The Search for the Holy Grail of Investing
Future Alpha Generators

Larry Swedroe


July 22, 2009
Important Disclosures Regarding Simulated Strategies

The following pages include illustrations of returns for the types of portfolios we design for clients.

The Simulated Strategies may or may not be the actual allocation determined to be appropriate for any individual clients, and a client may or may not follow the Simulated Strategies. Clients with the allocations shown may have different results based on capital flows, timing of rebalancing decisions, fees charged or other factors.

Our investment strategy is based on the principles of Modern Portfolio Theory (MPT). The tenets of MPT provide for a passive, long-term, buy-and-hold strategy implemented through globally diversified portfolios. Mutual funds representing asset classes where academic research has demonstrated higher expected returns for the level of risk taken are combined into a single portfolio. Portfolios are constructed with low-correlating components to provide diversification for the purpose of reducing the risk caused by volatility. Commodities may be added to some client portfolios for the purpose of additional risk reduction and not necessarily to provide higher expected returns in such portfolios. Portfolios are rebalanced to maintain agreed-upon asset allocations.

The historical performance information that follows is provided to demonstrate the methodology used in building portfolios using the aforementioned investment strategy. This information should not be considered as a demonstration of actual performance results or actual trading using client assets and should not be interpreted as such. The results are based on the retroactive application of a back-tested model that was designed with the benefit of hindsight and should not be interpreted as the performance of actual accounts. Past performance is not a guarantee of future results. The Simulated Strategies started in 1996 and have evolved over the years. Commodities, when shown in a portfolio, were added in 2004. Core funds, when shown in a portfolio, were added in 2007. International real estate, when shown in a portfolio, was added in 2008. All should be considered material changes to the Simulated Strategies. The differences in demonstrated returns can be seen by comparing Simulated Strategies with and without each of these. The investment returns and principal value of mutual funds recommended by our firm will fluctuate and may be worth more or less than their original cost when sold. A client may experience a loss when implementing an investment strategy.

In 1999, tax-managed funds became available for several different asset classes. We now use tax-managed funds extensively for taxable entities. While the tax-managed funds are consistent with the passive approach we follow, they should not be expected to regularly track the performance of corresponding taxable funds in the same or similar asset classes. As such, the performance of portfolios using tax-managed funds will vary from portfolios that do not use these funds.

Back-tested data does not represent the impact that material economic and market factors might have on an investment advisor’s decision-making process if the advisor were actually advising an investor and should not be considered indicative of the skill of the advisor. The back-testing of performance differs from actual account performance because an investment strategy may be adjusted at any time and for any reason, and can continue to be changed until desired or better performance results are achieved. The back-tested results assume ordinary income and capital gains distributions are reinvested, annual rebalancing and no income taxes. If performance reflects the deduction of an advisory fee (1.85 percent or less) billed quarterly in advance, it is indicated on the page. More information about mutual fund fees and expenses is available in the prospectus for each mutual fund.

Any back-tested data used in creating the Simulated Strategies includes only live funds. All funds are live for 10 years or more except the commodities fund, core funds and the international real estate fund.
Two Theories

Conventional wisdom: Markets are inefficient
• Add value by stock selection and market timing
• Winning strategy: identify past persistent alpha

Modern Portfolio Theory: Markets are efficient
• Market price of security is the best estimate of the correct price
• Efforts to outperform are unlikely to be productive after expenses
• Winning strategy: focus on fund construction, costs and tax efficiency
Are Markets Inefficient?

- If markets are inefficient, we should see evidence of *persistent* ability to outperform *risk-adjusted* benchmarks.
- Persistence should be *greater than randomly expected*.
- It is easy to identify past outperformance.
- But is the past prologue?
The Evidence

- Mutual funds
- Pension plans
- Hedge funds
- Venture capital
- Individual investors
- Behavioral finance


Mutual Funds

“On Persistence in Mutual-Fund Performance”

• Analyzed 1,892 funds for the period of 1961–93
  – Average actively managed fund underperformed appropriate passive benchmark by 1.8 percent p.a.\(^1\)

“Mutual-Fund Performance: An Empirical Decomposition Into Stock-Picking Talent, Style, Transaction Costs, and Expenses”

• Analyzed 1,788 funds for the period of 1975–94
  – Average risk-adjusted underperformance was 2.2 percent p.a.\(^2\)

• Both found no outperformance beyond the randomly expected.

Mutual Funds

On Mutual Fund Managers
“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.”¹

— Burton G. Malkiel
Author of A Random Walk Down Wall Street, professor of economics at Princeton

On Mutual Fund Fees
“Overwhelmingly, mutual funds extract enormous sums from investors in exchange for providing a shocking disservice.”²

— David Swensen
CIO of the Yale Endowment Fund

¹Burton G. Malkiel, A Random Walk Down Wall Street. 1996.
“For professional investors like myself, a sense of humor is essential. We are very aware that we are competing not only against the market averages but also against one another. It's an intense rivalry. We are each claiming that, ‘The stocks in my fund today will perform better than what you own in your fund.’ That implies we think we can predict the future, which is the occupation of charlatans. If you believe you or anyone else has a system that can predict the future of the stock market, the joke is on you.”

