ALPHA ARCHITECT
FOCUSED FACTOR INDEXES

Wesley R. Gray, PhD
T: +1.215.882.9983
F: +1.216.245.3686
ir@alphaarchitect.com
213 Foxcroft Road
Broomall, PA 19008

We Empower Investors Through Education | Affordable Alpha
Who We Are
We Are a Specialized Boutique – NOT a Mass-Market Asset Manager

Our View of Boutique versus Mass-Market Firms

- **Research-focused** versus distribution-focused
- **Consultative selling** versus aggressive outbound selling
- **Segmented marketing** versus scale marketing
- **High insider ownership** versus low insider ownership
- **Flat and flexible** versus hierarchical and rigid culture
- **High active share** versus closet-Indexing
- **Limited scalability** versus high scalability

We seek to be a specialized boutique, NOT a Mass-Market Asset Manager

Additional information for the figure on the left: No Differentiation: Strategies in this category seek to deliver exposure to a broad set of securities in a market segment and are often characterized by many holdings and seek no active share. These strategies are commonly referred to as broad-market index funds. Little Differentiation: Strategies in this category seek to deliver exposure to a broad set of securities in a market segment and are often characterized by many holdings and seek low active share. These strategies are commonly referred to as closet-index funds or smart-beta funds. High Differentiation: Strategies in this category seek to deliver exposure to a narrow set of securities in a market segment and are often characterized by a small number of holdings and seek high active share. These strategies are commonly referred to as active funds or alternative funds.
Firm Mission: Empower Investors Through Education

Wesley R. Gray, Ph.D. has been an active participant in financial markets throughout his career. He is the Founder, CEO and Co-CIO for Alpha Architect, an SEC-Registered Investment Advisor. Dr. Gray has published multiple academic articles and books, to include the co-authored books Quantitative Value, DIY Financial Advisor, and Quantitative Momentum.

Wesley R. Gray, Ph.D.
PhD/MBA, University of Chicago
BS Economics, Wharton
Captain, Marine Corps

Published multiple research-focused finance books

Jack Vogel, Ph.D., conducts research in empirical asset pricing and behavioral finance, and has collaborated with Dr. Gray on multiple projects. He is the CFO and Co-CIO for Alpha Architect, an SEC-Registered Investment Advisor. Dr. Vogel has published multiple academic articles and co-authored the books DIY Financial Advisor, and Quantitative Momentum.

Jack R. Vogel, Ph.D.
PhD, Drexel University
MS Mathematics, Drexel Univ.
BS Mathematics, U. of Scranton

Published in leading, peer-reviewed academic journals

- Journal of Investing (2014)

Present in major publications + editor of academic website

- Wall Street Journal (multiple articles)
- CFA Institute (multiple articles)
- Forbes (multiple articles)
- Alpha Architect (editor)

Numerous working papers (more available upon request)

- “On the Performance of Cyclically Adjusted Valuation Measures”
- “Using Maximum Drawdown to Capture Tail Risk”
- “Does Complexity Imply Value? AAll Value Strategies from 1963 to 2013”
- “Limited Attention and Asset Price Efficiency”
What is Factor Investing?
Factor Investing: Predicting Expected Returns via Characteristics

**Baseball**

- On Base %
- Home Runs
- ERA

**Expected Risk/Reward %**

**Factor Investing**

- Price / Earnings
- Market Cap
- Return on Assets

**Expected Risk/Reward %**

“The Moneyball” for Finance

The figures presented are for illustration purposes only and are not necessarily associated with better outcomes in either baseball or investing!
We Believe Factors Facilitate **Efficient** Active Investing

Factors Facilitate Low-Fees, Tax-Efficiency, and Transparency
Will Factors Work in the Future?
We Believe Excess Returns are Risky & Tough To Exploit

Efficient markets and behavioral finance help us understand how markets work.

Market Risks (Risky) + Career Risk (Tough to Exploit) = Potential Excess Return

Efficient Markets¹, Behavioral Finance²

Higher Potential Gains = Higher Potential Pains

Will *Factors* Work in the Future?

...

Why Wouldn’t *Factors*, If They Are Risky and Tough to Exploit, NOT Work in the Future?
Why We are Different
Reminder: Closet Indexes\(^1\) May Deliver Passive Market Results…
but they *may not deliver* academic factor results

\(^{1}\)A "closet index" is generally considered to be a strategy that is marketed as being different than a broad passive index, but in reality, is closely related to a broad passive index with minimal deviations in the underlying holdings and performance profile. VTV was chosen because it is the largest "smart beta" ETF as per [https://www.etf.com/channels/smart-beta-etfs](https://www.etf.com/channels/smart-beta-etfs) (accessed June 1, 2019). Performance is measured from 1/1/2005 to 12/31/2018 and is based on total returns, including dividends and distributions. Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only. Past performance is not indicative of future results, which may vary. For more information see the following paper: K.J. Martijn Cremers & Quinn Curtis, Do Mutual Fund Investors Get What They Pay For? The Legal Consequences of Closet Index Funds (November 24, 2015) at 1, available at [http://ssrn.com/abstract=2695133](http://ssrn.com/abstract=2695133) (last visited June 1, 2019).
Our Indexes Seek to Capture *Academic* Factor Exposures

