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MAGAZINE

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THE UK'S NO.1 FREE INVESTMENT PUBLICATION

RENEWABLE ENERGY

HOW TO POSITION YOUR PORTFOLIO FOR A NEW INVESTMENT CLIMATE

PLUS...

AUBREY DE GREY

ANTI-AGEING INSIGHTS FROM THE JUVENESCENCE POSTER-CHILD

ARTIFICIAL INTELLIGENCE

ARMAGEDDON OR OPPORTUNITY?

RECESSION WARNING?

DOES A FLATTENING YIELD CURVE SPELL TROUBLE AHEAD?

BLOODBATH FOR THE LIRA

THE STORY BEHIND TURKEY'S COLLAPSING CURRENCY

WELCOME

Dear Reader,

Welcome to the September issue of Master Investor Magazine. This month's cover theme is renewable energy, which has a somewhat mixed reputation among investors. In the past, the sector has been at the mercy of the vagaries of government legislation, which has led to a somewhat turbulent reputation. While that situation still pertains to some extent, the consensus that has coalesced around the climate change issue means that renewables are now here to stay, and they can play a useful role in portfolio diversification.

The global renewable energy sector is large and growing. It has been estimated by Allied Market Research (2018) that the global renewable energy market will grow at a CAGR (compound annual growth rate) of 4.9% between 2017 and 2025. A significant driver of the renewables market is the worldwide demand to move away from conventional fossil fuels, such as gasoline and diesel. At the same time, advancements in technology have increased the viability of using renewable sources to produce energy more efficiently.

The most obvious way to invest in the renewables sector is through one of the renewables infrastructure trusts, which are covered extensively in Nick Sudbury's article on page 24. Further to that, I gain an insight into the current state of the sector from Chris Holmes, fund manager at John Laing Environmental Assets, on page 14. However, those of a more adventurous persuasion may wish to investigate the opportunities on offer from individual situations, such as PowerHouse Energy (page 18) and Prem Biomass (page 30).

If renewables aren't your cup of tea, not to worry – there's plenty more on offer in this month's issue. One article that is certainly not to be missed is Aubrey de Grey's piece on the nascent rejuvenation sector (page 10). Being the poster-child for the anti-ageing industry, Aubrey offers some incredible insights into the sector that Jim Mellon has called "the biggest money fountain I've ever seen".

Whatever your investing persuasion, I'm sure you'll find something to pique your interest in this month's issue of Master Investor Magazine.

Best regards,

James Faulkner
Editor

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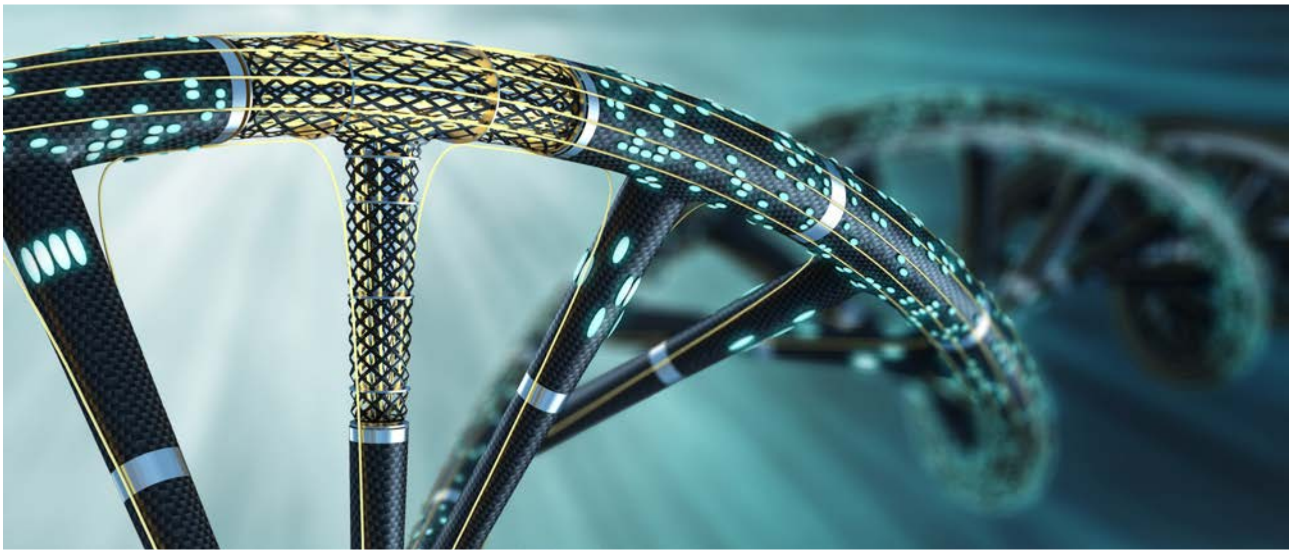
BY JIM MELLON

MELLON ON THE MARKETS

Just this minute, I have finished editing the second edition of Juvenescence; the first one came out about a year ago and already so much has changed in the field that we have had to do multiple revisions.

There is real progress, and some companies involved in the longevity space are now coming public; notably, **Unity Biotechnology (NASDAQ:UBX)** – a leader in senolytic drugs – and **Restorbio (NASDAQ:TORC)** – a company involved in boosting the ageing immune system – have listed in the US. In the private arena, huge amounts of money are now being mobilised to expand human healthy lifespan, and one such beneficiary is our own Juvenescence Ltd., which has so far raised $63 million since it started less than ten months ago. Juvenescence will shortly embark on its Series B, in order to fund its expanding list of exciting subsidiaries.

In the meantime, most markets are either in bear territory or treading water, and even the US market, while marking new highs, is showing signs of exhaustion. The US has so significantly outperformed European and Emerging markets that it is surely time for a reversal in roles. The recent weakness in the US dollar might presage a rotation back into emerging markets, as a strong dollar is decidedly bad for countries which have government and/or corporate sectors which have heavy US dollar denominated borrowings. But, worldwide, this bull market is very long in the tooth, and the economic growth and financial engineering which has characterised its latest stages has been accomplished on a sea of easy money which is coming to an end.



"JUVENESCENCE WILL SHORTLY EMBARK ON ITS SERIES B, IN ORDER TO FUND ITS EXPANDING LIST OF EXCITING SUBSIDIARIES."

Playing the rotation game

I remember as a young fund manager playing the sectoral rotation game; that is, when one sector looks a bit expensive (think tech today) you move into something that appears to be cheaper (think oil majors). This can work, but not forever; one day, the whole damn shooting match comes tumbling down, with the good girls going down with the bad. We are close to that point now, with just too many macroeconomic factors, not to mention the geopolitical stuff that assaults us every morning, to warrant getting overly bullish on anything.

Oh, except maybe gold and silver, where shorts are at all time record highs, just as inflation is beginning to take off – a classic moment for bottom fishers and smart money to start piling on positions. Yes, so though I have been painfully long on precious metals so far this year, I am holding firm. When they start to move, they go up rocket style.

Evil Knievil of this parish has written about **Tesla (NASDAQ:TSLA)** and its erratic CEO. I suppose there is a chance that **Apple (NASDAQ:AAPL)** or **Alphabet (NASDAQ:GOOGL)** buys Tesla, but if I were them I would just wait for the company to go bust. It owes suppliers $3 billion, has been extending payments, and has debts maturing – all classic warning symptoms of impending doom. The cult surrounding the great man has kept the stock levitated (recall that Tesla is still worth more than Ford), despite aggressive short positions. On balance, I remain sceptical about this company, and would remain short. The SEC is also taking a keen interest in the Tweetgate storm caused by Elon, and presumably they will not reflect that in a benign lack of action.

Nadezda Murmakova / Shutterstock.com

In similar mode, the weight of evidence against **Facebook (NASDAQ:FB)** as an investible stock is rising; this platform for timewasters and imbeciles is coming under concerted attack from just about everyone, and while WhatsApp and Instagram are viable businesses, they are as nothing compared to the main site, which is undoubtedly losing momentum. I would institute shorts here, in modest size, and ride the wave down.

Bullish options

One thing I like to do is to write bullish options (i.e. selling puts) against stocks that have decent dividend yields where the dividend is sustainable. This normally works, but sometimes you get caught with a company, seemingly without problems, that ends up having


Kaspars Grinvalds / Shutterstock.com

"MRS MAY, DESPITE ALL THE CRITICISM LEVELLED AT HER, HAS DONE A PRETTY GOOD JOB OF NAVIGATING WHAT MUST SEEM LIKE A CRAZY GOLF COURSE TO HER."

to cut the dividend due to unforeseen circumstances.

One such example is **Bayer (ETR:BAYN)**, which having just acquired Monsanto for $60 billion, ended up with a negative judgement on Round Up, its ubiquitous weed killer, which was deemed to have caused a US gentleman to suffer from a terminal cancer. The damages awarded – nearly $300 million – will no doubt be reduced, but there are many thousands of people lining-up with similar lawsuits. A really good, stable business could be severely damaged by a black swan (think **BP (LON:BP.)** a few years ago with the blow-up of the Macondo well). That's why 'obviously' cheap stocks aren't always what they seem, and diversification remains of extreme importance.

On a bullish note, I would actually tuck some Restorbio away in the long-term longevity portfolio. It spiked on good results for its Phase 2 trial in boosting the immune system in elderly patients and has since come down. It has plenty of cash and is well run. I think you can buy this and leave it for five years or until it gets taken over. I also agree with Evil that **M&S (LON:MKS)** in the UK is probably a buy, based on Archie Norman's presence and also on its substantial property backing. Archie has a really good record in shareholder returns and I would back him.

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Caution is the watchword

For the moment, however, caution is the watchword. We are becoming more liquid, and cash holdings should probably be held in sterling at this point, though the Japanese yen is also attractive. Sterling seems attractive as the risk of a no deal Brexit is low. Mrs May, despite all the criticism levelled at her, has done a pretty good job of navigating what must seem like a crazy golf course to her. No one really wants a UK crash out, no one (with the possible exception of Jeremy Corbyn) wants a fresh election, and common sense is likely to prevail.

I don't know what the shape of a deal will look like, but sterling is pricing in some pretty bad stuff, especially at a time when government finances are looking up and UK economic growth is reasonable. Expect a deal outline by October.

Do not expect Donald Trump to be indicted or impeached; also don't expect a rout at the midterms. It's not going to happen. But what might happen is that Trump overplays his hand with the Chinese and the incipient trade war becomes something much, much worse.

In those conditions, surely there is a pot of gold at the end of the rainbow?!

Happy Hunting!

Jim Mellon

About Jim

Jim is an entrepreneur with a flair for identifying emerging global trends enabling him to build a worldwide business empire. He is amongst the top 10% in the "Sunday Times Rich List" (Britain's equivalent to the Forbes list). He is often described as the British Warren Buffett and he predicted the Credit Crunch of 2007-08 in a book entitled *Wake Up! Survive and Prosper in the Coming Economic Turmoil*. Jim followed this with *The Top 10 Investments for the Next 10 Years* (2008) and subsequently *Cracking the Code* (2012), *Fast Forward* (2014) and, most recently, *Juvenescence* (2017). His monthly "Mellon on the Markets" column in Master Investor Magazine has gained him cult status among investors. He holds a master's degree in Politics, Philosophy and Economics from Oxford University. He is on the Board of Trustees of the Buck Institute in California, a trustee of the Biogerontology Institute, and a Fellow of Oriel College, Oxford.

BY AUBREY DE GREY

REJUVENATION BIOTECHNOLOGY

AT LAST, IT'S A GENUINE INDUSTRY, NOT JUST A MOVEMENT

Eighteen long years ago, in the middle of the night in a hotel in Los Angeles, I had a Eureka moment. I realised that the most practical way to overcome ageing with medicine is by comprehensive preventative maintenance – in a single word, rejuvenation.

Just like simple man-made machines, living organisms damage themselves throughout life as intrinsic side-effects of their normal operation, and they are only built to tolerate a certain amount of that progressively accumulating damage, so, eventually, their ability to function diminishes and finally ceases entirely. Hence, just as we periodically remove rust and such like from cars before the doors fall off, we should be repairing that damage in our bodies before it reaches pathogenic levels. Sounds like common sense, doesn't it? – and indeed it is, once you see it – but, like so many eventually obvious ideas, it was very counterintuitive to most people (including most academics who studied ageing) back then. The dominant school of thought, instead, was that all we would ever be able to do was slow down the rate at which the body generates that damage.

But some people got it. In only a couple of years, I was able to nucleate a community around the rejuvenation concept that consisted of enough scientists, enthusiasts and everyone in between to enable the creation of an organisation – the Methuselah Foundation – that took on the task of spearheading the promotion and eventual implementation of this vision. Over the following decade or more, the movement grew in numbers and also made great progress in the laboratory, with all the most challenging aspects of the research programme seeing advances that merited publication in the most high-profile peer-reviewed scientific journals.

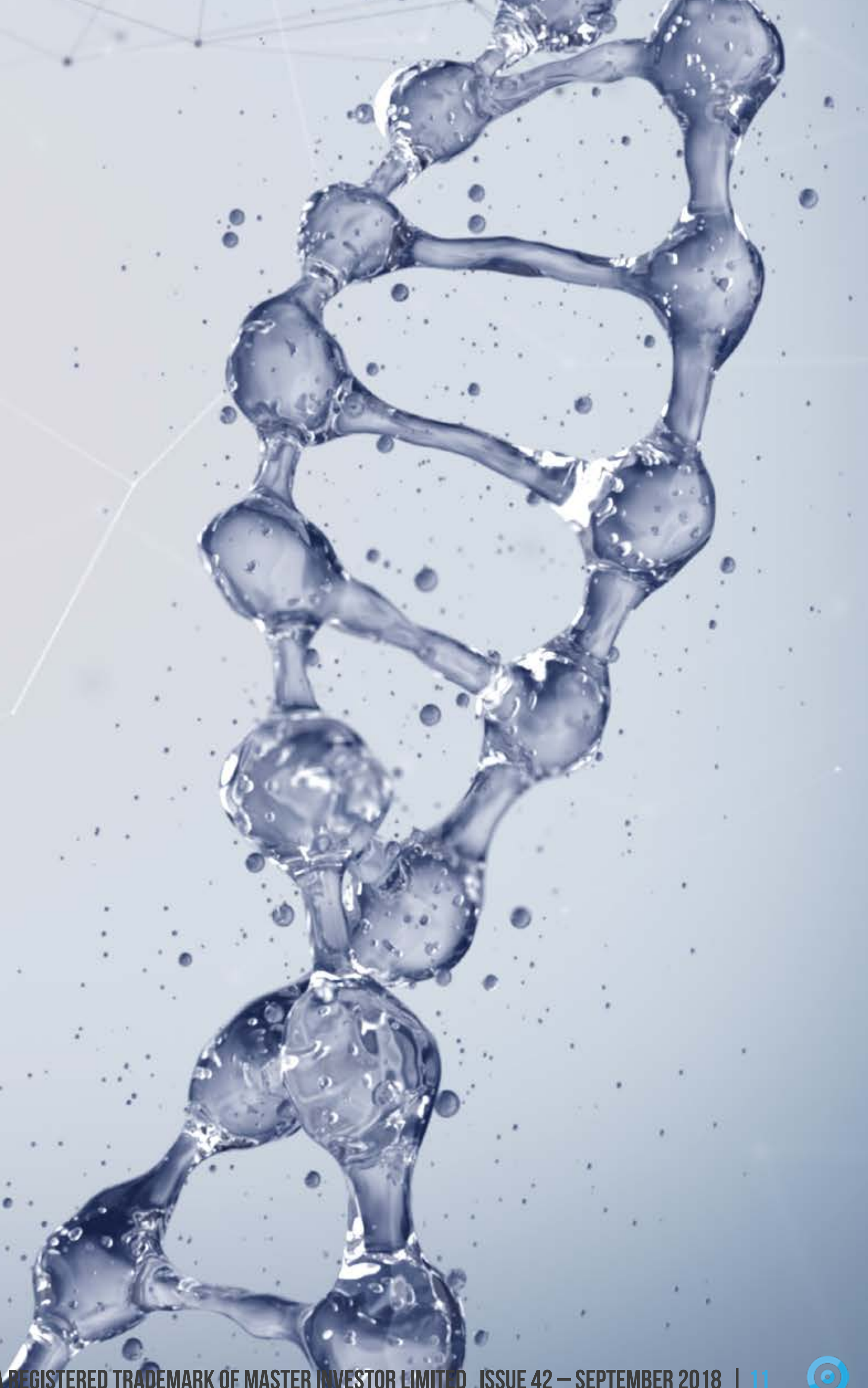
> **"THE PROVERBIAL TRAIN IS LEAVING THE STATION, AND I WANT YOU TO BE ON IT."**

Sounds great, doesn't it? But circa 2014, it wasn't looking very great at all. Progress wasn't exactly slowing down, but it didn't seem to be speeding up either, and the biggest-ticket supporters of our cause were exhibiting clear "donor fatigue". Were we about to enter a "winter" for rejuvenation biotech, akin to what happened with artificial intelligence in the 1970s?