— Ralph Wanger
Pension Plans

• Logically, if anyone could beat the market, it should be large pension plans.
  – Control large sums and pay lower fees than retail investors
  – Have access to the best performing portfolio managers
  – Only hire managers with records of outperformance
  – Most hire gatekeepers (SEI, Russell, Goldman) to perform extensive due diligence
Using Past Performance of Active Managers as a Predictor of Future Performance

U.S. Pension Plans

“Performance of U.S. Pension Plans”

- 716 defined benefit plans (1992–2004) and 238 defined contribution plans (1997–2004)\(^1\)

“Selection and Termination of Investment Management Firms by Plan Sponsors”

- 1994–2003: About 3,600 plans and more than 9,000 hiring and firing decisions\(^2\)

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Using Past Performance of Active Managers as a Predictor of Future Performance

U.S. Pension Plans

Findings:

• Prior to hiring, managers produced large excess returns\(^1\)

• Post-hiring returns relative to benchmarks were about zero (before transition costs)\(^1\)

• No persistence in performance beyond randomly expected\(^2\)

• Neither fund size, degree of outsourcing, nor company stock holdings were factors driving performance\(^2\)
  
  – Refutes claim that large pension plans are handicapped by size

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\(^1\) Amit Goyal and Sunil Wahal, The Selection and Termination of Investment Management Firms by Plan Sponsors. May 2005.

Using Past Performance of Active Managers as a Predictor of Future Performance

U.S. Pension Plans

Conclusion:

• “The striking similarities in net performance patterns over time makes skill differences highly unlikely.”
When Even the “Best” Aren’t Likely To Win

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<tr>
<td>SEI Instl Lrg Cap Grth A</td>
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<td>DFA US Small Cap Value Portfolio Class I</td>
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Sources: Morningstar, Dimensional Fund Advisors.
Information from sources deemed reliable, but its accuracy cannot be guaranteed. Performance is historical and does not guarantee future results.
Data as of December 31, 2008.
All fund information is live data. Returns for greater than one year are annualized. The return data is for the performance of certain funds and does not include the deduction of advisory fees. This is not actual or model performance of any advisor’s portfolios. Please refer to the simulated strategy slides for information on model portfolio performance and the effect of advisory fees on performance. Total return includes reinvestment of dividends and capital gains. The investment return and principal value will fluctuate so that an investor’s shares, when redeemed, may be worth more or less than their original cost. This is not a prospectus. There will be a management fee associated with any managed account that will be charged, which will reduce returns accordingly.
Hedge Funds

- No persistent outperformance beyond randomly expected
- Risk-adjusted returns similar to Treasury bills
- Exhibit negative skewness and excess kurtosis — traits investors prefer to avoid
- Highly illiquid
- Tax inefficient
- Lack transparency so investors lose control of risk
- Incentive structure creates agency risk
## Hedge Funds

**2003–08 Annualized Return (%)**

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<th>Index</th>
<th>Return (%)</th>
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<td>HFRX Index</td>
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<td>MSCI US Small Cap 1750 Index</td>
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<td>Dow Jones Select REIT Index</td>
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<td>MSCI EAFE Value Index</td>
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<td>MSCI Emerging Markets Index</td>
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<td><strong>Fixed Income</strong></td>
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<td>Merrill Lynch One-Year US Treasury Note Index</td>
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<td>Five-Year US Treasury Notes</td>
<td>5.3</td>
</tr>
<tr>
<td>Long-Term Government Bonds</td>
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Source: Dimensional Fund Advisors.
Information from sources deemed reliable, but its accuracy cannot be guaranteed. Performance is historical and does not guarantee future results.
# Private Equity

**July 1986–June 2005**

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<th>Asset Class</th>
<th>Annualized Return (%)</th>
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<tr>
<td>Mezzanine Financing</td>
<td>9.1&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>S&amp;P 500 Index</td>
<td>11.2&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>CRSP Deciles 9-10 Index</td>
<td>11.2&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Fama-French US Large Value Research Index</td>
<td>12.4&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Later Stage Venture Capital</td>
<td>13.8&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Leveraged Buyouts (LBOs)</td>
<td>13.8&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td><strong>Private Equity (Average)</strong></td>
<td><strong>13.8&lt;sup&gt;1&lt;/sup&gt;</strong></td>
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<tr>
<td>Fama-French US Small Value Research Index</td>
<td>16.2&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>Venture Capital</td>
<td>16.0&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Seed Stage Venture Capital</td>
<td>20.2&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

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<sup>2</sup> *Dimensional Fund Advisors.* Information from sources deemed reliable, but its accuracy cannot be guaranteed. Performance is historical and does not guarantee future results.
Private Equity

- Investors forgo benefits of liquidity, transparency, broad diversification and daily pricing

- Distributions of returns looks like a lottery ticket — small likelihood of extreme outperformance and large likelihood of underperformance
Individual Investors

• Series of studies by Brad Barber and Terrance Odean
  
  – *Even before costs*, stocks bought underperform and stocks sold go on to outperform.¹
  
  – The more investors traded, the worse the results. Those that trade the most underperform on a risk-adjusted basis by 10 percent p.a.²
  
  – Investment clubs underperformed by over 4 percent p.a. on a risk-adjusted basis.³
  
• Mensa club underperformed market by almost 13 percent p.a. for 15 years⁴

⁴Eleanor Laise, ‘*If We’re So Smart, Why Aren’t We Rich?’* Smart Money, June 2001.
Behavioral Finance

• Behavioral finance is the study of human behavior and how it leads to investment errors.
  – Overconfidence
  – Confuse familiarity with safety
  – Subject to herding
  – Loss aversion

• Behavioral errors can lead to the mispricing of assets.
  – Pricing anomalies are inconsistent with the Efficient Market Hypothesis (EMH).

