BEYOND SMART BETA: WHAT IS GLOBAL MULTI-FACTOR INVESTING AND HOW DOES IT WORK?

Multi-Factor investing works by identifying characteristics, or “factors,” of stocks or other securities that research shows explain differences in historical and expected returns. In this paper, we seek to provide an overview of much of the foundational research which guides the Gerstein Fisher Multi-Factor strategies, as well as an introduction to some of our most recent findings and papers.

Beta, Factors, and “Smart” Portfolios

The terms “smart beta” and “factor” are cropping up with greater frequency in the financial media lately. When the investment industry uses terms like smart beta, alternative beta, factors, or dynamic factors, most of the time these terms are basically referring to the same thing: characteristics, or “factors” of securities where stocks that share similar such characteristics should demonstrate similar returns. At Gerstein Fisher, we prefer to talk about factors rather than beta, since beta really measures the magnitude of an investment's exposure to factors, whereas we want exposure to the factors themselves.

The earliest version of multi-factor investing originated with Steve Ross in 1976, with his paper on arbitrage pricing theory (APT). According to APT, security returns are best explained by more than one factor. Previously (from the 1960s), the Capital Asset Pricing Model (CAPM) was a dominant theory. CAPM stated that there was only one factor that drove stock returns, and that was the market factor — or exposure to the risks of holding equity versus a “risk-free” asset such as a bond.

Now, fifty years later — with a lot more data available on the behavior of security prices — we know that there are multiple risk factors that drive the returns of securities. In other words, the single-factor CAPM, where anything in excess of the index return was dubbed “alpha,” never really fully described reality. The multi-factor model is actually a straightforward idea: the portfolio return is equal to the risk-free rate, plus factor premiums and exposures, plus what’s left, the residual (or “alpha”).

To date, hundreds of factors have been researched and/or documented. The key question for investment practitioners is, what factors actually matter? Research by numerous academics in the industry has shown that just five or six factors get us about 90% of the way there.¹ In other words, much of what we used to think of as the alpha of unexplained returns has been converted into factors that do explain where returns are coming from. Exhibit 1 shows eight factors that have been identified as some of the most powerful ones in explaining security returns.

Exhibit 1: The Conversion of Alpha into Factors

<table>
<thead>
<tr>
<th>Company Size</th>
<th>Momentum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Cap</td>
<td>Past One-Year Return</td>
</tr>
<tr>
<td>Valuation</td>
<td>Leverage</td>
</tr>
<tr>
<td>Book-to-Market</td>
<td>Ratio of Debt to Equity (REITs)</td>
</tr>
<tr>
<td>Profitability</td>
<td>R&amp;D</td>
</tr>
<tr>
<td>Gross Profits: Revenues – Costs</td>
<td>R&amp;D Spending</td>
</tr>
<tr>
<td>Capital Expenditures</td>
<td>External Financing</td>
</tr>
<tr>
<td>Change in Assets</td>
<td>Change in Debt Issuance</td>
</tr>
</tbody>
</table>


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Exhibit 2 shows return premiums of five factors in US markets for the past 40 years. These return premiums are significant, persistent, and exist across multiple countries over long periods of time, making them difficult to ignore.

There are two main theories that explain these premiums: the efficient market theory offers a risk-based explanation, and a behavioral-based theory links some factors to the actions of investors. The risk-based story might be that equity investors should be rewarded for taking risk in the form of enhanced returns, so as risk ebbs and flows, security returns will fluctuate. The behavioral explanation of the same thing might be that investors’ greed and panic causes prices to change due to buying and selling. We don’t really take a position on which explanation is right, risk-based or behavioral-based; what we care about is that we have factors that hold up over time based on empirical data for rolling periods.

While the past data on factor premiums is compelling, some question their persistence into the future now that the investment world has “caught on” to factor-based approaches. For example, why should the value premium continue to work if everyone knows that it adds value? That’s a difficult question to answer. Fama and French published their landmark paper on the value premium in 1992, which put value investing in the spotlight for the first time. For the period that this paper looked at (1972–1991), the value premium over growth stood at close to 5% per year. However, from right around the time the paper was published through August 2017, what we have seen is that the value premium shrank considerably, to just under 1% per year.

The same dynamic can be seen with the size premium, or the idea that smaller companies should outperform larger companies over long periods of time. Since Ralph Banz published his seminal paper on the size premium in 1981, it appears to have declined from 5% to 1% per year. Is it possible that when factor research is out there and everyone is focused on it, that to some degree the premium goes away?

