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Sustainable Investing Expertise by ROBECOSAM

Quantitative Equities

Signals are green for quant investing

- Factor investing will remain alive and healthy for foreseeable future as factor premiums are pervasive and persistent
- Big data revolution and exponential growth in computing power presents exciting possibilities for quant investing
- Innovation should be underpinned by a strong culture that rewards high-quality research

In this article, we reflect on decades' worth of experience in the field of quant investing and argue that the future looks bright. We look back at the empirical foundations for factor investing and focus on what is required to translate high-quality research into robust investment results. We explore the versatile nature of quant strategies as well as the possibilities offered by next-generation quant models stemming from the incorporation of alternative data and advanced techniques. We close off by stating why quant investing has increasingly become a 'team sport', hence team culture will be even more important going forward.

Article
For professional investors
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The swift analysis of vast amounts of data is an obvious characteristic of quant investing that sets it apart from its fundamental sibling. But its key strength is its rules-based and systematic nature that results in objective outputs that strip out human emotions. As we have dedicated our careers to quant investing, we have had front-row seats to witness how effective it has been for investors over the long term.

That said, we have learned that a long-term winning formula can sometimes feel like riding a rollercoaster in the short run. Due to this cyclicality, we tend to say that quant investing is often more a test of character than a test of intelligence – and 'strong hands' are necessary for success. To provide a bit more context to our view, we will first take a few steps back and briefly touch on the history of factor investing.

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Digging into the archives

The empirical foundations for equity factor investing were laid over 40 years ago. Sanjoy Basu outlined the value effect in 1977,[1] followed by the size anomaly discovered by Rolf Banz in 1981.[2] The three-factor model developed by Nobel prize laureate Eugene Fama and fellow researcher Kenneth French in 1992 then provided the catalyst for increased attention and research on factors.[3] Hot on the heels of the seminal Fama and French paper, Narasimhan Jegadeesh and Sheridan Titman documented the momentum factor in 1993.[4]

This bevy of academic research helped to form the basis of our own personal education and inspired us to become early proponents of factor-based investing. We thought to ourselves, "could it be so easy to beat the market?", while reading the academic literature in the 1990s. And as young and ambitious practitioners, we made our own contribution by helping to establish the low volatility effect within equities in the mid-2000s.[5]

Interestingly, this defensive factor has been largely ignored by academics, despite the abundant empirical evidence and research in support of it. However, the low volatility anomaly has remained strong post-publication and its popularity among investors has grown steadily. Similarly, we also embraced the momentum factor from the outset, notwithstanding the skepticism from academics who questioned its profitability after transaction costs.

In 2015, Fama and French built on their earlier work as they included the investment and profitability factors in their new five-factor model.[6] Industry practitioners typically bundle the two new factors into a single theme called quality, which also consists of other financial statement health metrics such as earnings quality. Interestingly, the empirically proven low volatility and momentum factors remained conspicuously absent from their model.

Quant cycles require strong hands

Through our experience as practitioners and researchers, we have observed that factors have offered a premium in the long term (pre and post publication), but tend to experience major bull and bear phases in the short run. The difficult quant bear phases come in different shapes, typically last two to four years, and are driven by deeply entrenched cognitive biases that afflict investors.

That said, we have learned that behavioral finance is not only a lens through which to view the world, but also a mirror to look at ourselves. Therefore in addition to employing a disciplined and systematic approach to keep emotions at bay and take advantage of market inefficiencies driven by human behavior, quant investors need to be stoic and tenacious to weather the bumps and bruises along the way, as we too are human.

Moreover, timing quant cycles has proven to be extremely hard. For instance, if we had changed our quant models by lowering our exposure to the value factor in various strategies due to its publicized struggles in the late 2010s, then we would have partially missed the recent rebound in performance. Similarly, investors typically make withdrawals after a prolonged period of underperformance, thereby locking in the losses and missing out on the subsequent reversals.[7]

To contextualize the cyclicality in factor returns, we mapped out a quant cycle by qualitatively identifying peaks and troughs that correspond to bull and bear markets in factor returns.[8] We observed that traditional business cycle indicators do not capture much of the large cyclical variation in factor returns.