• However, the question for investors is not whether the market persistently makes pricing errors.

• The real question is: Are the anomalies exploitable?
“Behavioral Finance: Are the Disciples Profiting From the Doctrine?”

• Behavioral funds are successfully attracting investment dollars at a significantly greater rate than index and matched actively managed nonbehavioral funds.

• Investors believe that the pricing errors are exploitable.

• While the behavioral funds do outperform S&P 500 Index funds, they do so because they have significant exposure to value stocks.
  – After adjusting for risk, they do not earn abnormal returns.

• Conclusion: “Behavioral mutual funds are tantamount to value investing.”

“Behavioral Finance: Are the Disciples Profiting From the Doctrine?”

“He [Richard Thaler] concedes that most of his retirement assets are held in index funds. ... He also concedes that ‘it is not easy to beat the market, and most people don't.'"

— Jon E. Hilsenrath

“Behavioral Finance: Are the Disciples Profiting From the Doctrine?”

“I have personally tried to invest money, my client’s and my own, in every single anomaly and predictive result that academics have dreamed up. And I have yet to make a nickel on any of these supposed market inefficiencies. An inefficiency ought to be an exploitable opportunity. If there’s nothing investors can exploit in a systematic way, time in and time out, then it’s very hard to say that information is not being properly incorporated into stock prices. Real money investment strategies don’t produce the results that academic papers say they should.”

— Richard Roll, financial economist
Why Is Persistent Outperformance So Hard to Find?

- It is easy to identify the managers with great *track records*. However, there is no evidence of the ability to do this *ex-ante*.

- The EMH explains why this outcome is expected — only by random luck should a fund persistently outperform.

AND

- Even if markets are inefficient, successful active management sows the seeds of its own destruction.
Who Gets the Money to Manage?

• Money flows to the top-performing manager.¹

• Eventually, the manager receives so much money it impacts the ability to generate alpha and returns will be driven down to the second best manager’s expected return.²

• The process continues until the expected return of investing with any manager is the benchmark expected return.³

• Inflows eliminate return persistence because fund managers face diminishing returns to scale.

²Ibid.
³Ibid.
“Scale Effects in Mutual Fund Performance: The Role of Trading Costs”

- Covered 1,706 U.S. equity funds for the period of 1995–2005
- Trading costs, on average, are greater than the expense ratio
  - Variation in returns is related to fund trade size
  - Trading costs are negatively related to performance
    - Negative impact increases as a fund’s relative trade size increases
  - $1 in trading costs decreases assets by $0.80 for large relative trade size funds

“Scale Effects in Mutual Fund Performance: The Role of Trading Costs”

“Our evidence directly establishes scale effects in trading as a source of diminishing returns to scale from active management.”
Successful Active Management Sows the Seeds of Its Own Destruction

• As fund assets increase, either trading costs will rise or the fund will have to diversify across more securities to limit trading costs.

• The more a fund diversifies, the more it looks like its benchmark — becoming a closet index fund with higher costs.

• The higher costs are spread across a smaller amount of differentiated holdings, increasing the hurdle of outperformance.
How Markets Really Work

• The EMH explains why investors cannot use publicly available information to beat the market.
  – All investors have access to that information. Therefore, it is already embedded in security prices.
  – The same is true when it comes to selecting active managers.
  – Investors should not expect to outperform the market by using publicly available information to select active managers.
  – Excess returns should go to the manager — in the form of higher fees.
Which Is the Scarce Resource?

The Ability to Generate Alpha

OR

Investor Capital
How Markets Really Work

• “When capital is supplied competitively by investors but ability is scarce only participants with the skill in short supply can earn economic rents.”

• “Investors who choose to invest with active managers cannot expect to receive positive excess returns on a risk-adjusted basis.”

• “If they did, there would be an excess supply of capital to those managers.”

— Jonathan Berk
The underlying basis for equity forecasts is economic forecasts. Do they have value?

- William Sherden, author of *The Fortune Sellers*, reviewed the leading research on forecasting accuracy from 1979 to 1995 and covering forecasts made from 1970 to 1995.¹
William Sherden:  
The Value of Economic Forecasts

• “Economists cannot predict the turning points in the economy.”

• “There are no economic forecasters who consistently lead the pack in forecasting accuracy.”

• “There are no economic ideologies that produce consistently superior economic forecasts.”

• “Increased sophistication provides no improvement in economic forecast accuracy.”