The first signs that we might turn the corner were, of course, open to interpretation. One was the creation of the first-ever longevity-focused venture fund by the amazing Laura Deming, who had shot to Bay area fame only a few years earlier as the youngest of the first crop of exceptional teenagers that Peter Thiel tempted out of university to follow their dreams. That sounds like a big deal until you discover that the total capitalisation of the fund was, wait for it, $4 million. Another was the first-ever creation of a company, Cenexys, based around the application of a key type of damage repair to ageing; their seed round was in fact co-led by Deming. Again, a big deal – until you notice that the scientific findings on which the company were based were insanely preliminary, giving real cause for apprehension (at least for those who did not know how smart the scientists involved, and of course Deming herself, actually are) that this could be just a hype-driven, premature bubble. In that period, I used my high public profile to the maximum in the attempt to maintain this embryonic momentum, but I didn't really dare to dream that we were seeing what Churchill, in what may ultimately be seen as a genuinely comparable circumstance, once called "the end of the beginning".

Now it is 2018 – just four years on. And what years they have been. Cenexys, since renamed Unity, has raised hundreds of millions of dollars. Dozens of other startups now exist in the rejuvenation biotech space, with technologies spanning all of the "seven deadly things" – the categories into which I classified the damage of ageing way back when, and which remain a valid and highly useful taxonomy today. I myself, while retaining my primary affiliation as chief science officer of SENS Research Foundation, have taken a part-time VP role under the true pioneer of private-sector rejuvenation biotech, Mike West, whose focus on ageing had been forced rather undercover for some years, but is now back in the public eye with a vengeance in the form of AgeX. SENS Research Foundation has so far spun out five projects as separate startups and will continue to do so, playing the vital role of "bridger" of the Valley of Death for early-stage work that needs small, but significant funding to reach an investable level of proof of concept.

And then there came Juvenescence. Jim Mellon has, as you all know, been a highly successful investor for many years, and once his friend (and successful biotech entrepreneur) Greg Bailey got him interested in ageing as the next big thing, they haven't put a foot wrong. The first right thing they did, of course, was to get in touch with me! But it's one thing to listen to what I can tell you about ageing and how it can be defeated; it's quite another thing to *hear* what I say. And they certainly have. Thus far, Juvenescence has already invested tens of millions in a variety of anti-ageing initiatives, and their focus has been exactly where mine would have been. The impact, in



"IT REALLY DOESN'T TAKE MUCH IMAGINATION TO FIGURE OUT HOW BIG AN ANTI-AGEING INDUSTRY WOULD BE THAT WAS BASED ON PRODUCTS THAT *DO* WORK."

terms of hastening the date at which the damage repair paradigm will reach the level of comprehensiveness that can legitimately be called the defeat of ageing, will be huge.

And, of course, the money to be made will be huge too. In giving people a sense of what to expect, my simplest approach is to draw attention to today's anti-ageing industry. Look at it – it is vast – depending on how you define it, it can be put in the hundreds of billions of dollars. And that's for an industry *based entirely on products that pretty much don't work!* It really doesn't take much imagination to figure out how big an anti-ageing industry would be that was based on products that *do* work. And we, right now, are at the beginning of the process of turning that "would" into a "will".

What does this mean for investors today? Well, for a start, you're making a good first step by reading what Jim Mellon and his colleagues have to say; I believe that he contributes every bit as much to society by the advice he gives other investors, through outlets such as this, as he does by his own investments.

The other huge thing it means is that the faster a new industry grows, and the bigger it can be forecast to grow, the more merit there is in getting in early. Clearly, there are many considerations that determine a given investor's choice of location on the risk/reward spectrum – but that spectrum is shifted in one industry relative to another, and the argument for being an angel or a seed investor in rejuvenation biotech may be stronger than in any other industry ever. As a measure of this, I am gratified to note that most of the groundbreaking investors in this space, Jim included, are also making substantial, purely philanthropic donations to SENS Research Foundation. (In this regard I will particularly highlight the pioneering German web entrepreneur Michael Greve, who is donating the same amount that he is investing.) Why? Not only for philanthropic reasons, but because what you gain by donating is access to the research that we are still guiding across the valley of death, which is the key thing you need if you want the chance to be the founding investor (and the biggest ultimate winner) once we get it there. The earliest-stage work is the least expensive to perform, but without it there won't be a next stage to invest in, and everyone, investors included, loses out.

In conclusion, let me offer the following personal perspective. As my appearance betrays, I am not a money guy – I am about as unmaterialistic as they come – so in order to spearhead this phase of the anti-ageing crusade I have surrounded myself with those to whom business comes naturally. But it takes two to tango; I would not have been able to do that if I had been delusional about the underlying technology, because I would have been found out. Increasingly, month by month, more and more investors and businesspeople with the absolute highest level of credentials are making the decision that rejuvenation biotech really is the next big thing. Now is your chance to become one of them. The proverbial train is leaving the station, and I want you to be on it.

Aubrey de Grey

Dr. Aubrey de Grey is a biomedical gerontologist based in Mountain View, California, USA, and is the Chief Science Officer of SENS Research Foundation, a California-based 501(c)(3) biomedical research charity that performs and funds laboratory research dedicated to combating the ageing process. He is also VP of New Technology Discovery at AgeX Therapeutics, a biotechnology startup developing new therapies in the field of biomedical gerontology. In addition, he is Editor-in-Chief of Rejuvenation Research, the world's highest-impact peer-reviewed journal focused on intervention in ageing. He received his BA in computer science and Ph.D. in biology from the University of Cambridge.

His research interests encompass the characterisation of all the types of self-inflicted cellular and molecular damage that constitute mammalian ageing and the design of interventions to repair and/or obviate that damage. Dr. de Grey is a Fellow of both the Gerontological Society of America and the American Aging Association, and sits on the editorial and scientific advisory boards of numerous journals and organisations. He is a highly sought-after speaker who gives 40-50 invited talks per year at scientific conferences, universities, companies in areas ranging from pharma to life insurance, and to the public.

BY JAMES FAULKNER

SHARPE MINDS

THE CLIMATE IS RIGHT FOR RENEWABLES

AN INTERVIEW WITH CHRIS HOLMES OF JOHN LAING ENVIRONMENTAL ASSETS GROUP

John Laing Environmental Assets (LON:JLEN) is one of a small but growing band of investment trusts seeking out investment opportunities in the renewables infrastructure sector. James Faulkner caught up with investment manager Chris Holmes to get a better understanding of the attractions of this nascent sub-sector.

James Faulkner: Thank you for taking the time to speak with Master Investor. To begin, please give our readers a brief summary of JLEN and its investment objectives.

Chris Holmes: *JLEN is targeting a net IRR of 7.5 to 8.5% on the IPO issue price of its shares over the long-term, and aims to issue a long-term sustainable dividend, paid quarterly, that increases in line with inflation and to preserve the capital value of its portfolio by reinvesting cash flows not reserved for dividends.*

JLEN's investment policy is to invest in environmental infrastructure projects that have the benefit of long term, predictable, wholly or partially inflation linked cash flows supported by long term contracts or stable regulatory frameworks.

JF: Until recently, the infrastructure space had been heavily over-bought by investors hungry for inflation-linked income in the face of low interest rates. However, the renewables infrastructure sub-sector appears to be relatively overlooked, with the typical premium to net assets in the single digits as opposed to the double-digits premiums exhibited in the general infrastructure space. How would you describe the sub-sector's attractions to potential investors?

CH: *The general infrastructure sector is heavily over-bought, in our opinion, and those investors that have the ability to diversify into renewables have found not only a new sector, but also new sub-sectors with compelling characteristics.*

Amongst other things, renewables typically have subsidy support, which is normally inflation-linked. As such, investors can enjoy an inflation-linked income, whilst benefiting from diverse revenue streams.

The UK renewables sector is strongly supported by the UK government, and we have seen huge growth in areas such as onshore and offshore wind and solar. While subsidy support is starting to reduce in these sectors, as equipment costs have fallen dramatically, the government remains committed to its overall renewable energy targets and continues to provide support for sectors like anaerobic digestion (AD) through other tariffs. As a result, certain renewable sectors are still showing promising growth potential.

JF: The Labour party has promised to bring PFI contracts back "in-house" if they win the next general election – an announcement that sent the share prices of the infrastructure funds reeling. How would such a move impact JLEN?

CH: *The PFI/PPP element of our portfolio is relatively small, unlike some general infrastructure funds, and we are comfort-*

“THOSE INVESTORS THAT HAVE THE ABILITY TO DIVERSIFY INTO RENEWABLES HAVE FOUND NOT ONLY A NEW SECTOR, BUT ALSO NEW SUB-SECTORS WITH COMPELLING CHARACTERISTICS.”

able with the protections we have under our contracts. In addition, JLEN's portfolio of renewable assets is well-diversified, covering wind, solar and AD.

JF: Unlike other renewables infrastructure trusts, you have a large portion of your portfolio invested in waste and water management. How do the investment characteristics of this arena stack up against the other renewables in the portfolio?

CH: *We have a small number of investments in water and waste management. They are exposed to different market dynamics to generate their returns which provide useful diversification across our portfolio, and they are backed by strong, stable contractual payment mechanisms under their PFI contracts.*

JF: The wind and solar spaces must be pretty crowded by now. How hard is it to secure attractive wind and solar assets at the right prices?

CH: *We would agree that the wind and solar space is a competitive market and are mindful of returns we need to target for our investors. While we still expect to acquire some assets in these sectors, we have focused on other sectors of the renewable energy space, such as AD, which offer comparatively better returns against this crowded environment.*

JF: You recently raised £15.5 million in an institutional fundraising to invest in the biomass and anaerobic digestion space. What is it about this sub-sector that interests you the most as investors?

CH: *The factor which interests us the most about the AD space is that we think it moves the metrics in our fund in all the right directions around increasing diversification, increasing inflation-linkage, reducing our exposure to merchant power markets and reducing the leverage within the portfolio.*

JF: The recent investment into Vulcan Renewables represents your first investment in a construction

About Chris Holmes

Chris joined the Investment Adviser in January 2018. Prior to this, Chris was a Managing Director and Head of Waste & Bioenergy team at the Green Investment Group (formerly the UK Green Investment Bank plc) for four years. During his time at Green Investment Group, Chris was responsible for over £0.5 billion of investment across 18 assets in the waste and biomass sectors.

Before taking up his position at the Green Investment Bank plc, Chris was Head of Capital Markets in the Infrastructure and Renewables team at NIBC, also with responsibility for UK debt origination and advisory within these sectors. Chris was with NIBC for over 12 years, working on a number of waste and bioenergy transactions.

Chris has a BA in Business Economics from the University of Durham.

project. Does this introduce a new element of risk into the portfolio? What is the logic behind this move?

CH: *JLEN has always had the ability to invest into construction phase assets. It is important to recognise that Vulcan Renewables is an existing operational asset that we already own and, therefore, the additional risk associated with extension of the site, conducted by our business partner Future Biogas, is perfectly manageable. We are looking forward to a successful delivery and enhanced revenues once the Vulcan works are completed.*

JF: The geographic spread of the portfolio is currently limited to the UK and France. Given that a major risk for JLEN is regulatory and legislative risk, are there any plans to expand the portfolio into other jurisdictions?

CH: *Whilst our portfolio contains assets in the UK and France, we have a mandate to invest in projects that are located in OECD countries. As a result, we will always explore good investment opportunities in those safe jurisdictions, where they offer a compelling return relative to the risk. It is worth noting, though, that at least 50% of the JLEN portfolio (by value) will always be based in the UK.*

JF: How has the recent collapse and subsequent recovery of the oil price affected the demand for renewable energy and renewables assets?

CH: *Media and market attention around oil prices has put a new focus on renewables and long-term energy options. There is a concerted drive by governments, as seen with the Paris Climate Accords, to move away from fossil fuels and encourage more renewable assets. As such, we are still seeing strong regulatory support in the sector.*

JF: How have the recent changes to the Renewable Obligation and feed-in tariff schemes impacted the sector?

CH: *As an acquirer of primarily operational assets in the renewable energy sector, we are observing the trend of governments to gradually reduce the reliance on subsidies for development of new projects. However, those assets that we are currently acquiring which were built a number of years ago still receive strong subsidy support.*

JF: As investors in the renewables space, what's your take on the recent bout of extreme weather we've been subjected to? Are the authorities doing enough to reduce carbon emissions? How do you see the renewables space evolving in the future?

CH: *We are well-placed to manage changing weather conditions, and this summer has reinforced the benefits of having a diversified portfolio across wind, solar, waste and water management and AD. To give you an example, if wind generation is lower than previous years, but there is strong solar irradiation, then the returns generated across a balanced portfolio should offer greater stability than for one concentrated on a particular sector.*

"WE ARE STILL SEEING STRONG REGULATORY SUPPORT IN THE SECTOR."

About James

Our Editorial Director, James Faulkner, began investing in the stock market in his early teens. With over a decade of experience covering the stock market under his belt, he has also been a judge at the Small Cap Awards, and is an Associate of the Chartered Institute for Securities & Investment.

BY KEITH ALLAUN

POWERHOUSE ENERGY

TURNING A TSUNAMI OF PLASTIC POLLUTION INTO THE WORLD'S CLEANEST POWER

PowerHouse Energy Group Plc has pioneered a proprietary technology platform that enables its customers to extract pure hydrogen from the wave of plastic waste currently blighting the environment.

What are the following companies doing to which you should pay close attention?

Alstom, Audi, BMW Group, China Energy, Daimler AG, Great Wall Motor, Honda, Hyundai, Nippon Oil & Energy, Shell, Toyota Tsusho – among others.

Each is investing in hydrogen. Extensively.

In fact, each is an original member of the Hydrogen Council, formed in Davos, Switzerland, in 2017, for the express reason of accelerating the development of the "hydrogen economy." They've made a $10.7 billion... yes, billion... commitment to building out the necessary components of a functional, cost-effective, hydrogen ecosystem. To date, 39 major multi-national companies have joined the Hydrogen Council to help shape the future of energy.

Let's talk about hydrogen.

Hydrogen. The single most abundant element in the universe. A gas that when combusted generates water vapour. It's the substance that powers the sun. It's quite literally solar power! And it's considered by many to be the holy grail of energy and power production for the future.

It's believed that using hydrogen to fuel transportation can help reduce worldwide CO_2 emissions by more than 25% by 2050. Industrial transport. Public Transportation: trains, buses, ships, airplanes. And of course, our automobiles. Hydrogen, as a fuel, is being adopted by more and more companies every day. Walmart uses hydrogen to power its fork-lifts. Anheuser Busch has placed an order for 800 HGVs for its US operations. And Toyota is focusing on decarbonising the Port of Los Angeles to reduce diesel pollution and particulate matter in the air.