1 Basu, S., June 1977, "Investment performance of common stocks in relation to their price-earnings ratio: a test of the market hypothesis", Journal of Finance.
2 Banz, R. W., March 1981, "The relationship between return and market value of common stocks", Journal of Financial Economics.
3 Fama, E., and French, F., 1992, "The cross-section of expected stock returns", Journal of Finance.
4 Jegadeesh, N., and Titman, S., March 1993, "Returns to buying winners and selling losers: implications for stock market efficiency", Journal of Finance.
5 Blitz, D., and van Vliet, P., October 2007, "The volatility effect: lower risk without lower return", Journal of Portfolio Management.
6 Fama, E., and French, K., April 2015, "A five-factor asset pricing model", Journal of Financial Economics.
7 Dichev, I., March 2007, "What are stock investors' actual historical returns? evidence from dollar-weighted returns", American Economic Review.
8 Blitz, D., January 2022, "The quant cycle", Journal of Portfolio Management.

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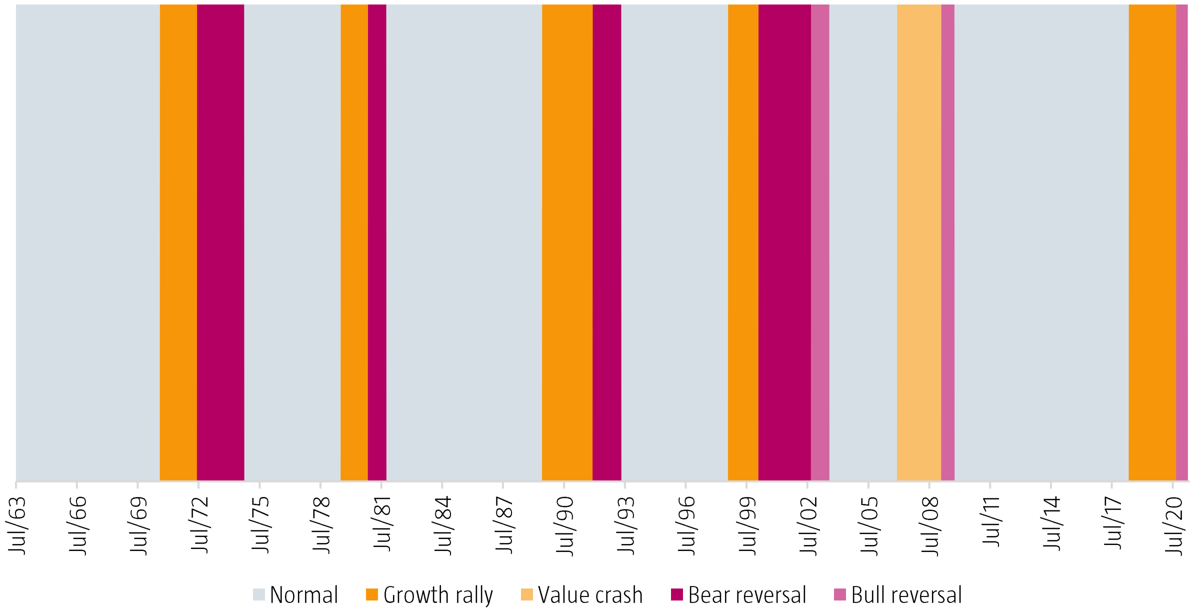
Instead, major turning points of factors seem to be caused by abrupt changes in investor sentiment. Thus, a quant cycle can be inferred directly from factor returns, which consists of a normal stage that is interrupted by occasional severe drawdowns of the value factor and subsequent reversals as shown in Figure 1.

Figure 1 | Quant cycles, 1963 to 2020



Source: Blitz, D., January 2022, “The quant cycle”, Journal of Portfolio Management.

