Both of these statements are common investor sentiments. But they may be driven more by emotion and gut feelings rather than a disciplined investment strategy. A large cash position may indicate fear and excessive loss aversion, while concentrated holdings could signal overconfidence, following the herd mentality, or even greed.\(^1\)

Although fear-driven or herd behaviors contributed to the survival of our species a million years ago, those emotions are not helpful when constructing a long-term investment strategy designed to help you survive threats, such as bubbles, volatility, and other extreme market events, to your investment goals.\(^2\)

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Additionally, neither of these sentiments is consistent with a disciplined asset allocation approach. An all-cash portfolio leaves you at risk of having less wealth in the long run because cash historically has not kept pace with the rate of inflation. Conversely, a portfolio with concentrated positions is at risk of extreme drawdowns. Interestingly, a similar problem exists with a “buy and hold” approach, whereby a portfolio can become quite imbalanced as some securities grow to outsized positions over time.

To combat these behaviors, you need a logic-based, disciplined strategy that seeks to keep you on course for investing success.

### Build a core investment strategy

<table>
<thead>
<tr>
<th>Define Investor Profile (or Investment Policy Statement)</th>
<th>Establish a Strategic Asset Allocation (SAA)</th>
<th>Complement with Tactical Asset Allocation (TAA)</th>
<th>Combine with Security and Manager Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Define your investment objectives, time horizon, risk tolerance, liquidity needs, and any constraints or preferences</td>
<td>• Create a long-term investment plan using a diversified set of asset classes, based on the outlook for returns and risks, with the goal of maximizing portfolio returns given a level of portfolio risk defined in the Investor Profile</td>
<td>• Make short-term variations to the long-term plan, with the goal of maximizing portfolio return relative to the SAA given a desired level of portfolio risk relative to the SAA</td>
<td>• Select specific securities or managers, with the goal of maximizing risk-adjusted returns within each SAA asset class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adaptive Valuation Strategies (AVS) is the Private Bank’s own strategic asset allocation methodology using a ten year investment horizon</td>
<td>• The Global Investment Committee at the Private Bank makes tactical underweights and overweights relative to the AVS SAA using a 12-18 month horizon</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The Private Bank’s Manager Research and Portfolio Management teams evaluate hundreds of third party managers and thousands of securities across AVS SAA asset classes</td>
</tr>
</tbody>
</table>

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Select your destination

Constructing a long-term core investment strategy is like planning a sailing voyage. Before setting sail, one develops a navigation plan that identifies a destination and lays out the optimal course for efficiently reaching that destination. Similarly, before investing, establishing an Investor Profile (or Investment Policy Statement) identifies your objectives while strategic asset allocation (SAA) lays out the optimal course for efficiently achieving your investment goals.

During your sailing journey, tools such as a sextant and compass, or GPS and radar, can be used to monitor your progress and correct your heading to stay on course. Likewise, during your investment journey, tools such as performance attribution, risk exposure analysis and rebalancing can be used to guide you toward achieving your financial objectives. Naturally, over your sailing voyage, you will make adjustments to your navigation plan given shifting winds, prevailing currents and unexpected obstacles. Similarly, over your investment voyage you will make adjustments via the tactical asset allocation (TAA) process (under- and overweighting asset classes) given central bank policies, political events and geopolitical conflicts.

At the end of the investment voyage, your cumulative portfolio return is the destination you have reached and can be attributed to three components: SAA return, TAA return and investment selection return. While all are important, SAA is the most important determinant of variability in portfolio returns.¹

![Diagram of strategic asset allocation and tactical asset allocation](image)

Source: The Private Bank’s Global Asset Allocation team. For illustration purposes only. This illustration does not take into consideration volatility in the financial markets. There is no guarantee that returns will go up over time.

- **If you are not fully invested**, you are like a sailboat with partial or no sails, and you may get to your destination at a slower pace – or not at all
- Inflation may drift you backwards
- **If you hold overly concentrated positions**, you are unbalanced
- You are susceptible to having your sailboat capsize in a gale wind
- **If you are a buy-and-hold investor** and are not rebalancing on a disciplined basis, you risk becoming too concentrated
- You are susceptible to drifting off course

Reallocating assets with a suitable SAA has the potential to get you back on course and leave you better positioned to face the next storm.

