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Big Data, Little Alpha?

The increasing power of Artificial Intelligence (AI) has opened up exciting possibilities for investment managers to discover alpha, but it is hard to know which road to go down.

One option is not to invest with AI, but simply to invest in AI. Many funds have chosen AI, or particular provinces of this, as an investment theme, in much the same way as some funds have long invested in broad motifs such as water, health, and the environment. There is some sense in this – up to a point. AI is going to become increasingly important in every walk of life. It is clearly a long-term trend rather than a fad.

But the trouble with this investment theme is that everyone agrees on the great and growing importance of AI. As a result, most companies with expertise in it are trading at extremely high multiples, such as price-to-earnings, price-to-book, and so on. Largely because of this, many AI-related stocks are already among the most valuable companies in the world, so AI-themed funds tend to have large holdings of various household names. Typically, the largest holdings of such funds tend to be companies such as Alphabet (formerly known as Google), Facebook and Netflix. These companies are hardly undiscovered jewels of the equity markets.

Even US equity index funds tend to have huge holdings in AI-related stocks. For example, for much of the recent past the four largest holdings in State Street Global Advisors' SPDR S&P 500 fund, the largest ETF in the world by assets under management, have all been businesses centred on AI: Apple, Microsoft, Amazon and Facebook.

In other words, there is little opportunity to discover 'alpha', the extra return of an investment above the benchmark return. Remember the old adage of investing: when everyone is bullish on a particular asset, it is time to head for the exit, because there is no value left.

Big data techniques

A more innovative AI approach is to use 'big data' techniques – ways of capturing, storing and assessing huge slabs of data of many different kinds – to evaluate corporate performance. In

particular, advances in big data capabilities make it realistic for the first time to analyse 'alternative data'. This is any data used to make investment decisions, outside traditional information sources such as corporate reports, press releases and economic statistics. This alternative data is often 'unstructured'. This means that it does not come in a predefined form, like numbers on a spreadsheet. Unstructured information includes social media feeds, digital pictures and videos.

It was, until recently, hard and in many cases impossible to crunch this alternative data, in the scale needed to squeeze any meaning out of it. However, recent advances in big data techniques have made it practical for specialist firms to do this for investment managers. These firms take data, clean it up and sell it in digestible form to investors, often on an exclusive basis. AI is not embedded in the investment process, but information discovered through the use of AI informs investment decisions.

As an example of how techniques have advanced, machines have become much better at Natural Language Processing (NLP). This is the capacity for software to understand the meaning of human conversation, with all its incompleteness and vagueness – a much harder challenge than processing numbers or simple 'yes' or 'no' responses. NLP is useful, for example, in taking talk about a particular company's products on Facebook and assessing it to gauge overall consumer sentiment. Armed with this information, an investor might have better knowledge of how a clothes retailer's summer range has done before the latest official earnings reveal it. Used well, alternative data can probably add as much as a couple of percent to returns, by giving investors access to information before anyone else. Hedge funds certainly think that it can discover alpha for them, so they are investing heavily in buying alternative data. Opimas, a consultancy, estimates that investors are spending about US\$5 billion a year on it – quite a lot for an investment technique whose efficacy is unproven.

Alternative data: not consistently useful

A criticism sometimes levelled at applying big data techniques to alternative data in the search for alpha is that it does not always show anything meaningful about the asset it is being used to monitor. Critics say that it is like the rubbish from celebrities' bins that unscrupulous media outlets sometimes sift through. It might occasionally yield up something juicy about the private life that

can be turned into a story, but most of the time it does not produce anything very interesting. It can even, they say, mislead. For example, satellite imaging may show a lot of shoppers driving into the car parks of a particular retailer. But sales per customer visit may be lower: it's very possible that they're going in, finding what's on offer disappointing, and getting back into the car with much less than they did the same time last year.

This comparison made by critics is apt in another way: just as with digging through other people's trash, there are potentially serious legal problems to buying this data, particularly given the heightened concern about privacy. Investors may wonder if the hope of achieving this small and uncertain edge is worth the legal and reputational risk, as they ponder the implications of the recent scandal involving Facebook and Cambridge Analytica. They were already nervous about the whole concept of data from unconventional sources after the dozens of prosecutions of hedge fund employees in recent years using information from 'expert-network' businesses.

Even if legal concerns about big data manipulation of alternative data prove unfounded, many investors will still be dissatisfied with a strategy for gaining competitive advantage that is so unsystematic and unreliable. Experts on hedge funds say that even the funds that do use it certainly do not depend on it.

