

7 Things About Next-Generation Quant Investing

Mike Chen, Head of Next-Gen Research, Robeco
Momentum Think-Tank 2024
London, 18 September 2024

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Robeco – The Investment Engineers

Organization Overview

Global Asset Manager

Founded in the Netherlands in 1929, Robeco is a dedicated asset manager with a long-term investment view and a global presence

Research-driven

Research lies at the heart of everything we do; we perform in-depth fundamental, quantitative and ESG analysis where innovative ideas are tested and re-tested, hence we call ourselves ‘The Investment Engineers’

Key strengths

Deep investment expertise in Sustainable Investing, Quant, Emerging Markets and Credits with a focus on building solutions for clients

\$199 billion

Total firm AUM including **\$196 billion** in ESG-integrated assets and **\$78 billion** in assets based on quant models.

1,052

Employees

306

Investment Professionals

13

Countries with Robeco offices




Quantitative Investments

 **Weili Zhou, CFA***
Head Quant Investing & Research
21 years experience

Research

 **David Blitz, PhD***
Chief Quant Researcher
28 years experience

 **Mike Chen, PhD****
Head Next Gen Research
18 years experience

 **Harald Lohre, PhD**
Head Quant Equity Research
17 years experience

 **Bart van der Grient**
16 years experience

 **Matthias Hanauer, PhD, CFA**
14 years experience


 **Iman Honarvar, PhD**
11 years experience

 **Kristina Ūsaitė, CFA**
10 years experience

 **Clint Howard, PhD**
7 years experience

 **Thom Marchesini, CFA**
6 years experience

 **Rob Huisman, CFA**
5 years experience


 **Sebastian Schneider, CFA**
4 years experience

 **Maarten Jansen, CFA**
3 years experience

 **Tobias Hoogteijling**
3 years experience


 **Nick Mutsaers**
2 years experience

 **Talent pool**
5 Researchers

 **Jacob Buitelaar**
Head Data Science
17 years experience

 **Richard Groenewegen, PhD**
Data Engineer
23 years experience

 **Thijs Markwat, PhD**
Data Scientist
17 years experience


 **Alexander de Roode, PhD**
Data Engineer
13 years experience


 **Data Science**
14 Investment Professionals
7 years average experience

Sustainability


 **Carola van Lamoen**
SI Centre of Expertise
22 years experience

 **Peter van der Werf**
Senior Manager Engagement
16 years experience


 **Kenneth Robertson**
Head SI CPM
9 years experience

 **Active Ownership**
19 Investment Professionals
13 years average experience

 **Thought Leader & Research**
28 Strategist & Researchers
14 years average experience

 **Client Portfolio Management**
5 Client Portfolio Managers
13 years average experience

Portfolio Management


 **Wilma de Groot, PhD, CFA***
Head Core Quant
Deputy Head Quant Equity
22 years experience


 **Pim van Vliet, PhD***
Head Conservative Equities
Chief Quant Strategist
23 years experience

 **Arlette van Ditshuizen***
Co-Head Quant Equity PM
26 years experience

 **Han van der Boon***
26 years experience


 **Maarten Polfliet, CEFA***
24 years experience


 **Machiel Zwanenburg***
24 years experience


 **Tim Dröge***
24 years experience


 **Arnoud Klep***
22 years experience


 **Daniel Haesen, CFA***
21 years experience


 **Jan Sytze Mosselaar, CFA***
19 years experience

 **Dean Walsh, CFA, CAIA***
11 years experience

 **Wouter Tilgenkamp***
9 years experience

 **Vania Sulman***
7 years experience

 **Koen Rijnen***
7 years experience

 **Yaowei Xu*****
Head Quant China
19 years experience

Client Portfolio Management

 **Jan de Koning, CFA, CAIA***
Head Quant CPM
22 years experience

 **Rupeng Chen, CFA**
Asia Pacific
17 years experience

 **Lejda Bargjo**
DACH and Italy
15 years experience

 **Lusanele Magwa**
Investment Specialist
12 years experience

 **Jorge Silva**
Investment Specialist
10 years experience


 **Jeroen Hagens, CFA, CAIA**
Europe
10 years experience

 **Jan Rohof, CAIA**
Asia Pacific
9 years experience


 **Dijana Kostic**
North America
4 years experience


 **Talent pool**
1 Investment Specialist


Quant Fixed Income

 **Patrick Houweling, PhD***
Head Quant Fixed Income
25 years experience

 **Martin Martens, PhD***
Research Coordination Quant Allocation
30 years experience

 **Olaf Penninga***
PM Quant Fixed Income
25 years experience


 **Ralph Berkien, CEFA***
CPM Quant Fixed Income
21 years experience

 **Frederik Muskens, CFA**
Research Coordination Quant Credits
11 years experience

 **Portfolio Management**
5 Investment Professionals
21 years average experience

 **Researchers**
10 Investment Professionals
10 years average experience

Portfolio Engineering & Trading

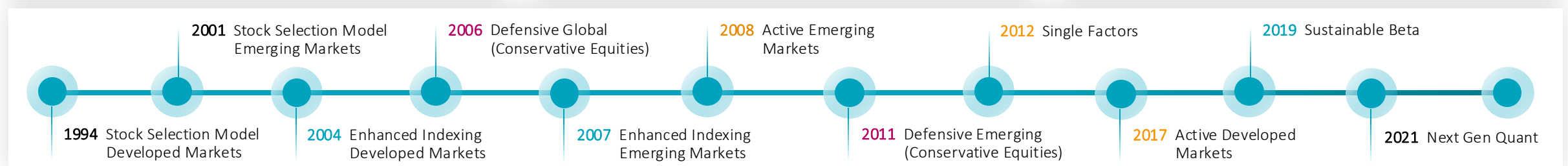
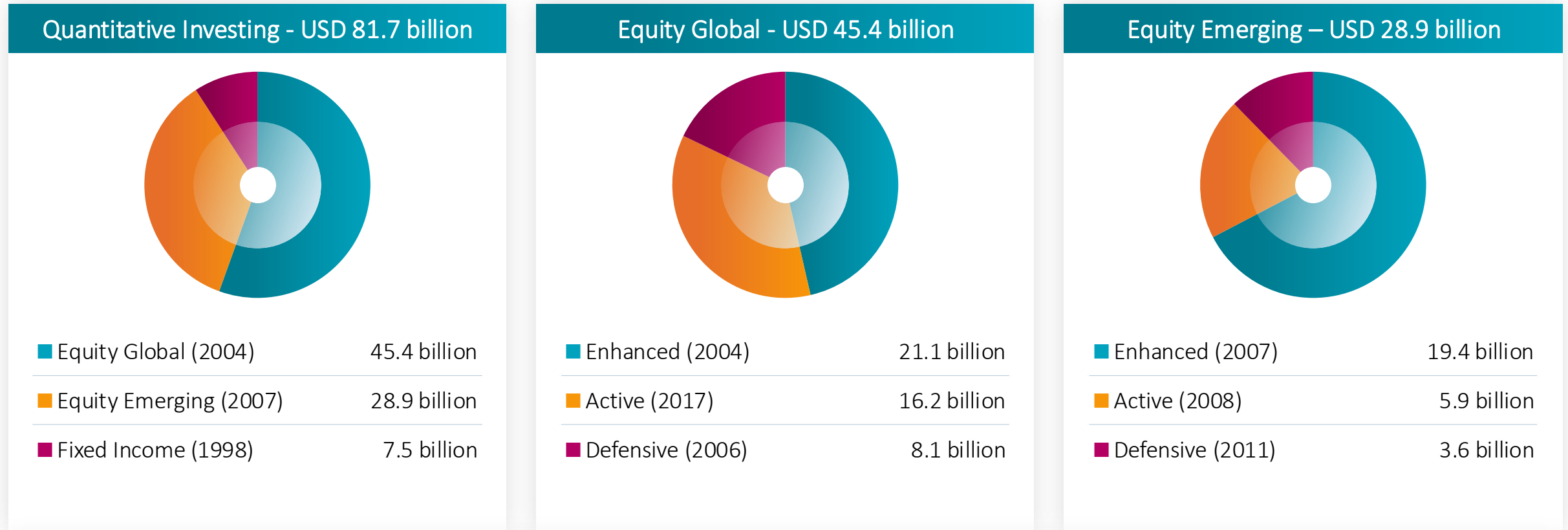
 **Robbert Wijgerse, CFA***
Head PE&T
24 years experience

 **PE&T professionals**
30 Investment Professionals
21 years average experience

This chart represents the persons involved in Robeco's quantitative investment strategies. Not all persons listed in this chart are actively involved with each available quantitative strategy. *Affiliate entities, Robeco BV and RIAM US are considered "participating affiliated" and some of their employees are "associated persons" of RIAM US as per relevant SEC no-action guidance. Employees identified as associated persons of RIAM US perform activities directly or indirectly related to the investment advisory services provided by RIAM US. In those situation these individuals are deemed to be acting on behalf of RIAM US, a US SEC registered investment adviser. SEC regulations are applicable only to clients, prospects and investors of RIAM US. **Employee of RIAM US. *** Employee part of Robeco PFM, affiliate of RIAM.

Capability overview: Reliable investment strategies based on quantitative factors

Quantitative Investing total assets - USD 81.7 billion



Source: Robeco. Robeco data end of June 2024. All figures are based on preliminary data.

