors closer to embracing a prudent and sound strategy of buying, holding and rebalancing an index portfolio.

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Index Funds
Index Funds
The 12-Step Recovery Program for Active Investors

by Mark T. Hebner

IFA Publishing
Irvine, California
This book is dedicated to: Beth, Brie, Kory, Ian, Tyler, Tessa and Emma
I would like to extend my gratitude to the many people who have assisted in the creation of this book. They include: Mary Brunson, Harry Markowitz, Wes Long, Jackson Lin, Tom Pohlen, Kai Xiong, Kayla Quattrone, Murray Coleman, Peter Broekelschen, Tom Allen, Robert Bray, Michael Auchterlonie, Simon Chang, Judy Baba, Cindy Mason, Michelle Ojeda and Tyler Collins. Many original works of art by Lala Ragimov and Aftab Alam bring color and life to the science of investing.

Thank you also to the many IFA team members, clients and friends who have assisted and encouraged me in my mission to change the way the world invests, by replacing speculation with an education.
# Table of Contents

**Foreword** ................................................. xi

**About the Author** ....................................... xvi

**Introduction** ........................................ xvi

**Step 1: Active Investors** ............................ 23

**Step 2: Nobel Laureates** ............................ 55

**Step 3: Stock Pickers** ............................... 77

**Step 4: Time Pickers** ............................... 99

**Step 5: Manager Pickers** ........................... 115

**Step 6: Style Drifters** ............................. 135

**Step 7: Silent Partners** ............................ 151

**Step 8: RiskeSe** .................................... 163

**Step 9: History** .................................... 189

**Step 10: Risk Capacity** ............................ 203

**Step 11: Risk Exposure** ........................... 225

**Step 12: Invest and Relax** ......................... 257

**About the Artist** .................................... 277

**Appendix A** .......................................... 278

**Appendix B** .......................................... 298

**References** ........................................ 300

**Index** ................................................. 308
Foreword

“It will fluctuate.”  
– J.P. Morgan’s reply when asked what the stock market will do.

In this volume, Mark Hebner meticulously refutes the idea that investors can beat the market by stock selection or market timing. Some readers may react with the thought that “perhaps most investors cannot beat the market, but some can. I merely have to emulate those with superior performance.” Examples of investors with sustained superior performance include the legendary Warren Buffett and David Swensen, Yale University’s chief investment officer, whose performance over decades has been widely admired and imitated by endowment and retirement plan managers, but with rare success.

If you examine the words and practices of these distinguished investors, you will find their above-market performance is not due to a set of rules which can be followed by individual investors. Rather, it is due to resources and opportunities which individual investors and most institutional investors do not have. Swensen tells how he does it in his book, “Pioneering Portfolio Management: An Unconventional Approach to Institutional Investment.” As noted in the title, Swensen’s book explains how an institutional investor (as distinguished from
an individual investor) might achieve above-market returns. He observes there is little chance for beating the market with well-followed securities such as large-cap and small-cap stocks. As to opportunities available to the institutional investor from less conventional sources, Swensen writes: “Populated by unusually gifted, extremely driven individuals, the institutional funds management industry provides a nearly limitless supply of products, a few of which actually serve fiduciary aims. Identifying the handful of gems in the tons of quarry rock provides intellectually stimulating employment for the managers of endowment portfolios.”

Few, if any, individual investors have the time and skill to separate the “gems” from the “quarry rock,” even if they were presented with similar opportunities. Any individual investor who believes he or she can achieve above-market performance is almost sure to underperform the market substantially.

Hardly any institutional investors are able to outperform their proper benchmarks. Among those who do accomplish this feat, their ranks largely change from year to year, making their discovery a moving target, as Mark Hebner shows in this volume. Swensen affirms the difficulty of identifying skilled fund managers. He states, “I erred in describing my target audiences. In fact, I have come to believe that the most important distinction does not separate individuals and institutions… few institutions and even fewer individuals exhibit the ability and commit the resources to produce risk-adjusted excess returns.”
Indeed, the challenge of ferreting out the gems from among the “tons of quarry rock” is more challenging than it might first appear.

While Warren Buffett has not written a text on the subject, his actions show his success — like Swensen’s — is in part due to his being offered opportunities not available to the individual investor. Specifically, he is offered the opportunity to take large positions in established companies at favorable prices. At such times, company information is made available to Mr. Buffett and his staff which is not routinely available to the public. Ultimately, however, it is his and his staff’s ability to evaluate such positions — to separate the gems from the quarry rock — that explains their long-run success. As in the case of Swensen’s outperformance, few individual investors have the time and skill to evaluate such opportunities, even if they were presented to them.

As to market timing, I know of no one who has consistently outperformed the market by market timing. Since there are always countless “authorities” who say to buy, and countless others who say to sell, there will always be many instances in which someone called correctly the last turn of the market, and even the last two or three turns. As Mr. Hebner documents, it is a foolish hope to try to emulate such market timers. It is better to go with J.P. Morgan’s advice — that all one knows about the market is that it will fluctuate.

J.P. Morgan’s observation has at least three implications. The obvious one is: Don’t try to time the market. You will
make your broker rich, not yourself. Another implication is you should choose a portfolio you can live with despite market fluctuations. For example, the year 2008 was not an “outlier,” nor was it even the worst year on record. Rather, it was tied for the second-worst year. It was a one-in-forty year event, not a one-in-a-thousand year event. The frightened investor who decided to get out of the market in March 2009 locked in his or her losses for good. The chief problem with investors is they buy after the market has gone up and believe it will rise further, and they sell after the market has fallen and believe it will fall more. One of the principal functions of the right financial advisor is to make sure the investor understands the volatility of his or her specific portfolio and is willing to stick with it for the long-run.

As Mr. Hebner explains, a third implication of the fact that markets fluctuate is the need to rebalance. Suppose an investor is comfortable with a 60-40 mix of stocks versus bonds. If the market has risen substantially, the portfolio’s equity exposure will greatly exceed sixty percent. The rebalancing process sells off the excess, bringing the portfolio back to a 60-40 mix. If the market has fallen, then the portfolio will have less invested in stocks than the target 60 percent. The rebalancing process then buys. This process of rebalancing — which sells after the market has gone up and buys after the market has gone down — is sometimes referred to as “volatility capture” and leads to what Fernholz and Shay (1979) refer to as “excess growth.” The rebalanced portfolio will grow faster than the average growth of its individual constituents. It may even grow faster than any one of its constituents due to
the rebalancing process. Thus, if handled knowledgeably, market volatility can be the investor’s friend.

“Money in the bank” sounds safe, but will do little to outpace inflation. On the average, over the long run, a well-diversified portfolio that includes stocks and bonds will almost surely continue to outpace both inflation and money in the bank. However, as this book documents so well, a foolish attempt to beat the market and get rich quickly will make one’s broker rich and oneself much less so.

– Harry Markowitz, Ph.D.
1990 Nobel Prize Recipient

Harry Markowitz, Ph.D. is best known for his pioneering work in Modern Portfolio Theory, for which he was awarded the 1990 Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel (referred to as the Nobel Prize in this book). In 1952, he developed the simple, yet profound notion that investors must consider the risk associated with their investments, not solely the return. This groundbreaking discovery sparked a financial revolution pertaining to the relationship between risk and return. He is widely known as the “Father of Modern Portfolio Theory”. Dr. Markowitz is also the recipient of the 1989 John von Neumann Prize in Operations Research Theory for his work in the areas of sparse matrix techniques and the SIMSCRIPT programming language, in addition to portfolio theory. He currently serves as an Adjunct Professor of Finance at the Rady School of Management at the University of California, San Diego.
Mark T. Hebner is the founder and president of Index Fund Advisors Inc., (IFA.com), author of the highly regarded book *Index Funds: The 12-Step Recovery Program for Active Investors*, is the creator and is featured in the award winning documentary film of the same name, and architect of ifa.com, one of the most comprehensive websites focused on investor education. This book and previous editions received praise from financial industry experts and academic luminaries, including John Bogle, David Booth, Burton Malkiel, and Nobel Laureates Harry Markowitz and Paul Samuelson.

Hebner is a respected speaker, frequent news contributor and authority on investing. His life’s mission is to “change the way the world invests by replacing speculation with education.” Hebner is especially knowledgeable about index funds, portfolio construction and the research indexes designed by Nobel Laureate Eugene Fama and Kenneth French. These indexes provide the building blocks for the prudent evidence-based investment strategies that Hebner implements for his IFA clients.

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INTRODUCTION

Americans work hard. On average we log 7.6 hours each working day, with many of us amassing far more hours to meet our current needs and secure our retirement. We are dedicated to our work and to saving for our “golden years.”

Rarely in the course of this frenetic pace do we stop to learn how to properly invest our savings so they can best work for us.

I was one of those people. I was fortunate enough to start a successful company right after I graduated from college. I was 32-years-old when I sold it and walked away with a very nice sum of money. Without a second thought, I deposited those proceeds with a big-name brokerage firm. They seemed to be looking out for my best interests and competent enough to grow my wealth through their stock-picking prowess. They had offices in high-rise towers. They had well-dressed analysts and impressive looking reports. I was confident they would effectively put my money to work for me.

Twelve years later, I woke up to the ugly truth that my confidence in that brokerage firm was unfounded, and my time spent trying to beat the market had been wasted.

Until that time, I believed the financial success of Wall Street brokerage firms was the result of creating wealth for their clients. I learned too late that brokerage firms did not get rich by enhancing their clients’ wealth, but rather (and ironically) by depleting it, transferring it slowly to their pockets in the form of commissions and margin interest that were in no way
justified by the below-benchmark returns. This steady transfer of funds from clients to brokers buys plenty of full-page ads in the Wall Street Journal and ample commercial time on CNBC to lure in even more clients, thus perpetuating the slow transfer of wealth that comes with each buy and sell.

Prior to my revelation, I lived with a nagging suspicion that my investments could do better. I suspected there was a better way to invest, but I never really had the motivation to find it. I was busy with my family and my work, and I could never put a finger on the risks I had taken or the returns I should have earned for those risks.

My revelation about the investment world came to me through a tragedy. A friend of mine was killed in a car accident. I told his widow I would help her in any way I could. A few years later, she said what she really needed was help with her investments. I knew she was relying on me to provide some good, solid help, and I also knew I was ill-equipped to give it.

“What do I know about investing?” I asked her. “My own portfolio hasn’t done that well.” I knew I had to do some research. I knew I needed to find a better way to invest, and I needed to share it with her. I revisited the finance courses from my MBA program at the University of California, Irvine. I went to the library and the bookstore and bought more than 20 books on investing, and I read them all. (My library now includes 2,565 books on finance, economics and investing dating back to 1648.) I dug into Burton Malkiel’s Random Walk Down Wall Street and John Bogle’s Common Sense on Mutual
Funds, among many others. What I discovered in the pages of those books was nothing short of stunning, but can easily be summarized as this: managers don’t beat markets.

At first I asked, “How could this be? We have all these managers in the world who are in business to beat the market, and yet, they’re not beating the market. The market is beating them.”

It struck me like a bolt of lightning: I didn’t just have the wrong brokers and managers, I had the wrong investment strategy altogether. With all of the time, effort and money spent trying to find the next hot stock or mutual fund manager, I would have been far better off had I simply bought, held and rebalanced a portfolio of index funds. How much better off? When I compared my own actively managed portfolio’s performance against the value of a risk-appropriate passively managed portfolio, I was struck with the harsh reality of the price I paid for my lack of investing knowledge. I call this my $30 million investment lesson.

I paid a very steep price for relying on an industry that profits handsomely when investors are kept in the dark. I wondered just how many others had paid a high price for too little knowledge and too much trust. I questioned how many more would suffer before the investment industry would awaken to its very own Howard Beale—who would finally muster the courage to step before the CNBC cameras to declare, “I’m mad as hell, and I’m not going to take it anymore.”

Awestruck by the glut of misinformation that served as the basis for poor investment decisions, I could not remain silent.
I knew I had found my mission in life, and I was determined to change the way the world invests. The World Wide Web provided the perfect medium for my mission.

Just as in the movie “Network,” in which Beale used the airwaves to deliver his message, I leveraged the Internet to deliver mine. In 1999, I launched what was the world’s first robo-advisor, which is now ifa.com, a free and comprehensive site that contains thousands of dynamic charts, graphs, articles, podcasts, books, videos and a documentary film based on this book. I did all of this to help investors learn about the value of a passive advisor with a fiduciary duty to its clients, one who advises on investments that can better capture the returns offered by markets around the world. At the same time, I launched Index Fund Advisors Inc., a fee-only fiduciary wealth services firm that works with individuals, retirement plans and institutions to invest in risk-appropriate portfolios properly matched to each investor’s risk capacity. With 41 employees, 2,400 clients and $3.86 billion in assets under management (March 2018), IFA’s mission has begun to become a reality.

This book incorporates the quality research and data that IFA uses to advance the financial futures of its clients. It is the same information I utilize daily to educate investors. Step by step, this book will lead you away from the pitfalls of active investing that threaten your long-term financial success and instead lead you toward a strategy that will efficiently put your money to work with the goal of providing you an all-around better investing experience.
You work hard enough. You don’t need to log any more hours or pay any more commissions to fund your broker’s retirement instead of your own. Read the following pages carefully, as they hold the key to your ability to optimally reap the returns for the risks you take.

Yes, you can finally invest and relax.

— Mark T. Hebner
July 2018
STEP 1: ACTIVE INVESTORS

“The investor’s chief problem, and even his worst enemy, is likely to be himself.”

Benjamin Graham, The Intelligent Investor; A Book of Practical Counsel, 1949

“The neural activity of someone whose investments are making money is indistinguishable from that of someone who is high on cocaine or morphine.”

Jason Zweig, Your Money & Your Brain, 2007

“There is something in people; you might even call it a little bit of a gambling instinct... I tell people investing should be dull. It shouldn’t be exciting. Investing should be more like watching paint dry or watching grass grow. If you want excitement, take $800 and go to Las Vegas.”


“When trillions of dollars are managed by Wall Streeters charging high fees, it will usually be the managers who reap outsized profits, not the clients. Both large and small investors should stick with low-cost index funds.”

Warren Buffett, February, 2017 Shareholder Letter
In the Martin Scorsese film, *The Wolf of Wall Street*, the senior broker at L.F. Rothschild, Mark Hanna, delivers broker training to Jordan Belfort over a cocaine and martini lunch. “The name of the game is to move the money from your client’s pocket into your pocket. Number one rule of Wall Street: I don’t care if you’re Warren Buffett or if you’re Jimmy Buffett, nobody knows if a stock is gonna go up, down, sideways or in [expletive deleted] circles, least of all stockbrokers. It’s all a fugayzi… It’s a fake.” Hanna goes on to highlight the lack of fiduciary duty to clients when he explains how clients keep trading with the broker because the clients are addicted to the process of trading. Hanna further explains that a broker needs to keep coming up with “brilliant ideas” to keep clients’ money at the firm and clients will keep trading “again, again and again” because they are addicted. Meanwhile, the client thinks he is getting rich, but that is only on paper, while the broker takes home “cold hard cash” via commissions. “That’s incredible sir,” exclaims Belfort, “I can’t tell you how excited I am.” Hanna: “You should be.”

Of course, the excitement of the broker equates to the despair of the client. My purpose in writing this book is to show you how to avoid becoming a victim to either an unscrupulous broker or to your own self-destructive behavioral tendencies that draw you into

*The lure of fast money makes you think active, but the record proves you’re better off passive.*

— The Speculation Blues
speculating, more generally known as active investing. This better way to invest is simply passive investing with index funds.

This *12-Step Recovery Program for Active Investors* will walk you through the land mines and pitfalls of active investing and show you a better way to invest. When you complete this 12-Step Program, you will understand the differences between speculating versus investing, and become aware of the emotional triggers that impact short-term decisions. You will also obtain an enlightening education on science-based and rules-based investing that may forever change the way you perceive how the stock market works. You will learn the hazards of speculation and the rewards of a disciplined investment strategy. The best part is that you can change your own investment behavior, which can lead to a more profitable and enjoyable life.

Emotions often override reason when it comes to investment decisions, leading to irrational and destructive behavior. The financial news media and Wall Street feed the fear, anxiety and other stressful emotions experienced by investors, resulting in less than favorable investment outcomes. This book will teach you how to hang on in the midst of market turmoil so you can earn the long-term returns of capitalism.

As you climb the 12 Steps illustrated in the following painting, you will abandon the gambling behaviors of the active investors located in the bottom right corner, ascend the stairs to claim your risk-appropriate portfolio (symbolized by the woman handing out colorful balls), and continue up to the balcony where individuals who have successfully completed their 12-Step Journey enjoy the tranquility of an “investing heaven.”
**Active Versus Passive Investing**

Active investing is a strategy investors use when trying to beat a market or appropriate benchmark. Active investors rely on speculation about short-term future market movements and ignore the lessons embedded in vast amounts of historical data. They commonly engage in picking stocks, times, managers or investment styles. As later steps demonstrate, active investors who claim the ability to outperform a market are in essence claiming to divine the future. When accurately measured, this is simply not possible. Surprisingly, the analytical techniques that active investors use are best described as qualitative or speculative, largely including predictions of future movements of stocks or the stock market. Bottom line, these methods prove self-defeating for active investors and actually lead them to underperform the very markets they seek to beat.

The first step in any 12-Step Program focuses on recognizing and admitting a problem exists. In this case, this means identifying the behaviors that define an active investor.

These include:

- Owning actively managed mutual funds
- Picking individual stocks
- Picking times to be in and out of the market
- Picking a fund manager based on recent performance
- Picking the next hot investment style
- Disregarding high taxes, fees and commissions
- Investing without considering risk
- Investing without a clear understanding of the value of long-term historical data
There are sharp contrasts between the behaviors of active and passive investors. Passive investors don’t try to pick stocks, times, managers or styles. Instead, they buy and hold globally diversified portfolios of passively managed funds. The term “passive” translates into less trading, more favorable tax consequences and lower fees and expenses than actively managed strategies.

A passively managed fund or index fund can be defined as a mutual or exchange-traded fund (ETF) with specific rules of construction that are adhered to regardless of market conditions. An index fund’s rules of construction clearly identify the type of companies suitable for the fund and the trading rules to implement the fund. Equity index funds would include groups of stocks with similar characteristics such as size, value, profitability and geographic location of a company. A group of stocks may include companies from the United States, international developed or emerging countries. Additional indexes within these markets may include segments such as small value, large value, small growth, large growth, real estate and fixed-income. Companies are purchased and held within the index fund when they meet specific index parameters and are sold when they move outside of those parameters. Think of an index fund as an investment utilizing rules-based investing.

Figure 1-1 illustrates the different characteristics between active and passive investing. Introduced in the early 1970’s, index fund investing has caught on, and for good reason. As the chart shows, index fund investors have fared better in returns and incurred lower taxes and turnover than active investors. They are also able to invest and relax.
**Active Versus Passive Investing**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Active Investing</th>
<th>Passive Investing</th>
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<tbody>
<tr>
<td>Return Objective</td>
<td>Beat a market</td>
<td>Obtain the return of a market, index or asset class</td>
</tr>
<tr>
<td>Style Definition</td>
<td>55% drift from classification (^1)</td>
<td>Pure and consistent classification</td>
</tr>
<tr>
<td>Average Equity Fund Investor Return Over 20 Years</td>
<td>5.29% per year according to Dalbar for 20-year period ending 2017 (^2)</td>
<td>S&amp;P 500 = 7.20% Annlzd Return. Global Equity Index Portfolio 100 = 9.04% Annlzd Return for 20-year period ending 2017 (^3)</td>
</tr>
<tr>
<td>Approach</td>
<td>Stock Picking, Time Picking, Manager Picking, or Style Drifting</td>
<td>Buy, hold and rebalance a globally diversified portfolio of index funds</td>
</tr>
<tr>
<td>Taxes</td>
<td>Higher Taxes (about 20-40% of return over 10 years) (^4)</td>
<td>Lower Taxes (about 10% of the return over 10 years) (^4)</td>
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<tr>
<td>Portfolio Turnover</td>
<td>A weighted average of fund categories in Index Portfolio 100 had a turnover of 65.9% in 2017 (^5)</td>
<td>Turnover of 15.7% in 2017 (Index Portfolio 100) (^6)</td>
</tr>
<tr>
<td>Net Performance</td>
<td>Expected to lag the index return by expenses &amp; mistakes. Higher taxes may result from more frequent realizing of capital gains</td>
<td>The index return minus low fees, low taxes, and sometimes, tracking error</td>
</tr>
<tr>
<td>Proponents</td>
<td>Virtually all Brokerage Firms, Mutual Fund Companies, Market Timing Services, Hedge Funds, Investment Press and Brokerage Training Programs</td>
<td>The Univ. of Chicago, Nobel Prize Recipients, Vanguard Group, Dimensional Fund Advisors, Barclays Global Investors, Warren Buffett, and Charles Schwab</td>
</tr>
<tr>
<td>State of Mind</td>
<td>Stressed</td>
<td>Relaxed</td>
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Sources: See page 300 reference No. 7.
Step 1: Active Investors

Problems

Emotions-Based Investing

Obsessively playing the stock market is recognized by Gamblers Anonymous as a form of gambling addiction. San Francisco clinical psychologist Paul Good developed a set of warning signs that may reveal whether an active investor is actually a compulsive gambler in disguise. Among them are a preoccupation with the financial media, borrowing to speculate (leverage), inability to cease or control trading activity and throwing good money after bad in order to break even. As the head of the Gambling Disorders Clinic at Columbia University, Dr. Carlos Blanco has a lot of experience with gambling addicts, and he says one difference between obsessive active investors and chronic gamblers is the age in which the disease is most prevalent. Pathological gamblers are typically in their late teens and early 20’s while people who are addicted to speculating in the stock market are commonly in their 30’s and 40’s. According to Christopher Burn, a gambling therapist at U.K.-based Castle Craig Hospital, development of intensive evidence-based therapies to treat compulsive stock trading and online ‘day trading’ are poised to become two of the biggest behavioral health challenges in the decades ahead.

Behavioral finance is a field that studies the connection between investors’ emotions and their financial decisions. In The Little Book of Behavioral Investing: how not to be your own worst enemy, author James Montier talks about the importance of planning ahead to protect us from the “behavioral biases that drag down investment returns.” He highlights the need for
investors to pre-commit to an investment strategy in order to avoid the pitfalls of emotional decisions.

In *Your Money & Your Brain,* financial writer Jason Zweig details evidence of the release of addiction-related dopamine in our brains when we anticipate big wins. “The dopamine rush we get from long shots is why we play the lotto, invest in IPOs, keep too much money in too few stocks, and invest with active portfolio managers instead of index funds,” Zweig states. “Our brains are wired to force us into forecasting; it is a biological imperative. In fact, humans are born with what I’ve come to call ‘the prediction addiction.’” Several researchers working in neuroeconomics, including Harvard’s Hans Breiter, have identified a striking similarity between the brain’s reaction to cocaine and the prediction of financial rewards.11

Even wealthy individuals struggle with emotions management and investing discipline. A Barclay’s study12 found that 41% of high net worth investors wished they had more self-control over their investing decisions. The study concluded that emotional trading can cost an investor about 20% in returns over the 10-year period studied. Investors who prevented themselves from over-trading through specific strategies were on average 12% wealthier than those who did not use self-control mechanisms. These self-control strategies include minimizing time spent checking their portfolios or seeking advice prior to making a buy or sell decision.

Several behavioral biases that affect decisions may include:

- **Overconfidence:** People mistakenly believe they can outperform the market.
• **Hindsight bias:** Investors think past events were predictable and obvious and believe they should have known better, when in truth, news is what moves the markets, and past events could not have been predicted in advance.

• **Familiarity bias:** Investors invest only in stocks they know, which provides a false sense of security. An example may be a “legacy” stock that’s been passed down in a family through generations. Geographical bias also comes into play when investors choose stocks of companies headquartered in their state or region of residence, which can lead to undiversified investments.

• **Regret avoidance:** Investors vow to never repeat the same decision if it resulted in a previous loss or missed gain, not accepting that the future cannot be predicted.

• **Self-attribution bias:** Investors tend to take full credit for investment gains and blame outside factors for losses, wrongly attributing success to personal skill instead of luck.

• **Extrapolation:** Investors base decisions on recent market movements, assuming the perceived trend will repeat.

These behavioral biases cause investors to believe they have control in areas where they actually have little or none. A disciplined, rules-based investing approach involves the understanding of the factors we can and cannot control, planning ahead and not giving into emotions when making investment decisions.
Figure 1-2 depicts the roller coaster of emotions active investors experience. In the emotional cycle, they wait until they feel confident their selected investments are on a perceived upward trend; then they place their orders. But once prices have fallen, doubt sets in. When that doubt turns to fear, they often sell the investment, resulting in a loss.

*Figure 1-2*

**Emotions of Active Investors**

<table>
<thead>
<tr>
<th>Hypothetical 5-Year Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
</tr>
<tr>
<td>Medium</td>
</tr>
<tr>
<td>Low</td>
</tr>
</tbody>
</table>

- **Buy after prices have increased.**
- **Sell after prices have decreased.**

In contrast, Figure 1-3 shows the relaxed emotions that indexers enjoy by accepting market randomness and relying on investing science instead of making decisions based on emotions. Passive investors invest regardless of market conditions, because they understand that short-term volatility is unpredictable. They know that succumbing to gut instincts and emotions undermines long-term wealth accumulation. They also know that news about capitalism is positive on average, but involves some stomach-churning volatility.
In order to regulate their risk, passive investors also engage in periodic rebalancing and are rewarded over time for their discipline. Figure 1-4 depicts the disciplined emotions.
and approach of “Rebalancers” who sell a portion of their funds that have grown beyond their target allocation and buy more of other funds to restore their target allocation. This is actually the opposite behavior of active investors, because rebalancers will sell a portion of their portfolio after it has gone up and buy more of those investments that have declined in order to maintain a target asset allocation. This strategy seems counter intuitive and can be emotionally difficult to implement. Rebalancing requires discipline and ensures that a portfolio will remain at a relatively constant level of risk.

The impact of emotional triggers on investor performance is a subject of much analysis. An annual study called the Quantitative Analysis of Investor Behavior (QAIB), which has been conducted by Dalbar since 1994, attempts to measure the impact of investor decisions to buy, sell and switch into and out of mutual funds. Each year the study has shown the average mutual fund investor earns significantly less than the actual mutual funds.

“No matter what the state of the mutual fund industry, boom or bust: Investment results are more dependent on investor behavior than on fund performance,” a recent QAIB concluded. The report issued in April 2018 reiterated this finding, concluding that poor investor behavior caused the average equity mutual fund investor to underperform the S&P 500 index by 1.19% for the year 2017.

Honing in on the deleterious effects of performance chasing behavior, the QAIB found that mutual fund investors “who hold on to their investments have been more successful than those
who try to time their investments.” The report has shown for the 20th time in as many years that “the average investor earns less — in many cases, much less — than mutual fund performance reports would suggest.”

Figure 1-5 illustrates the results of the 2018 Dalbar study, which includes a comparison of the returns of an average equity fund investor to the returns of the market from 1998 through 2017. Permitting their decisions to be driven by short term volatility, the average equity fund investor earned returns of only 5.29%, while a buy-and-hold investment in the S&P

**Figure 1-5**

<table>
<thead>
<tr>
<th>The Dalbar Study: Average Equity Fund Investor vs. Indexes</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Years (1/1/1998 - 12/31/2017)</td>
</tr>
</tbody>
</table>

**Average Annualized Return**

- **BofA ML 1-Yr US Treasury Note Index**: 2.57%
- **Average Equity Fund Investor**: 5.29%
- **S&P 500 Index**: 7.20%
- **Global Equity IFA Index Portfolio 100**: 9.04%

**Growth of $100,000**

- **BofA ML 1-Yr US Treasury Note Index**: $166,067
- **Average Equity Fund Investor**: $280,377
- **S&P 500 Index**: $401,694
- **Global Equity IFA Index Portfolio 100**: $565,015

*Sources: Dalbar 2018 QAIB Study, © Morningstar, Inc., Appx A*
500 returned 7.2%. An investment of $100,000 made in 1998 grew to $280,377 over the 20-year period for an average equity fund investor, while the same amount invested in the S&P 500 grew to $401,694. Even better, an investor who owned an all-equity, small value tilted, globally diversified index portfolio would have grown a $100,000 investment to $565,015. Clearly, investor behavior can have a far more negative impact on investments than investors realize.

**The Folly of Active Investing**

The perils of active investing have been well chronicled throughout history. In fact, nearly 300 years ago, a Dutch pictorial book titled “Het Groote Tafereel der Dwaasheid,” or “The Great Mirror of Folly” painstakingly portrayed the fates that befell investors who heavily speculated as the world’s first major stock market crash unfolded.

In the 1600s, stock exchanges were formed in Amsterdam, Paris and London to bring together buyers and sellers of shares, mostly in companies relating to trade, banking and insurance centered on maritime expansion in the East and West Indies and along the Mississippi River.

The “Tafereel” depicts the promise and ultimate financial devastation experienced by the many investors who became swept up in the allure of amassing quick fortunes in the stock market, or what was called “the wind trade.”
The book includes approximately 79 copper engravings (such as the one above) that illustrate the tales of hope, hype, speculation and devastation. It represents stockbrokers as harlequins or sly foxes and investors as frantic and crazed gamblers. I discovered the “Tafereel,” and asked Lala Ragimov to recreate a particularly poignant scene titled: “Monument Consecrated to Posterity in Memory of the Unbelievable Folly of the 20th Year of the 18th Century.”

This scene from 1720 depicts a street in Amsterdam that had erupted into a trading frenzy. At the Quinquenpoix coffee shop, overflow trading became the norm because the exchange had become too crowded with traders manically trading to gain quick riches. At the scene’s center, a cart is being pulled
Step 1: Active Investors
by characterizations of the bubble stocks of the time, including companies like the South Sea Company, the Mississippi Company, the Dutch East Indies Company and the West Indies Company, a banking company and an insurance company. Driving the cart is Lady Insanity, while the Goddess Fortuna floats above, dropping stock certificates littered with snakes, while the devil blows bubbles in the air. Meanwhile, the flying Lady Fame slowly, but assuredly, leads the speculators to one of three destinations: the hospital, the mad house, or the poor house.

I bring this important book and painting to light because they reveal that the same blunders committed in 1720 are still being made today by investors who speculate in the stock market.

**Solutions**

**Index Fund Investing**

While active investors, or speculators, seek to outperform the markets, buyers and rebalancers of index funds seek to capture the returns of the global market in a low-cost and tax-efficient manner. Long-term passive index investors select funds that track defined asset class indexes. Regardless of market conditions, they stay the course and do not make investment decisions based on emotions or forecasts. Since a globally diversified portfolio of indexes has delivered returns of capitalism at a generous 11.22% annualized return over the last 90 years, a wise investment strategy is to buy, hold, rebalance and glide path a portfolio that is globally diversified across many asset classes or indexes.14
MATCHING RISK CAPACITY WITH RISK EXPOSURE

Stock market returns are compensation for bearing risk. Higher expected returns require higher risk. Therefore, investors should take on as much risk as they have the capacity to hold — their risk capacity. One of the most effective ways to determine risk capacity is to examine five distinct dimensions: an investor’s time horizon and liquidity needs, investment knowledge, attitude toward risk, net income and net worth. This is explained more fully in Steps 10 and 11.

VALUE OF A PASSIVE ADVISOR

Over a decade ago, Vanguard coined the term “advisor’s alpha” as a measure of the value added by passive advisors who adhere to the principles of controlling costs, maintaining discipline and tax awareness. More recently, Vanguard quantified the value of advisor alpha at 3%, basing their number on the sum of estimated values of cost savings from using low-cost funds, disciplined rebalancing, behavioral coaching and asset location/withdrawal strategies.¹⁵

Advisors who play an active role in emotions management can be referred to as “passive advisors.” These knowledgeable advisors help maximize investor success by providing the critical discipline required to combat emotional reactions like pulling out of the market the way so many did in the downturn that occurred in 2008 to early 2009. Passive advisors not only help to manage investors’ emotions, they are fiduciary stewards of their clients’ wealth.
Figure 1-6 is a compilation of 20 data points from 15 similar studies that sought to determine the success of the average investor at capturing mutual fund or benchmark portfolio returns. The studies include investors who were following or not following the advice of a passive advisor. Since they leave intuition and forecasting out of their decision making process, passive advisors are also referred to as evidence-based advisors.

Within Figure 1-6, the blue bars indicate that the average mutual fund investor, without the advice of a passive advisor, captured only an average of 50% of fund returns. The purple bars represent investors who invested in index funds, but did not follow the advice of a passive advisor. On average, they captured 80% of the returns of various index funds. Possible explanations might include the failure to rebalance asset allocations during market turbulence, the delay of investing when cash is available, the inability to stay invested during rocky markets, or the failure to heed the ongoing advice of their passive advisor.

The green bars reveal the results of two time periods that looked at the success of index fund investors who have been identified as following the advice of their passive advisors. One study was conducted by my own firm, IFA, and the other by Morningstar in the 2005 Morningstar Indexes Yearbook. These two data points show that individuals who invested in Dimensional Fund Advisors’ funds and used passive advisors captured, on average, all of the fund returns and even a bit more — 105% of the fund returns.
Figure 1-6

**Investor Success at Capturing Fund Returns**

<table>
<thead>
<tr>
<th>Source of Studies</th>
<th>Investor Success</th>
<th>Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Little Book of Common Sense Investing, p. 56</td>
<td>0%</td>
<td>10 Yrs (1995-2005)</td>
</tr>
<tr>
<td>Dalbar QAIQ Study 2013 (Bond Funds), p. 12</td>
<td>21%</td>
<td>20 Yrs (1993-2012)</td>
</tr>
<tr>
<td>Bogle Financial Markets Research Center, Sec. 2</td>
<td>27%</td>
<td>10 Yrs (1996-2005)</td>
</tr>
<tr>
<td>Dalbar QAIQ Study 2014 (Equity Funds), p. 12</td>
<td>39%</td>
<td>30 Yrs (1984-2013)</td>
</tr>
<tr>
<td>Bad Timing Eats Away at Investor Returns, Morningstar.com</td>
<td>53%</td>
<td>10 Yrs (2000-2009)</td>
</tr>
<tr>
<td>The Arithmetic of “All-In” Investment Expenses, P. 19</td>
<td>58%</td>
<td>15 Yrs (1998-2013)</td>
</tr>
<tr>
<td>Advisor’s Alpha: The View from Vanguard</td>
<td>68%</td>
<td>30 Yrs (1984-2013)</td>
</tr>
<tr>
<td>Do UK Retail Investors Buy at the Top and Sell at the Bottom?</td>
<td>82%</td>
<td>18 Yrs (1992-2009)</td>
</tr>
<tr>
<td>IFA Client Study</td>
<td>69%</td>
<td>7 Yrs (2008-2014)</td>
</tr>
<tr>
<td>The Little Book of Common Sense Investing, p. 56</td>
<td>78%</td>
<td>10 Yrs (1995-2005)</td>
</tr>
<tr>
<td>IFA Client Study</td>
<td>101%</td>
<td>7 Yrs (2008-2014)</td>
</tr>
</tbody>
</table>

Sources: See Appendix
Don Phillips was the Managing Director of Morningstar when that report was issued. He summarized his findings this way: “Consider the success Dimensional Fund Advisors has had in selling its funds through advisors who undergo training on the merits of passive investing and in portfolio construction theory. Consider that over the past decade the dollar-weighted return of all index funds was just 82% of the time-weighted return investors could have gotten with those funds. Yet, the figures for Dimensional are much better. In fact, the dollar-weighted returns of Dimensional funds over the past 10 years are actually higher than their time-weighted returns, suggesting advisors who use Dimensional encourage very smart behavior among their clients, even buying more out-of-favor segments of the market and riding them up, rather than buying at the peak and riding the trend down, which is usually the case with fund investors.”\(^{18}\) The findings of the Morningstar report are shown in Figure 1-7.

<table>
<thead>
<tr>
<th>DFA Passive Funds with an Advisor vs. All No-Load Index Funds</th>
<th>10-yr Dollar Weighted Return</th>
<th>10-yr Time Weighted Return</th>
<th>+/- Difference</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DFA Funds</strong></td>
<td>10.81%</td>
<td>9.90%</td>
<td>+0.91</td>
<td>109%</td>
</tr>
<tr>
<td><strong>All No-Load Index Funds</strong></td>
<td>7.07%</td>
<td>8.65%</td>
<td>-1.58</td>
<td>82%</td>
</tr>
<tr>
<td><strong>The DFA Advantage</strong></td>
<td><strong>3.74%</strong></td>
<td><strong>1.25%</strong></td>
<td><strong>2.49</strong></td>
<td><strong>27%</strong></td>
</tr>
</tbody>
</table>

Source: Morningstar Indexes Yearbook, 2005

Knowledgeable passive advisors help their clients stay invested and rebalance throughout market turbulence. Such behavior
enables these investors to maximize their ability to capture returns and provides justification for the right advisor. Many investors are lured into do-it-yourself indexing through index funds and exchange-traded funds (ETFs). This is a step in the right direction, but without an advisor, I would estimate that those investors have not experienced the full value of passive indexing. Quality passive advisors offer valuable services, such as rebalancing, tax loss harvesting, a glide path strategy, and other wealth management tools that, in my experience, are rarely properly applied by do-it-yourself investors. Step 12 provides more information on these topics.

**The Ulysses Pact**

Homer’s legendary story about Ulysses (Greek name Odysseus) tying himself to the mast to avoid destruction can be aptly applied to investing. Ulysses was able to hear the alluring siren songs without being led to his demise, because he made an agreement with his seafaring crew as they approached the sirens. He ordered them to plug their ears with wax and keep him tied to the mast despite his protests and cries. Under no circumstances were they to untie him. Ulysses desperately tried to break free upon hearing the sirens, but the men kept their promise, and the entire crew sailed safely through danger. They all worked together to strategically prevent their own demise.

The lure and noise of the financial media often drive the behaviors and decisions of investors. A Ulysses Pact is like an investment policy statement, a proactive and strategic agreement that is made between a client and advisor. An advisor can guide clients through the murky or turbulent waters and ensure they
don’t jump ship in response to the noise by signing a Ulysses Pact. This pact allows investors to agree up front that they will not act on emotions that can lead to irrational and wealth-destroying decisions. It can serve as a promise to one’s future self to follow a passive advisor’s counsel to hold on and not buy or sell as a reflexive reaction to the short-term gyrations of the market.

