An evolution of quantitative investing

Macquarie Systematic Investments

2025

Macquarie Asset Management's global Systematic Investments team has a strong heritage in managing active quantitative equity strategies. But what that looks like today is very different to what it looked like at its inception ~30 years ago.

Over 30 years of quantitative investing at Macquarie

Quantitative equity investing has been an evolutionary process from its inception. Although not a new concept, quantitative strategies are on the rise. These strategies incorporate a disciplined adherence to a research driven and data-backed process, along with a robust awareness of risks. Performance outcomes of quantitative strategies on a risk-adjusted basis have historically been attractive – and investors, institutional and retail alike, are taking note.

Below we explore the evolution of active quantitative investing at Macquarie, highlighting some of the key developments along the way which have ultimately resulted in improved outcomes for clients – whether that is through better capture of alpha, more efficient management of risk, or the effective implementation of customised solutions.
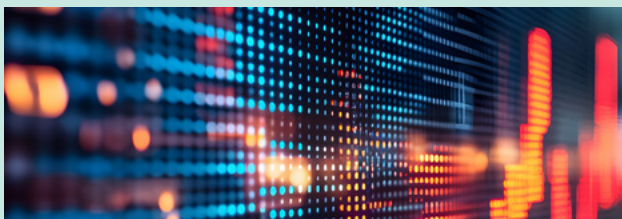
Quantitative investing: a complex puzzle...

Quantitative investing is a complex puzzle. It can be defined as the use of quantitative data analysis and rules-based securities selection models to build portfolios in a systematic way. From the identification of data sources through to the modelling of signals and portfolio implementation, each piece of the puzzle needs to work in isolation and in harmony with all other components in order for the process to be successful.

...but not a new concept

Quantitative investing is an approach with a distinguished academic pedigree stretching back to the early 20th century. Since this time, enduring behavioural and market inefficiencies identified by academic research and investment practitioners support the notion that quantitative approaches remain compelling.

We believe that quantitative investing remains an attractive investment approach, which is data driven, testable, and which can evolve through rigorous self-examination and process improvement. This natural inclination of quantitative practitioners to continuously evolve means that the process is never stagnant. It is in this spirit that we have continuously evolved our investment process.

The 1990s:
Simple (but not boring) beginnings

Quantitative investing at Macquarie began in Australia in the early 1990s. At that time the financial industry was still ruled by fundamental techniques, and Macquarie's suite of investment strategies were all managed fundamentally.

From the early 1990s, our first decade of quantitative investing began and was focused on signals. Signals are metrics that can capture characteristics of stocks, derived from underlying data.

Signals can be considered from either an alpha or risk perspective - alpha signals can distinguish between future outperformers/underperformers while risk signals are used to help control for uncertainty.

During the first years of investing, our signals typically only consisted of traditional financial metrics such as P/E ratio, dividend yield, and return on equity. Compared to some of the cutting-edge research that quantitative investment managers are doing today, such metrics could these days be considered more mainstream or 'boring.'

However it is important to remember that these traditional signals have stood the test of time and are still widely recognised and used as core signals in quantitative strategies.

An evolution of quantitative investing

Of course, when we started investing in the early 90s there was a limited number of signals at our disposal. Over the years since then, through increased data availability and advancement of modelling techniques, our quantitative research team has developed a library of over 1,000 proprietary signals that seek to capture alpha and identify risk.

The premise underpinning our signal development was that although past returns are not a guarantee for the future, studying what did and didn't work in the past, and understanding why should give investors an advantage. Our culture and investment philosophy were shaped during this period and in particular our evidence-based approach.

Through this continued signal development, another principle that shaped us is that quantitative investment strategies should have a clear economic rationale. We are, after all, investors applying economic insights in a systematic manner, rather than mathematicians applying formulas to economic problems.

The 2000s:
A global perspective

In 2002, Benjamin Leung, now Head of Macquarie Systematic Investments, joined the team and created the foundations of the global quantitative model used today.

The first quantitative global equity strategy was subsequently launched in 2005. Since then we have introduced strategies in different regions and sub-sectors. We are pleased to have a strong track record of delivering on investors' expectations. The team's suite of strategies has delivered information ratios from 0.3 to 3.0 (gross of fees)[1] since inception.

2010 onwards:
Continuing to embrace technological advancements

Over the last decade we have observed huge advances in cloud technology and computing power. While not directly linked to an observable evolution of our investment process, by embracing these advances we have ensured that our research infrastructure remains scalable, relevant, and efficient.