It's the most plentiful element in the universe. The entire universe. However, it's not found in 'deposits' or 'pools' or 'mines' here on Earth, and acquiring it in its purest form is a relatively expensive process. It's expensive economically and it's expensive environmentally. 95% of all hydrogen is derived from natural gas reforma-

About Keith Allaun

Keith Allaun has a background in alternative energy, venture capital and management consulting. Mr Allaun has worked with leading companies in emerging technologies for over 25 years. Educated at Stanford University in Palo Alto, CA, Mr Allaun possesses an extensive background in management and brings a wealth of results-driven experience to PowerHouse Energy Group. Mr Allaun has helped build or revitalize dozens of companies & organizations throughout his career including PowerHouse Energy, Apple, Yahoo, Amazon and Hewlett-Packard.

"IT'S BELIEVED THAT USING HYDROGEN TO FUEL TRANSPORTATION CAN HELP REDUCE WORLDWIDE CO_2 EMISSIONS BY MORE THAN 25% BY 2050."

tion. But the challenge is that between 12 and 16 tonnes of Carbon Dioxide is produced for every tonne of hydrogen generated from natural gas. Natural gas reformation is currently the only industrial scale producer of hydrogen on earth. But it's also a massive producer of greenhouse gases as an unfortunate by-product. Unless Carbon Capture and Sequestration (CCS) technologies catch up, large scale, low-carbon hydrogen is likely to be a pipedream – and in more ways than one.

POWERHOUSE ENERGY GROUP

"EACH YEAR, OVER EIGHT MILLION *MORE* TONNES OF PLASTIC FINDS ITS WAY INTO OUR RIVERS, STREAMS AND, ULTIMATELY, OUR OCEANS."

The least expensive method of transporting hydrogen is, of course, by pipeline. However, very few hydrogen pipelines exist, and they are extremely limited. One can't simply repurpose our standard natural gas or oil pipelines to accept hydrogen. Hydrogen degrades and embrittles the metal and, therefore, requires specialised pipelines. These are very expensive to install, and it will take decades to achieve an equivalent coverage to today's gas and oil pipelines. If we can make CCS work and install the necessary pipelines to transport hydrogen and capture carbon dioxide, then we'll be able to tap into the grid and have truly mass distributed hydrogen.

One of the biggest costs, both economically and environmentally, associated with hydrogen is the cost of distribution. Hydrogen is enormously expensive to transport and move from where it's produced to where it's needed and used. An entire lorry filled with industrial canisters of hydrogen – the entire forty-four-foot trailer – can only transport less than a single tonne of hydrogen. An empty three axel "tube trailer" and tractor for hydrogen transport weighs 37,500kg. That entire trailer only transports 321kg of hydrogen!

Ultimately, we'll likely get to fully distributed (meaning available at point of use), cost-effective, hydrogen. But, until then, we can't afford to let hydrogen lie dormant. It's the ultimate low-carbon fuel. It's the cleanest fuel on Earth!

But how do we get low carbon hydrogen where we need it?

How about electrolysis?

Separating pure hydrogen from water by using electricity seems like the ideal mechanism from which to derive hydrogen in a distributed manner. Many of us did so in school science experiments. But it's far from perfect. For the hydrogen to be truly "green", the electricity used in the process must come from "alternative sources." In other words, from solar, wind, or tidal electrical generation. The challenge is that there simply isn't enough alternative energy to power electrolysis to create green hydrogen. In fact, in reality, the CO_2 footprint that is ostensibly being replaced by the hydrogen produced under typical processes is simply being moved back to the electrical grid – where in the US, over 62% (UK: 51%) of electricity is still being created by burning coal and other fossil fuels. Less than one quarter of UK electricity is being generated by renewable sources. The "Renewable Target" for the UK is only 30% by 2020. So, while electrolysis is certainly a part of the equation to help build the hydrogen economy, it's not the panacea that some believe it to be.

Furthermore, the current cost of retail hydrogen is between £10-12 per kilo – several times the price of a litre of petrol or diesel.

When the price of hydrogen achieves parity with petrol or diesel, and ubiquitous environmentally-friendly electricity is universally available, then electrolysis can begin to have an impact.

Now let's talk about plastic...

Waste elimination, particularly for unrecyclable plastics and end-of-life tyres (two of the biggest challenges faced by the waste management sector), is also a major global challenge. In fact, as has been widely reported in the world's media over recent months, there is a tsunami of waste plastic that is growing ever larger in size as each day goes by.

An expedition by National Geographic last year discovered a previously unknown patch of floating and sub-surface plastic off the coast of Chile. That patch alone is estimated to be three times larger than the entire UK.

There are now six massive known "plastic patches" in gyres (areas where the ocean currents converge) in our oceans. The plastic problem has begun to kill marine life and cripple the oceanic ecosystem. And each year, over eight million *more* tonnes of plastic finds its way into our rivers, streams and, ultimately, our oceans.

Next year, even amid the calls to curtail single-use plastics, increase plastic recycling and stop this impending disaster, there will be more virgin plastic produced than the weight of every man, woman and child on our planet.

Plastic is here to stay. It's a "miracle product" in many ways. It has increased food safety and extended the shelf-life of many products. It is the basis of our mobile phones, our televisions, our computers. It allows hospitals to deliver oxygen and medication, and to literally save patients' lives. And yet, it's wreaking havoc on our environment.

But now there's a viable, efficient, and straight-forward solution to this conundrum. One which combines a commercially available technology that can reduce global plastic waste, and which enables the economically viable production of hydrogen.

PowerHouse Energy Group Plc has pioneered a proprietary technology platform that enables its customers to extract pure hydrogen from the wave of plastic pollution facing our world.

And it does so at a price on par with diesel or petrol!

Its technology, DMG® (a process centred on ultra-high temperature thermal conversion) creates EcoSynthesis Gas, from which a stream of 99.999% pure, road-fuel quality hydrogen can be derived, as well as a number of other useful chemical products.

And, critically, for hydrogen production, the DMG® technology generates *between 12 and 16 times less* CO_2, on a

"ACHIEVING THE ELIMINATION OF TONNES OF WASTE IN AN ENVIRONMENTALLY RESPONSIBLE AND COMMERCIALLY VIABLE BASIS ALLOWS US TO TURN OUR WASTE INTO A FRIEND RATHER THAN AN ENEMY."

If you'd like to learn more about PowerHouse Energy, they'll be presenting at our 'Investing into alternative energy' event on 11 October 2018.

[Sign up now for free](#) with our Early Bird Offer.

like-for-like comparison, to hydrogen that is generated from natural gas.

The other components of EcoSynthesis Gas, produced by customers utilising the DMG® technology platform, is that it can be used as chemical precursors for industry, or cleanly combusted to run highly efficient electrical generators for private usage, or for sale back to the National Grid. And the beauty is that the flexibility of the DMG® technology allows for the precise tuning of the EcoSynthesis output to be adjusted to meet individual customer requirements.

The DMG® technology platform is well positioned to address the issue of reducing waste, particularly plastic and end-of-use tyres, as it uses these and other wastes as the feedstock for producing EcoSynthesis Gas.

Achieving the elimination of tonnes of waste in an environmentally responsible and commercially viable basis allows us to turn our waste into a friend rather than an enemy.

Other attributes that underpin the power of the DMG® thermal conversion technology are its modular design, small footprint, and ease of operation. Many of the components around which the DMG® technology is based are already widely used, well established over many years, and technologically proven. PowerHouse has leveraged a unique integration of these components with the addition of some clever and compelling proprietary IP.

Requiring less than half an acre of land, a single DMG® thermal conversion powered module can process between 5 and 40 tonnes of waste plastic (a single lorry-full of plastic is approximately 25 tonnes). At its nominal operational size of 25 tonnes per day, it can produce – in a single day – enough hydrogen to fuel 40 to 50 lorries or buses for 300 miles each, *and* provide electricity to over 2,000 homes for 24 hours. All on a postage stamp size lot.

PowerHouse Energy's DMG® technology has been undergoing extensive testing and refining at the University of Chester, Thornton Science Park Energy Centre, where it was successfully integrated with the Energy Centre's micro-grid this year. The EcoSynthesis Gas produced by the Research Demonstrator has been independently analysed and its hydrogen component verified. The data acquired during the conversion of native plastics, mixed plastics, and tyre crumb has been fed into sophisticated engineering modelling software and the commercial design of the DMG® technology platform has completed the FEED (front-end engineering design) stage of development.

It hasn't been an easy journey...

But as the saying goes, "if it was easy, everyone would have done it!" PowerHouse has been engaged in over 18 years of technology exploration, research and development, extremely promising advances, and inevitably a few disappointing outcomes and delays along the way. But that is the path of nearly every disruptive technology. And, finally, DMG® has reached the technology readiness level necessary for it to start driving market adoption. The commercialisation process is now fully underway.

The next step is to build the first commercially operational system powered by the DMG® technology platform which will become a "show piece" and be used to demonstrate its efficacy and utility to future customers.

Having completed the FEED for the DMG® System, planning and permitting applications are under way, and PowerHouse is currently engaging with early-adopter, and potential reference customers, who have an interest in purchasing and putting the DMG® System to use at their own facilities. Additionally, PowerHouse is working with a number of project development partners around the globe to establish DMG® internationally.

The DMG® technology platform enables a customer, on an attractive commercial basis, to contribute to the elimination of plastic pollution while achieving something the Hydrogen Council, and the world at large, is aching for: *truly distributed hydrogen – produced where it's needed, at a cost that is the equivalent of petrol or diesel.*

The PowerHouse Energy Group's enabling DMG® technology is ready to deliver a means to help clean-up our environment while allowing its customers to capture the pure, clean, power of this most miraculous of elements – hydrogen.

A truly green company and a business that is underpinned by a regulatory environment that is only going to get tougher in regards of how plastic waste is disposed of in an environmentally friendly way, PowerHouse Energy's objective is to harness the true power of literally wasted resources by delivering the DMG® platform to be embedded within the consumer and industrial landscape.

High efficiency and low-carbon. Responsible, proven, environmental credentials. Economically compelling operations. These are the demands of the new world order – they command a social, political and commercial premium.

DMG® addresses these demanding criteria today, allowing PowerHouse to be poised to achieve broad and sustainable commercial adoption around the globe.

To learn more about PowerHouse Energy Group plc, go to: www.powerhouseenergy.net.

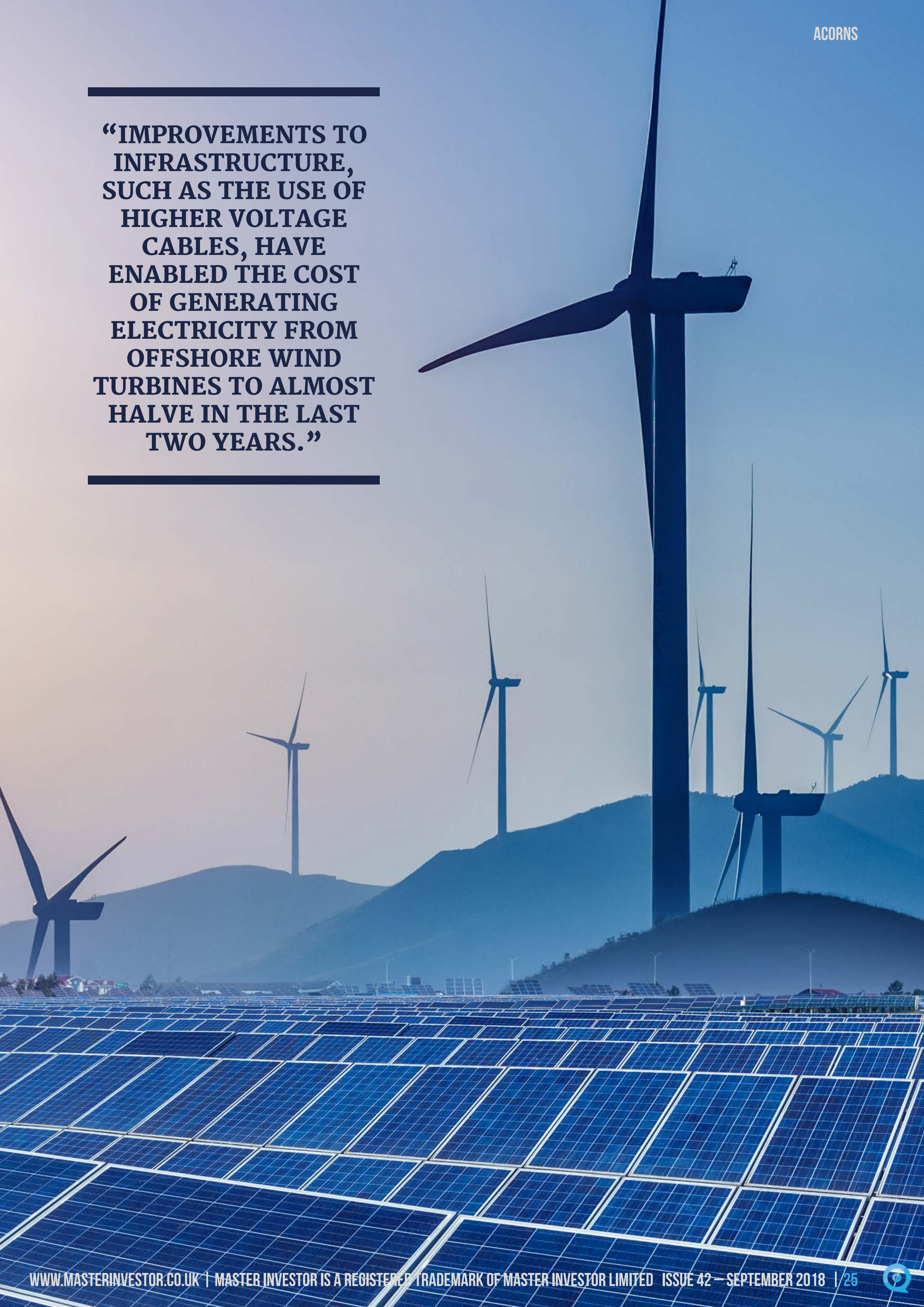
PowerHouse Energy Group Plc is listed on the AIM Market of the London Stock Exchange and trades under the ticker symbol: PHE.

BY NICK SUDBURY

FUNDS IN FOCUS

THE RENEWABLE ENERGY FUNDS GENERATING HIGH YIELDS

2017 was a momentous year for Britain's energy market, as it was the first time that the UK generated more electricity from lower-carbon resources like renewables and nuclear power than from gas and coal.



“IMPROVEMENTS TO INFRASTRUCTURE, SUCH AS THE USE OF HIGHER VOLTAGE CABLES, HAVE ENABLED THE COST OF GENERATING ELECTRICITY FROM OFFSHORE WIND TURBINES TO ALMOST HALVE IN THE LAST TWO YEARS.”

"THE INFRASTRUCTURE RENEWABLE ENERGY SECTOR NOW CONSISTS OF EIGHT DIFFERENT INVESTMENT COMPANIES. BETWEEN THEM THEY OWN TOTAL ASSETS WORTH £4.8 BILLION AND ARE GENERATING AN ATTRACTIVE AVERAGE DIVIDEND YIELD OF 5% PER ANNUM."

The move away from fossil fuels is being driven by the national Climate Change Act, which requires an 80% reduction in greenhouse gas pollution by 2050. It is also being helped by the reduction in the cost of generating wind and solar power.

Renewable energy projects used to require significant government subsidies to make them competitive, but that has now changed. Last year saw the creation of the UK's first subsidy-free solar farm, and improvements to infrastructure, such as the use of higher voltage cables, have enabled the cost of generating electricity from offshore wind turbines to almost halve in the last two years.

One of the main drawbacks with renewables is that the energy isn't always generated when it is needed, but the creation of new battery storage facilities might be a game changer. It is possible that these will make it viable to store the energy for future use so that it could be fed into the grid at times of peak demand.

