Key Insights

» The wide performance swings over the past two years demonstrate a key principle of asset allocation—that asset returns and rankings vary from year to year—but over multiple year time periods, asset class performance tends to smooth out.

» A diversified portfolio is designed to help reduce volatility over multiple year time periods, but it also can accomplish this goal over shorter periods of significant return fluctuations like we saw in 2017 and 2018.

» Holding a concentrated portfolio of riskier assets could result in greater portfolio downturns when markets correct. Holding a diversified portfolio that helps to control downside risk could be advantageous during times of market stress. Investors should follow an appropriate asset allocation strategy through short-term dislocations.

» A well-defined strategy can help investors avoid making emotionally-driven financial decisions. Some common behavioral biases include: chasing past winners and losers and recency bias, or trading based on recent trends.

What a difference a year makes. Asset class performance for the years 2018 and 2017 hardly could have been more different. In 2018, we observed negative annual returns for most asset classes, with only cash alternatives, municipal bonds, and short-term investment grade taxable bonds up by more than 1%. In global equity markets last year, Russia’s stock market stood alone with positive performance in U.S.-dollar terms. But just as 2018 was unusual in its breadth of negative returns across asset classes, 2017 was an unusual year in its range of positive returns. In 2017, nearly every major asset class delivered positive annualized returns, led by equities—a mirror opposite of 2018.
Yet, if we consider the two-year returns on an annualized basis, it turns out that only commodities showed a negative return. This example demonstrates a key principle of asset allocation, that asset price returns and rankings vary from year to year, but over multiple year time frames, asset class performance tends to smooth out. Also notice that during this period of wide oscillations across asset classes, the diversified portfolio (represented by the Moderate Growth & Income four asset group portfolio, without private capital included) outperformed most individual asset classes, generally with less fluctuations in returns than the other top performers.

Chart 1. Mirror opposites—asset class performance in 2017 and 2018

Sources: Bloomberg, FactSet, Morningstar Direct, Wells Fargo Investment Institute; as of December 31, 2018. The MGI 4AG Portfolio (without private capital) is a Wells Fargo Investment Institute diversified portfolio. Performance results for the Moderate Growth & Income 4 Asset Group without Private Capital Portfolio are hypothetical and do not represent an actual portfolio in existence now or during the time period shown. Index return information is provided for illustrative purposes only. Index returns do not represent investment performance or the results of actual trading. Index returns represent general market results, assume the reinvestment of dividends and other distributions and do not reflect deduction for fees, expenses or taxes applicable to an actual investment. Unlike most asset class indices, HFR Index returns reflect deduction for fees. Because the HFR indices are calculated based on information that is voluntarily provided actual returns may be lower than those reported. An index is unmanaged and not available for direct investment. Hypothetical and past performance do not guarantee of future results. Please see the end of the report for the composition of the Portfolios, the risks associated with the representative asset classes and the definitions of the indices. Indices represented in this chart include the following: U.S. Taxable Inv Grade FI: Bloomberg Barclays U.S. Aggregate Bond Index; U.S. High Yield FI: Bloomberg Barclays U.S. Corporate High Yield Index; U.S. Treasury FI: Bloomberg Barclays U.S. Treasury Index; U.S. Municipal FI: Bloomberg Barclays Municipal Bond Index; DM ex-U.S. FI: JPMorgan GBI Global Ex-U.S. TR USD Index; Emerging Market FI: JPMorgan EMBI Global TR USD Index; U.S. Large Cap Equity: S&P 500 TR USD Index; U.S. Mid Cap Equity: Russell Mid Cap TR USD Index; U.S. Small Cap Equity: Russell 2000 Index, DM ex-U.S. Equity: MSCI EAFE GR USD Index; Emerging Market Equity: MSCI EM GR USD Index; Frontier Market Equity: MSCI Frontier Markets GR USD Index; Public Real Estate: FTSE EPRA/NAREIT Developed TR USD Index; Commodities: Bloomberg Commodities Index; Global Hedge Funds: HFRI Fund Weighted Composite Index. USD = U.S. dollar. FI = Fixed Income. DM = Developed Markets. Inv Grade = Investment Grade.
The wide swings in asset class returns over the past two years (shown in Chart 2), highlight the potential value of diversifying portfolios across different asset classes in an effort to achieve higher returns with generally less volatility risk (over the two-year time period) than most individual asset classes provided.

We believe that a solid asset allocation strategy provides an element of diversification to a portfolio—and can help to smooth out performance over time. A smoothing effect can help to promote compounding returns and help investors stay committed to their longer-term investment plan. A diversified portfolio is designed to help reduce portfolio volatility over longer periods of time, but it also can accomplish this objective over shorter periods of significant return fluctuations (e.g., the past two years).

With that being said, there will be time periods when portfolio performance exceeds expected returns, and other periods when performance falls short of expected returns. In this report, we explore historical performance to better understand how asset allocation has added value to our strategic hypothetical model portfolio mixes over longer periods of time. We begin with a quick review of asset allocation principles and then examine actual asset class performance versus our capital market assumptions (CMAs)—the forward-looking estimates of how asset classes and combinations of asset classes may respond over the next 10 to 15 years—during various time periods. We then identify what we believe are key trends—and conclude with our view on implications for investors.

2017 and 2018—a study in contrasts

After a few years of below average volatility in markets, 2017 and 2018 felt like extreme outliers to many investors. Yet, over the past two years, most asset classes performed well within the expected ranges for standard deviation (or the variability in returns we expect on an annualized basis for the next 10 to 15 years3). However, our model the four asset group Moderate Growth & Income (MGI) portfolio generated hypothetical 2018 returns that were lower than what we would expect about 66% of the time (which is within one standard deviation of expected hypothetical return). This was because of the unusual breadth of the negative 2018 returns. In the past 30 years, we have only seen this many negative returns in one other year: 2008. While 2018 saw as many asset classes posting negative returns as in 2008, the degree of magnitude was much less in 2018. The MGI portfolio’s return was within what we would expect to see about 95% of the time (within two standard deviations of expected return), unlike what we saw for many asset classes in 2008.

**Chart 2. Wide two-year swings in performance were within expected return ranges**

Sources: Bloomberg, FactSet, Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. FI = Fixed Income. DM = Developed Markets. For illustrative purposes only. Please see Chart 2 above for the names of the indices representing the asset classes, and important information on hypothetical index performance. An index is unmanaged and not available for direct investment. Past performance is no guarantee of future results. Please see the end of the report for the composition of the MGI w/o PC Portfolio, the risks associated with the representative asset classes and the definitions of the indices.

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2 Please see page 4 for important information on the application of CMAs and the end of this report for limitations on the use of CMA forecasts.

3 When a stock or portfolio has a higher standard deviation, the predicted range of performance is wide, implying greater volatility.

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Reviewing the key principles of asset allocation

- The key ingredient to asset allocation is diversification.
- Key inputs to a strategic asset allocation model include return, risk, and correlation.
- Time horizon matters: We focus on strategic (10-15 years), cyclical (3-5 years), and tactical (6-18 months) time horizons for asset allocation decisions.
- Market timing is not on your side—as a few great days or a handful of really bad ones can determine a positive or negative return for a given year.