The navigation plan

To better explain the effectiveness of establishing an SAA plan, the Private Bank’s Global Asset Allocation team conducted a historical analysis and compared three theoretical portfolios beginning January 1, 1990 through December 31, 2016.4

1. **SAA strategy**, AVS portfolio with hedge funds
   - Risk Level III
2. **Greed (Momentum) strategy**, invested in the top five performing stocks in the S&P 500 over the previous 12 months, holding for one month and then repeating
3. **Fear (Cash) strategy**, fully allocated to cash

<table>
<thead>
<tr>
<th></th>
<th>SAA</th>
<th>Greed</th>
<th>Fear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Return</td>
<td>8.7%</td>
<td>10.2%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Annual Standard Deviation</td>
<td>7.6%</td>
<td>31.3%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Monthly Minimum</td>
<td>-7.7%</td>
<td>-45.6%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>1.2</td>
<td>0.3</td>
<td>4.3</td>
</tr>
<tr>
<td>Maximum Drawdown</td>
<td>-23.8%</td>
<td>-86.3%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

At first glance it appears that greed is good. The Greed strategy had the highest return, up 10.2% on an annualized basis since inception, followed by the SAA portfolio, up 8.7%, annualized, over the analysis period (January 1, 1990 through December 31, 2016). However, on closer inspection we see the Greed strategy had volatility of 31.3%, versus just 7.6% for the SAA portfolio. Greed also sustained a drawdown of -86.3%, versus just -23.8% in the SAA strategy.

Would you have stayed the course in the Greed strategy through the volatility experienced in 2000 and in 2008? Many investors did not and sold off after the crash in ’08 — thus, they would not have experienced the big gains post-crash reflected in the Greed strategy.

Without a plan, investors are vulnerable to knee-jerk, panic reactions during volatile times.

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4 Note that no fees or commissions were deducted in the analysis for any of the strategies. Summary statistics were computed using closing prices on the last trading day of each month. See Appendix 1 for asset class indices used in the SAA strategy. See Appendix 2 for a listing of the stocks held at year end in the Greed strategy. The Fear strategy uses the cash index noted in Appendix 1.

5 Adaptive Valuation Strategies (AVS) is the Private Bank’s proprietary strategic asset allocation methodology. It determines the suitable long-term mix of assets for each client’s investment portfolio. The AVS portfolio shown assumes investing in the US Dollar Global Level III with Hedge Funds and rebalancing monthly.
Here are the same three strategies over a shorter period of time beginning January 1, 2006 through December 31, 2016.

### Key Differences

**Greed (Momentum)**
- Annual Return: -2.8%
- Annual Standard Deviation: 27.3%
- Monthly Minimum: -33.1%
- Sharpe Ratio: -0.1
- Maximum Drawdown: -79.4%

**SAA (AVS)**
- Annual Return: 6.5%
- Annual Standard Deviation: 9.1%
- Monthly Minimum: -7.7%
- Sharpe Ratio: 0.7
- Maximum Drawdown: -23.8%

**Fear (Cash)**
- Annual Return: 1.0%
- Annual Standard Deviation: 0.5%
- Monthly Minimum: 0.0%
- Sharpe Ratio: 2.0
- Maximum Drawdown: 0.0%

Not only is the Greed strategy inferior from a risk-adjusted basis, but also from an absolute return basis. Over this indicated time period, the Greed strategy returned -2.8%, annualized. Meanwhile the SAA strategy achieved a 6.5% return, annualized. And, the Greed strategy even included popular technology stocks. If you are chasing returns at the wrong times — even with great stocks — you could sink.

Not surprisingly, the Fear strategy significantly underperformed the other two strategies over the original analysis period (January 1, 1990 through December 31, 2016). Over the shorter period illustrated above, the Fear strategy returned only 1.0% and would have lost ground to inflation which was 1.8% on an annualized basis over that time period. This illustrates the dangers of not being fully invested in a diversified portfolio. So don’t voyage out with no sails and drift backwards. Set sail with SAA.

