Regime-Based Asset Allocation

The next step in the evolution of asset allocation

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Agenda

1. The path toward regime-based asset allocation
2. Regime dynamics and asset class behavior
3. Constructing portfolios in response to changes in macroeconomic expectations

The march towards Regime-Based Asset Allocation

Old School
- Stocks
- Bonds
- Cash

Rise of Alts
- Stocks
- Bonds
- Alternatives

Transition to Macro
- Growth assets
- Inflation hedge
- Deflation hedge

Source: Investment Strategy & Solutions Group
Asset classes and portfolio roles should be used in tandem

<table>
<thead>
<tr>
<th>Traditional Asset Classes</th>
<th>Growth</th>
<th>Inflation</th>
<th>Deflation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equity</strong></td>
<td>U.S. Equity</td>
<td>Energy Equity</td>
<td>Utilities Equity</td>
</tr>
<tr>
<td></td>
<td>Int’l Equity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EM Equity</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fixed Income</strong></td>
<td>High Yield</td>
<td>TIPS</td>
<td>Treasuries</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sovereign Debt</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High Quality Corp.</td>
</tr>
<tr>
<td><strong>Alternatives</strong></td>
<td>Private Equity</td>
<td>Real Estate</td>
<td>Specialty HF</td>
</tr>
<tr>
<td></td>
<td>Long-biased HF</td>
<td>Commodities</td>
<td>Interest Rate Products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Real Assets</td>
<td></td>
</tr>
</tbody>
</table>

Source: Investment Strategy & Solutions Group

A further refinement of the bucketing system

“Goldilocks economics” is too simplistic

A richer framework

Source: Investment Strategy & Solutions Group
Revisions in inflation expectations explain bond returns better than levels of inflation

Revisions in growth expectations explain stock returns better than forecast GDP growth
Revisions in Inflation and growth expectations combine to create regimes

Revisions to Inflation and Growth Expectations

Revisions to Inflation Expectations
Revisions to Growth Expectations


Regimes do not occur in cycles

The conventional image

40 years of regime transitions

Source: Investment Strategy & Solutions Group
Regime lengths have varied

The Too Cold regimes have been shorter than others – likely due to Fed action.

U.S. Stock market performance varied by regime

<table>
<thead>
<tr>
<th>Regime</th>
<th>Inflation</th>
<th>Growth</th>
<th>Frequency</th>
<th>Real Return</th>
<th>Contribution to Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too Hot</td>
<td>Rising</td>
<td>Falling</td>
<td>11%</td>
<td>-5.9%</td>
<td>-0.7%</td>
</tr>
<tr>
<td>Too Cold</td>
<td>Falling</td>
<td>Negative</td>
<td>7%</td>
<td>-21.6%</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Cooling</td>
<td>Falling</td>
<td>Falling</td>
<td>20%</td>
<td>12.0%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Warming</td>
<td>Steady/Rising</td>
<td>Steady/Rising</td>
<td>46%</td>
<td>7.5%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Perfection</td>
<td>Falling</td>
<td>Rising</td>
<td>16%</td>
<td>14.6%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>100%</td>
<td>6.0%</td>
<td>6.0%</td>
</tr>
</tbody>
</table>

Asset performance varied by regime

Average Asset Class Performance by Regime

Ordered by performance in Perfection Regime

Canadian equities suffered during Too Hot regimes

Average Asset Class Performance by Regime

Ordered by performance in Perfection Regime.
Our view of likely outperforming asset classes by regime

<table>
<thead>
<tr>
<th>Regime</th>
<th>Growth</th>
<th>Inflation</th>
<th>Deflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfection</td>
<td>Equities (led by consumer &amp; tech sectors) U.S., Int'l and EM</td>
<td>Nat. Resource Equity</td>
<td>Nat. Resource Equity</td>
</tr>
<tr>
<td></td>
<td>EM Equity Energy &amp; Industrial Sectors</td>
<td>Energy Stocks Utilities Stocks</td>
<td>Energy Stocks</td>
</tr>
<tr>
<td>Warming</td>
<td>High Yield</td>
<td>Inflation-Linked High Yield</td>
<td>Treasuries Global Bonds Corporate Bonds</td>
</tr>
<tr>
<td></td>
<td>Investment Grade</td>
<td></td>
<td>US TIPS Global Linkers</td>
</tr>
<tr>
<td>Cooling</td>
<td>Real Estate</td>
<td>Commodities Infrastructure Real Assets Private Equity Gold</td>
<td></td>
</tr>
<tr>
<td>Too Hot</td>
<td>Real Estate</td>
<td>Private Equity</td>
<td>Commodities Oil Gold</td>
</tr>
<tr>
<td>Too Cold</td>
<td>U.S. TIPS</td>
<td>Global Linkers</td>
<td>Specialty HF “Interest Rate Products”</td>
</tr>
</tbody>
</table>

Regime specific portfolios have very different allocations

Source: Investment Strategy & Solutions Group
Awareness of regimes can lead to better performance

We believe:
1. Insight into regime probabilities should lead to better performance.
2. A regime based asset allocation framework requires a systematic approach to estimating regime probabilities.
3. The estimated probabilities can be used to dynamically adjust portfolio exposures.

Source: Investment Strategy & Solutions Group. For more information please see ISSG's paper entitled “Great Expectations”.