**Legendary Investors Agree on Index Funds**

Renowned investor Warren Buffett is an advocate of index investing. In his 2017 letter to shareholders, Buffett stated it plainly: “The bottom line: When trillions of dollars are managed by Wall Streeters charging high fees, it will usually be the managers who reap outsized profits, not the clients. Both large and small investors should stick with low-cost index funds.”

Buffett’s heirs will benefit from this advice, as well. His 2014 letter states that he has directed the trustee of his sizeable inheritance to invest in two straightforward investment vehicles: 10% is to go into short-term government bonds, and the 90% balance to be invested in index funds. Buffett’s affinity for indexing is not new. For many years, he has recommended index investing in several of his letters to shareholders. In his 2004 letter, Buffett stated that “Over [the past] 35 years, American business has delivered terrific results. It should therefore have been easy for investors to earn juicy returns: All they had to do was piggyback corporate America in a diversified, lower-expense way. An index fund they never touched would have done the job. Instead, many investors have had experiences ranging from mediocre to disastrous.”
Buffett not only advocates index funds, he’s betting on them. The June 2008 issue of *Fortune* reported that Buffett wagered a million dollars that an S&P 500 index fund’s ensuing 10-year returns would beat those of five actively managed funds or hedge funds chosen by Protege Partners, a prominent New York-based asset management firm. Citing the *Wall Street Journal*, Buffett’s hand picked S&P 500 index fund compounded an annual return of 7.1% compared to the basket of funds selected by Protégé Partners, which returned 2.1% from January 2008 through December 2017. An interesting note, Protégé Partners hedge fund manager Ted Seides, who accepted the wager with Warren Buffett, admitted defeat almost eight months in advance of the December 31, 2017 end date.

Many highly respected financial experts share Buffett’s enthusiasm for index funds. In his book, *Charles Schwab’s Guide to Financial Independence*, Schwab revealed, “Most of the mutual fund investments I have are index funds, approximately 75%.”

Benjamin Graham, influential economist and mentor to Warren Buffett, spent most of his professional life analyzing companies for stock market bargains. However, shortly before his death in 1976, Graham rejected his previous beliefs, stating that he is “…on the side of ‘efficient market’ school of thought now generally accepted by the professors.” Graham was a visionary in his early description of what is now known as value index investing.

Noteworthy institutional investors also advocate index
funds investing. David Swensen, Chief Investment Officer of the highly successful Yale Endowment Fund and author of *Unconventional Success: A Fundamental Approach to Personal Investment*\textsuperscript{23} and *Pioneering Portfolio Management: An Unconventional Approach to Institutional Investment,*\textsuperscript{24} has been particularly outspoken about the merits of index investing for individual and institutional investors alike. In an August 2011 article which appeared in the *New York Times,* Swensen blasted active investing and its facilitators, including mutual fund companies, retail brokers and advisors. He said that market volatility causes ill-advised investors to behave “in a perverse fashion, selling low after having bought high.” He asks, “What should be done? First, individual investors should take control of their financial destinies, educate themselves, avoid sales pitches, and invest in a well-diversified portfolio of low-cost index funds.”\textsuperscript{25}

So what is the lesson here? Like the illustration on the following page titled *Bear the Risk,* when you fully embrace a new way of investing, you can substantially reduce the stress and anxiety commonly experienced by active investors. You should be calmer, relaxed and more centered in the midst of the noise and frenzy of media pundits and Wall Street. An unwavering commitment to your investment plan should allow you to let go of unnecessary worry and enable you to focus on what truly matters to you most. You should not only be rewarded emotionally, but you will also improve your probability of investment success. Why would you want to do anything else?
Bear the Risk
“We next consider the rule that the investor does [or should] consider expected return a desirable thing and variance of return an undesirable thing.”

Harry Markowitz, Ph.D., Nobel Laureate in Economics, 1990, “Portfolio Selection”, 1952

“Markets are efficient, but there are different dimensions of risk and those lead to different dimensions of expected returns. That’s what people should be concerned with in their investment decisions and not with whether they can pick stocks”.

Eugene Fama, Ph.D., Nobel Laureate in Economics, 2013 ChicagoBooth Magazine, Fall, 2013

“… Any pension fund manager who doesn’t have the vast majority – and I mean 70% or 80% of his or her portfolio – in passive investments is guilty of malfeasance, nonfeasance or some other kind of bad feasance!”


“Properly measured, the average actively managed dollar must underperform the average passively managed dollar, net of costs.”


Step 2: Nobel Laureates
In 1709, English poet Alexander Pope warned “a little knowledge is a dangerous thing.” This observation describes the plight of the active investor. Armed with sound bites from media pundits, many active investors discover too late how little they know. They think active investing is the only way to make serious money. However, that conclusion is debunked by the wealth of knowledge produced by Nobel Laureates.

In traditional 12-Step Programs, the second step is to acknowledge the presence of a higher power. Nobel Laureates serve as the higher power for investors. They provide us with Nobel Prize-winning research and hundreds of peer-reviewed published papers that collectively discredit the myth that active investors can consistently beat the markets. Instead, their research supports the argument that a globally diversified, low-cost strategy maximizes returns at given levels of risk.

In the painting titled, Whom Should You Trust?, the dilemma of investors is depicted. On one side is the slick salesman of Wall Street products and services. Tugging on the other side is an academic who provides unbiased research that does not require the facade of a polished advertising campaign. The investors are caught in the middle, torn between the forces of salesmanship and empirical evidence. Hopefully, they will listen to the evidence.
Problems

Investors Rely On Lady Luck
The most significant problem for active investors is their reliance on factors other than empirical evidence in selecting investments. They speculate heavily and depend on Lady Luck, rather than on the science of investing. In addition, they often chase the recent success of a manager, stock, time, or investment style. The great majority of investors are unaware of the tremendous amount of academic brain power that has been applied to investing. This lack of awareness makes investors more susceptible to the lure of active management, so they engage in risks they do not understand and cannot quantify.

Solutions

Center for Research in Security Prices
Milestones of achievement in modern finance have accelerated over the last several decades, as advancements in technology have enabled sophisticated calculations and analysis of millions of data points. At the heart of these analyses and computations is the renowned Center for Research in Security Prices (CRSP).

In 1960, University of Chicago Professor James Lorie was asked by Merrill Lynch to determine how well most people performed in the stock market relative to other investments. His research led to the creation of CRSP, a database of total returns, dividends and price changes for all common stocks.
listed on the many exchanges from 1926 to the present. In January 1964, Lorie and Fisher published their findings in *The Journal of Business*, The University of Chicago’s Press. Their research paper proclaimed that the average compounded rate of return on NYSE common stocks from 1926 to 1960 was 9%. For the first time in history, an average rate of return was quantified. The front page of *The New York Times* financial section heralded the pair’s results. In 1977, Lorie and Fisher published a book on their subsequent research at CRSP, titled *A Half Century of Returns on Stocks & Bonds*. The CRSP database has made the University of Chicago’s Booth School of Business the premier institution for financial and stock market research, boasting 29 out of 79 Nobel Laureates in Economics who have either attended or taught at the university as of 2017.

The CRSP database plays such a pivotal role in portfolio construction that Rex Sinquefield, co-founder of Dimensional Fund Advisors, said this about its creation: “If I had to rank events, I would say this one is probably slightly more significant than the creation of the universe.” Celebrating its 58th anniversary in 2018, CRSP is now the leading provider of historical stock market data to over 500 institutions around the world.

**The Nobel Prize In Economics**

Since 1969, the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel has been awarded to honor contributions in the fields of economic policy, development economics, international trade and the use of
financial resources. The groundbreaking accomplishments of academics provide the knowledge that active investors need to free them from the delusion they can beat markets.

**A Timeline of the Science of Investing**

Truly successful investing is built on the pillars of academic research. The following milestones demonstrate how strongly the creativity, determination and tireless research of thousands of individuals has influenced the development of this 12-Step Recovery Program for Active Investors.

**1776 – The Wealth of Nations**

In his 1776 landmark book, *The Wealth of Nations*, Adam Smith asserted that countries that embrace free markets would prosper while others would not. His assertion was illustrated with the visual image of the invisible hand representing free market forces. Smith believed that individuals who acted in their own self-interest would benefit society as a whole. By allowing buyers and sellers to set prices, a free market economy would ensure the allocation of resources in the most efficient manner. Similarly, index investing is based on the idea that markets work, and that market prices constantly change to reflect current information and opinions. Smith believed that “by pursuing his own interest, he frequently promotes that of the society more effectively than when he really intends to promote it,” hence the invisible hand.
1900 – THE RANDOM WALK THEORY

In his 1900 doctoral thesis, “The Theory of Speculation,” Louis Bachelier set forth his revolutionary conclusion that “there is no useful information contained in historical price movements of securities.” Therefore, the expected return of speculation is zero (minus costs). Bachelier’s theory was rejected by his peers and sat untouched for 60 years until economist Paul Samuelson discovered it. Paul Samuelson, Eugene Fama and others would expand on Bachelier’s findings with the ensuing and revolutionary Random Walk Theory, which asserts that stock prices continuously react to new information and therefore move in a random and unpredictable fashion.

1906 – THE WISDOM OF THE CROWDS

English scientist Francis Galton was a statistician who developed the important concepts of correlation and regression toward the mean. He discovered in the early 1900s that the collective wisdom of many is more accurate than the wisdom of a few. Galton arrived at his discovery of “The Wisdom of the Crowds” at a livestock convention, where a crowd of almost 800 people were asked to guess the correct weight of a butchered ox. Surprisingly, the average guess of the entire crowd was very close to the ox’s actual weight, only one pound off. No one individual came
as close to the correct answer. In a 1906 *Nature* Magazine article titled, “Vox Populi” (Voice of the People), Galton concluded that a group of individuals making independent guesses would make a more accurate assessment than any individual would on their own.\(^{30}\) The world’s equity markets support Galton’s discovery, as about ten million investors trade ten billion shares and aggregate their wisdom into global securities every trading day.


**1965 – Prices Are Random**

In 1970, MIT Professor of Economics Paul Samuelson was the first American to be awarded a Nobel Prize in Economics. Samuelson has long been credited with contributing more than any other contemporary economist to raising the analytical and methodological levels of economic science. Influenced greatly by Louis Bachelier, Samuelson proved, expanded and refined Bachelier’s work in his famous paper, “Proof that Properly Anticipated Prices Fluctuate Randomly,”\(^{32}\) published in 1965. His findings can be summarized as follows: a) market prices are the best estimates of value; b) price changes follow random patterns; and c) future news and
stock prices are unpredictable. Samuelson’s wisdom is reflected in his words, “Investing should be dull, like watching paint dry or grass grow. If you want excitement, take $800 and go to Las Vegas. It is not easy to get rich in Las Vegas, at Churchill Downs, or at the local Merrill Lynch office.” The painting on the next page illustrates Samuelson’s belief that investing should provide as much excitement as watching grass grow.

1965 – Efficient Markets

In recognition of his contributions to the Efficient Market Hypothesis and asset pricing models, Eugene Fama was awarded the Nobel Prize in Economic Sciences in 2013. Fama is a University of Chicago professor of finance and is widely viewed as the “Father of Modern Finance.” Fama set out to explain why stock market prices fluctuate randomly, and his findings led to his coining of the phrase “Efficient Market.” In “The Behavior of Stock Market Prices,”\(^{33}\) published in 1965, Fama examined the prevailing assumption that the tremendous resources available to any major brokerage firm, including industry trends, effects of interest rates, accounting data, and access to managers of firms consistently allowed fund managers, stock brokers, and security analysts to outperform a randomly selected portfolio of securities with similar general risk levels. However, the study determined no such advantage existed beyond that attributed to chance alone. In 1970, Fama published his Efficient Market Hypothesis in “Efficient Capital Markets: A
Review of Theory and Empirical Work,”\textsuperscript{34} in which he concluded equity markets consistently incorporate all available information into their prices, and trends in capital markets cannot be identified in advance. He found that an agreement between a willing buyer and a willing seller reflects the most accurate value of a security, resulting in an environment where the only way an investor can expect to beat an index return is by taking risk greater than that index. This can be accomplished by increasing exposure to the dimensions of returns, such as small, value and profitability stocks.

Eugene Fama and Kenneth French’s 1992 paper, “The Cross-Section of Expected Stock Returns,”\textsuperscript{35} expanded upon the Nobel Prize-winning research of Harry Markowitz and William Sharpe that delivered Modern Portfolio Theory. In that paper, Fama and French determined that exposure to market, size and value risk factors explained as much as 96\% of historical returns in diversified stock portfolios. Their discoveries serve as the foundation for constructing their own portfolios that currently capture risks and returns based on the independent factors including term and default for fixed income.

\textbf{1973 – THE BIRTH OF INDEX FUNDS}

Shortly after earning his MBA from the University of Chicago, Rex Sinquefield convinced his then employer, American National Bank of Chicago, to develop one of the first market-capitalization weighted S&P 500 index funds. Established in 1973, the fund was only available to institutions, and the
New York Telephone Company became its first major investor. In 1976, Sinquefield teamed up with Roger Ibbotson to co-author “Stocks, Bonds, Bills and Inflation,” an annually updated study that is widely recognized as the most comprehensive empirical study of stock market returns available. Also in 1973, David Booth and John “Mac” McQuown helped develop a market-cap-weighted S&P 500 index fund for Wells Fargo Bank.

Sinquefield and Booth teamed up in 1981 to launch Dimensional Fund Advisors, a mutual fund company committed to the construction of asset class funds that efficiently capture the specific market risk factors identified by Fama and French. Sinquefield has been an eloquent and outspoken advocate for passive investing. At a 1995 Charles Schwab conference, Sinquefield shared his enlightening parallel between freedom and markets when he said, “It is well to consider, briefly, the connection between the socialists and the active managers. I believe they are cut from the same cloth. What links them is a disbelief or skepticism about the efficacy of market prices in gathering and conveying information… so who still believes markets don’t work? Apparently it is only the North Koreans, the Cubans and the active managers.”

1973 – A RANDOM WALK

Economist, author and Princeton Professor of Economics Burton Malkiel is a leading proponent of Fama’s Efficient Market Hypothesis. In his 1973 book, A Random Walk Down Wall Street (now in its 11th edition), Malkiel challenged
the financial services industry to provide the investing public a better way to invest. “Fund spokesmen are quick to point out you can’t buy the market averages,” he wrote. “It’s time the public could.” He also famously quipped, “A blindfolded monkey throwing darts at a newspaper’s financial pages could select a portfolio that would do just as well as one carefully selected by the experts.” Two years after his book was published, the Vanguard Group was formed to create the first index fund available to individual investors. Vanguard founder John C. Bogle refers to Malkiel as the “spiritual leader of the [indexing] crusade.”

1974 – A Case For Capitalism

Austrian economist Friedrich von Hayek (1899 to 1992) was awarded the Nobel Memorial Prize in Economics in 1974. In his seminal book, *The Road to Serfdom*, Hayek articulated the reasons why free market capitalism is a superior economic model to communism or socialism. He and his mentor, Ludwig von Mises, were influential figures in the Austrian school of political economy. He postulated that centralized planning by a government is not democratic and that market economies are the result of spontaneous order, resulting in a more efficient allocation of resources than any other system could achieve. Building on the work of Adam Smith, Mises, and others, Hayek argued that in socialist or communist societies, an individual or a small group of people inefficiently determines the distribution of resources. His findings support the concept
that prices in a free market, such as the global stock exchanges, reflect all available information as well as the forecasts of all market participants. In other words, prices are an effective and efficient means of communication between buyers and sellers.

**1975 – First Retail Index Fund**

On December 31, 1975, Princeton graduate John C. Bogle created Vanguard’s First Index Investment Trust with just $11 million, the first index fund available to individual investors. Now known as the Vanguard 500 Index Fund, the fund was initially met with criticism, even earning the nickname, “Bogle’s Folly.” The fund became the security industry’s largest mutual fund in 2000 and as of December 2017, managed nearly $391 billion.41

Bogle is widely recognized as a vocal champion of the individual investor, even earning him the moniker of “St. Jack” for his unwavering commitment to keeping fees as low as possible and ensuring fund transparency and purity. Bogle has received significant accolades in recognition of his efforts. In 2004, *TIME* Magazine named Bogle one of the world’s 100 most powerful and influential people, and *Institutional Investor* presented him with its Lifetime Achievement Award. In 1999, *Fortune* designated him as one of the investment industry’s four “Giants of the 20th Century.” In 1998, Bogle was presented the Award for Professional Excellence from the Association for Investment Management and Research, and he was inducted into the Hall of Fame of the Fixed Income Analysts Society, Inc. in 1999.

1981 – A NEW DIMENSION OF INVESTING

David Booth earned his MBA from the University of Chicago in 1971, where he studied under great economic minds like Eugene Fama and Merton Miller. Booth suspected many investors were unaware of the benefits of size risk exposures. In 1981, Booth and Rex Sinquefield, along with guidance from Eugene Fama, founded Dimensional Fund Advisors, a highly regarded mutual fund company that applies passive asset class strategies to its wide range of funds. Many of Dimensional’s funds capture tilts toward factors such as size, value, and profitability. Long-term exposure to these factors has produced above-market returns since 1928. Dimensional was one of the first fund companies to educate its clients and advisors about the direct relationship between specific risks and their expected returns. Booth’s initiative has paid off. Dimensional is regarded by independent investment advisors as a top mutual fund company with assets of $577 billion as of December 2017. Booth continues the advancement of investing science through generous donations. Most notably, in 2008, he gave $300 million to the University of Chicago’s School of Business, the largest gift in
the University’s history and the largest gift to any business school. In recognition of this gift, the University of Chicago’s business school was renamed Chicago Booth School of Business. Subsequently, four Nobel Prizes in Economic Sciences have been awarded to current and former faculty members of the Booth School of Business — Thomas Sargent in 2011, Eugene Fama and Lars Peter Hansen in 2013, and most recently, Richard Thaler in 2017.

1990 – Nobel Prize in Economic Sciences

After several decades of economic breakthroughs, the science of investing was recognized in 1990. The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, commonly know as the Nobel Prize in Economic Sciences, was awarded to three investment research pioneers for their collective work known as Modern Portfolio Theory: Harry Markowitz, for research regarding portfolio construction in relation to risk and return; William Sharpe, for his Capital Asset Pricing Model and the concept of beta; and Merton Miller, for modern corporate finance theory and the theory of company valuation with respect to dividends. After years of work, they were credited with collectively reforming the way the world invests and forming conclusions that continue to inspire financial economists today.

When Markowitz was a doctoral student at the University of Chicago in 1952, he concluded that investment diversification
reduced risk. His groundbreaking paper, “Portfolio Selection,” is the foundation of Modern Portfolio Theory. In fact, he is commonly referred to as the “Father of Modern Portfolio Theory.” Markowitz’s contributions showed that assets should be evaluated not only for their individual characteristics, but also for their combined effect on a portfolio as a whole. His research mathematically supports efficient portfolios that have provided the highest expected return for a given level of risk.

Stanford professor William Sharpe presented the Capital Asset Pricing Model (CAPM), or single factor asset-pricing model, in his 1963 paper, “A Simplified Model for Portfolio Analysis.” In his 1964 paper, “Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk,” he theorized risk is volatility relative to the market and found an asset’s sensitivity to market risk (known as beta) determines an investor’s expected return and the cost of capital of a firm. Stocks that carry higher risk (a beta greater than one) are more volatile than the market and therefore should have higher expected returns. CAPM is often used as the asset-pricing model for evaluating the risk and expected return of securities and portfolios.

Merton Miller derived two vital invariance theorems with the help of Franco Modigliani, now aptly named the Modigliani-Miller or MM theorems. Through Miller’s work, an important lesson was ascertained: a firm’s value is unrelated to its dividend policy, and dividend policy is an
unreliable guide for stock selection. The MM theorems have since established themselves as the comparative norm for theoretical and empirical analyses in corporate finance.

2013 – Nobel Prize in Economic Sciences

The 2013 Nobel Prize in Economic Sciences was awarded to Eugene Fama, Lars Peter Hansen, and Robert Shiller for their empirical analysis of asset prices. Essentially, all three converge on the idea that although prices are completely unpredictable in the short run, they become more predictable over longer time periods. Eugene Fama’s contributions were already discussed in the section titled “1965—Efficient Markets.” To summarize, although market efficiency implies a random daily movement of asset prices, the returns that are realized over long periods of time reflect the risks of those firms and those risks are embedded in prices by market participants.

The Higher Power For Investors

The above vignettes are brief snapshots of an enormous treasure trove of valuable information that can provide every investor the ability to invest for a better financial future. The findings of financial scientists, academics and Nobel Laureates are indeed the higher power for investors, enabling them to invest with an abundance of knowledge that will enable them to better fund their own retirement, not their broker’s retirement.
**Step 3: Stock Pickers**

“Active management is little more than a gigantic con game.”

- Ron Ross, Ph.D., *The Unbeatable Market*, 2002

“By day we write about ‘Six Funds to Buy NOW!’… By night we invest in sensible index funds. Unfortunately, pro-index fund stories don’t sell magazines.”


“If there are 10,000 people looking at the stocks and trying to pick winners, well, one in 10,000 is going to score, by chance alone, a great coup, and that’s all that’s going on. It’s a game, it’s a chance operation, and people think they are doing something purposeful… but they’re really not.”


“Very little evidence [was found] that any individual [mutual] fund was able to do significantly better than that which we expected from mere random chance.”

As we learned in Step One, courtesy of *The Wolf of Wall Street*, no one can predict with certainty the direction of a stock. Think about it from a purely logical perspective: is it realistic to presume that an individual investor or a stock broker can know more than the combined knowledge of ten million traders? I estimate that approximately five million sellers and five million buyers place trades each day. With each trade, a buyer and a seller both agree upon a price which represents the best estimate of a fair price.

Rex Sinquefield describes the market as a vast processing machine that compiles all knowable information, much like a “collective brain.” This concept is represented in the painting to the right and articulated by Sinquefield back in 1995, at a debate on active vs. passive investing, Sinquefield put it this way: “So you can have one individual who can be very, very smart and actually know a little bit more than everyone else. But does he know more than six billion people combined? No. He knows a tiny, tiny fraction of what is knowable and what is built into prices. That’s sort of the intuition why no one’s ever going to get an edge over the market.”

*The Speculation Blues*
Problems

Stock Pickers Fail

Stock prices are quickly moved by news that is available to virtually all market participants at the same time. Because news is unpredictable and random by nature, we come to the unavoidable conclusion that movements of stock prices are also unpredictable and random. Therefore, the current stock price is the best estimate of the stock’s fair price. This means those celebrity stock pickers appearing on television and the silver screen are no different than a team captain calling a coin toss before a big game. It’s a blind guess as to whether the stock will go up or down in the short term because these events will occur based on news that is unknowable in advance. This means your portfolio, if based on a few hand-picked stocks, will rise or fall on the whims of the daily news.

Ever since the first stock market trade, which took place in 1602 at the Amsterdam Stock Exchange (“Vereniging voor de Effectenhandel”), traders have been looking for ways to predict future stock market movements. They have studied reams of data in search of patterns in securities prices. In 2000, a Nova television special, “The Trillion Dollar Bet,” reported that a group of academics in the 1930s decided to find out if traders really could predict how prices moved. Since they could not find any scientific basis for the belief, they decided to run a series of experiments. In one of them, they created a random portfolio of stocks by throwing darts at The Wall Street Journal while blindfolded. After one
year, they were stunned to discover the dartboard portfolio had outperformed the portfolios of Wall Street gurus. The academics arrived at a devastating conclusion: The success of top traders was simply due to luck, and patterns in prices appeared by chance alone.

In 1992, 63 years after the stock market crash, John Stossel of ABC’s 20/20 program conducted some follow-up research on the dart throwing. He determined the economists’ findings from more than six decades prior remained true. Stossel interviewed Princeton Professor Burton Malkiel, author of A Random Walk Down Wall Street. Professor Malkiel reminded viewers that stock markets have historically delivered a performance of 9.5% to 10% per year. “To beat the average, should an investor listen to the Wall Street professionals?” Stossel asked. “No,” replied Malkiel. “All the information an analyst can learn about a company, from balance sheets to marketing material, is already built into the stock price because all of the other thousands of analysts have the same information. What they don’t have is the knowledge that will move the stock such as news events, which are unpredictable and impossible to forecast.”

**Baked In The Cake**

Stock pickers don’t realize that virtually all of the information and forecasts about a stock, a sector, or an economy is quickly digested by the totality of market participants and swiftly embedded into the price. This market efficiency ensures that prices agreed upon between willing buyers and willing sellers
are the best estimate of fair market values. As illustrated in the previous painting, available information and news is “baked in the cake,” and no one has special knowledge that is not already included in the price, except for inside information (which is illegal). No single trader can know more or have a consistent advantage over the millions of other market participants around the world. Markets reward investors, not speculators.

Tenets of market efficiency do not state that prices are perfect or that at any given time there are no mispriced securities in the marketplace. Rather, these tenets assert that because prices reflect all known information, mispriced securities cannot be identified in advance.

**Wealth Warning for Stock Pickers**

Stock pickers are inherently biased about their abilities to pick winning stocks. In a study titled, “Are Investors Reluctant to Realize Their Losses?,” Terrance Odean, professor of finance at the University of California, Berkeley, analyzed the activity of 10,000 discount brokerage accounts. Odean’s findings, published in the *Journal of Finance*, showed that investors habitually overestimated the profit potential of their stock trades. In fact, they would often engage in costly trading, even though their profits did not cover even their transaction costs. Odean’s research showed investors believed they had unique information which would give them an edge, when in reality the information was widely known. On average, the stocks investors bought underperformed the stocks they sold.

In a follow-up paper, “Trading is Hazardous to Your Wealth: The Common Investment Performance of Individual
Investors,$^{50}$ Odean joined Brad Barber of University of California, Davis to analyze 66,465 individual trading accounts. They found that investors who traded most earned annualized returns of 11.4%, while in the same period the market earned annualized returns of 17.9%. Excessive trading resulted in inferior returns compared to the market.

**Luck vs. Skill**

The media loves a good story. Can you blame them? So when a stock picker finds random success, the media adorns them with guru status. When their fleeting success fades, the guru title is handed to the next lucky stock picker. Unfortunately, luck is not a repeatable skill. Mark Hulbert clearly articulates this fact in his 2008 *New York Times* article, “The Prescient
are Few.” The article details the findings of a study by professors Laurent Barras, Olivier Scaillet and Russell Wermers about the performance of 2,076 mutual fund managers over the 32-years from 1975 to 2006. The study found that 99.4% of the managers displayed no evidence of genuine stock picking skill, and that the 0.6% of managers who did outperform the index were “statistically indistinguishable from zero,” or as Hulbert puts it, “just lucky.” Figure 3-1 depicts the study’s results.

**Figure 3-1**

A statistical test called the Student’s t-test was introduced in 1908 by William Sealy Gosset, referred to as the “Student,” while working for the Guinness brewery in Dublin, Ireland to evaluate the quality of the brewery’s ingredients. The t-test can be used
to determine if a series of historical returns is reliably superior – showing a t-statistic of 2 or higher – to a risk-equivalent benchmark. This can determine whether alpha (returns relative to its benchmark return) is due to luck or skill. In Figure 3-2, the t-test is applied to U.S. equity funds in six different style classifications over a 20-year period. Out of 438 mutual funds constructed with at least 90% U.S. equities, 98.4% of those fund managers did not have a statistically significant alpha, meaning any alpha they did have was due to luck, not skill. See the Step 5 Solutions section for a further explanation of the t-statistic.

Figure 3-2

<table>
<thead>
<tr>
<th>Evidence of a Lack of Stock Picking Skill Among Fund Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Years (1/1/1998 - 12/31/2017)</td>
</tr>
<tr>
<td>% of Managers Without Statistically Significant Positive Alpha (t-stat &lt; 2)</td>
</tr>
<tr>
<td>% of Managers With Statistically Significant Positive Alpha (t-stat ≥ 2)</td>
</tr>
<tr>
<td>438 Mutual Funds (All Asset Classes) with 20 Years of Return Data</td>
</tr>
<tr>
<td>98.4%</td>
</tr>
<tr>
<td>1.6%</td>
</tr>
<tr>
<td>68 Small Blend Mutual Funds</td>
</tr>
<tr>
<td>98.5%</td>
</tr>
<tr>
<td>1.5%</td>
</tr>
</tbody>
</table>

Returns adjusted using Fama/French 3 Factor Model. Sources: Morningstar Inc., ifabt.com
**LOOKING FOR A NEEDLE IN A HAYSTACK**

Vanguard Group founder John Bogle has accurately described the practice of stock picking as “looking for a needle in a haystack.” Even if you are lucky enough to pick a stock that outperforms the market, there is no certainty of success, or even survival, in the future.

In their book, *Creative Destruction*, McKinsey & Company consultants Richard Foster and Sarah Kaplan analyzed the companies of the original S&P 500 Index from 1957. Their findings shown in Figure 3-3 revealed that only 74 companies remained on the list in 1997, and just 12 of them ended up with returns that outperformed the index for the 41-year

**Figure 3-3**

*Survivors and Winners of S&P Stocks*

*Study of 41 Years (1957 - 1998)*

Source: *Creative Destruction*, Richard Foster & Sarah Kaplan
period through 1998. “As the ‘80s passed and we made our way through the ‘90s, both of us observed that almost as soon as any company had been praised in the popular management literature as excellent or somehow super durable, it began to deteriorate,” the authors wrote. “Searching for excellent companies was like trying to catch light beams; they were easy to imagine, but so hard to grasp,” they concluded.

Figure 3-4 lists the ten largest bankruptcies from January 1981 through December 2017, reminding stock pickers of big companies gone bust. Lehman Brothers, Washington Mutual, GM, and MF Global Holdings were among the big companies that ultimately failed. In 2017, we witnessed total of 38,062 commercial bankruptcies.

<table>
<thead>
<tr>
<th>The Ten Largest Bankruptcies</th>
<th>37 Years (1/1/1981 - 12/31/2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Companies</td>
</tr>
<tr>
<td>1.</td>
<td>Lehman Brothers Holdings, Inc.</td>
</tr>
<tr>
<td>2.</td>
<td>Washington Mutual, Inc.</td>
</tr>
<tr>
<td>3.</td>
<td>WorldCom, Inc.</td>
</tr>
<tr>
<td>4.</td>
<td>General Motors Corporation</td>
</tr>
<tr>
<td>5.</td>
<td>CIT Group, Inc.</td>
</tr>
<tr>
<td>6.</td>
<td>Enron Corporation</td>
</tr>
<tr>
<td>7.</td>
<td>Conseco, Inc.</td>
</tr>
<tr>
<td>8.</td>
<td>MF Global Holdings, Ltd.</td>
</tr>
<tr>
<td>9.</td>
<td>Chrysler, LLC</td>
</tr>
<tr>
<td>10.</td>
<td>Thornburg Mortgage, Inc.</td>
</tr>
</tbody>
</table>

Total Commercial Bankruptcies

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Filings</td>
<td>74,281</td>
<td>57,790</td>
<td>44,159</td>
<td>34,639</td>
<td>29,978</td>
<td>37,968</td>
<td>38,062</td>
</tr>
</tbody>
</table>

Sources: BankruptcyData.com, American Bankruptcy Institute
GREAT COMPANIES DON’T MAKE GREAT INVESTMENTS

Remember Peter Lynch’s advice about buying companies whose products you like? It turns out this advice is not as good as it sounds. Great companies don’t make great investments. You may love Elon Musk, but this doesn’t mean Tesla is a great stock to buy. In fact, the opposite is usually true. Distressed companies have earned higher returns than those of companies with lots of hype or goodwill at the time of purchase. Unfortunately, investors generally avoid investing in distressed companies, because it seems counterintuitive to buy perceived losers.

Finance Professors Meir Statman and Deniz Anginer wrote a 2010 study called “Stocks of Admired Companies and Spurned Ones.” Their study was based on Fortune Magazine’s annual list of “America’s Most Admired Companies” from 1983 to 2007. Fortune’s annual surveys ranked companies on eight attributes of reputation:

- Quality of management
- Quality of products or services
- Innovativeness
- Long-term investment value
- Financial soundness
- Ability to attract, develop and keep talented people
- Responsibility to the community and the environment
- Wise use of company assets

From these ratings, Statman and Anginer constructed two portfolios, each consisting of one half of the Fortune stocks. The “admired” portfolio (often referred to as growth stocks)
contained the stocks with the highest *Fortune* ratings, and the “spurned” portfolio (often referred to as value stocks) contained the stocks with the lowest *Fortune* ratings. For example, the list of admired companies included The Walt Disney Company, UPS and Google. Spurned companies included Jet Blue, Bridgestone and Stanley Works.

The results of the study are no surprise to value investors. “Stocks of admired companies had lower returns, on average, than stocks of spurned companies.” Figure 3-5 shows the 16.12% annualized return of the spurned portfolio and the 13.81% annualized return of the admired portfolio over the 24-year, nine-month period.

*Figure 3-5*

<table>
<thead>
<tr>
<th>Returns of Admired Companies vs. Spurned Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Years 9 Months (4/1/1983 - 12/31/2007)</td>
</tr>
<tr>
<td>---------------------------------------------</td>
</tr>
<tr>
<td><strong>Spurned</strong></td>
</tr>
<tr>
<td>16.12%</td>
</tr>
<tr>
<td>Annualized Return of Spurned Portfolio</td>
</tr>
<tr>
<td>---------------------------------------------</td>
</tr>
<tr>
<td><strong>Admired</strong></td>
</tr>
<tr>
<td>13.81%</td>
</tr>
<tr>
<td>Annualized Return of Admired Portfolio</td>
</tr>
</tbody>
</table>

Source: Stocks of Admired Companies and Spurned Ones, Deniz Anginer and Meir Statman, January 2010

Why have value stocks delivered higher returns to their investors? The market perceives value companies to be riskier,
driving down stock prices so their expected returns are high enough to attract investors. That is difficult for most investors to grasp since they prefer to believe growth stocks are better investments than value stocks. After all, investors looking for a stock tip want to hear the name of the next Apple, not the next JCPenney. As you will see in Step 8, the data indicates that investors should be interested in great investments (value stocks), not just great companies (growth stocks).

**FORTUNE “KOOKIE”**

I analyzed *Fortune’s* “Ten Most Admired Companies” (2001)\(^{55}\) as a whole portfolio and as individual companies, comparing them to 10 index portfolios for the 17-year period from January 2001 through December 2017. The results of the study are shown in Figure 3-6, indicating the equal-weighted (across the nine remaining publicly traded companies) “Fortune Most Admired Portfolio” underperformed many of the index portfolios — getting about the same returns as Index Portfolio 75 which has 25% fixed income. Despite the fact that the “Fortune Most Admired Portfolio” carried comparable risk to the riskiest Index Portfolio 100, $100,000 grew to $336,000 for the time period vs. $409,543 for Index Portfolio 100. The story is even worse for the “Fortune” tellers. Four of the ten companies took on significantly greater risk than the Index Portfolio 100, but earned returns lower than the Index Portfolio 40 which contains 60% fixed income. Important to note, one of the “Ten Most Admired Companies,” Dell Computer, ceased to exist as a public company and reverted to a private company in 2013.
Figure 3-6

Fortune Magazine's 10 Most Admired Companies in 2001

17 Years (1/1/2001 - 12/31/2017)

<table>
<thead>
<tr>
<th>Company</th>
<th>Annualized Return</th>
<th>Annualized Standard Deviation</th>
<th>Growth of $100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft</td>
<td>11.05%</td>
<td>26.33%</td>
<td>$535,301</td>
</tr>
<tr>
<td>Home Depot</td>
<td>10.92%</td>
<td>24.20%</td>
<td>$525,289</td>
</tr>
<tr>
<td>Berkshire Hathaway B</td>
<td>8.82%</td>
<td>15.80%</td>
<td>$386,890</td>
</tr>
<tr>
<td>S&amp;P 500 Index</td>
<td>6.33%</td>
<td>14.36%</td>
<td>$266,837</td>
</tr>
<tr>
<td>Wal-Mart</td>
<td>5.66%</td>
<td>17.57%</td>
<td>$241,139</td>
</tr>
<tr>
<td>Charles Schwab</td>
<td>4.85%</td>
<td>32.84%</td>
<td>$213,425</td>
</tr>
<tr>
<td>Cisco Systems</td>
<td>1.13%</td>
<td>33.62%</td>
<td>$119,752</td>
</tr>
<tr>
<td>General Electric</td>
<td>-2.68%</td>
<td>25.90%</td>
<td>$64,740</td>
</tr>
</tbody>
</table>

*Fortune Most Admired Portfolio is comprised of an equal weighting of 9 of the Fortune 10 Most Admired Companies (2-19-01 Issue), excluding Dell Inc. as it went private in 10/2013. Fortune Most Admired Portfolio is assumed to rebalance annually on Feb 1st. All returns include the reinvestment of dividends. Sources: Yahoo! Finance, Fortune Magazine, © Morningstar Inc., ifabt.com, Appx A
This sort of data begs the question: If stock picking is such a fruitless endeavor, why do magazines keep selling this elusive dream? The answer is quite simple: Pro-index fund stories don’t sell magazines. No big brokerage house would take out a full-page ad that says, “Don’t hire us to trade your portfolio — just index and relax.” Nonetheless, this is a poor reason to perpetuate the myth that financial journalists or “Fortune Tellers” can pick the handful of stocks to achieve wealth. In fact, by the looks of it, the best way to lose a fortune is to follow *Fortune*.

**The “Bond King” Lost His Crown**

A name that has been synonymous with active bond management is Bill Gross, formerly of PIMCO. Gross is known for his 27 year reign (26 full calendar years) at the helm of the PIMCO Total Return fund (PTTRX). There is no denying that his overall record is impressive, with only seven years in which the return fell short of the Morningstar analyst assigned benchmark. However, as Mr. Gross implied in his April 2013 Investment Outlook letter, luck played a substantial role in that leverage was used during a time period when it yielded a handsome payoff.

“All of us, even the old guys like Buffett, Soros, Fuss, yeah—me too, have cut our teeth during perhaps a most advantageous period of time, the most attractive epoch, that an investor could experience… An investor that took marginal risk, levered it wisely and was conveniently sheltered from periodic bouts of deleveraging or asset withdrawals could, and in some cases, was
rewarded with the crown of ‘greatness.’ Perhaps, however, it was the epoch that made the man as opposed to the man that made the epoch” Gross opined.\textsuperscript{56}

Gross’s fund was the largest fixed income mutual fund in existence with more than $230 billion of assets. And, then came 2013-2014. Gross’ fund hemorrhaged assets, losing more than $68 billion during 16 straight months of negative flows as it trailed Barclays Aggregate Bond Index benchmark by 1.45 percentage points.\textsuperscript{57} Morningstar downgraded PIMCO’s overall stewardship grade from a B to a C as a most public falling out ensued between Bill Gross and his former Co-Chief Investment Officer Mohamed El-Erian. Amidst reports of bizarre behavior, Gross unceremoniously departed PIMCO in September 2014. In the wake of the news, another $27 billion exited the fund within five days of Gross’ departure, leaving investors concerned about the future of their investment in the fund.