Since 2018, key developments have included the transition of our research platform from a MATLAB environment into a Python environment, which has added greater flexibility, processing speed and enabled greater sophistication in our signal generation and portfolio construction process.

In addition, the lower cost, higher performing computational power and cloud-based storage have provided the research team with the ability to reduce the research cycle and therefore broaden the research programme.

The big data deluge

It comes as no surprise that the increase in data availability provides a fertile hunting ground for quantitative research. More data availability means more information sources which can be captured within a quantitative model. Data sources continue to grow at an exponential rate, as shown in Figure 1 below, which has allowed our research team to identify a group of lower correlation signal sets and combine them with our more familiar signal sets. Across our universe of stocks, we are now capturing ~1,000 pieces of data per stock, contributing to a more comprehensive and powerful coverage of the investment universe.

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1. As at 31 December 2024.

Figure 1: Volume of data created and replicated worldwide
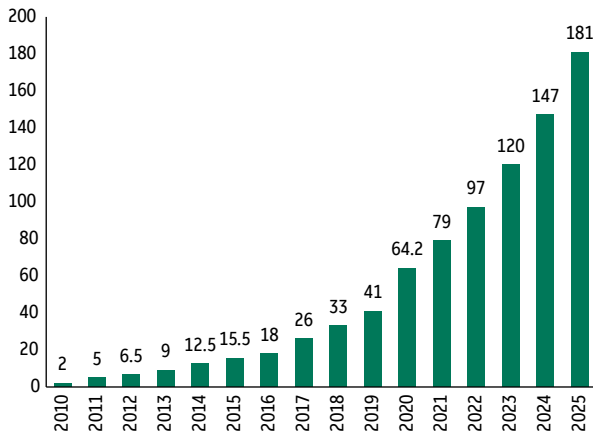
Source: International Data Corporation (IDC), Global DataSphere Forecast, 2021 – 2025, as cited by Red Gate Software (Will AI Make Data Science Jobs Obsolete in Finance? (cfainstitute.org))

Elevating investment strategies with alternative data

Orthogonal alternative datasets offer untapped potential by providing valuable insights for investors looking to gain a competitive edge in the market. These unconventional sources of information range from credit card transactions, transcripts from earnings calls, geolocation information, to textual data from news filings. For quant investors, this vast array of information can elevate the efficacy of investment strategies when skilfully integrated.

Example: Supply chain linkages

At the core of any systematic investment process is the belief that information about a public company is useful in predicting its future stock performance. The notion of spillover effects extends that concept, positing that information about other, related companies can be useful in predicting the future stock performance of a particular target company. For example, using the supply chain linkages we can determine the indirect effects of a customer's earnings upgrade on a supplier company (or vice versa).

2020 onwards:
Factor calibration providing a dynamic and customised approach

Being Australian grown, we have an appreciation that successful investment strategies need to be nuanced to their unique investment universe. What works in one region doesn't necessarily work in other regions.

With that in mind, we evolved the process to design a factor calibration model that recognises this, seeking to uncover the best approach to weigh the signal pool, to give the most robust (out of sample) prediction of future returns.

This calibration process uses proprietary algorithms to form a set of signal weights built from five separate views of the market, including investment universe, industry sectors, size bands, market direction and country/region. These five independent views are then combined to form a total score for each company, providing multiple different points of reference.

For example, if considering investment attractiveness of Glencore, the diversified mining company: it will be concurrently assessed relative to the UK universe, within the mining sector, and with respect to large capitalisation companies.

By taking a dynamic and customised approach, we aim to account for different investor focuses across segments which can result in variations in signal efficacy – for example is dividend yield a less important signal for a technology company? Are sentiment-like signals more effective in smaller companies?

Allowing for covariances and correlations

In addition to considering the ability of signals to predict excess return, our calibration process also incorporates the impact of turnover levels and seeks to provide diversification of information based on covariances and correlations. For example, we have observed that as Quality style factor returns have become more correlated in the last two years with strengthening Momentum factors, the factor calibration process has adapted by moderating Quality and Momentum weighting and increasing the allocation to Value.

To help protect against overfitting and hypersensitivity to parametrisation, we apply bootstrapping techniques over historical data to increase the robustness of the process. Over a given calibration time period, we apply the proprietary algorithm to create hundreds of sub samples, and within each sample we only use a subset of data to train on (e.g. a subset of months and a subset of stocks within each month). This random sampling reduces "luck" and focuses more on gaining exposure to the actual cross-sectional ability of our factors to explain excess returns.