It is in any case unnecessary to rely on it, because applying AI to conventional data can be so productive. This is not the case for regular analysts who cover a limited number of stocks – they already know everything on the companies they cover that it's possible to know through conventional means. They can keep tabs, for each of these stocks, on every single quarterly report, earnings update, upgrade and downgrade by other analysts, and so on. However, this is much harder for funds that are not sector-specific. Can any team of analysts manage this for every company in the market? No. Can they dig back beyond the past few months to the past 20 years for every single listed business? Even more unlikely. Can they do this all in about a day? Utterly impossible.

Placing machine learning at the centre of investment

AI can, however, manage all of this. Doing so involves machine learning: using software to find relationships between variables in the past, in order to provide a guide to the future. It's called machine learning because the software learns: it automatically gets better at this, through experience, with limited or no human intervention. With this technology, autonomous cars grow progressively better at anticipating danger, for example.

This processing advantage creates an intellectual advantage. Machine learning can make mental leaps to establish connections between seemingly unconnected data, to enable its users to detect what is going on in the market as a whole before other investors gain an inkling. It can, for example, act as the robot canary in the

coal mine, able to see build-ups in explosive material before the explosion happens. This is at odds with a misconceived criticism often made about investing techniques using AI: that these techniques are bad at predicting 'black swan' events. Named after the black swans discovered in Australia by surprised Europeans, used to seeing only white ones, in the 18th century, the term refers to events such as the 2008 financial crisis that are rare and difficult to predict, but which change markets immensely.

This approach of applying machine learning to conventional data also places machine learning at the centre of investment, in contrast to using alternative data, which consigns machine learning to the periphery. Machine learning becomes the main way of shaping investments. This makes it much more ambitious. Only a small number of investment managers employ machine learning in this innovative way, although the number is growing. The Eurekahedge AI Hedge Fund Index has 17 funds. All of them, in the words of Eurekahedge, "utilise artificial intelligence and machine learning theory in their trading processes". However, many are likely to call it into action primarily or exclusively for very short-term trading, often as part of long-short strategies.

Machine learning and multifactor investing

This raises the question of what the best use of machine learning might be, for investors interested in long-term strategies. Perhaps the best candidate for such a strategy that can gain from machine learning is dynamic multifactor investing, where the weightings assigned to different factors are changed over time in response to market signals.

Dynamic multifactor investing builds on the successes of static multifactor investing (otherwise known as 'smart beta'), where the weightings remain the same, but it seeks to address the pitfalls of a static approach. Figures from MSCI show that over the past two decades, multifactor indices have outperformed global stock markets as a whole by almost 5%¹. These take a number of commonly found characteristics, or 'factor premia' such as Value, Quality, Momentum, Small Size and Low Volatility, of stocks that tend to outperform the market in the long term, and select a portfolio of securities that have a combination of these characteristics. But multifactor indices could have outperformed by even more if they had temporarily shorted particular factors and increased long positions in other factors at particular times. The most obvious example is the credit crunch years, when the Value and Small Size factors did very badly. This even wrong-footed many investment icons who had performed outstandingly in previous times.

It's all very easy to say that in theory switching between different factors could have generated much better returns. The real issue is whether this can be done in practice. There is a plethora of different signals that a manager could respond to, when deciding whether and how to switch, and most of them are false.

¹ MSCI and Aberdeen Standard Investments, February 2018

The machine learning program has to be designed so that it does not behave like a car alarm so sensitive that it constantly goes off in response to the slightest stimulus. It must not be like the economist who, as the old joke goes, has a wonderful record: he has predicted eight recessions out of the last three. Good investors remember the saying that that bull markets climb a wall of worry: there is always something to fret about but sometimes these concerns have to be discounted.

Machine learning provides a way forward. It can be excellent at detecting signals that the market is on the cusp of change. It can also, crucially, be trained to grow progressively better at detecting genuine signals of change and discounting false ones. This is because it can analyse much more than humans can, and much faster. This allows it to dig far back into the past, in minute detail, in search of parallels with what is going on in the present.

For example, if machine learning finds that the Value factor did badly in 2007, 2010 and 2015, it can delve down to find common characteristics to markets just before Value started to slide. When these characteristics appear in present-day markets, they can be taken as genuine signals that Value is about to become less attractive.

In doing this work, machine learning can excavate far more deeply and widely than human intelligence. If human intelligence is like a man with a spade, machine learning is like a huge mechanical digger – and even the heftiest man with the biggest shovel can't compete with that.

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