Interestingly enough, during his tenure as an active fund manager at PIMCO, Mr. Gross joined the ranks of Warren Buffett and Peter Lynch in giving a solid endorsement to indexing. In his December 2013 Investment Outlook letter, Gross reminisced about his younger days when Jack Bogle introduced the first index fund available to retail investors:

“His [Bogle’s] early business model at Vanguard promoting index funds was a mystery to me for at least a few of my beginning years at PIMCO. Why would most investors be content with just average performance, I wondered? The answer is certainly now obvious; an investor should want the highest performance
for the least amount of risk, and for almost all measurable asset classes, index funds and many ETFs have done a better job than almost all active managers primarily because of lower fees.”

Rather than spending time and resources searching for the stock or bond that will outperform in the future, all investors are better served by indexing in all asset classes.

**Solutions**

It may be easy to understand the allure of stock picking, but looking for a needle in a haystack is not the answer. This pursuit may be very lucrative for stock brokers. “After all, it’s exciting, fun to dip and dart, pick stocks and time markets; to get paid high fees for this, and to do it all with someone else’s money,” quips Rex Sinquefield. Unfortunately, however, this well-worn pursuit has proven to be far less rewarding for their clients.

Picking stocks or bonds is an ill-fated strategy that wastes time, energy and money. The better solution is to trust the collective brain, buy the haystack, and maintain risk-appropriate exposures in low-cost globally diversified index portfolios.


**Step 4: Time Pickers**

“If I have noticed anything over these 60 years on Wall Street, it is that people do not succeed in forecasting what’s going to happen to the stock market.”

- Benjamin Graham, Interview with Hartman L. Butler, “An Hour with Mr. Graham”, 1976

“Statistical research has shown that, to a close approximation, stock prices seem to follow a random walk with no discernible predictable patterns that investors can exploit. Such findings are now taken to be evidence of market efficiency… Only new information will move stock prices…”

- Zvi Bodie, *Investments*, 2004

“Market timing is a wicked idea. Don’t try it.”

- Charles D. Ellis, Ph.D., *Winning the Loser’s Game*, 2002

“There are two kinds of investors, be they large or small: those who don’t know where the market is headed, and those who don’t know that they don’t know. Then again, there is a third type of investor… whose livelihood depends upon appearing to know.”

P.T. Barnum is often credited with coining the phrase, “There’s a sucker born every minute.” History buffs argue the famed circus founder instead stated, “There’s a customer born every minute.” However, for investors subscribing to market-timing services, the words “sucker” and “customer” are virtually interchangeable.

Time Pickers or market timers claim the ability to predict the future movement of the stock market, moving into the market before it goes up and getting out before it goes down. However, numerous studies from industry and academic experts demonstrate market timers have no such ability to beat the market, and they should be avoided just like the lion’s cage at Barnum’s circus. According to Eugene Fama, “Market timing is a flimsy, dangerous occupation.”

Problems

Gurus Are Inaccurate Too Often

How often does a market-timing guru need to be right to beat an index? Nobel Laureate William Sharpe set out to answer that very question in his 1975 study titled, “Likely Gains from Market Timing.” Sharpe wanted to identify the percentage of time a market timer would need to be accurate to break even relative to a benchmark portfolio. He concluded a market timer must
be accurate 74% of the time in order to outperform a passive portfolio at a comparable level of risk. In 1992, SEI Corporation updated Sharpe’s study to include the average 9.4% stock market return from the period 1901-1990. This study determined that gurus must be right at least 69% and as high as 91% of the time.\textsuperscript{62}

What percentage of times do market timing gurus get it right? CXO Advisory Group tracks public forecasts of self-proclaimed market-timing gurus and rates their accuracy by assigning grades as “correct,” “incorrect” or “indecisive.” Figure 4-1 depicts CXO’s percentage grades for 28 well-known market-timing gurus who made a collective 4,629 forecasts from 2000 - 2012. The study shows that not one of the self-proclaimed gurus was able to meet Sharpe’s requirement of 74% accuracy, or SEI’s minimum 69%, thereby failing to deliver accuracy sufficient to beat a simple index portfolio.\textsuperscript{63}

At first glance, the 10 gurus who had percentage accuracy of more than 50% might look appealing. But beware, the opportunity costs associated with being in cash before markets rise creates a higher hurdle that can only be made up by being in cash before markets go down. Transaction costs, taxes and mistakes associated with market timing add hurdles for market timers to just break even.

In \textit{The Big Investment Lie},\textsuperscript{64} Michael Edesess explains why market timing is so difficult, “The stock market can turn on a dime and always does. Prices are constantly twisting and turning without trend or predictable pattern. Their recent movement gives you nothing to go on.”
## Forecast Accuracy: 74% Required to Beat the Market

Forecasts Range From 2000 to 2012

### Sharpe’s Study: 74.00% Accuracy Required to Outperform the Market

<table>
<thead>
<tr>
<th>Market Timing Guru*</th>
<th>Number of Forecasts Made</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ken Fisher</td>
<td>120</td>
<td>66.40%</td>
</tr>
<tr>
<td>Louis Navellier</td>
<td>152</td>
<td>60.00%</td>
</tr>
<tr>
<td>Jason Kelly</td>
<td>126</td>
<td>59.70%</td>
</tr>
<tr>
<td>Dan Sullivan</td>
<td>115</td>
<td>59.10%</td>
</tr>
<tr>
<td>Carl Swenlin</td>
<td>128</td>
<td>54.90%</td>
</tr>
<tr>
<td>Bob Doll</td>
<td>161</td>
<td>54.70%</td>
</tr>
<tr>
<td>Mark Arbeter</td>
<td>230</td>
<td>53.20%</td>
</tr>
<tr>
<td>Gary Kaltbaum</td>
<td>144</td>
<td>53.10%</td>
</tr>
<tr>
<td>Don Luskin</td>
<td>201</td>
<td>52.00%</td>
</tr>
<tr>
<td>Tobin Smith</td>
<td>281</td>
<td>50.20%</td>
</tr>
<tr>
<td>Doug Kass</td>
<td>186</td>
<td>49.20%</td>
</tr>
<tr>
<td>Clif Droke</td>
<td>100</td>
<td>48.60%</td>
</tr>
<tr>
<td>S&amp;P Outlook</td>
<td>145</td>
<td>48.30%</td>
</tr>
<tr>
<td>James Stewart</td>
<td>115</td>
<td>47.00%</td>
</tr>
<tr>
<td>Dennis Slothower</td>
<td>145</td>
<td>45.60%</td>
</tr>
<tr>
<td>Bill Cara</td>
<td>208</td>
<td>45.60%</td>
</tr>
<tr>
<td>Gary Savage</td>
<td>134</td>
<td>45.00%</td>
</tr>
<tr>
<td>Marc Faber</td>
<td>164</td>
<td>44.60%</td>
</tr>
<tr>
<td>Tim Wood</td>
<td>182</td>
<td>43.80%</td>
</tr>
<tr>
<td>Jim Jubak</td>
<td>144</td>
<td>43.40%</td>
</tr>
<tr>
<td>Martin Goldberg</td>
<td>109</td>
<td>43.10%</td>
</tr>
<tr>
<td>Price Headley</td>
<td>352</td>
<td>42.00%</td>
</tr>
<tr>
<td>John Mauldin</td>
<td>211</td>
<td>39.90%</td>
</tr>
<tr>
<td>Comstock Partners</td>
<td>224</td>
<td>37.90%</td>
</tr>
<tr>
<td>Bill Fleckenstein</td>
<td>148</td>
<td>37.30%</td>
</tr>
<tr>
<td>Richard Russell</td>
<td>168</td>
<td>36.50%</td>
</tr>
<tr>
<td>Steven Jon Kaplan</td>
<td>104</td>
<td>32.10%</td>
</tr>
<tr>
<td>Robert McHugh</td>
<td>132</td>
<td>28.60%</td>
</tr>
</tbody>
</table>

Sources: *CXO Advisory, Limited to Gurus with more than 100 Forecasts, www.cxoadvisory.com/gurus/*

**Studies Prove Time Picking Doesn’t Work**

A study by University of Utah Professor John Graham and Duke University Professor Campbell Harvey is titled, “Market Timing Ability and Volatility Implied in Investment Newsletters’ Asset Allocation Recommendations.” The massive 51-page study tracked 15,000 predictions made by 237 market-timing newsletters from June 1980 to December 1992. By the end of the period, 94.5% of the timing newsletters had gone out of business with an average life span of just four years. “There is no evidence that newsletters can time the market,” the study concluded. “Consistent with mutual fund studies, ‘winners’ rarely win again and ‘losers’ often lose again.”

“Sure, it’d be great to get out of stocks at the high and jump back in at the low,” observed John Bogle in an interview with *Money* Magazine. “[But] in 55 years in the business, I not only have never met anybody who knew how to do it, I’ve never met anybody who had met anybody who knew how to do it.”

**Missing the Best and Worst Days**

Almost all big stock market gains and drops are concentrated in just a few trading days each year. Missing only a few days can have a dramatic impact on returns. Figure 4-2 illustrates how an investor who hypothetically remained invested in the S&P 500 Index throughout the 20-year period from 1998 to 2017 (5,036 trading days) would have earned a sizable 7.20% annualized return, growing a $10,000 investment to $40,135. When the five best-performing days in that time period were missed, the annualized return shrank to 5.02%, with $10,000 growing to
$16,625, and if an investor missed the 20 days with the largest gains, the returns were cut down to just 1.15%. If the 40 best-performing days were missed, an investment in the S&P 500 turned negative, with $10,000 eroding in value to just $5,670, a loss of $4,330.

**Figure 4-2**

<table>
<thead>
<tr>
<th>The Problem With Market Timing: Missing The Best Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Years (1/1/1998 - 12/31/2017)</td>
</tr>
<tr>
<td>$10,000 Invested in the S&amp;P 500 Index</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>All 5,036 trading days</td>
</tr>
<tr>
<td>Less the 5 days with the biggest gains</td>
</tr>
<tr>
<td>Less the 10 days with the biggest gains</td>
</tr>
<tr>
<td>Less the 20 days with the biggest gains</td>
</tr>
<tr>
<td>Less the 40 days with the biggest gains</td>
</tr>
</tbody>
</table>

*Source: Yahoo! Finance*

Many market timers want to miss the worst-performing days, an even bigger issue than the problem of missing the best days. The predicament, however, is that the worst days are equally concentrated and just as difficult to identify in advance as the best days. If someone could have avoided the worst days, they would have obtained true guru status. Figure 4-3 illustrates the value of missing the worst-performing days in the 20-year period from 1998 to 2017. If the 40 worst-performing days of the S&P 500 Index were missed, an investor’s increased
return would have been 952% more than investors who stayed in the market every day throughout the entire 20 years. The problem, however, is finding the crystal ball that can forecast the 40 worst performing days out of 5,036 days. This shows how market timing can be tempting and alluring.

**Figure 4-3**

<table>
<thead>
<tr>
<th>The Allure Of Market Timing: Missing The Worst Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Years (1/1/1998 - 12/31/2017)</td>
</tr>
<tr>
<td>$10,000 Invested in the S&amp;P 500 Index</td>
</tr>
<tr>
<td>All 5,036 trading days</td>
</tr>
<tr>
<td>Less the 5 days with the biggest losses</td>
</tr>
<tr>
<td>Less the 10 days with the biggest losses</td>
</tr>
<tr>
<td>Less the 20 days with the biggest losses</td>
</tr>
<tr>
<td>Less the 40 days with the biggest losses</td>
</tr>
</tbody>
</table>

University of Michigan Professor H. Nejat Seyhun analyzed 7,802 trading days for the 31 years from 1963 to 1993 and concluded that just 90 days generated 95% of all the years’ market gains — an average of just three days per year.67

The expected return of markets are positive and essentially constant. Therefore, investors who are out of the market for any period of time can expect to lose money relative to a simple low-cost and tax-efficient buy-and-hold strategy.
Goddess Fortuna

Many investors believe market watchers have the ability to forecast future market movements, but history tells a different story. Take the first half of 2009, when many such forecasters dismissed the rise in stock prices that ensued in March 2009 as an anomaly that would soon be rectified. Only market timers who have the Goddess Fortuna or Lady Luck whispering in their ears might be able to accurately forecast the markets twists and turns.

The Goddess Fortuna offers a cornucopia of gold coins and treats, but she sits atop a bubble that floats on the ocean, reminding us how fleeting luck can be. Her flowing scarf reminds her followers their fortunes can shift in the wind.

News Is Devoured in Minutes

In Analysis for Financial Management, Robert C. Higgins describes how market participants instantly devour new information, which is the inspiration for the painting on the following pages. “The arrival of new information to a competitive market can be likened to the arrival of a lamb chop to a school of flesh-eating piranhas,” Higgins writes. “The instant the lamb chop hits the water there is turmoil as the piranhas devour the meat. Very soon, the meat is gone, leaving only the worthless bone behind, and the water returns to normal… no amount of gnawing on the bone will yield any more meat, and no further study of old information will yield any more valuable intelligence.”

A 1969 study titled, “The Adjustment of Stock Prices to
New Information,” was conducted by Fama, Jensen et al, and concluded it takes five to 60 minutes for market prices to completely reflect new information. Given the study took place in 1969, imagine how quickly market information travels today as investors worldwide instantly get market news on their smart phones. Fund managers seek to exploit any tiny possible gain by reacting quickly to news, but the likelihood that they will consistently be on the right side of a trade is non-existent.

**Solutions**

**Going or Gone?**

When discussing the direction of the market, it’s important to use the past-tense verb. During times of high market volatility, people commonly err by saying, “The market is going down or going up.” Although it appears innocuous, this statement implies that the future direction of market prices is knowable. These statements serve as the impetus for rash investment decisions. Such decisions usually do not fare well, because they are based on the fallacy that one can predict future price movements. Investors can avoid this pitfall by understanding Eugene Fama’s finding that security prices move in a random walk. At all times, we only know the current and past price of any security. Where the price will be even a second later is unknown. The market continuously sets prices in response to news, which by its nature is unpredictable. Investors will serve themselves well by being able to say “the market has gone down or has gone up” without even having to think about it.
Free Market Forces

The job of free markets is to set prices so that investors are rewarded for the risks they take. To help explain this important statement, I created a model, which attempts to simplify market forces into three variables: Price, Expected Return and Uncertainty. Prices move inversely proportional to economic uncertainty so that expected returns at a specified level of risk can remain essentially constant. This implies that prices are fair all the time. From fair prices we expect fair returns, meaning that investors should be compensated for their risk exposure over a risk appropriate hold period.

The reason people invest is to get a return. At the time of a trade, buyers pay a price that reflects the risk associated with capturing the expected return. In other words, a fair price equals a fair expected return.

This model is based on Eugene Fama’s Efficient Market Hypothesis, which states that prices fully reflect all available information or news, economic uncertainty and probabilities of future events, thus implying that market prices are fair.

The model shown in the following painting attempts to diagram the three variables of Price, Expected Return and Uncertainty—resulting in a distribution of actual monthly returns shown at the bottom. The diagram shows the essentially constant expected return of a diversified investment portfolio held constant with 50% stocks and 50% bonds. Index Portfolio 50 is shown at the fulcrum of the teeter-totter, and the period-specific expected return can be estimated based on 50 or 90
years of simulated historical returns, the Fama/French Five-Factor Model, or any reasonable method an investor chooses. Current news impacts economic uncertainty and is represented on the left side of the teeter-totter. This economic uncertainty includes the probabilities of future events as estimated by the buyers and sellers. The price agreed upon by willing buyers and sellers is on the right side. Prices move inversely proportional to shifts in economic uncertainty so that expected returns remain essentially the same for a given level of risk.

From a fair price investors should expect: 1) a fair outcome, which would be a risk-appropriate or fair return; 2) an equal chance of being greater than or less than that fair return; and 3) the farther the actual return is from the expected return, the lower the probability of its occurrence.

So before you trade, ask yourself: 1) Who is on the other side of my trade? 2) Do I think I know more than they do? 3) Am I paying a fair price? In my opinion, your answers are as follows: 1) You don’t know; 2) It’s highly unlikely; and 3) If there are many willing buyers and sellers, by definition, it is a fair price.

Time pickers cannot forecast the direction of the market because they cannot know the next news story. There is no competitive edge that exists other than illegal inside information. The best way to earn the market’s fair return is to simply remain invested at all times in a relatively low-cost, passively managed index portfolio (also see hebnermodel.com).
“An investor doesn’t have a prayer of picking a manager that can deliver true alpha. Even over a 20-year period, the past performance of an actively managed fund has a ton of random noise that makes it difficult, if not impossible, to distinguish luck from skill.”

 полно аутентичность

Eugene Fama, Ph.D., Nobel Laureate in Economics, 2013
65th CFA Institute Annual Conference, 2012

“I have become increasingly convinced that the past records of mutual fund managers are essentially worthless in predicting future success. The few examples of consistently superior performance occur no more frequently than can be expected by chance.”

 полно аутентичность

Professor Burton G. Malkiel, Ph.D.,
A Random Walk Down Wall Street, 1973

“Wall Street’s favorite scam is pretending that luck is skill.”

 полно аутентичность

Ron Ross, Ph.D.,
The Unbeatable Market, 2002

“You will almost never find a fund manager who can repeatedly beat the market. It is better to invest in an indexed fund that promises a market return but with significantly lowered fees.”

 полно аутентичность

John Bogle, Economist, July 3, 2003, quoted in
The Little Book on Common Sense Investing, 2007
Men In Black II, Ocean's Twelve, & The Hangover, Part II... all of these movies have one thing in common: they all were abysmal sequels to blockbuster movies. We long to regenerate scenarios when everything comes together perfectly and the stars align, but that kind of success is rarely duplicated. In the world of money managers, success means blockbuster performance... every year! Fund managers who are successful in the short term are considered the current financial heroes, despite the fact that every reputable study of mutual fund performance over the past 30 years has found there is no reliable way to know if managers with recent winning performance will win in the future. This is why some variation of the disclaimer “past performance is no guarantee of future results” must appear in all mutual fund advertisements and prospectuses. Even still, unwitting investors chase recent performance, and the dangerous practice of manager picking ensues.

Sometimes managers can duplicate their success a few years in a row, but it just doesn’t last. As hard as it is to duplicate success in the film world, it is even more difficult for these all-star money managers to duplicate their past success.
PROBLEMS

TRACK RECORD INVESTING

“Most investors follow the crowd down the path to comfortable mediocrity,” says David Swensen in *Pioneering Portfolio Management*. Anxious to capture the gains that come with a winning mutual fund manager, manager pickers blindly chase a hot performing fund manager’s track record, failing to realize their odds for future success have vastly diminished.

Figure 5-1 shows the results of a study using Morningstar data reflecting the performance of active fund managers for the 13 years from 2004 to 2017. The chart depicts how on average, only about 9 funds remained in the top 100 the following year.

*Figure 5-1*
In the years 2008 and 2009, none of them repeated their previous year’s top 100 performance.

Variations in manager performance are a function of luck and the random rotation of the style of their fund. When a particular manager’s investment style is rewarded by the market, that manager is often credited with skill. As market conditions change, however, so does the performance of fund managers. Figures 5-2 and 5-3 track the rankings of the top 10 mutual fund managers in a given year and subsequent time periods. These charts reveal how quickly a “top” fund manager can slide to the bottom. For example, Figure 5-2 shows that the ProFunds Biotechnology UltraSector Inv had the highest performance out of 6,896 mutual funds in 2013. In 2014, however, the fund slipped to seventh place; then to 939 in 2015; 7,719th place in 2016 and finally landed in 393rd place in 2017. The data contained in these two figures reveal many other examples of fund performance that sharply declined in subsequent years.

Top-performing funds have failed to maintain their position throughout a meaningful subsequent period. As Bob Dylan famously said, “the first ones now will later be last, for the times they are a changing.”

An analysis of the Morningstar database of 246 mutual funds with 10 years of returns is shown in Figure 5-4. The top graph shows the performance rankings of these 246 funds from best to worst (left to right) for the first 5-year period from 2008 to 2012. Then the same order of fund rankings is maintained in the bottom graph in order to see if fund performance was repeated in the second 5 year period from 2013 to 2017. In light of the
### Figure 5-2

**2013 Top Ten Managers and Subsequent Performance**

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Annual Rankings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2013</td>
</tr>
<tr>
<td>ProFunds Biotechnology UltraSector Inv</td>
<td>1</td>
</tr>
<tr>
<td>ProFunds UltraJapan Inv</td>
<td>2</td>
</tr>
<tr>
<td>Firsthand Alternative Energy</td>
<td>3</td>
</tr>
<tr>
<td>Direxion Mthly Small Cap Bull 2X</td>
<td>4</td>
</tr>
<tr>
<td>ProFunds UltraSmall Cap Inv</td>
<td>5</td>
</tr>
<tr>
<td>ProFunds Internet UltraSector Inv</td>
<td>6</td>
</tr>
<tr>
<td>Rydex Russell 2000 2x Strategy A</td>
<td>7</td>
</tr>
<tr>
<td>Direxion Mthly NASDAQ-100 Bull 2X Inv</td>
<td>8</td>
</tr>
<tr>
<td>Rydex Dyn. NASDAQ-100 2X Strategy H</td>
<td>9</td>
</tr>
<tr>
<td>ProFunds UltraNASDAQ-100 Inv</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total Number of Mutual Funds:</strong></td>
<td>6,896</td>
</tr>
</tbody>
</table>

Source: Morningstar Principia 2017, Universe limited to distinct portfolios.

### Figure 5-3

**2014 Top Ten Managers and Subsequent Performance**

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Annual Rankings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2014</td>
</tr>
<tr>
<td>Matthews India Investor</td>
<td>1</td>
</tr>
<tr>
<td>ProFunds Semiconductor UltraSector Inv</td>
<td>2</td>
</tr>
<tr>
<td>ALPS</td>
<td>Kotak India Growth I</td>
</tr>
<tr>
<td>Vanguard Extended Dur Treas Idx I</td>
<td>4</td>
</tr>
<tr>
<td>Wasatch Emerging India Investor</td>
<td>5</td>
</tr>
<tr>
<td>PIMCO Extended Duration Instl</td>
<td>6</td>
</tr>
<tr>
<td>ProFunds Biotechnology UltraSector Inv</td>
<td>7</td>
</tr>
<tr>
<td>Franklin India Growth Adv</td>
<td>8</td>
</tr>
<tr>
<td>ProFunds Utilities UltraSector Inv</td>
<td>9</td>
</tr>
<tr>
<td>ProFunds Real Estate UltraSector Inv</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total Number of Mutual Funds:</strong></td>
<td>7,239</td>
</tr>
</tbody>
</table>

Source: Morningstar Principia 2018, Universe limited to distinct portfolios.
above studies, it should come as no surprise that many of the managers who outperformed their peers in the first 5-year period did not do so in the second 5-year period, and vice versa.

*Figure 5-4*

**Persistence in 5-Year Performances of 246 Mutual Funds**

10 Years (1/1/2008 - 12/31/2017)

Another tracking mechanism that can cause confusion is the reporting of mutual fund returns, often inflated when compared to actual long-term returns. The discrepancy arises from neglecting to account for funds that have closed or merged, resulting in the higher average returns of only surviving funds included in calculations. When funds go under, their records are stricken from databases, creating a survivorship bias. This
bias inflates the remaining funds’ average returns by 21%, according to CRSP data cited by John Bogle.\textsuperscript{72} The 2017 year end SPIVA study states that 58% of actively managed domestic equity funds, 55% of actively managed global equity funds, and 48% of actively managed fixed income funds were either merged or liquidated during the previous 15 years.\textsuperscript{73}

**The Fired Beat The Hired**

Even large institutions and pension plans chase performance, much to their detriment. A study conducted by Amit Goyal of Emory University and Sunil Wahal of Arizona State University found that manager hiring and firing decisions made by consultants, board members and trustees were a waste of time and money.

The study, “The Selection and Termination of Investment Management Firms by Plan Sponsors,”\textsuperscript{74} reveals the negative impact of manager picking. Goyal and Wahal analyzed hiring and firing decisions made by approximately 3,700 plan sponsors, representing public and corporate pension plans, unions, foundations and endowments. Figure 5-5 shows the results of hiring 8,755 managers over a 10-year period from 1994 through 2003. Note that investment manager performance is measured by average annualized excess returns over a benchmark. The chart illustrates that managers that were hired had outperformed their benchmarks by 2.91% over the three years before being hired. However, over the following three years the managers on average underperformed their benchmarks by 0.47% per year when adjusted for management fees and transition costs. Plan sponsors often proceeded to fire managers who had underperformed in favor of other recent top performers, only to
repeat the cycle again. The study concluded, “In light of such large transaction costs and positive opportunity costs, our results suggest that the termination and selection of investment managers is an exercise that is costly to plan beneficiaries.”

Using data from the same study by Goyal and Wahal, Figure 5-6 conveys the tendency for investment committees or plan sponsors to hire investment managers with a history of above-benchmark returns and fire managers with lower performance. The chart shows that after managers were hired, their post-hiring excess returns were indistinguishable from zero, and the managers that were fired performed better than the hired managers. The plan sponsors should have just bought index funds and forgotten about manager picking in the first place.
In the 2009 edition of *Pioneering Portfolio Management: An Unconventional Approach to Institutional Investment*,75 Yale Endowment Chief Investment Officer David Swensen states, “Active management strategies, whether in public markets or private, generally fail to meet investor expectations... In spite of the daunting obstacles to active management success, the overwhelming majority of market participants choose to play the loser’s game.”

Despite Swensen’s admonition, active manager selection and termination remains a common practice among public pension plans. Plan sponsors hire investment fund managers whom they expect to deliver above benchmark returns.
An investigative journalist for *The St. Petersburg Times*, approached Index Fund Advisors (IFA) and a handful of other investment experts to collect some in-depth analysis of the risks and returns of the Florida State Pension Plan for various periods of time relative to various index portfolio strategies. The research results were revealed in a July 2011 article titled, “Easy investments beat state’s expert pension planners,” which concluded that a simple index portfolio would have outperformed the Florida state pension plan’s investment performance over the last ten years.

“The professionally managed SBA [State Board of Administration] performed worse — by more than a percentage point — than seven index-fund portfolios for the decade ending 2010,” the article reports. “On average, a $100 investment in an index portfolio grew to $184, while Florida’s pension delivered just $157,” the reporter concluded.

The findings prompted me to dig deeper. If Florida’s $124 billion pension plan fared so poorly against the index portfolios, what about the other states? IFA attempted to analyze the employee retirement systems in all 50 states. Data on more than 40 state pension plans was obtained, yielding similar results with varying degrees of underperformance relative to the index portfolios.

Figures 5-7 through 5-10 show the annual risk and return of various state pension plans, net of fees, compared to passively managed index portfolios comprised of a blend of diversified asset allocations. A best effort was made to estimate fees in states that report returns before fees are deducted. States were analyzed for both 13-year periods and 26-year periods and were
charted based on either a June 30th or December 31st year-end date. The data shows that in the 26-year study, only 2 states (South Dakota and Delaware) matched the index portfolios, and not one of them outperformed in any of the time periods analyzed. For data sources, go to pension-gate.com.

Directors of these pension plans have access to so-called “top” money managers, which would lead one to believe that these plans fired their very best shots at earning above-benchmark returns, only to fall short. This analysis reveals that the widely implemented and costly process of hiring and firing of investment managers for state pension plans has delivered a negative payout relative to a risk-appropriate set of index benchmarks.
Figure 5-7
State Retirement Systems vs. Index Portfolios
14 Years (1/1/2000 - 12/31/2012) Limited to States with 12/31 Fiscal Year End

Figure 5-8
State Retirement Systems vs. Index Portfolios
27 Years (1/1/1987 - 12/31/2013) Limited to States with 12/31 Fiscal Year End

Sources, Updates and Disclosures: ifabt.com, pension-gate.com, Appx A
Figure 5-9

State Retirement Systems vs. Index Portfolios
13 Years (7/1/2000 - 6/30/2013) Limited to States with 6/30 Fiscal Year End

Figure 5-10

State Retirement Systems vs. Index Portfolios
26 Years (7/1/1987 - 6/30/2013) Limited to States with 6/30 Fiscal Year End
Solutions

A T-Stat of 2

As discussed in Step 3, a method to determine manager skill is to identify if there are enough years of performance data to be statistically significant by measuring a manager’s t-stat. If the t-stat is 2 or greater, then the investor has at least a 97.5% confidence level that the manager’s above-benchmark returns were due to skill, with up to a 2.5% chance that they were due to luck, and the true alpha of the manager is zero.

In this book’s 2015 printing, we analyzed the year-by-year difference between the fund return and the benchmark return of four funds that were named Morningstar’s 2013 “Manager of the Year” with ten or more years of data. At that time, each of the funds had a positive average alpha, but none of them had a t-stat of 2, meaning their alpha was not consistent enough to have 97.5% confidence in manager skill. How did those managers fare in the subsequent five years? Figures 5-11 through 5-14 reveal that all of the managers still had a positive average alpha, but none of them were able to attain a t-stat of 2 over the entire period ending of December 31, 2017.

When managers are subjected to the scrutiny of a simple t-test, the idea of manager skill to produce consistent alpha quickly becomes relegated to the realm of fantasy, taking its rightful place alongside unicorns, Bigfoot, and the Loch Ness Monster - as depicted in The Alpha Myth painting on the following page.
Figure 5-11

Morgan Stanley Inst Growth I (MSEQX)'s Alpha*

26 Years (1/1/1993 - 12/31/2017)

2013 Morningstar Domestic-Stock Fund Manager of the Year

Minimum Track Record to Indicate Skill (t-stat > 2): 46 Years

Average Alpha: 2.78% | Standard Deviation of Alpha: 9.42% | t-Statistic: 1.50

*Alpha measured as relative to the benchmark Russell 1000 Growth Index.
Benchmark selected by © Morningstar, Inc. Source: Morningstar Advisor.

Figure 5-12

Morgan Stanley Inst Mid Cap Growth I (MPEGX)'s Alpha*

27 Years (1/1/1991 - 12/31/2017)

2013 Morningstar Domestic-Stock Fund Manager of the Year

Minimum Track Record to Indicate Skill (t-stat > 2): 68 Years

Average Alpha: 2.29% | Standard Deviation of Alpha: 9.44% | t-Statistic: 1.26

*Alpha measured as relative to the benchmark Russell 1000 Growth Index.
Benchmark selected by © Morningstar, Inc. Source: Morningstar Advisor.
Figure 5-13

Artisan International Value Investor (ARTKX)’s Alpha*
15 Years (1/1/2003 - 12/31/2017)

2013 Morningstar International-Stock Fund Manager of the Year
Minimum Track Record to Indicate Skill (t-stat > 2): 23 Years

Average Alpha: 3.92% | Standard Deviation of Alpha: 9.49% | t-Statistic: 1.60

*Alpha measured as relative to the benchmark Russell 2000 Growth Index. Benchmark selected by © Morningstar, Inc. Source: Morningstar Advisor.

Figure 5-14

FPA Crescent (FPACX)’s Alpha*
19 Years (1/1/1999 - 12/31/2017)

2013 Morningstar Allocation Fund Manager of the Year
Minimum Track Record to Indicate Skill (t-stat > 2): 106 Years

Average Alpha: 2.43% | Standard Deviation of Alpha: 12.55% | t-Statistic: 0.85

*Alpha measured as relative to the benchmark Morningstar Moderately Aggr Target Risk. Benchmark selected by © Morningstar, Inc. Source: Morningstar Advisor.
Step 5: Manager Pickers
**Step 6: Style Drifters**

“Style drift is a serious problem because it distorts asset allocation and undermines performance when styles rotate. Value managers who have drifted over the past three years [1998-2000] toward more favored growth stocks are regretting those moves, but not as much as their [investors].”

Ron Surz, President, PPCA Inc. “Get the Drift”, 2001

“One thing is clear. Style drift happens to a sizable percentage of mutual funds. For [investors or] planners seeking to create portfolios tapping into consistently different equity styles, style drift presents a significant concern.”

Craig L. Israelsen, Ph.D., “Drift Happens”, Financial Planning Interactive, 1999

“The SEC deems it a fraud if performance results are compared to an inappropriate index, without disclosing the material differences between the index and the accounts under management.”

When you buy a box of corn flakes, you expect corn flakes in your cereal bowl. It is a safe and reasonable assumption that you are getting what you think you are buying. You know you are not buying granola or oatmeal. The name on the box is true to the box’s contents.

This is not the case with active fund managers who engage in style drifting. A style can refer to the asset class, index, market segment, or classification that a mutual fund states as its objective, described as the fund’s investment purpose. When active managers style drift, they do not stay true to the type or name of a fund in which your money is invested. They do this by drifting from a fund’s stated style into another style that no longer represents the fund’s objective. For example, you may have intentionally invested in a growth fund; then unbeknownst to you, your active manager takes 30% of your fund and puts it in cash and bonds. This changes the composition of your growth fund by altering the risk exposure, return and time horizon of your investment. The fund no longer matches its name or style. With index funds, the name of a fund corresponds to the contents of that fund, what I would call “style pure.”

Traders oughta learn from Nobel Laureates, but they keep on makin’ them long and short bets. —The Speculation Blues
PROBLEMS

STYLE DRIFTALTERS RISK EXPOSURE

There are different risk characteristics among the many categories of investment styles. An index or asset class is designed to carry a particular risk exposure, a key identifying factor for any fund. Market capitalization styles include large cap, mid cap, small cap, and micro cap stocks. A growth style commonly pertains to stocks that have experienced rapid growth in earnings, sales or return on equity, as well as low book-to-market ratios (BtMs). A value style, on the other hand, refers to stocks that have carried low price to earnings ratios, high BtMs, and are often labeled as “distressed.” Beyond these broad descriptions, funds are sorted into categories such as domestic, international, emerging markets, select technology, health care, energy and others.

No industry wide standards exist for defining these terms, making it hard for proper benchmarks to define what constitutes value, growth, large cap, small cap, international, or emerging market stocks. To make matters even more difficult, carefully crafted fund prospectuses give active fund managers significant leeway to deviate from their fund’s stated investment style. As a result, companies with divergent risk and return characteristics are often lumped together into the same style.
**Style Picking**

When active fund managers assume their fund’s investing style will underperform, they often abandon their stated strategies to chase the returns of other investment styles. For example, when small company fund managers forecast a slump in small company stocks, they may start buying large cap stocks in hopes of beating small cap benchmarks. As you will see, about 75% of actively managed funds utilize investments that do not reflect their stated objectives.

**The Elements Of Style**

The next three charts reveal the difficulty of identifying a winning style in advance. Figure 6-1 displays the Annual Returns of 13 Asset Class Indexes for the 20-year period from 1998 through 2017 and shows that high and low returns of key market indexes follow no discernible pattern. Figures 6-2 and 6-3 show the same is true for the historical returns of various countries and industrial sectors. Investors who attempt to overweight or underweight specific styles based on speculation about future market movement undermine their ability to achieve the risk-adjusted returns that result from maintaining a proper asset allocation made up of a consistent blend of investment styles.

**Style Drifters**

In the 1980s, Fidelity’s Magellan fund and its then-manager Peter Lynch were touted for outpacing the S&P 500 Index. However, Lynch had achieved his big returns by concentrating
### Annual Returns of 13 Asset Class Indexes

#### 20 Years (1/1/1998 - 12/31/2017)

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#### Sources, Updates, and Disclosures: ifabt.com, Appx A
### Annual Returns of 13 Country Indexes

**16 Years (1/1/2005 - 12/31/2017)**

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**Countries:**

- **AUS:** Australia
- **BRA:** Brazil
- **CAN:** Canada
- **CHE:** Chile
- **CHN:** China
- **FRA:** France
- **DEU:** Germany
- **IND:** India
- **JPN:** Japan
- **RUS:** Russia
- **SWE:** Sweden
- **USA:** United States

**Source:** © Morningstar Direct
### Annual Returns of 9 Sector Indexes

20 Years (1/1/1998 - 12/31/2017)

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**Source:** [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/)

**Legend:**
- CS: Consumer Staples
- CD: Consumer Discretionary
- E: Energy
- F: Financials
- H: Healthcare
- M: Manufacturing
- R: Retail
- T: Technology
- U: Utilities
a large portion of the fund’s holdings in small cap stocks. In so doing, his investors were unwittingly exposed to a higher level of volatility that may not have been in line with their investment objectives. Magellan’s returns looked good when measured against the S&P 500 Index, an inappropriate benchmark that included no small cap stocks. The appropriate benchmark for Magellan would have been a blended index of both small cap and large cap equities.

Figure 6-4 illustrates the style drift of Fidelity’s Magellan fund from January 1, 1982 through December 31, 2017. The scale on the vertical axis represents the fund’s relative exposure to different styles, and the different colors represent different investing styles. In 1995, the fund looked like a large value fund (green), but between 2000 and 2009, it would have been seen as a large growth fund (blue). This ongoing shift causes the fund’s investors to unknowingly be allocated to risks different from what they thought.

In the mid-1990s, Jeffrey Vinik took over the fund’s helm. He made a famous market call in November 1995, bailing out of $10 billion worth of technology stocks. This is visible in Figure 6-4 by the disappearance of the blue section (Large Growth) in 1995. He put a lot of that money into cash and bonds. During the next six months, Magellan’s value barely moved, as the Large Growth index grew by 11.3%. As a result, investors suffered from lower returns and higher capital gains taxes.

To expand the analysis, let’s look at two additional mutual funds whose exposure to different styles drifted over time. Figure 6-5 displays the style drift of the actively managed Vanguard Explorer Fund, which is designated by Vanguard
Figure 6-4

**Style Drift of Fidelity Magellan Fund**

36 Years (1/1/1982 - 12/31/2017)

![Graph showing the style drift of Fidelity Magellan Fund over 36 years with allocations between Russell 1000 Growth, Russell 1000 Value, Russell 2000 Growth, and Russell 2000 Value.](source: © Morningstar, Inc., IFA)

Figure 6-5

**Style Drift of Vanguard Explorer Fund Investor Shares**

36 Years (1/1/1982 - 12/31/2017)

![Graph showing the style drift of Vanguard Explorer Fund Investor Shares over 36 years with allocations between Russell 1000 Growth, Russell 1000 Value, Russell 2000 Growth, and Russell 2000 Value.](source: © Morningstar, Inc., IFA)
as a small growth fund. Note that the tan zone is a small growth index, and the brown is a small value index. The fund experienced a spike in exposure to small value in the early 1990’s, shifting it away from its original allocation and altering its risk exposure for its investors.