We believe our research capabilities allow us to develop intelligent differentiated focused factor portfolios

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Regions</th>
<th>Inception Date</th>
<th>Factor Exposures</th>
<th>Rebalance Frequency</th>
<th>Strategy Overview</th>
<th>Weighting Methodology</th>
<th>Targeted # of Holdings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Value Indexes</td>
<td>US, INTL, CAD</td>
<td>1/1/1992</td>
<td>Focused Value</td>
<td>Quarterly</td>
<td>Cheapest valuation, split by fundamental quality</td>
<td>Equal-Weight</td>
<td>50 (20 for CAD)</td>
</tr>
<tr>
<td>Quantitative Momentum Indexes</td>
<td>US, INTL, CAD</td>
<td>1/1/1992</td>
<td>Focused Momentum</td>
<td>Quarterly</td>
<td>Strongest momentum, split by momentum quality</td>
<td>Equal-Weight</td>
<td>50 (20 for CAD)</td>
</tr>
<tr>
<td>Global Value Momentum Trend Indexes</td>
<td>US, CAD</td>
<td>1/1/1995</td>
<td>Value, Momentum, and Trend</td>
<td>Monthly</td>
<td>Global value and momentum equity with a trend-following system to manages market exposure</td>
<td>Volatility-Weight</td>
<td>200</td>
</tr>
</tbody>
</table>

*Information on our Indexes are available at alphaarchitect.com/indexes or upon request.*
## Potential Costs and Benefits of Our Indexes

<table>
<thead>
<tr>
<th>Goal</th>
<th>Our Indexes</th>
<th>Passive Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiated Factor Exposure</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Factor Concentration</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Potential for Excess Return</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Potential for Tracking Error Risk</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Information on our Indexes are available at alphaarchitect.com/indexes or upon request.*
How to Use Factors
Factors Help Facilitate Long-Term Client Relationships

**TRUST**
Fiduciary relationship; authentic communication; establish a process.

**TEACH**
Empower your investor through education; help clients make better decisions.

**TRANSPARENCY**
Attribution analysis; portfolio transparency; long-term data analysis.
How to Use Factors: Deployment Options

**Core Satellite**
Combine an aggressive factor portfolio alongside a core low-cost market beta portfolio.

- Potential for higher returns
- Potential for tracking error

**Factor Diversification**
Deploy a focused factor allocation alongside a low-tracking error factor exposure.

- Potential factor diversification
- Potential for tracking error

**Alternative Exposure**
Deploy the exposure in an alternative sleeve, where tracking error expectations are high.

- Potential to diversify portfolio
- Potential for tracking error

**AA Model***
Deploy the exposures in accordance with custom Alpha Architect allocation models.

- Max leverage on AA research efforts
- Potential for tracking error

*Contact us for additional information.
CONTACT US TO LEARN MORE
Appendix
There are risks involved with investing, including loss of principal. There is no assurance that the objectives of any strategy or fund will be achieved or will be successful. No investment strategy, including diversification, can protect against market risk or loss. Current and future portfolio holdings are subject to risk. Past performance does not guarantee future results.

There is a risk of substantial loss associated with trading commodities, futures, options and other financial instruments. Before trading, investors should carefully consider their financial position and risk tolerance to determine if the proposed trading style is appropriate. Investors should realize that when trading futures, commodities and/or granting/writing options one could lose the full balance of their account. It is also possible to lose more than the initial deposit when trading futures and/or granting/writing options. All funds committed to such a trading strategy should be purely risk capital.

Certain economic and market information contained herein has been obtained from published sources prepared by other parties, which in certain cases have not been updated through the date hereof. While such sources are believed to be reliable, neither Alpha Architect nor its affiliates assumes any responsibility for the accuracy or completeness of such information and such information has not been independently verified by Alpha Architect.

Index returns are for illustrative purposes only and do not represent actual fund performance. References to an index do not imply that the portfolio will achieve returns, volatility or other results similar to that index. The composition of the index may not reflect the manner in which a portfolio is constructed in relation to expected or achieved returns, portfolio guidelines, restrictions, sectors, correlations, concentrations, volatility or tracking error targets, all of which are subject to change. Index performance returns do not reflect any management fees, transaction costs, or expenses, which would reduce returns.

Indexes are unmanaged and one cannot invest directly in an index. There are no active components of indexes; therefore, using them as a proxy can be of limited value because there is no guarantee that the portfolio would have been managed to match the index. Realized returns and/or volatility may come in higher or lower than expected.

