

BUILDING A STRONG DIVERSIFIED PORTFOLIO: THE GERSTEIN FISHER MULTI-FACTOR® INTERNATIONAL GROWTH EQUITY STRATEGY

By Gregg S. Fisher, Founder, Head of Quantitative Research and Portfolio Strategy

At Gerstein Fisher, we believe our quantitative structured approach to international growth equity investing offers a compelling alternative to both pure indexing and traditional active qualitative approaches.¹ The Gerstein Fisher Multi-Factor® International Growth Equity strategy is grounded in the efficiency of capital markets while capturing specific risk factors identified by time-tested research. By delivering reliable asset class representation and carefully calibrated exposure to proven risk factors, we think the strategy should serve as a strong core holding within a globally diversified portfolio.

At the highest level, the Gerstein Fisher Multi-Factor® International Growth Equity strategy seeks to add strategic risk factor tilts relative to the MSCI EAFE Growth index while controlling for other, undesired risks such as sector, country or currency concentrations. By deploying a Multi-Factor® model and a quantitative optimization framework, Gerstein Fisher seeks to build portfolios that have intended exposures at both the security and country levels to small cap, value, and momentum risk factors while still maintaining a low level of active risk relative to the MSCI EAFE Growth index. We believe that this is the only systematic way to deliver a return greater than the international developed equity market.

Essentially, the fundamental premise upon which our philosophy and process have been built is that the potential for superior long-term results can be achieved by systemically exploiting fundamental risk factors as well as the behavioral biases that influence the decisions of many investors. These include the tendency to extrapolate past performance patterns too far into the future and equating a good company with a good investment irrespective of price.

This paper details the rationale behind our distinct approach to managing international growth equity, as well as the process used to execute it.

¹ Gerstein Fisher is the advisor to and the manager of the Gerstein Fisher Multi-Factor® International Growth Equity fund

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Why Should Factor-Based Investing Add Value?

Since markets are generally efficient, arbitrage opportunities are virtually non-existent; economic theory suggests that higher expected returns are justified only as a payoff for bearing additional risk. Accordingly, it is possible to achieve excess returns by capturing certain strategic risks. In our view of the world, it is these discrete sources of risk that fuel stock returns.

Since the middle of the 20th century, many academics and investors sought to determine which common risk factors are primarily responsible for the variation in stock returns – in other words, to answer the question “What sources of risk has the market systematically rewarded with higher returns?” Building on Harry Markowitz’s Modern Portfolio Theory, several academics – including Jack Treynor, John Lintner, and William Sharpe – largely believed that a single-factor model was best suited to answer this question. This single-factor model was formalized by Sharpe as the Capital Asset Pricing Model (CAPM), which states that a portfolio’s expected return hinges solely on its beta, or its relationship to the overall market.

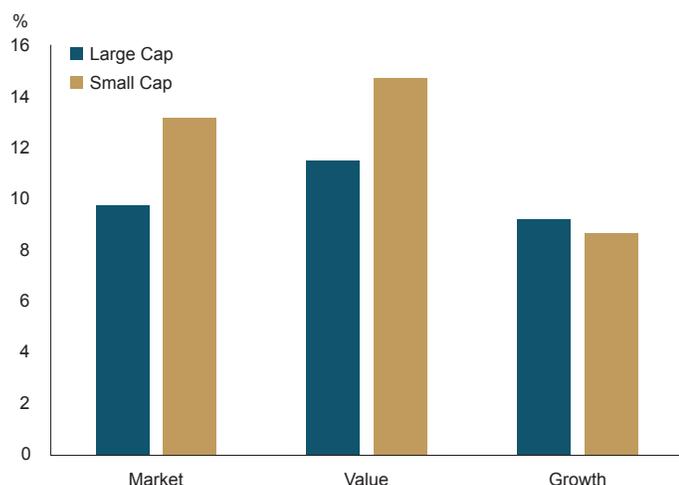
In the early 1990s, Eugene Fama and Kenneth French analyzed the returns of all US equities over different independent time periods and identified three systematic sources of risk that explained over 90% of variance in portfolio performance:²

- **Market** (Return premium for being in equities vs. fixed income)
- **Size** (Return premium for investing in small cap vs. large cap stocks)
- **Price** (Return premium for being in value vs. growth stocks)

Exhibit 1 shows the returns of domestic equity indices for the period starting January 1, 1927 and ending December 31, 2011. As seen in the chart, there is a return premium associated with being invested in small companies as compared to large companies and for being invested in value companies as compared to growth companies.

Research conducted on international markets also identified the presence of a positive return premium from these factors.³ Exhibit 2 shows the annualized total returns of a non-US developed market index and compares it to the returns of a non-US developed small cap index and a non-US developed value index for the period starting January 1, 1975 (when index data first became available) and ending December 31, 2011. As can be seen in Exhibit 2, both small and value return premiums have been present in developed non-US markets over this time period.

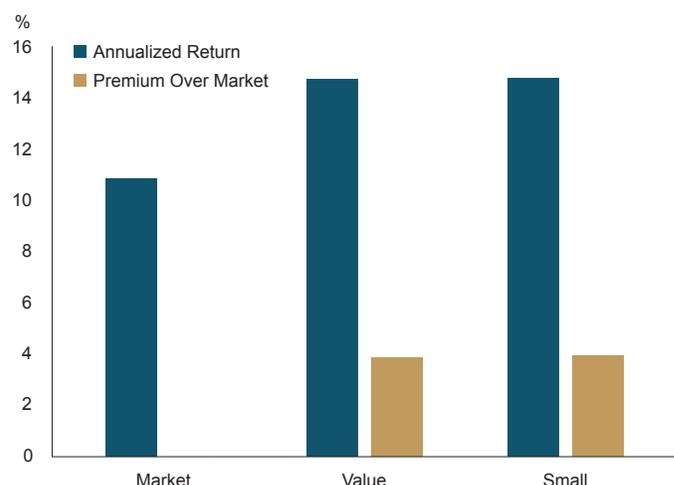
Exhibit 1: US Value and Small Premiums
Jan. 1, 1927–Dec. 31, 2011



Sources: Bloomberg, Fama/French, MSCI, Gerstein Fisher Research
For index information, please refer to *Index Data and Methodology* at the end of the paper.

