

## A Third Way: Quantitative Multi-Factor Investing Explained

- *Factors are observable and quantifiable firm-level characteristics that can explain differences in stock returns. Factor-based investing involves building portfolios with exposures to certain factors that may compensate investors with excess returns over the long run.*
- *Multi-factor investing has distinct advantages for long-term investors over both passive indexing and traditional active management.*
- *Building a factor-based strategy and optimizing the factor mix is quite complex.*

I regard some of my success in investment management as stemming from the serendipity of graduating from college and founding Gerstein Fisher in the same year that William Sharpe, as well as Eugene Fama and Ken French, published two seminal papers that gave rise to quantitative multi-factor investing.<sup>[1]</sup> What's more, dramatic advances in computing power at that time (the early 1990s) were enabling quantitative investment managers to organize and analyze vast amounts of information to construct factor-based investment strategies in a highly disciplined and mathematical fashion.

Gerstein Fisher did not invent factor-based investing, but we were among the first to translate academic theory into practical solutions for investors via multi-factor strategies. Not surprisingly, I am a passionate believer that quantitative multi-factor investing—which I might call a third way of investing—has distinct potential advantages for long-term investors over both passive indexing and traditional active investing. But I'm also aware that factor investing is less familiar and may seem opaque to some investors. For this reason, with this entry I am inaugurating a comprehensive, multi-part series on multi-factor investing that can serve as a primer to equip readers with a greater understanding of this exciting and rapidly evolving field. So let's get started.

### Compensated Risks

First, what is a factor? Factors are observable and quantifiable firm-level characteristics that can explain differences in stock returns. A large body of academic research<sup>[2]</sup> demonstrates that over the long term, returns of an equity portfolio can almost entirely be explained through the lens of these investment factors (some factor examples are value and momentum). Andrew Ang, a finance professor at Columbia University, has an insightful analogy to help explain factors: factors are to investment assets as nutrients are to food.<sup>[3]</sup> For example, much as we eat foods for their underlying nutrients—soy beans for protein, nuts for healthy oils, grains for fiber—to the quantitative investment manager it's the investment factors that compose the assets that really matter, not the assets themselves. Just as foods are bundles of nutrients, securities are bundles of factors.

Compelling and successfully implemented factors typically share the following characteristics:

- Abundant academic evidence and a strong theory based on financial or economic logic for why it works (i.e., empirical evidence alone is insufficient) and is expected to work in the future

- The theory may be risk-based, behaviorally based, or a combination of both
- Can explain differences in returns in different industries, countries, and markets over long time periods
- Able to be implemented in liquid, tradable securities

Exhibit 1 names and briefly describes eight distinct, important investment factors. (Note that this is hardly an exhaustive list, but encompasses some commonly researched and implemented factors.)

### Exhibit 1



Factor-based investing involves building portfolios with deliberate exposures, or tilts, to certain factors, or risks, that research has shown compensate patient investors with excess returns (relative to the relevant benchmark) over the long run, and tilting away from uncompensated risk factors. For example, in Gerstein Fisher's domestic Multi-Factor® Growth Equity strategy we maintain a positive tilt to the profitability and momentum factors (versus the Russell 3000 Growth Index), but negative exposure to capital expenditures and the fastest-growing small companies. Information from both company fundamentals and market prices are used to calculate numerous factor scores for each company (each security has characteristics that make it different from the profile of the market average). Exhibit 2 compares actual scores for two companies. Interestingly, the scores (for just seven of many factors) and compounded returns are remarkably similar despite the fact that the securities are in entirely different industries.

**Exhibit 2: Factor Scores and Investment Returns**

<b>Factor</b>	<b>Buffalo Wild Wings Inc</b>	<b>Diamond Hill Investment G</b>
Earnings Quality	0.72	0.72
Growth	1.20	0.43
Leverage	-1.00	-1.00
Momentum	0.98	1.08
Profitability	0.85	0.68
Size	-1.54	-2.71
Value	-0.54	-0.56
<b>10 Year Return (Ann.)</b>	<b>30.73%</b>	<b>30.66%</b>
<b>5 Year Return (Ann.)</b>	<b>32.19%</b>	<b>30.66%</b>

Sources: MSCI, Gerstein Fisher Research

**Harvesting Factors**

Conceptually, a multi-factor strategy seeks to generate superior long-term risk-adjusted returns relative to a benchmark by collecting risk premiums in a systematic, targeted way through strategic tilts toward securities with desirable factor exposures. Much as equity investors have collected an annual risk premium of 6.6% historically for putting money into volatile stocks rather than into virtually risk-free Treasury bills<sup>[4]</sup>, factor-oriented investors seek to collect factor premiums as a reward for holding factors through the bad times (remember that risk and return are related).

By contrast, we can say that an investor who holds a passive market index collects no factor risk premiums. Actively managed funds, with which most readers are quite conversant, deviate from the benchmark but they have different issues. Many studies by academics, ourselves and others have repeatedly demonstrated that, after fees, the majority of active funds struggle even to match their benchmarks' returns over extended time periods, and that the likelihood of past outperformance persisting into the future is low.<sup>[5]</sup> Exhibit 3 summarizes several of the key differences between the quantitative multi-factor and active approaches.