A look into the kitchen

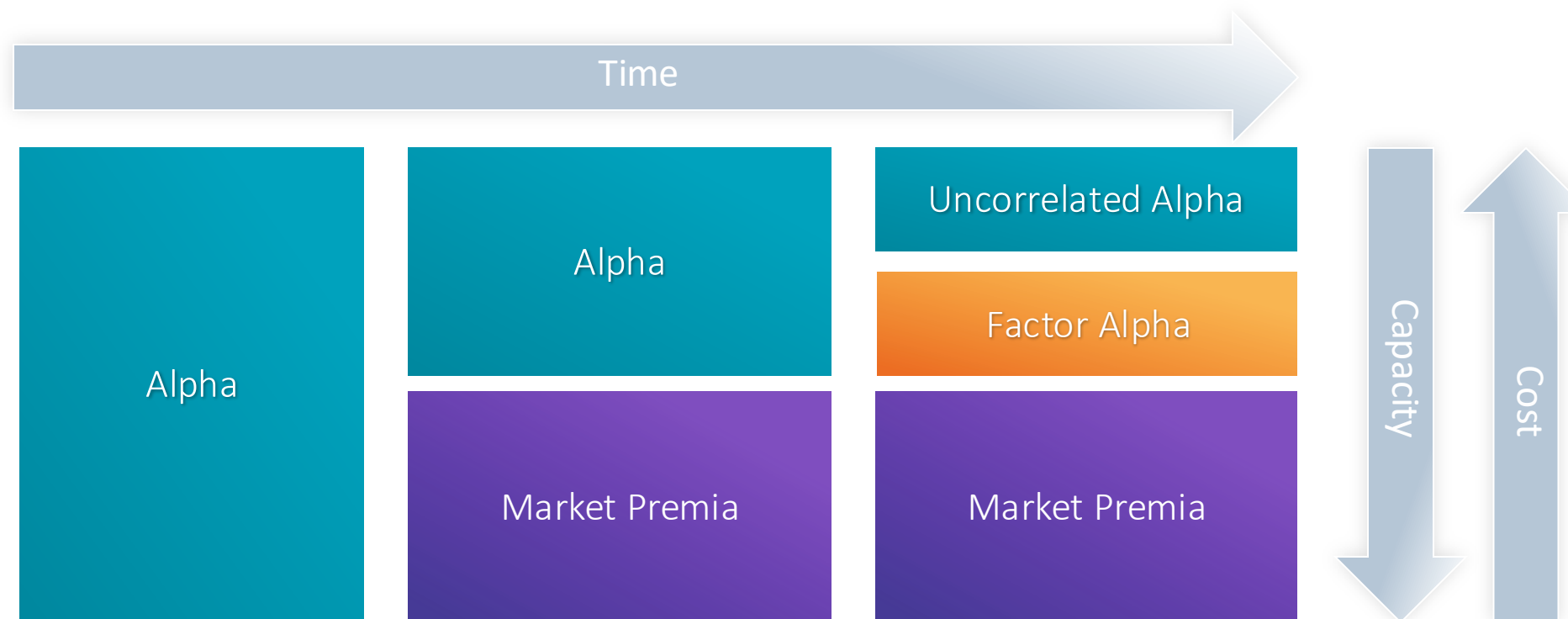
- > 1. Setting the Scene
- > 2. 8 Things About Next-Gen Quant
- > 3. Developing Differentiated Solutions
- > 4. Enhancing Established Strategies
- > Appendix: 20 Years of Robeco Quant Investing



1. Setting the Scene

Focus on Innovation

Innovation is not a nice to have, it is an imperative



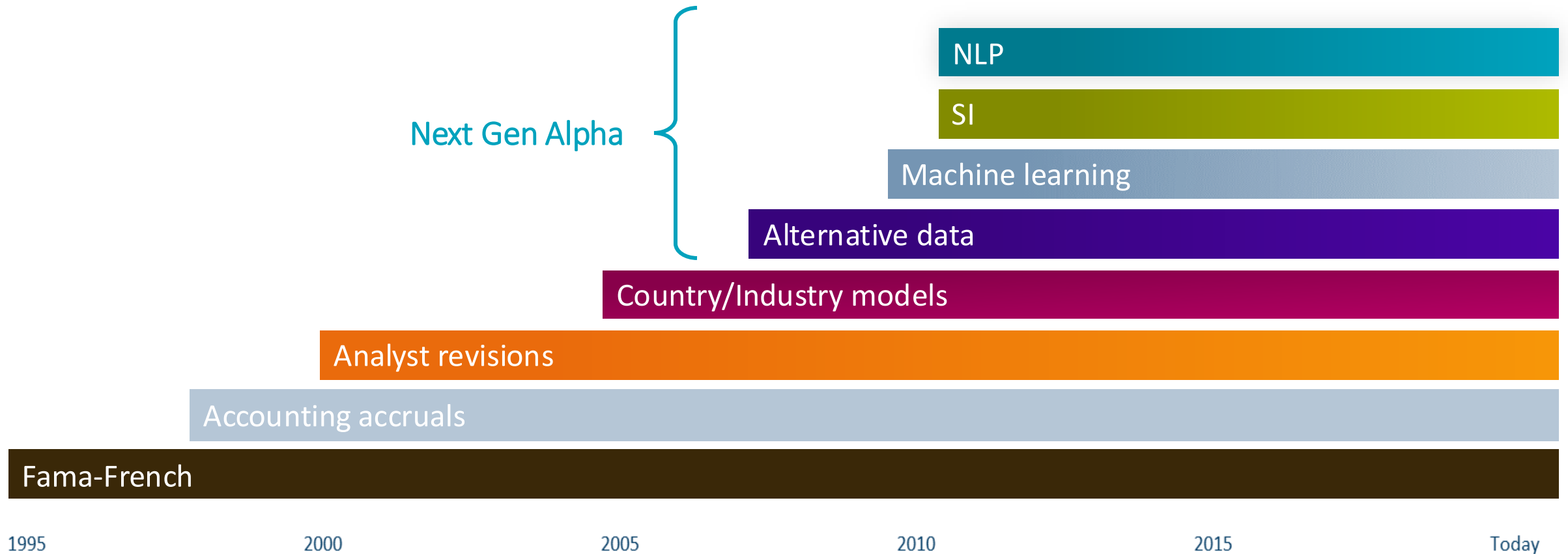
Prior to Market Risk Premia
> All returns were alpha

Market Risk Premia arose
Examples
> BarCap Aggregate
> S&P 500
> Various Index Funds

Factor Alpha arose
Examples
> Established Factor Strategies
> Various Style ETFs

Evolution of Quantitative Investment Research

Change is the only constant



For illustrative purposes only

2. 7 Things About Next-Gen Quant

2.1 Attempting to Exploit Alternative Data

Data, data everywhere...but a lot of it is noise...

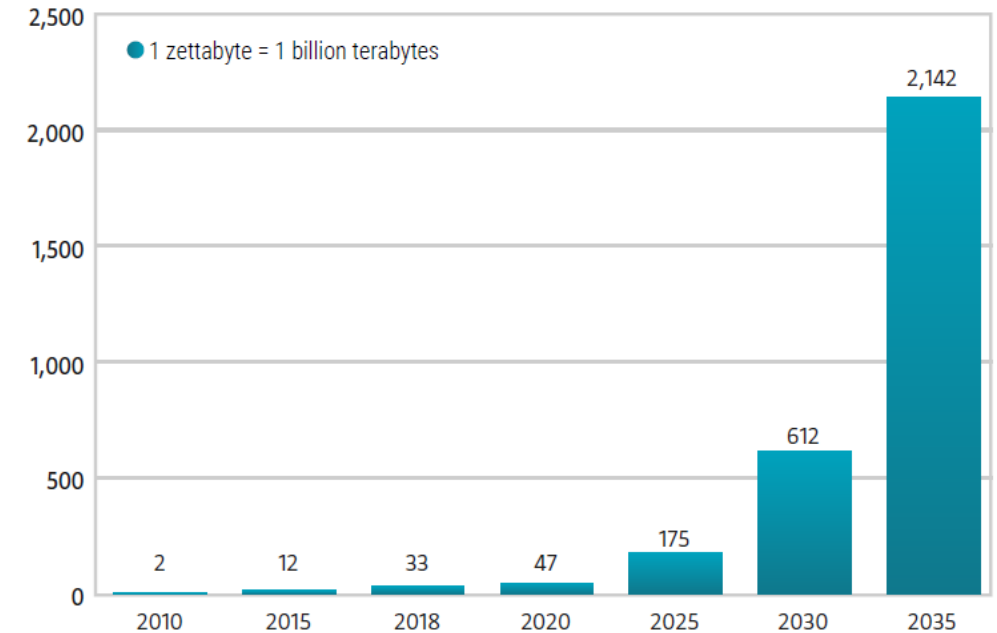
A few decades ago, the quant financial data landscape was much simpler.

- Mainly consists of financial statements and market data
- Those sources have long been exhaustively examined

Next-gen quant researchers utilize alternative data

- Unconventional/non-traditional data
- Not used historically
- Characterized by 4 Vs: volume, velocity, variety, veracity.
- Lots of data, but also a lot of noise. Only about 0.5% of all data is ever analyzed or used
- Economic insights and advanced analytics need to convert data to alpha

Actual and forecast amount of data created worldwide 2010-2035 (in zettabytes)



Source: Statista Digital Economy Compass 2019

2.2 Machine learning reveals new dynamics

But be careful of overfitting

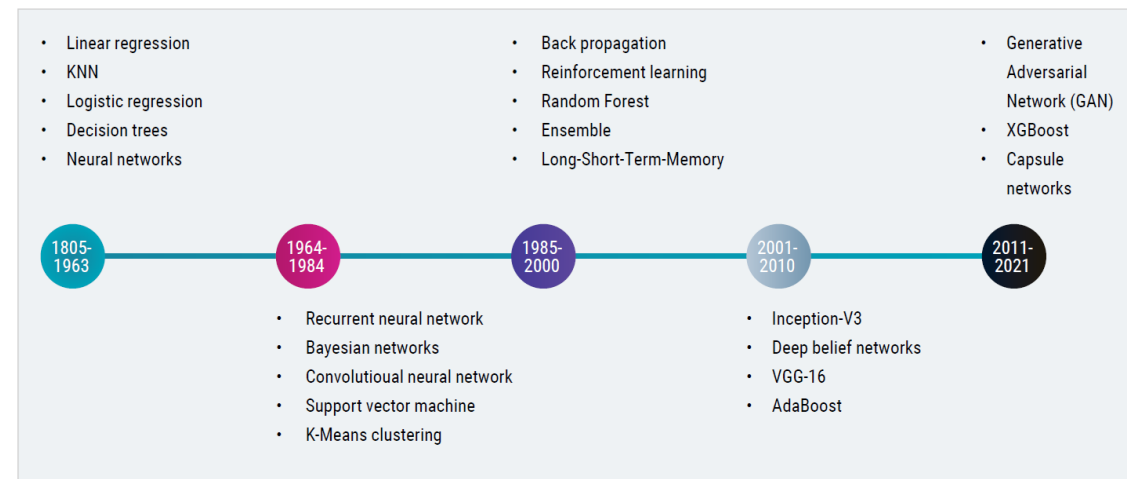
ML (or, more broadly, AI) has been around for half a century