² Fama & French (1992); Fama & French (1993); Fama & French (1996)
³ Fama & French (1998); Bauman, Conover, & Miller (1998)

Exhibit 2: Value and Small Premiums Non-US Developed
Jan. 1, 1975–Dec. 31, 2011



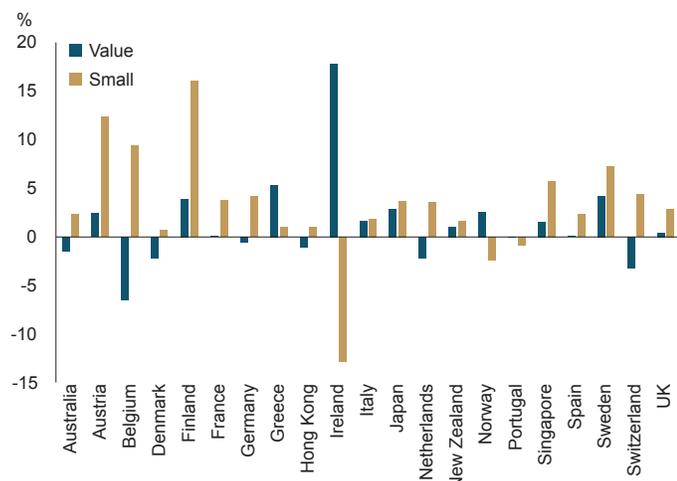
Sources: Bloomberg, Fama/French, MSCI, Gerstein Fisher Research
For index information, please refer to *Index Data and Methodology* at the end of the paper.

In addition to their existence within the broad index for developed countries, Gerstein Fisher research also identified small and value return premiums at the individual country level. Of the 21 countries in the MSCI EAFE index (a broadly diversified index of developed foreign equities) that were part of the index over the past 10 years ending December 31, 2011, 13 exhibited a value premium and 18 demonstrated a small premium over the same period. Exhibit 3 graphs the annualized value premium (value index minus market index) and the annualized small premium (small index minus market index) for each one of the 21 countries. The average annualized value premium over this period was 1.26 percentage points (pp) and the average annualized small cap premium was 3.23pp.

Despite the fact that historically there has been a return premium associated with smaller and more value-oriented companies, it is still important for investors to also have a portion of their assets in larger, more-growth oriented companies. There have been multiple, and at times, extended, periods of time during which small value companies have lagged large growth companies. As a recent example, in the year ending 12/31/2011, the Russell 1000 Growth index (a broad market index of domestic large cap growth companies) outperformed the Russell 2000 Value index (a broad market index of domestic small cap value

Exhibit 3: Value and Small Premiums in Developed Countries

Jan. 1, 2002–Dec. 31, 2011



Sources: MSCI, Gerstein Fisher Research
For index information, please refer to *Index Data and Methodology* at the end of the paper.

companies) by 8.14pp. Similarly, the MSCI EAFE Growth Index (a broad market index of international developed large and mid-cap growth companies) outperformed the MSCI EAFE Small Value Index (a broad market index of international developed small value companies) by 5.29pp.

Although an investor is expected to be rewarded for holding small value stocks over the long term, a sudden liquidity event during one of these periods can be detrimental to the investor’s long-term goals. Owning multiple asset classes, such as small value and large growth stocks, allows the investor the flexibility of liquidating the better performing asset classes instead of being forced to sell a depreciated investment. A diversified portfolio that includes both value and growth stocks also results in reduced volatility and increased return potential due to the diversification benefits of investing in low-correlated assets, leading to the potential for a better investment experience. As such, the Gerstein Fisher Multi-Factor® International Growth Equity Strategy is not meant to be a standalone investment but an integral component piece of a globally diversified portfolio.

Multi-Factor Models Explained

We know today that multiple factors contribute to the variation of stock returns, but how do we build models to account for this complexity? Instead of using one factor, as in CAPM, or three factors, as described by Fama/French, multi-factor models (MFMs) incorporate multiple risk factors to explain the performance of a given stock or portfolio. The basic structure of an MFM is outlined below:

$$R_{asset} = R_{risk-free} + \beta_1 f_1 + \beta_2 f_2 + \dots + \beta_n f_n$$

where,

$$R_{asset} = \text{return on asset}$$

$$R_{risk-free} = \text{return on risk-free asset}$$

$$\beta_n = \text{sensitivity of asset to factor } n$$

$$f_n = \text{return of factor 'n'}$$

MFMs find their roots in the Arbitrage Pricing Theory (APT)⁴. APT is an extension of CAPM in that it posits a linear relationship between a security’s returns and that security’s covariance with certain variables. However, instead of being restricted to one sources of non-diversifiable risk, as is the case in CAPM, APT allows for multiple sources. The main argument of the theory is that excess returns can only be achieved by taking on extra risk; if this were not the case, then market participants would arbitrage those excess returns away. Additionally, through the process of diversification, idiosyncratic (company-specific) returns on individual assets essentially cancel out, resulting in the returns on large portfolios being influenced mainly by systematic factors. APT states that a portfolio’s expected return is determined by its exposure to various systematic risk factors; it is this rationale that drives the construction of modern day MFMs.

MFMs may be macroeconomic, fundamental, or statistical based on the how these underlying factors, f_1 to f_n , are defined. Macroeconomic MFMs use time series of economic variables to model a linear relationship between an asset’s expected return and different economic shocks. Variables include rates of inflation and unemployment, growth of industrial output, the term structure of interest rates, and others.

