

Mixing art and science



Quarterly Letter

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Foreword

At first glance, art and science appear to occupy opposite ends of the intellectual spectrum. To many people, they are poles apart, as different as night and day, like chalk and cheese.

More often than not, however, art and science complement each other well, despite their differences. And by mixing the two, you can achieve inspiring results.

Take Florence Nightingale, for instance. She was an esteemed statistician, but it was art just as much as science that helped her improve sanitary measures in hospitals.

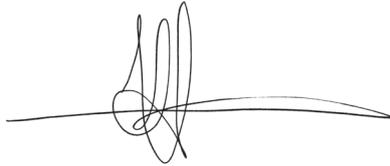
Recognising that people process data better visually, Nightingale invented polar area diagrams, an elaborate type of pie chart, to get her scientific message to cut through.

In an example of science influencing art, Leonardo da Vinci is thought to have painted the Mona Lisa according to the golden mean, a ratio often linked to aesthetic beauty in mathematics.

At Rothschild & Co, we also look to combine art and science to achieve better results.

Investing may seem like it's all about the numbers, and they are undoubtedly important. But there are also many hard to define, more subjective factors at work. They shouldn't be ignored.

By understanding both the art and science behind investing, we aim to increase the intrinsic value of your portfolio, preserving and growing your wealth over the long term.



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Cover image:
Envelope from a Presidential
'Thank you' sent to Nathaniel 1st
Lord Rothschild (1840–1915),
Senior Partner N M Rothschild &
Sons, from President Theodore
Roosevelt (1858–1919)
in 1904. Courtesy of The
Rothschild Archive.

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Why we believe an investment approach that combines quantitative and qualitative methods offers the best path to preserving and growing wealth

People trust numbers. Numbers convey precision, objectivity and authority. From an early age, we learn that two plus two will always equal four, a circle is exactly 360 degrees, and the sum of any number multiplied by zero is zero.

These are eternal and immutable truths. Numbers never lie, we are told.

It's a line of thinking that remains fundamental to the scientific method. By counting and measuring phenomena with numbers, we acquire knowledge about the world around us.

Research that relies primarily on collecting and analysing numerical data is referred to as 'quantitative'. It is widely accepted as a solid base for conducting objective experiments and achieving certainty in conclusions.

The 'hard' sciences, such as chemistry, physics and biology, have historically favoured quantitative approaches. British mathematical physicist Lord Kelvin once said:

"When you can measure what you are speaking about, and express it in numbers, you know something about it. When you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind."

Clearly, Lord Kelvin was a purist. But quantitative methods are far from perfect.

Not everything is easy to quantify, for example. How do you measure the beauty of a sunrise, or the emotions you feel when listening to Bach's cello suites. These are abstract concepts; a mark out of 10 doesn't quite do them justice.

Handling intangible, more subjective information requires a different approach.

'Qualitative' research and analysis collects and makes sense of less structured data: opinions, observations and reactions. It's a more subjective approach which has traditionally been applied in fields that study human behaviour and motivations, such as psychology and sociology. The so-called 'soft' sciences.

It's perhaps not difficult to see why quantitative methods might be considered more robust at first glance. Even the language we use is loaded.

'Hard science' implies firmness, rigour and complexity; soft sciences – and, by proxy, qualitative methods – sound fluffy, inexact and less valuable in comparison. Messy rather than ordered, more art than science.

But appearances can be deceptive. Hard data is often softer than it looks, and soft sciences regularly deliver hard truths.

This is partly why Mixed Method Research (MMR) has gained momentum in science and academia in the 21st century.¹ MMR formally integrates quantitative and qualitative techniques, providing researchers with a more holistic view of a problem when trying to answer some of science's most difficult questions.

Our investment approach is similar. We strive to mix art and science because we believe a combination of quantitative and qualitative methods offers the best path to preserving and growing our clients' wealth.

Quantitative versus qualitative investing

Before we delve deeper into our investment approach, it would be useful to define what we mean by quantitative and qualitative methods in finance and wealth management.

We've already touched on the key fundamentals from a scientific perspective: quantitative analysis deals with numerical data, while

The language of the universe

Many mathematicians are Platonists. Named after Plato, the Greek philosopher, Platonism is the belief that numbers, formulae and other mathematical concepts exist independently of human thought and philosophy.

In other words, we didn't invent numbers, we simply discovered them.