• “Consensus forecasts offer little improvement.”
William Sherden Concluded

• “Despite recent innovations in information technology and decades of academic research, successful stock market prediction has remained an elusive goal.”

• “Overall, we have not made progress in predicting the stock market, but this has not stopped the investment business from continuing the quest, and making $100 billion annually doing so.”
“We have two classes of forecasters: those who don’t know — and those who don’t know they don’t know.”
“The problem with macro [economic] forecasting is that no one can do it.”
“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.”
Why Is Persistent Outperformance So Hard to Find?
The Value of Security Analysis

- In May 1999, Intel had accumulated over $10 billion of cash.
- The board was trying to determine if it should repurchase stock.
- The stock was trading at about $120 per share.
- Based on publicly available forecasts of future cash flows:
  - If the ERP were 3 percent, Intel’s stock would be worth $204;
  - If the ERP were 5 percent it would be worth $130;
  - If the ERP were 7.2 percent, the stock would be worth just $82.
What Should Intel’s Board Do?

- If the stock was worth $204, they should repurchase shares.
- If it was worth $82, they should issue more shares.
- Valuations assumed that the cash flow projections were known.
- Not even the board (let alone a security analyst) has such clarity.
- Can the board predict the ERP better than the market?
What Should Intel’s Board Do?

If corporate insiders have such difficulty in determining a correct valuation, it is easy to understand why the results of active management are so poor and inconsistent.
“The Efficient Market Theory Thrives on Criticism”
Dwight Lee and James Verbrugge
The Tyrannical Nature of an Efficient Market

• “The efficient market theory is practically alone among theories in that it becomes more powerful when people discover inconsistencies between it and the real world.”

• “If a clear efficient market anomaly is discovered, the behavior (or lack of behavior) that gives rise to it will tend to be eliminated by competition for higher returns.”

• “The more empirical flaws that are discovered in the efficient market theory, the more robust the theory becomes.”
“The Efficient Market Theory Thrives on Criticism”
Dwight Lee and James Verbrugge
The Tyrannical Nature of an Efficient Market

“Those who do the most to ensure that the efficient market theory remains fundamental to our understanding of financial economics are not its intellectual defenders, but those mounting the most serious empirical assault against it.”
Prudent Investor Rule Restatement

• Modern Portfolio Theory is adopted as the standard by which fiduciaries invest.

• May of 1992 American Law Institute Third Restatement of the Prudent Investor Rule recognizes:
  
  – Little or negative payoff when fiduciaries and other investors try to apply expertise, investigation and diligence in efforts to “beat the market.”
  
  – Little correlation between fund managers’ earlier successes and their ability to produce above-market returns in subsequent periods.
Whose Interests Do They Have at Heart?

• Wall Street knows that the odds of outperforming appropriate benchmarks are so low that it is not in your interest to play.

• They need you to play so that they make the most money.

• They charge high fees, but deliver persistently poor performance.

• The financial media also want and need you to play so that you tune in. That is how they make money.
“You make more money selling the advice than following it.”

—Steve Forbes, quoting his grandfather who founded *Forbes* magazine

Whose Interests Do They Have at Heart?

Only sure way to win the active management game is not to play
Steve Galbraith Versus John Bogle

• Galbraith teaches security analysis at Columbia University.

• Galbraith is the former chief U.S. investment strategist at Morgan Stanley and the co-author of Morgan Stanley’s *U.S. Investment Perspectives*.

• In March 2002, Galbraith invited John Bogle to speak to his class.

• Bogle laid out a powerful case against active management.

• In the April issue of *U.S. Investment Perspectives*, Galbraith related the following:

Steve Galbraith Versus John Bogle

• “My guess is that more than a few students left wondering what the heck their hard-earned tuition dollars were doing going to a class devoted to the seemingly impossible — analyzing securities to achieve better-than-market returns.”

• “At least the students have the excuse of being early in their careers; what’s mine for staying the course in my current role?”

• “We recognize that the odds are against active managers.”

• “From our perspective, perhaps in a triumph of hope over experience, we continue to believe active managers can add value.”

• Stating otherwise would be committing economic suicide.

Summary

• You don’t have to play the game of active management.

• Instead, you can earn market (above average) rates of return with high tax efficiency by investing in passively managed funds.

• By doing so, you are virtually guaranteed to outperform the majority of both professional and individual investors.
The Arithmetic of Active Management

Total Market = Active Investors + Passive Investors

(10%) = (70% x ?) + (30% x 10%)

Subtract expenses (higher for active management)

- Operating expenses
- Cost of cash
- Commissions
- Bid/offer spreads
- Market impact
- Taxes
Summary

• If you invest in actively managed funds, you have the hope of outperformance.

• However, the evidence demonstrates that it is the triumph of hope over wisdom and experience.
“[Investors] think of the so-called professionals … as having all the advantages. That is total crap. … They'd be better off in an index fund.”
“Most investors, both institutional and individual, will find that the best way to own common stocks is through an index fund that charges minimal fees. Those following this path are sure to beat the net results (after fees and expenses) delivered by the great majority of investment professionals.”
How Many Corporate Pension Plans Outperformed a Passive Benchmark?

