Christian Hiller von Gaertringen . Peter Zolling
(eds.)

Computers are only human

»This fascinating volume blends illuminating insights. A brilliant read for investors who want to learn about factor investing.«
Professor Elroy Dimson
Centre for Endowment Asset Management, Cambridge Judge Business School.

Bernhard Langer and Michael Fraikin:
A conversation about systematic factor-based investing

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Foreword

At Invesco we exist to help people get more out of life by delivering a superior investment experience. Our entire company pursues a single mission: to help our clients achieve their investment goals. This consistent focus has shaped our company for many years.

We are active investment managers with both deep and broad experience in the industry, and we build on this experience to generate long-term, high returns for our clients. Our expertise in active investment management and factor-based investing feeds into a variety of different investment vehicles that allow us to help our clients across the globe achieve their investment goals.

Our active and factor-based investment strategies are designed to help our clients achieve their own specific objectives and go beyond traditional, benchmark-oriented active and passive strategies. This extremely independent and active approach is an important foundation for precise and effective portfolio analysis and strategizing.

Over the past few years, investor interest in passive and factor-based strategies to supplement active investment strategies has increased significantly. As a pioneer of factor-based investing, *Invesco* has promoted innovation in this field for 40 years, and today manages over USD 150 billion invested capital for clients across the globe.

We have achieved outstanding success in the realization of a wide range of long-standing and proven investment strategies to meet a diverse array of investor needs. Our range of funds available in the United States has included factor-based smart beta strategies since 1975, and our *Quantitative Strategies* team has implemented factor-based strategies since 1983. Since 2003, our *PowerShares* team has been a pioneer in the field of factor-based smart beta solutions. Over the past 13 years, *Invesco* has developed the most extensive portfolio of smart beta and factor ETFs in the industry. This allows our investors to engage in both the stock and bond markets, and provides them access to alternative investment vehicles.

As part of our commitment to further developing the field of factor-based investing, we recently established the *Factor Research Forum*. This institution is designed to provide investors with the latest findings and insights regarding important market developments in the area of factor-based investing. Additionally, we have also published the results of a comprehensive survey of more than 60 institutional clients around the globe regarding factor-based investment strategies.

Our leading position in factor-based investment strategies and smart beta reflects the depth of our experience and expertise, and is the foundation upon which we are able to consistently develop innovative solutions to meet the continually changing needs of our clients.

Factor-based investment strategies can be an effective instrument to ensure broader portfolio diversification or to help you achieve specific investment goals. Bernhard Langer and Michael Fraikin have been involved in factor-based investment strategies for over 20 years. Langer established the quantitative investment strategy department at the Bayerische Vereinsbank (now part of HypoVereinsbank) in 1992, and has developed this field further during his time at *Invesco*. After finishing his university studies in 1991, Fraikin first went to work at Commerzbank, where he was involved with their quantitative equity analysis department. Since then, both specialists have worked on quantitative strategies at *Invesco* for many years; Langer since 1994, and Fraikin since 1997. Both are also practitioners in the best sense of the word: they have acquired their knowledge of quantitative strategies through years of practical experience and – just as an engineer tunes a motor – they have continuously improved and refined their models.

The interview with these two experts in this book will provide you with very personal insights into the world of quantitative managers and the fascinating evolution of an investment strategy that continues to have revolutionary effects on our industry.

We hope that these insights will prove useful to you and that they might illustrate new paths forward in the continually developing investment landscape. We look forward to continuing our work together to help you achieve your investment goals in the future.

Marty L. Flanagan

President and CEO, *Invesco Ltd.*

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1 Introduction: Factor-based investing: How and why does it work?

Factor-based strategies have become some of the most influential investment concepts of our time. Institutional investors in particular have recognized that such approaches allow them to precisely and systematically fine-tune their investment strategies to meet specific investment goals.

Factor-based investment, also known as "smart beta" or "alternative beta", is a systematic approach to investing that takes into account asset characteristics other than market capitalization, region, or sector. While the approach has only recently gained significant interest from investors and the media, it has been studied since the 1970s and has proven effective over the past few decades. *Invesco* has utilized factor-based investment strategies for over 30 years.

The factor-based approach has profited from developments in data processing and technology, which have allowed analysts to rapidly develop their understanding of the approach and to underpin their findings with the results of sound scientific research. Such research has shown that factor-based investment strategies not only allow for long-term outperformance, but also facilitate better risk-adjusted performance.

This is because markets are inefficient, and investors do not always act rationally. Factor-based strategies seek to take advantage of these market inefficiencies and patterns of behavior. They also seek to collect factor premiums for the higher risk taken with respect to the wider market.

Quantifiable and academically proven

Factor investing is often regarded as an alternative investment approach to passive investment strategies and actively managed funds. The factors at the center of the approach are quantifiable characteristics of a given financial asset that have a proven influence on its performance. To put it another way: with the help of factors, investors can attribute the performance of individual securities to quantifiable asset characteristics.