### Strategic asset allocation best practices

The investment results in our three portfolios are indicative of the value of employing an asset allocation approach. Our strategic asset allocation methodology embodies time-honored asset management best practices.

Diversification may be the only “free lunch” in finance. Why is it a free lunch? Diversification can allow one to add assets while helping lower overall risk in the portfolio, without reducing its potential return.

### Asset class diversification

Portfolios should be diversified across asset classes. For example, a portfolio with large amounts of cash is not diversified and risks underperforming broad-based balanced benchmarks.

### Geographic diversification

Global diversification should be a default case when considering how to construct a strategic asset allocation for a balanced portfolio. Global investing has the potential to add value, especially when different regions around the world are in different phases of business cycles. Global portfolios have become more easy to implement as financial markets have matured and become more open.

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6 Fred database based on the Consumer Price Index, St. Louis Federal Reserve Board.

Adaptive Valuation Strategies (AVS) is the Private Bank’s proprietary strategic asset allocation methodology. It determines the suitable long-term mix of assets for each client’s investment portfolio. The AVS portfolio shown assumes investing in the USD Global Level III with Hedge Funds and rebalancing monthly.

Diversification does not guarantee a profit or ensure against a loss of principal.
Sector diversification
Diversifying across sectors is also important as industries have become more globalized (e.g., energy). Researchers have debated which is more important: diversifying across countries/regions or across sectors. We recommend, to the extent possible, do both.

Factor diversification
Less obvious to the naked eye is factor diversification. Factors can be viewed as the underlying forces driving financial assets and are thus, understandably, an important lens through which to view portfolio risk and return exposures. Diversifying across factors (e.g., value versus growth or market capitalization) can be an important way to enhance portfolio efficiency.

Target risk
Investors consider both return and risk when constructing portfolios, but often focus on targeting a specific level of return. And for very good reasons. This is important information for budgeting purposes. However, selecting a return can be difficult for two reasons: First, it is well known that returns are much more difficult to precisely estimate than risk. Second, return environments vary over time. Thus, setting an ambitious return goal in a lower return market environment will force an investor into a higher risk portfolio that may have undesirable consequences. For these two reasons, it may be preferable for investors to construct portfolios using long-term volatility measures and to select a portfolio risk level consistent with their risk aversion rather than constructing a portfolio solely based on a return objective.

Rebalancing
Not frequently discussed is that portfolio rebalancing can be thought of as diversifying a portfolio over time. Disciplined portfolio rebalancing — taking profits on securities that have appreciated and reallocating to securities that have depreciated — can provide incremental return relative to a buy-and-hold approach. So while initial diversification (geography, sector, etc.) in portfolio construction adds value in and of itself, maintaining that diversification through disciplined rebalancing over time can add even more incremental value in many cases. If diversification is the free lunch, then portfolio rebalancing is the free dessert.

Valuation matters
When investors are fearful of markets, you should be greedy and when they are greedy, you should be fearful. If returns in an asset class have been attractive over the past 10 years, AVS implies that strategic return estimates (SRE) over the coming 10 years will be less attractive. Conversely, if an asset class has struggled over the past 10 years, our forecast is generally for more attractive returns in the coming 10 years. This effectively means: be a contrarian investor.

Risk management
Traditional approaches define risk as standard deviation, with no distinction between profitable and unprofitable volatility. However, what is most important to investors is avoiding downside losses. Constructing a portfolio using downside risk measures can help you sleep at night.

Get fully invested
In order to take full advantage of a long-term strategic asset allocation, investors should not sit in cash, but rather be fully invested. When incepting a new portfolio, investors need to first decide how to put their money to work right away. One popular approach is to dollar-cost average into your SAA plan over a period of time (e.g., 18 or 36 months). A more institutionally-oriented approach is to invest immediately based on your Investor Profile (or Investor Policy Statement) and SAA, at least initially, into market-tracking vehicles. Otherwise you are exposing the portfolio to the potential risk of underperforming your SAA benchmark.

Now that we have shown the value of implementing a long-term investment strategy not based on return-eating emotional reactions, we can discuss how to construct an SAA.