Similarly, Figure 6-6 illustrates the style drift of the Growth Fund of America, which is designated as a large growth fund. Note the lack of style consistency as the various indexes in the fund seem to move up and down like a roller coaster. Both of these funds did not stay true to their stated identity.

*Figure 6-6*
**Style Drift on Steroids**

Normally, style drift refers to something like a value fund that dabbles in growth stocks or a large cap fund that drifts into small cap stocks. An article in *The Wall Street Journal* on May 2, 2013, “Bond Funds Running Low on…Bonds,” puts a whole new spin on style drift.

Faced with very low bond yields, some active bond fund managers have resorted to buying stocks. According to Professor Russ Wermers of the University of Maryland, “When bond-fund managers buy stocks, they’re reaching for yield in the form of dividends”.

However, high-dividend stocks are not a free lunch. An increase in yield always comes with an increase in risk, and dividend-paying stocks are far riskier than bonds.

According to Morningstar, 386 mutual funds classified as bond funds held stocks at the end of the fourth quarter of 2017. This represents a 24% increase over 312 as of year-end 2012. A somewhat extreme example is the Wells Fargo Real Return Admin Fund, which had only 3% allocation in 2012, but now has just under 18% of its assets in stocks, according to Morningstar.

One of the problems with this style drift is the 2017 returns will be very different from, and frequently higher than, their prospectus benchmarks, which are usually pure bond indexes. In the case of the Wells Fargo Real Return fund, its prospectus benchmark is an inflation protected bond. Comparing returns of a bond fund with equities to a bond benchmark without equities can lead naïve investors to believe that active managers possess some sort of advantage during low-interest rate periods. However, there is no evidence that the bond market suddenly...
became inefficient. On the contrary, just like stock traders, bond traders turn over every stone, looking for mispriced bonds.

An appropriate use of bonds in a portfolio is to dampen the volatility of the equities, where the portfolio’s risk should be taken. When investors access bonds through low-cost index funds, they do not need to be concerned about style drift into stocks.

**Tactical Asset Allocation**

Tactical asset allocation refers to the practice of changing the composition or style of a portfolio based on market conditions. An example would be selling a portion of the portfolio’s bonds and buying stocks when the earnings yield on stocks has risen above a benchmark interest rate. Of course, the parties on the other side of these trades are well aware of these changed market conditions, so the prices paid and received by the tactical allocator are fair and impart no expectation of an additional risk-adjusted return. Figure 6-7 displays the results of a study of the only 24 mutual funds with a 20-year record based on tactical asset allocation as of December 31, 2017. As the chart shows, only three funds plot slightly above the line of index portfolios. While 3 of 24 (12.5%) is rather dismal to begin with, the true percentage is much lower because we are only looking at funds that survived for the last 20 years. An investor who chose a tactical allocation fund 20 years ago had a very small chance of both keeping the same fund and beating a risk-appropriate allocation of index funds.
Solutions

Style Purity

Index funds are created according to specific criteria, and in accordance with an index, allowing for accurate tracking and prevention of style drift. Figure 6-8 shows the style purity of an S&P 500 Index Fund over a 36-year period. In contrast to the drift of the three previous funds, the index fund maintained relatively constant exposure to large growth and large value equities over the entire period.
The Standard & Poor’s Indices versus Active Funds Scorecard® (SPIVA®) is a report that provides information on the consistency or “persistence” of funds staying true to their styles. Data from the year-end 2017 report is shown in Figure 6-9, revealing the inconsistency or lack of persistence in the list of funds from 2003 through 2017. Looking at the active domestic equity funds tracked by Standard and Poor’s, only 38.93% remained style consistent over the fifteen-year period.

Investors should carefully review Morningstar data to determine if a fund has a history of adhering to its stated investment style. Because passively managed index funds adhere to their styles, they provide investors with consistent risk exposure and the assurance their funds will stay true to their purpose.
Step 6: Style Drifters

Wise investors avoid the pitfalls of style drift in two ways. First, they resist the temptation to overweight or underweight asset classes that may be touted or spurned based on speculation or hype from so-called experts or the financial media at any particular time. Second, they steer clear of actively managed funds because these are also notorious for style inconsistency in an attempt to beat the market. Instead, wise investors avoid the perils of style drift by holding a consistent allocation of index funds, permitting them the full benefits of a risk appropriate investment in the global markets.

![Figure 6-9](image)

### Style Consistency Data on Equity Mutual Funds from SPIVA

**15 Years (1/1/2003 - 12/31/2017)**

<table>
<thead>
<tr>
<th>Fund Category</th>
<th>No. of Funds at Start</th>
<th>Style Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large-Cap Core Funds</td>
<td>300</td>
<td>19.00%</td>
</tr>
<tr>
<td>Large-Cap Growth Funds</td>
<td>216</td>
<td>18.06%</td>
</tr>
<tr>
<td>Large-Cap Value Funds</td>
<td>190</td>
<td>30.00%</td>
</tr>
<tr>
<td><strong>All Large-Cap Funds</strong></td>
<td><strong>706</strong></td>
<td><strong>26.63%</strong></td>
</tr>
<tr>
<td>Mid-Cap Core Funds</td>
<td>86</td>
<td>15.12%</td>
</tr>
<tr>
<td>Mid-Cap Growth Funds</td>
<td>171</td>
<td>19.30%</td>
</tr>
<tr>
<td>Mid-Cap Value Funds</td>
<td>90</td>
<td>12.22%</td>
</tr>
<tr>
<td><strong>All Mid-Cap Funds</strong></td>
<td><strong>347</strong></td>
<td><strong>24.78%</strong></td>
</tr>
<tr>
<td>Multi-Cap Core Funds</td>
<td>196</td>
<td>9.69%</td>
</tr>
<tr>
<td>Multi-Cap Growth Funds</td>
<td>145</td>
<td>13.10%</td>
</tr>
<tr>
<td>Multi-Cap Value Funds</td>
<td>178</td>
<td>10.67%</td>
</tr>
<tr>
<td><strong>All Multi-Cap Funds</strong></td>
<td><strong>519</strong></td>
<td><strong>19.27%</strong></td>
</tr>
<tr>
<td>Small-Cap Core Funds</td>
<td>145</td>
<td>31.72%</td>
</tr>
<tr>
<td>Small-Cap Growth Funds</td>
<td>158</td>
<td>27.85%</td>
</tr>
<tr>
<td>Small-Cap Value Funds</td>
<td>95</td>
<td>20.00%</td>
</tr>
<tr>
<td><strong>All Small-Cap Funds</strong></td>
<td><strong>398</strong></td>
<td><strong>42.96%</strong></td>
</tr>
<tr>
<td>All Domestic Funds</td>
<td>1,970</td>
<td>38.93%</td>
</tr>
</tbody>
</table>

*Source: SPIVA Scorecard Year-End 2017*
Step 7: Silent Partners

“It is difficult to systematically beat the market. But it is not difficult to systematically throw money down a rat hole by generating commissions (and other costs).”

- Michael C. Jensen, Ph.D., Harvard University, Forbes Magazine, 1984

“Fund returns are devastated by costs, taxes and inflation.”… “The miracle of compounding returns is overwhelmed by the tyranny of compounding costs.”


“For the taxable investor, indexing means never having to say you’re sorry.”

- William Bernstein, Ph.D., M.D., The Intelligent Asset Allocator, 2002

“It’s not brains or brawn that matter in taxable investing; it’s efficiency. Taxable investing is a loser’s game. Those who lose the least to taxes and fees stand to win the most when the game’s all over.”

Have you ever closely examined your cell phone bill? Typically you just look at the big number at the bottom and write a check. But if you studied it line by line you would see that your bill contains several fees that aren’t going into your actual carrier’s pocket. City telecom tax, state telecom tax, a 9-1-1 service fee… They may seem like small dings here and there, but over time, they add up. These various government entities act as silent partners with your carrier, holding out their hands for their share of the transaction, eating away at your pocketbook.

Just as with your cell phone bill, your investment portfolio is vulnerable to silent partners. Ideally, a silent partner would provide some sort of benefit, but in the case of your investments, these silent partners add no value. There are numerous silent partners that take a bite out of realized and unrealized gains on investments. In the painting, titled The Feast, we depict Uncle Same and several others who eat away at your returns pie. The investing family stand idly in the background looking hungry and perplexed as their wealth is voraciously consumed by many silent partners.

Silent partners are havin’ a feast on most investors, but they suck the least from savvy indexers.

The Speculation Blues
Here is a list of some of the silent partners:

- The stock broker or sales agent who earns commissions on stock and bond trades, loads and 12b-1 fees on mutual funds
- Federal and state income tax agencies that tax realized gains
- Active Fund managers who earn an expense ratio while managing a mutual fund
- Accountants
- Firms that charge investment advisory fees
- Market makers who earn a bid-ask spread on transactions
- Transfer agents who handle share transfers
- Mutual fund distributors
- The brokerage firm that earns commissions and interest on margin accounts and other sources of income on customer assets

**Problems**

**The Silent Feast**

According to a 15-year study conducted by Vanguard founder John Bogle, investors in taxable accounts kept only 47% of the cumulative return of an average actively managed equity mutual fund, but they kept 87% in a market index fund, as reflected in Figure 7-1. This means $10,000 invested in the average actively managed equity fund grew to $49,000 versus $90,000 in an index fund. That’s a $41,000 drain that pads the pockets of the silent partners in the form of sales commissions, taxes, cash drag, expense ratios and transaction costs. Cash drag relates to the cash balance held in a fund that is maintained for redemptions, and therefore is expected to earn a lower return than the investments.
A later study by Bogle analyzed the returns and tax implications of the average equity investor vs. an investor in an S&P 500 Index Fund. Figure 7-2 details the end results for the 25 years from January 1, 1981 to December 31, 2005. The chart shows that $10,000 invested in the average managed equity fund would have grown to post-tax results of only $71,700. The same amount invested in the S&P 500 Index Fund would have grown to a much larger post-tax sum of $159,000.
Figure 7-2

Pre-Tax and After-Tax Growth of $10,000
25 Years (1/1/1981 to 12/31/2005)

Figure 7-3 further reveals the contrast between the post-tax returns of both index funds and their respective Morningstar categories. From January 2003 through December 2017, a $100,000 investment in DFA Tax-Managed US Equity Portfolio, lost only

Figure 7-3

Value Lost to Taxes: Index Funds with 15 Years of Data
15 Years (1/1/2003 - 12/31/2017)

<table>
<thead>
<tr>
<th>Fund/Category</th>
<th>Pre-Tax Ann'lzd Return</th>
<th>Post-Tax Ann'lzd Return</th>
<th>Value Lost to Taxes on $100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Fund Large Blend</td>
<td>9.24%</td>
<td>8.20%</td>
<td>$50,606</td>
</tr>
<tr>
<td>DFA Tax-Managed US Equity Portfolio</td>
<td>10.07%</td>
<td>9.71%</td>
<td>$20,389</td>
</tr>
<tr>
<td>US Fund Large Value</td>
<td>9.01%</td>
<td>7.79%</td>
<td>$56,742</td>
</tr>
<tr>
<td>DFA Tax-Managed US Marketwide Value Portfolio</td>
<td>11.11%</td>
<td>10.67%</td>
<td>$28,192</td>
</tr>
<tr>
<td>US Fund Small Blend</td>
<td>10.71%</td>
<td>9.30%</td>
<td>$80,742</td>
</tr>
<tr>
<td>Vanguard Small Cap Index Inv</td>
<td>11.97%</td>
<td>11.60%</td>
<td>$26,885</td>
</tr>
<tr>
<td>US Fund Foreign Large Blend</td>
<td>7.95%</td>
<td>6.91%</td>
<td>$42,525</td>
</tr>
<tr>
<td>DFA Tax-Managed Intl Value Portfolio</td>
<td>9.40%</td>
<td>8.78%</td>
<td>$31,738</td>
</tr>
</tbody>
</table>

Source: Morningstar, Inc.
$20,389 to taxes, while the Morningstar Large Blend category lost $50,606. Looking at another index at the bottom of the chart, the DFA Total International Index Fund lost $31,738 to taxes, while the Morningstar Foreign Large Blend category lost $42,525. It is important to note that the annualized returns for the Morningstar categories are upwardly biased due to the impact of survivorship bias. Such contrasts in taxes reveal why index funds investing makes for one very sad Uncle Sam, as seen in the painting.

**Turnover Is Costly In Taxable Accounts**

The average active mutual fund has higher turnover rates than index funds, creating tax liabilities that erode returns. Figure 7-4 shows six Morningstar categories, which are

**Table: Turnover Ratio of Categories vs. Vanguard and DFA**

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Turnover Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Fund Large Blend</td>
<td>57.47%</td>
</tr>
<tr>
<td>Vanguard 500 Index Investor</td>
<td>3.00%</td>
</tr>
<tr>
<td>DFA US Large Company I</td>
<td>7.00%</td>
</tr>
<tr>
<td>US Fund Large Growth</td>
<td>56.62%</td>
</tr>
<tr>
<td>Vanguard Growth Index Institutional</td>
<td>8.00%</td>
</tr>
<tr>
<td>US Fund Large Value</td>
<td>58.74%</td>
</tr>
<tr>
<td>Vanguard Value Index I</td>
<td>9.00%</td>
</tr>
<tr>
<td>US Fund Small Blend</td>
<td>69.20%</td>
</tr>
<tr>
<td>DFA US Small Cap I</td>
<td>14.00%</td>
</tr>
<tr>
<td>Vanguard Small Cap Index I</td>
<td>15.00%</td>
</tr>
<tr>
<td>US Fund Small Growth</td>
<td>74.47%</td>
</tr>
<tr>
<td>Vanguard Small Cap Growth Index I</td>
<td>19.00%</td>
</tr>
<tr>
<td>US Fund Small Value</td>
<td>82.15%</td>
</tr>
<tr>
<td>Vanguard Small Cap Value Index I</td>
<td>19.00%</td>
</tr>
<tr>
<td>DFA International Small Cap Value I</td>
<td>21.00%</td>
</tr>
</tbody>
</table>

Source: Morningstar Direct
Step 7: Silent Partners

primarily actively managed funds, compared to index funds within those categories. Note the large difference in turnover ratios between all Morningstar categories and index funds.

In another study analyzing trading between 1963 and 1992, researchers at Stanford University determined a passively invested dollar would have grown to $21.89 in a tax-deferred account such as an IRA. In contrast, they found a dollar invested by a high tax-bracket individual in an actively managed fund, in a taxable account, grew to just $9.87, almost 55% less! Passive index fund managers minimize portfolio turnover, thereby maximizing unrealized capital gain, and tax-managed index funds virtually eliminate short-term capital gains.85

Inflation

Unlike investment costs and taxes, inflation is an uncontrollable variable. To hedge inflation risk, investors may buy Treasury Inflation-Protected Securities (TIPS) which adjust their coupon payments and re-payment of principal based on the Consumer Price Index (CPI). While TIPS may seem an obvious choice, investors should not forget that free protection from risk does not exist. This protection comes with a lower long-term expected return relative to nominal bonds. A TIPS buyer bets that actual inflation will be higher than the “breakeven inflation” incorporated into TIPS prices. One way to mitigate inflation risk is to keep bond maturities short because market interest rates will reflect expected inflation, and as these bonds mature, they can be re-invested at the higher market interest rates. Another way is to invest in asset classes that have expected returns in excess of inflation.
HEFTY FEES WEIGH ON RETURNS

When compared to passive funds, active funds charge higher fees. The cost of a fund’s operation is passed on to the investors. In the case of active fund management, the costs associated with identifying mispriced securities are burdensome. Detailed stock analysis, frequent buying and selling inside the fund, and compensation to the funds’ managers for their perceived skill all add up to impose a hefty fee and a high hurdle for fund managers to beat their benchmarks net of fees. As I have shown in previous steps, active managers rarely beat their index benchmarks. These higher fees are a primary culprit of this underperformance. Figure 7-5 reveals the disparity in mutual fund expense ratios, showing the weighted averages of fund share classes tracked by Morningstar. The figure shows the differences of the average fund expense ratios between actively managed funds, and a 60% Stock/40% Bond Index Portfolio. As you can see, the average actively managed mutual fund is more than three times as costly as the blend of indexes.

Figure 7-5

<table>
<thead>
<tr>
<th>Expense Ratios: Active Mutual Funds Avg. vs Index Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>As of 12/31/2017</td>
</tr>
<tr>
<td>Prospectus Net Expense Ratio (%)</td>
</tr>
<tr>
<td>1.2%</td>
</tr>
<tr>
<td>1.0%</td>
</tr>
<tr>
<td>0.8%</td>
</tr>
<tr>
<td>0.6%</td>
</tr>
<tr>
<td>0.4%</td>
</tr>
<tr>
<td>0.2%</td>
</tr>
<tr>
<td>0.0%</td>
</tr>
<tr>
<td>Active Mutual Funds Average Exp. Ratio 1.05%</td>
</tr>
<tr>
<td>Index Portfolio 60 60% Stocks / 40% Fixed Income 0.31%</td>
</tr>
</tbody>
</table>

Note: Based on a weighted average of Morningstar category expense ratios used in Index Portfolio 60. Sources: © Morningstar Inc., ifabt.com, Appx A
Solutions

Tax-Managed Funds

Index funds are tax efficient by their very nature. However, some indexes can be further tax-managed to save you even more in taxes. These tax-managed index funds are very efficient in offsetting realized gains with realized losses, deferring the realization of net capital gains and minimizing the receipt of dividend income. The result is maximized unrealized capital gains that have not yet been realized for tax purposes. Taxes are not paid until a future date when withdrawals are made and the gains then become realized. The benefit is that the unrealized capital gains (profits) remain a growing part of the net asset value of a fund rather than being distributed to the investor. Exchange-traded funds (ETFs) are also a tax efficient way to invest in an index.

Minimize The Silent Partners

Index funds are an excellent way to minimize the effect of silent partners. Dimensional Fund Advisors and Vanguard are leading providers of tax-managed index funds with funds in many equity categories. While fees, transaction costs and taxes eat up active investors’ returns, index fund investors maximize asset growth by avoiding the major impacts of costs and taxes. No investment is completely free from silent partners, but passive investors use index funds, tax-managed index funds and ETFs to retain as much money as possible.
Step 8: Riskese

“The most important questions of life are, for the most part, really only problems of probability.”

Marquis de Laplace, *Théorie Analytique des Probabilités*, 1814

“The average long-term experience in investing is never surprising, but the short-term experience is always surprising. We now know to focus not on rate of return, but on the informed management of risk.”

Charles Ellis, Ph.D., *Investment Policy*, 1985

“If your broker [or investment advisor] is not familiar with the concept of standard deviation of returns, get a new one.”


“Odds are you don’t know what the odds are.”


“The probable is what usually happens.”

Aristotle
Do you speak Riskese? Citizens of Japan speak Japanese, lawyers speak legalese, and leading investment advisors, casino statisticians and insurance actuaries speak “Riskese.” This is a self-created word for the essential language of investing and I use it to discuss topics of risk, return, statistical significance and time. Returns and risk go hand in hand. You cannot expect high returns without taking risk. People are perfectly comfortable talking about the returns portion of the investment process, but how squeamish do they get when they realize they will lose money on their investments? After the decline of 2008, people are far more aware of this possibility, but they are still looking for that perfect investment with small risk and big returns. People are also still looking for a weight loss pill that will allow them to continue eating country fried steak, massive cinnamon buns and ice cream on a regular basis. Neither exists.

Problems

Lack of Understanding

One of the primary deterrents to investors earning market rates of returns is their lack of understanding of the relationship between risk and return. The natural tendency of investors is to want returns without the risk. Because risk is the source of
returns, investors would be better served to be more concerned with the risk level of their investments.

The overall concept of the risk/return relationship is that when risk increases, the expected return on the asset should also increase as a result of an expected risk premium.

**Solutions**

**Risk Defined**

Modern finance began with the realization that risk needed to be measured and managed. In 1654, French mathematicians Blaise Pascal and Pierre de Fermat tried to predict the future outcome of a game of chance. Their questions led to Pascal’s Theory of Probability, which quantifies the numerical likelihood of future events. Pascal’s Triangle was the foundation for learning how to manage the uncertainty of future outcomes, such as investment returns.

Every investment carries an expected return. The risk of an investment is quantified by the degree to which the returns of the investment deviate from the average return during specific periods of time. Higher risk investments carry a wider range of short-term outcomes but also carry higher expected returns, compensating investors for withstanding short-term volatility. In contrast, investments that have had a narrow range of outcomes over long periods of time are expected to provide more consistent returns with the trade-off of lower returns.
For example, an all-bond index portfolio has provided a small but consistent return, while an all-equity index portfolio has provided a larger but more erratic return. Higher expected returns are the reward for an investor’s willingness to accept this volatility. In other words, risk is the source of returns and, therefore, should be embraced in appropriate doses.

**Standard Deviation of Returns**

An effective and common method to measure the deviation of investment returns from the average is the standard deviation of returns. Standard deviation provides a statistical measure of historical volatility and sets forth a distribution of the ranges of probable outcomes. In investing, measuring standard deviation of returns shows the extent to which returns (daily, monthly or annual) are distributed around the average return, estimating a range of probable outcomes and establishing a framework of risk and return trade-offs.

The normal distribution in the form of a bell-shaped curve shown in Figure 8-1 illustrates the concept of standard deviation. The curve represents a set of outcomes. In this case, let’s say the outcomes are the monthly returns of an investment. The yellow area covered in one standard deviation away from the average in both directions accounts for approximately 68% of the outcomes in a period. The area within two standard deviations from the average, the yellow and green shaded areas, accounts for 95.6% of outcomes, and the area up to three standard deviations away from the average-illustrated by the yellow, green and orange shaded areas-accounts for 99.7% of
all outcomes. The higher an investment’s standard deviation, the greater the chance that future returns will lie farther away from the average return.

Francis Galton, an English mathematician who was an expert in many scientific fields, created his “Quincunx” machine to demonstrate how a normal distribution is formed through the occurrence of multiple random events. He expressed his fascination with this phenomenon by stating, “I know of scarcely anything so apt to impress the imagination as the wonderful form of cosmic order expressed by the ‘Law of Frequency of Error.’ It reigns with serenity... amidst the wildest confusion. The huger the mob, and the greater the apparent anarchy, the more perfect is its sway. It is the supreme law of Unreason. Whenever a large sample of chaotic elements are
taken in hand and marshalled in the order of their magnitude, an unsuspected and most beautiful form of regularity proves to have been latent all along.”

I commissioned the creation of a large, museum-quality Probability Machine to educate investors about the probability of outcomes that result from a series of random events. The machine helps to portray order in the midst of seeming chaos that is the random walk of Wall Street. In the stock market, random events are the news stories about a company or about capitalism in general, and the resulting prices of securities. The random drop of the beads, starting with a central point of a fair price, simulates a series of fair prices, ultimately forming a normal distribution in the shape of a bell curve. The distribution of the beads bears a strong resemblance to the distribution of monthly returns shown in red bars behind the beads, also shown in Figure 8-2, reflecting 600 monthly returns (50 years) for an all-equity index portfolio. Like the Probability Machine’s normal distribution, the portfolio carries a wide range of outcomes or a high standard deviation. It maintains an approximate normal distribution that accumulates to an average 1.14% monthly fair return over 600 months, but with a standard deviation of 4.67%, which is a high level of short-term volatility. The display of the beads that have randomly fallen, and yet consistently form a bell curve approximating the returns of a full equity portfolio is so powerful, I created a desktop version of the machine that is available worldwide. It is called “The Random Walker.”
Figure 8-2

High Volatility Portfolio: Distribution of Monthly Returns

50 Years (1/1/1968 - 12/31/2017) 600 Months

Index Portfolio 100
Average Monthly Return: 1.07%
Growth of $1: $320.48
Monthly Standard Deviation: 4.61%

Figure 8-3

Low Volatility Portfolio: Distribution of Monthly Returns

50 Years (1/1/1968 - 12/31/2017) 600 Months

Index Portfolio 10
Average Monthly Return: 0.49%
Growth of $1: $18.50
Monthly Standard Deviation: 0.95%
Note the comparison to Figure 8-3, which shows a lower-risk index portfolio comprised of 90% fixed-income funds and 10% stock funds with a narrow range of outcomes. The 100% stock fund index portfolio in Figure 8-2 experienced greater price swings but had higher returns. Over the simulated 50-year period, a dollar invested in the low-risk index portfolio would have grown to $18.50, while a dollar invested in the higher risk index portfolio would have grown to $320.48. This historical data supports the presumption that investors who have the capacity to hold higher risks are expected to earn substantially higher returns.

**Not All Risks Are Rewarded**

Higher expected returns are the result of higher risk, but not all risks are rewarded at the same rate. Financial economists have long sought to identify the factors that explain stock market returns. With the help of CRSP, substantial progress has been made. In Step 2, I discussed Nobel Laureate William Sharpe and his Capital Asset Pricing Model (CAPM). This model explains approximately 70% of all stock portfolio returns. CAPM enabled investors to quantify expected returns based on how investments fluctuate relative to the market as a whole. It concluded that investments which fluctuate more than the market, as a whole, carry more risk than the market, and therefore, should also carry higher expected returns. Sharpe asserted however, that some investments carry increased risk without providing the trade-off of higher expected returns. To clarify, he divided risk into two categories: systematic and unsystematic.
**Figure 8-4**

**SYSTEMATIC RISK**
- Market Wide Risk
  - War
  - Recession
  - Inflation
  - Government Intervention
- Capitalism Risk
- Non-Diversifiable
- Expected Return of Capitalism is About 9.8% Per Year

**UNSYSTEMATIC RISK**
- Company Specific Risk
  - Lawsuits
  - Fraud
  - Management
  - Unique Circumstances
- Unrewarded Risk
- Diversifiable
- No Additional Expected Return
- Increased Volatility
- Speculative

**STOCKS**
Risk Factors That Explain Returns

**FIXED INCOME**
Risk Factors That Explain Returns

**MARKET**
- The stock market has higher expected returns than the risk free T-bills.
- The annual average return of the market over T-bills from 1928 to 2017 was 8.12%.

**SIZE**
- Stocks with low market capitalization or small companies have higher expected returns than large companies.
- The annual average return of the bottom 30% of companies over the top 30% of companies ranked by size from 1928 to 2017 was 2.77%.

**VALUE**
- Stocks priced closer to their book value have higher expected returns than stocks priced far above their book value.
- The less goodwill in the stock price, the higher expected returns.
- The annual average return of the bottom 30% of goodwill stocks over the top 30% of goodwill stocks from 1928 to 2017 was 4.88%.

**TERM**
- Longer terms have higher yields.
- Longer terms have higher volatility.
- Terms beyond 5 years have increased volatility, but offer little increased expected returns.
- The average annual return for the term risk factor from 1928 to 2017 was 2.53%.

**DEFAULT**
- Lower credit ratings have higher expected returns.
- Lower credit ratings have higher volatility.
- Higher credit ratings have lower expected returns.
- 30-day T-bills have returns approximating inflation, i.e. zero risk = zero return.
- The average annual return for the credit risk factor from 1928 to 2017 was 0.37%.

An investor's expected return is determined by their exposure to the five risk factors shown below.
The entire market is exposed to unavoidable systematic risk, such as war, recession, inflation, and government intervention. In contrast, unsystematic risk refers to threats specific to individual companies, such as lawsuits, fraud and competition. A summary of these different risks is presented in the top portion of Figure 8-4. Systematic risk, or the risk of investing in capitalism itself, has rewarded investors with an approximate 9.8% total U.S. market annualized return over the last 90 years (8.18% above the risk-free rate). However, an investment in unsystematic risk, such as buying individual stocks, does not increase expected returns. Unsystematic risk should be avoided through diversification, thereby maximizing portfolio efficiency and expected returns at each level of risk.

*Figure 8-5*
Figure 8-5 illustrates the lack of increased expected returns when investors accept the additional concentrated and unsystematic risk of individual stocks relative to their designated index. The additional risk of buying individual stocks does not increase expected returns.

**The Trade-Off Between Risk And Return**

Even when all non-compensated risk has been eliminated from a portfolio, an investor cannot escape the systematic risks inherent in the market itself. As previously mentioned, history shows an investment in the U.S. market as a whole has delivered about 9.8% a year on average for the last 90 years, but not without substantial uncertainty. Risk and return go hand-in-hand. To obtain greater stock returns, the trade-off is suffering significant short-term volatility, such as that investors experience first-hand every day, with about 49% of daily returns being negative.

**The Dimensions Of Investment Returns**

Sharpe’s CAPM was widely held as the explanation of equity returns until 1992 when Nobel Laureate Eugene Fama and Kenneth French introduced their Fama/French Three-Factor Model, identifying market, size and value as the three factors that explain as much as 96% of the returns of diversified stock portfolios. Fama and French analyzed the CRSP database back to 1962 to determine that equity returns can be explained by a portfolio’s exposure to the market as a whole, as well as the exposure to small and value companies. Their data show that small and value companies carried higher risk and that risk was rewarded.
These small and value excess returns had shown to carry long-term persistence, but are not consistent in short periods of time. More than 90 years of risk and return data confirm their results.

Fama and French later expanded their model to include fixed income, identifying term and default as two additional risk factors that explain returns for fixed income. Thus, a Five-Factor Model was created, as shown in Figure 8-6.

**Figure 8-6**

<table>
<thead>
<tr>
<th>The Fama and French Five Factor Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Difference Between Investing and Speculating</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Expected Return [minus T-bills]</th>
<th>Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market</strong> - <strong>Value</strong> - <strong>Term</strong> - <strong>Default</strong> + e(t)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Active Management Expected Return (Alpha)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Zero Expected Return (before expenses)</td>
</tr>
<tr>
<td>- Negative Expected Return (after expenses)</td>
</tr>
<tr>
<td>- Random (positive alpha does not persist)</td>
</tr>
<tr>
<td>- Speculating (alpha is a myth)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Priced Risk</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Positive Expected Return</td>
</tr>
<tr>
<td>- Systematic</td>
</tr>
<tr>
<td>- Economic</td>
</tr>
<tr>
<td>- Long-Term</td>
</tr>
<tr>
<td>- Investing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Unpriced Risk</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Zero Expected Return</td>
</tr>
<tr>
<td>- Noise</td>
</tr>
<tr>
<td>- Random</td>
</tr>
<tr>
<td>- Short-Term</td>
</tr>
<tr>
<td>- Speculating</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Market</strong></th>
<th>sensitivity to market [market return minus T-bill]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size</strong></td>
<td>sensitivity to size [small stocks minus big stocks]</td>
</tr>
<tr>
<td><strong>Value</strong></td>
<td>sensitivity to value [value stocks minus growth stocks]</td>
</tr>
<tr>
<td><strong>Term</strong></td>
<td>sensitivity to term factor [LT Gov't minus T-bill]</td>
</tr>
<tr>
<td><strong>Default</strong></td>
<td>sensitivity to default factor [LT Corp minus LT Gov't]</td>
</tr>
<tr>
<td><strong>e(t)</strong></td>
<td>Random Error</td>
</tr>
</tbody>
</table>

Sources: Fama and French, Appx A

The relationship that exists between these five risk factors and a portfolio’s expected return serves as a framework for designing investment portfolios. The five risk factors are portrayed on the following pages.
THE MARKET RISK FACTOR

The first risk factor in the Fama/French Five-Factor Model is the “market risk factor” or the amount of an investor’s exposure to the overall stock market compared to risk-free investments, such as the 30-day T-Bill. Investors take on market risk through all of their different equity investments. Figure 8-7 plots the risk and return associated with the market risk factor for five allocations of the total U.S. stock market and U.S. Treasury bills. The highest market exposure, labeled 5, carries 100% exposure to the total U.S. market. The button labeled 0 is invested in 100% T-Bills. The chart reflects the differences in growth of $1 and annualized returns in the various market exposures over the 90-year period from January 1, 1928 through December 31, 2017.

Figure 8-7

<table>
<thead>
<tr>
<th>Market Risk Factor for U.S. Equities</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 Years (1/1/1928 - 12/31/2017)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Market Quintiles of U.S. Market:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranked by Market Exposure (% Total Market / % T-Bills)</td>
</tr>
<tr>
<td>0 0/100</td>
</tr>
</tbody>
</table>

The dollar amount reflects the growth of $1. Sources: © Morningstar, Inc., Appx A
THE SIZE RISK FACTOR

The second risk factor in the Fama/French model is the “size risk factor,” referring to the level of a portfolio’s exposure to small company stocks. Small companies are more volatile and riskier than larger companies because they have less business diversification, fewer financial resources and greater uncertainty of earnings than their large counterparts.

The painting for the size factor contrasts General Electric with the small cap company Acme Packet. It is obvious that Acme is a riskier investment than GE, therefore the cost of capital for Acme and the expected return for its investors should be higher.

Figure 8-8 plots the risk and return of the S&P 500 Index and U.S. companies according to size over a 90-year period.

Figure 8-8

<table>
<thead>
<tr>
<th>Size Risk Factor for U.S. Equities</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 Years (1/1/1928 - 12/31/2017)</td>
</tr>
</tbody>
</table>

Size Deciles of U.S. Stock Market:
Market capitalization deciles (1/10th of stocks) for U.S. equities ranked from the largest to the smallest. 1 Largest 10 Smallest SP S&P 500 Index

<table>
<thead>
<tr>
<th>Risk: Annualized Standard Deviation (%)</th>
<th>Annualized Return (%)</th>
<th>Size Decile</th>
<th>Market Cap (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>8.261</td>
<td>1</td>
<td>$4,788</td>
</tr>
<tr>
<td>20</td>
<td>10.213</td>
<td>2</td>
<td>$8,231</td>
</tr>
<tr>
<td>24</td>
<td>11.251</td>
<td>3</td>
<td>$10,213</td>
</tr>
<tr>
<td>28</td>
<td>12.606</td>
<td>4</td>
<td>$18,558</td>
</tr>
<tr>
<td>32</td>
<td>13.370</td>
<td>5</td>
<td>$15,344</td>
</tr>
<tr>
<td>36</td>
<td>14.059</td>
<td>6</td>
<td>$16,595</td>
</tr>
<tr>
<td>40</td>
<td>14.780</td>
<td>7</td>
<td>$19,870</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>$20,796</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>$21,080</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>$67,880</td>
</tr>
</tbody>
</table>
THE VALUE RISK FACTOR

The third risk factor in the Fama/French model is the “value risk factor,” which refers to the amount of a portfolio’s exposure to value or low-priced stocks relative to their book value. Value is measured by the book-to-market (BtM) ratio. The book value of a company is an accounting term for its net worth, its assets minus its liabilities. The market value of a company is its price per share times the number of shares outstanding. Stocks with higher BtM ratios are considered value stocks while stocks with lower BtM ratios are considered growth stocks. Figure 8-9 plots the risk and return characteristics and the growth of $1 for the value risk factor for the five quintiles of the U.S. stock market from 1928 through 2017.

Figure 8-9
THE TERM RISK FACTOR

Fixed income is also an important component to an investment portfolio. Since stocks and bonds frequently move in opposite directions, holding low-volatility bonds provides good diversification and will therefore level out a portfolio’s performance by dampening stock volatility and providing short-term liquidity.

The “term (maturity) risk factor” refers to the difference in returns between long-term government bonds and short-term treasury bills. Longer-term bonds are riskier than shorter-term instruments and have yielded higher returns over the 90 years ending in 2017. Figure 8-10 shows six different fixed income allocations and their differences in risk and return.

Figure 8-10

<table>
<thead>
<tr>
<th>Term Quintiles of U.S. Fixed Income:</th>
<th>0/100</th>
<th>20/80</th>
<th>40/60</th>
<th>60/40</th>
<th>80/20</th>
<th>100/0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranked by Term Risk (% Long Term Gov't Bonds / % 30 Day T-Bills)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Term Risk Factor for Fixed Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90 Years (1/1/1928 - 12/31/2017)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annualized Return (%)</td>
<td>$20.79</td>
<td>$32.16</td>
<td>$48.50</td>
<td>$71.28</td>
<td>$102.15</td>
<td>$142.73</td>
</tr>
</tbody>
</table>

The dollar amount reflects the growth of $1. Sources: © Morningstar, Inc., Appx A
THE DEFAULT RISK FACTOR

The last of the five risk factors is the “default risk factor,” which is associated with the credit quality of bonds. Instruments of lower credit quality are riskier than those of higher credit quality, thus yielding higher expected returns. Despite the downgrade of U.S. government debt by Standard & Poor’s that occurred in 2011, the market still assigns a higher default risk to corporations over the U.S. government. The default risk factor refers to the additional expected return of corporate bonds over government bonds. Figure 8-11 shows the strong relationship between risk, return and the growth of $1 as the probability of default increases.

Figure 8-11

Default Risk Factor for Fixed Income
34 Years and 6 Months (7/1/1983 - 12/31/2017)

Barclays Capital U.S. Intermediate Fixed Income Indexes
(Ranked by Low to High Default Risk)

1 Government 2 Corporate Aaa 3 Corp. A 4 Corp. Baa 5 High Yield

The dollar amount reflects the growth of $1. Sources: © Morningstar, Inc., Appx A
Implications Of The Five-Factor Model

A summary of the average annual returns for all five risk factors is presented in Figure 8-12. Both the risk and average annual returns for all five risk factors are shown in Figure 8-13.

The research of Eugene Fama and Kenneth French serves as a guiding protocol for both individual and institutional investing. Their Multi-Factor Model has revolutionized how portfolios are constructed and analyzed, and was one of the primary reasons for Eugene Fama being awarded the 2013 Nobel Prize in Economics.

As you have learned, three-of-the-five factors apply to equities. The Three-Factor Model is an invaluable tool for asset allocation and portfolio analysis. In his own words, Eugene Fama explains the small-value story, among other subjects, in a November 2007 interview with The Region, a publication for the Federal Reserve Bank of Minneapolis. “So, small-cap stocks have higher average returns than large-cap stocks, and stocks with higher ratios of book value to market value have higher returns than low book-to-market stocks.” He continues, “Low book-to-market stocks tend to be growth stocks. High book-to-market stocks tend to be relatively more distressed; they’re what people call value stocks. That’s given rise to what the finance profession — academic as well as applied — calls the size premium and the value premium. The value premium tends to be bigger” he said. “So, our model has three factors. Every asset pricing model says you need the market in there. Then they differ on how many other things you need. The CAPM says you only need the market. We basically say a minimum of two other factors seem to be necessary. And these two do a pretty good job.”