Consulting firm Futuremetrics’ most recent analysis of U.S. corporate pension plans covered the period 1988–2005. Of the 192 firms in the analysis, 137 plans (71 percent) failed to outperform a simple benchmark.
The Power of Diversification
Including Commodities

Portfolios Rebalanced Quarterly:
January 1973–December 2008

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<th>Portfolio</th>
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Performance

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<td>8.67%</td>
<td>9.60%</td>
<td>10.08%</td>
<td>10.61%</td>
<td>10.59%</td>
</tr>
<tr>
<td>Annualized Standard Deviation</td>
<td>12.72%</td>
<td>11.70%</td>
<td>13.35%</td>
<td>13.69%</td>
<td>12.93%</td>
<td>12.05%</td>
</tr>
<tr>
<td>Growth of $1</td>
<td>$23.52</td>
<td>$19.94</td>
<td>$27.10</td>
<td>$31.75</td>
<td>$37.75</td>
<td>$37.54</td>
</tr>
<tr>
<td>Sharpe Ratio*</td>
<td>0.311</td>
<td>0.286</td>
<td>0.334</td>
<td>0.365</td>
<td>0.421</td>
<td>0.442</td>
</tr>
</tbody>
</table>

A diversified portfolio can provide higher expected returns with reduced risk.

Source: Dimensional Fund Advisors.
Indices are not available for direct investment. Their performance does not reflect the expenses associated with the management of an actual portfolio nor do indices represent results of actual trading. Information from sources deemed reliable, but its accuracy cannot be guaranteed. Performance is historical and does not guarantee future results. Total return includes reinvestment of dividends. Annualized from quarterly data. All portfolios rebalanced quarterly.
See Sources and Descriptions of Data at the end of this booklet.

*The Sharpe Ratio is a measure of the risk-adjusted return of an investment. A higher ratio indicates a greater return for a unit of risk. The Sharpe Ratio is calculated as the average annual portfolio return less the average annual risk-free rate (one-month T-bills) divided by the portfolio’s annualized standard deviation.
## Simulated Portfolio Construction

### Simulated Strategy* — Value-3 2008

<table>
<thead>
<tr>
<th>Portfolio (%)</th>
<th>Conservative</th>
<th>Moderate</th>
<th>Aggressive</th>
<th>All-Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equity</strong></td>
<td>40.0</td>
<td>60.0</td>
<td>80.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Domestic</td>
<td>24.0</td>
<td>36.0</td>
<td>48.0</td>
<td>60.0</td>
</tr>
<tr>
<td>Large-Cap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFA US Large Company Institutional Index Portfolio</td>
<td>5.0</td>
<td>7.7</td>
<td>10.3</td>
<td>13.0</td>
</tr>
<tr>
<td>Large-Cap Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFA US Large Cap Value Portfolio III</td>
<td>7.0</td>
<td>10.3</td>
<td>13.7</td>
<td>17.0</td>
</tr>
<tr>
<td>Small-Cap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFA US Small Cap Portfolio</td>
<td>3.5</td>
<td>5.0</td>
<td>7.0</td>
<td>8.5</td>
</tr>
<tr>
<td>Small-Cap Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFA US Targeted Value Portfolio</td>
<td>8.5</td>
<td>13.0</td>
<td>17.0</td>
<td>21.5</td>
</tr>
<tr>
<td><strong>International</strong></td>
<td>16.0</td>
<td>24.0</td>
<td>32.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Large-Cap Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFA International Value Portfolio III</td>
<td>7.5</td>
<td>11.3</td>
<td>15.0</td>
<td>18.7</td>
</tr>
<tr>
<td>Small-Cap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFA International Small Company Portfolio</td>
<td>2.0</td>
<td>3.2</td>
<td>4.5</td>
<td>5.3</td>
</tr>
<tr>
<td>Small-Cap Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFA International Small Cap Value Portfolio</td>
<td>4.5</td>
<td>6.5</td>
<td>8.5</td>
<td>11.0</td>
</tr>
<tr>
<td>Emerging Markets Large</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFA Emerging Markets Portfolio</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Emerging Markets Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFA Emerging Markets Value Portfolio</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Fixed Income</strong></td>
<td>60.0</td>
<td>40.0</td>
<td>20.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DFA Two-Year Global Fixed Income Portfolio</td>
<td>30.0</td>
<td>20.0</td>
<td>10.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DFA Inflation-Protected Securities</td>
<td>30.0</td>
<td>20.0</td>
<td>10.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Dimensional Fund Advisors.
Information from sources deemed reliable, but its accuracy cannot be guaranteed.
*See preceding “Important Disclosures Regarding Simulated Strategies.”