- Practical application in quant space dates back close to two decades
- Rather than a hindrance, the amount of available data supercharges these algorithms
- Able to detect patterns in the ocean of data, revealing relationships that might have been missed

Compared to traditional programming, ML is a new paradigm

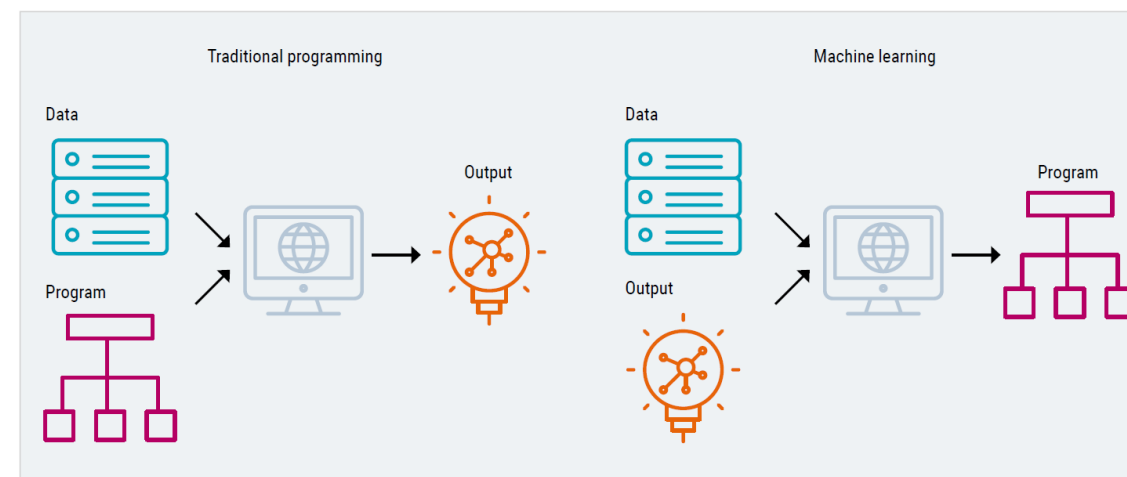
- When applied correctly, can allow for detection of insights and opportunities not apparent via traditional methods
- Possibility of overfitting abounds, safeguards and good research protocols must be put in place (see e.g., Chen and Zhou, 2022)

Figure 2: Illustration of machine learning and deep learning algorithms development timeline



Source: Researchgate³

Figure 3: Machine learning is a new paradigm compared to traditional programming



Source: Robeco

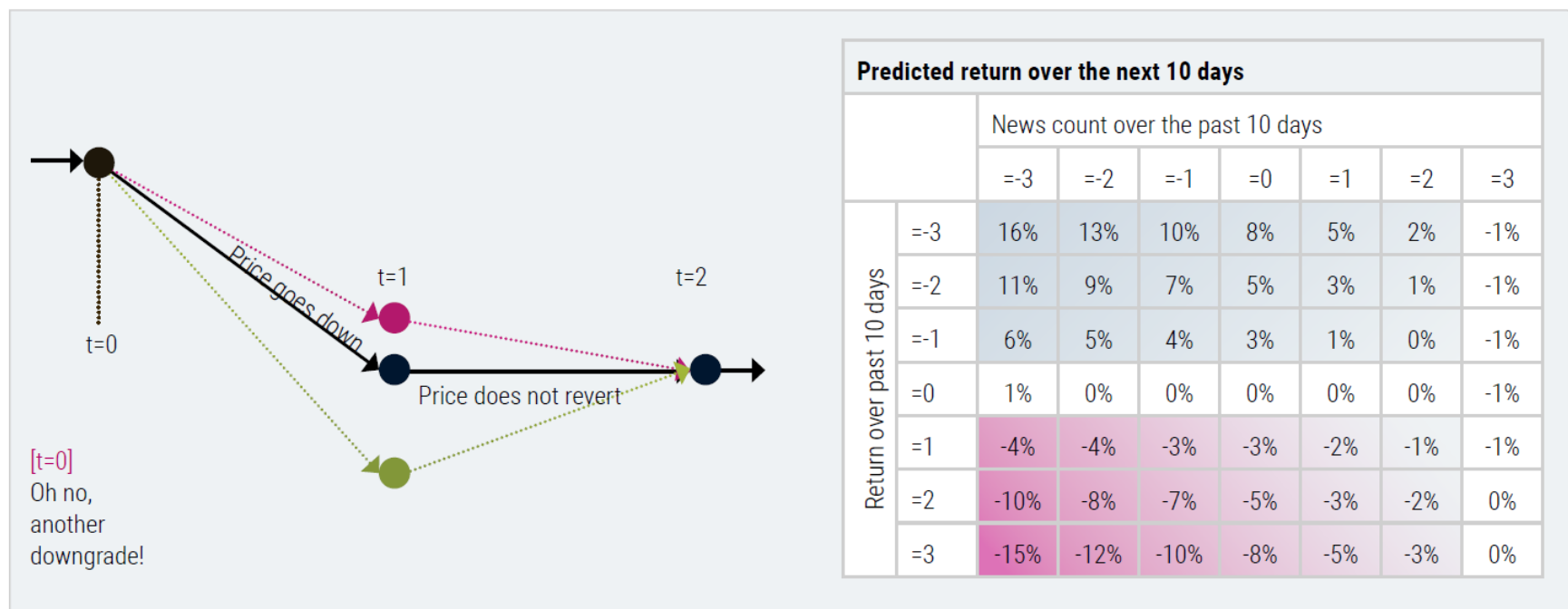
2.2 Machine learning reveals new dynamics

Example dynamic uncovered using ML

There is a statistically significant relationship between reversal and abnormal new volume

- Reversal effect is weak in presence of high news volume, and vice versa
- Difficult to discover via traditional approaches

Figure 4: An interaction dynamic regarding the reversal effect, discovered using machine learning



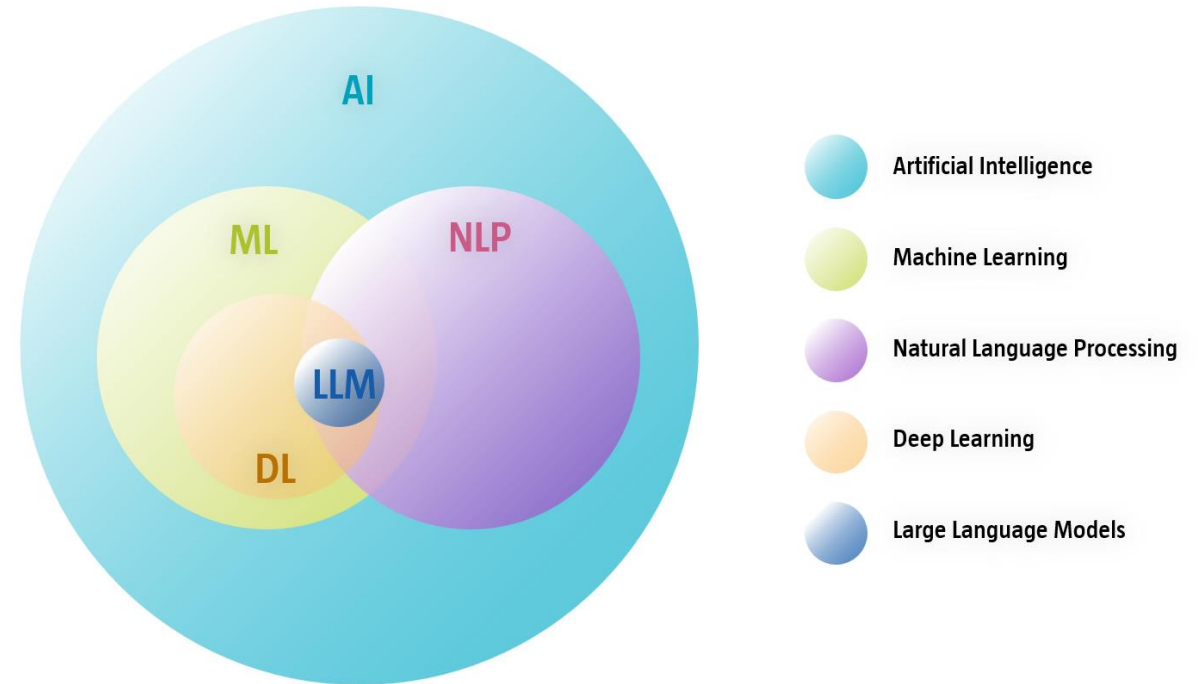
Source: Robeco

What do we mean by AI?

What is being said, and what is not being said

Like ML, NLP is also a branch of AI that has bloomed recently

- Financial information is more than just numbers in structured formats
- NLP allows practitioners to deduce information from what and how things are said
- Quants can now glean information from earnings calls, interviews, news articles, etc.
- Goes beyond the written word (tone, sentiment, emotion, etc.)



2.3 NLP, GPT, and beyond

Communication is more than words

Most of communication isn't words!