⁴ Roll & Ross (1976)

Fundamental MFMs are based on firm-specific characteristics such as past returns, market capitalization, book-to-market value, earnings yield, and other fundamental data derived from a company's balance sheet and income statement. The factor sensitivities for fundamental MFMs are determined using observable company attributes as opposed to conducting a time series linear regression. Fundamental factors do not require forecasting as they are known and observable. Their values are not subjective; rather they are known at the beginning of each month.

Statistical factor models use asset returns as an input to determine the factors and factor sensitivities, with a goal of maximizing the explanatory power of the model created. These models use quantitative methods more esoteric than those used in macroeconomic and fundamental models, looking for patterns that would otherwise remain hidden.

Gerstein Fisher uses a proprietary MFM to implement the Multi-Factor® International Growth Equity strategy. This model enables us to implement strategic tilts to risk factors that are based on time-tested academic research and investment principles and have historically compensated investors with higher returns while controlling exposures to undesired risk factors.

The result is a model that is relatively more exposed to the factor(s) that are quantitatively identifiable and that we believe are based on sound economic logic and rigorous academic research, and relatively less exposed to factors that we cannot quantify or whose validity cannot be substantiated by research.

Examples of risk factor tilts targeted in Gerstein Fisher's Multi-Factor® International Growth Equity strategy include a tilt to size (greater percentage in smaller companies), value (lower price-to-book ratio), and earnings yield (lower price-to-earnings).

The strategy also incorporates momentum, which can be defined as the tendency of stocks to demonstrate consistent performance over a given period of time, typically 3–12 months, and the tendency of past winners to keep winning and losers to keep losing relative to their peers (recall Isaac Newton's first law of motion – “an object in motion will stay in motion...”).

Momentum was first identified as a systematic sources of risk by Narsimhan Jegadeesh and Sheridan Titman. Their research revealed that, historically, momentum investing had provided excess returns.⁵ Mark Carhart later built on Fama and French's model by adding momentum as a fourth

risk factor.⁶ Carhart's four-factor model hence consisted of market, size, price, and momentum as four systematic sources of risk in a portfolio. This was followed by the work of Griffin, Ji and Martin as well as Asness, Moskowitz and Pedersen, who showed the presence of positive momentum returns both in domestic and international markets.⁷

Gerstein Fisher research has also confirmed the presence of positive returns associated with momentum investing. Exhibit 4 shows the return of momentum indices relative to the market index for the 21 member countries of the MSCI EAFE Index. The MSCI country indices were used as proxies for market indices for each respective country. The momentum indices were created from the country indices using the following process: at the beginning of each month, the securities in each country index were ranked by momentum – as measured by MSCI Barra's momentum factor. The top 30% of stocks ranked by this momentum factor were market cap weighted for each country and the return over the next month was calculated. This process was repeated for each month from January 1, 2004 to December 31, 2011. This time period serves as an out-of-sample period relative to the academic and industry research that covers the key investment principles utilized by the strategy.⁸ It includes the bull market that followed the speculative tech-bubble crash, which helped the S&P 500 attain its highest ever nominal level, as well as the ensuing subprime mortgage crisis that led to the collapse of the US housing bubble and contributed to the global financial crisis of 2008–2009 and the most severe recession since the Great Depression.

As can be seen in Exhibit 4, momentum indices outperformed the market indices in 16 out of the 21 nations. In the nations with positive momentum returns relative to the market returns, the average annualized outperformance was 4.66pp. For the five countries that had negative momentum returns relative to market returns, the average annualized underperformance was -1.75pp. Overall, momentum returns outperformed market returns by an average of 3.13pp on an annualized basis.

It is important to distinguish momentum investing from market timing – a practice Gerstein Fisher neither implements nor recommends. Market timing involves buying and/or selling securities based on arbitrary projections of future market direction, whereas momentum investing is a systematic approach based on historical relationships that are borne out of research and data.

⁵ Jegadeesh & Titman (1993)

⁶ Carhart (1997)

⁷ Griffin, Ji & Martin (2005); Asness, Moskowitz & Pederson (2008)

⁸ An out-of-sample test uses a subset of data from a longer time series to test and model a theory and then evaluate results against those found in research where a longer data period exists.

Exhibit 4: Returns of Country and Momentum Indices for MSCI EAFE Countries

Jan. 1, 2004–Dec. 31, 2011

Country Market Index	Missing Labels?		Momentum Index Mom – Mkt
Australia	12.27%	12.94%	-0.67%
Austria	0.05%	-0.26%	0.31%
Belgium	12.26%	0.53%	11.73%
Denmark	17.46%	11.33%	6.13%
Finland	12.11%	-0.47%	12.58%
France	3.09%	2.97%	0.12%
Germany	9.76%	5.17%	4.59%
Greece	-11.10%	-15.52%	4.42%
Hong Kong	12.71%	9.72%	2.99%
Ireland	-1.57%	-8.23%	6.66%
Italy	-1.52%	-1.82%	0.30%
Japan	0.27%	1.12%	-0.85%
Netherlands	0.09%	4.39%	-4.30%
New Zealand	6.82%	6.43%	0.39%
Norway	15.25%	12.82%	2.43%
Portugal	8.93%	1.68%	7.25%
Singapore	22.56%	12.29%	10.27%
Spain	7.27%	5.26%	2.01%
Sweden	7.93%	10.06%	-2.13%
Switzerland	6.18%	6.97%	0.79%
UK	7.36%	5.02%	2.34%
Average	7.06%	3.92%	3.13%

Sources: Bloomberg, MSCI, Gerstein Fisher Research

Understanding Momentum

Although it is acknowledged in academic circles that momentum exists in the market (Kenneth French referred to it in a 2005 issue of *CFA Magazine* as “one of the biggest embarrassments of the efficient market theory”), there is no agreement as to *why* it exists. We believe that at least some of the momentum return premium can be best understood as a consequence of investor behavioral biases. Behavioral finance theorizes that investors, as a whole,

behave irrationally – albeit in systematic and predictable ways. Philip Maymin and Gregg Fisher presented a model in which a representative behavioral investor believes that next year’s returns will exactly match last year’s returns and show that this leads to price adjustments on what would otherwise be random walk securities.⁹

One of the simplest explanations that we believe is at least part of the reason that momentum exists is that people are naturally inclined to make predictions by extrapolating recent trends. Stocks offer charts conducive to drawing imaginary lines that extend into the future – lines that look clear and predictable.