¹ <https://link.springer.com/article/10.1007/s11186-019-09345-5>

qualitative approaches seek to gain insights from non-quantifiable, more subjective information.

What does this mean in the investment world?

Quantitative investment strategies are the driving force behind large hedge funds such as Two Sigma and Renaissance Technologies. These companies use bespoke trading systems, underpinned by AI and machine learning algorithms, to automatically analyse buy and sell financial assets such as stocks.

Today's quantitative-led equity investors rely purely on complex mathematics, computer science and other data-driven tools to gauge a company's performance based on financial

ratios derived from sales revenues, profit margins and other metrics.

But as with the beauty of Bach's music, there are certain qualities of an investment that we feel cannot easily be expressed through a numerical value.

It is difficult to capture a company's culture, the strength of its brand or the enthusiasm and expertise of its management team in a spreadsheet or algorithm, for example. Quantitative analysis can calculate and predict a country's GDP, but is it possible to accurately reflect a society's unique political and cultural undercurrents in raw figures?

Quantitative approaches are essentially backward-looking. Any predictions made are based on historical data, and as you will often hear us say, 'past performance is no guarantee of future returns'.

This is where qualitative methods can provide crucial context that is often missing from a purely numbers-based approach. Qualitative analysis puts people, not formulae, at the centre of the decision-making process.

This involves talking to the management teams at investee companies to better understand their capabilities and business strategy, both before investing and throughout the relationship. The thoughts and opinions of a company's current and former employees, suppliers, distributors, competitors and customers also provide crucial insights into the overall health of a business.

A more qualitative approach means learning extensively about a company's industry, as well as its people, products and services, including any sustainable competitive advantages that it may or may not have.

Much of this analysis is inherently subjective, which is why actively managed portfolios, like ours, rely upon the extensive knowledge and experience of researchers, analysts and portfolio managers to guide investment decisions.

When numbers lie

To achieve the most favourable outcomes, it's important to recognise the advantages and disadvantages of quantitative and qualitative approaches. Neither are perfect.

They both deal with data, albeit of different types, and obtaining robust data can be difficult.

Earlier, we said hard data is often softer than it looks. That's because while numbers supposedly never lie, they do tell different stories depending on the maths of the teller.⁶

AI and black boxes

AI has been shown to detect cancer more accurately than doctors², solve Rubik's cubes in a fraction of a second³ and have better reading comprehension than the average person.⁴

But there are also pitfalls of placing our faith in machines. They may seem the epitome of objectivity, and yet behind every AI technology is a team of humans who programmed it and chose the data it learns from.

Many machine learning platforms are built using 'black box' development. This means the inner workings of the system are difficult to interpret even for the programmers themselves, let alone end users.

When the results seem accurate, it can also be tempting to ignore *why* they are accurate.

In one study, researchers designed an AI program to distinguish between domestic huskies and wild wolves in photographs. The technology chose correctly 90% of the time.

Subsequently, the researchers discovered the program wasn't differentiating wolves from huskies based on nuances in their appearance. It had simply recognised wolves were more often photographed in the snow than pet huskies and so had categorised any photo with a white background as depicting a wolf.⁵



² www.bbc.co.uk/news/health-50857759

³ www.washingtonpost.com/technology/2019/07/16/how-quickly-can-ai-solve-rubiks-cube-less-time-than-it-took-you-read-this-headline/

⁴ www.bloomberg.com/news/articles/2018-01-15/alibaba-s-ai-outgunned-humans-in-key-stanford-reading-test

⁵ Carl Bergstrom and Jevin West. *Calling Bullsh*t: The Art of Scepticism in a Data-Driven World*

⁶ Paraphrased from poet Luis Alberto Urrea's book *'The Devil's Highway: A True Story'*.

There is an old joke that may help illustrate what we mean.

A mathematician, a statistician and an accountant all apply for the same job. During a written test at the interview, each one is asked the question: "What is the sum of two plus two?"

The mathematician doesn't hesitate. 'Four', she answers. The statistician thinks for a moment and scribbles down 'on average, four – give or take 10%'. After deliberating for several minutes, the accountant gets up, approaches the interviewer and asks: "Before I write anything down, what would you like the answer to be?"

This may seem a little unfair on accountants! However, there are many different versions, with economists, engineers, lawyers and analysts often substituted in as the butt of the joke.

Whatever the profession, the message is broadly the same: data can be manipulated to suit whoever is presenting it. "Lies, damn lies and statistics" is a phrase often used to convey how misleading (albeit persuasive) numbers can be.