The normal stage prevails around two-thirds of the time and factors typically perform well during this phase. Value drawdowns, which usually occur once every decade and last around two years, are caused either by growth rallies or value crashes. The model also identifies two types of reversals: bear and bull. Bear reversals are distinguished by large positive returns for value due to a growth crash. By contrast, bull reversals are characterized by large negative returns for momentum.

Overall, we believe a better understanding of the quant cycle can help investors frame the behavioral dynamics of factors. This provides a basis to formulate a multi-year outlook by providing insight into how the cycle could potentially unfold based on the prevalent market environment. Moreover, our research highlights the benefits of perseverance during periods of weak factor performance.

More philosophically, the quant cycle plays a role in the persistence of factor premiums. As history shows, it is possible for factors to underperform for an interval as long as 10 years (a la value in the 1930s and 2010s). This leads some investors to give up in such instances as the waiting period is too long. Indeed, the occasional drawdowns that we witness often engender disillusion in the quant approach among investors.

This makes factor premiums difficult to arbitrage, because in the short run they are anything but risk free. As such, quant investing is ultimately more a test of character than a test of intelligence. In light of all this, we are confident that factor investing will remain alive and healthy for the foreseeable future.

Factor premiums are pervasive

Our strong conviction is also supported by our finding that the low volatility, value and momentum factors have been effective since the mid-19th century, based on a proprietary US stock database that dates back to 1866.[9] This underlines that these factor premiums do not depend on specific historical market structures. The deep 155-year sample also allows us to study infrequent macro events, from which we can infer that low-risk stocks generally exhibit resilience in times of recession, expansion, peace, war, deflation or inflation.

Most of the studies on quant investing revolve around the US, but the opportunity set is much broader. For example, factors also turn out to be highly effective in emerging markets.[10] It even seems that the grass is greener in emerging markets, perhaps because of the presence of many private, non-professional investors. More recently, the opening up of the Chinese A market to international investors has offered a rare opportunity for true out-of-sample testing. It turns out that factors also thrive in this market which is known to attract many speculative investors.[11]

Quant fixed income: the land of the future

Beyond equities, quant investing can be applied to fixed income. In corporate and sovereign bond markets, various signals can be used for dynamic market-timing strategies.[12] Moreover, similar factors as in stock markets turn out to be rewarded in corporate bond markets.[13] As a result, the concept of multi-factor investing seems equally appealing for credits as for stocks.[14]

We believe quant fixed income investing has the potential for enormous growth, but, in all fairness, we probably would have said the same thing ten years ago. Progress has been slow, similar to how Brazil has for a long time been recognized as the land of the future, but has had a hard time living up to the high expectations. In fact, some asset managers who had ventured into the quant fixed income space have since pulled out due to a lack of traction. This serves as yet another illustration that quant investing really requires long-term mindset.

In addition to stocks and bonds, factors can also be harvested in other asset classes such as commodity markets and currencies, where they are commonly referred to as alternative risk premia.[15] In our view, the next step could be the application of quant strategies to cryptocurrencies and tokens on illiquid assets.

Quant investing is versatile

As mentioned earlier, one of the unique elements of quant investing is that it can be used to systematically analyze vast amounts of data. But what investors plan to achieve with the use of data is an important consideration. Anecdotally, we have noticed that people instinctually focus on returns when they think about the use of data in the context of quant investing. For example, academic papers on the use of machine learning in quant investing virtually all examine alpha generation. We believe it is important to consider not only on return, but also risk, sustainability and other important characteristics.

Risk can have an impact on how clients experience their investment journey, especially in volatile environments. Moreover, risk also plays a vital role in performance. For instance, avoiding investments in companies that subsequently experience financial distress can be helpful for investors.