When creating asset allocation models we start with our assumptions for risk, return, and correlation that investors might experience from each asset class. Risk assumptions are based on historical standard deviations, but they also may include estimates for risks that we believe exist—but have not happened yet. Likewise, return assumptions are based on historical data and include our forward-looking estimates for inflation and risk premia. Correlations measure how much asset classes move together and are based on historical observations. Together, these assumptions (CMAs) reflect the asset class return and risk trends that we believe investors are likely to experience during the next 10 to 15 years. They help us to construct portfolio asset allocation and assist in longer-term financial planning.

CMAs are not promises of actual asset class returns—nor are they assurances of performance that may be realized. Instead, they are based on estimates that might not be achieved and on assumptions that may not occur. The actual rate of return on an asset will not necessarily follow these long-term average estimates. Rather, returns are more likely to fluctuate around the averages (generally expected to be within the standard deviation ranges). We believe that it is important for investors to maintain a well-diversified asset allocation to help manage market volatility and capitalize upon evolving long-term opportunities. Of course, one size does not fit all. But comparing the risk and return characteristics of various asset allocation strategic mixes may help investors to choose the investment profile that best matches their individual financial objectives.

Chart 3. Different objectives result in different risk and return characteristics

![Chart showing different objectives and their corresponding risk and return characteristics]

Source: Chart is conceptual and does not reflect any actual returns or represent any specific asset classifications.

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4 Correlation measures how two asset classes or investments move in relation to each other. A positive correlation indicates the extent to which those asset classes increase or decrease together; a negative correlation indicates the extent to which one asset class increases as the other decreases.

5 Asset allocation and diversification do not guarantee investment returns or eliminate risk of loss. They are investment methods used to help manage risk and volatility within a portfolio. There is no guarantee any asset class will perform in a similar manner in the future.
Investors should choose a portfolio allocation appropriate for their financial goals, ability and willingness to withstand market fluctuations, and time horizon. Our strategic asset allocation models are constructed utilizing our 10- to 15-year CMAs and reflect the trends that we believe investors are most likely to experience during the next full market cycle or two. A shorter time horizon may call for a more conservative asset allocation, while an investor with a longer time horizon may be able to wait out market downturns.

In theory, market timing—moving all or a very large portion of an investment portfolio into or out of stocks, bonds, cash alternatives, and other asset classes based on short-term performance expectations—could be a great way to achieve significant market gains and avoid losses. However, this strategy is extremely difficult to accomplish in practice. To effectively time the market, an investor has to be right twice, correctly predicting when to move out of and then when to move back into an asset class. Based on our research, over the 30 year period from 1989-2018, missing even a handful of the days when the stock market experienced its best gains can dramatically reduce returns (Chart 3). Further, these best days often come in the wake of the market’s worst days—and sometimes during a bear market—making it all the more difficult to time.

What investors may be able to do over shorter time periods is to assess market conditions relative to our longer-term assumptions. To potentially take advantage of intracycle conditions, we offer cyclical or tactical allocation models which attempt to position the portfolios for nearer-term market expectations. Cyclical allocations (3- to 5- year market outlook) are based on where we believe we are in the market cycle, while tactical allocations (6- to 18-month market outlook) strive to take advantage of near-term differentials between expected return or risk relative to the strategic CMAs and to other asset classes in the portfolio.

### Chart 4. Missing the best days in the market (1989-2018)

- **Remain fully invested**: $7.2 MM (starting with $1 MM)
- **Missing 10 best days**: $3.9 MM (starting with $1 MM)
- **Missing 20 best days**: $1.6 MM
- **Missing 30 best days**: $0.85 MM
- **Missing 40 best days**: $0.75 MM
- **Missing 50 best days**: $0.47 MM

**Sources:** Bloomberg, Wells Fargo Investment Institute, December 31, 2018. MM = millions. For illustrative purposes only. A hypothetical $1 million investment in the S&P 500 Index during the time period indicated. A price return index is not a total return index and does not include the reinvestment of dividends. The S&P 500 Index is a market capitalization weighted index composed of 500 stocks generally considered representative of the US stock market. Index returns do not represent investment performance or the results of actual trading and do not reflect deduction for fees, expenses or taxes applicable to an actual investment. An index is unmanaged and not available for direct investment. Past performance is no guarantee of future results.
Our recent analysis found that:

- CMAs were mostly right on target for hypothetical risk and return expectations, except for a few less mature and less efficient asset classes—such as emerging market asset classes and commodities—where supercycle\(^6\) and extended anomalies are more likely to occur.

- Diversification has benefited portfolios we design throughout market cycles, including extreme market environments. Diversification may offer more benefit to risk-averse investors (i.e., in the “Income” objectives). Keep in mind diversification does not guarantee investment returns or eliminate risk of loss. It is an investment method used to help manage risk and volatility within a portfolio.

We assessed the performance of our CMAs from the start of 2009 through the subsequent 10-year period ending on December 31, 2018. This is a critical time period to review as it encompasses a portion of the most recent financial crisis in the U.S. and rolling crisis overseas. As such, the returns and risk (as measured by standard deviation\(^7\)) may be somewhat higher/lower than our full cycle expectations for U.S. assets in particular.

Many investors thought that the years following the financial crisis would see considerably lower asset class returns as the global economy slowly worked its way back to health. We let the data guide our forecasts and maintained a relatively optimistic outlook for asset classes in the 10-15 year period that followed the financial crisis. In hindsight, that appears to have been the correct call. Half of our risk and return assumptions between 2009 and 2018 fell within 200 basis points from historical (actual) numbers.\(^8\) This was well within one standard deviation of our CMA hypothetical return expectations. Our rankings forecast was even closer over that period. For example, the realized risk and return assumptions of 13 out of 15 asset class CMAs ranked very closely to what was anticipated in 2009 (that is, within 2 places in the ranking). This is important, because the relative ranking of asset classes by return and risk assumptions is even more critical to our asset allocation optimization results (how portfolios are constructed) than the actual risk and return assumptions are.

There were a few asset classes that did not behave as our forecast had predicted. We underestimated volatility in 2009 for the Emerging Market Equities and Fixed Income classes by 6.5% and 8%, respectively. (Note our 2008-09 CMAs were the first to include Emerging Market Fixed income as an asset class to potentially be included in the portfolio mix). The relatively short history of those asset classes at the time—and the evolving nature of these markets—suggests that these classes were more likely to experience anomalies compared to more established asset classes. Extreme volatility related to commodity prices, currency movements, and changes in governments or policies all contributed to the higher volatility in Emerging Market Fixed Income and Equity. Even so, we believe that it is important to include relatively new asset classes in the portfolio mix when they offer the potential for return-enhancing or risk-mitigating characteristics.

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\(^6\) Commodity prices over the very long term (hundreds of years) tend to move in overall bull and bear cycles, some lasting decades. These are super-cycles.

\(^7\) A measure of volatility surrounding the outcome of an investment decision.