With momentum, so far this does not seem to be the case. Our academic partner Professor Sheridan Titman published a groundbreaking paper on momentum investing with co-author Narasimhan Jegadeesh in 1993. Since then, the momentum premium of nearly 7% doesn’t appear to have shrank much at all.

Research and statistics abound that show how difficult it is for active managers to outperform benchmarks. We used Morningstar data to study active large cap growth and value funds during the 15 years ending in September 2017. Around 60% of those funds disappeared during the 15 years. Of the surviving large cap growth funds, about one-third outperformed benchmarks, which was also the case for large value managers.

Exhibit 2: Historical US Factor Performance and Premiums

<table>
<thead>
<tr>
<th>Asset Growth</th>
<th>Profitability</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>High</td>
<td>Small</td>
</tr>
<tr>
<td>13.6%</td>
<td>12.4%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Mid</td>
<td>12.0%</td>
<td>11.4%</td>
</tr>
<tr>
<td>9.7%</td>
<td>10.7%</td>
<td>11.2%</td>
</tr>
<tr>
<td>High</td>
<td>8.9%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Momentum</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>14.0%</td>
</tr>
<tr>
<td>10.5%</td>
<td></td>
</tr>
<tr>
<td>8.3%</td>
<td></td>
</tr>
<tr>
<td>Mid</td>
<td>12.4%</td>
</tr>
<tr>
<td>11.7%</td>
<td></td>
</tr>
<tr>
<td>11.0%</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Core</td>
</tr>
<tr>
<td>11.8%</td>
<td></td>
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</tbody>
</table>

Average compound 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. Portfolios are based on CRSP market portfolios divided into bottom 30%, middle 40%, and top 30% segments for respective factors and calculated on a value-weighted basis. For momentum portfolios, the average of respective decile portfolios are used to create 30/40/30 breakpoint portfolios. 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.

Sources: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html, Gerstein Fisher Research
What is interesting is analyzing the growth managers’ performance through a multi-factor lens. When we accounted for the momentum, value, size and profitability factors, what we find is that only 12% of these managers actually outperformed their benchmarks, or generated positive alpha (see Exhibit 3). The question then becomes whether there is some rigorous multi-factor approach that achieves what the active growth managers have achieved, but with a more transparent framework. We think that there is.

### A Smarter Beta Approach: Combining Multiple Factors

When Professor Titman conducted research on factor models in the mid-1980s, he searched for the characteristics (what we now call factor exposures) that defined the types of stocks in which the most successful active portfolio managers were investing. He noticed the tendency of the best mutual funds to pick past winners and sell losers, and his research on this phenomenon resulted in the paper he co-authored with Jegadeesh. This research demonstrated that high-momentum stocks returned 13.4% on average compared to just 6.63% for low-momentum ones – a significant spread.

The momentum effect is to a large extent a smaller firm effect, since the momentum premium – the premium for buying winners over losers – is much stronger for smaller stocks than for large cap stocks. Similarly, in general the value spread is stronger for small stocks than for larger stocks. When you compare growth versus value, if you run a growth portfolio that tilts toward momentum, it offers much more of a premium than it does for a value portfolio.

Another factor that we’ve looked at and hamessed is what is called the profitability factor. Value stocks beat growth stocks on average, but recent research suggests that not all growth companies are created equal, and that in particular, growth companies with very profitable brands have not underperformed value stocks. In addition, our research indicates that firms that increase capital expenditures tend to realize negative excess returns, which implies that one should tilt away from the capex factor.

When you look at real estate investment trusts (REITs), a very similar quantitative model that captures the same characteristics – size, value, profitability, momentum, and so on – works well (Exhibit 4). But there is one factor that we’ve looked at carefully that turns out to be very important for REITs while not as important for stocks: financial leverage. Our research has shown that high leverage is especially costly for REITs, which makes it a factor to tilt away from in a REIT portfolio. A key to factor-based investing is that we seek exposure to, or tilt toward, those risk factors that provide high expected returns for the level of risk we are taking and tilt away from those factors that have an unfavorable risk-to-reward ratio.
Theory and Application in a Multi-Factor World

Let’s turn now to some examples of how we apply academic research to build real world, multi-factor investment strategies that are designed to improve on passive benchmarks and also to outperform active strategies. We’ve recently written two research papers that touch on these topics, one on the popular smart beta strategy of fundamental indexation and the other on how to best combine value and momentum.