Factor-based investment strategies invest in groups of stocks that share similar characteristics in order to achieve better performance than broad market indices

weighted by market capitalization. Traditional factors are *momentum* (positive relative performance), valuation or *value* (relative attractiveness based on valuation metrics such as the price-to-book ratio or the price-earnings ratio), *quality* (indicators such as stable profitability, strong cashflow generation, and a comparably low debt burden), and *volatility* (typically measured by fluctuations in the stock price).

When using the factor of *momentum*, for instance, investments are made in prior-year gainers, while prior-year losers are sold short. This strategy is based on the behavioral economic theory that investors tend to react less strongly to good news than they do to bad news. The *value* factor, on the other hand, takes advantage of the tendency for investors to extrapolate information too far into the future. This leads certain assets to be listed at a very favorable level compared to their intrinsic value.

Each individual factor is based on reliable scientific findings or recurring and well-documented investor behaviors. Factor-based approaches are thus not limited to use with stocks; factors can also be effective in bond markets, currency markets, etc., because investors tend to show the same behavioral tendencies regardless of where they invest their money.

Better calibration of risks and returns

Scientific studies show that factors can explain a large portion of the risk and return characteristics of a given portfolio, and factor-based investment strategies can be applied to a single factor or to a combination of factors. Combining multiple factors enables different market scenarios to be taken into account, and allows investors to take advantage of potential diversification benefits. Because factors are subject to their own cycles, diversification is just as important with factor-based investments as it is with any other investment strategy. Multifactor approaches can compensate for temporary periods of weakness in individual factors.

The prospect of an upswing phase with recurring short-term downturns, for instance, might call for a combination of *value* and *low volatility* factors. The largest diversification benefits emerge when using a combination of factors with rarely correlated excess returns that have behaved in very different ways in the past, such as *momentum* and *low volatility*. Overall, a finely balanced risk-return profile based on a multifactor model can help investors more accurately reach certain investment goals.

The more inefficient a given market is, the higher the probability that a quantitative approach such as *factor investing* will generate above average returns. When, for instance, *value* stocks are easy to identify and all market participants are convinced that these assets will generate better than average returns, one of the potential advantages of the factor approach quickly disappears.

Especially in light of the recent high levels of correlation between different markets, a particularly interesting aspect of factor strategies for investors is their minimal dependency on market direction and their low correlation with traditional asset classes. Such characteristics mean that factor strategies not only contribute to true portfolio diversification, but can also help limit the risk of loss.

Today, many passive investment instruments such as smart beta indices or ETFs also capitalize on systematic, evidence-based stock selection using factor approaches. Active factor-based investment at *Invesco Quantitative Strategies* (IQS) is somewhat different, and extends beyond a single factor approach. Our factor strategies utilize a widely diversified range of multiple factors that have different cyclical characteristics in order to achieve more stable performance. Above all, however, the IQS factor approach focuses on the *bottom-up* selection of stocks. To put it another way: the development of a multifactor portfolio explicitly takes into account alpha (and risk) expectations within a broader framework of comprehensive risk management

2 Computers in the financial world: Deus ex machina or a tool of humankind?

Mr. Langer, in the 1970 science fiction film *Colossus: The Forbin Project*, a robot prophesizes to a human that, "In time you will come to regard me not only with respect and awe, but with love." Have we now, almost half a century later, come to the point where we are more or less dominated by computers, and are even emotionally controlled by them?

Langer: It's clearly tempting to think in such terms, and the topic has proven particularly exciting for authors and filmmakers. But for me the computer represents a technical resource – a tool that is intelligent to a certain extent, and which allows me to process large amounts of information. Maybe I'm too matter-of-fact in this respect, and maybe my attitude is itself a sign that I have already long been controlled by computers. Have you read the thriller *The Fear Index* by the British novelist Robert Harris? It tells a story of how in our world, the investment world, the computers take over and begin to learn on their own. In the end, they become this monster that seizes control of everything. We are a long way away from such horror scenarios with our programs. The limited ways in which we technically use computers "only" as a resource is almost disenchanting. By no means would I argue that computers direct us or even control us. The computer is, and will remain, a pure tool.

Fraikin: The idea that a computer can control us would be like talking in the past about a dictatorship of the typewriter. I also can't imagine that people would ever look at such a machine with awe and love. I do believe that software or computers have crept into certain areas of our lives, and they may even dominate our lives in these areas. But the fact is that we don't even really notice it in many cases. Think about the route planner that calculates your trips while taking traffic information into account. I'm not sure people really think about or are even conscious of the fact that they trust their trips to a computer. If we really took a minute to reflect on that, we would quickly arrive at questions that might make us uncomfortable. Basically, the key issue is: which areas of our lives do we want to entrust to computers, and which do we not?