\(^8\) One hundred basis points equal 1%.
We overestimated the return for commodities by 10%, which, although relatively large on an absolute basis, is less than one standard deviation away from its realized return over the 10-year time period. We believe that this is the result of a bear supercycle that took place in the period beginning in the 2010s (when West Texas Intermediate oil, for example, dropped from $110 per barrel to $26 per barrel). The long-standing bear market in commodities lowered the actual payoff relative to the historical returns that were observed in 2009. Another observation in the 10 years of data from 2009-2018 that we believe is unlikely to be repeated in the next market cycle is that Sharpe ratios in many fixed-income asset classes have been very high. This likely is the product of artificially low interest rates, due to global central bank intervention in the wake of the financial crisis.

Chart 5. CMA volatility and return assumptions align with subsequent historical asset class returns

Sources: Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. FI = Fixed Income. DM = Developed Markets. In this chart, asset classes were ranked by CMA standard deviation from left to right. Return and standard deviation are annualized. For illustrative purposes only. Hypothetical returns represent our estimate of likely average returns over the time period shown above. They do not represent the returns that an investor should expect in any particular year. Expected returns for each asset class can be conditional on economic scenarios; in the event a particular scenario comes to pass, actual returns could be significantly higher or lower than forecasted. In an index is unmanaged and not available for direct investing. Past performance is no guarantee of future results. Please see Chart 2 on page 2 for the names of the indices representing the asset classes. Please see the end of this report for the definition of the indices and a description of the asset class risks.

The Sharpe ratio measures the additional amount of return that an investor could expect to receive for taking on additional risk.
A hypothetical diversified portfolio has outperformed global equity and global bonds on a risk-adjusted basis over the long term. Yet, the rankings may fluctuate over shorter time frames (i.e., global equity outperformed the diversified portfolio in 2018).

In recent years, outperformance of U.S. assets compared to international equities and fixed income has contributed to better performance for portfolios geared toward U.S. assets only. However, looking at longer time frames, a more globally diversified portfolio has outperformed.

Table 1. A hypothetical diversified portfolio has outperformed over the 15- and 20-year period shown

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>1-year return (%)</th>
<th>3-year annualized return (%)</th>
<th>5-year annualized return (%)</th>
<th>10-year annualized return (%)</th>
<th>15-year annualized return (%)</th>
<th>20-year annualized return (%)</th>
<th>20-year cumulative return (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate Income 4AG w/o PC</td>
<td>-1.70</td>
<td>3.72</td>
<td>3.25</td>
<td>5.92</td>
<td>5.13</td>
<td>5.57</td>
<td>195.45</td>
</tr>
<tr>
<td>Moderate Growth &amp; Income 4AG w/o PC</td>
<td>-4.74</td>
<td>5.56</td>
<td>4.23</td>
<td>8.50</td>
<td>6.49</td>
<td>6.66</td>
<td>262.72</td>
</tr>
<tr>
<td>Moderate Growth 4AG w/o PC</td>
<td>-7.33</td>
<td>6.56</td>
<td>4.61</td>
<td>10.00</td>
<td>7.15</td>
<td>6.95</td>
<td>282.95</td>
</tr>
<tr>
<td>60% Global Equity/40% Global Fixed Income</td>
<td>-5.68</td>
<td>5.67</td>
<td>3.51</td>
<td>7.35</td>
<td>5.75</td>
<td>5.01</td>
<td>166.02</td>
</tr>
<tr>
<td>60% U.S. Equity/40% U.S. Fixed Income</td>
<td>-2.26</td>
<td>6.52</td>
<td>6.22</td>
<td>9.48</td>
<td>6.51</td>
<td>5.59</td>
<td>196.80</td>
</tr>
<tr>
<td>Global Equity</td>
<td>-8.93</td>
<td>7.18</td>
<td>4.82</td>
<td>10.05</td>
<td>6.75</td>
<td>5.02</td>
<td>166.57</td>
</tr>
<tr>
<td>Global Fixed Income</td>
<td>-1.36</td>
<td>2.99</td>
<td>1.20</td>
<td>2.77</td>
<td>3.48</td>
<td>4.01</td>
<td>119.49</td>
</tr>
</tbody>
</table>

Sources: Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. Global Equity represented by MSCI All Country World Index. Global Fixed Income represented by Bloomberg Barclays Multiverse Index. U.S. Equity represented by S&P 500 Index. U.S. Fixed Income represented by Bloomberg Barclays U.S. Aggregate Bond Index. Shading represents the best-performing asset class or portfolio on risk-adjusted basis. The “4AG” reference in this table refers to the four asset group portfolio. The phrase “w/o PC” = without private capital. Performance results for the 4 Asset Group Moderate Income, Moderate Growth & Income, Moderate Growth without Private Capital and the 60/40 Portfolios are hypothetical and for illustrative purposes only. This information does not predict or depict the performance of any investment or the likelihood of achieving any return on an investment nor does it constitute a recommendation to invest in any particular asset allocation strategy. An index is unmanaged and not available for direct investment. Unlike most asset class indices, HFR Index returns reflect deduction for fees. Because the HFR indices are calculated based on information that is voluntarily provided actual returns may be higher or lower than those reported. Hypothetical and past performance does not guarantee future results. Please see the end of the report for the composition of the Portfolios, the risks associated with the representative asset classes and the definitions of the indices.
When we construct portfolio allocations, we use CMAs to assemble an efficient portfolio allocation—that is, one that we believe can deliver the highest hypothetical expected return for a given level of risk. Looking at the risk-adjusted returns, or Sharpe ratios, the hypothetical Moderate Growth & Income four asset group without private capital (MGI 4AG) portfolio has a better Sharpe ratio than both the indices representing global equities and global fixed income over most time frames. The strategic allocations are designed for a 10- to 15-year time horizon, which means that global equities or global fixed income may outperform over a short time frame. Yet, over longer time periods, mixing these asset classes historically has resulted in more efficient portfolios. Additionally, the more broadly diversified hypothetical MGI 4AG portfolio achieved better risk-adjusted returns than a narrowly diversified 60% global equity/40% global fixed income portfolio.

Table 2. Diversification may offer better risk-adjusted returns than single asset groups

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>1-year Sharpe ratio</th>
<th>3-year Sharpe ratio</th>
<th>5-year Sharpe ratio</th>
<th>10-year Sharpe ratio</th>
<th>15-year Sharpe ratio</th>
<th>20-year Sharpe ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate Growth &amp; Income 4AG w/o PC</td>
<td>-0.87</td>
<td>0.74</td>
<td>0.59</td>
<td>0.96</td>
<td>0.59</td>
<td>0.54</td>
</tr>
<tr>
<td>60% Global Equity/40% Global Fixed Income</td>
<td>-0.91</td>
<td>0.67</td>
<td>0.41</td>
<td>0.71</td>
<td>0.45</td>
<td>0.32</td>
</tr>
<tr>
<td>Global Equity</td>
<td>-0.80</td>
<td>0.58</td>
<td>0.39</td>
<td>0.66</td>
<td>0.37</td>
<td>0.21</td>
</tr>
<tr>
<td>Global Fixed Income</td>
<td>-0.88</td>
<td>0.41</td>
<td>0.14</td>
<td>0.47</td>
<td>0.41</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Source: Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. Global Equity represented by MSCI All Country World Index. Global Fixed Income represented by Bloomberg Barclays Multiverse Index. Shading represents the best-performing asset class or portfolio on a risk-adjusted basis. Performance results for the 4 Asset Group Moderate Growth & Income without Private Capital and the 60/40 Portfolios are hypothetical and for illustrative purposes only. This information does not predict or depict the performance of any investment or the likelihood of achieving any return on an investment nor does it constitute a recommendation to invest in any particular asset allocation strategy. An index is unmanaged and not available for direct investment. Unlike most asset class indices, HFR Index returns reflect deduction for fees. Because the HFR indices are calculated based on information that is voluntarily provided actual returns may be higher or lower than those reported. Hypothetical and past performance does not guarantee future results. MSCI All Country World Index (ACWI) is a market capitalization weighted index that captures large and mid-cap representation across 23 developed markets and 24 emerging market countries. Bloomberg Barclays Multiverse Index provides a broad-based measure of the global fixed-income bond market. Please see the end of the report for the composition of the Portfolios, the risks associated with the representative asset classes.
Table 3. Hedge funds have achieved higher risk adjusted returns over most time periods, aiding performance for a hypothetical four-asset group portfolio

