ROBECO
The Investment Engineers

Quant investing

'The best strategy is the one you can stick with through thick and thin'

- Fully automated stock selection helps avoid behavioral biases
- Bringing quant to non-quants is not easy, but it is worthwhile
- Portfolio construction is still an area where managers can m

Wes Gray is founder and CEO of Alpha Architect, an asset management firm that focuses on high-conviction Value and Momentum factor strategies. He has published multiple academic papers and four books, including three on investing.

After serving as a captain in the United States Marine Corps, Wes earned an MBA and a PhD in Finance from the University of Chicago. We asked him about his views on quant investing and the importance of knowledge sharing.

How did you first become interested in quant investing and why are you so fond of it? Is it aimed just at avoiding typical human biases?

"I started off as a stock picker and was always a fan of Ben Graham and Warren Buffett. I was also into special situations, such as liquidations, trading closed-end fund discount/premiums, and esoteric microcap companies. I was essentially the antithesis of quant. I really got involved in '99 at the height of the tech bubble when I was in college. I was lucky to have a heavy value bias at the time, so I felt bad for a while as the QQQ went flying higher and higher, but eventually the tech bubble

Interview
For professional investors
May 2019

Wes Gray
Founder and CEO of Alpha Architect

crashed. I had a great run for five or five years and continued investing while I was on the PhD program at the University of Chicago."

"While I was 'stock picking' on the PhD program, I was simultaneously learning a lot about quantitative techniques, factor investing, and behavioral finance. I quickly recognized the folly of my ways when I compared my stock picking performance to the generic small-cap value factor portfolio from 1999 to around 2004. Long story short, I had some 'alpha' as a stock picker, but I could have saved myself a lot of brain damage (and eliminated a lot of stress) by simply buying a portfolio of cheap small-caps. This experience opened my eyes to the power of quantitative techniques."

"Another formative experience was when I took a PhD-level course in behavioral finance, taught by Nick Barberis. This course, combined with my stock-picking experience, convinced me that I needed to end my run as a stock picker and rely on quantitative tools to codify my investment philosophy and eliminate my own bias."

'I am a fan of having humans review the data and sanity check the outputs from a model'

You advocate fully quant investment strategies. But what do you think of human oversight? Is it still useful?

"Investing is a personal thing and one should understand their own strengths and weaknesses. For me, I am a fan of automating 100% of the stock selection process. The risk of behavioral bias is simply too high relative to the potential of my ability to add value via a judgement call. For others, this trade-off might be more favorable. There is an argument that a 'quantamental' approach, which combines the benefits of quantitative techniques with human judgement, might work out for an asset manager. I've written a long piece[1] on the subject and I believe the evidence is stacked against quantamental, but reasonable people can disagree on this topic."

"I'd also like to point out that while we are 100% systematic, I am a fan of having humans review the data and sanity check the outputs from a model. We won't override a model's selection, but if there are data errors that cannot be reconciled, we will move past that selection to minimize 'garbage in, garbage out' type problems."

You always seem very keen on sharing your intellectual **property. Why? Aren't you afraid that others might try to** use your ideas to compete against your strategies?

"I view the biggest problem in investing as 'behavioral' and I think the issue is best described in 'Limits of Arbitrage', a 1997 Journal of Finance article by Shleifer and Vishny. In short, investors delegate asset management and don't have perfect information, so they rely on short-term relative performance as a gauge for determining 'skill'. Under these circumstances, the authors highlight that asset managers may be less inclined to focus on exploiting anomalies and more likely to closet-index. We see this phenomenon in the marketplace."

"In a 2015 article,[2] I outlined a hypothetical scenario in which an investor could choose between a strategy that would beat the market by an average of 1% per year over 25 years and never underperform the index by more than 1% in a given year, and a strategy that would beat the market by an average of 5% per year over 25 years but that would also have a five-year period of 5% annual underperformance."