[9] Baltussen, G., van Vliet, B. P., and van Vliet, P., November 2021, "The cross-section of stock returns before 1926 (and beyond)", SSRN working paper; Baltussen, G., van Vliet, B. P., and van Vliet, P., May 2022, "150+ years of conservative investing", Robeco article.
[10] van der Hart, J., Slagter, E., van Dijk, D., 2003, "Stock selection strategies in emerging markets", Journal of Empirical Finance.
[11] Blitz, D., Hanauer, M., and van Vliet, P., 2021, "The volatility effect in China", Journal of Asset Management.
[12] Baltussen, G., Martens, M., and Penninga, O., 2021, "Predicting bond returns: 70 years of international evidence", Financial Analysts Journal.
[13] Hottinga, J., van Leeuwen, E., and van Ijserloo, J., October 2001, "Successful factors to select outperforming corporate bonds", Journal of Portfolio Management.
[14] Houweling, P., and van Zundert, J., February 2017, "Factor Investing in the corporate bond market", Financial Analysts Journal.
[15] Baltussen G., Swinkels, L., and van Vliet, P., December 2021, "Global factor premiums", Journal of Financial Economics.

While sustainability integration is by no means limited to any particular investment approach, quant strategies are especially suitable for this. Their rules-based nature makes it easy to integrate additional quantifiable variables in the security selection and portfolio construction processes. This enables quant investors to create a portfolio that strikes the right balance between sustainability preferences and risk-return expectations.

A quant approach also offers the flexibility to adapt to ever-evolving views. A decade ago, sustainability was all about exclusions and integrating ESG. Nowadays, the market focuses on carbon footprints, calculating Scope 3 trajectories, SDGs, measuring real-world impact in portfolios, biodiversity, etc. And for certain, we have not seen the last of these changes.

Good quality data is required to address these issues. On the one hand, there is an increasing standardization of sustainability data for reporting purposes and to manage portfolio restrictions. While this data is being commoditized, it is not cheap. However, commercial data vendors could be disrupted if asset owners or asset managers make this data publicly available and free of charge.

Aside from the issue of data access, top-class technical skills are crucial for the development of proprietary sustainability data that is more effective than generic data and can also help generate alpha. This data 'arms race' will be an increasing hurdle for smaller quant houses with limited resources, whereas their larger peers could effectively harness their quant platforms to adequately satisfy evolving sustainability preferences.

Meanwhile, clients have differing beliefs and values, which can also evolve over time due to social developments. As such, we foresee increased demand for customized and flexible solutions that cater to client-specific financial and sustainability goals. The execution of such portfolios will likely require state-of-the-art infrastructure to facilitate the construction of customized strategies. This uniquely positions quant investing to benefit from these trends.

Next-generation quant

Quant investing has traditionally relied primarily on price data and financial statement information. However, exciting new opportunities are opening up due to the big data revolution and exponential growth in computing power. This forms the basis for next-generation quant investing which incorporates alternative data and advanced techniques such as machine learning and natural language processing.

In our research, we outline how machine learning can help to predict the risk that a firm becomes financially distressed.[16] Risk is often nonlinear. For instance, leverage levels might be fine up to a certain threshold, but risk could rise disproportionally beyond this point. Next-generation models can identify such patterns to better forecast stock crashes.

As return databases grow in breadth and depth, the likelihood of successfully exploiting non-standard patterns should increase. Moreover, machine learning techniques can help us to better understand how factors work and interact with each other. This can reveal some of the shortcomings of quant investing and risks associated with factors.