The chart below provides a visual as to how the bootstrapping works in practice. The blue line is the return of MSCI World in USD and the grey lines are alternate paths that could have been observed.

Figure 2: MSCI World Return vs potential outcomes
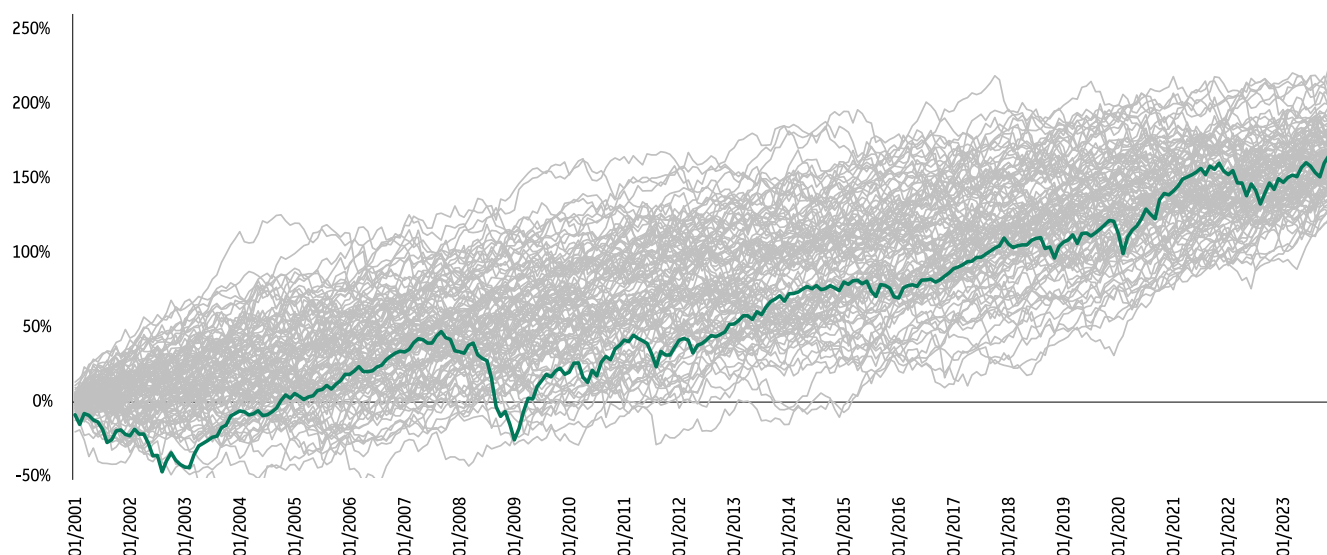
Source: Macquarie

A multi risk model approach

Quantitative managers have a tendency to only talk about changes to their alpha generation models. Risk is perhaps not as glamorous or exciting to talk about however, as noted previously, one of the key tenets of successful quantitative investing is the understanding and management of risk sources within portfolios.

One of our key differentiating factors is our alignment to investor outcomes, both positive and negative, through a unique product offering known as 'True Index.' This means we are rewarded for any outperformance (in a similar way to a typical performance fee); and additionally, unlike other managers, we are financially exposed to any underperformance in that we are required to compensate clients for any underperformance. As a result of this unique alignment, a focus on risk is paramount.

Many managers consider a single risk model for the purposes of estimating/penalising risk. However, risk models tend to be a noisy approximation of risk depending on the prevailing market conditions. Our research has identified advantages of incorporating a multi risk model approach to measuring risk within the objective function.

Next generation investing

AI and machine learning

We are convinced that more recent developments in alternative data, artificial intelligence, and machine learning are pivotal to the evolution of quantitative investing. Not only can they widen the opportunity set by unearthing new

and uncorrelated alpha signals, they can also improve our existing investment processes by leading to better model predictions of risk and return.

We have been using machine learning algorithms which have been well-studied within academia for well over 10 years. These techniques have generally been used in all parts of our investment process. However, our use of machine learning algorithms is targeted in its application.

For example, we are currently using machine learning to help us classify and forecast economic regimes for the purposes of calibrating our signal set based on the prevailing economic environment. For a quantitative process, this is particularly useful as it helps us to avoid overconcentration in certain signal sub groups and helps to ensure robustness throughout our process.