87
Figure 8-12

**Average Annual Returns of the Fama/French Risk Factors**

<table>
<thead>
<tr>
<th>Average Annual Return (%)</th>
<th>7.71%</th>
<th>4.71%</th>
<th>2.58%</th>
<th>2.43%</th>
<th>0.39%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market Premium</strong></td>
<td><strong>F/F Total US Market minus T-Bills</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Value Premium</strong></td>
<td><strong>F/F US Value Growth Index</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Small Size Premium</strong></td>
<td><strong>F/F US Small minus Large Index</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Term Premium</strong></td>
<td><strong>LT Gov't minus T-Bill</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Default Premium</strong></td>
<td><strong>LT Corp minus LT Gov't</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Risk: Annualized Standard Deviation**

| 18.60% | 12.13% | 11.14% | 8.44% | 4.73% |

Sources: © Morningstar, Inc., Appx A

Figure 8-13

**Risk and Return of the Five Risk Factors**

**Average Annual Return (%)**

Sources: © Morningstar, Inc., Appx A
**STEP 9: HISTORY**

“It takes between 20 and 800 years of monitoring performance to statistically prove that a money manager is skillful rather than lucky, which is a lot more than most people have in mind when they say ‘long-term’ track record.”


“While much has changed over the years, some things remain the same. There is still a strong relation between risk and expected return... Some things stand the test of time.”

James L. Davis, Ph.D., “Digging the Panama Canal”, 2004

“Those who are ignorant of investment history are bound to repeat it. Historical investment returns and risks of various asset classes should be studied. Investment results, for an asset over a long enough period (greater than 20 years) are a good guide to future returns and risks of that asset.”


“I know of no way of judging the future but by the past.”

Patrick Henry, Virginia Convention Speech, 1775
I think we can safely say that most investors don’t make decisions based on the long-term history of the stock market. They generally look at the most recent 1-, 3- and 5- and sometimes 10-year returns and assume that recent past performance will persist. Unfortunately, they don’t understand that short-term returns are based on random news and that investment decisions based on 50 years of data have a higher probability of enhancing wealth than decisions based on five years of data.

Historical stock market data provides investors with a powerful set of tools for constructing portfolios that can maximize expected returns at given levels of risk. By analyzing the historical returns for various asset classes, including stocks, bonds, private equity, real estate, and even precious metals, an investor can see the difference between compensated and uncompensated risk over time. Statisticians require data from periods of at least 30 years to minimize the sampling error of short-term data and to provide a more reliable estimate of expected returns and risk. Very few managers are able to provide 30 years of data to their clients.

Historical data serves as a testament to the enduring nature of capitalism. By considering and understanding long-term data, investors can use the long-term risks and returns for various indexes to construct an asset allocation based on history and the science of investing, not on speculation.


**Problems**

**Investors Focus On Short-Term Data**

The first problem investors face is that the long-term history of stock market returns is rarely provided to them. Secondly, investors are not aware that long-term data has more value to them than short-term data. When presented with 90 years of data, many investors deem the data irrelevant, because they do not have 90 years to live. This perspective overlooks the value of a large sample size. Investors who make decisions based on short-term data often regret it.

When describing the risk and return of an index, significant errors are likely to occur when using a subset of the available data. For example, in the five year period from 2013 to 2017, the S&P 500 Index had an annualized return of 15.79%\(^8\). Based on that return, many investors would conclude that the S&P 500 was a “shoot out the lights” investment. However, for the 20-year period ending 2017, the annualized return was much lower at 7.20%. For the 50-year period ending 2017, it returned 10.12%, and for the 90-year period ending 2017, it produced a 9.87% return. An S&P 500 index fund is an important building block for inclusion in a diversified index portfolio. The index is made up of 500 of the most economically important large U.S. companies, and comprises nearly 80% of the total market capitalization of the U.S. equity market. When gathering information to identify the risk and return characteristics of the many asset class indexes that belong in a diversified portfolio, the more quality long-term data you have, the more accurate and probable are your expectations about future outcomes.
Solutions

History Characterizes Risk and Return

The most complete historical database for stocks, bonds and mutual funds can be found at the Center for Research in Security Prices (CRSP) at the University of Chicago’s Booth School of Business. Figure 9-1 shows the annualized rates of return for 24 different indexes as constructed by Index Fund Advisors (IFA). This table provides an interesting review of various indexes over several different time periods. Note the pattern of higher annualized returns of small cap and value stocks over large cap and growth stocks over time.

The time series construction in Figure 9-2 enables index fund investors to make investment decisions based on a statistically substantial and significant 90-year time frame. This time series construction simulates a fund’s composition prior to its inception and allows for estimates of past performance data. The style purity of index fund investing allows for this exercise, providing an abundance of data. This time series construction carefully stitches together 90 years of risk and return data for the indexes referenced in this book, with the black-dotted outlined section representing the simulated indexes and the solid black lines representing live mutual fund data from Dimensional Fund Advisors. While not a perfect representation, the data produced by the time series construction is a very useful tool. Statisticians who consider 30 years of risk and return data to be statistically significant would consider this collection of 90 years of data a feast!
### Figure 9-1

#### Annualized Returns of Various Indexes (%)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IFA Emerging Markets Small</td>
<td>35.26</td>
<td>6.83</td>
<td>4.71</td>
<td>12.16</td>
<td>15.89</td>
<td>13.94</td>
</tr>
<tr>
<td>IFA Emerging Markets Value</td>
<td>33.76</td>
<td>3.67</td>
<td>1.40</td>
<td>11.34</td>
<td>15.85</td>
<td>13.89</td>
</tr>
<tr>
<td>IFA International Small Value</td>
<td>27.98</td>
<td>12.57</td>
<td>5.77</td>
<td>10.86</td>
<td>14.53</td>
<td>13.16</td>
</tr>
<tr>
<td>IFA U.S. Small Value</td>
<td>9.59</td>
<td>14.05</td>
<td>9.28</td>
<td>10.64</td>
<td>13.59</td>
<td>12.64</td>
</tr>
<tr>
<td>IFA Emerging Markets</td>
<td>36.57</td>
<td>4.18</td>
<td>2.53</td>
<td>9.06</td>
<td>14.52</td>
<td>12.64</td>
</tr>
<tr>
<td>IFA Intl' Small Company</td>
<td>30.24</td>
<td>11.75</td>
<td>5.64</td>
<td>9.88</td>
<td>13.27</td>
<td>12.50</td>
</tr>
<tr>
<td>IFA International Value</td>
<td>26.09</td>
<td>7.96</td>
<td>1.64</td>
<td>7.18</td>
<td>11.38</td>
<td>10.89</td>
</tr>
<tr>
<td>IFA Real Estate</td>
<td>9.20</td>
<td>7.92</td>
<td>6.19</td>
<td>8.49</td>
<td>10.27</td>
<td>10.85</td>
</tr>
<tr>
<td>IFA U.S. Large Value</td>
<td>18.97</td>
<td>16.09</td>
<td>8.73</td>
<td>8.80</td>
<td>12.38</td>
<td>10.68</td>
</tr>
<tr>
<td>Nasdaq</td>
<td>32.99</td>
<td>20.71</td>
<td>11.30</td>
<td>8.30</td>
<td>8.83</td>
<td>9.71</td>
</tr>
<tr>
<td>IFA Total Market Index</td>
<td>21.18</td>
<td>15.56</td>
<td>8.73</td>
<td>7.54</td>
<td>10.13</td>
<td>9.71</td>
</tr>
<tr>
<td>IFA U.S. Large Company</td>
<td>21.77</td>
<td>15.72</td>
<td>8.49</td>
<td>7.13</td>
<td>9.96</td>
<td>9.50</td>
</tr>
<tr>
<td>IFA Intl' Large Company</td>
<td>25.37</td>
<td>7.52</td>
<td>2.18</td>
<td>5.35</td>
<td>8.50</td>
<td>8.67</td>
</tr>
<tr>
<td>IFA Large Growth Index</td>
<td>27.82</td>
<td>16.08</td>
<td>9.53</td>
<td>7.37</td>
<td>8.94</td>
<td>8.36</td>
</tr>
<tr>
<td>Long-Term Corporate Bonds</td>
<td>12.25</td>
<td>5.26</td>
<td>7.83</td>
<td>7.26</td>
<td>8.22</td>
<td>6.03</td>
</tr>
<tr>
<td>Long-Term Government Bonds</td>
<td>6.24</td>
<td>3.16</td>
<td>6.12</td>
<td>6.69</td>
<td>7.85</td>
<td>5.48</td>
</tr>
<tr>
<td>IFA Five Year Global</td>
<td>1.97</td>
<td>1.53</td>
<td>3.04</td>
<td>4.08</td>
<td>6.49</td>
<td>4.76</td>
</tr>
<tr>
<td>IFA Five Year Government</td>
<td>0.51</td>
<td>0.66</td>
<td>2.23</td>
<td>3.61</td>
<td>6.30</td>
<td>4.66</td>
</tr>
<tr>
<td>IFA Two Year Global</td>
<td>0.93</td>
<td>0.61</td>
<td>1.27</td>
<td>2.77</td>
<td>5.84</td>
<td>4.43</td>
</tr>
<tr>
<td>IFA One Year Fixed</td>
<td>0.94</td>
<td>0.54</td>
<td>1.13</td>
<td>2.62</td>
<td>5.68</td>
<td>3.79</td>
</tr>
<tr>
<td>One-Month US Treasury Bills</td>
<td>0.80</td>
<td>0.21</td>
<td>0.30</td>
<td>1.91</td>
<td>4.80</td>
<td>3.36</td>
</tr>
<tr>
<td>US Consumer Price Index</td>
<td>2.11</td>
<td>1.43</td>
<td>1.61</td>
<td>2.14</td>
<td>4.05</td>
<td>3.00</td>
</tr>
</tbody>
</table>

Sources, Updates and Disclosures: © Morningstar Direct, ifabt.com, Appx A
### Time Series Construction of the IFA Indexes

90 Years (1/1/1928 - 12/31/2017)

<table>
<thead>
<tr>
<th>Year</th>
<th>Simulated Index Data</th>
<th>Live Mutual Fund Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1930</td>
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<tr>
<td>1940</td>
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</tr>
<tr>
<td>1950</td>
<td></td>
<td></td>
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<tr>
<td>1960</td>
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<td></td>
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<tr>
<td>1970</td>
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<td>1980</td>
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<tr>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Index Fund Advisors (IFA) U.S. Large Company Index**

**Dimensional Fund Advisors (DFA) U.S. Large Cap Index**

**IFA U.S. Large Cap Value Index**

**Dimensional Fund Advisors (DFA) U.S. Large Value Index**

**IFA U.S. Small Cap Index**

**Dimensional Fund Advisors (DFA) U.S. Small Cap Index**

**IFA U.S. Small Cap Value Index**

**Dimensional Fund Advisors (DFA) U.S. Targeted Value Index**

**IFA Global REIT Index**

**50% (SC) & 50% (SV) / DJ U.S. Select REIT Index**

**IFA International Value Index**

**IFA U.S. Large Value Index (LV) / MSCI EAFE VALUE**

**IFA International Small Company Index**

**IFA U.S. Small Cap Index (SC) / DFA Int’l Small Cap Index**

**IFA International Small Cap Value Index**

**IFA U.S. Small Cap Value Index (SV) / DFA Int’l Small Cap Value Index**

**IFA Emerging Markets Index**

**50% (LV) & 50% (SC) / 50% (IV) & 50% (IS) / DFA EM Index**

**IFA Emerging Markets Value Index**

**IFA U.S. Small Cap Value Index (SV) / Fama/French EM Value Index**

**IFA Emerging Markets Small Cap Index**

**IFA U.S. Small Cap Index (SC) / Fama/French EM Small Index**

**IFA One-Year Fixed Income Index**

**One-Month T-Bills / One-Year T-Note Index**

**IFA Two-Year Global Fixed Income Index**

**5-Year T-Notes / ML US Treas. Index 1-3 Yrs / Citi World Gov’t Bond**

**IFA Short Term Government Fixed Income Index**

**5-Year T-Notes / BarCap Intermediate Gov’t Bond Index**

**IFA Five Year Global Fixed Income Index**

**IFA Short Term Government Index (3G) / Citi Global Gov’t Bond**

See additional details at www.ifaindexes.com. Sources, Updates and Disclosures: ifabt.com
THE RESILIENCE OF CAPITALISM

Capitalism has proven to be quite resilient. Figure 9-3 shows the growth of a dollar in various indexes over the course of 90 years, marked with 16 major news events listed in Figure 9-4. While the major events had large short-term impacts on market prices, they proved to be largely inconsequential in the long term as the market marched ahead. Despite several setbacks, capitalism has not only persevered, but thrived. This long-term history of quality data provides a useful tool for investors to construct risk appropriate portfolios.

Figure 9-3
Despite the historic advance of equities and the proven resilience of capitalism, many investors still get nervous during extended or sharp down periods such as the one we endured in 2008 and early 2009. When market-moving news appears, many investors may question if the fundamental relationship between risk and return is still valid. However, when a larger data set is considered, the outlook looks better for long-term investors.

Rolling period analysis enables investors to examine large

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**Monthly Rolling Periods**

Despite the historic advance of equities and the proven resilience of capitalism, many investors still get nervous during extended or sharp down periods such as the one we endured in 2008 and early 2009. When market-moving news appears, many investors may question if the fundamental relationship between risk and return is still valid. However, when a larger data set is considered, the outlook looks better for long-term investors.
sets of performance data by dividing returns into monthly rolling periods, instead of traditional calendar year periods with a January beginning and a December ending. This method provides Simulated Passive Investor Experiences (SPIEs) which begin at the 1st of each month throughout the designated period. Figure 9-5 shows 12 consecutive 12-year rolling periods beginning on January 1, 1959. Each rolling period can be thought of as an outcome representing the experience of a unique investor who started and ended on the dates specified in the period. Hence, the name Simulated Passive Investor Experiences.

The primary advantage of rolling periods is the large number of simulated investors who can be observed in a given time period. For example, in a 50-year period, there are 589 rolling periods.

*Figure 9-5*

<table>
<thead>
<tr>
<th>Explanation of 12-Year Monthly Rolling Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>12 Years, 11 Months (1/1/1959 - 11/30/1971)</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Periods</th>
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<tbody>
<tr>
<td>1</td>
<td>January 1, 1959</td>
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<tr>
<td>2</td>
<td>February 1, 1959</td>
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<td>3</td>
<td>March 1, 1959</td>
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<td>April 1, 1959</td>
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<td>May 1, 1959</td>
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<td>June 1, 1959</td>
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<td>July 1, 1959</td>
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<td>August 1, 1959</td>
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<td>October 1, 1959</td>
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<tr>
<td>11</td>
<td>November 1, 1959</td>
</tr>
<tr>
<td>12</td>
<td>December 1, 1959</td>
</tr>
</tbody>
</table>
12-month periods as opposed to 50 consecutive, non-overlapping 12-month periods. One important caveat regarding the use of rolling periods is that a single extreme monthly return may be counted in many different rolling periods.

Figure 9-6 charts the comparison of the performance of various equity indexes from 1928 through 2017 using this SPIE analysis. For example, the chart illustrates in the bottom left quadrant that over 1,069 1-year (12 months) monthly rolling periods, a simulated passive investor in a large growth index beat a simulated passive investor in a large value index 45% of the time, causing investors to think it might be a close call between large growth and large value. Compounded by the financial media touting the benefits of large growth companies, investors tend to believe that large growth may be a better investment. But in 841 20-year monthly rolling periods, the large value index beat the large growth index 89% of the time. Over short periods, volatility and price swings confuse investors as to which indexes are better long-term investments, but the picture becomes clearer when longer periods are considered.

Figure 9-7 tracks large, small, value, blend, and growth indexes from around the world. For U.S. markets, more than 90 years of data are shown. For non-U.S. developed markets, 43 years of data is available, and there are 29 years of data for emerging markets. In each case, it is worthwhile to note the lackluster annualized returns of both large and growth indexes, relative to the strong annualized returns delivered by all of the indexes labeled small or value.
Figure 9-6

Various Equity Index Comparisons

90 Years (1/1/1928 - 12/31/2017) Monthly Rolling Data

**U.S. Large Growth Index vs U.S. Small Value Index**

- % of Periods Large Growth Beats Small Value: 40%, 38%, 33%, 24%, 8%, ▲3%
- % of Periods Small Value Beats Large Growth: 60%, 62%, 67%, 76%, 92%, 97%

**U.S. Small Growth Index vs U.S. Small Value Index**

- % of Periods Small Growth Beats Small Value: 43%, 39%, 31%, 17%, ▲4%
- % of Periods Small Value Beats Small Growth: 57%, 61%, 69%, 83%, 96%, 100%

**U.S. Large Growth Index vs U.S. Large Value Index**

- % of Periods Large Growth Beats Large Value: 45%, 42%, 41%, 28%, 18%, 11%
- % of Periods Large Value Beats Large Growth: 55%, 58%, 59%, 72%, 82%, 89%

**U.S. Large Cap Index vs U.S. Small Cap Index**

- % of Periods Large Cap Beats Small Cap: 46%, 44%, 39%, 28%, 19%, 14%
- % of Periods Small Cap Beats Large Cap: 54%, 56%, 61%, 72%, 81%, 86%

Sources, Updates, and Disclosures: ifabt.com, Appx A
### Various Indexes From Around the World

#### Annualized Returns and Standard Deviations Over Various Periods

<table>
<thead>
<tr>
<th>Categories</th>
<th>Annualized Return</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U.S. Large Capitalization Stocks</strong> - 90 Years (1/1/1928 - 12/31/2017)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fama/French U.S. Large Value Index*</td>
<td><strong>10.41%</strong></td>
<td>25.90%</td>
</tr>
<tr>
<td>S&amp;P 500 Index</td>
<td><strong>9.87%</strong></td>
<td>18.78%</td>
</tr>
<tr>
<td>Fama/French U.S. Large Growth Index*</td>
<td><strong>9.32%</strong></td>
<td>18.47%</td>
</tr>
<tr>
<td><strong>U.S. Small Capitalization Stocks</strong> - 90 Years (1/1/1928 - 12/31/2017)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fama/French U.S. Small Value Index*</td>
<td><strong>13.36%</strong></td>
<td>29.57%</td>
</tr>
<tr>
<td>Fama/French U.S. Small Cap Index*</td>
<td><strong>11.76%</strong></td>
<td>26.10%</td>
</tr>
<tr>
<td>Fama/French U.S. Small Growth Index*</td>
<td><strong>8.94%</strong></td>
<td>27.83%</td>
</tr>
<tr>
<td><strong>Non-U.S. Developed Markets Stocks</strong> - 43 Years (1/1/1975 - 12/31/2017)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fama/French International Value Index</td>
<td><strong>13.96%</strong></td>
<td>18.00%</td>
</tr>
<tr>
<td>Dimensional International Small Cap Index</td>
<td><strong>15.19%</strong></td>
<td>17.44%</td>
</tr>
<tr>
<td>MSCI EAFE Index (net div.)</td>
<td><strong>9.98%</strong></td>
<td>16.94%</td>
</tr>
<tr>
<td><strong>Emerging Markets Stocks</strong> - 29 Years (1/1/1989 - 12/31/2017)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fama/French Emerging Markets Value Index</td>
<td><strong>13.60%</strong></td>
<td>24.39%</td>
</tr>
<tr>
<td>Fama/French Emerging Markets Index</td>
<td><strong>11.12%</strong></td>
<td>22.28%</td>
</tr>
<tr>
<td>Fama/French Emerging Markets Growth Index</td>
<td><strong>10.19%</strong></td>
<td>21.93%</td>
</tr>
</tbody>
</table>

*ex utilities

Sources: CRSP, Fama/French Data, ifabt.com
QUARTERLY AND ANNUAL REVIEWS OF RETURNS

While I began this step with identifying the problem of investors focusing on short-term returns, they still should regularly review and benchmark the performance of their portfolio with an understanding of the contribution of the components to the total portfolio return. These reviews should be geared only towards understanding what occurred and should refrain from turning into a “market outlook” or a “portfolio recommendation.” As we learned in Step 4, there is no “going up” or “going down” with financial markets. There is only “gone up” or “gone down.” With rare exceptions, a change in a well thought-out asset allocation should only be in response to changes in the investor’s circumstances that affect his or her risk capacity. This will be discussed in greater detail in Step 10.

THE IMPORTANCE OF HISTORY

Although all disclosure statements from investment advisory firms are required to state that “past performance does not guarantee future results,” studying the very long-term history better characterizes both the risks and returns of asset classes, empowering investors to make better choices. Market history demonstrates the enduring nature of capitalism and how a long-term investor can benefit from an investment in global capitalism. Long-term historical data enables investors to build a portfolio that matches their individual risk capacity, while also equipping them with the knowledge they need to stay the course. For these important reasons, investors should rely on large sets of historical data when building an investment portfolio.
STEP 10: RISK CAPACITY

“Investment Policy [asset allocation] is the foundation upon which portfolios should be constructed and managed.”

♫ Charles D. Ellis, Ph.D., Investment Policy, 1985

“Rip Van Winkle would be the ideal stock market investor: Rip could invest in the market before his nap and when he woke up 20 years later, he’d be happy. He would have been asleep through all the ups and downs in between. But few investors resemble Mr. Van Winkle. The more often an investor counts his money or looks at the value of his mutual funds in the newspaper the lower his risk tolerance.”

♫ Richard Thaler, Ph.D., Economist, University of Chicago Booth School of Business

“What if your advisor talks only about returns, not risk?… It’s his job to take risk into account by telling you the range of possible outcomes you face. If he won’t, go to a new planner, someone who will get real.”


“Design a portfolio you are not likely to trade… akin to premarital counseling advice; try to build a portfolio that you can live with for a long, long time.”

♫ Robert D. Arnott, “Is Your Alpha Big Enough to Cover Your Taxes?”, 1999
Envision the market as a wild bull, bucking up and down, rearing and spinning. Investors are like bull riders, trying to hang on as the bull kicks and twists, making for a tumultuous ride. Matching the right portfolio to an individual’s ability to handle risk is akin to finding the right bull that each investor can ride through all the ups and downs of the market.

Each investor has a unique risk capacity, one which can be identified and quantified in a risk capacity score which is a measure of how much risk an individual can manage. This score is based on five specific dimensions of risk capacity: 1) time horizon and liquidity needs; 2) attitude toward risk; 3) net worth; 4) income and savings rate; and 5) investment knowledge.

Risk capacity can be regarded as a measurement of an investor’s ability to earn stock market returns. Calculating risk capacity is the first step to deciding which portfolio will generate optimal returns for each investor. A risk capacity score determines the proper risk exposure for an investor’s portfolio.

Problems

Improper Assessment Of Risk Capacity

Many investors face the improper measurement of their risk capacity. Each of the five dimensions has to be carefully examined and quantified. Some dimensions carry more weight
in the final score. The survey must be carefully designed, and investors must be accurate when answering the questions.

**SOLUTIONS**

**RISK CAPACITY SURVEY**

An easy and efficient way to determine an investor’s risk capacity is to complete a questionnaire or a survey that evaluates and quantifies each of the five dimensions of risk capacity. Several such surveys can be found at ifarcs.com, which quantify risk capacity using numerical values from 1 to 100. These values correspond to various index portfolios created with the indexes referenced in Step 9.

**RISK CAPACITY RESULTS**

Once an individual has completed a survey, an overall score is provided, which reflects that investor’s capacity to take risk. An asset allocation of stocks and bonds with a risk exposure that properly matches the individual’s risk capacity is also recommended.

Higher scores signify a higher capacity for risk, a longer time horizon and an ability to withstand market volatility. Investors with higher scores are generally recommended to hold portfolios with a larger allocation of global stocks. In contrast, lower scores signify a lower risk capacity and a higher need for liquidity. Investors with lower scores are steered toward more conservative portfolios that hold a higher proportion of short-term investments such as fixed income.
DIMENSION ONE

TIME HORIZON AND LIQUIDITY NEEDS

Archimedes is often referenced as saying, “Give me a lever long enough and a place to stand, and I can move the earth.” In the world of investing, that lever is time. The longer investors can hold onto their portfolios, the greater their risk capacity. Will an investor need 20% of the value of his investment portfolio in two years, five years, seven years, 10 years, or longer? Usually, the closer a person is to retirement, the shorter his or her investment horizon becomes. Risk-calibrated index portfolios carry recommended holding periods that range from four to 15 years. The longer an investor holds onto a risky investment, the greater the chance of obtaining its average historical return and the greater the ability to reduce the uncertainty of these returns through time diversification.

SAMPLE RISK CAPACITY SURVEY QUESTION:

Please estimate when you will need to withdraw 20% of your current portfolio value, such as a need for a house down payment or some other major financial need?

A. Less than 2 years
B. From 2 to 5 years
C. From 5 to 10 years
D. From 10 to 15 years
E. More than 15 years
DIMENSION TWO

ATTITUDES TOWARD RISK

This risk capacity dimension assesses aversion or attraction to risk, providing an estimation of an investor’s willingness or ability to experience an investment loss. The last 90 years have shown that stock market investing can be a wild ride, with a lot of volatility and uncertainty. Investors who hold riskier investments can expect higher returns, but with greater volatility. Some people take less risk than they’re actually capable of taking, preferring the tranquility of Ferdinand the Bull over the untamed violence of Crossfire Hurricane to carry them on their ride through the market.

SAMPLE RISK CAPACITY SURVEY QUESTION:

What is the worst 12-month percentage loss you would tolerate for your long-term investments, beyond which you would be inclined to sell some or all of your investment?

A. A loss of 50%
B. A loss of 40%
C. A loss of 30%
D. A loss of 20%
E. A loss of 10%
**DIMENSION THREE**

**Net Worth**

What is the current value of an investor’s long-term investments or golden nest egg? Net worth is the value of an investor’s assets minus liabilities, or in other words, what is owned minus what is owed. Investors have a positive net worth when they own more than they owe. An individual’s total net worth can provide a cushion against short-term stock market volatility and the uncertainty of future cash needs. Because life itself is a random walk, investors can never be completely certain of what their cash needs will look like tomorrow. The more assets in reserve, the greater the capacity for risk.

**Sample Risk Capacity Survey Question:**

What is the current value of your long-term investments? Please include your taxable accounts, retirement savings plan with your employer and your individual retirement accounts (IRAs).

- A. Less than $25,000
- B. $25,000 to $50,000
- C. $50,000 to $100,000
- D. $100,000 to $250,000
- E. $250,000 or more
DIMENSION FOUR

INCOME AND SAVINGS RATE

The Income and Savings Rate dimension estimates excess income and ability to add to savings. A high score indicates that a large percentage of income is discretionary and is available for investing. A low score indicates that all or almost all income is being used for ordinary expenses and not being added to annual investments. A higher income also bolsters the ability to respond to emergencies without cashing out portfolio funds. Having to take money out of your portfolio after it has declined creates irreparable harm to your long-term returns. Having a solid income will minimize the chance you will need to dip into your retirement account. That is why this dimension is an important consideration when assessing risk capacity.

SAMPLE RISK CAPACITY SURVEY QUESTION:

What is your total annual income?

A. Less than $50,000
B. $50,000 to $100,000
C. $100,000 to $150,000
D. $150,000 to $250,000
E. $250,000 or more
**DIMENSION FIVE**

**INVESTMENT KNOWLEDGE**

An individual who understands several key concepts that impact investing, such as the failure of active management, the Random Walk Theory, the Efficient Market Hypothesis, the Five-Factor Model, and Modern Portfolio Theory has a greater capacity for risk than someone without this understanding.

**SAMPLE RISK CAPACITY SURVEY QUESTION:**

The performance of stock pickers must be examined on an adjusted basis. When comparing the returns of a stock picker’s portfolio to an appropriate index, which factors must be considered before determining if the stock picker has beaten the index?

A. Proper accounting of returns, including cash flows in and out of the account

B. Exposure to market, size and value risk of both portfolios

C. A statistical analysis of the difference in returns with a measure of the significance of the difference, such as the t-stat

D. Standard deviations or volatility measurements

E. All of the above

The following pages display portraits and provide descriptions of four risk capacities, which consider age, family composition, activities, careers, and lifestyles. These movie poster style portraits are designed to capture the characteristics of individuals who score 100, 75, 50, or 25 on a risk capacity survey (ifarcs.com).
**Risk Capacity 100: Red**

**Most Aggressive:**

Individuals who score 100 on a risk capacity survey (scaled from 1-100) likely possess nerves-of-steel with a general proclivity toward high-risk activities tantamount to skydiving, NASCAR racing, surfing typhoon waves or other extreme sports. This type of investor has a strong gut for withstanding extreme volatility in exchange for maximum portfolio growth potential; a substantial amount of investable capital; a secure income stream and in-depth knowledge about how the stock market works. These investors may be relatively young, with the capacity to wait at least 15 years before withdrawing as much as 20% of their investments. Over the course of their investment’s lifetime, these individuals are able to expose their capital to high levels of risk and commit to staying the course during considerable market volatility, such as the 57% decline that occurred over the one-year, four-month period from November 2007 to February 2009, and the wild upturn from March 2009 through December 2017 which produced a 313% total return. Along with their ability to take on high risk, they are very disciplined in buying, holding and rebalancing asset classes without jumping in and out of the market. They are willing to tie themselves to the mast and ignore the media and doomsayers who sing their siren songs with intensity. At the end of Step 11, you can see Index Portfolio 100. Very few investors have a risk capacity of 100. Please take the Risk Capacity Survey before investing any capital at this level of risk.
**Risk Capacity 75: Dark Blue**

**Moderately Aggressive:**

Younger professionals with new careers or young families beginning to save for their children’s college would likely score near the risk capacity 75. These individuals generally possess an understanding about the sources of stock market returns and are willing to take moderately aggressive risks to capture the returns associated with increased volatility. These investors understand the long-term benefits of the multi-factor model of investing and are aware that they are entitled to earn returns commensurate with the risks they take. They are also prone to some thrill seeking, demonstrating their penchant for risk and adventure. Although they have a higher risk capacity than others, they require about 25% fixed income to soften their portfolio’s volatility. They may need some access to a small percentage of liquid assets to acquire a house or car, or to accommodate the unforeseen events that unfold in life. This risk capacity is suitable for investors who have at least 13 years before needing approximately 20% of their investments and are willing to accept a higher degree of volatility in order to achieve higher portfolio growth potential. Risk exposures associated with this level of risk capacity lost about 44% of their value over a one-year, four-month period in 2007 to 2009, and from March 2009 through December 2017, they saw a 201% increase, with an annual expected return of 10.81% (based on the last 50 years). At the end of Step 11, you can see the risk and return data for Index Portfolio 75.
**Risk Capacity 50: Sea Green**

**Moderate:**

Individuals in their late-40s to mid-50s with growing families and careers in full swing would likely score close to a 50 on a risk capacity survey. These investors may have children graduating from high school or college with younger children still at home. Some may be eyeing retirement, making plans for future activities, hobbies or travel. Such individuals would have about eight years before they would need to withdraw approximately 20% or more of their investments and would be willing to accept a moderate degree of volatility in order to achieve moderate portfolio growth. This capacity for risk is appropriate for those who can stomach a moderate amount of risk in their portfolios and have the emotional fortitude to close their eyes to the market’s highs and lows, choosing instead to focus on the long-term historical return, which is the expected return. The risk exposure that would be appropriate for this capacity would have lost about 30% during the worst one-year, four-month period from November 2007 to February 2009, and gained 116% from March 2009 through December 2017, but has an expected return of 9.15% per year (based on the last 50 years). Such investors would need or want to invest in stock market equities with an eye toward fueling long-term growth, but would remain mindful of their need to dampen volatility given their window to retirement. At the end of Step 11, you can see the risk and return data for Index Portfolio 50.
**Risk Capacity 25: Ice Blue**

**Conservative:**

Investors in their mid-70s and enjoying their golden years would likely score close to a 25 on a risk capacity survey. They may be engaged in the lives of their grandchildren and regularly enjoying hobbies. A risk capacity level of 25 is suitable for these investors who have at least five years before needing approximately 20% of their investments and are willing to accept a conservative degree of risk for incremental appreciation with emphasis on capital preservation. At this stage in life, these individuals are less likely willing and able to take on risk. These individuals would shun stock market risk in exchange for a smoother ride through the markets during their later years of retirement. A portfolio of risk that would be appropriate for this conservative investor lost about 14% of its value during the worst period of decline in November 2007 through February 2009, and it delivered a 53% return from March 2009 to December 2017, with an expected annual return of 7.25% (based on the last 50 years). At the end of Step 11, the risk and return data for Index Portfolio 25 is provided.

**An Investor’s Role In Risk Capacity**

When investors actively participate in the investment process by conducting the self-examination required to establish a risk capacity score, they better position themselves to weather appropriate levels of market volatility, thereby enhancing their ability to experience a high degree of investment success.
Step 11: Risk Exposure

“We can extrapolate from the study that for the long-term individual investor, who maintains a consistent asset allocation and leans toward index funds, asset allocation determines about 100% of performance.”


“Diversification is your buddy.”


“A good portfolio is more than a long list of good stocks and bonds. It is a balanced whole, providing the investor with protections and opportunities with respect to a wide range of contingencies.”

Harry Markowitz, Ph.D., Nobel Laureate in Economics, 1990, Professor of Economics UCSD, “Portfolio Selection: Efficient Diversification of Investments”, 1959

“Investment planning is about structuring exposure to risk factors.”

Gene Fama, Jr., “The Error Term”, 2001
In the early 1950s, a young Harry Markowitz applied his mathematical expertise to investing. Markowitz, then a Ph.D. candidate in economics at the University of Chicago, believed investment professionals erred by urging investors to focus solely on returns of individual stocks with no consideration of the concept of risk exposure. He set out to reveal how investors could improve their stock market investing performance by optimizing the trade-off between risk and return. In his 1952 Nobel Prize-winning paper, “Portfolio Selection,” Markowitz established the importance of diversification. He asserted the best portfolios include non-correlated stocks that act and move independently from each other. Today, I estimate that trillions of dollars worldwide are invested according to his principles of risk and return, known collectively as Modern Portfolio Theory.

The blend of investments that is appropriate for a particular investor is known as asset allocation, also called risk exposure, and is based on an investor’s risk capacity. Asset allocation is the most important factor in optimizing a portfolio’s expected return, thus it is essentially the most important decision an individual investor can make. This concept also extends to larger institutional investments—such as state pension funds, fire and police pension plans, non-profit and for-profit defined

Traders think that money grows from speculation, but indexers know it’s just risk compensation. —The Speculation Blues
contribution plans, church funds, college endowments, and any other funds governed by committees.

As presented in Step 8, Nobel Prize-winner Eugene Fama and professor Kenneth French identified that as much as 96% of equity returns are explained by a portfolio’s exposure to market, size and value. Their research expanded upon Markowitz’s and Sharpe’s initial findings regarding risk and return. While Fama and French demonstrated that indexes constructed of small and value companies have historically outperformed the total market index over the long term, the risks associated with these small and value indexes have also been higher.

**Problems**

**Investors Unknowingly Take The Wrong Risks**

Some investors tend to avoid risk when it comes to their investments. They want high returns with low risks. But avoiding risks positions investors to avoid returns. Some take on too much risk, while others take risks that just haven’t been properly rewarded. All of these behaviors are at the crux of the poor performance many investors experience. Risk should be embraced in appropriate doses that match an investor’s risk capacity. There is a right amount and type of risk for every investor. Risk provides opportunity, and a taste for appropriate risk is a good thing.

As was shown in Step 9, certain asset classes, such as small and value, have had a long history of sufficiently rewarding investors for the risks associated with them. However, there
are also several asset classes that carry risk but have been inefficient in delivering returns commensurate with the risks taken. This kind of risk is not worth taking. As such, many investors struggle to develop an asset allocation that captures the right blend of the markets that have maximized returns at given levels of risk. A case in point: many investors seem comfortable investing in companies that are best described as glamour or large growth stocks, presuming they perform better than small or value stocks. These investors would be surprised to learn that growth companies actually have a poor history of delivering risk-commensurate returns. Commodities, private-equity, long-term bonds and technology stocks have also failed to historically maximize returns for risks taken. Failing to understand which blend of investments are worth their risk could cause investors to earn lower returns than they could if they simply bought, held and rebalanced a blend of indexes that optimizes returns at a given level of risk.

**Investors Get Commodity Fever**

Commodities have developed a reputation for providing a hedge against inflation and a low correlation to equities. Further research into this subject reveals that no such advantage exists. A study\(^9\) by former USC finance professor, Truman Clarke, details the lack of substantiation for the claims made by commodities proponents. A commodity is purchased with the hope that an increased demand or a decreased supply of the item will cause its price to increase. “Remember when you buy a commodity, you’re not buying something that generates earnings
and profit. You’re buying a hard asset and hoping another buyer will be willing to pay more for that asset in the future,” wrote Matt Krantz in a June 2008 USA Today article titled, “Read This Before You Jump on the Commodities Bandwagon.”

Commodity investments differ from stock investments in that the companies in the S&P 500 Index have earned profits that have produced an average return of about 9.87% per year for the last 90 years, ending December 2017. Their stock price is expected to increase in-line with their growth in profits. The expectation of price appreciation for commodities is not based on profits, but rather on supply and demand. In short, commodities have not provided expected returns much greater than inflation.

Noted economist and professor of finance at Dartmouth, Kenneth French, conveyed his findings regarding commodities. He concluded, “The high volatility of commodity prices makes it impossible to accurately estimate the expected returns, volatilities and covariances of commodity funds, but theory suggests that if commodity returns are negatively correlated with the rest of the market, the expected risk premium on commodities is small, perhaps negative. Finally, commodity funds are poor inflation hedges. Most of the variation in commodity prices is unrelated to inflation. In fact, commodity indices are typically 10 to 15 times more volatile than inflation. As a result, investors who use commodity funds to hedge inflation almost certainly increase the risk of their portfolios.”
SOLUTIONS

EFFICIENT DIVERSIFICATION: THE KEY TO SUCCESS

A diversified portfolio which captures the right blend of market indexes reaps the benefit of carrying the systematic risk of the entire market while minimizing exposure to the unsystematic and concentrated risk associated with individual stocks and bonds, countries, industries or sectors. The only risk that remains is the risk of the market itself, a risk that must be taken in order to capture market returns.

As capitalism has expanded throughout the world, it has become increasingly important to allocate a significant portion of one’s portfolio to international and emerging markets securities. In the 1970’s, the U.S. comprised more than 68% of global equity value, but today it comprises about 50%. Investors achieve the benefit of increasing diversification and capturing the expected returns of global capitalism by investing in index funds comprised of international developed countries and emerging markets countries in risk-appropriate doses.