The reduction in the cost of green energy and the growing demand for these alternative sources has led the Office for Budget Responsibility to forecast that £8.4 billion will be spent on renewable projects in the UK in 2020/21. This suggests that there will be plenty of new opportunities for investors with much of the capital being provided by specialist investment funds.

According to data from the analysts at Winterflood Securities, the Infrastructure Renewable Energy Sector now consists of eight different investment companies. Between them they own total assets worth £4.8 billion and are generating an attractive average dividend yield of 5% per annum. This has helped them to move to an average premium to Net Asset Value (NAV) of 7.8%.

Wind farms

The largest investment company in the sector is **Greencoat UK Wind (LON:UKW)**, with a market value of £1.4 billion. It has a 'buy' rating from the brokers Numis and Canaccord Genuity.

UKW provides investors with exposure to a diversified portfolio of UK wind farms, most of which are based onshore. The company has generated a strong performance record and has grown its NAV in real terms since its IPO in March 2013. It has also successfully increased its dividend in line with inflation each year.

Greencoat has consistently sought to boost its net generating capacity via new acquisitions, but during the six months to the end of June it finished 6% below its output target at 951 Gigawatt Hours (GWh), mainly due to lower wind speeds in May and June. This shortfall was largely offset by higher than expected wholesale electricity prices, so that the net cash generated was as budgeted.

The company pays a quarterly dividend of 1.69 pence per share, which represents a prospective yield of 5.3% per annum. Its overall objective is to increase the distributions in line with RPI inflation, while preserving capital on a real basis.

Greencoat continues to deliver solid returns and is one of the simpler funds in the sector to understand, with a straightforward business model and low gearing of 20%. Its consistent and well covered dividend has pushed the shares onto an expensive 11% premium to NAV, so it would be best to wait for some weakness in the share price before investing.

Solar

The other fund in the sector that is recommended by Numis is the £448 million **Bluefield Solar Income (LON:BSIF)**, which was launched in July 2013. It provides investors with exposure to a portfolio of 46 solar energy assets across the UK, with each site expected to generate stable, renewable energy over a 25-year asset life.

With funds like these, the key driver of their long-term returns are wholesale electricity prices. These can be quite volatile, so the investment managers will typically use Power Purchase Agreements (PPA) to fix the prices of some of their electricity output in advance to help ensure the sustainability of their near-term dividends.

In February, Bluefield Solar Income confirmed that it had power price visibility for over 73% of revenues for the period to December 2018. This provides a good level of transparency to investors, with the main remaining variable being the amount of solar power that the sites will actually generate.

BSIF is currently paying quarterly dividends of 1.8 pence per share, which gives the fund a prospective yield of 6.1%, one of the highest in the sector. It has delivered a decent performance since its IPO, and offers a transparent portfolio valuation, but this has resulted in the shares trading on an excessive premium of 12%.

It is a different story at the £639 million **Next Energy Solar Fund (LON:NESF)**, where the shares are available on a 5.7% discount. The weak rating is due to the dull recent returns following the slow deployment of the £126.5 million that was raised in June 2017. Recent announcements suggest that the pace of investment is finally picking up, although the high gearing might prompt another equity issue at some point in the next few months. The shares are currently yielding 5.8%.

FUND OF THE MONTH

The **Renewables Infrastructure Group (LON:TRIG)** is the second largest fund in the sector with a market value of £1.2 billion, and aims to provide investors with long-term, stable dividends, whilst preserving the capital value of its portfolio.

TRIG has acquired a diversified range of renewable energy infrastructure assets in the UK and Northern Europe, including onshore and offshore wind farms, solar farms and battery storage facilities that have a combined power generation capacity of 862MW, with a further 76MW under construction.

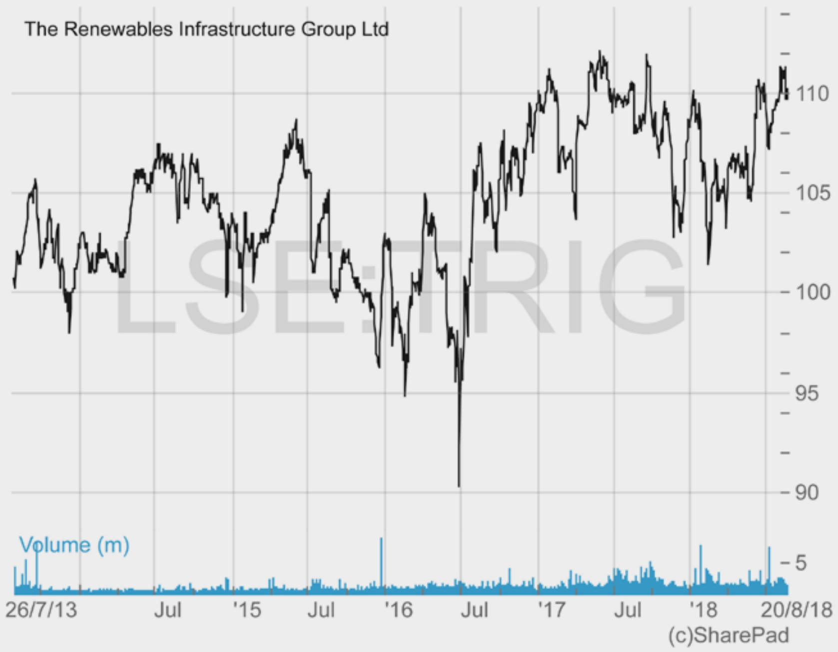
Portfolio performance during the six months to the end of June was mixed, with lower production on a like-for-like basis due to poor wind, offset by higher than expected power prices. This enabled the company to achieve a NAV total return of 4.7%, including the dividends.

Renewables Infrastructure is currently paying a quarterly dividend of 1.625 pence per share, which is comfortably covered by the net cash flow and gives it an attractive prospective yield of 5.8%. When it launched in July 2013, it intended to increase the dividend in-line with inflation, but falling power prices have forced it to abandon this link, although it will probably not be the last fund in the sector to have to do this.

"TRIG HAS DELIVERED IMPRESSIVE NAV TOTAL RETURNS OF 7.2% PER ANNUM SINCE ITS IPO AND RECENT ACQUISITIONS HAVE INCREASED THE PORTFOLIO'S RESILIENCE TO LOWER POWER PRICES."

TRIG has delivered impressive NAV total returns of 7.2% per annum since its IPO and recent acquisitions have increased the portfolio's resilience to lower power prices as the government subsidies – typical in Ireland and France, but rare in the UK − guarantee the price received for each unit of power generated.

The company has built up a diversified portfolio that should help to ensure consistent power generation and is big enough to benefit from economies of scale. It pays an attractive quarterly dividend, which is well covered by the cash flows. The shares are currently trading on a 4.9% premium to NAV.



Fund Facts

Name:	Renewables Infrastructure Group (LON:TRIG)
Type:	Investment Company
Sector:	Renewable Energy
Total Assets:	£1.2 billion
Launch Date:	July 2013
Current Yield:	5.8%
Project-Level Gearing:	36%
Ongoing Charges:	1.19%
Website:	www.trig-ltd.com

Other options

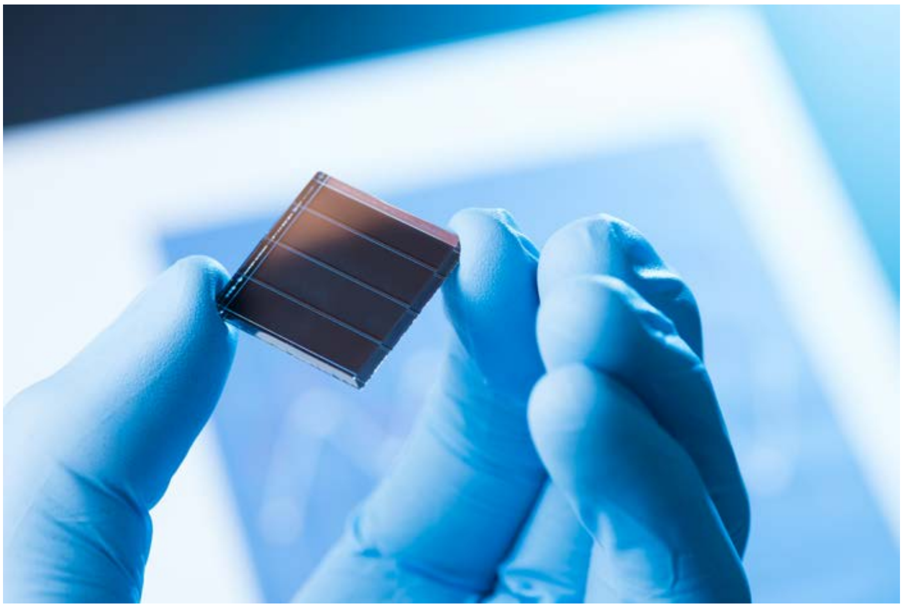
Greencoat Renewables (LON:GRP) raised €270 million when it floated on London's AIM market and on Ireland's ESM market last July. The company aims to provide investors with quarterly dividends, while growing the capital value of its portfolio, by investing in euro denominated electricity generation assets within the eurozone.

GRP owns five wind farms in the Republic of Ireland, and they have a combined capacity of 194MW, but it has recently announced a 12-month share issuance programme for up to 250 million shares that will enable it to expand. The new capital will allow the fund to take advantage of what it sees as an increasingly active secondary market for wind farms in Ireland, with the managers having identified a pipeline of assets of more than 200MW.

Greencoat Renewables is currently paying quarterly dividends of 1.5 cents per share, which gives the fund a prospective yield of 5.8%. It is trading on a 6.6% premium to NAV.

One of the main problems with solar and wind power is that the energy can't always be generated when it is most needed, hence the creation of the world's first listed energy storage fund, **Gore Street Energy Storage (LON:GSF)**. The intention was to raise £100 million of investment capital, but despite securing funding from two keystone investors it only managed to attract a total of £30.6 million when it listed in March.

GSF will invest in a diversified portfolio of utility scale energy storage projects primarily located in the UK, and it currently has two operational assets. It is targeting a dividend yield of 7% per annum as well as an element of capital growth, but it is too early to



tell whether or not it will achieve these ambitious targets.

Open-ended funds

There are also a handful of open-ended funds operating in the renewable energy sector, although they offer a different type of exposure than the investment companies. Rather than invest in illiquid assets such as wind farms and solar farms that cannot easily be sold to finance client redemptions, they hold shares in businesses involved in the industry.

The biggest of these funds is **BlackRock New Energy** that was launched in April 2001 and has assets under management of $1.1 billion. It is mandated to invest at least 70% of its portfolio in new energy companies, which are businesses that are engaged in alternative energy and energy technologies, including renewable energy technology, renewable developers, alternative fuels, energy efficiency and enabling energy and infrastructure.

BlackRock's largest holdings include the likes of renewable giants such as Enel, Kingspan, and Vestas Wind Systems, as well as more familiar names such as National Grid. Its performance has recently improved and over the last five years it has produced a reasonable annualised return of just under 7% per annum.

Another decent sized option is **Pictet Clean Energy**, which invests at least two-thirds of its total assets in the shares of companies that contribute to and benefit from the switch to lower-carbon energy sources. This gives it the freedom to invest in businesses operating in the field of cleaner infrastructures and resources, carbon reducing technologies and equipment, as well as the generation, transmission and distribution of cleaner energy and energy efficiency.

The managers have put together a relatively concentrated portfolio of 59 holdings, with the largest including the likes of Nxp Semiconductors, Aptiv plc, Applied Materials and Synopsys. Over the last five years, the fund has generated a cumulative return of 52.4%.

Amongst the ETFs operating in this area is the **Vontobel Fund – New Power**, which invests in companies that offer new technologies and innovative solutions that aim to achieve more efficient energy use and the use of alternative energy sources.

The fund was launched in December 2001 and is mainly invested in stocks that provide demand side energy savings, although there are also holdings in businesses involved in the efficient generation and transmission of energy, as well as companies operating in the wind and solar power industries.

It is a global fund with the largest positions including the likes of Nextera Energy, Synopsys, Schneider Electric and Roper Industries. Over the last five years, it has generated an annualised return of 6.2% per annum.

About Nick

Nick Sudbury is an experienced financial journalist who has written extensively for a range of investment publications aimed at both private and institutional investors. Before moving into journalism he worked both as a fund manager and as a consultant to the industry. He is a fully qualified accountant and has an MBA with finance specialism.

BY PREM BIOMASS

INTRODUCING PREM BIOMASS

SUSTAINABLE GROWTH WITH A SOCIAL CONSCIENCE

Prem Biomass was established to provide sustainable biofuel at low cost and generate bioelectricity while maintaining a role of social responsibility. Its founders, Bertil Petersson and Yatish Chouhan, have spent the past three years developing a network of contacts and associates with the aim to deliver a platform for a biomass business that can fill the growing demand in the global power industry.

Incorporated in Jersey, Prem Biomass Limited is advised by UHY Hacker Young LLP.

The business model is vertically integrated, providing electricity on a small-scale through modular power plants and using internal or locally sourced material. The electricity produced is targeted for countries in the developing world with an inadequate supply, in particular Sub Saharan Africa (SSA) and South East Asia (SEA).

The business will be established in specific phases, with the cash flow from the early stages being used to fund the later stages. Phase one involves producing and suppling biomass material – including wood chips or pellets and some for animal feed – while phase two is focused on producing power in selected regions through the construction of modular power plants.

The founders have spent the last twenty-four months putting in place opportunities within the biomass arena, and gaining access to local knowledge, contacts and expertise through strategic partnering. Utilising their regional experience and network, the founders have pre-sourced demand through the scoping of offtake agreements with energy suppliers and have had pre-contract discussions with government departments with a view of producing biomass feed and energy supply locally.

A globally replicable business model in a growing market

Prem Biomass has a globally replicable business model, offering an environmentally friendly, low cost self-generation energy source.

As of 2015, the value of the global energy consumption market reached $9.1 trillion, with the Asia Pacific (APAC) region representing the largest share of the market[i]. The compound annual growth rate (CAGR) for the global energy market was 5.2% between 2011 and 2015. Growth is expected to continue, at 6.1% in the APAC region, 0.6% in Europe and 1.8% in the US. Currently, oil and oil products comprise 37.5% of the global energy consumption market in terms of volume.

The global renewable energy sector is also large and growing. It has been estimated by Allied Market Research (2018)[ii] that the global renewable energy market will grow at a CAGR of 4.9% between 2017 and 2025. A significant driver of the renewables market (including biomass) is the worldwide demand to move away from conventional fossil fuels, such as gasoline and diesel. At the same time, advancements in technology have increased the viability of using renewable sources to produce energy more efficiently.

“THE FOUNDERS HAVE SPENT THE LAST TWENTY-FOUR MONTHS PUTTING IN PLACE OPPORTUNITIES WITHIN THE BIOMASS ARENA.”

"ACCORDING TO THE INTERNATIONAL RENEWABLE ENERGY AGENCY (IRENA), THE DEMAND FOR BIOMASS WILL INCREASE BY 60% BY 2030."

According to The International Renewable Energy Agency (IRENA), the demand for biomass will increase by 60% by 2030, but that growth figure could be double, depending on the introduction of new technologies and inventions in the industry[iii]. 30% of biomass output will be used by local power industries, and a greater proportion will be used as feedstock.

An important target market for Prem Biomass is Africa, with demand for electricity there expected to grow significantly – in fact, in the next 22 years, it's expected to triple – and with supply failing to meet demand[iv]. Ghana, in particular, presents an attractive opportunity, with seven million Ghanaians currently without access to electricity. Solar power shows the largest growth potential[v], but biomass also offers significant opportunities.

South East Asia is becoming increasingly influential in the global energy industry. The ten member countries of the Association of South East Asian Nations (ASEAN) collectively are the world's seventh largest economy. Economic growth since 2000 has led to a 70% increase in energy demand, and the region now accounts for 5% of total global demand. The Cambodian market looks attractive for Prem Biomass due to a surge in foreign investment and new legislation around foreign ownership. There is a government-mandated programme to increase power production, and feed-in-rate legislation that supports a long-term operating basis for investment commitments. The availability of land for biomass production also makes it an attractive market.