7-38-55 RULE OF COMMUNICATION



7%
SPOKEN
WORDS



38%
VOICE
TONE



55%
BODY
LANGUAGE

Examples



Voice analysis



Machine learning



The figure shows mean vocal feature characteristics for the top and bottom quantiles as a percentage relative to the third quantile. This is not a buy, sell or hold recommendation for any particular security. The information shown is only available for one-on-one presentations and for illustrative purposes only. No representation is made that these examples are past or current recommendations, that they should be bought or sold, nor whether they were successful or not.

2.4 Innovate consciously

Can alpha and sustainability co-exist?

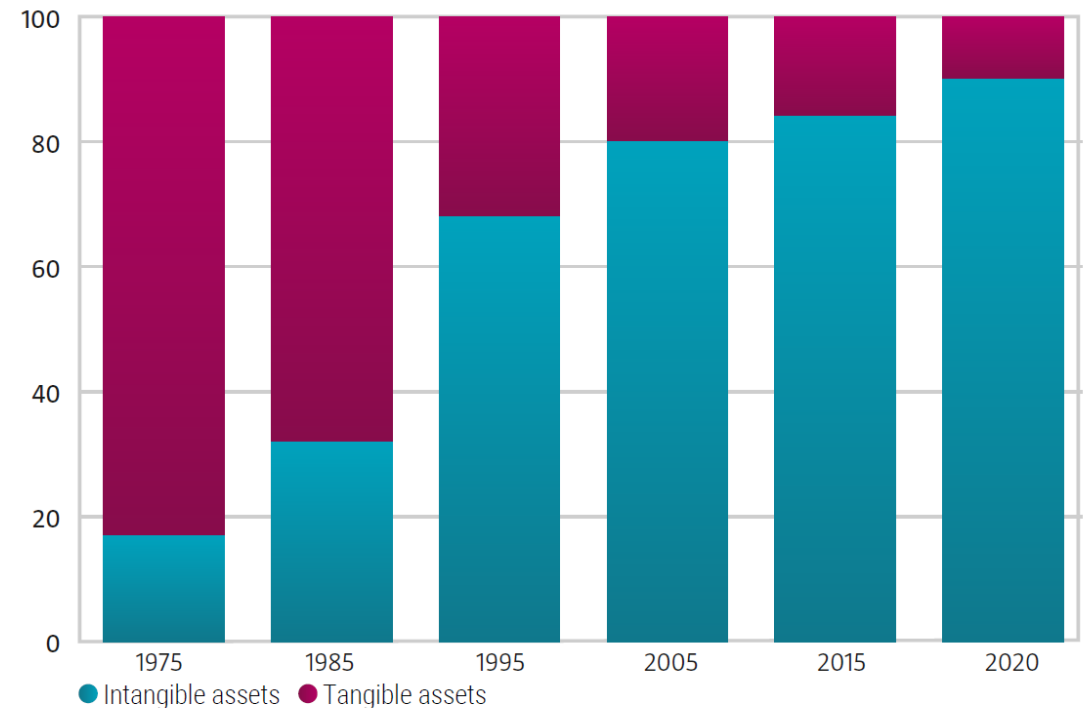
Can you have both your cake and eat it too? The answer is maybe...

- There is a large overlap between “sustainability” and “intangibles”
- It all depends on the **financial materiality** of the “sustainability” metric that one cares about

The key is to assess sustainability and intangible assets simultaneously.

- Sustainability-related data is notoriously poor
- Alternative data and innovative techniques can be a solution

Figure 6: Corporate valuation is increasingly dominated by intangible assets.



Source: Ocean Tomo, LLC

2.4 Innovate consciously

How to build an optimal, customized, sustainable strategy?

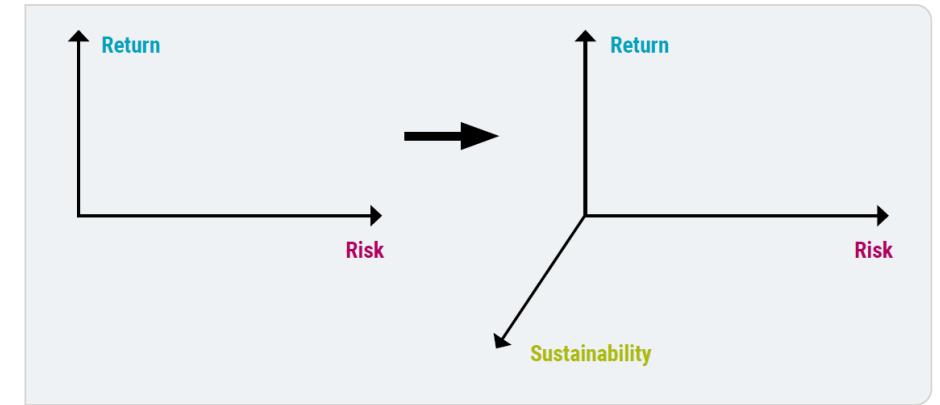
By definition, sustainable strategies must custom

- There is no agreed-upon definition of what is sustainable
- For sustainable asset managers, the aim is to customize to client's sustainability goals (what?), and any potential tradeoffs between alpha (how much?)
- I.e., sustainable investing is 3-dimensional

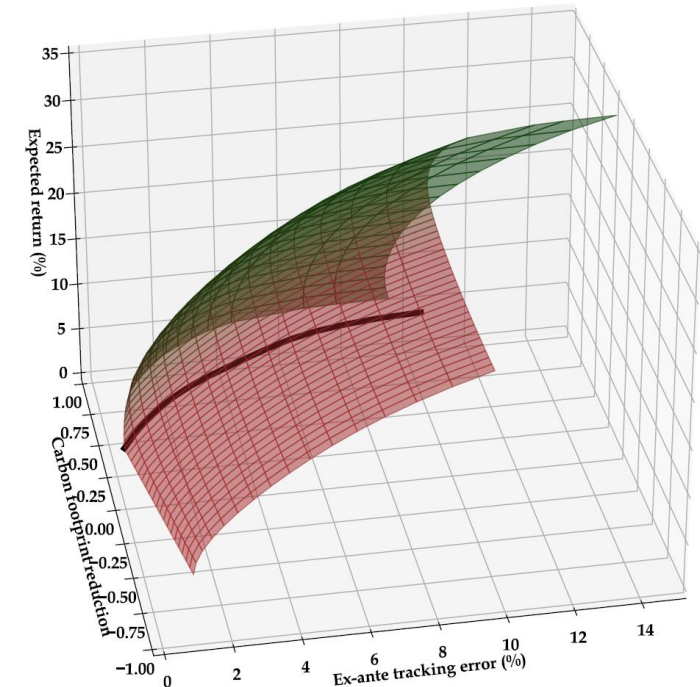
What does it mean to build an “optimal” 3-D portfolio?

- In Chen and Mussalli (2020, JPM) and Blitz, Chen, Howard, and Lohre (2024, FAJ), we show how to build ex-ante **Pareto-optimal** 3-D strategies.

Figure 7: Portfolio customization via optimization means evolving the investment problem from 2-dimensions to 3-dimensions



Source: Robeco



2.5 How does this factor into broader quant investing?

Why even bother?

It takes a lot of resources to build-up a next-gen program

- New skill sets need to be developed/acquired
- New data sources need to be purchased
- Infra needs to be built and computing needs to be spent

Why? Because alpha decays and get arbitrated away over time.

Infrastructure & investment

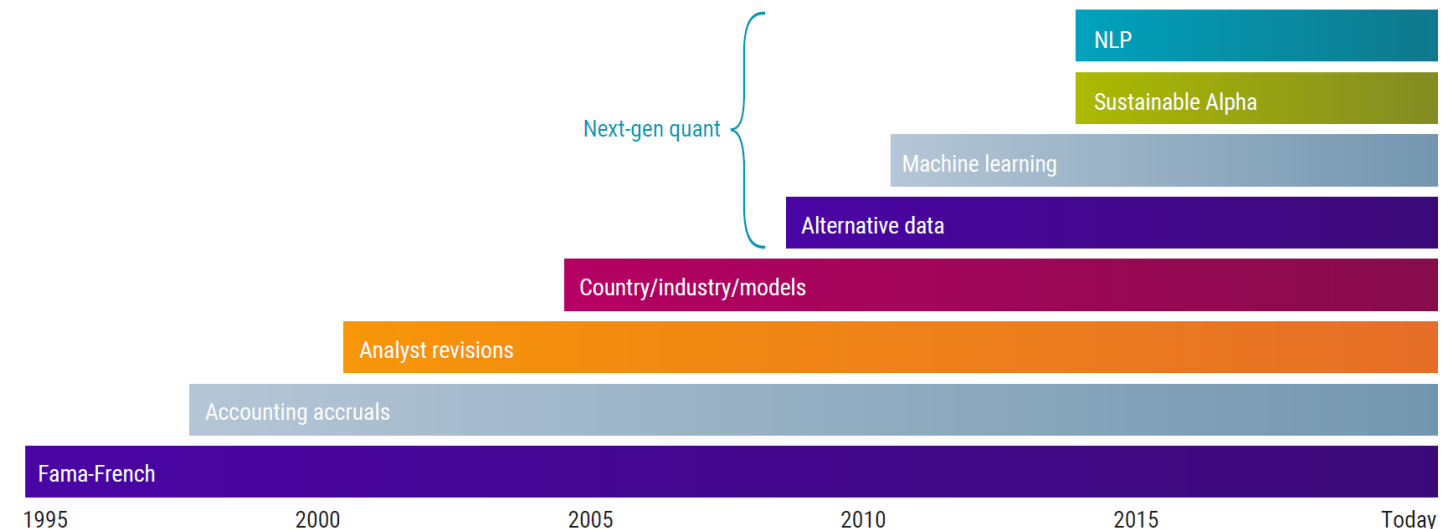
30+ data sources 200TB data utilized

20M+ spending on data, 2x growth
versus 3 years ago

35000 CPU/hours used on a monthly

basis, more than 3x the rate back in 2020

Figure 8: Evolution of quantitative investment research



2.6 Infrastructure is the foundation

Good, fast, or cheap? Pick two

Infrastructure for a quant program is like the foundation of a building

- Not sexy, not normally seen, but critical
- Requires serious investment to make it robust and scalable
- One can do it in either “dorm-room” or “industrial” styles; practical consequences are huge between the two.