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>1-year Sharpe ratio</th>
<th>3-year Sharpe ratio</th>
<th>5-year Sharpe ratio</th>
<th>10-year Sharpe ratio</th>
<th>15-year Sharpe ratio</th>
<th>20-year Sharpe ratio</th>
<th>25-year Sharpe ratio</th>
<th>Since 1990 Sharpe ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate Growth &amp; Income 4AG w/o PC</td>
<td>-0.87</td>
<td>0.74</td>
<td>0.59</td>
<td>0.96</td>
<td>0.59</td>
<td>0.54</td>
<td>0.58</td>
<td>0.94</td>
</tr>
<tr>
<td>Moderate Growth &amp; Income 3AG</td>
<td>-0.84</td>
<td>0.74</td>
<td>0.60</td>
<td>0.96</td>
<td>0.58</td>
<td>0.51</td>
<td>0.55</td>
<td>0.84</td>
</tr>
<tr>
<td>Global Hedge Funds</td>
<td>-0.81</td>
<td>0.79</td>
<td>0.57</td>
<td>0.99</td>
<td>0.80</td>
<td>0.98</td>
<td>1.15</td>
<td>1.44</td>
</tr>
</tbody>
</table>

Sources: Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. Performance results for the 4 Asset Group Moderate Growth & Income without Private Capital and the 3AG Moderate Growth & Income Portfolios are hypothetical and for illustrative purposes only. This information does not predict or depict the performance of any investment or the likelihood of achieving any return on an investment nor does it constitute a recommendation to invest in any particular asset allocation strategy or fund. An index is unmanaged and not available for direct investment. Unlike most asset class indices, HFR Index returns reflect deduction for fees. Because the HFR indices are calculated based on information that is voluntarily provided actual returns may be higher or lower than those reported. Hedge funds are not suitable for all investors and are only open to "accredited" or "qualified purchasers" within the meaning of US securities laws. Hypothetical and past performance does not guarantee future results. Please see the end of the report for the composition of the Portfolios, the risks associated with the representative asset classes and the definitions of the indices.

- **Risk-adjusted performance (Sharpe ratio) for the hypothetical MGI 4AG portfolio tends to outperform the hypothetical 3AG portfolio counterparts.** Adding the exposure to traditional hedge funds historically has reduced volatility of returns over time. However, hedge funds are not appropriate for all investors.

Compared to the hypothetical three asset group Moderate Growth & Income (MGI 3AG) portfolio, the hypothetical MGI 4AG portfolio achieved better risk-adjusted returns over a longer time period, due to the higher returns and lower volatility experienced by hedge funds (as represented by the HFRI Fund Weighted Composite Index) in the 1990s. In one, three, and five year time periods the hypothetical 3AG and 4AG MGI portfolios achieved similar risk-adjusted returns to hedge funds, since Sharpe ratios have come down from the highs seen in the 1990s.

- **Correlations (the tendency of asset classes to move up and down in different directions) tend to increase in down markets.** Asset class convergence also tends to increase in down markets.

Over an extended period of time, correlations typically are lower as several market cycles may be included. When comparing correlations over the past 10 years and the past 25 years, it is apparent that the longer-term correlations show a better mix of lower- and higher-correlated asset classes, while the 10-year correlations are higher for each asset class.

Table 4. Correlations were higher on average over the past 10 years

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Average 25-year correlations</th>
<th>Average 10-year correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Alternatives</td>
<td>0.02</td>
<td>-0.06</td>
</tr>
<tr>
<td>U.S. Inv Grade FI</td>
<td>0.14</td>
<td>0.18</td>
</tr>
<tr>
<td>DM ex-U.S. FI</td>
<td>0.20</td>
<td>0.43</td>
</tr>
<tr>
<td>High Yield FI</td>
<td>0.46</td>
<td>0.52</td>
</tr>
<tr>
<td>Emerging Markets FI</td>
<td>0.43</td>
<td>0.53</td>
</tr>
<tr>
<td>U.S. Large Cap Equity</td>
<td>0.50</td>
<td>0.53</td>
</tr>
<tr>
<td>DM ex-U.S. Equity</td>
<td>0.54</td>
<td>0.60</td>
</tr>
<tr>
<td>Emerging Markets Equity</td>
<td>0.52</td>
<td>0.61</td>
</tr>
<tr>
<td>Public Real Estate</td>
<td>0.52</td>
<td>0.60</td>
</tr>
<tr>
<td>Commodities</td>
<td>0.52</td>
<td>0.60</td>
</tr>
<tr>
<td>Global Hedge Funds</td>
<td>0.52</td>
<td>0.56</td>
</tr>
</tbody>
</table>

Sources: Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. Green shading represents higher average correlations. Red shading represents lower average correlations. Average correlation is calculated as the average of the correlation between an asset class and the other 10 asset classes listed. Table information is for illustrative purposes only. There is no direct correlation between a hypothetical investment and the anticipated performance of a fund. Correlation between a fund’s performance and the performance of an index may be affected by the fund’s expenses, changes in the composition of the index, the timing of purchases and redemptions of the fund’s interests, among other factors. Correlations represent past performance. Past performance is no guarantee of future results. An index is unmanaged and not available for direct investment. There is no guarantee that future correlations between indices or an index and a fund will remain the same. Please see Chart 2 on page 2 for the names of the indices representing the asset classes. Please see the end of this report for the risks associated with the representative asset classes and for the definitions of the indices.
How do correlations between asset class effect diversification?

During the current bull market, correlations have been above average—with both U.S. stocks and bonds posting positive returns for much of the recovery. A well-diversified portfolio may have underperformed a simple blend of U.S. stocks and bonds. However, in times of average correlations and below average correlations, we believe a diversified portfolio should outperform a simple benchmark index as correlations start to fall.