"For an investment professional being hired on behalf of 100,000 firemen, the choice is often obvious, despite being sub-optimal for investors. The manager will choose the first option and avoid getting fired. The reason is that the incentives of an investment manager are complex. Fund managers are not the owners of the capital, but work on behalf of someone else. Financial mercenaries, if you will."

"Logically, these managers will make decisions that increase the odds of them keeping their job, but will not necessarily maximize risk-adjusted returns for their investors. For these managers, relative performance is everything and tracking error is dangerous. In my example, the tracking error of the second option is just too painful. There is a good chance that the manager will not be around long enough to see the rebound, after five years of underperformance."

"Meanwhile, if the manager follows the first strategy, he can avoid career risk and the fireman's pension will not

[1] Gray, W., 2014, 'Behavioral Finance and Investing: Are you Trying Too Hard?'.

[2] Gray, W., 2015, 'Sustainable Active Investing Framework: Simple, but Not Easy'.

endure the stress of a prolonged downturn. Over long time frames, a mispricing opportunity may be a mile wide. But this agency problem, I mean the fact that the owners of the capital can, in the short-term, begin to doubt the abilities of the arbitrageur and pull their capital, precludes smart managers from taking advantage of the long-term mispricing opportunities that are highly volatile."

"Now that we have a little context on the incentives of the marketplace, I can address your initial question: No, I am not extremely worried about sharing our intellectual property because I think the expected returns associated with our portfolios (and most portfolios) are priced in equilibrium. The expected pain will roughly equal the potential gain. I'm starting to sound like Eugene Fama here, but let me elaborate. In contrast to a pure efficient market ethos, my belief is that the 'pain' can be partially attributed to holding fundamentally riskier assets and partially to exploiting mispricing opportunities that require one to endure heavy career risk costs."

"So part of our role as an asset manager is to do the best research we can to identify reasonable ways to exploit factors. However, we then make these portfolios have tons of career risk in the hope that we can capture the expected excess returns associated with this pain. Next, we educate the heck out of investors and share our methodologies in a transparent way. We can't eliminate the pain of our strategies, but we can help our investors focus more on process and less on outcomes. The more our investors understand what we are doing and why, the easier it is for them to be sustainable during a period when our strategies inevitably 'aren't working'."

'Investing is a unique arena where beating your head against the wall doesn't make your skull thicker but often gets you injured'

You go to great efforts to somehow 'bring' quant investing to non-quants. Do you find that easy? Have you seen a change in how quant investing is perceived over the past decade?

"No, this is not easy, but we think it is worthwhile. And our goal is not to convince everyone that 'systematic' is the answer. We are really set up to help those who would like to be helped. The reality of educational efforts is they require the student to have an interest in learning. We can't force-feed someone knowledge and expect them to gain any benefits."

"For those who are inclined to learn, we think we can help. We believe quantitative tools can help investors express an investment philosophy in a more efficient manner and with less stress. But getting people to understand that less is more can be quite challenging. Our whole lives we are taught that when you try harder, you often get more. Investing is a unique arena where beating your head against the wall doesn't make your skull thicker but often gets you injured."

Your research has focused mainly on value and momentum, although you have also looked at other factors such as quality. In your view, what are the main drivers behind these two anomalies? Is there anything more than risk?

"We think value and momentum are the kings of the factor world, but buried inside our systems are elements of size and quality. We believe the characteristics of cheapness and momentum proxy for elements of risk and mispricing that are tough to exploit. Quantifying how much is associated with risk and how much is attached to mispricing would give too much precision to an inherently noisy process. But if I had to rank order them, I'd say for value you have more fundamental risk and less mispricing, and for momentum you have more mispricing and less fundamental risk."

What are your views concerning the current state of research on factors? Is there still a lot to be discovered about the main market anomalies? And if so, which are these?

"I don't think there is much to be gleamed from hammering on the data at this point. It seems clear that certain characteristics proxy for expected returns and these relationships are likely stable because of 1) fundamental risk considerations or 2) psychological considerations coupled with costly arbitrage. Many of the 'new findings' inevitably end up being noisy proxies for what was already known, especially when you redo the results and stress test the findings in your own laboratory. I have been hacking on data for almost 20 years now and there doesn't seem to be much that is new under the sun. Buy cheap, buy strong, and hold 'em long. Wish someone

had told me that 20 years ago – I would have saved myself a lot of time."