An additional important aspect of diversification is diversifying across time. When investors maintain a globally diversified portfolio for long periods of time, they are able to maximize their ability to capture the complete range of returns that are offered by the global markets. Index portfolios with a high exposure to stocks require a longer holding period than fixed income portfolios in order to maximize the probability of achieving an expected outcome.
Investors should think of their portfolios as an investment in global capitalism. This hypothetical stock certificate represents an investment in Capitalism, Inc., showing estimates for year-end 2017 of total market value, sales, profits, number of CEOs, and number of employees who work for an investor who buys a globally diversified index portfolio. With a total market capitalization of $51 trillion, more than 12,000 CEOs worldwide and over 82 million employees selling products in 195 countries, it is not reasonable to believe that Capitalism, Inc. will go out of business. And if it did... your money would be worthless.
RISK-CALIBRATED PORTFOLIOS

The stacked chart of Figure 11-1 shows the general asset class allocations for 20 of 100 different risk-calibrated Index Portfolios. The Index Portfolio number matches the equities (stocks) allocation of that portfolio; i.e. Index Portfolio 20 has a 20% equities allocation, and Index Portfolio 80 has an 80% equities allocation. In the chart, gold represents each portfolio’s weighting in fixed income, and burgundy represents its percentage of equities. Almost all of the asset allocations carry the same asset class components — fixed income, U.S. stocks and non-U.S. stocks and REITs — but weighs each differently. For example, the least risky Index Portfolio displayed, number 5, is heavily weighted in fixed income, carrying very little global

Figure 11-1

<table>
<thead>
<tr>
<th>General Asset Allocation of Index Portfolios</th>
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<tbody>
<tr>
<td>The Number of the Index Portfolio Equals the % Stock Allocation</td>
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<table>
<thead>
<tr>
<th>Asset Allocation (%)</th>
<th>Fixed Income Indexes</th>
<th>Stock Indexes (U.S. and International)</th>
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</thead>
<tbody>
<tr>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>25%</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>75%</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Sources, Updates and Disclosures: ifabt.com
equity exposure. This portfolio is well suited to an investor with a very low risk capacity — in general, someone with a short investment time horizon and current liquidity needs. An example of this type of investor would be an older retiree. To really simplify the matching of people and portfolios, investors could match their age to the allocation of bonds in an index portfolio.

The highest risk capacity Index Portfolio 100 may be suitable for either a very young investor just starting out or someone who fluently speaks Riskese, and will not need to liquidate his investments for a minimum of 15 years, has a high net worth and net income and a strong stomach for volatility.

The higher risk Index Portfolios 75 and 100 have a high stock market exposure and a considerable tilt toward small and value indexes. The increased volatility of these higher risk index portfolios had higher returns over the 35-year period from January 1, 1983 to December 31, 2017, relative to the less volatile Index Portfolios 25 and 50. As Figure 11-2 shows, an individual who invested $1 in a lower risk Index Portfolio 25 would have grown his investment to $10.00 in the 35-year period. However that same dollar invested in a higher risk Index Portfolio 100 would have grown to $61. This example provides evidence for the importance of establishing the efficient asset allocation that is best matched to an investor’s risk capacity.
Figure 11-2

Roller Coaster of Risk and Return of Index Portfolios
35 Years (1/1/1983 - 12/31/2017)

Annual Return (%)

Growth of $1

Source, Updates, and Disclosures: ifabt.com, Appx A
**Index Portfolio Implementation**

Once investors identify the asset allocation that matches their risk capacity, they have a choice to make as to how to best implement that asset allocation. A handful of passively managed fund providers offer asset class indexes, namely Vanguard and Dimensional Fund Advisors (Dimensional). In 2013, these two firms had the most cash inflows of all mutual fund families. The index portfolios referenced in this book are usually implemented with funds from Dimensional, a highly regarded fund company which provides indexes and funds based on the Fama/French Five-Factor Model, purposefully isolating risk factors to efficiently capture higher expected returns. They have recently added a sixth factor known as Direct Profitability (to be further detailed in future editions of this book).

Figure 11-3 illustrates a 19-year comparison between 20 index portfolios implemented with funds from Dimensional and Vanguard, and with the same stock/bond allocations. The time period shown reflects the longest time period for which we have live mutual fund data. All portfolio results are net of fund fees as well as a 0.9% advisor fee. The chart shows that the implementation of the index portfolios utilizing Dimensional funds had a higher annualized return than the portfolios utilizing Vanguard funds.

Figure 11-4 is a similar chart that shows a 17-year comparison between the same 20 index portfolios implemented with Dimensional funds and iShares ETFs. The beginning date is two years later (due to the limited availability of live ETF data), but the results are similar. The size of the Dimensional advantage is directly proportional to the risk level of the portfolio. Although several brokerage firms offer a “free-
Figure 11-3

Vanguard Funds vs. Dimensional Funds in Index Portfolios
19 Years (1/1/1999 - 12/31/2017)

Figure 11-4

iShares ETFs vs. Dimensional Funds in Index Portfolios
17 Years (1/1/2001 - 12/31/2017)
trades” promotion with select ETFs, investors should proceed cautiously with their trades, staying cognizant of the bid/ask spread, and the possible divergence between market price and net asset value. Investors who do not understand what this means should refrain from trading ETFs altogether. Finally, lessons from Steps 4 and 6 show why investors must avoid the temptation to use ETFs as market-timing tools and tactical asset allocation.

Dimensional funds are available through a select group of fiduciary registered investment advisors to whom the company provides comprehensive data from CRSP on numerous indexes dating all the way back to 1926. This allows for analysis of data that is usually only available to academic researchers.

Dimensional’s emphasis on educating advisors, who in turn, educate investors, is intended to improve the investor experience for the clients of fiduciary advisors.

Dalbar surveyed investment advisors four times between 1997 and 2004. In a study titled, “The Professionals’ Pick,” advisors rated Dimensional the best overall no-load mutual fund company in 1997, 2000, 2002, and number two in 2004. Dimensional was also ranked #2 for Advisor Commitment in 2010 and 2011 by Cogent Research and #1 by Barron’s in 2010. In 2014, Dimensional was the focus of a feature article, with Nobel Prize winner Eugene Fama and Dimensional CEO and founder David Booth gracing the cover of the publication. In 2017, Dimensional was named “Retirement Leader of the Year” by Fund Intelligence. See Figure 11-5 for a summary of their accolades.
### Figure 11-5

**Fund Company Ratings and Awards**

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<tr>
<th>Dalbar 1997 Rankings</th>
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<td>3.86</td>
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<td><strong>BlackRock</strong> 2</td>
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<td>Oakmark Funds</td>
<td><strong>PIMCO</strong> 3</td>
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<td>PIMCO</td>
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<td>Artisan Funds</td>
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<tr>
<td><strong>Dimensional Fund Advisors</strong></td>
<td><strong>Vanguard</strong> 2</td>
</tr>
<tr>
<td>American Funds</td>
<td><strong>T. Rowe Price</strong> 3</td>
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</table>

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<th>Investment Management Top 3</th>
<th>Cogent Research</th>
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<td><strong>Dimensional Fund Advisors</strong></td>
<td><strong>Most Trusted Institutional Asset Managers 2016 (Non-Profits $250M+)</strong></td>
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<td>3.96</td>
<td><strong>Vanguard</strong> 1</td>
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<tr>
<td>First Eagle Funds</td>
<td><strong>Dimensional Fund Advisors</strong> 2</td>
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<td>Dodge and Cox Funds</td>
<td><strong>BlackRock</strong> 3</td>
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<th>Cogent Research</th>
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<td><strong>Dimensional Fund Advisors</strong></td>
<td><strong>2017 Retirement Leader of the Year</strong></td>
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<td><strong>Dimensional Fund Advisors</strong></td>
</tr>
<tr>
<td>Nuveen Fund Advisors</td>
<td></td>
</tr>
<tr>
<td>Principal Management</td>
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<tr>
<td>Oppenheimer Funds</td>
<td></td>
</tr>
<tr>
<td>Waddell &amp; Reed</td>
<td></td>
</tr>
</tbody>
</table>

Sources: Dalbar Report, Barron, Cogent, Fund Intelligence
**It’s All In The Mix**

A globally diversified index portfolio has historically delivered reasonable returns for the risk that is built into each portfolio. Figure 11-6 plots the risk and reward for 20 index portfolios and various indexes, along with an S&P 500 Index over the 50-year period from January 1, 1968 to December 31, 2017. Note the higher annualized returns of the index portfolios that have had similar risk (annualized standard deviation) as the S&P 500 Index. Also note the returns of the emerging market indexes when isolated on their own (high risk with compensated returns). The index portfolios shown are all comprised of an efficient blend of indexes. Also, note the square buttons that I advise clients to avoid in efficient portfolios.

The chart shows the S&P 500 had similar risk characteristics (14.99%) as Index Portfolio 95 (15.16%) but delivered a lower return: 10.12% vs. 11.96%. The S&P 500 Index actually delivered an annualized return comparable to the return of Index Portfolio 65 with 35% fixed income, which shows that similar returns were available at lower risk. A higher annualized return could have been delivered by taking less risk. This chart shows the value of diversifying beyond large cap companies in the U.S., as reflected in the S&P 500 Index. Portfolios 65-95 all delivered higher annualized returns with similar or less risk than the S&P 500 Index.

Figure 11-7 shows 50 years of monthly return distributions for four index portfolios. These histograms represent 600 months of monthly risk and return data for the 50 years from January 1, 1968 to December 31, 2017. Note the wider bell curve distributions in the higher risk Index Portfolios 100 and
Figure 11-6

Risk Return Scatter Plot of Index Portfolios and Indexes

50 Years (1/1/1968 - 12/31/2017)

*Square icons excluded from index portfolios.
Sources, Updates and Disclosures: © Morningstar Inc, ifabt.com; Appx A
Figure 11-7

**Distribution of Monthly Returns of Index Portfolios**

50 Years (1/1/1968 - 12/31/2017)

**Index Portfolio 100: Bright Red**
- Average Monthly Return: 1.07%
- Monthly Standard Deviation: 4.60%
- Growth of $1: $319.92

**Index Portfolio 75: Dark Blue**
- Average Monthly Return: 0.92%
- Monthly Standard Deviation: 3.48%
- Growth of $1: $169.33

**Index Portfolio 50: Sea Green**
- Average Monthly Return: 0.76%
- Monthly Standard Deviation: 2.39%
- Growth of $1: $79.45

**Index Portfolio 25: Ice Blue**
- Average Monthly Return: 0.59%
- Monthly Standard Deviation: 1.39%
- Growth of $1: $33.12

Sources, Updates and Disclosures: ifabt.com, Appx A
75 as compared to the lower risk Index Portfolios 50 and 25. The riskier portfolios had a larger range of outcomes over time.

This wider range or increased volatility has also carried a higher average return. Of the four portfolios shown, the most risky Index Portfolio 100 had the widest range of monthly return outcomes over the 50-year period. This wider range or increased volatility is the trade-off for higher returns, relative to Index Portfolios 25, 50 and 75 that had lower risk and lower returns. The charts also reflect the growth of a $1 investment in each portfolio over the 50-year period. Remember that an investor’s actual returns will vary from these returns due to the timing of withdrawals and contributions, rebalancing strategies, costs, fees and other factors.

As was shown in the previous charts and discussions, diversification among low-cost index funds is a very effective means for investing. While one cannot obtain any guarantee of future success based on the past, the 50 or 90 years of data associated with the style-pure index portfolios is arguably, and evidentially, as good as it gets for any investor, individual or institution.

The data table in Figure 11-8 represents the short-term and long-term risk and return data for the S&P 500 and 10 index portfolios with varying degrees of exposure to bonds and stocks. Growth of $1 is also shown for each portfolio. When seeking to construct a portfolio, it is advisable for investors to pay careful attention to the 20, 50 and 90-year data columns on the right hand side. The 50-year return is largely considered the historic return and a good estimate of the future or expected return over 15-year or greater periods. The left columns which show the year-to-date, one-, three- and five-year returns are shown
## Figure 11-8

### Index Portfolios and S&P 500 Over Various Periods

**90 Years (1/1/1928 - 12/31/2017)**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>S&amp;P</strong></td>
<td>$1.22</td>
<td>$1.12</td>
<td>$1.01</td>
<td>$1.14</td>
<td>$1.38</td>
<td>$2.08</td>
<td>$4.01</td>
<td>$124</td>
<td>$4,784</td>
</tr>
<tr>
<td>Growth $1</td>
<td>$1.18</td>
<td>$1.16</td>
<td>$0.96</td>
<td>$1.03</td>
<td>$1.31</td>
<td>$1.75</td>
<td>$5.65</td>
<td>$319</td>
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<td>Return %</td>
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<td>19.16%</td>
<td>16.21%</td>
<td>14.59%</td>
<td>13.45%</td>
<td>13.95%</td>
<td>16.45%</td>
<td>18.95%</td>
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<td>Risk %</td>
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<td>10.29%</td>
<td>13.66%</td>
<td>8.26%</td>
<td>10.06%</td>
<td>9.49%</td>
<td>14.87%</td>
<td>14.99%</td>
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<td><strong>100</strong></td>
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<td>$1.13</td>
<td>$0.96</td>
<td>$1.03</td>
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<td>$1.58</td>
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<td>Growth $1</td>
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<td>$1.50</td>
<td>$4.25</td>
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<td>$3,691</td>
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<tr>
<td>Return %</td>
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<td>9.13%</td>
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<td>7.66%</td>
<td>13.49%</td>
<td>8.41%</td>
<td>12.56%</td>
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</tr>
<tr>
<td>Risk %</td>
<td>3.33%</td>
<td>10.33%</td>
<td>9.82%</td>
<td>8.27%</td>
<td>8.52%</td>
<td>8.44%</td>
<td>13.49%</td>
<td>12.82%</td>
<td>17.62%</td>
</tr>
<tr>
<td><strong>90</strong></td>
<td>$1.13</td>
<td>$1.11</td>
<td>$0.97</td>
<td>$1.02</td>
<td>$1.19</td>
<td>$1.42</td>
<td>$3.79</td>
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</tr>
<tr>
<td>Growth $1</td>
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<td>$1.10</td>
<td>$0.97</td>
<td>$1.02</td>
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<td>$1.42</td>
<td>$3.79</td>
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<td>$2,098</td>
</tr>
<tr>
<td>Return %</td>
<td>12.75%</td>
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<td><strong>70</strong></td>
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<td>5.82%</td>
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<td><strong>60</strong></td>
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<tr>
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<td>6.45%</td>
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<tr>
<td>Risk %</td>
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<td>3.01%</td>
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<td>Return %</td>
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<td>1.07%</td>
<td>1.18%</td>
<td>3.21%</td>
<td>6.01%</td>
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<tr>
<td>Risk %</td>
<td>0.43%</td>
<td>1.36%</td>
<td>1.22%</td>
<td>1.36%</td>
<td>1.11%</td>
<td>1.31%</td>
<td>1.99%</td>
<td>3.30%</td>
<td>3.39%</td>
</tr>
</tbody>
</table>

Annualized return net of advisory and fund fees, see ifafe.com. Risk measured in annualized standard deviation. Sources, Updates and Disclosures: © Morningstar, Inc., ifabt.com, ifacalc.com, Appx A
in order to make investors aware of the short-term volatility of the various investments and should not be considered useful for determining which portfolio is right for an investor.

**Matching Risk Capacity to Risk Exposure**

Unlike horseshoes, close enough isn’t good enough for investors who want to maximize their ability to capitalize on the tradeoff between risk and return. For this reason, when selecting a risk exposure, the primary consideration should be identifying and investing in a blend of indexes that most closely matches risk capacity.

An investor’s optimal strategy is to invest in a portfolio that directly corresponds to a particular risk capacity, capturing every available increment of risk exposure. This more refined approach enables investors to take on just the right amount of risk, allowing them to identify an appropriate portfolio.

The benefits associated with capturing just the right amount of risk are displayed in Figure 11-9, which shows the growth of $1,000 in 100 different index portfolios over the 50 years from 1968 through 2017. Each of these sophisticated index portfolios is designed with different blends of equities and fixed income. This continuum of risk and return provides investors the opportunity to invest in a targeted asset allocation that matches their risk capacity score between 1 and 100. The chart further validates the value of carefully matching an investor’s risk capacity to a corresponding risk exposure. As you can see, a small change in risk made a sizeable difference in the growth of $1,000 over this 50-year period.
Figure 11-9

Growth of $1,000 in 100 Index Portfolios

50 Years (1/1/1968 - 12/31/2017)

Sources, Updates and Disclosures: ifabt.com, ifacalc.com, Appx A
Prudent Investing

The process of prudent long-term investing requires thorough and thoughtful discernment. The best way to earn optimal returns is by buying and holding a passively managed and globally diversified index portfolio, matching an investor’s risk exposure to his or her risk capacity and relying on 90 years of historical risk and returns data. In Step 10, an explanation of four unique risk capacities was provided for risk capacity scores of 100, 75, 50 and 25. Fact sheets showing risk and return data for the four index portfolios that match those risk capacity scores are provided on the following pages.

These portfolio fact sheets consist of simulated passive investor experiences with returns and volatility data, charts that represent annual returns and growth of $1, a 50-year monthly rolling period analysis, and a histogram of monthly rolling periods for the time intervals matched to the average holding periods that are appropriate for each risk exposure. For an investment period of a given length; e.g. three years, this rolling period table will show how many periods there were in the entire 50-year period (in this case, 600), the median annualized return over all these periods, as well as both the highest and the lowest returns that occurred in these periods. The very clear pattern that emerges is that as the period length increases, the median return changes very little, but the range of returns narrows considerably. We refer to this as the benefit of time-diversification of returns.
Index Portfolio 100
Risk Profile: Most Aggressive
Age Profile: Only High Risk Investors

Suitable for investors who have at least 15 years before needing approximately 20% of their investments and are willing to accept a very high degree of volatility in exchange for maximum portfolio growth potential.

General Allocation of Global Indexes
- 100% Stock Indexes
- 0% Bond Indexes

Simulated Returns and Volatility Data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
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<th></th>
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<tbody>
<tr>
<td>Growth of $1 ($)</td>
<td>1.18</td>
<td>1.16</td>
<td>0.96</td>
<td>1.03</td>
<td>1.31</td>
<td>1.75</td>
<td>1.93</td>
<td>5.65</td>
<td>319.92</td>
<td>14,375</td>
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<td>Annualized Std.Devation (%)</td>
<td>4.20</td>
<td>13.07</td>
<td>12.46</td>
<td>10.27</td>
<td>10.76</td>
<td>10.54</td>
<td>18.85</td>
<td>17.10</td>
<td>15.95</td>
<td>22.13</td>
</tr>
</tbody>
</table>

Annual Returns: 50 Years (1/1/1968 - 12/31/2017)

Growth of $1: 50 Years (1/1/1968 - 12/31/2017) - Log Scale

Sources, Updates, and Disclosures: ifabt.com, Appx A
Index Portfolio 100

Simulated Passive Investor Experiences (SPIEs)

Based on 50 Years of Monthly Data (January 1, 1968 to December 31, 2017) 600 Months

Examples of 15-Year Monthly Rolling Periods

Rolling Period Return Data: 50 Years (1968 to 2017)

Per Period Number of Months # of Rolling Periods Median Ann%zd Return (50th %ile) Return Range (High minus Low) Median Growth of $1 Lowerest Rolling Period Return Lowerest Growth of $1 in Lowest Rolling Period Date Highest Rolling Period Return Highest Growth of $1 in Period

0.08 1 600 1.37% 2 45.01% 2 $1.01 2 10/08-10/08 -22.59% $0.77 1/75-1/75 22.42% $1.22
0.25 3 598 4.10% 2 77.26% 2 $1.04 2 9/08-11/08 -37.19% $0.63 3/09-5/09 40.08% $1.40
0.5 6 595 7.02% 2 109.62% 2 $1.07 2 9/08-2/09 -47.73% $0.52 3/09-8/09 61.90% $1.62
1 12 589 15.93% 2 126.80% $1.16 3/08-2/09 -49.38% $0.51 3/09-2/10 77.42% $1.77
2 24 577 14.17% 2 82.47% $1.30 3/07-2/09 -31.37% $0.47 3/09-11 51.10% $2.28
3 36 565 12.59% 55.26% $1.43 3/06-2/09 -18.27% $0.55 8/84-7/87 37.00% $2.57
4 48 553 12.33% 44.54% $1.59 3/05-2/09 -10.39% $0.64 10/74-9/78 34.15% $3.24
5 60 541 12.79% 38.31% $1.83 3/04-2/09 -5.44% $0.76 8/82-7/87 32.87% $4.14
6 72 529 12.46% 36.37% $2.02 1/69-12/74 -6.54% $0.67 1/75-12/80 29.83% $4.79
7 84 517 12.58% 28.72% $2.29 1/68-12/74 -1.57% $0.89 8/82-7/89 27.15% $5.37
8 96 505 13.15% 23.93% $2.69 3/01-2/09 0.83% $1.07 1/75-12/82 24.76% $5.87
9 108 493 12.75% 24.54% $2.94 3/00-2/09 1.06% $1.10 1/75-12/83 25.60% $7.78
10 120 481 12.41% 20.78% $3.22 3/09-2/09 3.36% $1.39 9/77-8/87 24.13% $8.69
11 132 469 12.76% 22.45% $3.75 3/98-2/09 2.17% $1.27 1/75-12/85 24.62% $11.26
12 144 457 12.65% 21.37% $4.18 3/07-2/09 3.41% $1.49 1/75-12/86 24.78% $14.24
13 156 445 13.08% 21.06% $4.94 3/06-2/09 4.34% $1.74 10/74-9/87 25.40% $18.97
14 168 433 13.36% 18.12% $5.79 3/05-2/09 5.67% $2.17 1/75-12/88 23.79% $19.85
30 360 241 13.39% 7.79% $43.40 9/87-8/17 9.89% $16.94 1/75-12/04 17.69% $132.35
40 480 121 13.36% 4.16% $151.04 3/69-2/09 10.89% $62.57 1/75-12/14 15.05% $272.65
50 600 1 12.23% 0.00% $319.92 1/68-12/17 12.23% $319.92 1/68-12/17 12.23% $319.92

15-Year Monthly Rolling Periods: 50 Years (1968 to 2017) Total of 421 Rolling Periods

15-years represents the estimated average holding period for investors who score 100 on the Risk Capacity Survey at ifa.com.

The Median Annualized Returns, Return Range, and Median Growth of $1 shown for 1, 3, and 6 month periods are not annualized.

* Percentile ranking of all the rolling periods.

Sources, Updates, and Disclosures: ifabt.com, Appx A
Index Portfolio 75

Risk Profile: Moderately Aggressive
Age Profile: Age 30 to 40

Suitable for investors who have at least 13 years before needing approximately 20% of their investments and are willing to accept a higher degree of volatility in order to achieve higher portfolio growth potential.

General Allocation of Global Indexes

- 75% Stock Indexes
- 25% Bond Indexes

Simulated Returns and Volatility Data

<table>
<thead>
<tr>
<th>Period</th>
<th>Growth of $1 ($)</th>
<th>Annualized Return (%)</th>
<th>Annualized Std.Devation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 yr ending 2017</td>
<td>1.14</td>
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<td>3.11</td>
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<td>1 yr ending 2016</td>
<td>1.12</td>
<td>12.21</td>
<td>9.65</td>
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<td>1 yr ending 2015</td>
<td>0.97</td>
<td>-3.40</td>
<td>9.16</td>
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<tr>
<td>1 yr ending 2014</td>
<td>1.03</td>
<td>2.56</td>
<td>7.76</td>
</tr>
<tr>
<td>1 yr ending 2013</td>
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<td>1 yr ending 2010</td>
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<td>7.79</td>
<td>12.60</td>
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<td>1 yr ending 2009</td>
<td>169.33</td>
<td>10.81</td>
<td>12.05</td>
</tr>
<tr>
<td>1 yr ending 2008</td>
<td>4,796</td>
<td>9.87</td>
<td>16.52</td>
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</table>

Annual Returns: 50 Years (1/1/1968 - 12/31/2017)

Growth of $1: 50 Years (1/1/1968 - 12/31/2017) - Log Scale

Sources, Updates, and Disclosures: ifabt.com, Appx A
The Median Annualized Returns, Return Range, and Median Growth of $1 shown for 1, 3, and 6 month periods are not annualized.

Based on 50 Years of Monthly Data (January 1, 1968 to December 31, 2017)  600 Months

Examples of 13-Year Monthly Rolling Periods ^1

<table>
<thead>
<tr>
<th>Per Period Number of Months</th>
<th># of Rolling Periods</th>
<th>Median Ann'zd Return (50th %ile)</th>
<th>Return Range (High minus Low)</th>
<th>Median Growth of $1</th>
<th>Lowest Rolling Period Date</th>
<th>Lowest Rolling Period Return</th>
<th>Growth of $1 in Lowest Period</th>
<th>Highest Rolling Period Return</th>
<th>Growth of $1 in Highest Period</th>
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<tbody>
<tr>
<td>0.08 1</td>
<td>600</td>
<td>1.10%^2</td>
<td>33.64%^2</td>
<td>$1.01^2 10/87-10/87</td>
<td>-16.62%</td>
<td>$0.83 1/75-1/75</td>
<td>17.02%</td>
<td>$1.17</td>
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<tr>
<td>0.25 3</td>
<td>598</td>
<td>3.41%^2</td>
<td>54.95%^2</td>
<td>$1.03^2 9/08-11/08</td>
<td>-26.53%</td>
<td>$0.73 3/09-5/09</td>
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<tr>
<td>0.5 6</td>
<td>595</td>
<td>5.85%^2</td>
<td>79.87%^2</td>
<td>$1.06^2 9/8/2-9/09</td>
<td>-35.83%</td>
<td>$0.64 3/09-8/9</td>
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<td>1 12</td>
<td>589</td>
<td>13.28%</td>
<td>92.68%</td>
<td>$1.13 3/08-2/09</td>
<td>-37.29%</td>
<td>$0.63 3/09-2/10</td>
<td>55.39%</td>
<td>$1.55</td>
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<tr>
<td>2 24</td>
<td>577</td>
<td>12.22%</td>
<td>59.94%</td>
<td>$1.26 3/07-2/09</td>
<td>-22.49%</td>
<td>$0.60 3/09-2/11</td>
<td>37.45%</td>
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<td>42.49%</td>
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<td>-12.10%</td>
<td>$0.68 8/84-7/87</td>
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<td>$0.77 7/82-6/86</td>
<td>28.23%</td>
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<td>26.94%</td>
<td>$1.85 1/69-12/74</td>
<td>-3.11%</td>
<td>$0.83 1/75-12/80</td>
<td>23.82%</td>
<td>$3.60</td>
<td></td>
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<tr>
<td>7 84</td>
<td>517</td>
<td>11.00%</td>
<td>22.14%</td>
<td>$2.08 1/68-12/74</td>
<td>0.67%</td>
<td>$1.05 8/82-7/88</td>
<td>22.80%</td>
<td>$4.21</td>
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<tr>
<td>8 96</td>
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<td>18.56%</td>
<td>$2.37 3/01-2/09</td>
<td>2.18%</td>
<td>$1.19 1/75-12/82</td>
<td>20.74%</td>
<td>$4.52</td>
<td></td>
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<tr>
<td>9 108</td>
<td>493</td>
<td>11.19%</td>
<td>18.99%</td>
<td>$2.60 3/00-2/09</td>
<td>2.35%</td>
<td>$1.23 1/75-12/83</td>
<td>21.34%</td>
<td>$5.01</td>
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<tr>
<td>10 120</td>
<td>481</td>
<td>10.79%</td>
<td>16.47%</td>
<td>$2.79 3/99-2/09</td>
<td>4.04%</td>
<td>$1.49 9/77-8/87</td>
<td>20.51%</td>
<td>$6.46</td>
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<tr>
<td>11 132</td>
<td>469</td>
<td>11.12%</td>
<td>17.70%</td>
<td>$3.19 3/98-2/09</td>
<td>3.12%</td>
<td>$1.40 1/75-12/85</td>
<td>20.82%</td>
<td>$8.01</td>
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<tr>
<td>12 144</td>
<td>457</td>
<td>11.10%</td>
<td>16.89%</td>
<td>$3.54 3/97-2/09</td>
<td>4.06%</td>
<td>$1.61 1/75-12/86</td>
<td>20.95%</td>
<td>$9.09</td>
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<tr>
<td>14 168</td>
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<td>11.44%</td>
<td>14.23%</td>
<td>$4.56 3/95-2/09</td>
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<td>$2.21 1/75-12/88</td>
<td>20.06%</td>
<td>$12.94</td>
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<td>15 180</td>
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<td>11.60%</td>
<td>14.89%</td>
<td>$5.19 3/94-2/09</td>
<td>5.39%</td>
<td>$2.20 10/74-9/89</td>
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<td>10.23%</td>
<td>$10.79 3/89-2/09</td>
<td>7.16%</td>
<td>$3.98 10/74-9/94</td>
<td>17.38%</td>
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<tr>
<td>30 360</td>
<td>241</td>
<td>12.09%</td>
<td>6.47%</td>
<td>$30.66 9/87-8/17</td>
<td>8.68%</td>
<td>$12.14 1/75-12/04</td>
<td>15.15%</td>
<td>$68.87</td>
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<tr>
<td>40 480</td>
<td>121</td>
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<td>2.85%</td>
<td>$82.99 3/69-2/09</td>
<td>10.11%</td>
<td>$47.16 1/75-12/14</td>
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<td>50 600</td>
<td>1</td>
<td>10.81%</td>
<td>0.00%</td>
<td>$169.33 1/68-12/17</td>
<td>10.81%</td>
<td>$169.33 1/68-12/17</td>
<td>10.81%</td>
<td>$169.33</td>
<td></td>
</tr>
</tbody>
</table>

13-Year^1 Monthly Rolling Periods: 50 Years (1968 to 2017) Total of 445 Rolling Periods

1 13-years represents the estimated average holding period for investors who score 75 on the Risk Capacity Survey at ifab.com.
2 The Median Annualized Returns, Return Range, and Median Growth of $1 shown for 1, 3, and 6 month periods are not annualized.
3 Percentile ranking of all the rolling periods.

Sources, Updates, and Disclosures: ifabt.com, Appx A
Index Portfolio 50

Risk Profile: Moderate  
Age Profile: Age 50 to 60

Suitable for investors who have 8 years before needing approximately 20% of their investments and are willing to accept a moderate degree of volatility in order to achieve moderate portfolio growth.

General Allocation of Global Indexes

- 50% Stock Indexes
- 50% Bond Indexes

Simulated Returns and Volatility Data

<table>
<thead>
<tr>
<th>Period</th>
<th>Growth of $1 ($)</th>
<th>Annualized Return (%)</th>
<th>Annualized Std. Deviation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 yr ending 2017</td>
<td>1.09</td>
<td>9.16</td>
<td>2.00</td>
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<tr>
<td>1 yr ending 2016</td>
<td>1.08</td>
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<tr>
<td>1 yr ending 2015</td>
<td>0.98</td>
<td>-2.31</td>
<td>5.94</td>
</tr>
<tr>
<td>1 yr ending 2014</td>
<td>1.02</td>
<td>1.80</td>
<td>5.25</td>
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<tr>
<td>3 yrs 2015-2017</td>
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<td>5 yrs 2013-2017</td>
<td>1.34</td>
<td>6.05</td>
<td>5.28</td>
</tr>
<tr>
<td>10 yrs 2008-2017</td>
<td>1.58</td>
<td>4.65</td>
<td>9.05</td>
</tr>
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<td>50 yrs 1968-2017</td>
<td>79.45</td>
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<td>90 yrs 1928-2017</td>
<td>1,129</td>
<td>8.12</td>
<td>11.16</td>
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</tbody>
</table>

Annual Returns: 50 Years (1/1/1968 - 12/31/2017)

Growth of $1: 50 Years (1/1/1968 - 12/31/2017) - Log Scale

Sources, Updates, and Disclosures: ifabt.com, Appx A
## Index Portfolio 50

Simulated Passive Investor Experiences (SPIEs)

Based on 50 Years of Monthly Data (January 1, 1968 to December 31, 2017) 600 Months

### Examples of 8-Year Monthly Rolling Periods

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<th>Periods</th>
<th>Months</th>
<th>Yrs</th>
<th>Median</th>
<th>Return</th>
<th>Growth</th>
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<td>-</td>
<td>600</td>
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<td>-</td>
<td>553</td>
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<td>-</td>
<td>541</td>
<td>9.26%</td>
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</tr>
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<td>529</td>
<td>9.06%</td>
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</tr>
<tr>
<td>10</td>
<td>8</td>
<td>-</td>
<td>517</td>
<td>9.09%</td>
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### Rolling Period Return Data: 50 Years (1968 to 2017)

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<tr>
<th>Per Period</th>
<th>Number of Months</th>
<th>Median Annualized Return (50th %ile)</th>
<th>Return Range (High minus Low)</th>
<th>Median Growth of $1</th>
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<td>9.32%</td>
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<td>11.21%</td>
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<td>8.37%</td>
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<td>0.00%</td>
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</table>

### 8-Year¹ Monthly Rolling Periods: 50 Years (1968 to 2017) Total of 505 Rolling Periods

- **50th**: 9.38%
- **75th**: 13.00%
- **95th**: 16.31%

¹ 8-years represents the estimated average holding period for investors who score 50 on the Risk Capacity Survey at ifa.com.

² The Median Annualized Returns, Return Range, and Median Growth of $1 shown for 1, 3, and 6 month periods are not annualized.

* Percentile ranking of the all rolling periods.

Sources, Updates, and Disclosures: ifabt.com, Appx A
Index Portfolio 25
Risk Profile: Conservative
Age Profile: Only Low Risk Investors

Suitable for investors who have 5 years before needing approximately 20% of their investments and are willing to accept a conservative degree of risk for incremental appreciation with emphasis on capital preservation.

General Allocation of Global Indexes

- 25% Stock Indexes
- 75% Bond Indexes

Simulated Returns and Volatility Data

<table>
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<tr>
<th></th>
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<th></th>
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<tr>
<td>Growth of $1 ($)</td>
<td>1.05</td>
<td>1.04</td>
<td>0.99</td>
<td>1.01</td>
<td>1.08</td>
<td>1.16</td>
<td>1.34</td>
<td>2.37</td>
<td>33.12</td>
<td>188.50</td>
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<td>Annualized Return (%)</td>
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<td>4.23</td>
<td>-1.22</td>
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<td>2.52</td>
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<td>Annualized Std.Devation (%)</td>
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<td>4.49</td>
<td>4.11</td>
<td>4.81</td>
<td>6.03</td>
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Annual Returns: 50 Years (1/1/1968 - 12/31/2017)

Growth of $1: 50 Years (1/1/1968 - 12/31/2017) - Log Scale

Sources, Updates, and Disclosures: ifabt.com, Appx A
## Index Portfolio 25

Simulated Passive Investor Experiences (SPIEs)

Based on 50 Years of Monthly Data (January 1, 1968 to December 31, 2017) 600 Months

### Examples of 5-Year Monthly Rolling Periods

<table>
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<tr>
<th>Periods</th>
<th>Months</th>
<th>Yrs</th>
<th>5 Yrs</th>
<th>Periods</th>
<th>Months</th>
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<td>7.23</td>
<td>17.87</td>
<td>Apr 68</td>
<td>553</td>
<td>7.23</td>
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</table>

### Rolling Period Return Data: 50 Years (1968 to 2017)

<table>
<thead>
<tr>
<th>Per Period</th>
<th>Number of Months</th>
<th># of Rolling Periods</th>
<th>Median Annualized Return (50th %ile)</th>
<th>Return Range (High minus Low)</th>
<th>Median Growth of $1</th>
<th>Lowest Rolling Period Date</th>
<th>Lowest Rolling Period Return</th>
<th>Growth of $1 in Lowest Period</th>
<th>Highest Rolling Period Date</th>
<th>Highest Rolling Period Return</th>
<th>Growth of $1 in Highest Period</th>
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</thead>
<tbody>
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<td>600</td>
<td>0.65%²</td>
<td>12.08%²</td>
<td>$1.01²</td>
<td>10/87-10/87</td>
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<td>$0.95</td>
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</tr>
<tr>
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<td>$0.93</td>
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<td>28.43%²</td>
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<td>553</td>
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<td>8.68%</td>
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<td>10/97-9/17</td>
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<td>1/68-12/17</td>
<td>7.25%</td>
<td>$33.12</td>
</tr>
</tbody>
</table>

---

1. 5-years represents the estimated average holding period for investors who score 25 on the Risk Capacity Survey at ifabt.com.
2. The Median Annualized Returns, Return Range, and Median Growth of $1 shown for 1, 3, and 6 month periods are not annualized.
3. Percentile ranking of all the rolling periods.

Sources, Updates, and Disclosures: ifabt.com, Appx A
Step 12: Invest and Relax

“A decade ago, I really did believe that the average investor could do it himself. I was wrong. I’ve come to the sad conclusion that only a tiny minority, at most one percent, are capable of pulling it off. Heck, if Helen Young Hayes, Robert Sanborn, Julian Robertson, and the nation’s largest pension funds can’t get it right, what chance does John Q. Investor have?”

♫ William Bernstein, Ph.D., M.D., “The Probability of Success”, 2003

“Index funds are the only rational alternative for almost all mutual fund investors.”


“What if your advisor talks only about returns, not risk? ...It’s his job to take risk into account by telling you the range of possible outcomes you face. If he won’t, go to a new planner, someone who will get real.”


“The best way in my view is to just buy a low-cost index fund and keep buying it regularly over time, because you’ll be buying into a wonderful industry, which in effect is all of American industry...People ought to sit back and relax and keep accumulating over time.”

♫ Warren Buffett, MarketWatch, May 7, 2007
As we have climbed our way up the first 11 steps, I have explained the benefits of being a long-term investor and the pitfalls of being a short-term speculator. I have warned against the dangers of stock picking and market timing. I have spelled out the problems with manager picking. I have shined a spotlight on the silent partners lurking in the shadows. I’ve done all of it to get you to the point where you can tie yourself to the mast and resist the siren songs of speculation, and invest in a risk-appropriate index portfolio.

As you’ve learned, the stock market has appropriately rewarded those who have invested for the long term. However, staying the course is difficult due to the bombardment of bad news that causes us concern about our economic certainty. For example, confidence was high on October 9, 2007, when the Dow Jones Industrial Average (DJIA) reached its peak of 14,164. The DJIA then steadily declined for over a year, followed by a sharp drop of 22% in the eight trading days from October 1 to 10, 2008. The stock market then continued its decline over the next five months and bottomed out at 6,547 on March 6, 2009. Many investors pulled out of the stock market for the safety of money market funds during this prolonged and painful time period. The DJIA then shot back up, closing at 26,616 on January 26, 2018. Those who threw in the towel because they did not trust that prices are fair at all times, which causes the market to eventually

*While the passive relax on a tropical cruise, the active are singin’ the Speculation Blues.*

♫ The Speculation Blues
rebound, have irrevocably hampered their ability to capture their share of the market recovery.