Stock prices generally change on news of an event that investors deem relevant to a company’s future profitability. The Efficient Market Hypothesis predicts that this happens instantly – as soon as news breaks, traders and arbitrageurs jump into action, the new information is immediately incorporated into the price, and the stock will stay at this level until the next piece of relevant information is released. However reality rarely looks like this. Many practitioners have noted the tendency for markets to underreact to news in the short term, and overreact in the long term. That is, when good news breaks, a stock will often jump, and then continue to rise despite a lack of subsequent new information. This observation is consistent with a well-documented cognitive bias known as anchoring and adjustment. When making predictions and recommendations, people can unknowingly be influenced in a systematic, predictable way by numbers in their head – reference points that are often remarkably irrelevant.

For example, daily closing prices act as a fair value anchor for investors trying to incorporate new information into a company’s share price. Consider the case in which the market initially underreacts to significant news: prices jump in the right direction, but after the initial jump they continue to move in that direction. When markets close, a new anchor is dropped, and the next day investors adjust their target price from there. As this plays out, it forms what appears to be a clear, short-term trend, attracting followers who believe it will persist for the foreseeable future.

Additionally, there are issues of industry at work. Both active funds and index funds play a role in contributing to momentum, both upward and downward. Consider the case of an active manager with a concentrated position in a stock he loves, XYZ. If XYZ experiences significant gains, his performance will be great, attracting more money from investors (see Maymin and Fisher (2011)). As he

⁹ Maymin & Fisher (2011); Maymin & Fisher (2011)

puts the new money to work, he will be buying more of the company he loves so dearly, thus propelling the price further upward. If XYZ loses big, however, his performance will be terrible, prompting investor outflows, forcing him to sell, and pushing the price of XYZ down further. (Momentum works both ways.)

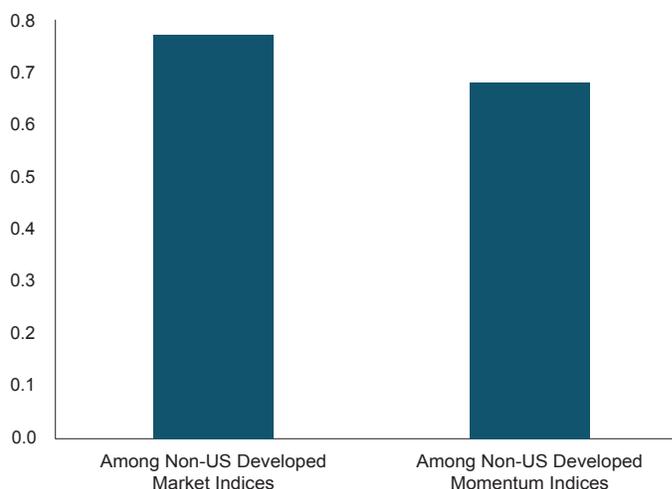
Academics have also derived risk-based explanations for the momentum phenomenon. In particular, research suggests that some of the profitability of investing in momentum strategies can be explained as compensation for bearing exposure to downside risk.¹⁰ Stocks with greater downside risk, as measured by higher correlations conditional on negative moves in the market, have historically been shown to have higher returns. However, other research¹¹ has indicated that exposure to downside risk is only a partial, incomplete, explanation for the momentum effect.¹²

Whichever view one subscribes to, there is considerable agreement that momentum strategies have provided the opportunity for excess returns in most major developed markets throughout the world.¹³

In addition to the historical return benefits provided by momentum investing, academic and industry research have also shown risk reduction benefits when using momentum across a diversified international equity portfolio. Correlations between the momentum indices of different countries have been found to be lower than the correlations between their corresponding market-weighted country indices.¹⁴ Gerstein Fisher research confirms the lower correlation between momentum indices as compared to market indices for several developed countries. Exhibit 5 above shows the average correlation among momentum indices compared to the average correlation among market indices for 21 non-US developed nations – as defined by membership in the MSCI EAFE Index – from January 1, 2004 through December 31, 2011.

Of the 210 pairs of countries, 199 had lower correlations among their momentum indices than among their market indices. The average correlation among all pairs of momentum indices was 0.68 compared to 0.77 for all pairs of market indices. The range of correlations for all pairs of momentum indices was 0.34–0.89 compared to a range of 0.52–0.96 for all pairs of market indices.

Exhibit 5: Average Correlations Among Non-US Developed Momentum Indices and Among Non-US Developed Market Indices
Jan. 1, 2004–Dec. 31, 2011



Sources: Bloomberg, MSCI, Gerstein Fisher Research

In addition to the lower correlation among the non-US developed momentum indices as compared to the correlation among non-US developed market indices, there appears to be a correlation benefit when using US and non-US developed momentum indices compared with using US and non-US developed market indices. The correlation between the US momentum index and each one of the 21 non-US developed nations was calculated, providing 21 correlations with each correlation value being a pair of the US momentum index and one non-US developed momentum index. The same process was repeated for the market indices, resulting in 21 market correlations. For each one of the 21 countries, the momentum correlation was lower than the market correlation. The implications of this are significant, as anything that reduces risk and does not reduce return has the potential to increase compound returns at the total portfolio level.

The average momentum and market correlations can be seen in Exhibit 6. The average market correlation of 0.80 was approximately 12% higher than the average momentum correlation of 0.71. The range of momentum correlations was 0.49–0.85 compared to a range of 0.64–0.88 for market indices.