"That said, portfolio construction is still an important area that can be used to differentiate yourself from the crowd. You can take the same exact signal and vary the dimensions of turnover and number of holdings to create wide dispersion of expected outcomes. There are also elements of portfolio optimization that can be important; for example, how to minimize trading costs or taxes. Plenty of areas where an asset manager can earn their keep via craftsmanship decisions."

'I'm not holding my breath for a new proprietary high Sharpe-ratio factor premium'

So, how do you view the debate on the main factor models? In particular, the Fama-French model and the Q-factor model?

"I find it all very interesting from an intellectual standpoint. In fact, I put together a history of factor models in a piece called, 'Factor investing is more art, and less science'.[3] The funny thing about that piece is that the title changed by the time I'd finished writing it. My original intent was to cover the Q-factor model in-depth and announce that perhaps we had identified the best new technology in the factors wars. But as the piece evolved, and as I dug deeper and deeper into the history of all these factor models, I began to realize that we still don't really know how the stock market works."

"To be honest, I've sort of given up on using factor models as a way to 'account for risk' and instead, now think of factor models as a way to attribute performance to different characteristics. The attribution aspect is important because you can map your process to an outcome and explain the tracking error of your portfolio, which gives investors confidence, regardless of how performance looks on a relative basis. I find attribution analysis useful because it helps us keep investors in their seats when relative performance gets wild, be it good or bad."

What is your take on the low risk/low volatility effect?

"We've written 30 or 40 blog posts on this topic. I think it is interesting. In the end, from a long-only perspective, I believe that a cheap/quality portfolio will act similarly to a low vol/beta portfolio most of the time. So setting aside minutia arguments, I think it is probably close to six of one, half a dozen of the other. However, I fundamentally believe in the risk/behavior arguments underlying 'value' over the arguments underlying the low risk effect. The good news is I am not the arbiter of these debates. The best strategy is the strategy you can stick with through thick and thin. That will differ for all investors."

In your view, which topics concerning factor investing should researchers focus on in the coming years?

"I see the marketplace providing two core economic services: liquidity provision and long-term risk bearing. Liquidity provision is the trading game. The fast money stuff that is heavy on information acquisition and being quicker and smarter than the next trader. Lots of bets, lots of resolution, lots of learning. This field will probably benefit from new technology, new data, and so forth. I think this is reasonable because you can't expect to win in the trading game if you are still doing things with a pencil and a paper."

"But we aren't in the trading game. We are in the game of investing. Of course, many investors will go down the rabbit holes of machine learning, new datasets, new factors, new technology, and so forth. We'll partake in this research because we can't help ourselves. Research is fun and exciting. But to be frank, I'm not sure any of these efforts will lead to anything unique for investors over the long haul. I'm not holding my breath for a new proprietary 'high Sharpe-ratio factor premium'."

"Why do I say that? Well, one of the more remarkable findings is that super simple valuation metrics, I mean low P/E ratios, have worked in many different time periods, in many different countries, and in many different contexts. One example of this is the simple low P/E strategy recommended by Benjamin Graham in 1976.[4] He said that over the previous 50 years, the strategy had generated 15% returns and a ton of volatility, about 5% more than the market."

"Why did it work? Arguably, the portfolio contained an awful lot of fundamental risk and the relative performance swings would have tested the will of even the most disciplined investors! For fun, we did the out of sample backtest from 1973 to the present period and the

[3] Gray, W., 2017, 'Factor Investing is More Art, and Less Science'.

[4] See: Graham, B., 1976, 'The simplest way to select bargain stocks', Medical Economic, Special Report.

ROBECO
The Investment Engineers

strategy generated around 15% returns and a ton of volatility – basically the same result. What did the strategy look like? Like the previous 50 years, the investor in this portfolio would be eating a ton of fundamental risk and holding onto a portfolio that would give you a heart attack."