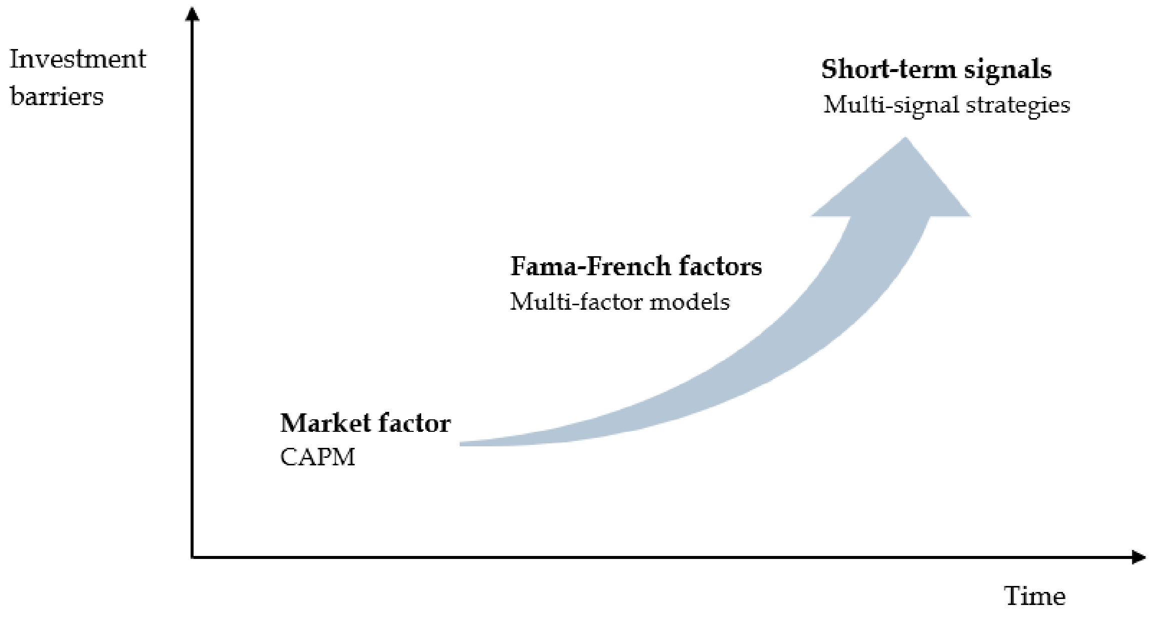
Next-generation models may also better cluster similar securities beyond traditional industry classifications. This could allow for more effective tracking error control, thereby improving the accuracy of relative risk forecasts which could lead to more stable outperformance. As mentioned, advanced methods can also be used to create new sustainability data. For example, this can be achieved by analyzing audio transcripts, decomposing capital expenditure and R&D data, or web scraping.

In addition, next-generation quant strategies can be designed to target sources of alpha that are orthogonal to existing factors. For instance, short-term signals are uncorrelated with traditional Fama-French factors because they change frequently. In a recent paper we show that these alpha signals can be captured and exploited when multiple signals are integrated and an efficient trading approach is used.[17]

[16] Swinkels, L., and Hoogteijling, T., June 2022, "Forecasting stock crash risk with machine learning", Robeco white paper.
[17] Blitz, D., Hanauer, M. X., Honarvar, I., Huisman, R., and van Vliet, P., May 2022, "Beyond Fama-French: alpha from short-term signals", SSRN working paper.

In Figure 2, we show conceptually how short-term signals may enable investors to go beyond the standard Fama-French framework. The diagram illustrates the move from passive to factors and on to short-term signals over time, but also increasing investment barriers which need to be overcome to translate these new signals into positive net alpha.

Figure 2 | Beyond Fama-French factors



Source: Blitz, D., Hanauer, M. X., Honarvar, I., Huisman, R., and van Vliet, P., May 2022, "Beyond Fama-French: alpha from short-term signals", SSRN working paper.

Culture eats quant strategies for breakfast

Peter Drucker supposedly said "culture eats strategy for breakfast". Relatedly, quant investing has increasingly become a team sport over time. Staying ahead of the curve with cutting-edge research calls for investing in state-of-the-art infrastructure and employing smart people. As the saying goes, the bamboo that bends is stronger than the oak that resists. In other words, failure to take into account the future needs of investors and evolve will likely result in asset managers being left behind.

However, it is more important than ever to carefully look for genuine signals in this era of burgeoning data sources and modeling techniques. With more data, there is increased risk of data mining or uncovering spurious results. The issue here is that some patterns may come out as statistically significant, when in fact there is no real underlying phenomenon. Within academia, the problem of 'p-hacking' is now more acknowledged than ten years ago.[18]

Thus, we believe in a cautious approach to innovation. Our investment philosophy of evidence-based research, economic rationale and prudent investing also applies to new variables or methods. Although some new signals might not have long histories, the coverage should at least be sufficient and preferably span across multiple markets worldwide. The quality of the data should also be sufficiently high, while variables have to pass our stringent falsification tests. We often find that many new promising variables fail at this stage of testing.