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For example, investment funds commonly claim they have beaten market benchmarks over certain time periods. Such performances can appear impressive on the surface, but even the raw data rarely tells the whole story.

Underperforming funds are often shut down, rebranded or merged with other, better-performing funds. By definition, the remaining funds are the successful ones. It's a type of logical error called survivorship bias – success stories take centre stage, while failures are hidden and forgotten.

They say history is written by the winners, but a lot of research is also shaped by 'survivors'.

Economist and author Burton Malkiel once calculated the extent to which survivorship bias

had flattered investment funds in academic studies. He arrived at a figure of 1.5% per year.

"That may not sound like much, but over a lifetime of investing it's a factor of two," explains *Financial Times* columnist and author Tim Harford.⁷

"Put another way, if you ignore all the investment funds that quietly disappear, the apparent performance is twice as good as the actual performance."

When we evaluate funds, track record is not our first concern. Assessing the people and processes behind the performance is more important. That's how we look to differentiate luck from skill.

If a fund's capabilities are being judged purely on its track record, how long would it need to perform well before you had complete confidence in the skills of its managers? We would argue nearer to ten years than five, and probably more.

Garbage in, garbage out

Even when data has been comprehensively collected, analysed and presented in good faith, it runs the risk of being inaccurate due to human error, unconscious bias or mechanical failures.

A poor result may be down to the original quality of the data being shoddy; a principle commonly known as 'garbage in, garbage out'.

We have already quoted Lord Kelvin, a scientist who is mostly known for inventing the absolute temperature scale and having a unit of temperature named after him – the kelvin.

Measuring and recording temperatures is unambiguously quantitative, but accuracy still isn't guaranteed, as was demonstrated by German physician Carl Wunderlich, one of Lord Kelvin's contemporaries.

The doctor embarked on what can only be described as a 19th Century big data project. Over nearly two decades, Wunderlich collected one million body temperature measurements from approximately 25,000 patients.⁸

His work established the convention that the average healthy body temperature is 37 degrees Celsius, or 98.6 degrees Fahrenheit. Understandably, his results went unchallenged for over a century – repeating the experiment was simply too onerous a task.

Only recently has it been discovered that Wunderlich was wrong. Not by much – his calculations were about half a Fahrenheit degree too high – but enough to raise eyebrows, given the sheer size of the dataset. So, what happened?

⁷ Tim Harford. *How to Make the World Add Up*. p33.

⁸ *Ibid* – p177

One of Wunderlich's old thermometers was inspected at a medical museum and found to be miscalibrated by two degrees centigrade, which is nearly four degrees Fahrenheit. It's not known how many readings he took using this particular thermometer, but it's likely to have skewed the results. Garbage in, garbage out.

What about qualitative approaches? One of the greatest strengths of qualitative analysis – subjectivity – is commonly cited as its biggest drawback too. If researchers are using their own judgements to interpret results, psychological biases often play a part in the process.

However, it's worth noting that qualitative frameworks – unlike quantitative ones – tend to acknowledge and account for unconscious bias where possible. Nevertheless, researchers (and investors) should scrutinise every decision to screen for potential prejudices.⁹

How we mix art with science

We've mentioned that our investment approach combines quantitative and qualitative methods. This is not like mixing oil and water – we believe art and science complement each other well.

Quantitative data is often easier to access, collect and compare, especially at scale. It paints a detailed picture of the past, which can provide vital clues to the present and immediate future.

But as wealth managers, we are focused on the long term. Analyses that rely only on looking backwards are not suited to our goal of preserving wealth for future generations.

We believe qualitative factors provide us with a clearer idea of what the future may hold. Any judgements we make about the long-term performance of assets are therefore supported with – not dictated by – economic data.

As such, our starting point for investing is not a market index. We are flexible about where our investment ideas come from, although they often have a qualitative focus.

WEIRD data

When it comes to qualitative data, it's also especially important to consider *who* is missing from the data. Behavioural studies, for instance, are notoriously skewed towards WEIRD participants – Western, Educated and living in Industrialised, Rich and Democratic countries.

People from WEIRD demographics represent up to 80% of research participants, despite comprising only 12% of the world population.¹⁰

We talk to other investment professionals, industry experts and our wider network to seek out potential opportunities. Our clients are also some of the world's most successful industry leaders and entrepreneurs, so your insights remain a valuable source of inspiration for us.