"If you sit back and think about the results associated with this simple value strategy, it is mind-blowing. Over the past 100 years or so, technology has increased, investor sophistication has increased, data access has increased, transparency has increased, and so forth. And yet, a basic 'buy cheap' philosophy has worked roughly the same throughout the sample period. What's my conclusion? I've given up trying to know what is going on in the stock market, but my best guess is that what we call 'factors' are proxies for equilibrium market outcomes."

"No amount of effort can change that fact. Of course, the ebbs and flows of assets will move back and forth across the quant firms that market themselves as the cutting edge and catch a good run of performance, but in the end, an investor with long duration capital and extreme discipline attached to a reasonable process will likely perform well, regardless of the process or level of sophistication."

Important Information

Robeco Institutional Asset Management B.V. has a license as manager of Undertakings for Collective Investment in Transferable Securities (UCITS) and Alternative Investment Funds (AIFs) ("Fund(s)") from The Netherlands Authority for the Financial Markets in Amsterdam. This document is solely intended for professional investors, defined as investors qualifying as professional clients, have requested to be treated as professional clients or are authorized to receive such information under any applicable laws. Robeco Institutional Asset Management B.V and/or its related, affiliated and subsidiary companies, ("Robeco"), will not be liable for any damages arising out of the use of this document. Users of this information who provide investment services in the European Union have their own responsibility to assess whether they are allowed to receive the information in accordance with MiFID II regulations. To the extent this information qualifies as a reasonable and appropriate minor non-monetary benefit under MiFID II, users that provide investment services in the European Union are responsible to comply with applicable recordkeeping and disclosure requirements. The content of this document is based upon sources of information believed to be reliable and comes without warranties of any kind. Without further explanation this document cannot be considered complete. Any opinions, estimates or forecasts may be changed at any time without prior warning. If in doubt, please seek independent advice. It is intended to provide the professional investor with general information on Robeco's specific capabilities, but has not been prepared by Robeco as investment research and does not constitute an investment recommendation or advice to buy or sell certain securities or investment products and/or to adopt any investment strategy and/or legal, accounting or tax advice. All rights relating to the information in this document are and will remain the property of Robeco. This material may not be copied or used with the public. No part of this document may be reproduced, or published in any form or by any means without Robeco's prior written permission. Investment involves risks. Before investing, please note the initial capital is not guaranteed. Investors should ensure that they fully understand the risk associated with any Robeco product or service offered in their country of domicile ("Funds"). Investors should also consider their own investment objective and risk tolerance level. Historical returns are provided for illustrative purposes only. The price of units may go down as well as up and the past performance is not indicative of future performance. If the currency in which the past performance is displayed differs from the currency of the country in which you reside, then you should be aware that due to exchange rate fluctuations the performance shown may increase or decrease if converted into your local currency. The performance data do not take account of the commissions and costs incurred on trading securities in client portfolios or on the issue and redemption of units. Unless otherwise stated, the prices used for the performance figures of the Luxembourg-based Funds are the end-of-month transaction prices net of fees up to 4 August 2010. From 4 August 2010, the transaction prices net of fees will be those of the first business day of the month. Return figures versus the benchmark show the investment management result before management and/or performance fees; the Fund returns are with dividends reinvested and based on net asset values with prices and exchange rates of the valuation moment of the benchmark. Please refer to the prospectus of the Funds for further details. Performance is quoted net of investment management fees. The ongoing charges mentioned in this document are the ones stated in the Fund's latest annual report at closing date of the last calendar year. This document is not directed to, or intended for distribution to or use by any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction where such distribution, document, availability or use would be contrary to law or regulation or which would subject any Fund or Robeco Institutional Asset Management B.V. to any registration or licensing requirement within such jurisdiction. Any decision to subscribe for interests in a Fund offered in a particular jurisdiction must be made solely on the basis of information contained in the prospectus, which information may be different from the information contained in this document. Prospective applicants for shares should inform themselves as to legal requirements also applying and any applicable exchange control regulations and applicable taxes in the countries of their respective citizenship, residence or domicile. The Fund information, if any, contained in this document is qualified in its entirety by reference to the prospectus, and this document should, at all times, be read in conjunction with the prospectus. Detailed information on the Fund and associated risks is contained in the prospectus. The prospectus and the Key Investor Information Document for the Robeco Funds can all be obtained free of charge at www.robeco.com.