### Exhibit 3: Comparison between Multi-Factor and Active Investment

Fundamental Approach	Multi-Factor Approach
Search for mispriced securities	Search for factors that explain return
Focus on company-specific risk	Focus on systemic risk and investor behavior
Kick the tires, shake hands with management	Capture networked knowledge
Prediction	Observation
Construct portfolios based on bets of where price is wrong	Build optimized portfolios targeted to certain risk factors that reward
Qualitative, subjective	Quantitative, objective

Source: Gerstein Fisher Research

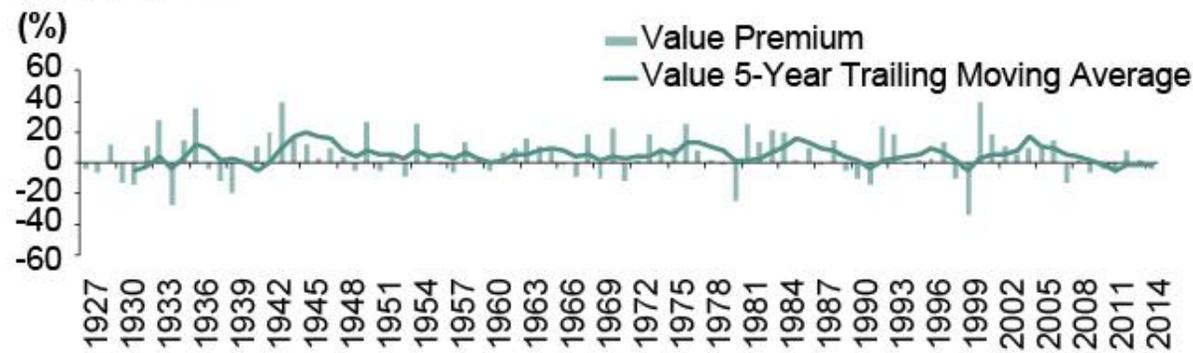
Before I close, I would like to stress that building a factor-based strategy is far more complex than simply identifying and tilting towards factors that have been academically shown to reward over long market periods. One of the great challenges in building a multi-factor portfolio is how to combine factors in an intelligent, efficient way that works for investors—in other words, how to take academic research and make it work in the real world. I will devote an entire column to the important topic of how we combine factors later in the series, but here I do at least want to explain why we combine factors.

Recall from above that factor-based investors seek to be rewarded with a risk premium for sitting tight through the bad times. While factor indexes have exhibited excess risk-adjusted returns over long time periods, as with asset class indexes they all have cycles and periods of underperformance. But since different factors have distinct performance patterns and cycles and are relatively uncorrelated over time (i.e., while some will be performing well, others will be doing poorly), a manager can combine factors to build a more-diversified portfolio with better risk-adjusted returns that potentially provides a smoother ride for long-term investors (Exhibit 4 illustrates the historical cycles of two important factors). Now, how to optimize that factor mix is a science unto itself, but that is a subject for a future article.

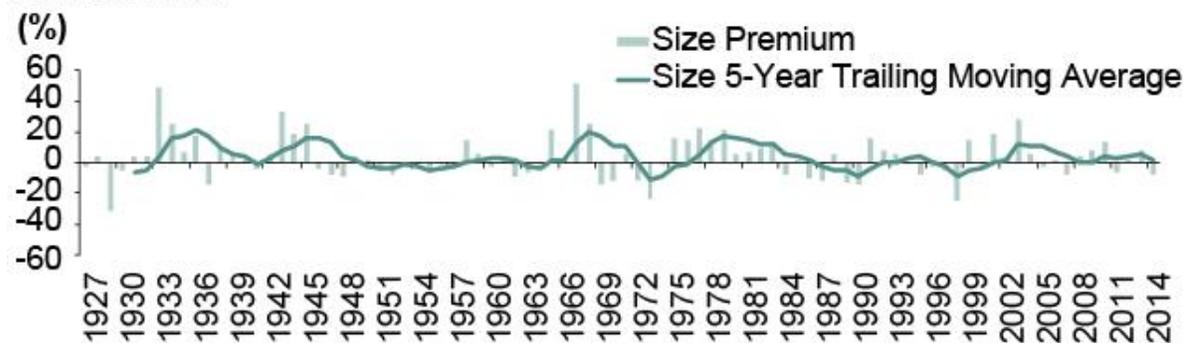
## Exhibit 4: Value and Size Cycles over History

Annual Data from 1927-2014

### Value Premium



### Size Premium



Source: Data provided by Fama/French. SmB (Size) and HmL (Value) research factors taken from Ken French's website.

Average annual returns (%) in US dollars. **Indices are not available for direct investment. Their performance does not reflect the expenses associated with the management of an actual portfolio. Past performance is not a guarantee of future results. Asset class returns are not representative of indices or actual portfolios, and do not reflect costs and fees associated with an actual investment. Actual returns may be lower.**

In the next installment in this series, I will trace the history and evolution of several important investment factors.

## Conclusion

Multi-factor investing can be thought of as a third way to invest with distinct advantages for long-term investors over both passive indexing and traditional active management, which are generally better understood by investors. This is the first in a series of educational articles that should help investors to acquire a sound understanding of the relatively modern and fast-evolving field of quantitative multi-factor investing.

[1] Asset Allocation: Management Style and Performance Measurement (1992) by William F. Sharpe, The Cross-Section of Expected Stock Returns (1992) by Eugene F. Fama and Kenneth R. French [2] See for example: Ang, A., W.N. Goetzmann, and S. Schaefer, 2009, Evaluation of Active Management of the Norwegian Government Pension fund-Global, Report to the Norwegian Ministry of Finance [3] Asset Management: A Systematic Approach to Factor Investing by Andrew Ang, Oxford Univ. Press, 2014 [4] During the period from January 1926 to August 2015 (Source: Bloomberg) [5] See for example <http://gersteinfisher.com/in-mutual-funds-is-active-vs-passive-the-right-question/> and [http://gersteinfisher.com/gf\\_article/should-you-bet-your-future-on-a-managers-past-performance/](http://gersteinfisher.com/gf_article/should-you-bet-your-future-on-a-managers-past-performance/)

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