Long-term investors understand the merits of indexing. But unfortunately, even those investors are prone to emotional decision making. For this reason, the right passive advisor fulfills a critically important role in investment success.

PROBLEMS

INVESTORS “GO IT ALONE”

Some passive investors get in their own way of success. As the legendary investor Benjamin Graham stated, “The investor’s chief problem, and even his worst enemy, is likely to be himself.” An investor may want to consider the fees paid to a passive advisor as a casualty insurance premium, insuring the investors against their own mistakes and lack of knowledge.

COMMISSIONS CREATE CONFLICT

A broker who receives a commission with every trade is acting in conflict with a client’s best interest, and therefore, not acting as a fiduciary for the client. In fact, in April 2005, the SEC set forth regulations that require commissioned financial professionals to include the following language on their advertising materials:

“Your account is a brokerage account and not an advisory account. Our interests may not always be the same as yours. Please ask us questions to make sure you understand your rights and our obligations to you, including the extent of our obligations to
disclose conflicts of interest and to act in your best interests. We are paid both by you and, sometimes, by people who compensate us based on what you buy. Therefore, our profits, and our salespersons’ compensation, may vary by product and over time.” This language reveals the all-too-common discrepancies that arise between a broker’s and a client’s goals.

Solutions

A Fiduciary Advisor

When choosing a financial advisor, an investor is best served by working with a fiduciary. The word “fiduciary” originates from the Latin word fiduciarius, which means “holding in trust.” In the investment industry, a fiduciary is obligated to act solely in the best interest of the client.

Registered investment advisers (RIAs) are fiduciaries and are held to fiduciary standards by the U.S. Securities and Exchange Commission (SEC), so they are legally and ethically required to put the client’s interests and needs above their own at all times. An RIA is paid solely for advice, accepting no compensation for any investment products or trading recommended to clients. An RIA that specializes in passive investments helps investors:

• Invest according to their risk capacity
• Properly allocate assets across a blend of globally diversified, passively managed index funds
• Maintain a portfolio with appropriate risk exposure
Step 12: Invest & Relax

- Avoid the impulse to react to market volatility
- Minimize investment costs and taxes

In contrast, broker-dealers and commission-based financial professionals are not fiduciaries. When providing investment advisory services, they are not held to the same legal standards as RIAs. Some brokers clarify their lack of fiduciary responsibilities in their contracts. Before hiring an investment advisor, it behooves an investor to ask questions and do some research on the fiduciary requirements of the financial advisors they are considering.

Fiduciary Protection in Retirement Plans

Fiduciary protection is fundamentally important to enhancing returns in retirement plans. The Employee Retirement Income Security Act (ERISA) is a federal law that is enforced by the Department of Labor (DOL). ERISA section 3(38) allows employers or retirement plan sponsors to delegate their personal responsibility and liability for selecting and monitoring a plan’s menu of investment options to a designated ERISA 3(38) investment manager who is obligated to act as a fiduciary in the truest sense of what ERISA requires: “an entity that legally must act with the sole purpose of benefiting the plan participants and beneficiaries.” This is an appealing option for companies who are not comfortable with taking on the fiduciary risks inherent in this role. A 3(38) investment manager can reduce the legwork and burdens that usually fall upon the company.
Asset Location

Along with asset allocation, investors should also consider asset location. For a client who has a mixture of accounts including taxable, traditional IRAs and Roth IRAs, it is helpful to construct one portfolio that includes multiple asset classes divided among different accounts. The ultimate purpose of this approach is to maximize after-tax returns. A good passive advisor will evaluate the purpose of each account to determine if it should be stand-alone or part of an asset location strategy.

When choosing which asset classes to place in different account types, a knowledgeable passive advisor would consider the following:

1. For Roth IRAs where all investment growth is tax-free, the best strategy is to include the asset classes with the highest expected returns. Examples include emerging markets and international small value.
2. For traditional IRAs where withdrawals are taxed as ordinary income, the best strategy is to include the asset classes that are least tax-efficient. Examples include real estate investment trusts (REIT’s) and fixed income.
3. For taxable accounts, the best strategy utilizes tax-managed funds whenever possible. Examples include tax-managed funds for U.S. large company, U.S. large cap value, U.S. small blend, U.S. small cap value, and international value.

A good advisor will carefully trade all accounts in unison, along with an eye toward tax-efficiency, minimization of transaction costs and maintenance of the client’s designated risk level.
Rebalancing

Periodic portfolio rebalancing is an important strategy for risk maintenance, allowing you to adjust your current allocation back to your target allocation. Rebalancing most frequently involves selling shares that have appreciated significantly and buying more of those that have grown more slowly, ensuring a consistent level of risk exposure in a portfolio. For further information on rebalancing, including frequencies and formulas, see ifa.com/rb.

Figure 12-1 reflects the mechanism of maintaining the discipline of rebalancing. It seems counterintuitive to sell off a portion of an investment that has outperformed others in order to buy one that has underperformed. However, out-of-balance portfolios with asset classes that have grown beyond their target allocations take on inappropriate risk exposures.

---

**Figure 12-1**

<table>
<thead>
<tr>
<th>Emotions of Rebalancers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothetical 5-Year Period</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Investment Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
</tr>
<tr>
<td>Medium</td>
</tr>
<tr>
<td>Low</td>
</tr>
</tbody>
</table>

**Rebalancers' Emotions Over Time**

- **Disciplined**: Sell a portion to restore target allocation.
- **Disciplined**: Buy a portion to restore target allocation.

Sources, Updates and Disclosures: ifabt.com
THE GLIDE PATH

An investor’s risk exposure is systematically adjusted to risk capacity changes by reducing the allocation from stocks to bonds. This is referred to as a glide path strategy. One effective method to glide path a portfolio is through an approximate 1% reduction in the equity allocation of a portfolio per year over a lifetime.\textsuperscript{96} When young investors start their careers, they are long on human capital and short on financial capital. As investors age, there is an exchange of human and financial capital. Figure 12-2 is a hypothetical illustration of an individual’s financial glide path (see ifa.com/gp). It illustrates an investor’s transition from living off their labor (human capital) to living off their savings (financial capital) with a slow risk reduction over time.

\textit{Figure 12-2}
Tax Loss Harvesting

In the dark skies of a market downturn, there is a silver lining. Tax loss harvesting is the recognition of losses so that you can reduce future tax liabilities either due to rebalancing or capital gains distributions. To save on future capital gains taxes, investors might consider this strategy: 1) Sell the stock mutual funds in your taxable accounts that have declined more than 10% and $5,000; 2) Immediately invest the assets in a substantially different fund, realizing a capital loss; 3) Purchase the original funds back after 31 days from the sale; 4) Report the realized capital losses to your accountant to offset future capital gains and a portion of your income. Losses can be carried forward until they’ve been offset by future capital gains or income. There are some risks associated with tax loss harvesting, so an investor should consult with their accountant prior to making a decision to tax loss harvest. To learn more, visit ifa.com/thl.

Figure 12-3

Emotions of Tax Loss Harvesters

Hypothetical 5-Year Period

Disciplined  Disciplined  Disciplined  Disciplined  Disciplined
Tax Loss Harvesters' Emotions Over Time
**Retirement Analyzer**

A retirement analyzer is a valuable retirement planning tool that enables investors to assess their financial health, specifically their probability of running out of money during retirement. It is best used as a guide in making decisions on saving, spending, and investing and should be revisited annually. The retirement analyzer at ifa.com/ra provides the tools to assess an investor’s probability of portfolio survival.

The retirement analyzer performs a Monte Carlo simulation which generates 10,000 individual scenarios. Each scenario is calculated using randomly selected annual returns from distributions based on the performance of historical data. The results of a Monte Carlo simulation are heavily dependent on the following specific inputs:

1. Beginning portfolio value
2. The number of years for the projection
3. Future cash flows (both deposits and withdrawals)
4. Inflation rate to be applied to the cash flows
5. The distribution of returns
6. Investment strategy

Quite often, the results of an initial analysis will appear unsatisfactory. Several changes in assumptions can be made to improve the expected outcome, these include:

1. Save a larger percentage of salary
2. Spend less in retirement
3. Shorten years in retirement
4. Take more risk during the working years
5. Take less risk during the drawdown phase
6. Use glide path (steadily decreases risk over time)

Figure 12-4 depicts the results of a portfolio simulation for an individual with a retirement age starting at 67. The green and gold bars represent the probability of the portfolio surviving through various ages. A portfolio survival simulation is a valuable tool for investors to use for establishing a degree of confidence about the sustainability of their portfolio through their lifetime. Revisiting the retirement analyzer each year allows investors to make sure they are on course — much like an onboard navigation system for a car. The closer one gets to their destination, the more finely tuned the directions become.

---

**Figure 12-4**

<table>
<thead>
<tr>
<th>Probability of Portfolio Survival During Retirement Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Simulation from Age 67 to 87</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percentage of Surviving Simulations</th>
<th>67</th>
<th>68</th>
<th>70</th>
<th>71</th>
<th>72</th>
<th>74</th>
<th>75</th>
<th>76</th>
<th>77</th>
<th>78</th>
<th>79</th>
<th>80</th>
<th>81</th>
<th>82</th>
<th>83</th>
<th>84</th>
<th>85</th>
<th>86</th>
<th>87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100.00%</td>
<td>100.00%</td>
<td>99.96%</td>
<td>99.73%</td>
<td>99.54%</td>
<td>99.10%</td>
<td>98.68%</td>
<td>97.81%</td>
<td>96.69%</td>
<td>95.22%</td>
<td>93.90%</td>
<td>92.20%</td>
<td>90.23%</td>
<td>87.90%</td>
<td>85.71%</td>
<td>83.34%</td>
<td>78.36%</td>
<td>75.48%</td>
<td></td>
</tr>
</tbody>
</table>

Sources, Updates and Disclosures: ifa.com/ra, ifabt.com, Appx A
Your Next Step

We have now arrived at the conclusion of our 12-Step Journey. Along our path, we have brought to light the detrimental impact our own emotions and behaviors can wreak on our investments.

We have taken a brief walk through the milestones of financial science and been enlightened by a group of academic legends who paved the way by contributing research that facilitates our ability to better understand risk, return, and the collective wisdom of people and markets.

We have crossed the path of some fallen stars who provide a cautionary lesson on why we should primarily respect the market’s uncanny ability to spontaneously price all known information and to willingly accept that the current price is the best estimate of a fair price.

We have been challenged to understand the futility of blindly chasing after winning fund managers, knowing their recent hot performance is a function of luck, not repeatable skill.

We have learned the deleterious results that come from attempting to predict the future performance of markets, sectors, or styles and the erosive costs associated with this speculation.

We have explored the probability of outcomes and have been guided to an understanding of how and why risk and return walk hand-in-hand.

We have traveled backward in time to learn that the travails of today are not so dissimilar from those of history and that the precise risk experienced in the past will never be the same, but the ability of a free market to price those risks will be the same. Global capitalism has continued its onward march, allowing
its shareholders to participate in the prosperity of a diversified portfolio of companies.

We have evaluated how much risk we can stomach and have been encouraged to be willing participants in market volatility at risk-appropriate levels.

We have been shown a rainbow of potential investment portfolios that cuts across a wide spectrum of risk and return.

And finally, we have learned the value of walking with a trusted passive advisor who will guide us through the peaks and valleys of the market, away from the temptations of speculation and toward a more rewarding and tranquil way of investing.

Each step of this book has been opened with a stanza from “The Speculation Blues,” a song I wrote that summarizes the many emotions and struggles of active investors — the lyrics of which can be found on the following pages. This song details how those who go it alone, speculating instead of investing, unnecessarily struggle on their investment journey.

I wrote this book to lead investors to a more peaceful and profitable investment experience. I sincerely hope this journey has brought you to a deeper understanding of investing and strengthened your ability to achieve a brighter financial future.
THE SPECULATION BLUES

Lyrics by Mark Hebner

- The lure of fast money makes you think active, but the record proves you’re better off passive.
- Professors came to a shocking conclusion, the active advantage was just an illusion.
- The stock market gamble can be an addiction, you’ll search, but won’t find that winnin’ prediction.
- Traders devour the news like a school of piranha, while the passive find peace in a tradeless nirvana.
- The bets laid down on predictin’ that news, will surely bring on the Speculation Blues.
- All them scholars toilin’ at the universities, uncovered the fact that risk was just probabilities.
- They said that investors should diversify, and tell their stock brokers “good luck and goodbye.”
- The traders oughta learn from Nobel Laureates, but they keep on makin’ them long and short bets.
- Once you get the efficient market hypothesis, you’ll no longer be fooled by market randomness.
- Stockaholics search for the best stock to choose, but end up cryin’ the Speculation Blues.
- Instead of Morgan or Cramer, or Barney or Lynch, you’re better off with Bogle, Fama or French.
- The wisdom of crowds throughout the land, will act like the force of the invisible hand.
• Everyone knows there ain’t no free lunch, but the pickers keep thinkin’ they can win from a hunch.
• Your broker’s out buyin’ himself a fine yacht, and you’re gettin’ nothin’ from the stocks that he bought.
• Stock gamblin’ can be like drinkin’ that booze, leavin’ you singin’ the Speculation Blues.
• Market timers dream of makin’ a killin’ on a trend, but buyin’ and holdin’ wins out in the end.
• Fund managers trade as though taxes don’t matter, but tradin’ too much just makes Uncle Sam fatter.
• Silent partners have a feast on most investors, but you know that they suck the least from savvy indexers.
• Traders think that money grows from speculation, but indexers know it’s just risk compensation.
• Trades placed online just guessin’ tomorrow’s news, leads those gamblers into the Speculation Blues.
• So before investing your hard earned green, catch a good vibe for the variance and the mean.
• The smart money man is best served, by checkin’ out how the bell is curved.
• For when it’s skinny and the average is high, the traders can’t beat it no matter how hard he try.
• A risk taker gots’ta know his risk capacity, then hang on for his payout with true tenacity.
• While the passive relax on a tropical cruise, the active are singin’ the Speculation Blues.

Watch the music video at: speculationblues.com
About the Artist

Lala Ragimov

I would like to extend a special thank you to master artist, Lala Ragimov, who painted 65 original and beautiful oil paintings that are located throughout the book. The originals of these paintings are proudly displayed at the headquarters of Index Fund Advisors in Irvine, California. Lala was born in Moscow and draws her artistic inspiration from the painters of the Venetian Renaissance and Flemish Baroque periods.

Lala earned a Bachelor of Fine Arts from the world-renowned California Institute of the Arts in 2003 and a Master of Fine Arts degree from California State University, Long Beach in 2009. Today Lala is a Fine Art Instructor and creates art and illustrations for Index Fund Advisors, biomedical manuals, magazines, art exhibitions, and many private collectors.
APPENDIX A

The following descriptions of IFA Indexes indicate how indexes are strung together to simulate similar risk and return characteristics back to 1928. This reduces the standard error of the mean which is unacceptably high for periods less than 20 or 30 years. When IFA Indexes are shown in Index Portfolios, all return data reflects a deduction of 0.9% annual investment advisory fee, which is the maximum advisory fee charged by IFA. Unless indicated otherwise, data shown for each individual IFA Index is shown without a deduction of the IFA advisory fee. This method is used because the creation, choice, monitoring and rebalancing of diversified index portfolios are the services of the independent investment advisor. Therefore, fees are deducted from the whole portfolio data but not the index data. Live Dimensional Fund Advisors’ (DFA) fund data reflects the deduction of mutual fund advisory fees, brokerage fees, other expenses incurred by the mutual funds and incorporates actual trading results. Simulated index data also reflects DFA’s current mutual fund expense ratios for the entire period. Both simulated and live data reflect total returns, including dividends, except for IFA/NSDQ Index. For updates on sources and descriptions of data see www.ifaiindexes.com.
## IFA U.S. Large Company Index (LC)

### Time-Series Construction

January 1928 – December 1990: Dimensional US Large Cap Index minus 0.0025%/mo (mutual fund exp ratio)


May 2010 – June 2017: DFA US Large Company Portfolio Symbol: DFUSX

July 2017 – Present: Schwab S&P 500 Index Symbol: SWPPX

### Investment Objective of Schwab S&P 500 Index (SWPPX)

The investment seeks to track the total return of the S&P 500 Index. The fund generally invests at least 80% of its net assets in stocks that are included in the S&P 500 Index. It generally gives the same weight to a given stock as the index does. The fund may invest in derivatives, principally futures contracts, and lend its securities to minimize the gap in performance that naturally exists between any index fund and its corresponding index. It may concentrate its investments in an industry or group of industries to the extent that its comparative index is also so concentrated.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schwab S&amp;P 500 Index</td>
<td>22.32%</td>
<td>12.03%</td>
<td>15.47%</td>
<td>9.08%</td>
</tr>
<tr>
<td>S&amp;P 500 Index</td>
<td>22.59%</td>
<td>11.97%</td>
<td>15.59%</td>
<td>8.81%</td>
</tr>
<tr>
<td>Number of Holdings</td>
<td>508</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividend Yield</td>
<td>1.74%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover Ratio (as of 10/31/15)</td>
<td>2.00%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Weighted Average Market Cap         | $31.2B   |
| Weighted Average Book-to-Market     | 3.06     |
| Expense Ratio                       | 0.03%    |

All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.

## IFA U.S. Large Cap Value Index (LV)

### Time-Series Construction

January 1928 – February 1993: Dimensional US Large Cap Value Index minus 0.0233%/mo (mutual fund exp ratio)

March 1993 – Present: DFA US Large Cap Value Portfolio Symbol: DFLVX

### Investment Objective of DFA US Large Cap Value Portfolio I (DFLVX)

The Portfolio is a feeder portfolio and pursues its objective by investing substantially all of its assets in its corresponding Master Fund, The U.S. Large Cap Value Series, which has the same investment objective and policies as the U.S. Large Cap Value Portfolio.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA US Large Cap Value Portfolio (I)</td>
<td>18.97%</td>
<td>10.93%</td>
<td>16.09%</td>
<td>8.73%</td>
</tr>
<tr>
<td>Russell 1000 Value Index</td>
<td>13.66%</td>
<td>8.65%</td>
<td>14.04%</td>
<td>7.10%</td>
</tr>
<tr>
<td>Number of Holdings</td>
<td>311</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividend Yield</td>
<td>2.13%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover Ratio (as of 10/31/15)</td>
<td>15.00%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Weighted Average Market Cap         | $117,322M|
| Weighted Average Book-to-Market     | 1.97     |
| Expense Ratio                       | 0.27%    |

All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.
### IFA U.S. Small Cap Index (SC)

**Time-Series Construction**
- January 1928 – March 1992: Dimensional US Small Cap Index minus 0.0308%/mo (mutual fund exp ratio)

**Investment Objective of DFA US Small Cap Portfolio I (DFSTX)** is to achieve long-term capital appreciation.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA US Small Cap Portfolio (I)</td>
<td>11.52%</td>
<td>10.04%</td>
<td>14.63%</td>
<td>9.97%</td>
</tr>
<tr>
<td>Russell 2000 Index</td>
<td>14.65%</td>
<td>9.96%</td>
<td>14.12%</td>
<td>8.71%</td>
</tr>
<tr>
<td>Number of Holdings</td>
<td>1,939</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividend Yield</td>
<td>1.10%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover Ratio (as of 10/31/15)</td>
<td>10.00%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Weighted Average Market Cap**: $2,352M

**Weighted Average Book-to-Market**: 2.13

**Expense Ratio**: 0.37%

All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.

### IFA U.S. Small Cap Value Index (SV)

**Time-Series Construction**
- January 1928 – February 2000: Dimensional US Targeted Value Index minus 0.0317%/mo (mutual fund exp ratio)

**Investment Objective of DFA Targeted Value Portfolio I (DFFVX)** is to achieve long-term capital appreciation.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA US Targeted Value Portfolio (I)</td>
<td>9.59%</td>
<td>9.44%</td>
<td>14.05%</td>
<td>9.28%</td>
</tr>
<tr>
<td>Russell 2000 Value Index</td>
<td>7.84%</td>
<td>9.55%</td>
<td>13.01%</td>
<td>8.17%</td>
</tr>
<tr>
<td>Number of Holdings</td>
<td>1,422</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividend Yield</td>
<td>1.26%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover Ratio (as of 10/31/15)</td>
<td>28.00%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Weighted Average Market Cap**: $3,367M

**Weighted Average Book-to-Market**: 1.49

**Expense Ratio**: 0.37%

All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.
### IFA Global REIT Index (RE)

#### Time-Series Construction
- January 1928 – December 1977: 50% IFA US Small Cap Index and 50% IFA Small Cap Value Index
- January 1978 – December 1993: Dow Jones US Select REIT Index minus 0.0183%/mo (mutual fund exp ratio)
- July 2008 – Present: DFA Global Real Estate Securities Portfolio Symbol: DFGEX

#### Investment Objective of DFA Global Real Estate Securities Portfolio (DFGEX)
is to achieve long-term capital appreciation.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA Global Real Estate Sec. Portfolio</td>
<td>9.20%</td>
<td>5.42%</td>
<td>7.92%</td>
<td>--%*</td>
</tr>
<tr>
<td>S&amp;P Global REIT Index**</td>
<td>7.41%</td>
<td>4.19%</td>
<td>6.94%</td>
<td>--%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Holdings</th>
<th>440</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividend Yield</td>
<td>4.08%</td>
</tr>
<tr>
<td>Turnover Ratio (as of 10/31/15)</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weighted Average Market Cap</th>
<th>$14,986M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighted Average Book-to-Market</td>
<td>1.70</td>
</tr>
<tr>
<td>Expense Ratio</td>
<td>0.24%</td>
</tr>
</tbody>
</table>

*Inception Date 6/4/08. **Net Dividends All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.

### IFA International Value Index (IV)

#### Time-Series Construction
- January 1928 – June 1955: IFA US Large Value Index
- July 1955 – December 1969: Dimensional UK Large Value minus 0.0358%/mo (mutual fund exp ratio)
- January 1970 – December 1974: MSCI EAFE Gross Dividends minus 0.0358%/mo (mutual fund exp ratio)
- January 1975 – February 1994: Fama/French International Value minus 0.0358%/mo (mutual fund exp ratio)

#### Investment Objective of DFA International Value Portfolio I (DFIVX)
is to achieve long-term capital appreciation. The portfolio pursues its objective by investing substantially all of its assets in its corresponding Master Fund, The International Value Series, which has the same investment objective and policies as the DFA International Value Portfolio.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA Intl. Value Index Portfolio</td>
<td>26.09%</td>
<td>8.59%</td>
<td>7.96%</td>
<td>1.64%</td>
</tr>
<tr>
<td>MSCI EAFE Index*</td>
<td>24.21%</td>
<td>7.36%</td>
<td>7.46%</td>
<td>1.87%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Holdings</th>
<th>514</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividend Yield</td>
<td>3.46%</td>
</tr>
<tr>
<td>Turnover Ratio (as of 10/31/15)</td>
<td>17.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weighted Average Market Cap</th>
<th>$63,749M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighted Average Book-to-Market</td>
<td>1.10</td>
</tr>
<tr>
<td>Expense Ratio</td>
<td>0.43%</td>
</tr>
</tbody>
</table>

*Net Dividends. All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.
### IFA International Small Company Index

#### Time-Series Construction

- January 1928 – December 1969: IFA US Small Cap Index
- January 1970 – September 1996: Dimensional International Small Cap Index minus 0.0458%/mo (mutual fund exp ratio)
- October 1996 – Present: DFA International Small Company Portfolio Symbol: DFISX

#### Investment Objective of DFA International Small Company Portfolio I (DFISX) is to achieve long-term capital appreciation.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA Intl. Small Cap Index</td>
<td>30.24%</td>
<td>13.43%</td>
<td>11.75%</td>
<td>5.64%</td>
</tr>
<tr>
<td>MSCI World ex USA Small Cap Index*</td>
<td>31.04%</td>
<td>12.96%</td>
<td>11.37%</td>
<td>5.16%</td>
</tr>
<tr>
<td>Number of Holdings</td>
<td>4,530</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividend Yield</td>
<td>2.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover Ratio (as of 10/31/15)</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted Average Market Cap</td>
<td>$2,555M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted Average Book-to-Market</td>
<td>1.61</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expense Ratio</td>
<td>0.53%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Price-Only. All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.

### IFA International Small Cap Value Index

#### Time-Series Construction

- January 1928 – December 1969: IFA Small Cap Value Index
- July 1981 – December 1994: Dimensional International Small Cap Value Index minus 0.0575%/mo (mutual fund exp ratio)

#### Investment Objective of DFA International Small Cap Value Portfolio I (DISVX) is to achieve long-term capital appreciation.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA Intl. Small Cap Value</td>
<td>27.98%</td>
<td>12.86%</td>
<td>12.57%</td>
<td>5.77%</td>
</tr>
<tr>
<td>MSCI EAFE Small Cap Index*</td>
<td>31.04%</td>
<td>12.96%</td>
<td>11.37%</td>
<td>5.16%</td>
</tr>
<tr>
<td>Number of Holdings</td>
<td>2,212</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividend Yield</td>
<td>2.37%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover Ratio (as of 10/31/15)</td>
<td>19.00%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted Average Market Cap</td>
<td>$2,309M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted Average Book-to-Market</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expense Ratio</td>
<td>0.68%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Price-Only. All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.
## IFA Emerging Market Index (EM)

### Time-Series Construction

- **January 1928 – December 1969:** 50% IFA US Large Value Index and 50% IFA US Small Cap Index
- **January 1970 – December 1987:** 50% IFA Int'l Value and 50% IFA Int'l Small Cap Index
- **January 1988 – December 1988:** MSCI Emerging Markets Index (gross div.) minus 0.05%/mo (mutual fund exp ratio)
- **January 1989 – April 1994:** Fama/French Emerging Markets Index minus 0.05%/mo (mutual fund exp ratio)

### Investment Objective of DFA Emerging Markets Portfolio I (DFEMX)

is to achieve long-term capital appreciation. The portfolio pursues its objective by investing substantially all of its assets in its corresponding Master Fund, The Emerging Markets Series, which has the same investment objective and policies as the Emerging Markets Portfolio.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA Emerging Markets Portfolio I</td>
<td>36.57%</td>
<td>8.83%</td>
<td>4.18%</td>
<td>2.53%</td>
</tr>
<tr>
<td>MSCI Emerging Markets Index*</td>
<td>37.28%</td>
<td>9.10%</td>
<td>4.35%</td>
<td>1.68%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Holdings</th>
<th>Dividend Yield</th>
<th>Weighted Average Market Cap</th>
<th>$72,566M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,160</td>
<td>2.09%</td>
<td>Weighted Average Book-to-Market</td>
<td>1.74</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turnover Ratio (as of 10/31/15)</th>
<th>Expense Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.00%</td>
<td>0.48%</td>
</tr>
</tbody>
</table>

*Gross Dividend. All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaiindexes.com.

## IFA Emerging Market Value Index (EV)

### Time-Series Construction

- **January 1928 – December 1969:** IFA US Small Cap Value Index
- **January 1970 – December 1988:** IFA Emerging Markets Index
- **January 1989 – April 1998:** Dimensional Emerging Value Index minus 0.05%/mo (mutual fund exp ratio)
- **May 1998 – Present:** DFA Emerging Markets Value Portfolio Symbol DFEVX

### Investment Objective of DFA Emerging Markets Value Portfolio I (DFEVX)

is to achieve long-term capital appreciation. The portfolio pursues its objective by investing substantially all of its assets in its corresponding Master Fund, The Dimensional Emerging Markets Value Fund, which has the same investment objective and policies as the Emerging Markets Value Portfolio.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA Emerging Markets Value Portfolio I</td>
<td>27.59%</td>
<td>0.78%</td>
<td>3.83%</td>
<td>1.36%</td>
</tr>
<tr>
<td>MSCI Emerging Markets Index*</td>
<td>23.75%</td>
<td>1.07%</td>
<td>3.96%</td>
<td>1.91%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Holdings</th>
<th>Dividend Yield</th>
<th>Weighted Average Market Cap</th>
<th>$27,966M</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,293</td>
<td>2.89%</td>
<td>Weighted Average Book-to-Market</td>
<td>0.97</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turnover Ratio (as of 10/31/15)</th>
<th>Expense Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.00%</td>
<td>0.56%</td>
</tr>
</tbody>
</table>

*Gross Dividend. All Data as of Jun 30, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaiindexes.com.
### IFA Emerging Market Small Cap Index

**Time-Series Construction**
- January 1928 – December 1969: IFA US Small Cap Index
- January 1989 – March 1998: Fama/French Emerging Markets Small minus 0.065%/mo (mutual fund exp ratio)

**Investment Objective of DFA Emerging Markets Small Cap Portfolio I (DEMSX)** is to achieve long-term capital appreciation. The portfolio pursues its objective by investing substantially all of its assets in its corresponding Master Fund, The Dimensional Emerging Markets Value Fund, which has the same investment objective and policies as the Emerging Markets Value Portfolio.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA Emg. Markets Small Cap Portfolio</td>
<td>35.26%</td>
<td>11.06%</td>
<td>6.83%</td>
<td>4.71%</td>
</tr>
<tr>
<td>MSCI Emerging Market Index**</td>
<td>37.28%</td>
<td>9.10%</td>
<td>4.35%</td>
<td>1.68%</td>
</tr>
<tr>
<td>Number of Holdings</td>
<td>4,032</td>
<td>Weighted Average Market Cap</td>
<td>$1,498M</td>
<td></td>
</tr>
<tr>
<td>Dividend Yield</td>
<td>1.89%</td>
<td>Weighted Average Book-to-Market</td>
<td>1.42</td>
<td></td>
</tr>
<tr>
<td>Turnover Ratio (as of 10/31/15)</td>
<td>18.00%</td>
<td>Expense Ratio</td>
<td>0.72%</td>
<td></td>
</tr>
</tbody>
</table>

*Gross Dividend. All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindices.com.

### IFA One-Year Fixed Income Index (1F)

**Time-Series Construction**
- January 1928 – June 1963: One-Month T-Bills minus 0.015%/mo (mutual fund exp ratio)
- July 1963 – July 1983: One-Year T-Note Index minus 0.015%/mo (mutual fund exp ratio)
- August 1983 – Present: DFA One-Year Fixed Income Portfolio Symbol DFIHX

**Investment Objective of IFA One-Year Fixed Income Portfolio (DFIHX)** is to achieve a stable real return in excess of the rate of inflation with a minimum of risk.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA One-Year Fixed Income Port</td>
<td>0.94%</td>
<td>0.70%</td>
<td>0.54%</td>
<td>1.13%</td>
</tr>
<tr>
<td>One-Year US Treasury Note*</td>
<td>0.57%</td>
<td>0.49%</td>
<td>0.38%</td>
<td>0.90%</td>
</tr>
</tbody>
</table>

**Duration** 0.93
**Average Portfolio Maturity Range** 0.94 Years
**Expense Ratio (as of )** 0.17%

*BoFA Merrill Lynch Index. All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see ifaindices.com.
### IFA Two-Year Global Fixed Income Index

**Time-Series Construction**

January 1928 – June 1977: Five-Year T-Notes minus 0.015%/mo (mutual fund exp ratio)
July 1977 – December 1989: ML US Treasury Index 1-3 Years minus 0.015%/mo (mutual fund exp ratio)
January 1990 – February 1996: Citi World Gov't Bond 1-3 Years Hedged minus 0.015%/mo (mutual fund exp ratio)
March 1996 – Present: DFA Two-Year Global Fixed Income Portfolio Symbol: DFGFX

**Investment Objective of DFA Two-Year Global Fixed Income Portfolio (DFGX)** is to maximize total returns consistent with preservation of capital.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA Two-Year Global Fixed Income Port</td>
<td>0.93%</td>
<td>0.74%</td>
<td>0.61%</td>
<td>1.27%</td>
</tr>
<tr>
<td>World Gov't Bond Index 1-3 Years*</td>
<td>0.88%</td>
<td>0.81%</td>
<td>0.74%</td>
<td>1.35%</td>
</tr>
</tbody>
</table>

**Duration** 1.56
**Average Portfolio Maturity Range** 1.59 Years
**Expense Ratio (as of )** 0.17%

*Citi Group Index, Hedged. All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see ifaindexes.com.

### IFA Short Term Government Index (3G)

**Time-Series Construction**

January 1928 – December 1972: Five-Year T-Notes minus 0.0167%/mo (mutual fund exp ratio)
January 1973 – May 1987: Barclays Intermediate Government Bond Index minus 0.0167%/mo (mutual fund exp ratio)
June 1987 – Present: DFA Short-Term Gov't Portfolio (Five-Year Gov't Income) Symbol: DFFGX

**Investment Objective of DFA Short-Term Government Portfolio (DFFGX)** is to maximize total returns from the universe of debt obligations of the U.S. Government and U.S. government agencies.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA Short-Term Gov't Portfolio</td>
<td>0.51%</td>
<td>0.83%</td>
<td>0.66%</td>
<td>2.23%</td>
</tr>
<tr>
<td>Capital US Gov't Bond Index Int.*</td>
<td>0.66%</td>
<td>0.91%</td>
<td>0.76%</td>
<td>2.05%</td>
</tr>
</tbody>
</table>

**Duration** 2.77
**Average Portfolio Maturity Range** 2.88 Years
**Expense Ratio (as of )** 0.19%

*Barclays Index. All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see ifaindexes.com.
IFA Five-Year Global Fixed Income Index

**Time-Series Construction**

January 1928 – December 1984: IFA Short Term Government Index
January 1985 – November 1990: Citi Global Government Bond Hedged minus 0.0233%/mo (mutual fund exp ratio)
December 1990 – Present: DFA Five-Year Global Fixed Income Portfolio Symbol: DFGBX

**Investment Objective of DFA Five-Year Global Fixed Income Portfolio (DFGBX)**

is to provide a market rate of return for a fixed income portfolio with low relative volatility of returns.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFA Five-Year Global Fixed Portfolio</td>
<td>1.97%</td>
<td>1.74%</td>
<td>1.53%</td>
<td>3.04%</td>
</tr>
<tr>
<td>World Gov't Bond 1-5 Years*</td>
<td>1.13%</td>
<td>1.21%</td>
<td>1.23%</td>
<td>2.13%</td>
</tr>
</tbody>
</table>

Duration 3.86  
Average Portfolio Maturity Range 4.02 Years  
Expense Ratio (as of ) 0.27%

*Citigroup Index, Hedged. All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see ifaindexes.com.

IFA U.S. Total Market Index (TM)

**Time-Series Construction**

Jan 1928 - Apr 1992: Dimensional US Marketwide minus 0.01%/mo (mutual fund exp ratio)  
May 1992 - Present: Vanguard US Total Market Index Instl :VITSX

**Investment Objective of Vanguard US Total Market Index (VITSX)**

The investment seeks to track the performance of a benchmark index that measures the investment return of the overall stock market. The fund employs a passive management strategy designed to track the performance of the MSCI US Broad Market index, which consists of all the U.S. common stocks traded regularly on the New York Stock Exchange and the Nasdaq over-the-counter market. It typically holds 1,200-1,300 of the stocks in its target index.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanguard US Total Market Index</td>
<td>21.18%</td>
<td>11.10%</td>
<td>15.56%</td>
<td>8.73%</td>
</tr>
</tbody>
</table>

Number of Holdings 3,645  
Weighted Average Market Cap $54.9B

All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.
### IFA U.S. Large Growth Index (LG)

**Time-Series Construction**

Jan 1928 - Nov 1992: Dimensional US Large Cap Growth minus 0.01%/mo (mutual fund exp ratio)

Dec 1992 - Present: Vanguard Growth Index Inst'tl: VIGIX

**Investment Objective of Vanguard Growth Index (VIGIX)** The investment seeks to track the performance of a benchmark index that measures the investment return of large-capitalization growth stocks. The fund employs a passive management investment approach designed to track the performance of the MSCI US Prime Market Growth index, a broadly diversified index of growth stocks of large U.S. companies. It attempts to replicate the target index by investing all, or substantially all, of assets in the stocks that make up the index, holding each stock in approximately the same proportion as its weighting in the index.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanguard Growth Index</td>
<td>27.82%</td>
<td>11.90%</td>
<td>16.08%</td>
<td>9.53%</td>
</tr>
</tbody>
</table>

| Number of Holdings | 325 | Weighted Average Market Cap | $86.3B |

All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.

### IFA U.S. Small Growth Index (SG)

**Time-Series Construction**

Jan 1928 - May 1998: Dimensional US Small Cap Growth minus 0.01%/mo (mutual fund exp ratio)

Jun 1998 - Present: Vanguard Small-Cap Growth Index Inst'l :VSGIX

**Investment Objective of Vanguard Small-Cap Growth Index (VSGIX)** The investment seeks to track the performance of a benchmark index that measures the investment return of small capitalization growth stocks. The fund employs a passive management investment approach designed to track the performance of the MSCI US Small Cap Growth index, a broadly diversified index of growth stocks of smaller U.S. companies. It attempts to replicate the target index by investing all, or substantially all, of assets in the stocks that make up the index, holding each stock in approximately the same proportion as its weighting in the index.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanguard Small-Cap Growth Index</td>
<td>21.91%</td>
<td>9.59%</td>
<td>13.59%</td>
<td>9.40%</td>
</tr>
</tbody>
</table>

Number of Holdings | 651 | Weighted Average Market Cap | $4.2B |

All Data as of Dec 31, 2017. Returns include the impact of reinvested dividends and capital gains distributions. For updates see www.ifaindexes.com.
S&P 500 Index (SP)

Time-Series Construction

Investment Objective of S&P 500 Index
Widely regarded as the best single gauge of the U.S. equities market, this world-renowned index includes 500 leading companies in leading industries of the U.S. economy. Although the S&P 500 focuses on the large cap segment of the market, with approximately 75% coverage of U.S. equities, it is also a proxy for the total market. S&P 500 is part of a series of S&P U.S. indices that can be used as building blocks for portfolio construction.

<table>
<thead>
<tr>
<th>Average Annual Total Return</th>
<th>One Year</th>
<th>Three Years</th>
<th>Five Years</th>
<th>Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P 500 Index</td>
<td>21.83%</td>
<td>11.41%</td>
<td>15.79%</td>
<td>8.50%</td>
</tr>
</tbody>
</table>

Weighted Average Market Cap $96.4B

All Data as of Dec 31, 2017. Returns include dividends. For updates see www.ifaindexes.com.

IFA NSDQ Index (N)

Time-Series Construction
Mar 1971 - Present: NASDAQ % Change; Excluding Dividends (Source: Yahoo! Finance).