AVS uses a specialized risk measure called Extreme Downside Risk (EDR). This measure calculates the worst potential loss that a particular allocation may suffer within a rolling twelve-month period over ten years. We use this measure to inform how we construct our strategic asset allocations.

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Quote from: Adaptive Valuation Strategies, A New Approach to Strategic Asset Allocation, 2017 Annual Update
Diversification does not guarantee a profit or ensure against a loss of principal.

Strategic Return Estimates (SRE) are not a guarantee of future returns.

See glossary for definitions of Strategic Return Estimates (SRE) and Extreme Downside Risk (EDR).
Process of creating a strategic asset allocation plan

1. Inputs
   - Capital Market Return Assumptions on Asset Classes
     - Sourced internally or from advisors
   - Risk Assumptions
     - Sourced internally or from advisors
   - Constraints
     - Investor-specific

2. Optimization
   - Optimize Allocations
     - Quantitative and/or qualitative process or algorithm to optimize these inputs into optimal asset class allocations

3. Output
   - 41% Global Developed Equities
   - 6% Global Emerging Equities
   - 12% Global Investment Grade Fixed Income
   - 2% Global High Yield Fixed Income
   - 2% Global Emerging Fixed Income
   - 35% Global Government Fixed Income
   - 3% Cash

The chart above corresponds to AVS’ Global USD Risk Level II portfolio. The chart is fairly detailed, but perhaps a more intuitive way to think about the SAA is to group the allocations into three investment “buckets.”

Three investment buckets

Safety (Liquid)
- The “sleep at night” bucket is intended to be a buffer to help protect against unexpected expenses
- Includes assets such as sovereign short-term or treasury inflation securities

Income Oriented
- Accounts for lifestyle needs
- Includes assets such as medium/long duration investment bonds and higher dividend-yielding equities

Risky (Growth)
- The higher risk/higher return potential bucket may drop in value at times – sometimes precipitously – but the other two buckets help to diversify some of the risk
- It is expected that this bucket will be the growth engine for the portfolio over time

It is important to review your SAA on a periodic basis to help ensure it remains consistent with lifestyle changes and needs. We believe that implementing a strategic asset allocation is one of the most important investment decisions that you can make to help ensure a sustainable asset base. It is the foundation of a disciplined investment plan.

Tactical asset class calls are made by our Global Investment Committee (GIC) on a globally diversified set of asset classes and are intended to take advantage of shorter-term market opportunities and help mitigate shorter-term risks. The GIC’s investment horizon is 12 to 18 months and therefore considers return and risk on a shorter-term basis than AVS.

While AVS is a quantitative methodology, the GIC’s decision-making process blends quantitative with qualitative inputs from asset-class specialists at Citi Research and from within the Private Bank.

Tactical asset allocation (TAA) – adjusting the sails

While strategic asset allocation is a long-term investment plan, tactical adjustments can take advantage of favorable opportunities, or can help you avoid unexpected obstacles. These adjustments, generally moderate in size, are embodied and implemented in underweightings and overweightings of asset classes relative to the SAA.

What are some of the sources of TAA opportunities? First, the investing missteps discussed earlier, driven by human emotions, have a short-term component as well. Second, large groups of investors, in aggregate, who are driven by emotions will influence markets in the short run. This observation was made by economist John Maynard Keynes who famously suggested that markets are moved by animal spirits rather than by logic.

Overreaction-driven market flows – the animal spirits – have the potential to create opportunities for sophisticated investors. The asset flows lead to changes in the attractiveness of one asset class relative to another, presenting an opportunity for an investor to take advantage of shorter-term market opportunities and to help mitigate shorter-term risks.

Back to sailing, the tactical asset allocations are the adjustments in your sails designed to take advantage of the shifting winds and currents of central bank policies, political events, or to avoid unexpected obstacles from geopolitical conflicts – events that can contribute to overvaluations or undervaluations for securities and markets. These short-term factors might be impossible to anticipate in a longer-term strategic asset allocation and might only be relevant over a 12 to 18 month investment horizon.

Source: The Private Bank’s Global Asset Allocation team. For illustration purposes only. This illustration does not take into consideration volatility in the financial markets. There is no guarantee that returns will go up over time.