Additional Information for US investors

Neither Robeco Institutional Asset Management B.V. nor the Robeco Capital Growth Funds have been registered under the United States Federal Securities Laws, including the Investment Company Act of 1940, as amended, the United States Securities Act of 1933, as amended, or the Investment Advisers Act of 1940. No Fund shares may be offered or sold, directly or indirectly, in the United States or to any US Person. A US Person is defined as (a) any individual who is a citizen or resident of the United States for federal income tax purposes; (b) a corporation, partnership or other entity created or organized under the laws of or existing in the United States; (c) an estate or trust the income of which is subject to United States federal income tax regardless of whether such income is effectively connected with a United States trade or business. Robeco Institutional Asset Management US Inc. ("RIAM US"), an Investment Adviser registered with the Securities and Exchange Commission under the Investment Advisers Act of 1940, is a wholly owned subsidiary of ORIX Corporation Europe N.V. and offers investment advisory services to institutional clients in the US. In connection with these advisory services, RIAM US will utilize shared personnel of its affiliates, Robeco Nederland B.V. and Robeco Institutional Asset Management B.V., for the provision of investment, research, operational and administrative services.

Additional Information for investors with residence or seat in Australia and New Zealand

This document is distributed in Australia by Robeco Hong Kong Limited (ARBN 156 512 659) ("Robeco"), which is exempt from the requirement to hold an Australian financial services license under the Corporations Act 2001 (Cth) pursuant to ASIC Class Order 03/1103. Robeco is regulated by the Securities and Futures Commission under the laws of Hong Kong and those laws may differ from Australian laws. This document is distributed only to "wholesale clients" as that term is defined under the Corporations Act 2001 (Cth). This document is not for distribution or dissemination, directly or indirectly, to any other class of persons. In New Zealand, this document is only available to wholesale investors within the meaning of clause 3(2) of Schedule 1 of the Financial Markets Conduct Act 2013 ('FMCA'). This document is not for public distribution in Australia and New Zealand.

Additional Information for investors with residence or seat in Austria

This information is solely intended for professional investors or eligible counterparties in the meaning of the Austrian Securities Oversight Act.

Additional Information for investors with residence or seat in Brazil

The Fund may not be offered or sold to the public in Brazil. Accordingly, the Fund has not been nor will be registered with the Brazilian Securities Commission – CVM, nor has it been submitted to the foregoing agency for approval. Documents relating to the Fund, as well as the information contained therein, may not be supplied to the public in Brazil, as the offering of the Fund is not a public offering of securities in Brazil, nor may they be used in connection with any offer for subscription or sale of securities to the public in Brazil.

Additional Information for investors with residence or seat in Canada

No securities commission or similar authority in Canada has reviewed or in any way passed upon this document or the merits of the securities described herein, and any representation to the contrary is an offence. Robeco Institutional Asset Management B.V. is relying on the international dealer and international adviser exemption in Quebec and has appointed McCarthy Tétrault LLP as its agent for service in Quebec.

Additional information for investors with residence or seat in the Republic of Chile

Neither the issuer nor the Funds have been registered with the Superintendencia de Valores y Seguros pursuant to law no. 18.045, the Ley de Mercado de Valores and regulations thereunder. This document does not constitute an offer of, or an invitation to subscribe for or purchase, shares of the Funds in the Republic of Chile, other than to the specific person who individually requested this information on his own initiative. This may therefore be treated as a "private offering" within the meaning of article 4 of the Ley de Mercado de Valores (an offer that is not addressed to the public at large or to a certain sector or specific group of the public).