One of Prem Biomass's goals is to provide services in-line with local needs and customs. It plans, in consultation with the locals, to identify areas of improvement and then develop those areas using locally sourced resources. As part of its corporate social responsibility, the company plans to use Napier grass, animal feed and bioelectricity to benefit the locals and the environment.

"IN SUB-SAHARAN AFRICA AND SOUTH EAST ASIA, BIOMASS ENERGY USE ACCOUNTED FOR 74% AND 29% OF TOTAL ENERGY CONSUMPTION."

The biomass opportunity

As of 2012, biomass accounted for 14% of the world's energy consumption[vi]. More specifically in Sub-Saharan Africa and South East Asia, biomass energy use accounted for 74% and 29% of total energy consumption.

Future expansion is expected to come from mini- and off-grid operations that will deliver between 100kW-1,000kW per unit[vii]. Expansion of existing grid systems is more likely in densely populated urban centres, where the cost can be offset by new customers coming on line.

The biomass industry has grown significantly over the past 10 years and is now considered to be in its second generation phase, according to a study by the United Nations (UNCTAD)[viii]. With biomass, there are clear divisions in the use of ethanol and other agricultural bi-products. The ethanol market is focused on the US, Europe and Brazil, while in Africa there is virtually no production of ethanol, while agricultural bi-products are used instead. Biomass is the leading source of feedstock for cooking stoves in the equatorial region of Africa and S-E Asia. Pelletising the agricultural waste available in these areas is a long-term goal for international support agencies. Napier grass is considered a useful strain, as it is the highest yielding, three times that of the next best (sugarcane). The cost of Napier grass pellets, at $0.06 per kWh, makes it a competitive choice.

Although there are many sources of biomass materials, Prem Biomass has chosen Napier grass as its main focus owing to having a high net calorific value: 3,895 Kcal per kg with the ability to produce three to four crops per annum.

Prem Biomass's marketing activities are carried out largely through face to face direct sales. This is achieved through identifying suitable partnerships in-country, and then working on building up solid relationships with these groups. It has selected two countries in each geographical region to start its operations with similar characteristics.

Progress to date and future plans

Cambodia and Ghana both have stable investment climates, pro-government support for adopting renewable energy with legislated pricing structures, minimal red-tape, local demand and local renewable expertise.

The business will obtain 10-year offtake agreements that can provide security of return for investors. These are to be agreed within the first three-four months following the investment.

Prem Biomass's financial projections show profitability from the second year of operations. Management has structured the investment in phases to generate early sales revenue, with a focus on controlling costs. The company believes the market timing is perfect, as this is a developing market, with strong demand, government support, and locally sourced feedstock and energy that is cheap and simple to produce.

Phase one's focus is to produce and supply biomass material, whereas phase two is to focus on the construction of modular power plants and supply of biomass material.

Prem Biomass will provide agriculture material, including wood chip and Napier grass pellets for power plants and other bi-products. There will be an initial investment in Cambodia to set-up a wood chip facility to meet existing biomass demand in South Korea and Japan as per off-take agreements. This will be followed with further investment in Ghana with a move into the cultivation of Napier grass and the installation of a processing plant that will meet local demand as well as the increased demand from South Korea and Japan.

Phase two consists of the construction of modular power plants for power production in rural areas where there is a high demand. The first stage is to be in Ghana, with the installation of a small-scale 2MW, modular power plant with future demand required of 25MW. The aim is to propose a programme that can provide flexible and scalable power units to this segment of the population. The Cambodian Government has requested a biomass power plant and indicated feed-in-tariff agreements.

The total investment opportunity of US$10,000,000 is to be used to execute the initial business plan over eighteen months. US$2,000,000 will be used to execute phase one of the business plan over the first six-to-twelve months. US$8,000,000 will be used to execute phase two of the business plan from six-to-eighteen months. The investment offering is common stock, preference shares, convertible loans or a combination of the above, with a negotiated term.

Prem Biomass will generate revenues through selling electricity to the grid for a guaranteed feed-in fee structure and by selling pellets or wood chip to power companies and feedstock to local farmers. Although Napier grass is an important revenue stream, over the five years of this business plan, sales of power to the grid and woodchip are intended to surpass revenues from this source. The projections indicate EBITDA positive in year 2.

Summary

- A high cash generating investment
- Conservative biomass yields and pricing forecast estimates provide significant upside opportunities
- Strong governmental support for projects in the power sector and renewables
- Legislated feed-in tariffs for electricity as of 2016 guaranteeing sales
- Securing animal feed pellets is a Ghana Government supported national mandate
- Diversified, low risk marketing plan, including power purchase agreements with government and telecommunication operators
- Highly fertile arable land with the ability to irrigate and achieve excellent crop yields
- Low overheads through significant savings in land rentals and labour costs
- Demand for second generation biofuels are high in Japan, South Korea and Europe

Investment Highlights

- Vertically integrated business model
- Positive environmental and social impact
- High growth and high margin business
- EBITDA positive from year 2
- Highly experienced management team
- Scalable and replicable business model
- Phase I: Fast establishment of biomass production against security of offtake agreements
- Phase II: Locally generated power to supply strong demand to rural communities
- Strategic partnerships in South EA and West Africa
- Low entry cost of land
- Expansion opportunities: targeted growth to 25MW with further demand for 3-400MW
- Significant opportunities in downstream partnerships

Contact

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Picture shows most recent visit (August 2018) by Yatish Chouhan, Director (centre), Arfizal Ariffin, Technical Director (right) and team to survey plantation in Koh Kong Province, Cambodia.

i Marketline (2016) Energy Consumption Global Industry Guide
ii Allied Market Research 2018 Renewable Energy Market by Type and end User
iii IRENA, 2014 report
iv World Energy Outlook 2017 Summary
v IEA Africa Energy Outlook, 2014, page 185
vi World Energy Council 2012
vii IEA Africa Energy Outlook 2014
viii UNCTAD (United Nations Conference on Trade and Development)

BY RICHARD GILL, CFA

FROM ACORNS TO OAK TREES

AIM MARCHES ON BUT ISA BARGAINS STILL TO BE FOUND

It is now just over five years since AIM shares were allowed to be included in a Stocks & Shares Individual Savings Account, or ISA. Having previously denied small cap fans the opportunity to put junior market listed shares into the tax efficient investment wrapper, George Osborne finally signed off the new rule on 5th August 2013. And many investors have been enjoying the benefits since then.

While the market experienced a modest downturn during 2014, 2015 and into 2016, the AIM All Share Index is currently trading 49.3% higher since the new rule was put in place, mainly driven by excellent performances from some of AIM's largest constituents. As the chart below shows, the AIM index outperformed the FTSE 100 over the period (with the blue-chips up by just 14.3%) as well as the FTSE Small Cap Index, which grew by 42.8%. My research shows 12 AIM companies which have risen in value by over 1,000% since 5th August 2013, with another 144 having doubled or more.

Of course, being an inherently risky market, there has been a fair share of losers too. In the 80%-down-or-more club are 156 companies, with many more having gone bust over the years. This only goes to highlight the importance of good stock picking amongst junior market shares. For those investors who still have some of their annual £20,000 ISA allowance to take advantage of, here are three AIM listed companies which I believe look worthy of consideration for your tax-free account.

TELFORD HOMES

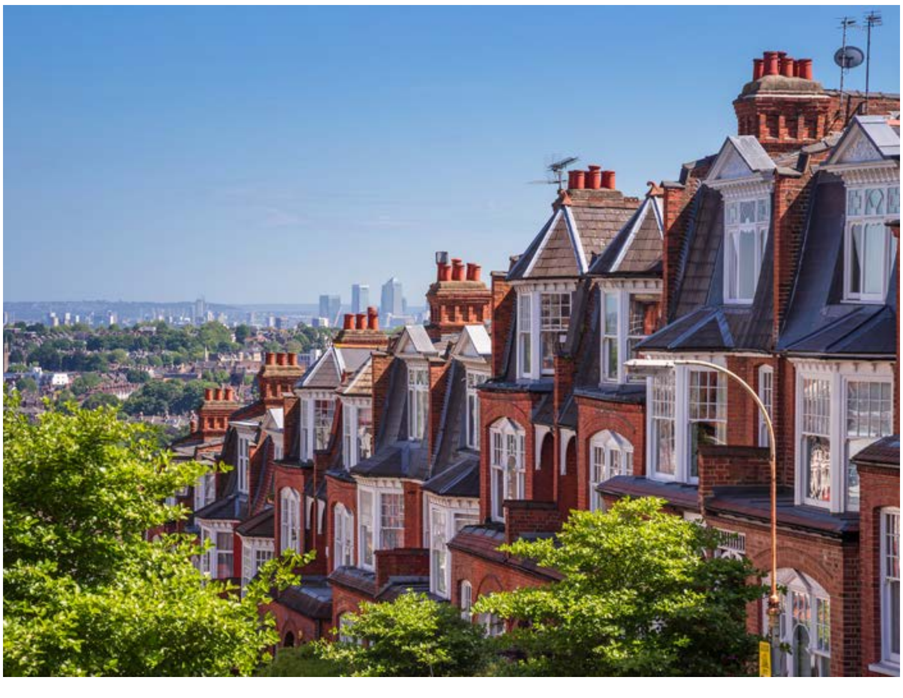
I first covered **Telford Homes (LON:TEF)** in the February 2016 edition of Master Investor Magazine, when the shares were trading at 363p. Despite falling to a low of c.262p in the aftermath of the EU Referendum result, they have since recovered to the current 420.5p. Just under 30p per share of dividends have been paid since then too.

Building for the future

Telford Homes is a residential property developer focussed on building houses in areas of London which, in estate agent speak, are typically called "up and coming". The company shies away from prime locations such as the City, Central London and the West End and concentrates on inner city areas such as Poplar, Stratford, Finsbury Park and near where I live at Gallions Point. The average price of homes within the company's development pipeline is c.£539,000 and that is expected to remain constant over the coming years.
INSERT TELFORD DEVELOPMENT MAP
The London property market has seen a bit of a wobble in recent months, with asking prices down by 3.6% year-on-year in August, according to property website owner Rightmove. However, forward selling through early open market launches is a core part of Telford's business model, thus reducing exposure to short-term volatility and increasing income visibility. In addition, growing in the burgeoning "build to rent sector" is now a key part of the growth strategy. On this front, Telford is looking to partner with a long-term investor and has recently instructed property advisor Savills to assist in this process.

"THE LONDON RESIDENTIAL PROPERTY MARKET CONTINUES TO SUFFER FROM A FUNDAMENTAL LACK OF SUPPLY."

While the market continues to have concerns over issues such as rising interest rates and the exit from the EU, the fact is that the London residential property market continues to suffer from a fundamental lack of supply. According to the Ministry of Housing, Communities & Local Government, new home construction starts have recently fallen under 20,000 per annum, with the annual requirement in the Greater London Authority's latest draft "London Plan" being over 60,000 homes based on expected population growth. Combined with mortgage rates remaining near all-time lows, along with government incentive schemes such as Help to Buy, that leaves the company with excellent long-term growth opportunities.



High rise developments

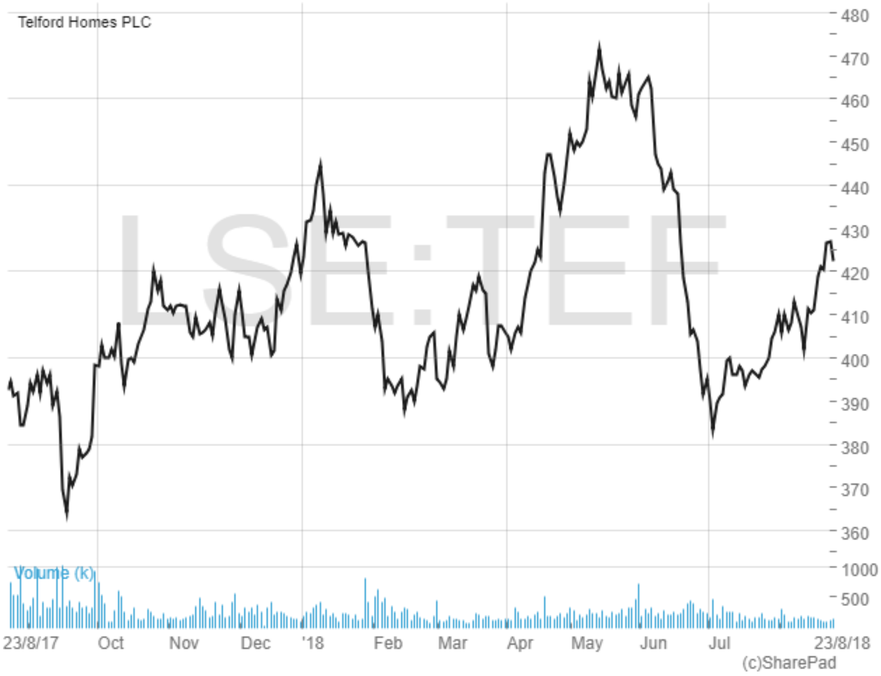
The last financial year (to March 2018) was a good one for Telford, with revenues rising by 8.3% to £316.2 million and pre-tax profits beating market expectations, growing by 35% to £46 million. There were 476 open market home purchases completed in the year, up from 289 in 2017, although as these sales were recognised in the accounts the forward sold position fell from £546 million to £344 million. Nevertheless, this still provides good earnings visibility, representing over a year of historic annual sales.

The most recent announcement to the market was released in mid-July and was broadly positive with a few minor caveats. Telford said that it had continued to perform well since the results were released at the end of May, with ongoing demand being seen from customers and houses priced below £600,000 selling at a steady rate. Homes sales above this level, however, are more challenging but in line with forecasts. Overall, the company believes it is "well placed" to achieve its £50 million+ pre-tax profit target for the year to 31st March 2019, double the c. £25 million posted in 2015, with trading being weighted towards the second half as in previous years.

Safe as houses?

Shares in Telford Homes have slipped from a recent high of 471.5p in May this year and, as such, I see another good buying opportunity. Assuming that the £50 million pre-tax profit target is achieved for 2019, and assuming a 19% tax charge, the price to earnings multiple is just 7.9 times. The historic dividend is 17p per share, which means the current yield is a decent 4%. I expect payments to rise steadily as profits grow, with Telford looking to distribute at least a third of its earnings to shareholders.

Telford is well funded for future growth, with a £210 million corporate



loan facility in place which extends to December 2022. As at 31st March 2018, the company had drawn down £115 million, leaving decent headroom of £95 million to fund future site acquisitions and construction costs. Net debt was £103.1 million at the period end, but gearing was modest at 44.6%. Net assets of £231.1 million as at 31st March 2018 also provides decent backing to the current market cap of c.£320 million.

All in all, while there are minor concerns over the investment case, I believe that these are more than accounted for in the current valuation.

ELEGANT HOTELS

Also in the business of buildings, but with a bit more risky investment case, is **Elegant Hotels Group (LON:EHG)**, the owner and operator of seven up-market hotels and a beachfront restaurant on the island of Barbados in the Caribbean.

After opening its latest establishment at the end of last year, the company now offers sun seekers 588 rooms across its portfolio, making it twice as large as its closest competitor in the Barbados luxury hotel market. Six of the seven properties are situated along the west coast of Barbados, commonly known as the "Platinum Coast", with all being freehold owned. Bringing in further revenues, the group also has a management contract for the Hodges Bay Resort in Antigua and a sales and marketing contract for The Landings Resort & Spa in St. Lucia. The UK is a key market for the company, with 72% of room nights booked by UK visitors in the first half of the current financial year.