Chart 6. Correlations are starting to return to average levels

Sources: Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. Average correlation is the average of the 60-month correlation of monthly changes in the S&P 500 Index with the monthly changes in 11 major asset classes. Major asset classes: Investment Grade Fixed Income: Bloomberg Barclays U.S. Aggregate Bond Index; Cash Alternatives: Bloomberg Barclays U.S. Treasury Bill 1-3 Months; High Yield Fixed Income: Bloomberg Barclays U.S. Corporate High Yield Index; Emerging Markets Fixed Income: JPMorgan GBI Global Ex-U.S. TR USD Index; Developed Market Fixed Income: JPMorgan EMBI Global TR USD Index; Mid Cap Equities: Russell Mid Cap TR USD Index; Small Cap Equities: Russell 2000 Index; Developed Market ex-U.S. Equities: MSCI EAFE GR USD Index; Emerging Market Equity: MSCI Emerging Market GR USD Index; REITs: FTSE EPRA/NAREIT Developed TR USD Index; Commodities: Bloomberg Commodities Index; Hedge Funds: HFRI Fund Weighted Composite Index. For illustrative purposes only. Please see Table 4 above for important information on correlation. An index is unmanaged and not available for direct investment. Past performance is no guarantee of future results. Please see the end of this report for the risks associated with the representative asset classes and for the definitions of the indices.
Looking at the most recent two years, correlations in 2018 (a down year for most asset classes) were higher than in 2017 (an up year for most asset classes). Correlations also rose during the last bear market and were higher on average than in 2018. Some asset classes, like commodities, tended to have lower correlations even in times of market stress and could be used as diversifiers to help mitigate risk when many other asset classes are down. Keep in mind, investing in commodities is not suitable for all investors.

Typically, in times of economic expansion and when equities are in a bull market, equities outperform fixed income. However, in 2018 (a period of economic expansion), global equity markets corrected lower, and fixed income asset classes outperformed equities. We do not believe that this points to the end of the expansion. Rather, we see it as a sign that the market may experience higher volatility after a few years of below-average volatility.

Table 5. Correlations are higher on average during down years

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Average 2017 correlations</th>
<th>Average 2018 correlations</th>
<th>Average correlations during last bear market</th>
</tr>
</thead>
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<tr>
<td>Cash Alternatives</td>
<td>-0.11</td>
<td>-0.11</td>
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<td>U.S. Inv Grade FI</td>
<td>0.25</td>
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<td>DM ex-U.S. FI</td>
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<tr>
<td>High Yield FI</td>
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<td>0.30</td>
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<tr>
<td>Emerging Markets FI</td>
<td>0.25</td>
<td>0.23</td>
<td>0.64</td>
</tr>
<tr>
<td>U.S. Large Cap Equity</td>
<td>0.23</td>
<td>0.40</td>
<td>0.61</td>
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<td>DM ex-U.S. Equity</td>
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<td>0.68</td>
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<td>Emerging Markets Equity</td>
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<td>Public Real Estate</td>
<td>0.27</td>
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<td>Commodities</td>
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<td>0.16</td>
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<tr>
<td>Global Hedge Funds</td>
<td>0.29</td>
<td>0.45</td>
<td>0.56</td>
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</table>

Sources: Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. Green shading represents higher average correlations. Red shading represents lower average correlations. Last bear market: October 2007 - March 2009. Average correlation is calculated as the average of the correlation between an asset class and the other 10 asset classes listed. For illustrative purposes only. Please see Table 4 above for important information on correlation. An index is unmanaged and not available for direct investment. Past performance is no guarantee of future results. Please see Chart 2 on page 2 for the names of the indices representing the asset classes. Please see the end of the report for the risks associated with the representative asset classes and the definitions of the indices.
Low correlations can potentially reduce portfolio volatility (Chart 6). In our allocations, the correlations among asset classes within our hypothetical portfolios helped to reduce more than 1% (in absolute terms) of portfolio volatility across investment objectives (Chart 7, top panel).

For example, in the Moderate Income allocation, from 2001 to 2018, portfolio volatility was reduced to 2.2% from 3.5% as a result of asset-class correlation—which translated to a 37% reduction in the allocation’s total volatility. Over the same period, this volatility reduction ratio was 23% for the hypothetical Moderate Growth & Income and 15% for Moderate Growth (Chart 7, bottom panel).

2017 and 2018 were years in which diversification worked well in a historical context. In 2017, the equity market rally and reduction in correlations, along with the low-risk environment, helped to diversify as much as 30-40% of total volatility across hypothetical portfolios (see green bars in Chart 7). It was a historical high for a diversified portfolio over the past 20 years (Chart 6). In 2018, asset correlations increased, when massive sell-offs roiled the markets, but the amount of volatility diversified in our hypothetical portfolios was still close to historical average levels (see purple bars in Chart 7).
How diversification can potentially benefit a portfolio during recessions and market crisis events?

Investors frequently debate whether diversification works during a recession or a significant market event—when the same types of risk and fear propagate across markets and asset correlations increase significantly. Although we see correlations rising during periods of market stress, we also note that diversification across asset classes delivers expected benefits during such events. To demonstrate this, we examined our strategic portfolios' performance during various historical exogenous events. We found that the diversified portfolio allocations consistently ranked near the middle of the individual asset classes in terms of loss and elevated volatility. In down markets, the losses and volatility levels of our portfolio allocations were more subdued than those of the riskier asset classes. Keep in mind that crisis events rarely happened and often were quick to reverse. Therefore, one of the greatest benefits of holding a diversified portfolio may be mitigating some of the sharp downside that was experienced by the riskier asset classes, while maintaining some exposure to them for long-term growth. In other words, holding a more concentrated portfolio in risky assets could result in greater portfolio downturns when markets correct. Holding a diversified portfolio that helps to mitigate downside risk could be advantageous, despite higher correlations during times of market stress. Based on our findings, we continue to believe that investors should follow an appropriate asset allocation strategy through these short-term dislocations.

Chart 9. Diversification has helped to mitigate risk in extreme market events

Sources: FIS APT, Wells Fargo Investment Institute; December 31, 2018. Extreme market environments analyzed included the Asian Crisis in 1997; the Russian Default in 1998; the Long-Term Capital Management Collapse in 1998; September 11 terrorist attack in 2001; the WorldCom crisis in 2002; the mortgage crisis in 2007; the 2008 financial crisis; the 2010 euro sovereign crisis; the 2011 Japanese earthquake; and the sovereign downgrade crisis in 2011. MI = Moderate Income 4AG without private capital portfolio; MGI = Moderate Growth & Income 4AG without private capital portfolio; MG = Moderate Growth 4AG without private capital portfolio. For illustrative purposes only. There are difficulties in assessing hypothetical asset class performance during certain extreme market environments, in part, because these results do not represent actual trading and cannot completely account for the impact financial risk has on actual trading. Keep in mind, it might not be possible to replicate a historical event because instruments existing today did not exist in the time of the historical event and the event may not be representative for today’s markets because of changes in regulation or market environment. An actual portfolio or account will invest in different economic conditions during periods with different volatility and in different securities than those incorporated in the hypothetical performance shown above. It is possible there are other scenarios, or crisis events which could have resulted in heavier losses for a portfolio than those that occurred during the time periods shown. Diversification does not guarantee investment returns or eliminate risk of loss. There is no guarantee any asset class will perform in a similar manner in the future. An index is unmanaged and not available for direct investment. Hypothetical and past performance is no guarantee of future results. Please see the end of the report for the composition of the hypothetical Portfolios, the risks associated with the representative asset classes and the definitions of the indices.
What impact can emotional decisions have on achieving financial goals?