¹⁰ Ang, Chen & Xing (2001)

¹¹ Hansen & Jagannathan (1997)

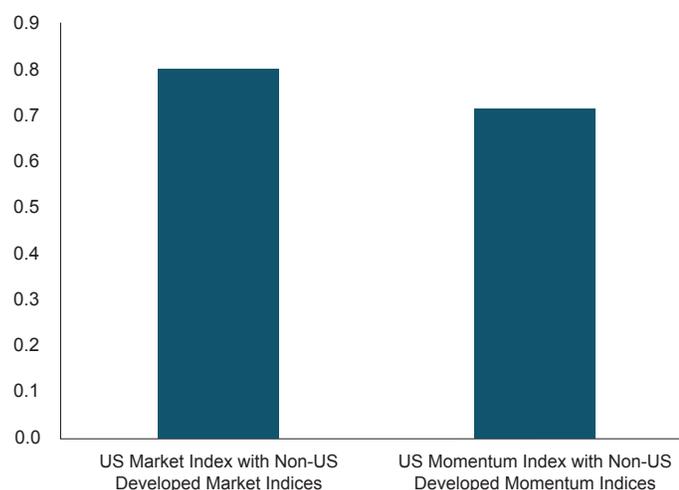
¹² Conrad & Kaul (1998)

¹³ Griffin, Ji & Martin (2005); Chan, Hameed & Tong (2000)

¹⁴ Griffin, Ji & Martin (2005); Gerstein Fisher Research (2011)

Exhibit 6: Average Correlation Among the US Index and Non-US Developed Indices

Jan. 1, 2004–Dec. 31, 2011



Sources: Bloomberg, MSCI, Gerstein Fisher Research

This result indicates that international momentum investors derived greater benefits of diversification as compared to international index investors. The diversification benefit not only manifests itself as reduced portfolio volatility but also as the potential for increased return.¹⁵

To recap, the four factors of market, size, price and momentum form the basis of the quantitative strategy that is used to construct the Gerstein Fisher Multi-Factor® International Growth Equity strategy. By focusing on risk/return relationships that have a strong basis in sound economic reasoning and are borne out of historical data, we seek to add value to our portfolios and help our clients achieve their financial goals.

How Does the Process Work?

The Gerstein Fisher Multi-Factor® International Growth Equity strategy does not seek to own every constituent stock in the index, instead investing in a broadly diversified sampling of securities contained in the index comprising approximately 200 securities in 22 countries. By using a representative segment of the MSCI EAFE Growth index, we can control the costs that would be associated with rebalancing a portfolio of nearly 600 stocks monthly – costs that would offset some of the value gained from our investment process.

The specifics of the process used to manage the Gerstein Fisher Multi-Factor® International Growth Equity strategy are as follows:

Step 1: Defining the Investment Universe

Given that the entire international growth universe is not being held by the strategy, a smaller number of stocks (150–300) are selected from the larger list of securities, called the stock universe, which constitutes every possible holding for the strategy. Since the strategy is meant to provide exposure to international developed growth equities, its stock universe is the MSCI EAFE Growth Index. (“EAFE” stands for Europe, Australasia and Far East.)

This index is comprised of large and mid-cap growth companies from developed markets not including the US and Canada. As of December 31, 2011 it included 22 countries. Large and mid-cap companies are defined by the index as those that comprise the top 85% of market capitalization of all companies from the developed markets. Each company in the top 85% is either classified as growth or value, or may be partially allocated to both (with no double counting) with the end goal of dividing the index into value and growth indices, each of which target 50% of the free float adjusted market capitalization of the underlying total index. The securities – or partially allocated securities – characterized as growth form the MSCI EAFE Growth Index.

Step 2: Establishing Maximum Country Weights

There are various ways to structure country weights for an international portfolio. While they may be subject to some constraints as part of self-imposed risk management protocols, active managers are relatively free to weight countries at their discretion based on their prevailing research views. These weightings are also subject to change as their views change. On the other end of the spectrum, passive indices use a stringent rule-based system to weight countries. The most commonly used methodology for passive indices is market capitalization weighting. This involves weighting countries based on the total size of all public companies from each country. For example, if country A had a market capitalization of \$100 billion and country B had a market cap of \$400 billion, then a market cap weighted portfolio would have 20% of its assets in country A and 80% of its assets in country B. This weighting scheme provides the lowest tracking error to the aggregate developed non-US stock markets, which are inherently cap weighted. Another approach is to use Gross Domestic Product “GDP” weighting. In this scenario, countries are weighted based on the GDP of the underlying nation irrespective of the country’s market capitalization. For example, if country A had a GDP of \$700 billion and country B had

¹⁵ Booth & Fama (1992)

a GDP of \$300 billion, then a GDP weighted portfolio would have 70% of its assets in country A and 30% of its assets in country B. GDP weighting reflects the size of a country's economy instead of the size of its equity market. Using this methodology tends to overweight countries with above-average economic growth and may underweight countries with relatively high valuation relative to a market cap weighting approach. With either, there is a possibility of there being a large weighting to a single country if that country's market cap or GDP is large relative to the other countries. These countries tend to be the most developed, with higher-priced equity markets, and are typically the ones that have already experienced a sustained period of growth.

Gerstein Fisher uses a combination of these two approaches to weight its international growth equity strategy whereby target country weights are based on market capitalization with the stipulation that no single country is allowed to exceed a certain pre-determined percentage of the portfolio. Countries whose market cap exceeds this limit are capped at this predetermined percentage. The excess weight is redistributed to the rest of the nations on a cap weighted basis. For example, let's assume a three-nation portfolio with a maximum weight of 50% for any single country. Let's also assume that the market cap weight of country A is 75%, country B is 20% and country C is 5%. Country A is the only one that exceeds the 50% limit. Country A will then be capped at a max weight of 50% and the excess 25% (which is the original weight of country A minus the capped weight of country A) is redistributed to the other countries. Since country B has four times the weight of country C, it is 80% of the remaining market cap and will receive 80% of the excess weight from country A. Country B will now have a max weight of 40% (original weight of 20% plus the 4/5 of the excess 25%) and country C will have a max weight of 10% (original weight of 5% plus 1/5 of the excess 25%). This is a simplification of the actual process where there are a total of 22¹⁶ nations with multiple countries exceeding the cap limit, but the fundamental process of redistributing the weights remains the same.