The signal set today

As noted previously, over the last 30 years, our quantitative research team has developed a library of over 1,000 signals that seek to exploit human bias to capture alpha and identify risk. Our current signal pool consists of over 60 signals. On average, the team expects to remove, evolve or add four signals per year. Below we have provided a diagram illustrating signal categories, correlations, and some specific signal examples:

The sophistication of the signals varies from traditional valuation metrics (which are refined based on the team's proprietary definitions) to more sophisticated applications and utilisation of orthogonal alternative data sets.
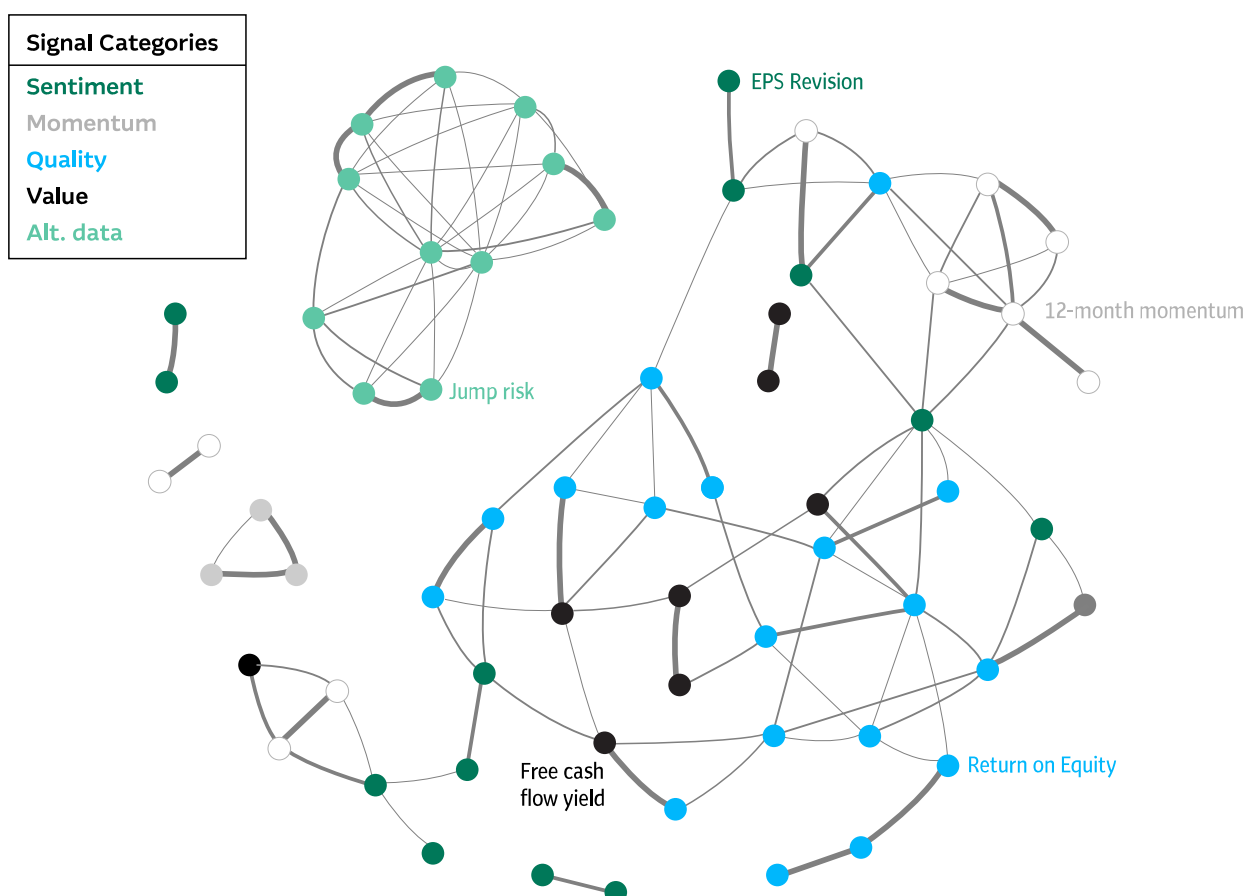
Summary

As leading quantitative investors we recognise the need to continue to innovate in order to stay relevant and meet our clients' evolving needs. We are therefore focused on improving our current offering as well as developing next-generation quantitative solutions that are diversified from traditional quantitative portfolios. Importantly, through this ongoing evolution we continue to remain true to label and adhere to our investment philosophy which is based on strong empirical evidence, sound economic rationale and a prudent approach to risk management.

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