Additional Information for investors with residence or seat in Colombia

This document does not constitute a public offer in the Republic of Colombia. The offer of the Fund is addressed to less than one hundred specifically identified investors. The Fund may not be promoted or marketed in Colombia or to Colombian residents, unless such promotion and marketing is made in compliance with Decree 2555 of 2010 and other applicable rules and regulations related to the promotion of foreign Funds in Colombia.

Additional Information for investors with residence or seat in the Dubai International Financial Centre (DIFC), United Arab Emirates

This material is being distributed by Robeco Institutional Asset Management B.V. (Dubai Office) located at Office 209, Level 2, Gate Village Building 7, Dubai International Financial Centre, Dubai, PO Box 482060, UAE. Robeco Institutional Asset Management B.V. (Dubai office) is regulated by the Dubai Financial Services Authority ("DFSA") and only deals with Professional Clients or Market Counterparties and does not deal with Retail Clients as defined by the DFSA.

Additional Information for investors with residence or seat in France

Robeco is at liberty to provide services in France. Robeco France (only authorized to offer investment advice service to professional investors) has been approved under registry number 10683 by the French prudential control and resolution authority (formerly ACP, now the ACPR) as an investment firm since 28 September 2012.

Additional Information for investors with residence or seat in Germany

This information is solely intended for professional investors or eligible counterparties in the meaning of the German Securities Trading Act.

Additional Information for investors with residence or seat in Hong Kong

The contents of this document have not been reviewed by the Securities and Futures Commission ("SFC") in Hong Kong. If you are in any doubt about any of the contents of this document, you should obtain independent professional advice. This document has been distributed by Robeco Hong Kong Limited ("Robeco"). Robeco is regulated by the SFC in Hong Kong.

Additional Information for investors with residence or seat in Italy

This document is considered for use solely by qualified investors and private professional clients (as defined in Article 26 (1) (b) and (d) of Consob Regulation No. 16190 dated 29 October 2007). If made available to Distributors and individuals authorized by Distributors to conduct promotion and marketing activity, it may only be used for the purpose for which it was conceived. The data and information contained in this document may not be used for communications with Supervisory Authorities. This document does not include any information to determine, in concrete terms, the investment inclination and, therefore, this document cannot and should not be the basis for making any investment decisions.

Additional Information for investors with residence or seat in Peru

The Fund has not been registered with the Superintendencia del Mercado de Valores (SMV) and is being placed by means of a private offer. SMV has not reviewed the information provided to the investor. This document is only for the exclusive use of institutional investors in Peru and is not for public distribution.

Additional Information for investors with residence or seat in Shanghai

This material is prepared by Robeco Investment Management Advisory (Shanghai) Limited Company ("Robeco Shanghai") and is only provided to the specific objects under the premise of confidentiality. Robeco Shanghai has not yet been registered as a private fund manager with the Asset Management Association of China. Robeco Shanghai is a wholly foreign-owned enterprise established in accordance with the PRC laws, which enjoys independent civil rights and civil obligations. The statements of the shareholders or affiliates in the material shall not be deemed to a promise or guarantee of the shareholders or affiliates of Robeco Shanghai, or be deemed to any obligations or liabilities imposed to the shareholders or affiliates of Robeco Shanghai.