Estimating probabilities of regimes

Source: Investment Strategy & Solutions Group. * Multinomial logistic regression models are typically used to predict the probabilities of different possible outcomes of a predefined, dependent variable, given a set of independent variables.
Constructing a dynamic RBAA strategy

Strategy Over/Under Weights Through Time

RBAA vs Institutional Portfolio Performance (Net of fees)

<table>
<thead>
<tr>
<th></th>
<th>RBAA Portfolio</th>
<th>Inst. Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annualized Return</td>
<td>9.5%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Annualized Risk</td>
<td>8.3%</td>
<td>11.5%</td>
</tr>
<tr>
<td>Risk Free Rate</td>
<td>4.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.67</td>
<td>0.34</td>
</tr>
</tbody>
</table>

Current RBAA forecasts reflect a relatively benign environment

<table>
<thead>
<tr>
<th>Regime</th>
<th>Inflation</th>
<th>Growth</th>
<th>Current Forecast Probability</th>
<th>Historical Average</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too Hot</td>
<td>Rising</td>
<td>Falling</td>
<td>28%</td>
<td>11%</td>
<td>17%</td>
</tr>
<tr>
<td>Too Cold</td>
<td>Falling</td>
<td>Negative</td>
<td>0%</td>
<td>7%</td>
<td>-7%</td>
</tr>
<tr>
<td>Cooling</td>
<td>Falling</td>
<td>Falling</td>
<td>35%</td>
<td>20%</td>
<td>15%</td>
</tr>
<tr>
<td>Warming</td>
<td>Steady/Rising</td>
<td>Steady/Rising</td>
<td>20%</td>
<td>46%</td>
<td>-26%</td>
</tr>
<tr>
<td>Perfection</td>
<td>Falling</td>
<td>Rising</td>
<td>17%</td>
<td>16%</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>100%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: Investment Strategy & Solutions Group  *Based on data from Greenwich Associates. Please see appendix for further information and index descriptions.
Current RBAA model position: Underweight nominal bonds and overweight inflation hedges

<table>
<thead>
<tr>
<th>Current Weight</th>
<th>Neutral Mix</th>
<th>Active Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Stocks</td>
<td>32%</td>
<td>30%</td>
</tr>
<tr>
<td>International Stocks</td>
<td>25%</td>
<td>20%</td>
</tr>
<tr>
<td>Emerging Market</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>REITs</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>Aggregate Bonds</td>
<td>18%</td>
<td>20%</td>
</tr>
<tr>
<td>US Treasuries</td>
<td>1%</td>
<td>10%</td>
</tr>
<tr>
<td>High Yield</td>
<td>0%</td>
<td>5%</td>
</tr>
<tr>
<td>15+ Year STRIPS</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>TIPS</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>Commodities</td>
<td>9%</td>
<td>5%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Investment Strategy & Solutions Group

Conclusion

We believe:

1. Regimes are important drivers of relative asset class performance.
   - They evolve due to changes in investors' expectations.
   - The transitions are not a simple cycle of heating and cooling.

2. A regime-based asset allocation framework can add value.
   - Systematically combines regime probabilities with regime contingent asset class performance.

3. Regime based asset allocation can be implemented across the entire portfolio or within asset classes.

Source: Investment Strategy & Solutions Group
Appendix

The Survey of Professional Forecasters is the oldest quarterly survey of macroeconomic forecasts in the United States. The survey began in 1968 and was conducted by the American Statistical Association and the National Bureau of Economic Research. The Federal Reserve Bank of Philadelphia took over the survey in 1990. The forecasted annual CPI inflation and GDP growth are an aggregation of the forecasted values for each of the next four quarters.

The MSCI EAFE index is widely accepted as a benchmark for international stock performance (excluding the United States and Canada), and measures the performance of the developed stock markets of Europe, Australia, and the Far East (EAFE). The index is an aggregate of 22 individual country indices that collectively represent most of the major stock markets of the world. The index series includes only markets, companies, and share classes available to foreign investors. It is designed to maximize flow and liquidity, minimize cross-country, and accurately reflect the market’s total size, industry composition, and size of stock. The index is calculated on a total return with the percentage change in price plus actual coupon income making up the total return. The index is rebalanced monthly.

S&P 500 Index is considered to be generally representative of the U.S. large capitalization stock market as a whole. It is an unwielded capitalization-weighted index of 500 commonly traded stocks designed to measure performance of the broad domestic economy through changes in the aggregate market value of those stocks. The index assumes reinvestment of dividends.

The FTSE EPRA/NAREIT US Real Estate Equity Index Series is designed to provide the most comprehensive assessment of overall industry performance, and includes all tax-qualified real estate investment trusts (REITs) that are listed on the New York Stock Exchange, the American Stock Exchange and the NASDAQ National Market List. The index constituents span the commercial real estate space across the US economy and provide investors with exposure to all investment and property sectors.

CPI Urban Consumers (seasonally adjusted) – Measures the change in the prices paid by urban consumers for a representative basket of goods and services.

GDP Revisions – The revised series for real GDP growth since 1947 is an aggregation of the forecasted values for each of the next four quarters. The data series includes only market, companies, and share classes available to foreign investors. It is designed to maximize flow and liquidity, minimize cross-country, and accurately reflect the market’s total size, industry composition, and size of stock. The index is calculated on a total return with the percentage change in price plus actual coupon income making up the total return. The index is rebalanced monthly.

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