ELEGANT HOTELS
BARBADOS
elegance with a twist

Life's a beach

Elegant Hotels listed on AIM in May 2015, raising £32.2 million for itself at a price of 100p per share. However, the shares have since fallen to the current price of 75.5p after trading disappointed on several occasions, with a big share price fall being seen in the run-up to and in the aftermath of results for the six months to March 2016. While the numbers showed modestly rising profits, the company warned that a number of factors would impact future trading. These included political uncertainty in the UK leading to a reduction in demand for luxury holidays,

negative publicity around the Zika virus resulting in room cancellations and substantial competitor discounting.

Into 2017, and while revenues grew by 5.1% to $59.9 million for the year to September following the addition of another hotel, net profits fell by 6.1% to $9.2 million. As well as seeing rising administrative expenses the company also had to contend with a weakening of sterling against the US dollar. As room rates are priced in dollars and the majority of customers are from the UK, rates were discounted in order to drive occupancy figures. To reflect the situation, and to preserve cash to re-invest in properties, the dividend for the full year was cut from 7p to 5.25p.

Numbers for the six months to March 2018 (which reflect the peak winter season) saw a stabilisation of trading, with revenues growing by 8% to $38.8 million as occupancy rates increased from 66% to 67%. Revenue per available room rose by 5% to $292 and new hotel Treasure Beach made a maiden contribution. However, profits were once again squeezed, with the pre-tax figure falling from $9.2 million to $8.8 million following an increase in import tax, depreciation and interest costs, along with a number of one off expenses. Nevertheless, the outlook was positive, with the company saying that it remains comfortable with the full-year outlook after trading in-line with expectations.

"THERE APPEARS TO BE SIGNIFICANT HIDDEN VALUE ON THE BALANCE SHEET."

Buried treasure?

While Elegant Hotels faces challenges, there appears to be significant hidden value on the balance sheet. As at the end of March this year, the company had an "implied" net asset value of $177.2 million. This figure includes a valuation of the company's property portfolio (by consultants CBRE) of $249.5 million which is not fully recognised in the accounts, as property is valued at cost as opposed to "fair" value. At current exchange rates, this equates to net assets of 154.2p per share, a figure which is 104% above the current share price.

At that kind of discount you would imagine that the company could be on the watchlist of a potential acquirer. On that front, in early December last year, The Times reported that Elegant was in the early stages of talks with Spanish group Meliá Hotels International over an estimated 110p share bid. The company swiftly followed up by saying that it had received an approach from Meliá relating to an all cash offer but that talks had been terminated. Nevertheless, in my view, given the quality of the assets and cheap valuation, Elegant remains in play for a takeover.

House broker Liberum has a 130p target price on the shares. In addition, with a 4p per share dividend having been guided to for the full year, the yield is an attractive 5.3% (although the 1.33p interim payment has already been made). Overall, Elegant Hotels is a special situation stock, backed by a decent yield and relatively stable operations.

1PM

Finally, **1PM (LON:OPM)** is an alternative finance provider, offering lending to a range of UK businesses across the areas of asset, vehicle, loan and invoice finance. The business model is simple: the company makes a living by borrowing money from a range of sources, including block discount facilities, secured loans from high net worth individuals and other bank sources, then lending it out to SME customers at a higher rate. The company currently operates across six trading subsidiaries serving over 16,000 SME businesses across the three product groups of Asset Finance including vehicles, Loans and Commercial Finance. Incidentally, the name comes from "one payment monthly".

A rapidly expanding business for several years now, following the appointment of Ian Smith as CEO in February 2016, 1PM has seen a step change in its growth, driven by a number of complementary acquisitions, along with organic expansion. The stated strategic aim is to achieve a market capitalisation of £100 million, up from £46.6 million currently. 1PM is focussed on doing this by, amongst other things, building operational scale, strictly adhering to underwriting policies and credit control procedures and being geared appropriately with cost-effective funding facilities.

A good time for lunch

Numbers for the six months to November 2017 showed the benefits of the expansion strategy, with revenues up by 74% at £13.9 million (including organic growth of 23%) and pre-tax profits before exceptionals up by 77% at £3.6 million. While earnings only rose by 5% per share, this was despite the weighted average number of shares in issue rising by 56% following share based earn-out payments being made for acquisitions and a £13 million equity fundraise in June. Reflecting the company's cautious attitude to lending, net bad debt write-offs for the period were £0.7 million, representing just 0.5% of total receivables, well below the sector average.

There has been further good news since the interims, with a £35 million asset finance facility agreed in March with the British Business Bank which will be used to significantly expand lending to businesses seeking "hard asset" finance. The facility is expected to "significantly" reduce the blended borrowing cost. April then saw the company negotiate increased block discounting facilities totalling £62 million with six existing funding partners.

Results for the year to May 2018 will be released on 12th September, with a June trading statement confirming that revenue was slightly ahead of market expectations for the year, up 75% at £30 million, with profits in line with expectations and earnings per share up 20%. Other highlights include over 50% of revenue for the current year already being secured as "unearned income", the blended cost of borrowing falling to less than 4% from c.5.3% in 2017 and total borrowing facilities doubling to more than £160 million.

On a profit mission

I believe there is a good opportunity to enter into 1PM shares, now 54p, at the current time. The full year results are due to be announced shortly, with the June trading update providing decent detail, so they should not contain any nasty surprises. Historically, the shares have performed well following results announcements, with them rising by 20% in the few days following the last interims and by 9% in the few days following the 2017 finals.

In terms of the valuation, 1PM looks cheap on a number of metrics. With earnings of around 7.9p per share expected for the year just gone, the shares trade on a multiple of just 6.8 times. This looks very cheap for a business which is set to have doubled earnings over the past three financial years and looks very well placed to continue its expansion. Adding further backing, net assets of £44.5 million as at 30th November 2017 cover 95% of the current market cap.

What's more, a few weeks ago the company confirmed details of an enhanced progressive dividend policy under which a final dividend for the year to May 2018 of 0.65p per share will be declared, up by 30% over the previous year. From then on the company is looking to recommend a 30% annual increase in dividends for the next three financial years. That equates to a modest historic yield of 1.2%, rising to 2.6% over three years if payout targets are met.

About Richard

Richard Gill is an investment analyst with over a decade's experience of analysing small/mid cap equities. He is the Head of Research at Align Research. Richard qualified with the Chartered Financial Analyst (CFA) designation in 2012 and was awarded PLUS Markets Financial Writer of the Year at the 2008 PLUS Awards. He has been a judge at the Small Cap Awards from 2013 to 2017.

BY JOHN KINGHAM

DIVIDEND HUNTER

A BEGINNER'S GUIDE TO DIVIDEND INVESTING

When you've been investing for decades, it's easy to forget just how confusing the whole thing can be for newcomers. It's easy to ramble on about things like capital intensity, acquisition rates or Common Equity Tier 1 ratios and sound like an expert. But to most people, and most investment newbies, it's just gobbledygook. So, this month, I thought I'd take a step back and write a meat-and-potatoes beginner's guide to dividend investing containing just a handful of the most important points.

And if you're an old hand at the dividend game, then you might still want to read this guide. Why? Because it's always a good idea to revisit the basics.

Step 1: Invest in lots of very different companies

The number one cause of most stock market horror stories is excessive risk taking. I've seen it many times in myself (many years ago), family members and other investors I talk to.

The investor puts their money into just a handful of companies. Those companies go up in value and the investor is happy. But, at some point, several of those investments go dramatically south, falling by thirty, forty or fifty percent in a few months. The investor panics, terrified that the investments could go to zero, so they sell everything today to avoid further pain tomorrow.

However, in most cases, if the companies are fundamentally strong, then their share prices eventually recover, leaving the dazed and confused investor sitting on the side lines with their losses locked in for eternity. In my case, I'm so daft I had to go through this process twice (in 2003 and 2008) before finally learning one of the world's oldest lessons: Don't put all your eggs in one basket. In practical terms, this means investing an equal amount into at least 20 different companies. It also means spreading your investments across many different sectors and investing in companies that generate profits from many different countries. For example, I hold 30 companies. No more than three of those companies come from any one sector, about half of the portfolio's revenues are generated outside the UK (from a wide variety of different countries) and no more than six percent of my portfolio is invested in any one company.

By following this step (or something similar), you'll be insulating your portfolio from any single

"THE NUMBER ONE CAUSE OF MOST STOCK MARKET HORROR STORIES IS EXCESSIVE RISK TAKING."

bad event, such as a company going bust, a sector going into decline or a country going into a recession.

Step 2: Invest in companies with long-term steady growth

"DIVIDEND GROWTH IS NOTHING WITHOUT EARNINGS GROWTH, AND EARNINGS GROWTH IS NOTHING WITHOUT REVENUE GROWTH."

Notice that I didn't say "long-term steady *dividend* growth". If you're looking to build a portfolio capable of generating long-term dividend growth, then yes, obviously you're going to be interested in companies with track records of long-term dividend growth. But dividend growth is nothing without earnings growth, and earnings growth is nothing without revenue growth. So, let's break down long-term steady growth in a bit more detail.

By long-term, I mean ten years, at least. Data covering this sort of timescale isn't usually free (premium offerings from Morningstar, SharePad and Sharelockholmes all have 10+ years data for all FTSE All-Share stocks), but there are workarounds.

For example, you can see a list of all UK stocks with 10+ years of dividend growth on the dividendchampions.uk website. And you can also download this data as a spreadsheet, which is very handy. Unfortunately, the spreadsheet doesn't tell you whether a given company is large, medium or small cap – or more importantly, which sector it operates in. However, the London Stock Exchange (LSE) website has a Statistics section with a Companies and Securities page, and there you can download a spreadsheet of all LSE-listed companies which includes Sector and Market Cap information.

With a bit of spreadsheet fiddling, you can create a spreadsheet which combines the list of UK dividend champions with their related sectors and market caps. That will certainly get you a long way down the road of choosing which companies to invest in.

The dividend champion spreadsheet includes each company's dividend history, so you'll still need revenue and earnings information, but you can get a lot of that for free too. Morningstar, for example, has a comprehensive five-year data-set for each listed company. A narrower but deeper dataset (i.e. covering only the key variables, but over ten years or more) is available from investegate.co.uk under their "fundamentals" tab.

So, it's possible, with a bit of work, to build a list of FTSE All-Share companies with 10+ years of dividend growth, as well as their sector, market cap and ten-year revenue and earnings histories. There are easier alternatives to this, such as an investment newsletter and so on, but if you want to go the free route then this is what you need to do (at least if you want to follow this strategy).

As for a definition of steady growth, I mean consistent, repeated or not one-off. If you're selecting stocks from the list of dividend champions, then obviously their dividend growth is consistent because that's the definition of a dividend champion. You can also apply the same thinking to revenue and earnings growth. If revenues and earnings went up every year, that's good. If they went down every year, that's bad. And somewhere in the middle is somewhere in the middle between good and bad. Again, spreadsheets make this sort of analysis easy and if you want you can download a spreadsheet from my website which will do these calculations for you.

The final part of steady long-term growth is growth, and it's a good idea to measure this (using a spreadsheet) over a ten-year timespan across revenues, earnings and dividends.

So, in summary, you want companies with steady, long-term broad-based growth – and the steadier, longer, broader and faster the growth, the better.

Step 3: Invest in low risk companies

It's all well and good for a company to have a long history of steady growth of dividends, profits and so on, but the past is not necessarily a good guide to the future.

For example, what if you have a min-

"EVEN THE BEST COMPANIES IN THE WORLD CAN TURN INTO TERRIBLE INVESTMENTS IF THEY'RE BOUGHT AT THE WRONG PRICE."

ing company which has benefited from a very long commodity super-cycle, where copper prices and the company's profits and dividends have increased consistently and rapidly for more than a decade. Is this company likely to continue growing at rapid pace for another decade or more? Perhaps, but perhaps it's also likely that copper supply will eventually catch-up with demand, that the price of copper will then collapse, and that the company's profits and dividends will collapse along with it.

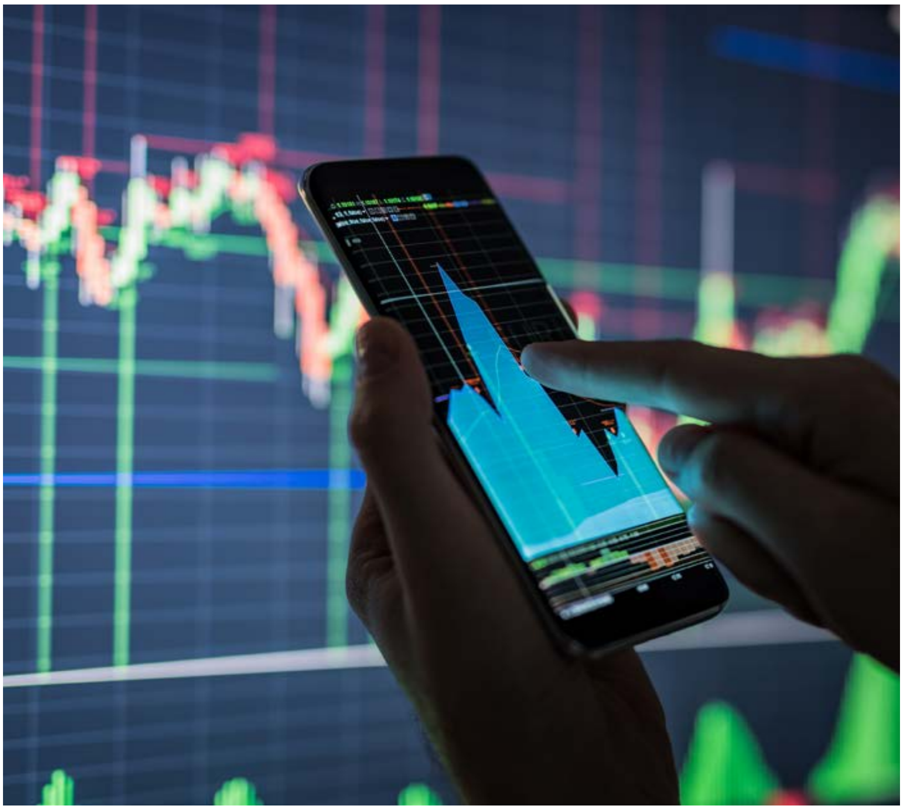
So, in addition to a good steady track record of growth, there are some additional factors you'll need to look out for.

Since I've already mentioned mining, I'll start with commodity companies. These companies have zero pricing power because (more or less) copper or oil from one company is identical to copper or oil from another company. They are price takers, not price makers. That isn't the real problem, though. The real problem is that supply is typically slow to react to increasing demand, because, to significantly increase the supply of copper, you have invest a lot of time and money into setting-up or expanding copper mines. Increasing demand and a slow response from supply creates price increases which, if the demand increase is sustained, can last for years. This is good for commodity companies because they make lots of money and some of that gets turned into increasing dividends. But this happy scenario rarely lasts forever. Eventually, demand falls or supply catches-up with demand and the result is rapidly falling prices, profits and dividends.

This sort of thing is notoriously difficult to predict, so I don't try to. I simply assume that a fast-growing commodity company is not going to be able to sustain that growth over the long term. Instead, I effectively assume that it won't be able to grow faster than about 5% per year (which is average for most companies) and value the company on that basis. What I have done in the past, but definitely won't do again, is pay a high price for a rapidly growing commodity company on the assumption that it will continue to grow rapidly.

This cyclical risk also applies to oil-related stocks, housebuilders and most construction companies.

The second major risk is debt and pension obligations. Debt is a fairly obvious one. You might have a company that's been growing rapidly for years, but only because each year it takes on lots more debt to fund its expansion. This growth is externally funded rather than internally, and because of that, it's both unsustainable and risky. It's unsustainable because debt and the



related interest payments cannot grow faster than profits forever, and it's risky because it puts a lot of power into the hands of banks and other lenders whose interests are not necessarily aligned with shareholders.

For debts, I just look at the latest total borrowings figure (current borrowings plus non-current borrowings) and compare that to the company's average profits over the last few years. If debts are more than four or five-times average profits, I'll usually end my analysis there.