Quote from: Adaptive Valuation Strategies, A New Approach to Strategic Asset Allocation, 2017 Annual Update
Overreactions are evident from the herd behavior and flows into “hot” asset classes:

“Risk-on” periods
Investors generally become more risk tolerant and we see large asset flows into momentum strategies — recall the Greed strategy.

“Risk-off” periods
Investors generally become more risk averse and we see large asset flows into cash and highly defensive strategies — recall the Fear strategy.

Purposely navigating off course for a short period of time to avoid a risk has the potential to add value to your portfolio: you may get to your destination faster by taking advantage of a puff of wind, while simultaneously reducing risk by not colliding with the hazard on your course.

There are opportunities for TAA to add value, but TAA also comes with a challenge. This relates to the “Fundamental Law of Active Management” which states that the magnitude of the potential return/risk ratio for a strategy increases with forecasting accuracy and the number of independent investment decisions made in the strategy.\(^{12}\)

To understand the implication of this, compare an equity or a bond portfolio manager to an asset allocator. In the security selection process, the portfolio manager makes decisions on which securities to overweight or underweight relative to a benchmark. This requires a large number of decisions, as there is a large number of securities in the investment universe. However, in the TAA process, while the asset allocator also makes decisions on which investments to emphasize (i.e., asset classes) relative to the strategic allocation, there are far fewer asset classes than there are securities.

Assuming similar forecasting accuracy, the asset allocator faces a higher hurdle than the portfolio manager in achieving high return/risk ratios as the allocator is making fewer independent decisions. This is why trying to time just two asset classes, say cash versus equities, like a wager on a single coin toss, is a risky proposition. But research has shown that diversified TAA strategies, which make tactical adjustments to many asset classes, have the potential to contribute economically to core portfolio returns.\(^ {13}\) So, from a performance perspective, both investment selection and tactical asset allocation can independently be a meaningful source of additional value to a strategic asset allocation.

\[^{12}\text{Fundamental Law of Active Portfolio Management is IR=IC} \times \sqrt{\text{BR}, \text{where IR is Information Ratio (i.e., return/risk ratio), IC is Information Coefficient (i.e., forecasting accuracy) and BR is Breadth (i.e., number of independent decisions). For details see Grinold, R and Kahn, R, Active Portfolio Management, McGraw Hill, 1999.}\]

\[^{13}\text{Blitz, David and van Vliet, Pim, Global Tactical Cross-Asset Allocation: Applying Value and Momentum Across Asset Classes (2008).}\]
Real Estate and Private Equity are not candidates for TAA due to long-term liquidity constraints, but there are many traditional global asset classes to build a diversified portfolio and make more asset class investment decisions. With a larger number of opportunities, you can afford to be wrong on some of them.

Approaches used to select tactical allocations often involve comparisons of relative valuations across asset classes, such as:

- Valuation ratios of onshore equity markets versus offshore equity markets
- Dividend yield on equities versus coupon yield on bonds
- Current valuation of an asset class to its own historical value

Determining the optimal SAA can effectively take a quantitative approach; however, TAA decision making often includes shorter-term qualitative inputs, in conjunction with quantitative inputs. Please consult your Private Banker when determining an optimal allocation.

The biggest problem we see among investors is they often lack discipline in their investment approach. They may hold a haphazard collection of securities whose properties as a portfolio have not been fully thought through. They may overestimate their tolerance for risk. They may not regularly review and rebalance their portfolio. Investors get emotional, they panic, they ride a security up for too long, they sell at the wrong time, and they do not stay invested.

The steps for developing a successful strategy to achieve long-term investment goals starts with establishing an Investor Profile or a formal Investment Policy Statement (IPS). An IPS defines objectives, time horizon, risk tolerance, liquidity needs, constraints, preferences, core asset classes, and benchmarks used for measuring performance. Informed by the IPS and using the principles described in this article, the next step is to create a strategic asset allocation where target weights are assigned to each of the core asset classes to maximize long-term risk-adjusted returns. Then a process is established for making tactical adjustments to the strategic allocations based on shorter-term market conditions.