Using country caps can enhance portfolio diversification by helping to minimize the risk of having a large exposure to any one country irrespective of that country's contribution to global market capitalization or global GDP. By way of

contrast, since passive indices are market cap weighted, they could have a significant weight in a single country at any given time; for example, the MSCI EAFE Growth Index had nearly 24% of its weight in the UK as of December 31, 2011. In the late 1980s, Japan peaked at approximately 65% of the EAFE (Sources: MSCI). Cap weighted indices are likely skewed toward more popular and thus more expensive countries. Active managers, on the other hand, tend to select a small basket of securities and typically do not have a systematic method of capping country risk – at the extreme, it is possible that an active manager could have the entire portfolio invested in just one country.

The forced redistribution implemented in the Gerstein Fisher Multi-Factor® International Growth Equity strategy should result in increased exposure to the smaller, less developed economies that have tended to have a higher growth potential and less expensive equity markets relative to the larger countries as measured by GDP or market cap. In essence, adhering to these maximum country weights serves as a type of value and size filter within the strategy.

Once these maximum weights are set based on the cap limit and cap-weighted redistribution – let's call these initial max weights – a momentum tilt is added at the country level. Countries with higher momentum have their max weights increased and countries with negative momentum have their max weights decreased. The amount of increase or decrease is based on the country's initial max weight and its momentum exposure relative to other countries in the index. A final stipulation is that no country's adjusted max weight (after adding the momentum tilt) is more than 1/5 more than its initial max weight. As mentioned previously, this helps minimize the risk of having a large exposure to any one country.

Step 3: Determining Factor Exposures

As previously described, small and value tilts are applied to the portfolio at the country level in the form of country max limits. Any country exceeding this limit has its excess weight distributed to other countries in a cap-weighted ratio. Momentum tilts are also applied at the country level by adjusting these initial max weights upward or downward based on each country's momentum exposure relative to other countries in the portfolio.

¹⁶ 21 countries have been used for historical data since one country was added to the index in 2010.

In addition to the country level tilts, security level tilts are also applied (relative to the MSCI EAFE Growth index). The holdings from each country consist of greater exposures to smaller, more value-oriented, and higher-momentum securities relative to that country's holdings in the index, because based on our research, these tilts should result in higher expected returns. In order to implement benchmark-relative exposures at the security level, the factor exposures of the benchmark must first be calculated. Gerstein Fisher's MFM is used to calculate the various risk factor characteristics of the index. Once the factor exposures for the benchmark are computed, the targeted exposures of the strategy can be determined.

The three risk factors described previously (size, value, and momentum) are constrained to 'benchmark exposure + x' where x denotes the excess exposure to that risk factor, relative to the benchmark exposure. Though the strategy is focused on the large growth investment space and uses a large growth index as its universe of stocks, there is still a small and value tilt applied to the portfolio. At the security level, the small cap tilt is a result of dialing up the exposure to the 'smaller' large cap companies and simultaneously reducing the exposure to 'larger' large cap companies. The value tilt is implemented in a similar way: the exposure to the more value-oriented growth companies is increased and the exposure to the 'growthier' growth companies is reduced while still allowing the strategy to embrace momentum. As a result, the overall portfolio still looks and feels like a large growth index but has strategic tilts to small cap, momentum and value. Any factor exposures that are not desired by the strategy (industry risk, currency sensitivity, et al.) are constrained to be as close as possible to the benchmark exposures. This ensures strategic tilts to risk factors that are based on time-tested academic research and investment principles without taking on unintended risk bets.

Step 4: Constructing the Portfolio

After defining the universe of stocks from which the strategy can buy holdings, establishing country weights based on the cap-limit and redistribution process, adjusting max weights based on country level momentum exposures, and determining targeted risk factor exposures, the final step of the process is the construction of the portfolio.

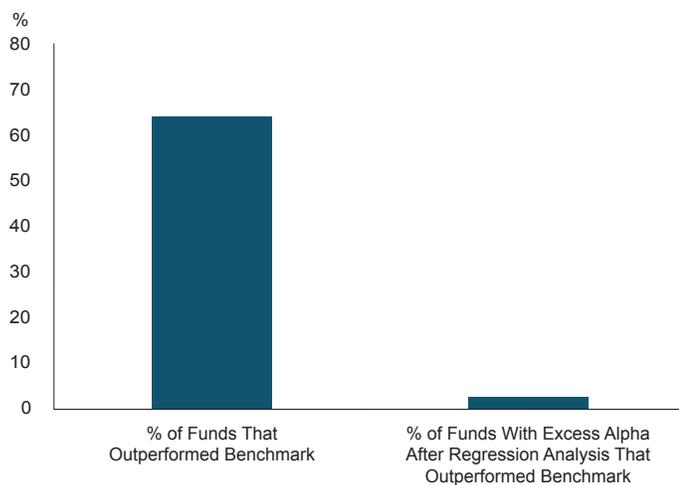
The multi-factor model is used in conjunction with a quantitative optimization process to structure a portfolio that consists of all the targeted constraints defined previously while seeking to minimize exposures to undesired risks. Of all the different combinations of securities that can provide the constraints mentioned above, the portfolio that is selected is the one that minimizes the level of active risk as defined by the multi-factor model. Before implementing the structured portfolio, the stocks are screened for potential liquidity issues. On a systematic basis, the multi-factor® model is used to recalculate the factor exposures of the benchmark and the portfolio is rebalanced to ensure that the relative tilts are maintained and that the active risk remains within specified limits. We believe the flexibility to rebalance our portfolio frequently instead of being required to hold a stock based on an index (even if the stock may be exhibiting negative price momentum and causing a drag on performance) is an advantage. By contrast, traditional indices reconstitute only once a year, at the end of June. This results in the potential for style drift throughout the year as market capitalizations may shift. By more dynamically rebalancing via regular cash flows, Gerstein Fisher's strategy should yield relatively constant exposure to the specific asset class and risk factors through time.