As for defined benefit pension obligations, these are similar to debts, although pension obligations tend to grow too large when companies overinvest in human assets (by offering pensions that were too generous) rather than overinvesting in the capital assets (such as new factories or stores) that debts are often used for.

With large pension obligations, the risk is that the pension scheme's assets won't cover its liabilities, and that the resulting pension deficit will have to be paid-off by the company. This draws valuable cash away from both the business and its shareholders and can put an almighty strain on companies which are often already weak and uncompetitive.

If a company has a defined benefit scheme, you'll find its related pension obligations in the notes to the accounts in the latest annual report. If a company's pension obligations are more than ten-times its recent average profits, my assumption is that the risks are simply too high.

The third major risk is a dependence on "big wins". These are companies where one big win today can lead to revenues and perhaps even profits for many years to come. Companies like **Serco (LON:SRP)** or **Capita (LON:CPI)** have to win big contracts with big clients and that can lead to an excessive focus on winning contract at any cost, rather than winning contracts only if they'll produce good returns for shareholders.

This often leads to suicide bidding, where contracts are signed which can only make a profit if everything goes exactly to plan. But in reality, few things go exactly to plan.

Other types of "big win" companies are pharmaceutical and biotechnology companies which need big wins from big blockbuster drugs and the big patents that come with them. If a pharmaceutical company has produced lots of profit for a long time by relying on a small number of big patents, it will almost inevitably run into major problems when those patents run out. **GlaxoSmithKline (LON:GSK)** (which I own shares in) and **AstraZeneca (LON:AZN)** have found this out over the last few years.

The final major risk is companies where rapid growth has been driven by multiple acquisitions. Acquisitions aren't always a bad thing, but they usually are when they're used to grow a business where the existing core business is stagnant or in decline. These acquisitions are often too numerous, too frequent and too big to be successfully integrated into a single, seamless business. In the end, they're

often a costly distraction at a time when management should really be focusing on and investing in the core business.

So, if you see a company where stagnant core growth is being boosted by large and/or multiple acquisitions (especially if the acquired business is not virtually identical to the company's core business), be especially careful.

Step 4: Invest in attractively valued companies

Even the best companies in the world can turn into terrible investments if they're bought at the wrong price. The poster-child for this is **Coca-Cola (NYSE:KO)**, undoubtedly one of the world's best businesses in terms of

long-term financial performance, but also a very bad investment if you bought the shares in 1998.

Why? Because if you bought Coca-Cola shares in 1998, you would have paid about 10-times revenues and 50-times earnings, and you'd have received a dividend yield of less than 1%. Since then, the business has continued to grow (albeit at a gradually slowing rate) and its dividend has gone up by around 150%. However, the share price is more-or-less where it was 20 years ago. That's 20 years with zero capital gains, and all because the starting price was way too high.

Avoiding overpaying for quality dividend companies is relatively easy, although that doesn't mean you won't make the odd mistake here or there. But really, this is Dividend Investing 101: Buy shares that have a yield which is above average, or at the very least, not too far below average.

Another way to think about this is to look at the dividend growth rate which would be required to produce decent returns. Let's say you want a 10% total annual return over the long-term. If you look at a company and its yield is 1%, then it's going to have to grow that dividend by 9%, year after year, to give you your 10% target return.

I don't know about you, but I don't think there are many companies capable of producing long-term dividend growth of 9% per year or more. Certainly not enough to build a well-diversified portfolio.

Personally, I don't like to invest where the yield is below 2%, and I'd much rather invest where the yield is 4% or more. I also look at the share price relative to ten-year average dividends and earnings, just to make sure the current yield isn't caused by an abnormally large one-off dividend. If the share price is more than 30-times the company's ten-year average earnings, or 60-times its average dividend, then that price is a bit too hot for my liking.

Step 5: Sell companies when their growth, risk and price are no longer attractive

Companies change and share prices change, so when a company does well and its share price shoots up too far, I'll trim the position or sell it entirely. And at the less positive end of the spectrum, if a company's growth rate turns negative for too long, or if its debts go too high, I'll sell in order to reinvest in better companies at lower prices.

But don't become a hyperactive day trader. I typically make just six purchases each year and six sales, which is enough to steer a portfolio in the right direction, but not so much that your stock broker benefits more from your portfolio than you do.

A basic plan to get you started

If you're a beginner, I think this guide should be enough to get you up and running in the right direction. Eventually, as you gain experience, you can tweak it and refine it as much as you like.

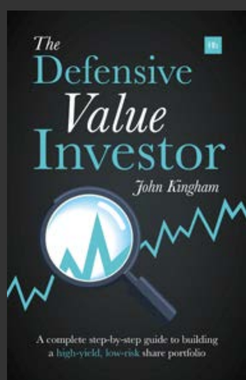
But, however advanced you become, make sure you never forget the basics of broad diversification, consistent growth, low risk and attractive price. If you stick with those basics for a decade or more, then it's likely that your investment returns will be more than satisfactory.

About John

John Kingham is the managing editor of UK Value Investor, the investment newsletter for defensive value investors which he began publishing in 2011. With a professional background in insurance software analysis, John's approach to high yield, low risk investing is based on the Benjamin Graham tradition of being systematic and fact-based, rather than speculative.

John is also the author of *The Defensive Value Investor: A Complete Step-By-Step Guide to Building a High Yield, Low Risk Share Portfolio*.

His website can be found at: www.ukvalueinvestor.com.



BY DAVID JONES

CHART NAVIGATOR

CANDLESTICK CHARTING FOR INVESTORS

For this month's article I thought we would go back to a classic charting approach and take a look at something that has increased in popularity over recent decades and is now arguably the default way to display price data for traders and investors alike. This month, we will look in more depth at the Japanese candlestick chart and a couple of associated patterns.

As mentioned, this form of representing price data has become very popular in recent years. It is an approach that is thought to date back to the 18th century, amongst Japanese rice traders. It was only in the 1990s that these charts started becoming much more popular amongst Western traders and investors, thanks to the publication of the book 'Japanese Candlestick Charting Techniques' by Steve Nison.

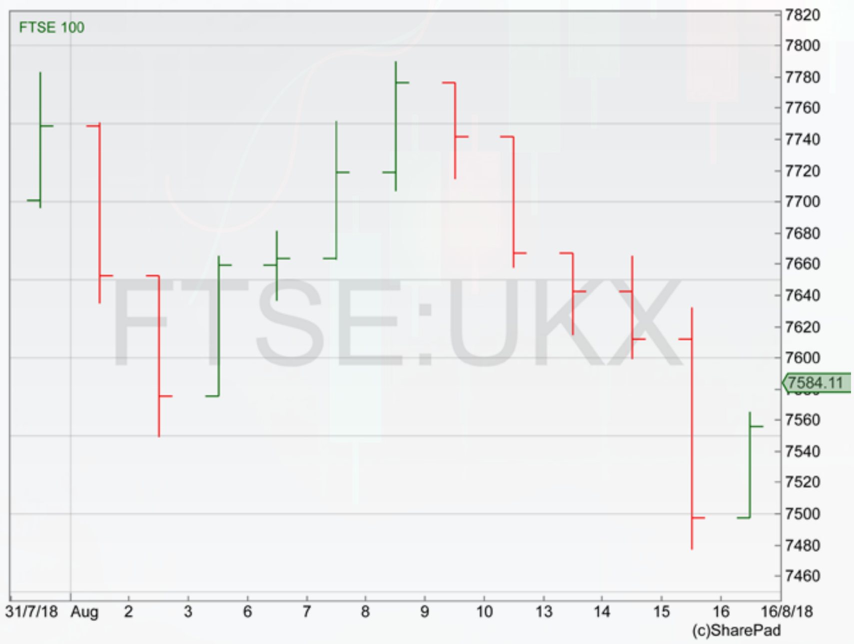
First of all, let's start with the absolute basics. And take a look at how a candlestick is actually constructed.

Basics of candlestick charts

In any particular time period – and for the purposes of this I am going to use daily data – there are four separate points of price information that we have available. Sticking with daily charts, the price data we have for any market is: the high for the day, the low for the day, where the market opened at the start of the day and, of course, where it closed. (Of course, this is true for five-minute, hourly, weekly etc. candles too). Traditionally this would be represented by bar charts, an example of which is shown below.

FTSE Bar Chart

This is a bar chart of the FTSE 100 from the first half of August 2018. Each vertical bar represents one day of trading. The low of the bar represents the lowest price reached by the FTSE on that particular day and, unsurprisingly, the high shows the FTSE's high point for the day. On the bars you can see horizontal lines – one on the left and another on the right. The left horizontal line shows where the FTSE opened that

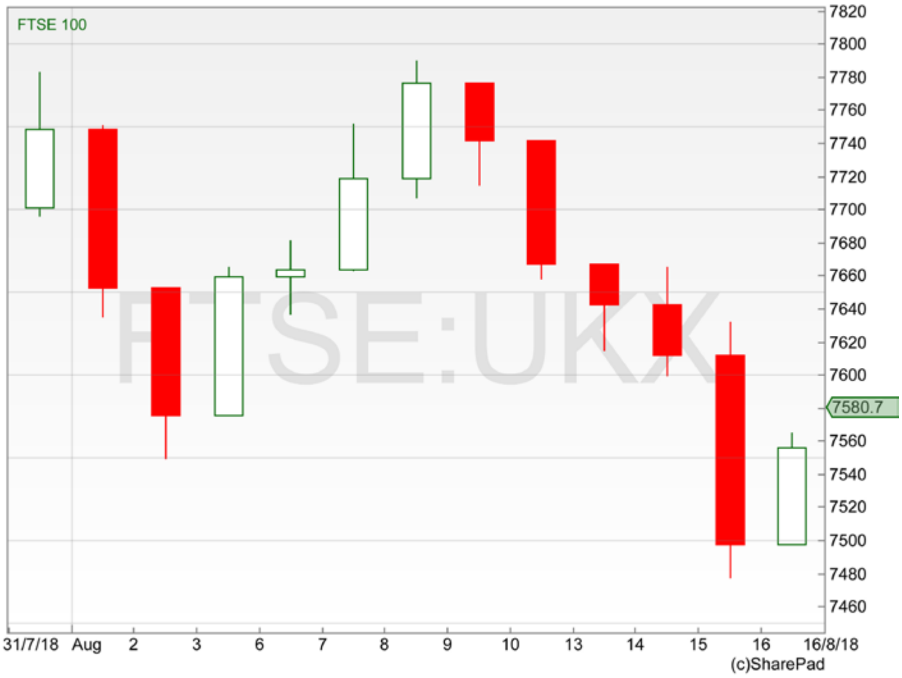


"CANDLESTICK CHARTING IS A WHOLE OTHER BRANCH OF TECHNICAL ANALYSIS WITH ITS OWN ARRAY OF PATTERNS BASED OFF THESE CANDLE PATTERS."

day – and the line to the right shows the closing price. So far, this is straightforward enough. Chartists have used these types of charts for decades, updating by hand before computer software made it easy for anyone to call up a chart for all sorts of markets.

Candlestick charts don't do anything particularly different with this open, high, low, close data. But in candlestick charting, it is the difference between the open and the close which is considered all important – where did the market start the day, and where did it finish. Candlestick charting is a whole other branch of technical analysis with its own array of patterns based off these candle patters. One way to think of a candlestick chart is a bar chart with this difference (between the open and close price) shaded in. Here is the same FTSE chart as above, but now displayed as a candlestick chart.

FTSE Candle Chart



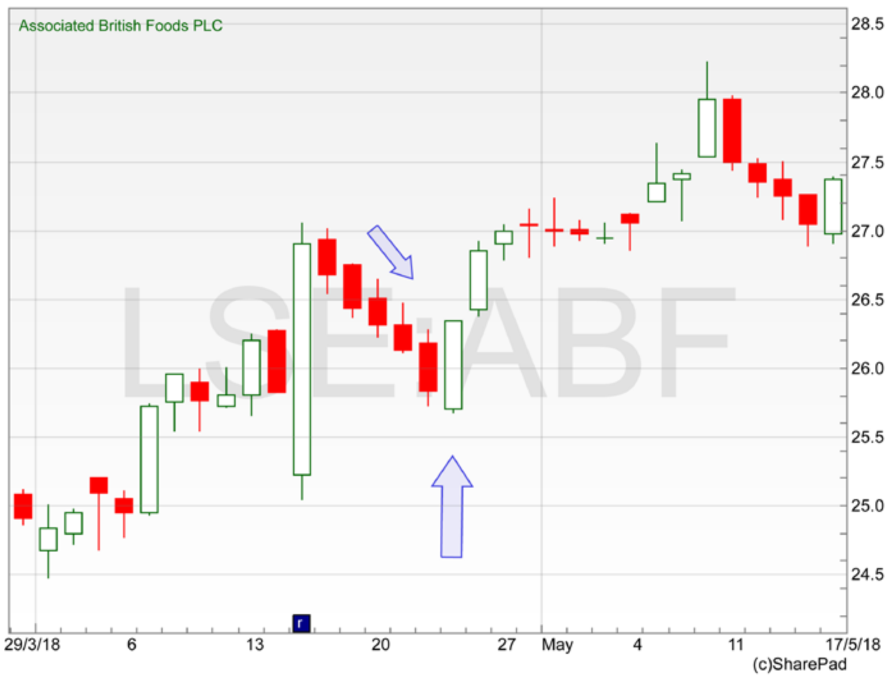
The shaded in part of the candle chart is referred to as the 'real body' of the candle. In this example, where the market closes lower than the open, this is coloured in red – and where the market finishes higher than its opening price the colour is white. The market may have an incredibly volatile day, but if the close is only a little bit different to the open, then the candle will have a small body. Conversely, if the market opens and just goes up or down all day, the body will be larger. You can see an example of this on the second to last candle on the chart. Clearly this was a big down day for the FTSE, seen by the large red candle.

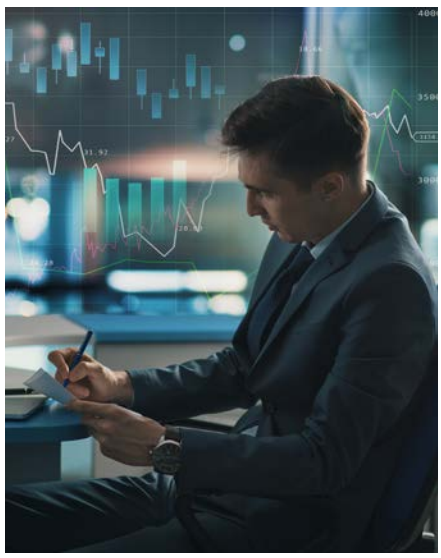
As mentioned, much of the analysis of candlestick charting patterns focusses on the bodies of these candles, and for this month we are going to take a look at two very common patterns. They are variations on the same theme and are known as 'engulfing patterns'. The reason for this name is very simple – it is when the body of one candlestick engulfs, or completely covers the previous day's body. Japanese candlestick charting looks at trying to weigh up the battle between the bulls and the bears in the market – who is winning, whether the tide has turned. Like all approaches to markets, it is not something that works all the time, but in my experience engulfing patterns can be a useful tool for tracking the first changes in sentiment.

These are reversal patterns – so one of the prerequisites to set up an engulfing pattern is for the market to have been in a trend before the pattern occurs. Here is the **Associated British Foods (LON:ABF)** share price chart from April to May of 2018. This is a great example as it shows two types of engulfing candlesticks.