The final step in converting the asset allocation plan described here into an actual, implementable portfolio is to select the investment vehicles used to populate the plan allocations. The roster selected may include only actively managed vehicles, only passive vehicles, or a hybrid of both. Taking these steps to create a long-term plan and a balanced, core portfolio lays the foundation for achieving long-term investment goals. This core, long-term asset allocation plan can be supplemented with opportunistic investment ideas, including investments in out-of-benchmark asset classes, which have the potential to contribute additional value based on your investment objectives and risk tolerances.

Investors need to be cognizant that, at times, market returns will be higher than expected, or lower than expected, but you need to stay the course — and stay invested. This is not easy to do when it is your own money on the line. However, we believe investing according to a plan, perhaps with the help of a more emotionally-removed, but trusted, advisor is the best way to achieve your investment goals.

For more information about, and advice on, implementing the Private Bank’s strategic and tactical asset allocation, please contact your Private Banker.

“Any fool can carry on, but a wise man knows how to shorten sail in time.”

Joseph Conrad
Appendix 1: Asset class indices

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Developed Market Equity</td>
<td>The asset class is composed of MSCI indices capturing large-, mid- and small-cap representation across 23 individual developed-market countries, as weighted by the market capitalization of these countries. The composite covers approximately 95% of the free float-adjusted market capitalization in each country.</td>
</tr>
<tr>
<td>Global Emerging Market Equity</td>
<td>The asset class is composed of MSCI indices capturing large and mid-cap representation across 20 individual emerging-market countries. The composite covers approximately 85% of the free float-adjusted market capitalization in each country. For the purposes of supplemental long-term historical data, local-market country indices are used, wherever applicable.</td>
</tr>
<tr>
<td>Global Developed Investment Grade Fixed Income</td>
<td>The asset class is composed of Bloomberg Barclays indices capturing investment-grade debt from twenty different local currency markets. The composite includes fixed-rate treasury, government-related, and investment grade rated corporate and securitized bonds from the developed-market issuers. Local market indices for US, UK and Japan are used for supplemental historical data.</td>
</tr>
<tr>
<td>Global High Yield Fixed Income</td>
<td>The asset class is composed of Bloomberg Barclays indices measuring the non-investment grade, fixed-rate corporate bonds denominated in US dollars, British pounds and Euros. Securities are classified as high yield if the middle rating of Moody’s, Fitch and S&amp;P is Ba1/BB+/BB+ or below, excluding emerging market debt. Ibbotson High Yield Index, a broad high yield index including bonds across the maturity spectrum, within the BB-B rated credit quality spectrum, included in the below-investment-grade universe, is used for supplemental historical data.</td>
</tr>
</tbody>
</table>
### Global Emerging Fixed Income
The asset class is composed of Bloomberg Barclays indices measuring performance of fixed-rate local currency emerging markets government debt for 19 different markets across Latin America, EMEA and Asia regions. *iBoxx ABF China Govt. Bond*, the Markit iBoxx ABF Index comprising local currency debt from China, is used for supplemental historical data.

### Cash
The asset class is represented by US 3-Month Government Bond TR, measuring the US dollar-denominated active 3-Month, fixed-rate, nominal debt issues by the US Treasury.

### Hedge Funds
The asset class is composed of investment managers employing different investment styles as characterized by different sub categories — HFRI Equity Long/Short: Positions both long and short in primarily equity and equity derivative securities; HFRI Credit: Positions in corporate fixed income securities; HFRI Event Driven: Positions in companies currently or prospectively involved in wide variety of corporate transactions; HFRI Relative Value: Positions based on a valuation discrepancy between multiple securities; HFRI Multi Strategy: Positions based on realization of a spread between related yield instruments; HFRI Macro: Positions based on movements in underlying economic variables and their impact on different markets; Bloomberg Barclays Trader CTA Index: The composite performance of established programs (Commodity Trading Advisors) with more than four years of performance history.

### Private Equity
The asset class characteristics are driven by those for Developed Market Small Cap Equities, adjusted for illiquidity, sector concentration and greater leverage.

### Real Estate
The asset class contains index contains all Equity REITs (US REITs and publicly-traded real estate companies) not designated as Timber REITs or Infrastructure REITs: NAREIT US REIT Index, NAREIT Canada REIT Index, NAREIT UK REIT Index, NAREIT Switzerland REIT Index, NAREIT Euro-zone REIT Index, NAREIT Japan REIT Index, NAREIT Hong Kong REIT Index, NAREIT Singapore REIT Index, NAREIT Australia REIT Index.