Consequences of badly build infrastructure

- Scalability: cannot handle data volume and computing demands
- Replicability: Hard to verify research done by others. Leads to potential p-hacking
- Maintainability: spend most of the time fixing things that break vs. expanding the system/capability
- Iterate: hard to modify and improve specific functionalities

1. DATA STORAGE AND MANAGEMENT SYSTEM

Capable of handling a large volume and variety of data and data with high throughput.

2. COMPUTING STRUCTURE

Scalable and flexible enough to handle the demand for an ever larger variety of processes, including those that run on CPUs, GPUs, and either a single node or multiple clusters.

3. CODE STACK

Well-structured with strong documentation, logical interface, consistent style, and version control.

The trade-off above is **false**: A well-built system is good, fast, and ultimately cheaper over the long run.

2.7 People matter

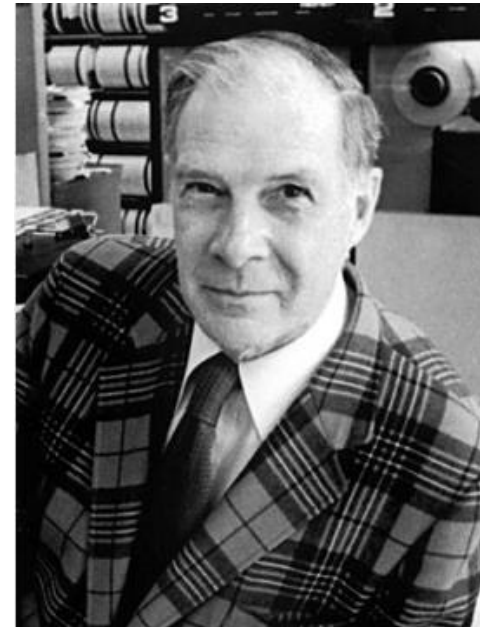
Yes, and water is wet...

This is super obvious, and everyone says this. But surprisingly many shops get it wrong!

- From personal experience, almost all corporate ills start with culture
- Super hard to get right, and takes constant work to maintain
- More than just slogans... Even Enron said ethical behavior is one of their “north stars”. They mention it on many of their earnings calls.

What makes a great researcher?

- Curiosity, courage, drive, and scientific mind
- Aim for impact rather than busyness
- You and your research
(<https://www.cs.virginia.edu/~robins/YouAndYourResearch.html>)



“ Great workplace is not espresso, lush benefits, sushi lunches, grand parties, or nice offices. A great workplace is stunning colleagues.

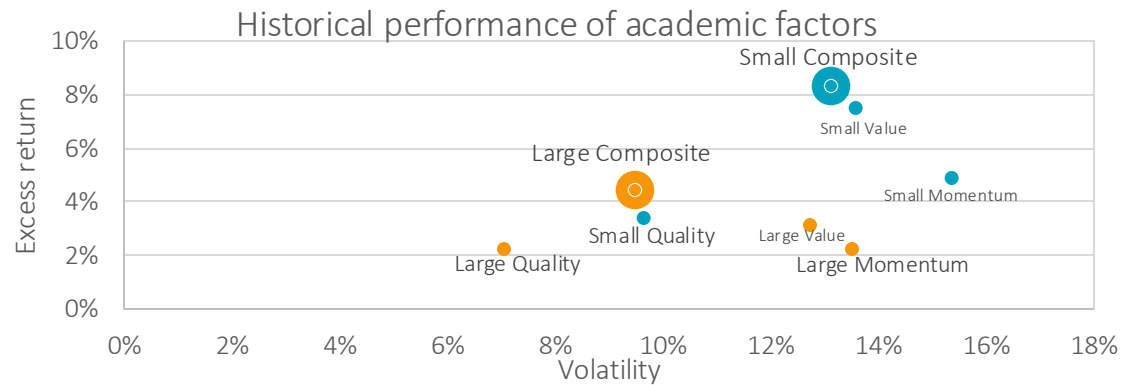
Netflix culture deck¹³

3. Developing Differentiated Solutions Next-Gen Strategies

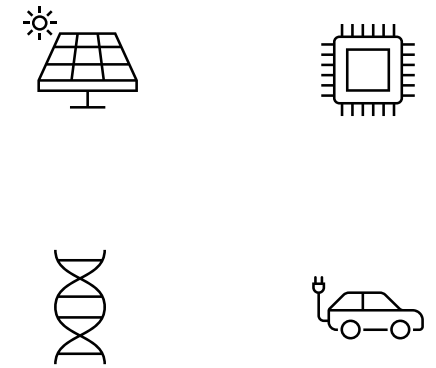
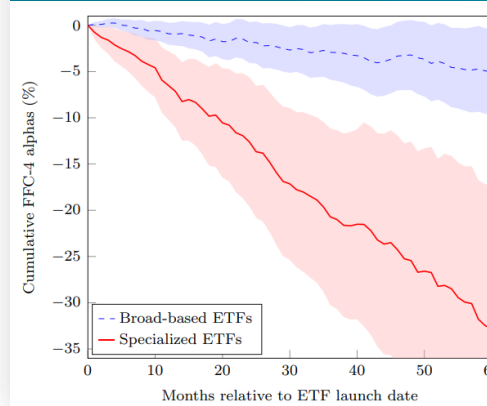
Next-gen suite of products heavily drawing on advanced analytics (ML/NLP)

Incubator strategies funded by internal seed capital

Machine learning in the small-cap space



Thematic investing based on NLP



Uncorrelated alpha from novel signals



Sustainable alpha powered by advanced analytics



4. Enhancing Established Strategies

Examples of incorporated signals

Leveraging human intelligence to identify related companies

Extracting signals from connected company networks

Proprietary shared analyst momentum signal

Standard industry classifications (e.g. GICS) can fail to spot fundamentally related stocks

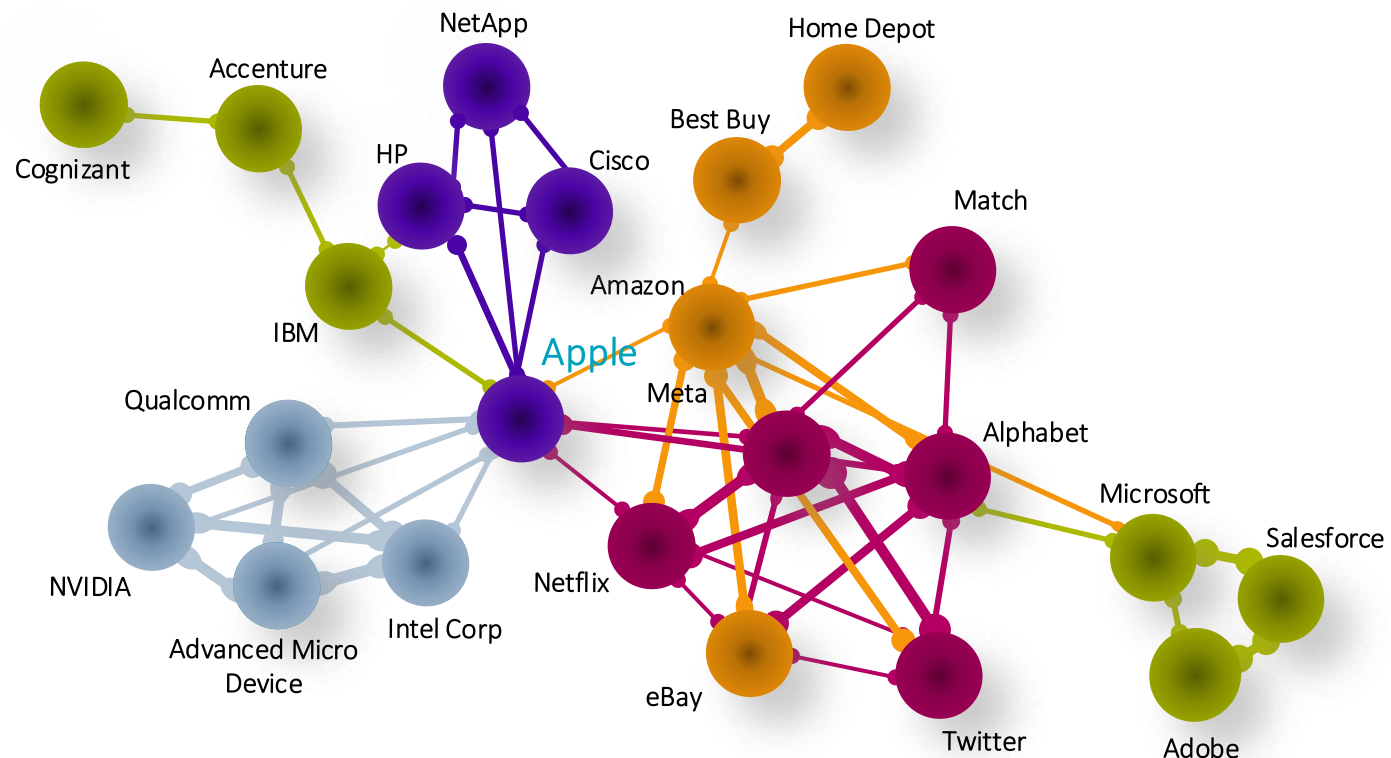
Human analysts are better placed to determine homogenous clusters of firms

This allows us to create an analyst-based network of connected companies

This is useful for:

- > Better peer groups
- > Exploiting information spillover effects
- > Via a related momentum signal

Shared analyst network for Apple (connections beyond GICS classification)