### Simulated Portfolio Performance

#### Simulated Strategy* — Value-3 2008

**Annualized Returns for Periods Ending 12/31/08**

<table>
<thead>
<tr>
<th></th>
<th>Conservative (40/60)</th>
<th>Moderate (60/40)</th>
<th>Aggressive (80/20)</th>
<th>All-Stock (100/0)</th>
<th>S&amp;P 500/ MSCI EAFE Index**</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Year</td>
<td>−15.27%</td>
<td>−23.57%</td>
<td>−31.88%</td>
<td>−40.16%</td>
<td>−39.55%</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>7.90%</td>
<td>11.59%</td>
<td>15.57%</td>
<td>19.81%</td>
<td>17.82%</td>
</tr>
<tr>
<td>Three Years</td>
<td>−0.69%</td>
<td>−3.27%</td>
<td>−6.19%</td>
<td>−9.49%</td>
<td>−7.88%</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.61%</td>
<td>2.17%</td>
<td>1.41%</td>
<td>0.31%</td>
<td>−0.58%</td>
</tr>
<tr>
<td>Five Years</td>
<td>2.61%</td>
<td>2.17%</td>
<td>1.41%</td>
<td>0.31%</td>
<td>−0.58%</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>6.85%</td>
<td>10.18%</td>
<td>13.71%</td>
<td>17.43%</td>
<td>15.23%</td>
</tr>
<tr>
<td>Ten Years</td>
<td>4.99%</td>
<td>5.31%</td>
<td>5.42%</td>
<td>5.30%</td>
<td>−0.44%</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>9.28%</td>
<td>14.02%</td>
<td>18.85%</td>
<td>23.74%</td>
<td>22.70%</td>
</tr>
</tbody>
</table>

**Growth of $1,000 Invested for Periods Ending 12/31/08**

<table>
<thead>
<tr>
<th></th>
<th>Conservative (40/60)</th>
<th>Moderate (60/40)</th>
<th>Aggressive (80/20)</th>
<th>All-Stock (100/0)</th>
<th>S&amp;P 500/ MSCI EAFE Index**</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Year</td>
<td>$847</td>
<td>$764</td>
<td>$681</td>
<td>$598</td>
<td>$605</td>
</tr>
<tr>
<td>Three Years</td>
<td>$980</td>
<td>$905</td>
<td>$825</td>
<td>$742</td>
<td>$782</td>
</tr>
<tr>
<td>Five Years</td>
<td>$1,138</td>
<td>$1,113</td>
<td>$1,073</td>
<td>$1,016</td>
<td>$971</td>
</tr>
<tr>
<td>Ten Years</td>
<td>$1,627</td>
<td>$1,678</td>
<td>$1,696</td>
<td>$1,675</td>
<td>$957</td>
</tr>
</tbody>
</table>

Source: Dimensional Fund Advisors.

Indices are not available for direct investment. Their performance does not reflect the expenses associated with the management of an actual portfolio nor do indices represent results of actual trading. Information from sources deemed reliable, but its accuracy cannot be guaranteed. Performance is historical and does not guarantee future results. Simulated strategy total return includes reinvestment of dividends. Index total return includes reinvestment of dividends. Simulated strategy allocations have evolved over time. Please see the appropriate Simulated Strategy Evolution slide to understand these evolutions and thus the makeup of the returns. Portfolios shown do not include tax-managed funds. Standard deviations for three- and five-year periods are annualized from quarterly standard deviations. "See preceding “Important Disclosures Regarding Simulated Strategies.”" **60 percent S&P 500 Index/40 percent MSCI EAFE Index.**

Simulated Strategy — Value-3/Series A (page 3 of 4). Evolution and portfolio construction shown on previous pages. Returns with fee deductions shown on following page.
Simulated Portfolio Performance
Simulated Strategy* — Value-3 2008

Annualized Returns for Periods Ending 12/31/08
With 1.25% Advisory Fee

<table>
<thead>
<tr>
<th></th>
<th>Conservative (40/60)</th>
<th>Moderate (60/40)</th>
<th>Aggressive (80/20)</th>
<th>All-Stock (100/0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Year</td>
<td>-16.33%</td>
<td>-24.52%</td>
<td>-32.72%</td>
<td>-40.90%</td>
</tr>
<tr>
<td>Three Years</td>
<td>-1.92%</td>
<td>-4.48%</td>
<td>-7.36%</td>
<td>-10.61%</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>7.88%</td>
<td>11.56%</td>
<td>15.52%</td>
<td>19.75%</td>
</tr>
<tr>
<td>Five Years</td>
<td>1.33%</td>
<td>0.89%</td>
<td>0.15%</td>
<td>-0.93%</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>6.83%</td>
<td>10.15%</td>
<td>13.67%</td>
<td>17.38%</td>
</tr>
<tr>
<td>Ten Years</td>
<td>3.68%</td>
<td>4.00%</td>
<td>4.11%</td>
<td>3.99%</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>9.17%</td>
<td>13.85%</td>
<td>18.62%</td>
<td>23.44%</td>
</tr>
</tbody>
</table>

Growth of $1,000 Invested for Periods Ending 12/31/08
With 1.25% Advisory Fee

<table>
<thead>
<tr>
<th></th>
<th>Conservative (40/60)</th>
<th>Moderate (60/40)</th>
<th>Aggressive (80/20)</th>
<th>All-Stock (100/0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Year</td>
<td>$837</td>
<td>$755</td>
<td>$673</td>
<td>$591</td>
</tr>
<tr>
<td>Three Years</td>
<td>$943</td>
<td>$872</td>
<td>$795</td>
<td>$714</td>
</tr>
<tr>
<td>Five Years</td>
<td>$1,068</td>
<td>$1,046</td>
<td>$1,008</td>
<td>$954</td>
</tr>
<tr>
<td>Ten Years</td>
<td>$1,436</td>
<td>$1,481</td>
<td>$1,496</td>
<td>$1,478</td>
</tr>
</tbody>
</table>