Behavioral finance considers the role that psychology and emotions play in investment decision-making. It recognizes that individuals are not always rational when making investment decisions—and that all investors are not equally informed. Some common biases that are related to asset allocation strategy include:

- **Chasing winners and losers**—Chasing the previous year’s top-performing asset class or worst-performing investment is a strategy that some investors have tended to follow. We have found that, historically, following the best-performing asset class (hot-hand fallacy) and worst-performing investment (gambler’s fallacy) did not result in performance that exceeded the return of the hypothetical model MGI portfolio over a 15-year time frame.

- **Recency bias**—Investors tend to use recent experience as a baseline for risk and return expectations. As a bull market charges ahead, some investors forget about the times when it was not in place. Recent memory could suggest that the equity market should continue increasing. Consequently, such investors continue to purchase assets at high prices; then suddenly, the stock market drops. Unprepared investors may then wonder how they missed the peak. Investors experience a similar situation in down-trending markets—assuming that the market will continue to decline, when it may be reaching a bottom. Instead of considering a long-term view in which the market fluctuates, investors can behave as though current trends will not change. Humans, in general, tend to have short memories, particularly, it appears, when it comes to investing and market cycles. And recency bias tends to be exacerbated during large market swings, up or down. Timing the market typically is a futile exercise. Instead, in our view, investors should consider both possibilities (market rallies and downturns) as potential outcomes and plan accordingly.

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**Chart 10. Chasing past winners or losers has not been a successful strategy**

Sources: Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. Indexed to 100 as of December 31, 2001. The top performer portfolio consists of the top performing asset class of the previous year invested 100% in the portfolio in the current year. The bottom performer portfolio consists of the bottom performing asset class of the previous year invested 100% in the portfolio in the current year. Portfolio compositions are provided at the end of this report. Performance results for the Moderate Growth & Income 4 Asset Group without Private Capital Portfolio and the top and bottom-performer portfolios are hypothetical and do not represent an actual portfolio in existence now or during the time period shown. Index return information is provided for illustrative purposes only. Index returns do not represent investment performance or the results of actual trading. Index returns represent general market results, assume the reinvestment of dividends and other distributions and do not reflect deduction for fees, expenses or taxes applicable to an actual investment. Unlike most asset class indices, HFR Index returns reflect deduction for fees. Because the HFR indices are calculated based on information that is voluntarily provided actual returns may be lower than those reported. An index is unmanaged and not available for direct investment. Hypothetical and past performance do not guarantee of future results. Please see the end of the report for the composition of the MGI w/o PC Portfolio the risks associated with the representative asset classes and the definitions of the indices.

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**Investor implications**

- Diversification adds value over long term.
- It is important to select the appropriate strategic asset allocation for an investor’s goals.
- Things change over time, so it is essential to revisit, review, and rebalance.

We recommend that investors build a globally diversified portfolio and then review and rebalance their holdings regularly—annually at a bare minimum. Regular rebalancing can help to significantly reduce risk while potentially offering a return that is similar to that of a portfolio that is not rebalanced. Table 4 shows that, by rebalancing annually, a 60% U.S. equity/40% U.S. bond portfolio experiences 15% less volatility and has a similar return to that of a portfolio that was not rebalanced. Additionally, a portfolio mix with exposure to a wide variety of asset classes can help to smooth out performance over time. With that in mind, we believe that it is important for investors to:

- Select an asset allocation strategy that addresses short- and long-term investment needs
- Recognize their ability and willingness to assume risk
- Maintain appropriate levels of liquidity to deal with periods of volatility
- Align the time horizon of their investment strategy with the time horizon of their financial goals—developing plans (and investments) for short-, mid-, and long-term goals.

Over time, specific assets in a portfolio may become overvalued or undervalued. Rebalancing the portfolio back to strategic target weights enforces the discipline of buying risk when it is inexpensive and selling risk when it is expensive. In other words, this discipline helps to facilitate buying low and selling high. Moreover, investors should not let emotional reactions to headline hyperbole or unfounded market fears derail a disciplined investment strategy. Investors who attempt to time the market—or react to a single market event or an overstated headline—likely will get caught on the wrong side of a market move.

**Table 6. The importance of rebalancing**

<table>
<thead>
<tr>
<th></th>
<th>Index</th>
<th>Weighting as of</th>
<th>Return (%)</th>
<th>Standard Deviation (%)</th>
<th>Sharpe Ratio</th>
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<tr>
<td><strong>Annual rebalancing</strong></td>
<td>S&amp;P 500 Index</td>
<td>12/31/2018</td>
<td>60%</td>
<td>8.29</td>
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<td></td>
<td>Bloomberg Barclays U.S. Aggregate Bond Index</td>
<td>40%</td>
<td></td>
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<tr>
<td><strong>No rebalancing</strong></td>
<td>S&amp;P 500 Index</td>
<td>12/31/2018</td>
<td>79%</td>
<td>8.24</td>
<td>9.98</td>
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<td></td>
<td>Bloomberg Barclays U.S. Aggregate Bond Index</td>
<td>21%</td>
<td></td>
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</tr>
</tbody>
</table>

Sources: Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. *Index return information is provided for illustrative purposes only.* Index returns do not represent investment performance or the results of actual trading. Index returns reflect general market results, assume the reinvestment of dividends and other distributions, and generally do not reflect deduction for fees, expenses or taxes applicable to an actual investment. The S&P 500 Index is a market capitalization index composed of 500 stocks generally considered representative of the US stock market. The Bloomberg Barclays U.S. Aggregate Bond Index is a broad-based index that measures the investment grade, U.S. dollar-denominated, fixed-rate taxable bond market. An index is unmanaged and not available for direct investment. **Past performance does not guarantee future results.**

10 Rebalancing is reweighting the portfolio to original target allocations.
Investors must recognize that in any given period of time, one asset class will outperform all others. As the quilt chart in Chart 11 demonstrates, the top-performing and worst-performing asset class changes from year to year. That does not mean that investors should scrap a diversification strategy. A diversified portfolio, such as MGI, can help limit drawdowns. This means that the portfolio does not have to work as hard to recover from significant losses. Using diversification can also help promote compounding through more consistent and smoother returns over time. In our opinion, an appropriate asset allocation that aligns with an investor’s return objective, risk tolerance, and time horizon is the optimal way to capture upside potential and mitigate downside risk over time.