Additional Information for investors with residence or seat in Singapore

This document has not been registered with the Monetary Authority of Singapore ("MAS"). Accordingly, this document may not be circulated or distributed directly or indirectly to persons in Singapore other than (i) to an institutional investor under Section 304 of the SFA, (ii) to a relevant person pursuant to Section 305(1), or any person pursuant to Section 305(2), and in accordance with the conditions specified in Section 305, of the SFA, or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA. The contents of this document have not been reviewed by the MAS. Any decision to participate in the Fund should be made only after reviewing the sections regarding investment considerations, conflicts of interest, risk factors and the relevant Singapore selling restrictions (as described in the section entitled "Important Information for Singapore Investors") contained in the prospectus. You should consult your professional adviser if you are in doubt about the stringent restrictions applicable to the use of this document, regulatory status of the Fund, applicable regulatory protection, associated risks and suitability of the Fund to your objectives. Investors should note that only the sub-Funds listed in the appendix to the section entitled "Important Information for Singapore Investors" of the prospectus ("Sub-Funds") are available to Singapore investors. The Sub-Funds are notified as restricted foreign schemes under the Securities and Futures Act, Chapter 289 of Singapore ("SFA") and are invoking the exemptions from compliance with prospectus registration requirements pursuant to the exemptions under Section 304 and Section 305 of the SFA. The Sub-Funds are not authorized or recognized by the MAS and shares in the Sub-Funds are not allowed to be offered to the retail public in Singapore. The prospectus of the Fund is not a prospectus as defined in the SFA. Accordingly, statutory liability under the SFA in relation to the content of prospectuses would not apply. The Sub-Funds may only be promoted exclusively to persons who are sufficiently experienced and sophisticated to understand the risks involved in investing in such schemes, and who satisfy certain other criteria provided under Section 304, Section 305 or any other applicable provision of the SFA and the subsidiary legislation enacted thereunder. You should consider carefully whether the investment is suitable for you. Robeco Singapore Private Limited holds a capital markets services license for fund management issued by the MAS and is subject to certain clientele restrictions under such license.

Additional Information for investors with residence or seat in Spain

Robeco Institutional Asset Management BV, Branch in Spain is registered in Spain in the Commercial Registry of Madrid, in v.19.957, page 190, section 8, page M-351927 and in the Official Register of the National Securities Market Commission of branches of companies of services of investment of the European Economic Space, with the number 24. It has address in Street Serrano 47, Madrid and CIF W0032687F. 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 Switzerland

This document is exclusively distributed in Switzerland to qualified investors as defined in the Swiss Collective Investment Schemes Act (CISA) by ACOLIN Fund Services AG which is authorized by the Swiss Financial Market Supervisory Authority FINMA as Swiss representative of foreign collective investment schemes, and UBS Switzerland AG, Bahnhofstrasse 45, 8001 Zurich, postal address: Europastrasse 2, P.O. Box, CH-8152 Opfikon, as Swiss paying agent. The prospectus, the Key Investor Information Documents (KIIDs), the articles of association, the annual and semi-annual reports of the Fund(s), as well as the list of the purchases and sales which the Fund(s) has undertaken during the financial year, may be obtained, on simple request and free of charge, at the office of the Swiss representative ACOLIN Fund Services AG, Affolternstrasse 56, 8050 Zürich, Zwitserland. The prospectuses are also available via the website www.robeco.ch.

Additional Information for investors with residence or seat in the United Arab Emirates

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.

Additional Information for investors with residence or seat in the United Kingdom

Robeco is subject to limited regulation in the UK by the Financial Conduct Authority. Details about the extent of our regulation by the Financial Conduct Authority are available from us on request.

Additional Information for investors with residence or seat in Uruguay

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 in 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.

Additional Information concerning RobecoSAM Collective Investment Schemes

The RobecoSAM collective investment schemes ("RobecoSAM Funds") in scope are ub-Funds under the Undertakings for Collective Investment in Transferable Securities (UCITS) of MULTIPARTNER SICAV, managed by GAM (Luxembourg) S.A., ("Multipartner"). Multipartner SICAV is incorporated as a Société d'Investissement à Capital Variable which is governed by Luxembourg law. The custodian is State Street Bank Luxembourg S.C.A., 49, Avenue J. F. Kennedy, L-1855 Luxembourg. The prospectus, the Key Investor Information Documents (KIIDs), the articles of association, the annual and semi-annual reports of the RobecoSAM Funds, as well as the list of the purchases and sales which the RobecoSAM Fund(s) has undertaken during the financial year, may be obtained, on simple request and free of charge, via the website www.robecosam.com or www.funds.gam.com.

Version Q4/18