Source: Dimensional Fund Advisors.
Information from sources deemed reliable, but its accuracy cannot be guaranteed. Performance is historical and does not guarantee future results.
Total return includes reinvestment of dividends and capital gains distributions.
Simulated strategy allocations have evolved over time. Please see the appropriate Simulated Strategy Evolution slide to understand these evolutions and thus the makeup of the returns.
Portfolios shown do not include tax-managed funds. Standard deviations for three- and five-year periods are annualized from quarterly standard deviations.
*See preceding “Important Disclosures Regarding Simulated Strategies.”

Important Disclosures Regarding Simulated Strategies

The preceding pages include illustrations of returns for the types of portfolios we design for clients.

The Simulated Strategies may or may not be the actual allocation determined to be appropriate for any individual clients, and a client may or may not follow the Simulated Strategies. Clients with the allocations shown may have different results based on capital flows, timing of rebalancing decisions, fees charged or other factors.

Our investment strategy is based on the principles of Modern Portfolio Theory (MPT). The tenets of MPT provide for a passive, long-term, buy-and-hold strategy implemented through globally diversified portfolios. Mutual funds representing asset classes where academic research has demonstrated higher expected returns for the level of risk taken are combined into a single portfolio. Portfolios are constructed with low-correlating components to provide diversification for the purpose of reducing the risk caused by volatility. Commodities may be added to some client portfolios for the purpose of additional risk reduction and not necessarily to provide higher expected returns in such portfolios. Portfolios are rebalanced to maintain agreed-upon asset allocations.

The historical performance information that follows is provided to demonstrate the methodology used in building portfolios using the aforementioned investment strategy. This information should not be considered as a demonstration of actual performance results or actual trading using client assets and should not be interpreted as such. The results are based on the retroactive application of a back-tested model that was designed with the benefit of hindsight and should not be interpreted as the performance of actual accounts. Past performance is not a guarantee of future results. The Simulated Strategies started in 1996 and have evolved over the years. Commodities, when shown in a portfolio, were added in 2004. Core funds, when shown in a portfolio, were added in 2007. International real estate, when shown in a portfolio, was added in 2008. All should be considered material changes to the Simulated Strategies. The differences in demonstrated returns can be seen by comparing Simulated Strategies with and without each of these. The investment returns and principal value of mutual funds recommended by our firm will fluctuate and may be worth more or less than their original cost when sold. A client may experience a loss when implementing an investment strategy.

In 1999, tax-managed funds became available for several different asset classes. We now use tax-managed funds extensively for taxable entities. While the tax-managed funds are consistent with the passive approach we follow, they should not be expected to regularly track the performance of corresponding taxable funds in the same or similar asset classes. As such, the performance of portfolios using tax-managed funds will vary from portfolios that do not use these funds.

Back-tested data does not represent the impact that material economic and market factors might have on an investment advisor’s decision-making process if the advisor were actually advising an investor and should not be considered indicative of the skill of the advisor. The back-testing of performance differs from actual account performance because an investment strategy may be adjusted at any time and for any reason, and can continue to be changed until desired or better performance results are achieved. The back-tested results assume ordinary income and capital gains distributions are reinvested, annual rebalancing and no income taxes. If performance reflects the deduction of an advisory fee (1.85 percent or less) billed quarterly in advance, it is indicated on the page. More information about mutual fund fees and expenses is available in the prospectus for each mutual fund.

Any back-tested data used in creating the Simulated Strategies includes only live funds. All funds are live for 10 years or more except the commodities fund, core funds and the international real estate fund.
Sources and Descriptions of Data

U.S. Equities

**S&P 500 Index**


**CRSP Deciles 9–10 Index**

Courtesy of Center for Research in Security Prices (CRSP), University of Chicago. Small company universe returns (Deciles 9-10) — all exchanges.

October 1988–present: CRSP Index (NYSE, AMEX and OTC).

**CRSP Deciles 6–10 Index**

Courtesy of CRSP, University of Chicago. Small company universe returns (Deciles 6–10) — all exchanges.

October 1988–present: CRSP Index (NYSE, AMEX and OTC).

**CRSP Deciles 1–10 Index (market)**

Courtesy of CRSP, University of Chicago.


**Fama-French US Large Growth Index (excluding utilities), Fama-French US Large Cap Index, Fama-French US Large Cap Value Index (excluding utilities), Fama-French US Small Growth Index (excluding utilities), Fama-French US Small Cap Index and Fama-French US Small Cap Value Index (excluding utilities)**

January 1927–present: Courtesy of Fama-French and CRSP. Upper-half market cap, upper 30 percent book-to-market. Buy range-only, no simulated hold range or estimated trading costs, rebalanced quarterly.

Composition: U.S. operating companies trading on the NYSE, AMEX or Nasdaq NMS. Maximum weight of any security in a portfolio is 4 percent.