### Commodities
The asset class contains the index composites — *GSCI Precious Metals Index*, *GSCI Energy Index*, *GSCI Industrial Metals Index*, and *GSCI Agricultural Index* — measuring investment performance in different markets, namely precious metals (e.g., gold, silver), energy commodity (e.g., oil, coal), industrial metals (e.g., copper, iron ore), and agricultural commodity (i.e., soy, coffee) respectively. Reuters/Jeffries CRB Spot Price Index, the TR/CC CRB Excess Return Index, an arithmetic average of commodity futures prices with monthly rebalancing, is used for supplemental historical data.
## Appendix 2: Constituents of the greed strategy

The Greed portfolio invested in the top 5 performing stocks in the S&P 500 over the previous 12 months, holding for one month and then repeating from January 1, 1990 through December 31, 2016.

<table>
<thead>
<tr>
<th>Date</th>
<th>Company Name</th>
<th>Number of Shares</th>
<th>Stock Name</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/29/89</td>
<td>Federal National Mortgage Association</td>
<td>5</td>
<td>Holiday Corporation</td>
<td>NIKE, Inc. Class B</td>
</tr>
<tr>
<td>12/31/91</td>
<td>Advanced Micro Devices, Inc.</td>
<td>5</td>
<td>Data General Corporation</td>
<td>Gap, Inc.</td>
</tr>
<tr>
<td>12/31/92</td>
<td>BankBoston Corp.</td>
<td>5</td>
<td>Chrysler Corporation</td>
<td>DSC Communications Corporation</td>
</tr>
<tr>
<td>12/31/93</td>
<td>Clark Equipment Company</td>
<td>5</td>
<td>DSC Communications Corporation</td>
<td>Echo Bay Mines Ltd.</td>
</tr>
<tr>
<td>12/30/94</td>
<td>Andrew Corp.</td>
<td>5</td>
<td>ChemFirst Inc.</td>
<td>Micron Technology, Inc.</td>
</tr>
<tr>
<td>12/31/96</td>
<td>Andrew Corp.</td>
<td>5</td>
<td>Dell Inc.</td>
<td>Intel Corporation</td>
</tr>
<tr>
<td>12/31/97</td>
<td>Caliber System Inc.</td>
<td>5</td>
<td>Dell Inc.</td>
<td>Guidant Corporation</td>
</tr>
<tr>
<td>12/31/98</td>
<td>Apple Inc.</td>
<td>5</td>
<td>Ascend Communications Inc.</td>
<td>Dell Inc.</td>
</tr>
<tr>
<td>12/31/99</td>
<td>LSI Corporation</td>
<td>5</td>
<td>Nextel Communications Inc.</td>
<td>QUALCOMM Incorporated</td>
</tr>
<tr>
<td>12/29/00</td>
<td>ALZA Corporation</td>
<td>5</td>
<td>Dynegy Inc.</td>
<td>HealthSouth Corporation</td>
</tr>
<tr>
<td>12/31/01</td>
<td>AutoZone, Inc.</td>
<td>5</td>
<td>Best Buy Co., Inc.</td>
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<td>12/31/02</td>
<td>Apollo Education Group, Inc. Class A</td>
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<td>Ball Corporation</td>
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<td>12/31/03</td>
<td>Avaya Inc.</td>
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<td>Dynegy Inc.</td>
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<td>Apple Inc.</td>
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<td>EDG Resources, Inc.</td>
<td>Express Scripts Holding Company</td>
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<td>Allegheny Technologies Incorporated</td>
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<td>Amgen Inc.</td>
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<td>Ford Motor Company</td>
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<td>Cummins Inc.</td>
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<td>Electronic Arts Inc.</td>
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<td>Netflix, Inc.</td>
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<td>Applied Materials, Inc.</td>
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<td>Freepoint McMoRan, Inc.</td>
<td>Newmont Mining Corporation</td>
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Source: Factset and the Global Asset Allocation team at the Private Bank.
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