In addition, we can sell a security with negative momentum or delay its purchase, and we can continue to hold on to a security with positive momentum even if the rules of an index suggest a sale. Coupled with the limits on maximum country weights, disciplined rebalancing helps Gerstein Fisher maintain the portfolio's size, momentum and value tilts by not allowing the larger, more expensive countries to dominate the portfolio.

What is Really Driving Active Manager Returns?

Interestingly, foreign growth equity has historically been an asset class in which active managers have actually eked out some outperformance over the index (see column 1 in Exhibit 7). There were 118 funds in the foreign growth space that were active for at least 12 months during the period January 1, 2002 and December 31, 2011. This data was free of survivorship bias. (Survivorship bias is the tendency of failed or underperforming funds to be excluded from performance studies since they no longer exist. This results in the performance study being skewed higher because the surviving funds tend to be the ones that have performed relatively better.)

Exhibit 7: Percent of Active Managers Outperforming Benchmark
10 Years Starting Jan. 1, 2002 and Ending Dec. 31, 2011



Sources: Bloomberg, MSCI, Gerstein Fisher Research

Of these 118 foreign growth funds 87 were active as of December 31, 2011 and 42 had been in existence for the 10 years starting January 01, 2002 and ending December 31, 2011. Of these 42 funds, 27 (64%) outperformed the MSCI EAFE Growth index and 15 underperformed the index over this 10-year period. The average outperformance of the funds that outperformed over this 10-year time period was 55.06pp and the average underperformance of the funds that underperformed was -17.60pp indicating that when these funds outperformed, it was by a significant amount (See Exhibit 8).

The 64% of active managers that outperformed the benchmark did so by, on average, approximately 4.5pp per year over this time period, which would lead the casual observer to believe that active management in this asset class definitely has merit. But what was really responsible for this performance?

It may be partly due to the fact that these managers are not bound to hold or sell stocks simply because these stocks are constituents of the index and can take active stock, sector, and country/region bets. However, factor-based analysis of active growth managers' returns leads us to believe that much of their outperformance can actually be attributed to their exposure to various risk and behavioral factors – and not to manager skill (see column 2 in Exhibit 7).

It appears that the outperformance of international growth funds relative to the MSCI EAFE Growth index in Exhibit 7 is far more common than positive manager “alpha”, or excess returns that cannot be attributed to exposures to momentum, value and size. Of the 42 funds we

¹⁷ Brinson, Hood & Beebower (1986)

Exhibit 8: Average Outperformance of Active International Managers over MSCI EAFE Growth Index
10 Years Starting Jan. 1, 2002 and Ending Dec. 31, 2011

	Cumulative	Annualized
27 Funds that outperformed	55.06pp	4.48pp
15 Funds that underperformed	-17.60pp	-1.92pp

Sources: Bloomberg, MorningStar, Gerstein Fisher Research

examined, only 1 had positive alpha at the 10% significance level. Said another way, after further research it appears that only 2.4% of the managers we analyzed – not 64% – generated outperformance that could be explained by anything other than the four systematic risk factors we have studied. Of the 27 funds that outperformed the benchmark on a pre-risk-adjusted basis, 26 had a positive exposure to momentum, 20 had a negative exposure to size – which implies exposure to smaller companies – and all 27 had a positive exposure to value. In other words, much of what appears to be outperformance due to the manager’s stock picking acumen could be interpreted in many cases as due instead to one or more risk factors.

This finding raises important philosophical issues regarding the investment risks for which active managers should be rewarded. Does the active portfolio consciously possess a size or style bias? If so, then why? If the size, momentum and style tilts of an active fund are sufficiently stable, could an investor potentially be better served by selecting a more moderately priced index-like strategy for this segment of his portfolio? In so doing, the investor also has the potential for more reliable and consistent exposures to the risk factors that he desires for the portfolio. It is widely accepted that portfolio structure determines the vast majority of the variance in investment returns¹⁷, and in some cases, active managers can fail to provide reliable asset class representation – and reliable alphas. This makes structuring an appropriate portfolio difficult for the investor when using active managers.

Why a Structured Quantitative Approach for Growth Equity?

When selecting investments with which to implement their strategic asset allocations, many investors rely on either passively managed index funds or traditional, actively managed mutual funds. Both of these approaches have their merits – but also their drawbacks. Indexing can prove too rigid, limiting a fund’s flexibility to capitalize on market opportunities and its ability to take on risks that have the

potential to reward investors. Active management is more flexible by nature, but introduces the risk of style drift, or the migration over time of a fund or portfolio away from its stated style or market capitalization objectives.

By applying a structured, quantitative approach that analyzes and filters information mathematically rather than intuitively, provides the overall asset class representation of an index fund plus the flexibility to capitalize on specific themes like momentum or small company exposure, we believe the Gerstein Fisher Multi-Factor® International Growth Equity strategy offers a better way for investors to access the developed international growth equity space.

A framework based on an index-like approach should provide ample diversification across countries and sectors, an advantage over active funds that may be concentrated in fewer stocks, countries, and/or sectors. Such concentrated bets can result in severe downside risk while not providing enough upside to compensate for the additional stock-specific risk. Because of our structured approach and targeted risk factor tilts, we believe our strategy will offer higher expected returns on the up side while limiting the significant downside risk associated with stock-specific bets relative to active managers. Additionally, we believe the strategy's performance is more likely to reflect a reliable, empirically tested, and well-documented process rather than luck.

The key benefits to investors of the Gerstein Fisher Multi-Factor® International Growth Equity strategy can be summarized as follows:

- **The flexibility to harness potential excess return:**
By adding a tilt to large cap stocks in one portfolio, as well as incorporating both value and momentum themes (albeit within the growth universe), Gerstein Fisher has the flexibility to be opportunistic and proactive in seeking incremental returns relative to a large cap growth equity benchmark or its component part benchmarks.