Even when we use more systemised, automated approaches for generating ideas, qualitative factors are still important. For example, we utilise AI to screen annual reports, but the technology is set up to identify key words (not numbers) that indicate a company has features or values that we look for when investing.

We believe qualitative factors provide us with a clearer idea of what the future may hold.

This process generates many investment ideas. However, most companies and externally managed funds do not meet our quality thresholds and can be removed from further consideration fairly quickly.

We then conduct thorough fundamental research into the remaining stocks and funds. This is an intensive process that can take many months to complete, depending on the sophistication of the business or fund and our existing knowledge of the company and its industry.

As regular readers of the *Quarterly Letter* will know, we focus on three key areas when evaluating a company:

- Business
- Management
- Price

Each of these areas incorporates a blend of quantitative and qualitative analysis.

When examining the business and its management, for instance, we want to understand the underlying economics of the business and therefore look at profitability, balance sheets and cash flows. The numbers need to make sense.

But intangibles matter too. Does a company have economies of scale or lucrative patents that prevent rivals from providing a similar service at a competitive price? Are its employees happy, motivated and loyal?

The quarterly or annual figures may be impressive, but qualitative factors are more indicative to us of long-term value.

⁹ Our October 2018 Quarterly Letter 'Fighting against our instincts' provides more insight into psychological biases, as well as how we look to overcome them.

¹⁰ www.apa.org/monitor/2010/05/weird

Finally, any investment that meets our quality requirements must also be attractively priced.

And while calculating risk, forward return expectations and other valuation metrics may seem like a fundamentally quantitative process, it's often a mixed-method approach.

For example, when calculating forward returns, we assess many qualitative factors, such as the strength of the franchise, its management capabilities and growth opportunities.

Similarly, evaluating whether a company's business practices are responsible and sustainable relies largely on our qualitative judgement, but we also use materiality maps and other quantitative tools and frameworks to augment our decision-making.

Importantly, however, the task of adding a stock or fund to portfolios – or removing them – is never delegated to a machine.

Final investment decisions are made by our portfolio managers. We only invest in a company or fund when there is unanimous agreement between them. Meanwhile, the decision to sell one of our holdings requires just one vote in favour.

Our view is that your wealth is better invested over the long term in robust businesses with strong management teams and sustainable competitive advantages.

The mixed-method approach in action

Our investment in global brewing company AB InBev is a good example of how we combine quantitative and qualitative methods during our decision-making process.

We started investing in AB InBev in November 2013. Up until five years ago, our quantitative analysis of the company had continued to be favourable; the numbers were strong, and the business appeared to be heading in the right direction.

However, we had begun to receive feedback from several sources within our network that the company was becoming overly aggressive in its pursuit of shorter-term financial objectives. It was clear this could affect the business's long-term prospects, even if this wasn't yet being reflected in the financial data.

One piece of key qualitative information we received was from a senior contact at a firm that supplied packaging materials to AB InBev. They informed us that the drinks company had rejected an attractive long-term deal in order to make immediate savings.

Furthermore, we had concerns the company was paying a steep price to acquire rival brewer SAB Miller. Some of the numbers weren't making sense anymore, which – when combined with the qualitative feedback we had received – prompted us to sell.

Within five years, the shares were trading at just half the level that we sold them.

Conclusion

Returns, asset allocations, risk ratios – it's easy to assume that investing is purely a numbers game. And for some investors, a quantitative-based approach may be the right option for them.

But at Rothschild & Co, we are not looking to make short-term gains from market inefficiencies. Our view is that your wealth is better invested over the long term in robust businesses with strong management teams and sustainable competitive advantages, as well as in high-quality external managers who share our investment philosophy.

Researching these investments from the bottom up requires an understanding and appreciation of qualitative factors. It also requires access to the right sources of this type of information, which we are able to achieve through our extensive network and strong industry relationships.

Ultimately, we believe it is only with a combination of qualitative *and* quantitative analysis – art and science – that we can gain a more complete view of an investment's past, present and future value.

Notes

At Rothschild & Co Wealth Management we offer an objective long-term perspective on investing, structuring and safeguarding assets, to preserve and grow our clients' wealth.

We provide a comprehensive range of services to some of the world's wealthiest and most successful families, entrepreneurs, foundations and charities.

In an environment where short-term thinking often dominates, our long-term perspective sets us apart. We believe preservation first is the right approach to managing wealth.

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