Importantly, this should be underpinned by a strong culture that rewards high-quality research. Meritocracy is central to this, as the best ideas should always win, regardless of who proposes them. For this to happen, a flat structure and direct

[18] Harvey, C. R., Liu, Y., and Zhu, H., January 2016, "… and the cross-section of expected returns", The Review of Financial Studies.

communication that offers everyone an opportunity to engage and speak up is key. In other words, a culture where junior members can safely challenge their seniors and contribute to discussions. This competition of ideas helps to shape an innovative research agenda.

Moreover, a team-based approach is important as the problems that need to be solved in quant investing have become increasingly complex, and often call for cooperation across disciplines. In this sense, quant investing is very much a team sport. In terms of actual research, a strong research protocol is required to separate sheep from goat factors in an ever-expanding zoo of factors.

Also, remaining ahead of the curve requires an awareness of the innovator's dilemma, meaning the willingness to disrupt or falsify one's established approach, beliefs or solutions. This is a tough concept to follow since many biases need to be overcome. That said, it is a great method to stay honest and to future-proof the investment process.

Innovation is not a goal in itself and must be conducted with a long-term horizon. This means prioritizing sustainable innovation that will endure the test of time, which in turn requires strategic investments in infrastructure and people. A collaborative approach is also crucial to this. For example, encouraging all researchers to improve the shared code base helps to guard against complexities that can stifle innovation down the line.

Quant investing is more a vocation than an occupation

Ten years ago we might have said that most research questions would be answered by 2022. Instead, we probably have more questions today than we had a decade ago. We have experienced that quant investing is easy and difficult at the same time. We have also learned to maintain 'strong hands' when we encounter challenging phases of the quant cycle. Now, we are facing a fast-developing world in which data and computing power is swiftly increasing, giving rise to next-generation quant.

As an asset manager, our clients entrust us with their savings. Therefore, we have a duty to act as responsible stewards of their capital and to help them achieve their financial and sustainability goals. This means we have to exercise prudence in our decision-making and align ourselves with their objectives by investing our own capital in our strategies. We derive great pleasure and purpose from our jobs as we continuously undertake sustainable innovation to deliver quality results for our clients.

From an asset owner perspective, we believe that quant investing will become an even more important part of the investment toolbox. More specifically, it will not only help them to generate attractive returns over the full investment horizon, but also in an increasingly sustainable manner.

In our humble and admittedly biased opinion, we firmly believe the signals are green for quant investing!

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Robeco Institutional Asset Management B.V., Sucursal en España with identification number W0032687F and having its registered office in Madrid at Calle Serrano 47-14º, is registered with the Spanish Commercial Registry in Madrid, in volume 19.957, page 190, section 8, sheet M-351927 and with the National Securities Market Commission (CNMV) in the Official Register of branches of European investment services companies, under number 24. The investment funds or SICAV mentioned in this document are regulated by the corresponding authorities of their country of origin and are registered in the Special Registry of the CNMV of Foreign Collective Investment Institutions marketed in Spain.

Additional Information for investors with residence or seat in South Africa

Robeco Institutional Asset Management B.V. is registered and regulated by the Financial Sector Conduct Authority in South Africa.

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Additional Information relating to RobecoSAM-branded funds/services

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Some Funds referred to in this marketing material have been registered with the UAE Securities and Commodities Authority (the Authority). Details of all Registered Funds can be found on the Authority's website. The Authority assumes no liability for the accuracy of the information set out in this material/document, nor for the failure of any persons engaged in the investment Fund in performing their duties and responsibilities.

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The sale of the Fund qualifies as a private placement pursuant to section 2 of Uruguayan law 18,627. The Fund must not be offered or sold to the public in Uruguay, except under circumstances which do not constitute a public offering or distribution under Uruguayan laws and regulations. The Fund is not and will not be registered with the Financial Services Superintendency of the Central Bank of Uruguay. The Fund corresponds to investment funds that are not investment funds regulated by Uruguayan law 16,774 dated September 27, 1996, as amended.