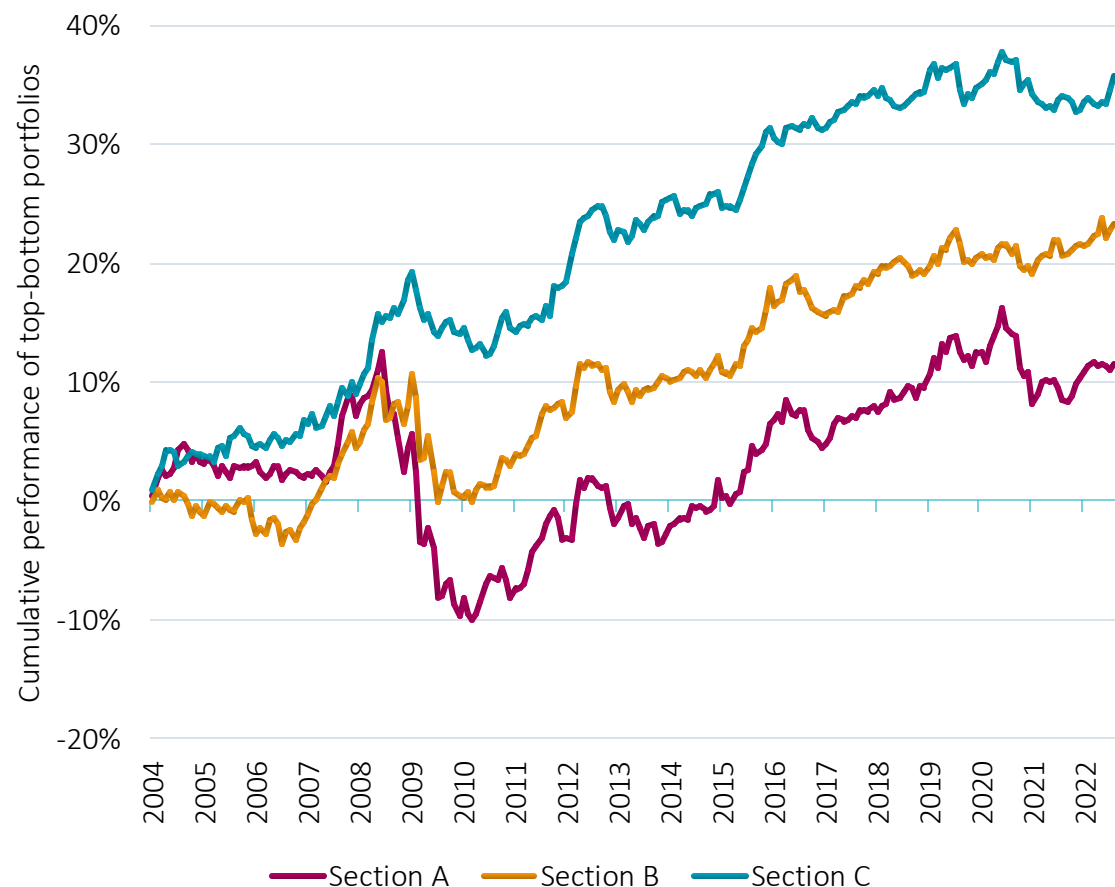


Source: Robeco Quantitative Research, I/B/E/S, Refinitiv. For illustrative purposes only. The figure shows a simplified analyst network of connected firms for Apple as of September 2022. Two firms are connected when the same analyst covers them. The more analysts cover a pair of stocks, the thicker the line between them. The different colors indicate different GICS industry groups.

Listening in between the words

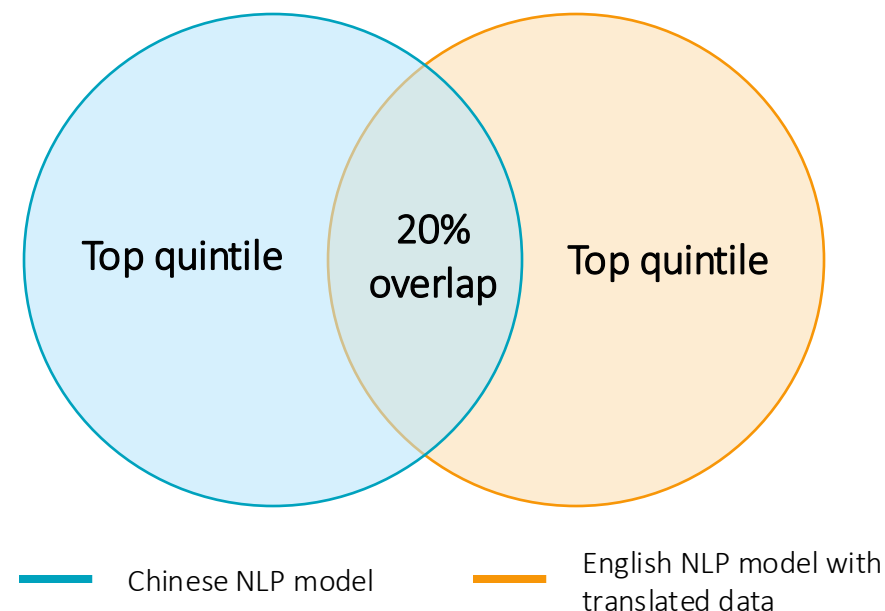
Using NLP to amplify sentiment from earnings calls

Decoding clues from objective voices and impromptu responses



Mitigating a loss in translation

- > NLP model outcomes vary based on model language and data language
- > Analysis of Chinese data with 2 different models produce different rankings
- > Combining both approaches enhances signal robustness



This is not a buy, sell or hold recommendation for any particular security. The information shown is only available for one-on-one presentations and for illustrative purposes only. No representation is made that these examples are past or current recommendations, that they should be bought or sold, nor whether they were successful or not.



Alpha decay necessitates innovation

Next-gen quant investing can unlock novel alpha from alternative data, ML, and NLP

Reconciling the new with the established brings about challenges and opportunities

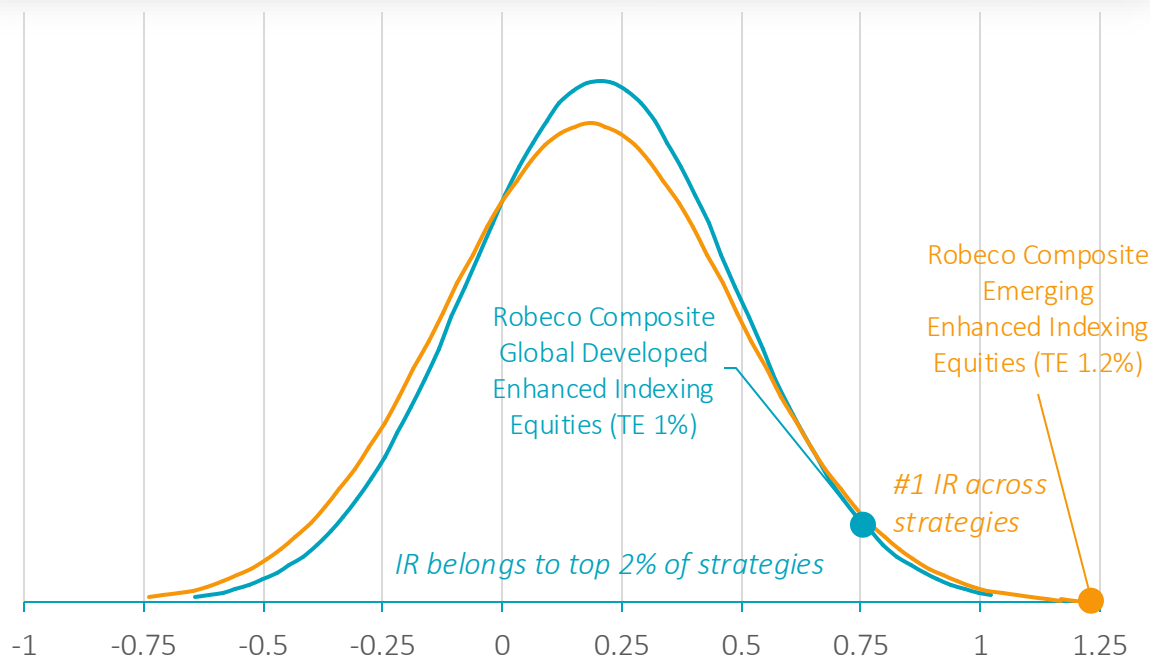
Appendix: 20 Years of Robeco Quant Investing

Celebrating 20 years of Robeco Quant Enhanced Indexing in 2024

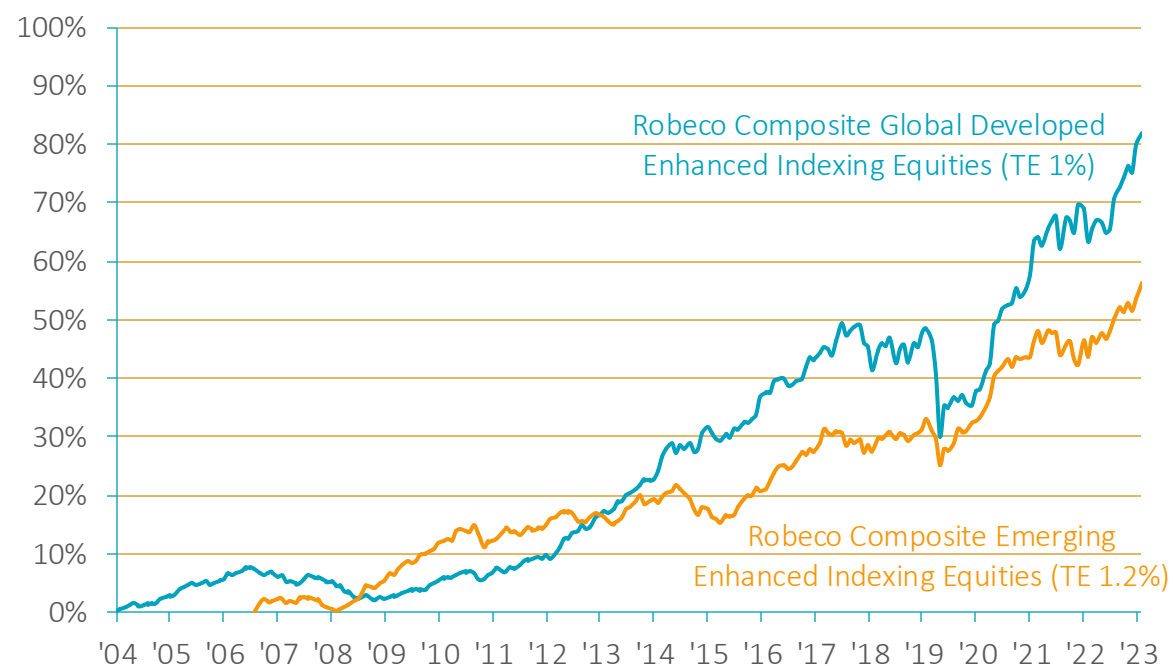
Strategies rank in top 2% eVestments league table of active managers with same years of live performance