| Year | Global Equities | US Large Cap | US Small Cap | US Mid Cap | International Equities | Cash | Hedge Funds | Commodities | Real Estate | Fixed Income | Alternative | Public Real Estate | Total
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<td>94.5%</td>
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Sources: Morningstar Direct, Wells Fargo Investment Institute; December 31, 2018. Average is calculated as geometric mean. Average is calculated as 15 years from 2004–2018. Portfolios are rebalanced quarterly. The MGI w/o PC and 60/40 Portfolios are hypothetical. An index is unmanaged and not available for direct investment. Hypothetical and past performance do not guarantee future results. Please see the end of the report for the composition of the MGI w/o PC and 60/40 Portfolios the risks associated with the representative asset classes and the definitions of the indices. Hypothetical 60%/40% Portfolio: Composed of 60% S&P 500 Index and 40% Bloomberg Barclays U.S. Aggregate Bond Index Hypothetical Moderate Growth & Income (MGI-4AG w/o PC) Cash Alternatives: Bloomberg Barclays U.S. Treasury Bills (1–3 month) Commodities; Bloomberg Commodity Index; Emerging-Market Equities; MSCI Emerging Markets Index; Developed Ex-S. Fixed Income: JP Morgan GBI Global Ex. US Index; Emerging-Market Fixed Income: JPM EMBI Global Index; High-Yield Fixed Income: Bloomberg Barclays U.S. Corporate; High-Yield Bond Index; Inflation-CPI: IA SBDI U.S. Inflation Index; Developed Ex-S. Equities: MSCI EAFE Index; Investment-Grade Fixed Income: Bloomberg Barclays U.S. Aggregate; Bond Index; U.S. Large-Cap Equities: S&P 500 Index; U.S. Mid-Cap Equities: Russell MidCap Index; U.S Small-Cap Equities: Russell 2000 Index; Public Real Estate: FTSE EPRA/NAREIT Developed Index; Hedge Funds: HFRI Fund Weighted Composite Index.
Tracie McMillion, CFA
Head of Global Asset Allocation Strategy
Global Investment Strategy
Wells Fargo Investment Institute

Tracie McMillion is the head of global asset allocation strategy and leads the development of global investment strategy. In her current role, she oversees the creation of asset allocation recommendations and writes economic and market commentary and analysis. She oversees the creation of asset allocation recommendations and writes economic and market commentary and analysis. Ms. McMillion has more than 20 years of experience in financial services. Tracie earned a Bachelor of Arts in Economics and a Master of Business Administration from the College of William and Mary in Virginia. Ms. McMillion is located in Winston-Salem, North Carolina.

Chao Ma, PhD, CFA, FRM
Global Portfolio and Quantitative Strategist
Global Portfolio Management
Wells Fargo Investment Institute

In his role, Dr. Chao Ma leads the research, development and implementation of WFII’s top-down and systematic strategy and framework for asset allocation, investment strategy, portfolio construction and risk management practice. Dr. Ma develops methodology for Capital Market Assumptions and designs systematic optimization approach for Strategic, Cyclical and Tactical asset allocation as well as portfolio construction. Dr. Ma earned his Doctor of Philosophy and Master of Science from California Institute of Technology (Caltech), as well as Bachelor of Science—with Honors—from Beijing Institute of Technology. Dr. Ma is located in Saint Louis, Missouri.

Michael Taylor, CFA
Investment Strategy Analyst
Global Investment Strategy
Wells Fargo Investment Institute

Michael Taylor’s role focuses on global asset allocation strategy and economic and market analysis. Mr. Taylor has more than 20 years of experience in financial services and has spent the past 16 years at Wells Fargo in various roles within wealth and brokerage. Mr. Taylor earned a Bachelor of Science in Chemistry from the University of Minnesota Institute of Technology, a Bachelor of Arts in Chinese and a Bachelor of Arts in Russian both from the University of Minnesota College of Liberal Arts, and a Master of Business Administration from the University of Minnesota Carlson School of Management. He is based in Houston.

Veronica Willis
Investment Strategy Analyst
Global Investment Strategy
Wells Fargo Investment Institute

In her role, Veronica Willis assists in research and development of asset allocation recommendations and analysis of the economy and financial markets. Prior to her current role, she served as a research analyst for strategy around developed and emerging countries, commodities, and currencies. She began her career at Wells Fargo in 2012. Ms. Willis earned a Bachelor of Arts in Mathematics with a concentration in Statistics and a Bachelor of Arts in Spanish with a minor in Economics from Washington University in St. Louis. She is based in St. Louis.
Investment or asset class might achieve. The risks associated with the representative asset classes discussed in this report include:

These risks are heightened in emerging and frontier markets. Although free from credit risk, they are subject to interest rate risk.

liquidity, volatility, the use of derivative instruments and other significant risks such as Equity Hedge, Event Driven, Macro and Relative Value may expose investors to risks such as short selling, leverage, counterparty, may be no secondary market for alternative investment interests and transferability may be limited or even prohibited. Hedge fund strategies, investments to potentially improve the risk-reward profiles of their portfolios, the investments themselves can carry significant risks. There may be no secondary market for alternative investment interests and transferability may be limited or even prohibited. Hedge fund strategies, such as Equity Hedge, Event Driven, Macro and Relative Value may expose investors to risks such as short selling, leverage, counterparty, liquidity, volatility, the use of derivative instruments and other significant risks.

Hypothetical 60/40 Portfolios:

**Compositions**

**U.S. 60/40 Portfolio:** 60% S&P 500 Index; 40% Bloomberg Barclays US Aggregate Bond Index

**Global 60/40 Portfolio:** 60% MSCI All Country World Index; 40% Bloomberg Barclays Multiverse Index
Hypothetical Four-asset-group portfolios without private capital

**Moderate Income:**
3% U.S. Treasury Bill 1–3 Month Index, 14% Bloomberg Barclays U.S. Aggregate (1–3 year), 25% Bloomberg Barclays U.S. Aggregate (5–7 year), 7% Bloomberg Barclays U.S. Aggregate (10+ year), 7% Bloomberg Barclays U.S. Corporate High Yield Bond Index, 6% JPM GBI Global Ex-U.S. TR USD Index, 5% JPM EMBI Global TR USD Index, 10% S&P 500 Index, 2% Russell Mid Cap TR USD Index, 4% MSCI EAFE GR USD Index, 5% FTSE EPRA/NAREIT Developed TR USD Index, 4% HFRI Relative Value Arbitrage Index, 5% HFRI Macro Index, 3% HFRI Event Driven Index.

**Moderate Growth and Income:**
3% Bloomberg Barclays U.S. Treasury Bill 1–3 Month Index, 11% Bloomberg Barclays U.S. Aggregate (5–7 year) Bond Index, 6% Bloomberg Barclays U.S. Aggregate (10+ year) Bond Index, 6% Bloomberg Barclays U.S. Corporate High Yield Bond Index, 3% JPM GBI Global Ex-U.S. TR USD Index, 5% JPM EMBI Global TR USD Index, 20% S&P 500 Index, 8% Russell Mid Cap TR USD Index, 6% Russell 2000 Index, 5% MSCI EAFE GR USD Index, 5% MSCI EM GR USD, 5% FTSE EPRA/NAREIT Developed TR USD Index, 2% Bloomberg Commodities Index, 3% HFRI Relative Value Arbitrage Index, 6% HFRI Macro Index, 4% HFRI Event Driven Index, 2% HFRI Equity Hedge Index.

**Moderate Growth:**
2% Bloomberg Barclays U.S. Treasury Bill 1–3 Month Index, 2% Bloomberg Barclays U.S. Aggregate (10 year), 3% Bloomberg Barclays U.S. Corporate High Yield Bond Index, 3% JPM EMBI Global TR USD Index, 25% S&P 500 Index, 13% Russell Mid Cap TR USD Index, 12% Russell 2000 Index, 11% MSCI EAFE GR USD Index, 10% MSCI EM GR USD, 5% FTSE EPRA/NAREIT Developed TR USD Index, 2% Bloomberg Commodities Index, 2% HFRI Relative Value Arbitrage Index, 6% HFRI Macro Index, 2% HFRI Event Driven Index, 2% HFRI Equity Hedge Index.