Annual performance is calculated based on monthly return streams, geometrically linked as of the end of the specified month end.

Results, unless cited otherwise, are shown gross of fees and do not reflect the effect of investment fees which would lower performance. Performance reflects the reinvestment of dividends and other earnings. The following hypothetical illustrates the compound effect fees have on investment return: For an account charged 1% with a stated annual return of 10%, the net total return before taxes would be reduced from 10% to 9%. A ten year investment of $100,000 at 10% would grow to $259,374, and at 9%, to $236,736 before taxes. For a complete description of all fees and expenses, please refer to Alpha Architect’s Form ADV Part 2A.
Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only.

Past performance is not indicative of future results, which may vary.

Hypothetical performance results (e.g., quantitative backtests) have many inherent limitations, some of which, but not all, are described herein. No representation is being made that any fund or account will or is likely to achieve profits or losses similar to those shown herein. In fact, there are frequently sharp differences between hypothetical performance results and the actual results subsequently realized by any particular trading program. One of the limitations of hypothetical performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or adhere to a particular trading program in spite of trading losses are material points which can adversely affect actual trading results. The hypothetical performance results contained herein represent the application of the quantitative models as currently in effect on the date first written above and there can be no assurance that the models will remain the same in the future or that an application of the current models in the future will produce similar results because the relevant market and economic conditions that prevailed during the hypothetical performance period will not necessarily recur. There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical performance results, all of which can adversely affect actual trading results. Hypothetical performance results are presented for illustrative purposes only.

Neither Alpha Architect nor its affiliates provide tax advice. IRS Circular 230 disclosure: To ensure compliance with requirements imposed by the IRS, we inform you that any tax advice contained in this communication was not intended or written to be used, and cannot be used, for the purpose of (i) avoiding tax-related penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any matters addressed herein. You should seek advice based on your particular circumstances from an independent tax advisor.

The information contained in this communication is not meant to substitute for a thorough estate planning and is not meant to be legal and/or estate advice. It is intended to provide you with a preliminary outline of your goals. Please consult your legal counsel for additional information.

This presentation is only intended for pre-approved presentations and may not be duplicated in any form by any means or redistributed without Alpha Architect's prior written consent.
Simulated Historical Performance: All returns are total returns and include the reinvestment of distributions (e.g., dividends).

Index Characteristics Data Source: Characteristics are from FactSet and derived via the ETFs that track the respective Indexes. Characteristics are holdings-weighted. The data for the performance and factor attribution analysis are from Alpha Architect and Solactive.

The S&P 500 Index (SP500) is a capitalization-weighted index that measures the performance of the broad U.S. equity market.

The MSCI EAFE Index (EAFE) is a capitalization-weighted index that measures the performance of developed market equities, excluding the U.S. and Canada.

The MSCI World Index is a capitalization-weighted index that measures the performance of developed market equities.

EBIT/TEV is defined as earnings before interest and taxes divided by total enterprise value.

Momentum (2-12) is defined as the cumulative total return for the past 12 months, excluding the last (12th) month.

Size is defined as the total market value of the company's listed equity.

Return on assets is defined as net income divided by total assets.

Compound annualized growth rate, or CAGR, is defined as the annualized growth of an initial investment to the ending investment value if you assume that the investment has been compounding over the time period.

Standard Deviation: Sample standard deviation

Downside Deviation: Sample standard deviation, but only monthly observations below 41.67bps (5%/12) are included in the calculation

Sharpe Ratio (annualized): Average monthly return minus treasury bills divided by standard deviation

Sortino Ratio (annualized): Average monthly return minus treasury bills divided by downside deviation

Appraisal Ratio (annualized): CAPM regression intercept estimate divided by regression residual volatility

Worst Drawdown: Worst peak to trough performance (measured based on monthly returns)

Rolling X-Year Win %: Percentage of rolling X periods that a strategy outperforms

Sum (5-Year Rolling MaxDD): Sum of all 5-Year rolling drawdowns

Down %: The Down Number Ratio is a measure of the number of periods that the investment was down when the benchmark was down, divided by the number of periods that the benchmark was down. The smaller the ratio, the better

Up %: The Up Number Ratio is a measure of the number of periods that the investment was up when the benchmark was up, divided by the number of periods that the benchmark was up. The larger the ratio, the better

Tracking Error: Tracking Error is measured by taking the square root of the average of the squared deviations between the investment's returns and the benchmark's returns

Negative Correlation: Correlation of returns relative to benchmark returns when the benchmark is negative

Positive Correlation: Correlation of returns relative to benchmark returns when the benchmark is positive

Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only. Past performance is not indicative of future results, which may vary. Index returns are for illustrative purposes only and do not represent actual fund performance. Index performance returns do not reflect any management fees, transaction costs, or expenses, which would reduce returns. Indexes are unmanaged and one cannot invest directly in an index.