MULTI-FACTOR STRATEGIES

SCIENTIFIC BETA MULTI-BETA MULTI-STRATEGY INDEXES

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# OUTLINE

1. Balancing Factors with Diversification  
2. Don’t Lose Sight of Diversification  
3. Taking the “Right” Risks  
4. Scientific Beta Methodology  
5. The Diversified Weighting Scheme
### BALANCING FACTORS WITH DIVERSIFICATION

- A potential problem with many existing smart beta strategies is an emphasis of factor exposure over diversification.

<table>
<thead>
<tr>
<th>Stock Selection</th>
<th>Weighting Scheme</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select stocks that exhibit particular factor</td>
<td>Use all stocks in benchmark index</td>
<td>Select stocks that exhibit particular factor</td>
</tr>
<tr>
<td>Apply cap weighting scheme</td>
<td>Overweight stocks that exhibit particular factor</td>
<td>Overweight stocks that exhibit particular factor</td>
</tr>
<tr>
<td>Weighting scheme has heavy concentration</td>
<td>Still exposed to companies that do not exhibit desired factor</td>
<td>Heavy concentration in particular sectors</td>
</tr>
</tbody>
</table>

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DON’T LOSE SIGHT OF DIVERSIFICATION!

- Diversification has been as important as factor selection in delivering outperformance

TAKING THE “RIGHT” RISKS

- Scientific Beta Multi-Beta Multi-Strategy Indexes seek to provide exposure to well rewarded risks while avoiding or diversifying away unrewarded risks

<table>
<thead>
<tr>
<th>Rewarded Risks</th>
<th>Unrewarded Risks</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Value</td>
<td>- Growth</td>
<td>Stock selection to tilt exposures towards rewarded risks</td>
</tr>
<tr>
<td>- High Momentum</td>
<td>- Low Momentum</td>
<td>Diversified weighting scheme to reduce concentration on individual stocks and weighting schemes</td>
</tr>
<tr>
<td>- Low Volatility</td>
<td>- High Volatility</td>
<td></td>
</tr>
<tr>
<td>- Small Size (mid caps)</td>
<td>- Large Size (large caps)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Company-Specific Risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Weighting Scheme-Specific Risks</td>
<td></td>
</tr>
</tbody>
</table>
**METHODOLOGY**

- Gain factor exposure through simple selection methodology (don’t over-fit), and apply diversified weighting scheme

<table>
<thead>
<tr>
<th>Starting Universe</th>
<th>Stock Selection</th>
<th>Weighting scheme</th>
<th>Sub-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 largest stocks by market cap</td>
<td>250 stocks w/lowest P/B</td>
<td>Diversified weighting scheme</td>
<td>Value Index</td>
</tr>
<tr>
<td></td>
<td>250 stocks w/highest P/B</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Multifactor Index**

- Value
- Low volatility
- Momentum
- Size

Equal Risk Contribution of 4 sub indexes
METHODOLOGY

- Gain factor exposure through simple selection methodology (don’t over-fit), and apply diversified weighting scheme

Starting Universe
- 500 largest stocks by market cap

Stock Selection
- 250 stocks w/lowest P/B
- 250 stocks w/highest P/B
- 250 stocks w/lowest 104w volatility
- 250 stocks w/highest 104w volatility

Weighting scheme
- Diversified weighting scheme
- Diversified weighting scheme

Sub-Index
- Value Index
- Low Volatility Index

Multifactor Index
- Equal Risk Contribution of 4 sub indexes

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METHODOLOGY

- Gain factor exposure through simple selection methodology (don’t over-fit), and apply diversified weighting scheme

Starting Universe

- 500 largest stocks by market cap

Stock Selection

- 250 stocks w/lowest P/B
- 250 stocks w/highest P/B
- 250 stocks w/lowest 104w volatility
- 250 stocks w/highest 104w volatility
- 250 stocks w/highest returns in last 52w (ex last 4w)
- 250 stocks w/lowest returns in last 52w (ex last 4w)

Weighting scheme

- Diversified weighting scheme

Sub-Index

- Value Index
- Low Volatility Index
- High Momentum Index

Multifactor Index

Equal Risk Contribution of 4 sub indexes
METHODOLOGY

- Gain factor exposure through simple selection methodology (don’t over-fit), and apply diversified weighting scheme

Starting Universe

Stock Selection

Weighting scheme

Sub-Index

Multifactor Index

500 largest stocks by market cap

250 stocks w/lowest P/B

250 stocks w/highest P/B

Diversified weighting scheme

Value Index

250 stocks w/lowest 104w volatility

250 stocks w/highest 104w volatility

Diversified weighting scheme

Low Volatility Index

250 stocks w/highest returns in last 52w (ex last 4w)

250 stocks w/lowest returns in last 52w (ex last 4w)

Diversified weighting scheme

High Momentum Index

250 stocks w/lowest market cap

250 stocks w/highest market cap

Diversified weighting scheme

Mid Cap Index

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## Diversified Weighting Scheme

- Individual diversified weighting schemes can reduce stock-specific risks, but may introduce model risks in estimates (based on historical numbers) or assumptions.
- Scientific Beta’s Multi-Strategy approach incorporates five different diversified weighting schemes to reduce stock specific risk and model-specific risks.

<table>
<thead>
<tr>
<th>Weighting strategy to reduce stock-specific risk</th>
<th>Volatility</th>
<th>Correlation</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Deconcentration Equal Weight Strategy</td>
<td>Assumed equal</td>
<td>Assumed equal</td>
<td>Assumed equal</td>
</tr>
<tr>
<td>Diversified Risk Weighted Risk parity approach</td>
<td>Estimated</td>
<td>Assumed equal</td>
<td>Assumed equal</td>
</tr>
<tr>
<td>Maximum Decorrelation Attempts to reduce correlation-adjusted concentration</td>
<td>Assumed equal</td>
<td>Estimated</td>
<td>Assumed equal</td>
</tr>
<tr>
<td>Efficient Minimum Volatility Attempts to create minimum variance portfolio</td>
<td>Estimated</td>
<td>Estimated</td>
<td>Assumed equal</td>
</tr>
<tr>
<td>Efficient Max Sharpe Ratio Attempts to maximize risk adjusted performance</td>
<td>Estimated</td>
<td>Estimated</td>
<td>Estimated</td>
</tr>
</tbody>
</table>

Combine five weighting schemes to reduce model-specific risks.
CONCLUSION

Scientific Beta Multi-Beta Multi-Strategy Indexes seek to provide diversification on three levels:

- Multi-factor methodology to diversify factor risks
- Diversified weighting schemes to reduce stock-specific risks
- Combining five diversified weighting schemes to reduce model-specific risks