- > For over twenty years Enhanced Indexing has enabled investors to capture a higher equity risk premium in core portfolios
- > Robeco Developed Enhanced Indexing (Nov 2004) delivered an information ratio (IR) of 0.75, outscoring 98% of >2,000 active strategies
- > With an IR of 1.2 Robeco Emerging Markets Enhanced Indexing (Jul 2007) is ranked #1, outperforming all >2,800 active strategies

eVestments: Distribution of information ratios since inception



Cumulative excess returns Enhanced Indexing strategies



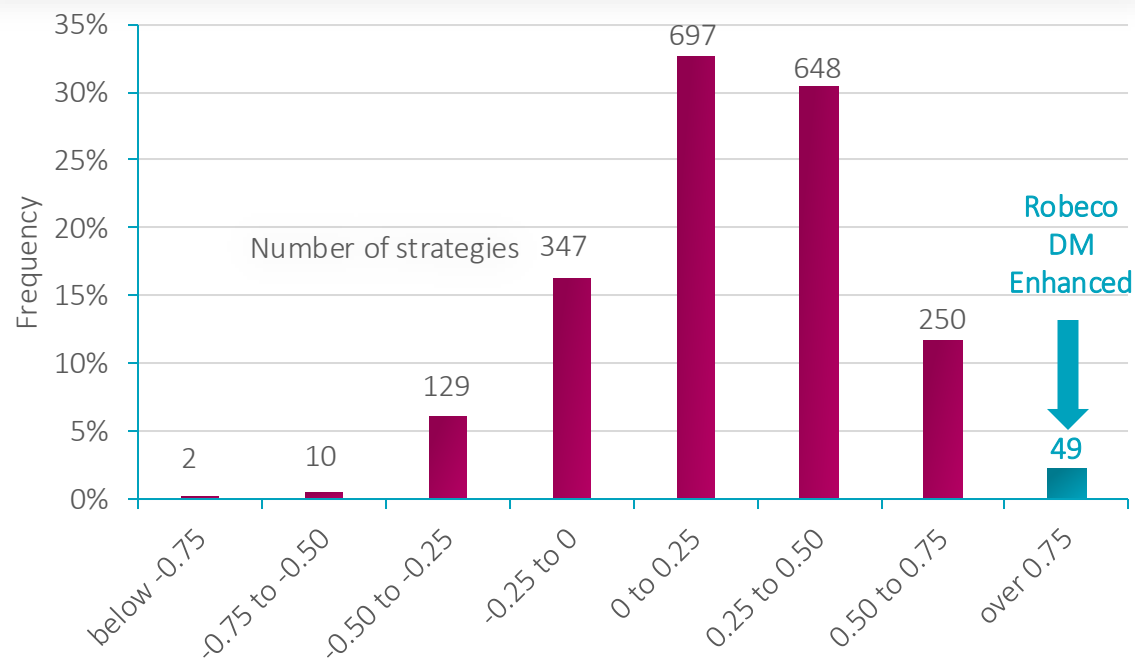
Source: Robeco, eVestment. Blitz, D. (2024). *The unique alpha of Robeco Quant Equity strategies*. Working paper. Graph left: The figure shows continuous density distributions of the annualized information ratio of the Robeco Composite Global Developed Enhanced Indexing Equities (inception November 2004) and the Robeco Composite Emerging Enhanced Indexing Equities (inception July 2007). The peer cohort consists of all the non-single-country and non-single sector (REITs) equity funds with tracking error levels $\geq 0.5\%$ and track record starting no later than November 2004 (DM) and July 2007 (EM), excluding micro-cap funds. This totals to 2,132 funds in DM and 2,812 in EM. Graph right: Portfolio returns in excess of the benchmarks (MSCI World and MSCI EM) are shown. Monthly return series based on the gross asset value of Robeco Composite Global Developed Enhanced Indexing Equities from November 2004 to December 2023, gross of fees, in EUR and Robeco Composite Emerging Enhanced Indexing Equities from July 2007 to December 2023, gross of fees, in EUR are used. The value of your investments may fluctuate. Results obtained in the past are no guarantee for the future.

Celebrating 20 years of Robeco Quant Enhanced Indexing in 2024

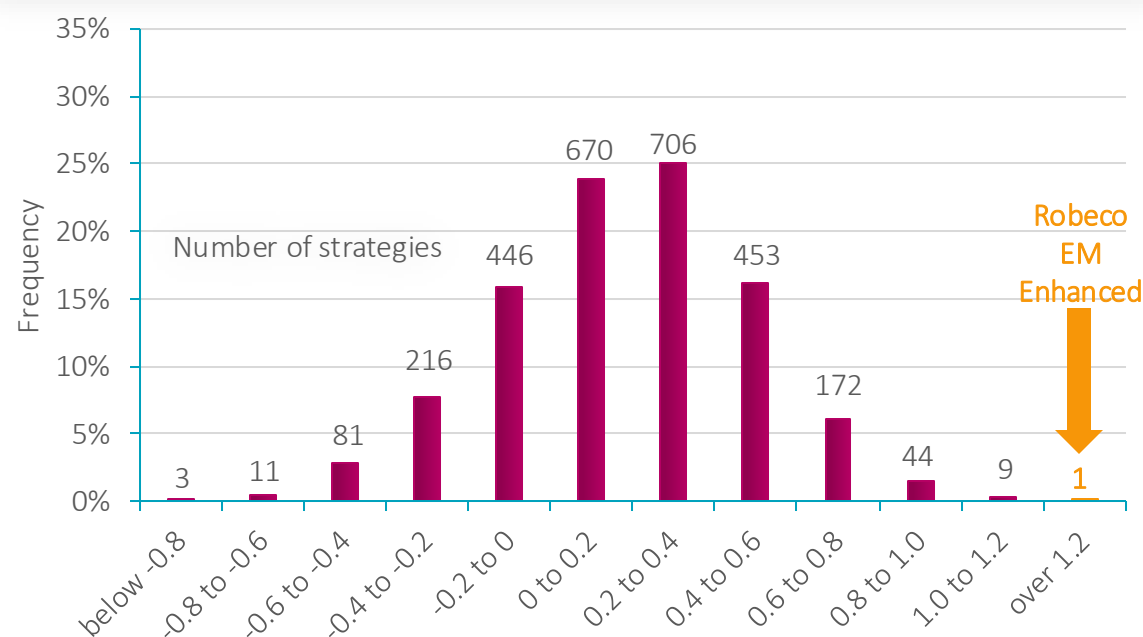
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- > Robeco Developed Enhanced Indexing (Nov 2004) delivered an information ratio (IR) of 0.75, outscoring 98% of >2,000 active strategies
- > With an IR of over 1.25 Robeco Emerging Markets Enhanced Indexing (Jul 2007) is ranked #1, outperforming all >2,800 active strategies

Information ratio distribution for DM since November 2004



Information ratio distribution for EM since July 2007



Source: Robeco, eVestment. Blitz, D. (2024). *The unique alpha of Robeco Quant Equity strategies*. Working paper. Graph left: The figure shows the frequency distribution of the annualized information ratio of the Robeco Composite Global Developed Enhanced Indexing Equities (inception November 2004) and peers. Graph right: The figure shows frequency distribution for the annualized information ratio of the Robeco Composite Emerging Enhanced Indexing Equities (inception in July 2007) and peers. The peer cohorts consists of all the non-single-country and non-single sector (REITs) equity funds with Tracking Error levels $\geq 0.5\%$ and track records starting no later than November 2004 (DM) and July 2007 (EM), excluding micro-cap funds. This totals 2,132 funds in DM and 2,812 in EM. The value of your investments may fluctuate. Results obtained in the past are no guarantee for the future.