- **The discipline to ensure asset class representation:**
Research has shown that portfolio structure – the mix of asset classes in a portfolio – is the predominant driver of the variation of long-term returns¹⁸. Yet asset allocation is only effective when investments behave like the asset classes they are designed to represent. By using a structured, factor-based approach to portfolio construction, our objective is to build a portfolio that provides reliable core exposure to international growth equities for our clients.
- **Diversification to lower portfolio risk:** Investors can also benefit from the diversification aspect of owning both growth- and value-oriented stocks, as these segments of the market tend to behave differently at different times. Our research has shown that the lower correlation between momentum and value – and between momentum stocks across countries – results in lower volatility relative to traditional international growth equity index vehicles.¹⁹
- **Transparency of process:** Given the current environment for hedge funds and other structured products (many of which are characterized by low levels of liquidity and transparency and high fees²⁰), we believe the Gerstein Fisher Multi-Factor® International Growth Equity strategy is likely to appeal to investors looking for alternatives to the status quo in this space.

Grounded in the theory of market efficiency, the strategy uses the mathematics of portfolio engineering to bring together fundamental variables and aspects of behavioral finance in a structured quantitative manner.

¹⁸ *ibid*

¹⁹ Fisher (2011)

²⁰ According to an April 2008 paper by Kenneth French, "The Cost of Active Investing", the typical hedge fund fee is 4.26%

Index Definitions

Large-Cap Value Index (Exhibit 1): This index consists of the Fama/French US Large Value Research index through November 30, 2011 and the Russell 1000 Value index from December 1, 2011 through December 31, 2011.

Large-Cap Core Index (Exhibit 1): This index consists of S&P 500 Index through December 31, 2011.

Large-Cap Growth Index (Exhibit 1): This index consists of the Fama/French US Growth Research index through November 30, 2011 and the Russell 1000 Growth index from December 1, 2011 through December 31, 2011.

Small-Cap Value Index (Exhibit 1): This index consists of the Fama/French US Small Value Research index through November 30, 2011 and the Russell 2000 Value index from December 1, 2011 through December 31, 2011.

Small-Cap Neutral Index (Exhibit 1): This index consists of the Fama/French US Small Neutral Research index through November 30, 2011 and the Russell 2000 index from December 1, 2011 through December 31, 2011.

Small-Cap Growth Index (Exhibit 1): This index consists of the Fama/French US Small Growth Research index through November 30, 2011 and the Russell 2000 Growth index from December 1, 2011 through December 31, 2011.

International Value (Exhibit 2): This index consists of Fama/French International Value index through December 31, 2010, the Dimensional International Value index from January 1, 2011 through November 30, 2011, and the MSCI EAFE Value Index from December 1, 2011 through December 31, 2011.

International Market (Exhibit 2): This index consists of Fama/French International index through December 31, 2010, the Dimensional International Market index from January 1, 2011 through November 30, 2011, and the MSCI EAFE index from December 1, 2011 through December 31, 2011.

International Small (Exhibit 2): This index consists of the Dimensional International Small Cap Index through November 30, 2011 and the MSCI EAFE Small Cap Index from December 1, 2011 through December 31, 2011.

Country Market (Exhibit 3): This index consists of the country level MSCI Standard index for each specific country through December 31, 2011.

Country Value (Exhibit 3): This index consists of the country level MSCI Value index for each specific country through December 31, 2011.

Country Small (Exhibit 3): This index consists of the country level MSCI Small Cap index for each specific country through December 31, 2011.

Definitions of Key Terms

Beta: Beta is the sensitivity of the stock's price to that of the whole market's. A positive beta suggests that the assets returns tend to follow the market returns. A negative beta implies that assets returns are in the opposite direction relative to the market.

Alpha: Alpha is the abnormal return that is not explained by the theoretical return of a market model. In the case of a Multi-Factor® model, alpha is the return that can't be attributed to any of the existing factors in the model.

Correlation: Correlation is the degree to which two or more measurements tend to vary together. A positive correlation between two variables implies that those variables tend to move in the same direction. A negative correlation between two variables implies that those variables tend to move in opposite directions.

MSCI EAFE: The MSCI EAFE index consists of MSCI country indices that represent developed markets in Europe, Australasia, and the Far East. The largest 85% of stocks in the entire universe of developed stocks (not including North America) comprise the MSCI EAFE Standard index which is also known as the MSCI EAFE Index. The MSCI EAFE Index is divided into the MSCI EAFE Growth index and the MSCI Value index. Each security is either placed into the Value or Growth indices, or may be partially allocated to both (with no double counting) with each sub index targeting 50% of the free float adjusted market capitalization. Value/Growth is a measure consisting of the price of the security and some fundamental information of the security such as book value. The exact calculation is as per the methodology used by MSCI Barra.

MSCI EAFE Growth: The MSCI EAFE Growth index consists of the growth portion (growth being a measure of price relative to book/value/cash-flow or as described by MSCI Barra) of the MSCI EAFE index.

MSCI EAFE Value: The MSCI EAFE Value index consists of the value portion of the MSCI EAFE index

MSCI EAFE Small: The MSCI EAFE Small cap index consists of the smallest 15% of stocks by market capitalization in the entire universe of developed stocks (not including North America).

P/E: P/E is the price-to-earnings ratio of a security.

P/B: P/B is the price-to-book value ratio of a security.

S&P 500 Index: The S&P 500 is a free float market capitalization weighted index that comprises of 500 large cap securities that are traded in the United States. It is generally used a proxy for the domestic equity market.

Tracking Error (Active Risk): Tracking error is a measure of how closely a portfolio matches the performance of another portfolio/index/stock that is being used as a benchmark. The greater the tracking error, the greater is the deviation in performance between the portfolio and its benchmark.

Significance Level: Significance level is the probability of committing a type 1 error (false positive) while testing for statistical significance. The smaller the significance level, the greater is the amount of evidence required to reject the null hypothesis and hence the test is statistically more significant.

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