Let’s first investigate how we can use quantitative information to form factors, which, in turn, help us to obtain a better understanding of a firm’s expected return and risk. A fundamental factor is one that utilizes information from a firm’s financial statements. It informs investors about the health of a firm and helps us to understand a firm’s cost of capital. This differs markedly from a price or valuation factor, which uses market-based information that is incorporated into the price or market capitalization of a stock. As information on a stock emerges, the price of the stock changes, and therefore the market’s expectation of a stock’s expected return is going to change.

In our Multi-Factor® process, we use information from both fundamentals and prices to inform on a stock’s expected return. The downside of a pure fundamental approach is that it utilizes stale information. Because firms file financial statements with a lag of several months, this data does not necessarily reflect the market’s current view or expectation. In contrast, a security’s price often does reflect market expectations; however, because prices are influenced by recent news or information, those factors that we form based on price are inherently volatile. For these reasons, we believe a sound approach is one that combines both fundamental and price-based information.

In our working paper, “Decomposing Fundamental Indexation,” we wanted to gain an understanding of how well a fundamental index portfolio does relative to a market index. What we find in our paper is quite simple: a fundamental index strategy will improve on a market index if securities with high fundamentals relative to market price (e.g., high book values, cash flows to price, and earnings to price) have higher returns than those with low relative fundamentals to price. But a related question is whether fundamental indexing is the best way to gain value exposure, assuming that you want to have relatively low tracking error.

In the paper we discuss risk-adjusted returns, which we measure using the information ratio (portfolio return minus the index return, divided by tracking error). This essentially captures how intelligently different you are relative to the index – how much value you add relative to the index, relative to your level of tracking error.

Here are some results from our study, in which we looked at both small and large cap stocks: first, we find that the fundamental index strategy – essentially a value tilt in disguise – improves on the market index. Second, when we ran the study with a multi-factor model in which we tilt to four factors, we find that using this strategy with better factor diversification leads to a higher risk-adjusted return, a lower tracking error and a substantial increase in the information ratio when compared with the fundamental index strategy.

One of the challenges of applying academic research in practice is trading costs. By implementing a factor-based strategy, every time we transact securities in the market on behalf of investors, we pay a price, which impacts performance. Therefore, we need to be very cognizant of securities’ holding periods. Value, for example, is what we call a relatively slow factor, with an average holding period of two to five years. This is in direct contrast to a momentum strategy, a strategy that chases stocks that have high past returns, in which the average holding period is only three to nine months. One of the benefits of incorporating both value and momentum factors into a portfolio is factor diversification, which is the subject of our second paper.

The allure of quantitative finance and multi-factor investing is that you can combine two different quantitative insights and essentially improve on a market-based index. In our
paper, “Combining Value and Momentum” we looked at three separate approaches to gaining value and momentum exposure simultaneously in a single portfolio.

The first approach is to invest separately in a single-factor value manager and a single-factor momentum manager. One of the disadvantages of this approach, whereby you give half of your money to a value manager and half of your money to a momentum manager, is the fact that the value manager will be selling to the momentum manager and the momentum manager will be selling to the value manager. The resulting turnover will have a negative impact on performance. Also, by separately investing in these single-factor portfolios, you’re not integrating information from two portfolios very well.

We also considered two separate approaches that combine value and momentum in the same portfolio. The first approach is to assign securities both value and momentum scores and then take each security’s joint score and invest only in those securities that have favorable joint scores. If you find that, on average, the combination is more favorable than the average security in the universe, you will purchase that stock. One of the challenges with this second approach is that turnover is often very high because it’s driven by the faster factor, momentum.

For that reason, we also examine a third approach, in which we build a value portfolio and use momentum to tell us when to buy or sell. For example, if a stock price is falling rapidly, as Lehman Brothers did during the crisis, it will become a value-oriented security. By layering a momentum strategy on top of a value portfolio, however, you could avoid the “value trap” the stock would otherwise present, since Lehman has negative momentum. This also slows down portfolio turnover.

The research question that we ask in “Combining Value and Momentum” is, what is the best way to optimally combine value and momentum from the perspective of a long-only investor? When we compare the three approaches, we find that approaches two and three improve on approach one by generating higher compound returns, often lower volatility, and higher Sharpe Ratios. One of the keys is that the Sharpe Ratio will drop with high transaction costs, which reflect turnover.

The takeaway for advisors from this study is this: if you are thinking about how to gain both value and momentum exposure, consider an approach whereby you gain these exposures in a single portfolio as opposed to dividing your portfolio into pieces and allowing different managers to invest in different pieces to gain the desired level of exposure you would like for your clients.