Three-asset-group portfolios

**Hypothetical Moderate Growth and Income:**
3% Bloomberg Barclays U.S. Treasury Bill 1–3 Month Index, 4% Bloomberg Barclays U.S. Aggregate (1–3 year), 16% Bloomberg Barclays U.S. Aggregate (5–7 year), 7% Bloomberg Barclays U.S. Aggregate (10+ year), 6% Bloomberg Barclays U.S. Corporate High Yield Bond Index, 3% JPM GBI Global Ex-U.S. TR USD Index, 5% JPM EMBI Global TR USD Index, 21% S&P 500 Index, 9% Russell Mid Cap TR USD Index, 8% Russell 2000 Index, 6% MSCI EAFE GR USD Index, 5% MSCI EM GR USD, 5% FTSE EPRA/NAREIT Developed TR USD Index, 2% Bloomberg Commodities Index.

**Index Definitions**

**Investment Grade Fixed Income:** Bloomberg Barclays U.S. Aggregate Bond Index is composed of the Bloomberg Barclays U.S. Government/Credit Index and the Bloomberg Barclays U.S. Mortgage-Backed Securities Index and includes Treasury issues, agency issues, corporate bond issues, and mortgage-backed securities.

**High Yield Fixed Income:** Bloomberg Barclays U.S. Corporate High Yield Bond Index covers the U.S.-dollar-denominated, non-investment-grade, fixed-rate, taxable corporate bond market. Securities are classified as high yield if the middle rating of Moody’s, Fitch, and S&P is Ba1/BB+/BB= or below. Included issues must have at least one year until final maturity.

**Cash Alternatives/Treasury bills:** Bloomberg Barclays U.S. Treasury Bill (1–3 Month) Index is representative of money markets.

**Commodities:** Bloomberg Commodity Index is a broadly diversified index of commodity futures on 20 physical commodities, subdivided into energy, U.S. agriculture, livestock, precious metals, and industrial metals sectors. Commodity weights are derived in a manner that attempts to fairly represent the importance of a diversified group of commodities to the world economy.

**Developed Market Ex-U.S. Fixed Income:** JP Morgan Global Ex-U.S. Index (JPM GBI Global Ex-U.S.) is a total return, market-capitalization-weighted index, rebalanced monthly, consisting of the following countries: Australia, Germany, Spain, Belgium, Italy, Sweden, Canada, Japan, the United Kingdom, Denmark, the Netherlands, and France.

**Emerging Market Fixed Income:** JPM EMBI Global Index is a U.S.-dollar-denominated, investible, market-cap-weighted index representing a broad universe of emerging market sovereign and quasi-sovereign debt. While products in the asset class have become more diverse, focusing on both local currency and corporate issuance, there is currently no widely accepted aggregate index reflecting the broader opportunity set available, although the asset class is evolving. By using the same index provider as the one used in the developed market bonds asset class, there is consistent categorization of countries among developed international bonds (ex. U.S.) and emerging market bonds.
Developed Market Ex-U.S. Equities: MSCI EAFE Index (Europe, Australasia, Far East) Index (MSCI EAFE GR) is a free-float-adjusted market-capitalization-weighted index designed to measure the equity market performance of developed markets, excluding the U.S. and Canada.

Emerging Market Equities: MSCI Emerging Markets Index (MSCI EM GR) is a free-float-adjusted market-capitalization-weighted index designed to measure equity market performance of emerging markets.

U.S. Small Cap Equities: Russell 2000® Index measures the performance of the 2,000 smallest companies in the Russell 3000® Index, which represents approximately 8% of the total market capitalization of the Russell 3000 Index.

U.S. Mid Cap Equities: Russell Midcap® Index measures the performance of the 800 smallest companies in the Russell 1000® Index, which represent approximately 25% of the total market capitalization of the Russell 1000 Index.

U.S. Large Cap Equities: S&P 500 Index consists of 500 stocks chosen for market size, liquidity, and industry group representation. It is a market-value-weighted index with each stock's weight in the index proportionate to its market value.

Public Real Estate: FTSE EPRA/NAREIT Developed Index is designed to track the performance of listed real estate companies and REITs in developed countries worldwide.

HFRI Fund Weighted Composite Index is a fund-weighted (equal-weighted) index designed to measure the total returns (net of fees) of the approximately 2,000 hedge funds that comprise the Index. Constituent funds must have either $50 million under management or a track record of greater than 12 months. Substrategies include HFRI Event-Driven, Distressed/Restructuring Index, and HFRI Event-Driven (Total) Index.

HFRI Relative Value Index maintains positions in which the investment thesis is predicated on realization of a valuation discrepancy in the relationship between multiple securities. Managers employ a variety of fundamental and quantitative techniques to establish investment theses, and security types range broadly across equity, fixed income, derivative, and other security types.

HFRI Equity Hedge Index maintains positions both long and short in primarily equity and equity derivative securities. A wide variety of investment processes can be employed to arrive at an investment decision, including both quantitative and fundamental techniques; strategies can be broadly diversified or narrowly focused on specific sectors and can range broadly in terms of levels of net exposure, leverage employed, holding period, concentrations of market capitalizations, and valuation ranges of typical portfolios.

HFRI Macro Index is composed of a broad range of strategies in which the investment process is predicated on movements in underlying economic variables and the impact these have on equity, fixed income, hard currency, and commodity markets. Managers employ a variety of techniques, both discretionary and systematic analysis, combinations of top-down and bottom-up theses, quantitative and fundamental approaches, and long- and short-term holding periods. Although some strategies employ RV techniques, macro strategies are distinct from RV strategies in that the primary investment thesis is predicated on predicted or future movements in the underlying instruments rather than realization of a valuation discrepancy between securities.

HFRI Event Driven Index maintains positions in companies currently or prospectively involved in corporate transactions of a wide variety, including but not limited to mergers, restructurings, financial distress, tender offers, shareholder buybacks, debt exchanges, security issuance, and other capital structure adjustments. Security types can range from most senior in the capital structure to most junior or subordinated and frequently involve additional derivative securities. Event driven exposure includes a combination of sensitivities to equity markets, credit markets, and idiosyncratic, company-specific developments. Investment theses are typically predicated on fundamental characteristics (as opposed to quantitative) with the realization of the thesis predicated on a specific development exogenous to the existing capital structure.

Note: While the HFRI Indices are frequently used, they have limitations (some of which are typical of other widely used indices). These limitations include survivorship bias (the returns of the indices may not be representative of all the hedge funds in the universe because of the tendency of lower performing funds to leave the index); heterogeneity (not all hedge funds are alike or comparable to one another, and the index may not accurately reflect the performance of a described style); and limited data (many hedge funds do not report to indices, and, therefore, the index may omit funds, the inclusion of which might significantly affect the performance shown. The HFRI Indices are based on information self-reported by hedge fund managers that decide on their own, at any time, whether or not they want to provide, or continue to provide, information to HFR Asset Management, L.L.C. Results for funds that go out of business are included in the index until the date that they cease operations. Therefore, these indices may not be complete or accurate representations of the hedge fund universe, and may be biased in several ways. Returns of the underlying hedge funds are net of fees and are denominated in USD.

General Disclosures

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