Exclusions:

- ADRs, investment companies, tracking stocks before 1993, non-U.S. incorporated companies, closed-end funds and certificates.
- Sources:

Breakpoints:

- Before June 1996, the small-cap portfolios contain firms with market capitalization below the 55th percentile of all eligible NYSE firms, and the large-cap portfolios contain firms with market caps above the 50th percentile. From June 1996 to December 2000, the size breakpoint for all portfolios is the market cap of the median eligible NYSE firm. The book-to-market breakpoints for 1926 to 2000 split the eligible NYSE firms with positive book equity into three categories: the top 30 percent are in value and the bottom 30 percent are in growth.
- Starting in January 2001, the size breakpoints are defined by cumulative market cap percentile rules. Small-cap is the bottom 8 percent of the overall stock market and large-cap is the top 90 percent. The book-to-market breakpoints are defined by the firms in the relevant size range.
- The breakpoints for small-cap value (high book-to-market) and small-cap growth (low book-to-market) assign 25 percent of the total market cap in the small-cap size range to each portfolio. The book-to-market breakpoints for large-cap assign 10 percent of the market equity of large firms to the large-cap value portfolio and 20 percent to the large-cap growth portfolio.

Rebalancing:


**Dimensional US Micro Cap Index**

Courtesy of CRSP and Compustat.

June 1927–present: Dimensional US Micro Cap Index.

Composition: Market-capitalization-weighted index of securities of the smallest U.S. companies whose market capitalization falls in the lowest 4 percent of the total market capitalization of the eligible market. The eligible market is composed of securities of U.S. companies traded on the NYSE, AMEX and Nasdaq Global Market.

**Dimensional US Small Cap Value Index**

Courtesy of CRSP and Compustat.

June 1927–present: Dimensional US Small Cap Value Index.

Composition: Companies whose book-to-market ratio falls in the top 25 percent of U.S. small-cap companies after the exclusion of utilities, companies lacking financial data and companies with negative book-to-market ratio. The eligible market is composed of securities of U.S. companies traded on the NYSE, AMEX and Nasdaq Global Market.

**Dimensional US Large Cap Value Index**

Courtesy of CRSP and Compustat.

June 1927–present: Dimensional US Large Cap Value Index.

Composition: Companies whose book-to-market ratio falls in the top 20 percent of U.S. large-cap companies after the exclusion of utilities, companies lacking financial data and companies with negative book-to-market ratio. The eligible market is composed of securities of U.S. companies traded on the NYSE, AMEX and Nasdaq Global Market.

**US Market Equity — Risk Targets 2 and 3**

Courtesy of DFA.


**US Large Cap Value**

Courtesy of DFA.


**US Small Cap Value**

Courtesy of DFA.


**International Equities**

**Fama-French International Value Index**

Courtesy of Morgan Stanley Capital International (MSCI) and Fama-French.

January 1973–December 1974: Data provided by MSCI EAFE Index (net dividends).

January 1975–present: Data provided by Fama-French from MSCI EAFE data. Simulated strategy of MSCI EAFE countries in the top 30 percent book-to-market range.

Sources and descriptions of data supplied by Dimensional Fund Advisors. Information from sources deemed reliable, but its accuracy cannot be guaranteed.

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Sources and Descriptions of Data

International Market Equity

- Courtesy of MSCI, DFA and Fama-French.
- July 1981–present: 35 percent MSCI EAFE (net dividends). 28 percent Fama-French International Value Index. 32 percent DFA International Small Cap Index. 5 percent DFA International Small Cap Value Index.

International Large Value

- Courtesy of MSCI, DFA and Fama-French.

International Small Value

- Courtesy of DFA.

Emerging Market Equity

- Courtesy of MSCI, DFA and Fama-French.
- January 1975–December 1987: 75 percent DFA International Small Cap Index. 50 percent Fama-French International Value Index. 50 percent DFA International Small Cap Index.

Fixed Income

Barclays Capital Government/Credit Bond Index
- Range 1–30+ years. Courtesy of Barclays Capital.

Barclays Capital Intermediate Government Credit Bond Index
- Range 1–10 years. Courtesy of Barclays Capital.

Six-Month Treasury Bills

- Courtesy of CRSP and Merrill Lynch.
- January 1964–December 1977: CRSP.
- January 1978–present: Merrill Lynch G002 Index.

One-Year Treasury Note Index

- Courtesy of CRSP, DFA and Merrill Lynch.
- July 1963–May 1991: CRSP/DFA.
- July 2000–present: Merrill Lynch One-Year US Treasury Note Index (G003 Index).

One-Month Treasury Bills (Average maturity: 30 days), Five-Year Treasury Notes, Long-Term Government Bonds (Average maturity: 20 years) and Long-Term Corporate Bonds


One-Month Certificate of Deposit

- Courtesy of Federal Reserve Bank.
- January 1996–present: One-Month Certificate of Deposit Index.

Three-Month Certificate of Deposit

- Courtesy of Federal Reserve Bank.

Sources and descriptions of data supplied by Dimensional Fund Advisors. Information from sources deemed reliable, but its accuracy cannot be guaranteed.