In addition to researching how we can combine disparate factors into a cohesive strategy, we have also conducted research on how the growth of companies, and the expectations of the analysts who track that growth, can be looked at as a factor. We found substantial evidence linking higher profitability to future excess stock returns and higher-than-average asset growth to lower expected returns. Additionally, professional security analysts consistently were unable to predict future growth or returns, with one possible explanation being that market prices influence management choices and sway analyst interpretations. If the market and the analyst community view the firm favorably, the firm is more likely to raise capital, grow its assets, and may feel less compelled to increase sales and profitability. We explored these themes in much more detail in our recent working paper “Analyst Long-term Growth Forecasts, Accounting Fundamentals and Stock Returns.”

Multi-Factor and Global Investing

Quantitative, factor-based investing does not apply only to US securities, and we have also conducted a range of research into how the Multi-Factor approach may be applied to international or global strategies. For example, in our recent paper “International Investing and the Small Country Effect,” we examine whether the size of the stock market in a security’s home country impacts expected returns, much as the market capitalization of the security itself does.

Our research has shown that, when investing in foreign stocks, smaller countries (as measured by market capitalization) tend to outperform their larger peers; this is referred to as the small country effect. Investment strategies that attempt to closely track cap-weighted indexes can end up with a large-country bias given that the index is “top-heavy” and is concentrated in larger countries - the MSCI EAFE Index of developed market country stocks is over 70% concentrated in the top 5 largest countries, for example.

The small country effect is independent of the firm-size effect (small company premium); research has shown that smaller countries tend to outperform across the capitalization spectrum. This research confirms our belief that a highly-diversified approach to investing can provide investors with a wider opportunity set and potentially better risk-adjusted expected returns.

Finally, we have also applied our multi-factor research and strategies to the area of global real estate, and in our paper “The Case For Going Global With Real Estate Investing” we examine the advantages of a quantitative and diversified approach to this asset class.
In recent decades, with the rise of investable options such as Real Estate Investment Trusts (REITs), a single investor can potentially access thousands of properties across roughly two dozen countries. We find that by diversifying globally, real estate investors can build a potentially more risk-efficient portfolio than with a basket of US-only REITs. Additionally, decades of academic research on REITs has found evidence that certain investment factors do have the ability to explain returns for real estate securities in much the same way as for US and international stocks. For example, in 2003 a team of professors (Chui, Titman and Wei) found evidence of the tendency for REITs with above-average price momentum over the past 12 months to outperform lower-performing securities.

Conclusion

Gerstein Fisher has spent over two decades as both a practitioner and a leading researcher in the area of quantitative portfolio management, as well as the theory and construction of Multi-Factor portfolios. Our goal is to deliver investment strategies that are rooted in a disciplined, explainable approach that consistently focuses on characteristics that securities investors own across multiple markets and asset classes. These views have been shaped by both academic and proprietary research, and in this paper we seek to provide an overview of that research. It is our belief that through this research we can provide an intelligent alternative to pure active or passive management that balances diversification with the potential for investors to earn a higher expected return than with traditional benchmarks.

Key Takeaways

- While “smart beta” is capturing headlines, it is just one type of approach to investing based on stock characteristics, or factors.
- Factor-based investing involves building portfolios with deliberate exposures to certain company characteristics; research has shown that of the hundreds of factors that exist, only a handful have been consistently shown to reward investors over time.*
- Fundamental factors are stale in that they are based on company financials that are reported with a time lag. Price or valuation-based factors are more recent, but also volatile as they continually incorporate new news. Gerstein Fisher believes in combining both in a portfolio rather than relying solely on either type.
- The majority of the outperformance active managers have extracted in the past (which used to be viewed as skill-based “alpha”) can actually be attributed to investment factors.
- Gerstein Fisher research has shown that a multi-factor approach improves on a pure fundamental index-based approach.
- In our view, deciding which factors to use and how to combine them is a science. Considerations should include how the factors relate to one another (with the goal of combining low-correlated factors for greater diversification); and in addition, real-world implementation calls for a focus on managing trading costs.
- Gerstein Fisher uses a quantitative, Multi-Factor® approach to investing, drawing on academic research to inform our expectations of stock returns. We apply this approach across our strategies focused on domestic growth stocks, developed-market international large growth stocks, and real estate investment trusts (REITs), respectively.

* Research conducted is on past performance. There is no guarantee that the influence of identified factors on investment returns in the past will continue to persist in the future.
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