Investment Objective of IFA NSDQ Index
To capture the return of the NASDAQ-100 Index, excluding the impact of dividends. The NASDAQ-100 Index includes 100 of the largest domestic and international non-financial securities listed on The Nasdaq Stock Market based on market capitalization. The Index reflects companies across major industry groups including computer hardware and software, telecommunications, retail/wholesale trade and biotechnology. It does not contain securities of financial companies including investment companies.

All Data as of Dec 31, 2017. For updates see ifaindexes.com.

Fama/French Total US Market Research Factor

Time-Series Construction
July 1926 – Present: Fama/French Total US Market Research Factor minus T-Bill

Composition of Fama/French Total US Market Research Factor: The Value-Weighted US Market Index is constructed every month, using all issues listed on the NYSE, AMEX or Nasdaq with available outstanding shares and valid prices for that month and the month before.

Exclusions: American Depositary Receipts.
Rebalancing: Monthly 1926-2005
Does not include hold range and does not incur transaction costs.
Currency: USD

Sources: Dimensional Returns Version 2.2.
Fama/French multifactor data provided by Fama/French.
Dividends: Reinvested in the paying company until the portfolio is rebalanced.
Fama/French US Value Research Factor

Time-Series Construction
July 1926 – Present: Fama/French US HmL Research Factor minus Growth Companies

Composition of Fama/French US HmL (High minus Low) Research Factor: The Fama/French value factor, HmL, is constructed from four size/book-to-market research portfolios that do not include hold ranges and do not incur transaction costs. HmL for July of year t to June t+1 includes all NYSE, AMEX, and NASDAQ stocks for which we have market equity for December t-1 and June of t, and (positive) book-to-market equity data for fiscal year ending in t-1. HmL is the average return on two value research portfolios minus the average return on two growth research portfolios: 1/2 (Small High + Big High) - 1/2 (Small Low + Big Low).

Sources: Dimensional Returns Version 2.2. Fama/French and multifactor data provided by Fama/French.

Exclusions: ADRs, Investment Companies, Tracking Stocks, non-US incorporated companies, Closed-end funds, Certificates, Shares of Beneficial Interests, and negative book values.

Currency: USD

Fama/French US Small Research Factor

Time-Series Construction
July 1926 – Present: Fama/French US SmB Research Factor minus Large Companies

Composition of Fama/French US SmB (Small minus Big) Research Factor: The Fama/French small factor, SmB, is constructed from six size/book-to-market research portfolios that do not include hold ranges and do not incur transaction costs. SmB for July of year t to June t+1 includes all NYSE, AMEX, and NASDAQ stocks for which we have market equity for December t-1 and June of t, and (positive) book-to-market equity data for fiscal year ending in t-1. SmB is the average return on three small research portfolios minus the average return on three big research portfolios: 1/3 (Small High + Small Medium + Small Low) - 1/3 (Big High + Big Medium + Big Low).

Sources: Dimensional Returns Version 2.2. Fama/French and multifactor data provided by Fama/French.

Exclusions: ADRs, Investment Companies, Tracking Stocks, non-US incorporated companies, Closed-end funds, Certificates, Shares of Beneficial Interests, and negative book values.

Currency: USD

US Term Factor Premium

Time-Series Construction
Jan 1926 – Present: Fama/French Long Term Government Factor minus 30 Day T-Bill

Sources: Dimensional Returns Version 2.2. Fama/French multifactor data provided by Fama/French.

Currency: USD

US Default Factor Premium

Time-Series Construction
Jan 1926 – Present: Fama/French Long Term Corp Factor minus Fama/French Long Term Gov't

Sources: Dimensional Returns Version 2.2. Fama/French multifactor data provided by Fama/French.

Currency: USD
Disclosure for Backtested Performance Information, the IFA Indexes, and IFA Index Portfolios (updates can be found at www.ifabt.com):

1. Index Fund Advisors, Inc. (IFA) is an SEC registered Investment Adviser. Information pertaining to IFA’s advisory operations, services, and fees is set forth in IFAs’ current Form ADV Part 2 (Brochure), a copy of which is available upon request and at www.adviserinfo.sec.gov. The performance information presented in certain charts or tables represent backtested performance based on combined simulated index data and live (or actual) mutual fund results from January 1, 1928 to the period ending date shown, using the strategy of buy and hold and on the first of each year annually rebalancing the globally diversified portfolios of index funds. Backtested performance is hypothetical (it does not reflect trading in actual accounts) and is provided for informational purposes only to indicate historical performance had the index portfolios been available over the relevant time period. IFA refers to this hypothetical data as a Simulated Passive Investor Experience (SPIE). IFA did not offer the index portfolios until November 1999. Prior to 1999, IFA did not manage client assets. The IFA indexing investment strategy is based on principles generally known as Modern Portfolio Theory and the Fama and French Three Factor Model for Equities and Two Factor Model for Fixed Income. Index portfolios are designed to provide substantial global diversification in order to reduce investment concentration and the resulting potential increased risk caused by the volatility of individual companies, indexes, or asset classes.

2. A review of the IFA Index Data Sources (ifaindexes.com), IFA Indexes Time Series Construction (http://www.ifa.com/disclosures/charts/#timeseries) and several of the Dimensional Indexes (http://www.ifa.com/disclosures/charts/#dfafunds) is an integral part of this disclosure and should be read in conjunction with this explanation of backtested performance information presented. IFA defines index funds as mutual funds that follow a set of rules of ownership that are held constant regardless of market conditions. An important characteristic of an index fund is that its rules of ownership are not based on a forecast of short-term events. Therefore, an investment strategy that is limited to the buying and rebalancing of a portfolio of index funds is often referred to as passive investing, as opposed to active investing. Simulated index data is based on
the performance of indexes and live mutual funds as described in the IFA Indexes Data Sources page. The index mutual funds used in IFA’s Index Portfolios are IFA’s best estimate of a mutual fund that will come closest to the index data provided in the simulated indexes. Simulated index data is used for the period prior to the inception of the relevant live mutual fund data and an equivalent mutual fund expense ratio is deducted from simulated index data. Live (or actual) mutual fund performance is used after the inception date of each mutual fund. The IFA Indexes Times Series Construction goes back to January 1928 and consistently reflects a tilt towards small cap and value equities over time, with an increasing diversification to international markets, emerging markets and real estate investment trusts as data became available. As of January 1928, there are 4 equity indexes and 2 bond indexes; in January 1970 there are a total of 8 indexes, and there are 15 indexes in March 1998 to present. See (http://www.ifa.com/disclosures/charts/#IFA_evolution) to see the analysis of the evolution of these portfolios. This names the indexes used in the IFA Portfolios for each period, and shows the Time Series Construction of the IFA indexes. If the original 4 equity indexes from 1928 (IFA US Large Company Index; IFA US Large Cap Value Index; IFA US Small Cap Index; IFA US Small Cap Value Index) are held constant until December 2012, the annualized rate of return of this simplified version of IFA Index Portfolio 100 is 10.67%, after the deduction of a 0.9% IFA advisory fee and a standard deviation of 23.59%. The evolving IFA Indexes over the same period have a 10.99% annualized return for IFA Index Portfolio 100 after the same IFA advisory fees and a standard deviation of 22.66%. The stitching together of index and live fund data and adding international markets, emerging markets and REITs only had a slight impact on risk and return over this 85 year period. Instead, it demonstrates the value of a small cap and value tilt in global equity markets, since over the same period a Simulated S&P 500 Index only had a return of 9.53% (with no fees deducted), at a standard deviation of 19.19%. Backtested performance is calculated by using a computer program and monthly returns data set that start with the first day of the given time period and evaluates the returns of simulated indexes and DFA index mutual funds. In 1999, tax-managed funds became available for many different DFA index funds.

3. Backtested performance does not represent actual performance and should not be interpreted as an indication of such performance. Actual performance for client accounts may be materially lower than that of the index portfolios. Backtested performance results have certain inherent limitations. Such results
do not represent the impact that material economic and market factors might have on an investment adviser’s decision-making process if the adviser were actually managing client money. Backtested performance also differs from actual performance because it is achieved through the retroactive application of model portfolios (in this case, IFA’s Index Portfolios) designed with the benefit of hindsight. As a result, the models theoretically may be changed from time to time and the effect on performance results could be either favorable or unfavorable.

4. History of Changes to the IFA Indexes: 1991-2000: IFA Index Portfolios 10, 30, 50, 70 and 90 were originally suggested by Dimensional Fund Advisors (ifa.com/pdf/balancedstrategies.pdf), merely as an example of globally diversified investments using their custom index mutual funds, back in 1992 with moderate modifications in 1996 to reflect the availability of index funds that tracked the emerging markets asset class. Index Portfolios between each of the above listed portfolios were created by IFA in 2000 by interpolating between the above portfolios. Portfolios 5, 95 and 100 were created by Index Fund Advisors in 2000, as a lower and higher extension of the DFA 1991 risk and return line. As of March 1, 2010, 100 IFA Index Portfolios are available to IFA clients, with IFA Index Portfolios between the shown allocations being interpolations of the 20 allocations shown. In January 2008, IFA introduced three new indexes and eighteen socially responsible portfolios constructed from these three indexes and five pre-existing IFA indexes. The new indexes introduced were: IFA US Social Core 2 Equity, IFA Emerging Markets Social Core, and IFA International Real Estate. All three use live DFA fund data as long as it has been available. Prior to live fund data, they use index data supplied by DFA modified for fund management fees. In April 2008, IFA introduced two new indexes and eighteen sustainability portfolios constructed from these two indexes and five pre-existing indexes. The new indexes introduced were: IFA US Sustainability Core 1 Equity and IFA International Sustainability Core Equity. In November 2011, IFA made a change to the index data used in its large growth and small growth indexes. Fama/French data was replaced with data supplied by Dimensional Fund Advisors via its Returns 2.2 program. For large growth, the difference in annualized return was about 1% (a decrease). For small growth, the difference was about 0.2%. In November 2012, IFA changed the allocations and the historical returns for its socially responsible portfolios to reflect the introduction of the DFA International Social Core
Equity Portfolio (DSCLX). Prior to this, the international developed equity asset class was unavailable in a socially responsible implementation. Although clients who were invested in the old allocation from the time it became available (January 2008) likely did better than they would have done with the new allocation, the difference is not statistically significant, and it is IFA’s advice that going forward having an exposure to international developed equities will provide a substantial diversification benefit to socially responsible investors. As of September 2013, all new clients will be placed into the NEW IFA Index Portfolios, and all existing clients will be given the option to transition to the new portfolios. Index Portfolio 100 was held the same as it has been since 2000 and became the only 100 percent equity portfolio in the NEW Index Portfolios. The four fixed income indexes (25% each) remain the same as they have been since 2000 and will make up the fixed income allocation of all IFA index portfolios in the allocation equal to 100-New IP#. As of June 2015, IFA introduced Profitability into the historical back-tested returns of the equity funds. IFA wanted to incorporate the new research completed by Fama/French that introduced profitability as its fourth factor in their asset pricing model. Profitability was back-tested by DFA back to 1975. As of 2015, NEW IFA Index Portfolios are referred to as IFA Index Portfolios. The previous allocations are now referred to as Original IFA Index Portfolios. In April 2016, IFA changed the allocations and the historical returns for its socially responsible portfolios to reflect the introduction of the DFA Social Fixed Income Portfolio (DSFIX). Prior to this, the fixed income asset class was composed of four unscreened bond funds as a screened alternative did not exist. Although the duration of the unscreened bond fund mix was less than that of the socially screened bond fund, the increase in duration enhances the portfolio on a risk adjusted basis, and it enables IFA to provide a fully screened portfolio for socially responsible investors. As of July 2017, IFA changed its US Large Blend allocation from using DFA US Large Company (DFUSX) to Schwab S&P 500 Index (SWPPX). IFA has also amended its index backtest for US Large Blend to reflect the new allocation. US Large Blend will track SWPPX live fund data on a go forward basis. Go to www.ifa.com/btp/historyofchange.html to see a summary of changes made to the IFA Indexes and Index Portfolios.

5. Backtested performance results assume the reinvestment of dividends and capital gains and annual rebalancing at the beginning of each year. It is important to understand that the assumption of annual rebalancing has an
impact on the monthly returns reported for the IFA Index Portfolio in both the Risk and Reward Table (www.ifabigttable.com) and the Index Calculator (www.ifacalc.com). For monthly rebalancing, the monthly return is calculated with the assumption that the portfolio is perfectly in balance at the beginning of each month. For annual rebalancing, the year-to-date return is calculated with the assumption that the portfolio is perfectly in balance at the beginning of the year. The latter assumption underlies the returns shown for the IFA Index Portfolios. In actual portfolios, however, rebalancing occurs at no set time, and such actions are dependent on both market conditions and individual client liquidity inflows and outflows, along with the cost impact of such transactions on the overall portfolio. Therefore actual monthly and year-to-date returns will differ from the IFA Returns Calculator. The reason for this difference is that with annual rebalancing, the monthly returns are calculated from the ratio of the year-to-date growth of $1.00 at the end of the month to the year-to-date growth of $1.00 at the beginning of the month. For monthly rebalancing, the monthly return is calculated with the assumption that the portfolio is perfectly in balance at the beginning of the month. The performance of the IFA Index Portfolios reflects and is net of the effect of IFA’s annual investment management fee of 0.9%, billed monthly, unless stated otherwise. Monthly fee deduction is a requirement of our software used for backtesting. Actual IFA advisory fees are deducted quarterly, in advance. This fee is the highest fee IFA charges. Depending on the amount of your assets under management, your investment management fee may be less. Backtested risk and return data is a combination of live (or actual) mutual fund results and simulated index data, and mutual fund fees and expenses have been deducted from both the live (or actual) results and the simulated index data. When IFA Indexes are shown in IFA Index Portfolios, all returns data reflects a deduction of 0.9% annual investment advisory fee, which is the maximum IFA fee. Unless indicated otherwise, data shown for each individual IFA Index is shown without a deduction of the IFA advisory fee. We choose this method because the creation, choice, monitoring and rebalancing of diversified index portfolios are the services of the independent investment advisor and at that point the fees are appropriate to deduct from the whole portfolio returns. Since we accept no fees from investment product firms, IFA compares index funds based on net asset value returns, which are net of the mutual fund company expense ratios only. Although index mutual funds minimize tax liabilities from
short and long-term capital gains, any resulting tax liability is not deducted from performance results. Performance results also do not reflect transaction fees (as seen at www.ifafee.com) and other expenses, which reduce returns.

6. For all data periods, annualized standard deviation is presented as an approximation by multiplying the monthly standard deviation number by the square root of 12. Please note that the number computed from annual data may differ materially from this estimate. We have chosen this methodology because Morningstar uses the same method. Go to www.ifabt.com for details. In those charts and tables where the standard deviation of daily returns is shown, it is estimated as the standard deviation of monthly returns divided by the square root of 22.

7. The tax-managed index funds are not used in calculating the backtested performance of the index portfolios, unless specified in the table or chart.

8. Performance results for clients that invested in accordance with the IFA Index Portfolios will vary from the backtested performance due to market conditions and other factors, including investments cash flows, mutual fund allocations, frequency and precision of rebalancing, tax-management strategies, cash balances, lower than 0.9% advisory fees, varying custodian fees, and/or the timing of fee deductions. As the result of these and potentially other variances, actual performance for client accounts may differ materially from (and may be lower than) that of the index portfolios. Clients should consult their account statements for information about how their actual performance compares to that of the index portfolios.

9. As with any investment strategy, there is potential for profit as well as the possibility of loss. IFA does not guarantee any minimum level of investment performance or the success of any index portfolio or investment strategy. All investments involve risk and investment recommendations will not always be profitable.


11. IFA Index Portfolio Value Data is based on a starting value of one, as of January 1, 1928.
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Updated 5-1-2018. For additional updates see www.ifabt.com.
Other Information IFA Considers to be Helpful

It is IFA’s advice that the value of having a longer time series exceeds the concerns of index substitutions over the 1928 to present period. Due to the very high standard deviations of returns (21.99%) a 40 year or more sample size of data is recommended to obtain a T-statistic of 2, that allows for a conclusion at a 97.5% or higher level of certainty. In other words, in IFA’s opinion, smaller sample sizes introduce larger errors than the errors introduced by stitching together indexes and live data over time. This is the advice IFA provides to its clients.

Client portfolios are monitored and rebalanced, taking into consideration risk exposure consistency, transaction costs, and tax ramifications to maintain target asset allocations as shown in the Index Portfolios.

IFA uses tax-managed funds in taxable accounts. The tax-managed funds are consistent with the indexing strategy, however, they should not be expected to track the performance of corresponding non-tax-managed funds in the same or similar indexes. As such, the performance of portfolios using tax-managed funds will vary from portfolios that do not utilize these funds.

Clients’ accounts will be rebalanced depending on the fluctuation of the asset classes and the cash flow activity of the client. It is IFA’s opinion that the assumption of first of the year annual rebalancing is a reasonable approximation to reality.

IFA is not paid any brokerage commissions, sales loads, 12b1 fees, or any form of compensation from any mutual fund company or broker dealer. The only source of compensation from client investments is obtained from asset based advisory fees paid by the client. More information about advisory fees, expenses, no-load mutual fund fees, prospectuses for no-load index mutual funds, brokerage and custodian fees can be found at www.ifa.com/admin/fees.asp. Not all IFA clients follow our recommendations, and depending on unique and changing client and market situations, we may customize the construction and implementation of the index portfolios for particular clients, including the use of tax-managed mutual funds, tax-loss-harvesting techniques and rebalancing frequency and precision. In taxable accounts, IFA uses tax-managed index funds to manage client assets.
APPENDIX B

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**For book corrections and updates**, go to: www.ifapublishing.com/bookcorrections
REFERENCES


3. Ibid., pg. 3.


7. Reference for Figure 1-1
   i. Standard and Poor's Index Versus Active Scorecard as of 12/31/2016.
   ii. DALBAR 2017 Quantitative Analysis of Investor Behavior
   iii. Internal calculations performed by Index Fund Advisors per guidelines stated in www.ifabt.com
   v. Internal calculations performed by Index Fund Advisors using data from Morningstar Direct.


12. Dr. Ian Ayres, Dr. Peter Ayton, Dr. Greg B. Davies, Dr. Barbara Fasolo, Professor Thorsten Hens, Sheena Iyenger, Dr. Annie Koh, Dr. Neil Stewart, Rory Sutherland, and Dr. Chun Xia, “Risk and Rules: The Role of Control in Financial Decision Making,” Barclays Wealth Insights, vol. 13 (2011).


16. The 109% figure that was calculated in the Morningstar study occurred during a period when there was a high benefit to rebalancing. The 109% applied to individual mutual funds only and would not be applicable to the return shown for a portfolio of mutual funds across different asset classes.

17. Disclosures for Investor Success Chart


26. A Half Century of Returns on Stocks & Bonds


46. Ibid


59. Ibid


73. SPIVA (S&P Indices Versus Active) 2017 Year End Scorecard. (2018)


77. State Retirement Systems Data from public information, includes states that provided 11 and 24 yrs of returns for fiscal years ending 6/30, and are net of fees; Index Portfolios are net of fund fees and 0.05% Advisory Fee. See www.pension-gate.com/ states for additional disclosures.

78. Ibid.

79. State Retirement Systems Data from public information, includes states that provided 12 and 25 yrs. of returns for fiscal years ending 12/31, and are net of fees; Index Portfolios are net of fund fees and 0.05% Advisory Fee. See www.pension-gate.com/ for additional disclosures.

80. Ibid.


82. SPIVA (S&P Indices Versus Active) 2017 Year End Scorecard. (2018)


96. People and Portfolios: Glide Path for Retirement Success Table.
## People and Portfolios: Glide Path for Retirement Success

### A Hypothetical Illustration of a Financial Glide Path (90 Yrs, as of 12/31/2017)

<table>
<thead>
<tr>
<th>Age</th>
<th>Index Portfolio</th>
<th>90-Year Ann'ld Return</th>
<th>90-Year Ann'ld Std Dev.</th>
<th>Annual Contribution Amount$^{1,2}$</th>
<th>Annual Withdrawal Amount$^{1,3}$</th>
<th>Salary$^{1,4}$</th>
<th>Human Capital$^5$</th>
<th>Financial Capital</th>
<th>Total Capital$^5$</th>
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<tbody>
<tr>
<td>15</td>
<td>100</td>
<td>11.23%</td>
<td>22.14%</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$2,480,393</td>
<td>$-</td>
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<tr>
<td>20</td>
<td>95</td>
<td>10.99%</td>
<td>20.99%</td>
<td>$-</td>
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<td>$-</td>
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<tr>
<td>30</td>
<td>85</td>
<td>10.47%</td>
<td>18.73%</td>
<td>$3,990 $2</td>
<td>$57,005</td>
<td>$2,470,737</td>
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<tr>
<td>35</td>
<td>80</td>
<td>10.18%</td>
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<td>$4,626 $3</td>
<td>$66,084</td>
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<td>40</td>
<td>75</td>
<td>9.88%</td>
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<td>$5,363 $4</td>
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<td>$2,278,338</td>
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<td>45</td>
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<td>50</td>
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<td>9.22%</td>
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<tr>
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<td>12.22%</td>
<td>$9,686 $8</td>
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<td>45</td>
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<td>$-</td>
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<td>75</td>
<td>40</td>
<td>7.32%</td>
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<tr>
<td>80</td>
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<tr>
<td>85</td>
<td>30</td>
<td>6.45%</td>
<td>7.03%</td>
<td>$258,265 $13 $</td>
<td>$-</td>
<td>$-</td>
<td>$3,223,004</td>
<td>$3,223,004</td>
<td></td>
</tr>
</tbody>
</table>

$^1$ Annual amount is at the beginning of the 5-year period.

$^2$ Annual contributions equal to 7% of salary made at the beginning of the year.

$^3$ Annual withdrawals start at 5.75% of financial capital at retirement, adjusted annually for 3% inflation.

$^4$ Amount is stated at the beginning of period value.

$^5$ Human capital is the present value of future salary.

Data as of 12/31/17. Sources, Updates and Disclosures: ifabt.com, ifa.com/ra, Appx A
Index

A
active investing. See also costs; market timing; stock selection
   emotions-based, 24–25, 31–38, 43, 47
   overconfidence and, 84-85
   passive investing vs., xix–xxi, 28–30
   returns from, 44-46, 84-85, 154–55
advisors, xiv, 44–46, 259–61
alpha, 43, 87, 130-132
aggressive risk capacity, 234-235, 241-243, 248-249
Anginer, Deniz, 91
asset allocation, 36, 146-149, 226-227. See also risk exposure; style drift
asset location, 43, 263

B
Bachelier, Louis, 62
Barber, Brad, 84-85
Barclay, 32, 96
Barras, Laurent, 86
Benchmarks, 123, 137-38, 145, 146, 160
beta, 73-74
Blanco, Carlos, 31
blend indexes, 142, 160-61, 228, 245
Bogle, John C., xix, 70-71, 103, 122-23, 154-155
bond funds, 95, 145, 192
bond portfolios, 183
book-to-market (BtM) ratio, 181
Booth, David, 72-73, 238
Breiter, Hans, 32
Buffett, Warren, xi, xiii, 50-51, 93, 96
C
Capital Asset Pricing Model (CAPM), 73-74, 171
capital gains, 142, 161, 269
Center for Research in Security Prices (CRSP), 58-59, 123, 171, 174, 192, 238
Charles Schwab and Company, 50-51
Clarke, Truman, 228
Cogent Research, 238
collective wisdom/brain, 62, 64, 73, 97-98
commissions, xvi-xxi, 28, 154, 259-261
commodities investments, 228-29
company-specific risk, 171-174, 231
corporate finance theory, 73
costs
  commissions, xvi-xxi, 28, 154, 259-261
  fees, 28-29, 71, 97, 123, 126, 152-154, 160-161, 243
  of index funds, 154-155, 161, 260-261
  inflation, 159
  overview, 152-155, 161
  taxes, 155-58, 161
  turnover, 158-159
country index returns, 140
CXO Advisory Group, 101–2

D
Dalbar studies, 36–37, 238, 298
Default Factor Premium, 289
default risk, 185
Dimensional Fund Advisors (Dimensional), 45-46, 59, 68, 72, 161, 236-238, 278, 290, 292-293, 296
diversification, 231-232, 238-45
Dow Jones Industrial Average (DJIA), 258
E
Edesess, Michael, 101
Efficient Markets Hypothesis, 65-67, 81, 84, 111-13
efficient markets, 137, 198, 231, 263
emotions-based investing, 24-25, 31-38, 43, 47
Employee Retirement Income Security Act (ERISA), 261
equity funds, 36-38, 148
equity index funds, 29
equity index portfolios, 170-71, 198-99, 231-33
equity investment risks, 174-75, See also stock selection
exchange traded funds (ETFs), 45-46, 160, 236-237
expected returns, 72, 74, 93, 105, 111, 113, 159, 165-6, 171-175, 179,
185, 190, 219, 221, 226, 231, 236, 243, 263
expense ratios, 154

F
Fama, Eugene, 62, 65-67, 72-73, 75, 100, 110, 115, 174-175, 179, 181,
187, 231, 238
Fama/French Five-Factor Model
default risk, 185
market risk, 177, 186–87
overview, 175, 186–87
portfolio construction and, 234-38
size risk, 179, 186-87
term risk, 183, 186-87
value risk, 181, 186-87
Fama/French Three-Factor Model, 174-75, 181
fee-only fiduciaries, 260
fees. See costs
Fermat, Pierre de, 165
Fernholz, Robert, xiv
Fidelity Magellan Fund, 138, 142-43
fiduciaries, 260-261
Fisher, Lawrence, 110
Five-Factor Model. See Fama/French Five-Factor Model
fixed income investments, 93, 161, 171, 175, 183, 231, 233, 241, 245
forecasting, 32, 71, 101-2, 107
free-market model, 60, 70-71, 111-113, 272
Forward Income Builder Fund, 145

G
Galton, Francis, 62-64, 167, 169
glide path, 42, 46, 267, 271
Goddess Fortuna, 42, 107
Good, Paul, 31
Gosset, William Sealy, 86
Goyal, Amit, 123–24
Graham, Benjamin, 51, 259
Graham, John, 103
The Great Mirror of Folly, 38-39
Gross, Bill, 95-96
Growth Fund of America, 144
growth stocks, 92-93, 144-45, 187, 192, 199, 228

H
Harvey, Campbell, 103
Hayek, Friedrich von, 70-71
Hebner Model, 111-13
Higgins, Robert C., 107
historical returns. See also returns
capitalism resilience and, 195-96
by country, 138, 140
Dimensional funds, 45-46
index funds, 36–38, 45-46
of index portfolios, 36-38, 137-39, 191-94, 199, 238-45
mutual funds, 36-38
overview, 190, 201
rolling period analysis, 196-200
by sector, 138-39, 141
short-term data vs., 191
stock market, 81, 170-74, 229, 258
by style, 137-38
style drift and, 137-40
H. Nejat Seyhun, 105
Hulbert, Mark, 86
Human Capital, 267

I
Ibbotson, Roger, 68
income, 204, 213, 234, 263, 269
index funds
  as active investing alternative, 25, 42
  construction rules, 29, 45, 192-94, 233-34, 236-38
  definition, 29
  historical returns, 36-38, 42, 45-46
  history of, 67-68, 71-72
  legendary investors on, 50-51
Index Funds Advisors (IFA), xvi, xx, 126, 290
  Emerging Market Index (EM), 193-194, 240, 283
  Emerging Market Small Cap Index (ES), 193, 194, 240, 284
  Emerging Market Value Index (EV), 193, 194, 240, 283
  Five-Year Global Fixed Income Index (5F), 193, 194, 240, 286
  Index Portfolio 25 (ice blue), 223, 234, 254-55
  Index Portfolio 50 (sea green), 221, 252-53
  Index Portfolio 75 (dark blue), 219, 250-51
  Index Portfolio 100 (red), 217, 248-49
  International Small Cap Value Index (ISV), 193, 194, 240, 282
  International Small Company Index (IS), 193, 194, 240, 282
  International Value Index (IV), 193, 194, 240, 281
  NSDQ Index (N), 193, 240, 287
  One-Year Fixed Income Index (1F), 193, 194, 240, 284
  Real Estate Index (RE), 139, 193, 194, 240, 281
  Risk Capacity Survey, 215
  Short Term Government Index (3G), 194, 285
S&P 500 Index (SP), 194, 240, 288
Two-Year Global Fixed Income Index (2F), 193, 194, 240, 285
U.S. Large Cap Value Index (LV), 29, 193, 194, 199, 240, 279
U.S. Large Company Index (LC), 193, 194, 279
U.S. Large Growth Index (LG), 29, 193, 199, 240, 287
U.S. Micro Cap Index (MC), 194, 286
U.S. Small Cap Index (SC), 193, 194, 199, 240, 280
U.S. Small Cap Value Index (SV), 29, 193, 194, 199, 240, 280
U.S. Small Growth Index (SG), 29, 287
U.S. Total Market Index (TM), 288
index portfolios. See also Dimensional Fund Advisors (Dimensional); Index Funds Advisors (IFA)
    Fortune’s most admired companies vs., 91–95
growth of $1,000 in, 245-46
historical returns, 36-37, 192-93, 200, 236-37, 240-44
risk calibration of, 233-236, 240-44
S&P 500 compared with, 240-241, 243-44
state retirement systems vs., 126–29
inflation, xv, 159, 228-29, 270
institutional investors, see also manager performance
international securities, 231
investing. See active investing; passive investing
investment advisors, xiv-xv, 43-46, 259-61
investment knowledge, 43, 204, 215
investment newsletters, 103
investors
    behavior of, xiv, 28-29, 31-33, 36, 43, 46-47, 227, 272
    legendary, 50-51
IRAs, 158, 263
iShares ETFs, , 236-238

J
Jensen, Michael, 110
K
Krantz, Matt, 229

L
large cap stocks, xii, 137-38, 142, 144, 187, 192, 240-41
liquidity needs, 43, 183, 204-05, 234
Lorie, James, 58-59
luck reliance, 58, 80-81, 85-87, 89-90, 107, 120
Lynch, Peter, 91, 96, 138

M
Malkiel, Burton, , xvi, xviii, 68, 70, 81, 115
manager performance
  hiring and firing effects, 123-25
  market-timing skills, xiii, 99-105
  pension plan returns, 123-27
  stock-picking skills, xvii, 84-87, 89, 97, 258
  track records, 117-22, 130, 189
market efficiency, 65, 75, 81, 84, 99
market risk, 68, 74, 177, 223
market timing
  best and worst trading days, 103-5
  definition, 100
  ETFs and, 236, 238
  free market roles, 111-13
  fund manager accuracy, xiii, 100-2, 107, 115-16
  luck and, 107
  market unpredictability, xiii-xiv, 110-11
  news and information effects, 107-9
  newsletters on, 103
Markowitz, Harry, xi–xv, 55, 67, 73-74, 225-27
micro cap stocks, 137
mid cap stocks, 137
Miller, Merton, 55, 72-74, 77, 225
Mises, Ludwig von, 70
Modigliani-Miller theorems, 74
moderately aggressive risk capacity, 219, 241-43, 250–51
Modern Portfolio Theory, xv, 67, 73-74, 215, 226, 290
Modigliani, Franco, 74
Monte Carlo simulations, 270-71
Montier, James, 31
Morgan, J.P., xi, xiii
Morningstar, 45-46, 95-96, 117, 120, 123, 130, 145, 149, 157-58, 160
most aggressive risk capacity, 217, 241-43, 248-49
mutual funds. See also manager performance; style drift
  Fidelity Funds, 138, 142
  historical returns, 37, 138-41
  return discrepancies, 120-22
  style drift of, 138, 142-45
  tactical allocation, 146-47
  Vanguard Funds, 70-71, 142-43, 154, 157-58, 161, 234, 236, 287-88

N
net worth, 32, 181, 211
news and information effects, 25, 107-10, 190, 195-96, 258
newsletters, 103
Nobel Prize in Economics, 56, 59, 64-65, 67, 73, 75, 187, 226-27, 238

O
Odean, Terrance, 84-85

P
Pascal, Blaise, 165
passive investing. See also index funds; registered investment advisor roles
active investing vs., xix–xx, 28–30
advisors, xiv-xv, 43-46, 260-61
definition, 29-30
effects-based investing vs., xiv-xv, 24-25, 31-38
overview, 24-25, 258-59
Pension-gate, 125–29
Phillips, Don, 45
PIMCO, 95, 96
Pope, Alexander, 56
prices, 58, 60, 64-65, 67, 71, 74, 78, 80-81, 84, 101, 110-13, 159, 192, 229, 259
prospectuses, 137
public pension plans, 123, 125-127

R
Random Walk Theory, 62, 68-70, 110, 215
rebalancing, xiv, 35-36, 43, 217, 265, 269
registered investment advisor roles
  asset location, 43, 263
  glide path transitions, 267, 309
  overview, 260-61
  rebalancing, xiv, 35, 43, 46, 265, 269
  retirement analyzer, 270-71
  tax loss harvesting, 46, 269
research milestones
  capitalism model, 60-64, 70-71, 195-196
  Center for Research in Security Prices (CRSP) and, 58-59, 123, 171, 174, 238
  collective wisdom, 62, 64
  Efficient Markets Hypothesis, 60, 65, 67-68, 70-71, 75, 111, 215
  index funds, 67-68, 71-73
  Modern Portfolio Theory, 67, 73-75, 215, 226
  overview, 56, 75
retirement analysis, 126, 261, 270-71
returns. See also costs; historical returns; risk
  active investing, 37, 38, 85, 154-55
  of admired vs. spurned companies, 91–95
  discrepancies in, 123
expected, 111–13
passive investing, 43-46, 154-157
stock market, 43, 68, 81, 100-02, 103-05, 171, 177, 258
risk. See also Fama/French Five-Factor Model; risk capacity; risk exposure
   CAPM and, 171-175, 187
   overview, 164, 187
   return relationship to, 164-67, 171-74, 238-41
   standard deviation and, 166-171, 241
   stock market, 170-71, 176, 186-87, 231, 234-35
   style drift effect on, 136
   systematic/unsystematic, 171,-174, 231
   Three-Factor Model, 174-75, 187
risk capacity
   assessment of, 204-05
   attitudes about risk, 43, 209
   conservative (ice blue), 223, 240-44, 254-55
   income/savings rate and, 43, 204, 213
   investment knowledge and, 43, 204, 215
   liquidity needs and, 43, 204, 234
   moderate (sea green), 221, 240-44, 252-53
   moderately aggressive (dark blue), 219, 240-43, 250-51
   most aggressive (red), 217, 240-44, 248-49
   net worth and, 32, 43, 181, 211, 234
   overview, 43, 202
   risk exposure matching to, 205, 245-46
   time horizon and, 43, 205, 207, 234
risk exposure
   commodities and, 228-29
   diversification and, 73-74, 173, 179, 183, 226, 231-34, 243
   index portfolio mix, 238-47
   overview, 226-27
   portfolio construction, 234-38
   risk-calibrated portfolios, 233-38
risk capacity matching to, 245-46
“wrong risk” behaviors, 227-28
Roll, Richard, 110
rolling period analysis, 196-200
Roth IRAs, 263
rules-based investing, 25, 29, 33, 258

S
Samuelson, Paul, 62, 64-65
savings rate, 204, 213
Scaillet, Olivier, 86
Schwab, Charles, 50, 68
sector index returns, 141
Securities and Exchange Commission (SEC), 259, 260, 290
Sharpe, William, 67, 73-74, 100-01, 171, 174-75, 227
Shay, Brian, xiv
Simulated Passive Investor Experiences (SPIEs), 197-98, 290
Sinquefield, Rex, 59, 67-68, 72, 78, 97
size risk, 72, 179, 186
small cap stocks, xii, 67, 137-38, 142, 187, 192-94, 237
Smith, Adam, 60, 70
South Sea Company, 39
S&P 500 Index
  best and worst trading days of, 103-5
  Fidelity Magellan Fund returns vs., 138, 142
  fund costs and tax implications, 155-57
  historical returns, 191-92
  index portfolio returns vs., 238-44
The Speculation Blues (Hebner), 275-76
standard deviation, 166-69, 215, 241, 291
Statman, Meir, 91
stock market. See also market risk; market timing
  2008-2009 downturn, xiv, 43, 120, 196, 258
  best and worst trading days, 103-5
  Crash, 38-39
efficiency of, 64-65, 68-70, 81, 84, 111-13
historical returns, 42, 81, 171, 229, 258-59
randomness of, 110-11

stock selection
admired vs. spurned companies, 91–95
individual stocks, 89–90
market efficiency and, 81, 84
Markowitz on, xi-xv
by mutual fund managers, xi-xv, 85-87
overconfidence and, 84-85
overview, 80, 97
price randomness and, 80-84
risk, 171-74
Stossel, John, 81
Student’s t-test, 86-87, 130

style drift
definition, 136
fund objectives and, 137-38
historical returns, 138-41
risk exposure and, 137
style purity vs., 136, 144-145
tactical asset allocation, 146-47
of top mutual funds, 138, 142-45
Surowiecki, James, 64
surveys for risk capacity, 205, 207-15
Survivorship Bias, 122, 157
Swensen, David, xi-xiii, 51-52, 117, 125
systematic risk, 171-74, 231

T
tactical asset allocation, 146, 238
Tafereel, 38-42
taxes, 154-55, 157, 161, 269
tax loss harvesting, 46, 269
technology indexes, 228
Term Factor Premium, 289
term risk, 183, 190, 243
Three-Factor Model, 174, 187
time horizon, 43, 136, 174, 187, 204, 205, 207, 234
time picking. See market timing
transaction costs, 84, 101, 124, 154, 161, 263
t-statistic or t-test, 86-87, 130-32
turnover ratio, 158

U
Ulysses Pact, 47
uncertainty, 111, 113, 207, 209, 211
unsystematic risk, 171-174, 231
U.S. dollar growth, 195

V
value index funds, 51
value portfolios, 234-236
value risk, 67, 181, 186-87
value stocks, 67, 92, 93, 187, 191-192, 228
Vanguard 500 Index Fund, 71, 157
Vanguard Explorer Fund, 142
Vanguard Funds, 158, 236
Vanguard Group, 70, 89
Vinik, Jeffrey, 142
volatility, xiv, 35, 51, 110, 138, 166, 174, 183, 198, 201, 205, 209, 211,
217-221, 223, 229, 234, 243, 245, 247, 261, 273, 290

W
Wahal, Sunil, 123–24
Wall Street Journal, xviii, 80, 144
Wermers, Russell, 86, 145

Z
Zweig, Jason, 31-32