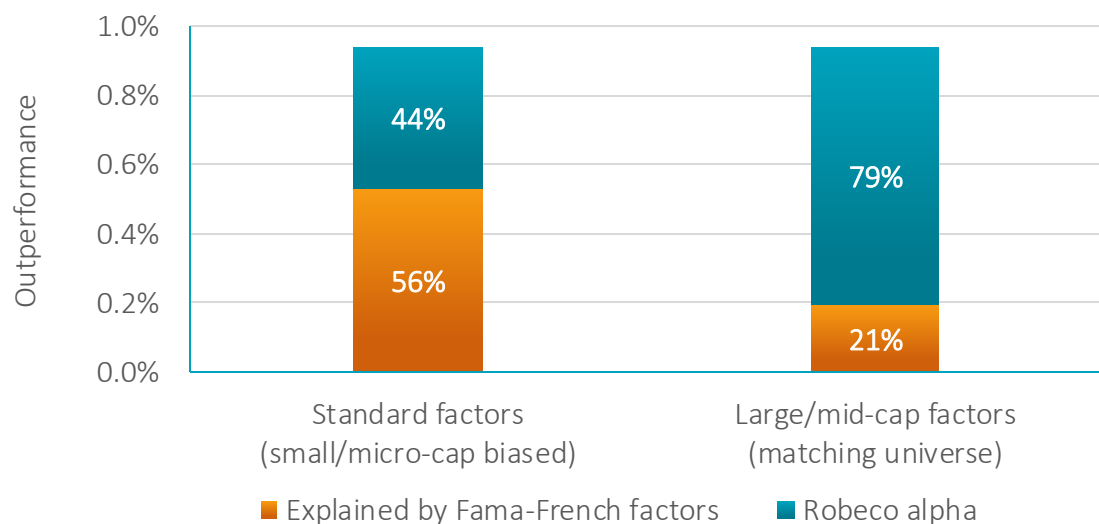
Quantifying alpha beyond Fama-French

Robeco's outperformance transcends generic academic factors

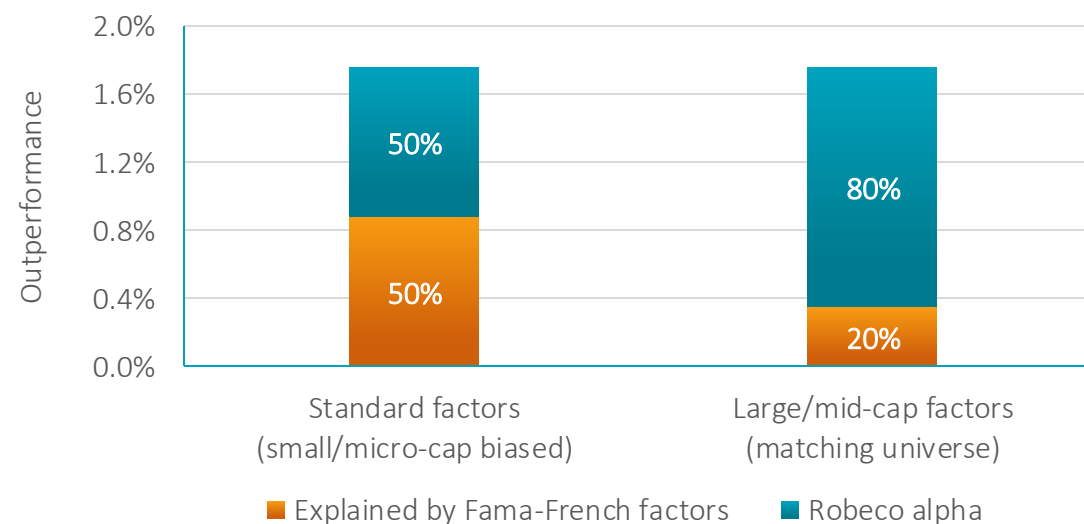
A rigorous analysis of performance reveals the added value of Robeco Quant Equity strategies

- > Results over an all-cap universe showcase that around 50% of the outperformance stands as unique Robeco's alpha
- > These figures which takes trading costs into account, include small/micro-caps that are outside our investable universe
- > Narrowing to a large/mid-cap factors universe, a compelling 80% of our outperformance is solely attributed to Robeco's distinctive alpha

Developed Markets



Emerging Markets



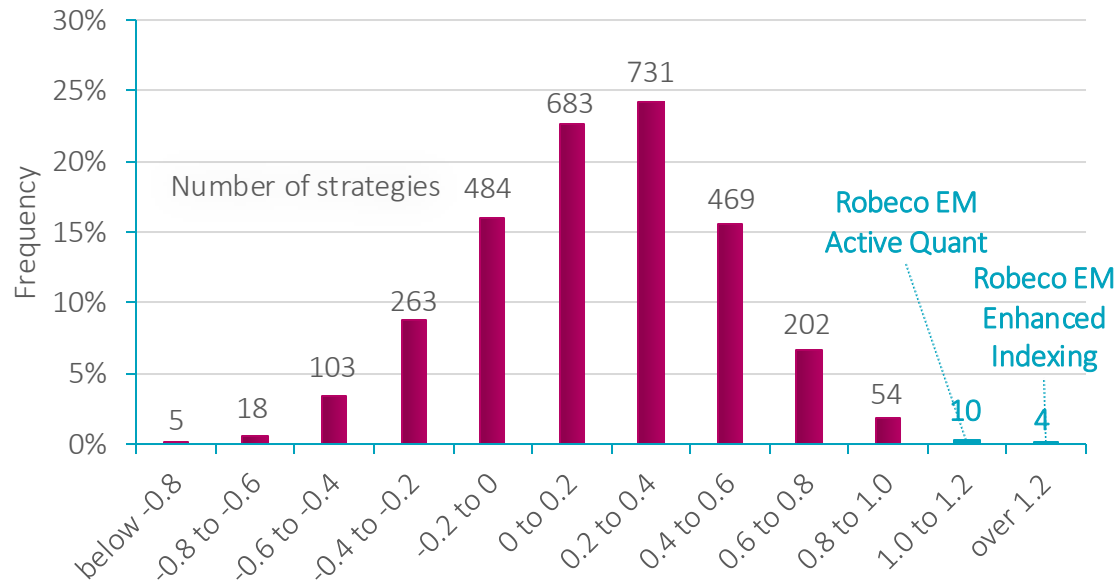
Source: Robeco, [Kenneth French data library](#). Blitz, D. (2024). *The unique alpha of Robeco Quant Equity strategies*. Working paper. Figures calculated based on Robeco QI Institutional Global Developed Enhanced Indexing Equities and Fama-French developed markets 6 factor return series for developed markets, and on Robeco QI Institutional Emerging Markets Enhanced Index Equities Fund and Fama-French emerging markets 6 factor return series for emerging markets. The LHS and RHS charts show Robeco DM and EM outperformance explained and not explained by Fama-French standard and large/mid-cap generic academic portfolios, for developed and emerging markets, respectively. Standard academic factors weigh 50% to large/mid-caps and 50% to small/micro-caps. The right bar on both charts is based on the large/mid academic factor definitions only, matching our industry-wise large, mid and small-cap investable universe. The sample period is from September 2004 to October 2023 for developed markets, and from June 2007 to October 2023 for emerging markets.

Strong and unique alpha in Emerging Markets Quant strategies

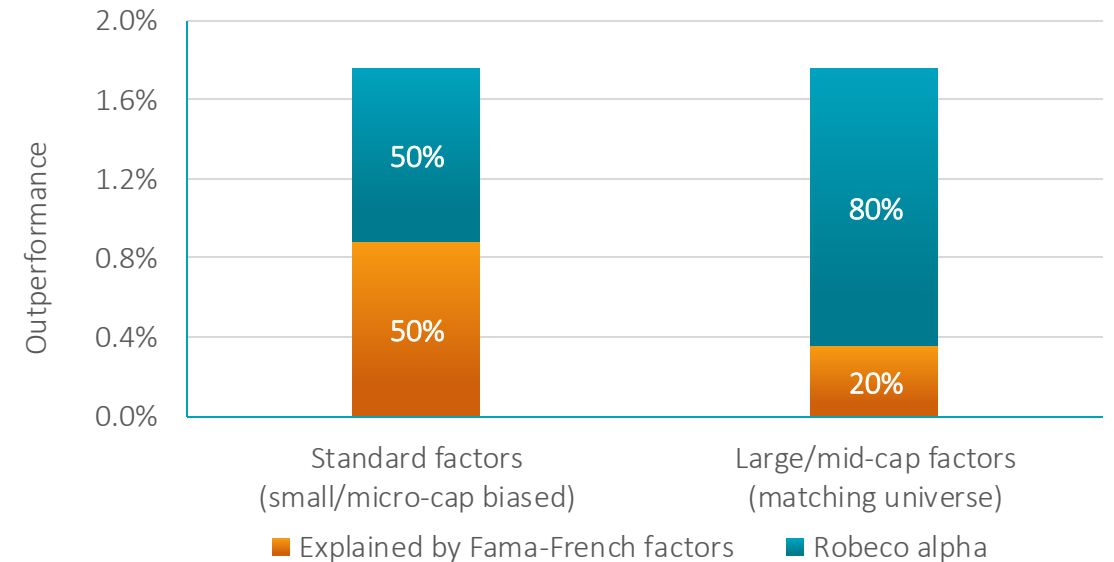
Extensive peer analysis places us at the forefront of the ranking, showcasing our alpha beyond Fama-French

- > For over twenty years Quant investing at Robeco enabled investors to capture a higher equity risk premium in core portfolios
- > Robeco Emerging Markets Active (2008) delivered an information ratio (IR) of 1, outperforming 99.5% of >3,000 active strategies
- > With an IR of over 1.2 Robeco Emerging Markets Enhanced Indexing (Jul 2007) is ranked #1, outperforming all >2,800 active strategies
- > Alpha beyond generic factors as 80% of outperformance is attributed to distinctive alpha sources

Information ratio distribution for EM since March 2008



Emerging Markets Enhanced indexing



Source: Robeco, eVestment, [Kenneth French data library](#). Blitz, D. (2024). *The unique alpha of Robeco Quant Equity strategies*. Working paper. Graph left: The figure shows frequency distribution for the annualized information ratio of the Robeco Composite Emerging Enhanced Indexing Equities (inception in July 2007), Robeco Composite Active Quant Emerging Markets Equities (inception in March 2008) and peers. The peer cohorts consists of all the non-single-country and non-single sector (REITs) equity funds with Tracking Error levels $\geq 0.5\%$ and track records starting no later than March 2008, excluding micro-cap funds. This totals 3,026 strategies. Data as per 31st December 2023. Graph right: Figures calculated based on Robeco QI Institutional Emerging Markets Enhanced Index Equities Fund and Fama-French emerging markets 6 factor return series. The chart shows Robeco EM outperformance explained and not explained by Fama-French standard and large/mid-cap generic academic portfolios. Standard academic factors weigh 50% to large/mid-caps and 50% to small/micro-caps. The right bar is based on the large/mid academic factor definitions only, matching our industry-wide large, mid and small-cap Emerging Markets investable universe. The sample period is from June 2007 to October 2023.

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