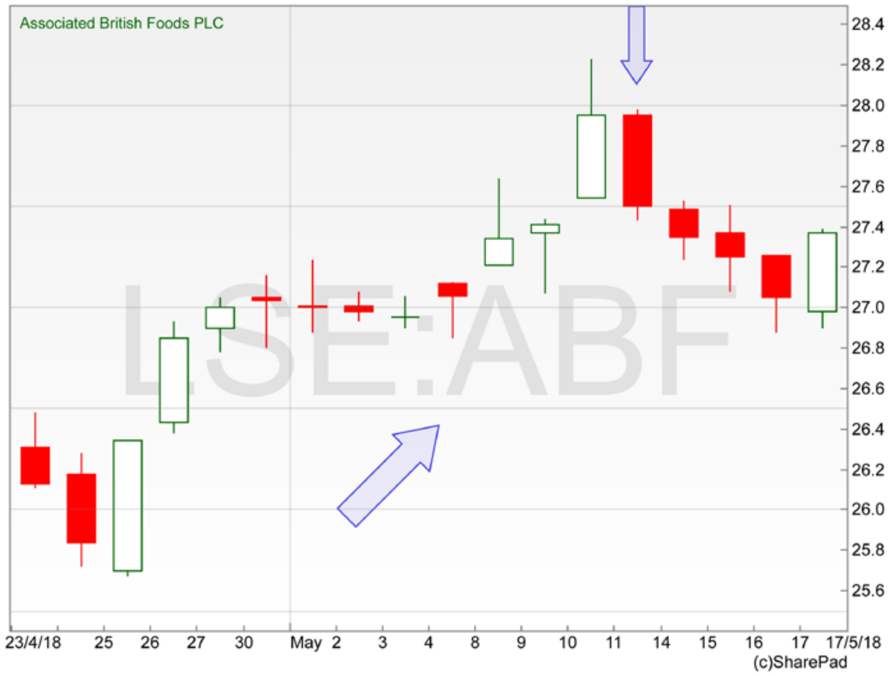
Bullish Engulfing

The first part we are interested in here is the move during the middle of April. It can be seen that the share price drops for five days in a row. I have highlighted this by the falling arrow,





"ENGULFING PATTERNS CAN BE A USEFUL TOOL FOR TRACKING THE FIRST CHANGES IN SENTIMENT."



but I think it is clear from that procession of red candlesticks. But then there is one day, also highlighted, where the share price recovers and engulfs the previous day's candle. This is the bullish engulfing pattern and suggests that possibly the trend is changing.

An aggressive way to trade this would be to buy the market on the next day's open, with a stop-loss under the low of the previous day. By definition, the market should not drop below the low of the bullish engulfing candle, if it is going to work. It is a reversal pattern so the market should continue reversing. A more relaxed approach, giving the market time to prove you right, would be for a stop loss to go under that previous low around 2,500p. It is all to do with your personal risk levels, but either way, if the market moves much below the low of the engulfing candle, the pattern can be considered invalid.

In this example, as we can see, it worked pretty well. The share price did recover and went on to trade as high as 2,800p. Which brings us to the next pattern.

For every bullish pattern, there is normally a corresponding bearish, or negative one. This is the bearish engulfing candle which occurs after the market has been trending higher and then there is a day that engulfs the prior day's 'up' candle. That happened on our ABF chart during May.

Bearish Engulfing

The market was recovering after that previous bullish engulfing candlestick. We then get the opposite happening. Admittedly not quite as 'text book' an example as the bullish engulfing but good enough I think. The down candle in red engulfs the previous day's up candlestick. And the market does sell off for the next three days.

These are of course examples used with the benefit of hindsight to illustrate the point. The real world of trading and investing is never quite as perfect – these signals don't work all the time and that is what stop-losses are for. But, in my experience, particularly on longer term charts showing daily and weekly candles, these are normally a good hint that sentiment is starting to shift – especially so when they occur near an obvious level of prior support.

Charts of The Month

Carrying on with the idea of engulfing patterns, I thought it would be interesting to pick a couple for the charts of the month. I have chosen weekly candles for these examples to fit it with the longer-term view of the typical investor.

CRH (LON:CRH)

This FTSE 100 industrial business's share price has slid around 10% in recent months. But over the last couple of weeks, we are finally starting to see some positive candlesticks. The second to last candle on the chart is engulfing the previous candle after a slide – so we have a bullish engulfing set-up on the weekly chart. It is it going to remain valid then that the price should not slip below the low of that engulfing candle, around the 2,470p mark – although there is clearly stronger support, also, a little further away ahead of 2,300p.

"THE REAL WORLD OF TRADING AND INVESTING IS NEVER QUITE AS PERFECT – THESE SIGNALS DON'T WORK ALL THE TIME AND THAT IS WHAT STOP-LOSSES ARE FOR."

Paddy Power Betfair (LON:PPB)

This is more of an aggressive one as, at the time of writing, the pattern was still forming. But after a sharp fall, there was some stability coming back to the bookie's share price. Added into this, the lows from May ahead of 6,600p had been good support, so if strength is going to be coming back anywhere, then this area is a good one to watch.

These engulfing patterns are not some sort of 'chart voodoo' that are going to be right every time. But, for traders and investors alike, they can be a heads-up that previous sentiment could well be on the turn, giving low risk/high reward opportunities across different timeframes and in a host of markets.

About David

David Jones qualified as a technical analyst in 1995 and started his City career as a currency analyst. He then went on to work for trading companies CMC Markets and IG Group as Chief Market Strategist. Since leaving the industry in 2013 he has been a presenter on BBC Radio 5 Live's Wake up to Money programme and the Chartist for Shares magazine. He is an active trader and private investor.

BY VICTOR HILL

OPPORTUNITIES IN FOCUS

ARTIFICIAL INTELLIGENCE IS ARRIVING SOON

Artificial intelligence (AI) in its most basic form has already arrived with popular gizmos such Amazon's Alexa and Apple's Siri. Even though both of these machines, while competent at retrieving basic information from the internet and verbalising it, do not have thinking skills and are therefore probably no more "intelligent" than an insect. Again sat-navs (GPS devices), while incredibly powerful tools, do not "think". There are reasons to suppose, however, that much more subtle and powerful forms of artificial intelligence will be arriving soon.

But what is AI? Artificial intelligence is essentially the technology by means of which computers can mimic human reasoning or thinking. But thinking actually entails many different skills. Learning, pattern-forming (of which language, voice and face recognition), induction, deduction, inference, interpolation, extrapolation, arithmetic calculation and sequencing are just a few of the thinking skills that human beings have developed over countless millennia and which have been reinforced in the last 2,500 years by the development of mathematics. Mathematics, of course, is itself in a phase of accelerated development by virtue of the rise and rise of computers.

If you could create a machine that exhibited all these different skills together, as humans do, then you would achieve what is now called *artificial general intelligence* or AGI. A machine with AGI could (ultimately) solve any problem that you present it with.

How soon will this happen? Who are the players who will last the course of the incipient AIG revolution? What if AIG ends up being controlled by just a few players? What sort of products will be revolutionised first? Who will be the winners and losers? How will our lives be transformed in the next 20 years?

Used positively, AGI could bring about huge advances in the human condition with massively improved productivity, health and well-being. Without proper safeguards, however, we might just be signing our own death warrants.

Deepening minds

In 2014, **Google (Alphabet (NASDAQ: GOOGL)** battled with Facebook for the control of DeepMind Technologies, the AI incubator established by chess grand master, neuroscientist, game theorist, entrepreneur and British genius Demis Hassabis. In the event, Google won out with a bid of $660 million (£503 million). Since then, it seems that the relationship between Google and its acquisition has been symbiotic. DeepMind has helped Google to commercialise its AI products. Reportedly, DeepMind's algorithms have been used to cut Google's energy bills across its massive server farms by "several percentage points". At the same time, Google has funded DeepMind in its quest to open up new frontiers in the science of AI.

DeepMind's unique selling point was that it had been working on algorithms inspired by biology to mimic human intelligence. Mr Hassabis, after a career as a computer gamer and chess player, enrolled at University College London (UCL) to obtain a PhD in cognitive neuroscience in 2009. He has often spoken of the quest to make computers more analogous to human brains.

One project which has received widespread publicity is DeepMind's collaboration with the UK National Health Service (NHS). In particular, Moorfield's Eye Hospital in central London, a renowned centre of excellence in eye surgery, has worked with DeepMind in diagnostics. According to the *New Scientist*, DeepMind's AI algorithms are now as capable of spotting early-stage eye disease as some of the world's top consultants[i].

Anonymised data from 15,000 NHS patients were fed into an AI system in order for it to identify ten key features of eye disease. The AI system was then used to analyse complex optical coherence topography (OCT) retinal scans which generate 3-D images of the back of the eyeball.

As of now, the AI system at Moorfields does not make a diagnosis in and of itself. Rather, it recommends which patients should be seen urgently by a consultant and which need to be kept under observation. Other expert systems used in healthcare such as Now Healthcare – which has two million users in the UK – are currently screening devices whereby initial symptoms can be referred to a medical specialist. It seems very likely, however, that the day is not far off when computers will be capable of diagnosis, even if in tandem with human experts.

All systems GO!

If you have watched the **Netflix (NASDAQ:NFLX)** movie AlphaGo, you will know the extraordinary story of how DeepMind created a computer programme that was able to outplay the greatest player of the game GO! This is an abstract strategy board game for two players, the aim of which is to surround one's opponent's territory. The game was invented in China more than 2,500 years ago and is believed to be the oldest board game still played to the present day.

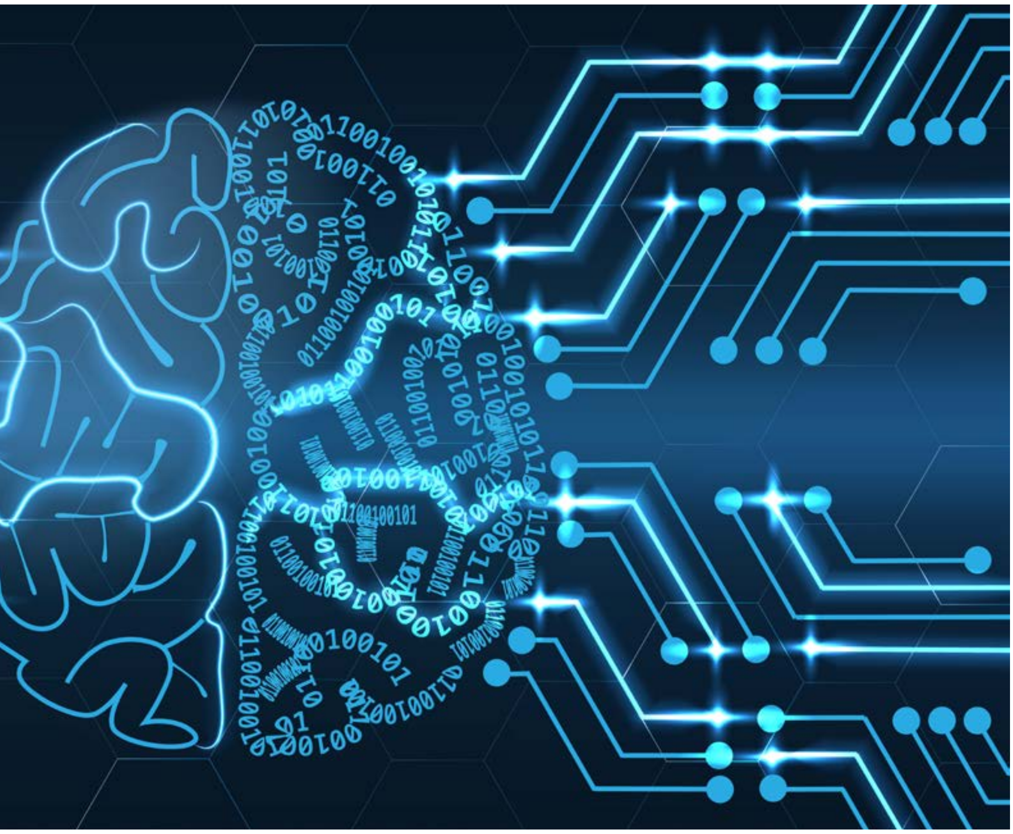
It is especially popular in South Korea where the epic contest between DeepMind's *AlphaGo* system and the GO! World Champion Lee Sedol took place in Seoul over 09-15 March 2016. The AlphaGo programme triumphed over the Korean master in four of the five games in the match. This is considered by computer scientists to have been a greater advance in AI than even the *Deep Blue* chess-playing computer created by **IBM (NYSE:IBM)**, which defeated a number of grand masters.

The Turing Machine has arrived

The great British mathematician and computer scientist Alan Turing (1912-54) conjectured in the 1930s that we would know that we had developed a truly intelligent machine when, the machine being placed behind a curtain, a human interlocutor assumed that he was interacting with a human being. For decades computer scientists and futurologists debated whether it was even theoretically possible for the *Turing Test* (as it became known) to be passed. Could a Turing Machine ever be built?

Well, it has already happened (though no curtains are necessary). As I reported in the June edition of this magazine, in May, Google unveiled a machine that was capable of making phone calls on people's behalf. The

"USED POSITIVELY, AGI COULD BRING ABOUT HUGE ADVANCES IN THE HUMAN CONDITION WITH MASSIVELY IMPROVED PRODUCTIVITY, HEALTH AND WELL-BEING. WITHOUT PROPER SAFEGUARDS, HOWEVER, WE MIGHT JUST BE SIGNING OUR OWN DEATH WARRANTS."



Computer studies rule OK!

The word is that some of the top universities incubating AI technologies are Cambridge in the UK and Massachusetts Institute of Technology (MIT) in the USA. University College London (UCL) and Edinburgh University also offer well respected degree courses in AI. Clearly, students graduating with a good degree in AI can command lavish salaries due to the shallow talent pool. Supposedly, the average salary at DeepMind is £260,000 per year. DeepMind has recruited 400 PhDs encompassing 50 nationalities in recent years.

It is worth recalling that most global businesses from manufacturing to finance employ huge numbers of programmers. Agricultural equipment manufacturer **John Deere (NYSE:DE)** apparently has more programmers than factory workers. **Goldman Sachs (NYSE:GS)** employs more programmers than Facebook[iii]. About one third of the super-bank's 33,000 employees worldwide are IT specialists.

"I AM SURPRISED THAT MORE WAS NOT MADE OF THE FACT THAT THE LEGENDARY TURING TEST HAS NOW BEEN PASSED."

Duplex artificial voice software almost perfectly imitated a human at the end of the line and successfully booked a haircut and then a table at a Chinese restaurant – without arousing any suspicion that it was a robot. Duplex can even make human-like thinking noises like *um* and *hmmmn*...

Of course, *Duplex* might struggle a bit if it had to talk about anything other than booking haircuts or meals. (I once tried to have a conversation with *Alexa* – and found it pretty one-sided.) But I am surprised that more was not made of the fact that the legendary Turing Test has now been passed.

Recent acquisition activity

Facebook (NASDAQ:FB) bought Bloomsbury AI in July for a reported $30 million, with $15 million going to its founder, 40-year old Guillaume Bouchard. Bloomsbury started life as part of a research team at UCL. It has been developing rapid language processing whereby machines can scan texts at speed and then answer questions about them. Boucher supposedly joined the European start-up incubator Entrepreneur First without a business model. He later obtained funding from the London Co-Investment Fund.

The fear is that, once again, a brilliant British start-up has been acquired by an American behemoth, which could relocate its technology and brains to Silicon Valley if it chose to do so. The opposing view is that, if young potential entrepreneurs believe there is a chance of building viable businesses rapidly, more will come forward. Moreover, the team at Bloomsbury – which includes 12 PhDs – will get access to unimaginable resources under Facebook's wing.

Twitter (NASDAQ:TWTR) also gobbled up London-based Magic Pony from Rob Bishop and Zehang Wang for a reported $75 million in 2016. The company specialised in the ability to create quality videos from pre-digital grainy footage. At least two other British AI start-ups have been acquired by Twitter. Moreover, many major banks – amongst which, reportedly, JP Morgan, Citibank and UBS – are setting up their own internal AI divisions.

In 2016 Amazon Web Services acquired Cloud9[ii], a San Francisco-based start-up that has built an integrated development environment (IDE) for web and mobile developers to collaborate together. The fact is that Silicon Valley has the huge economies of scale in technology and is acting like a black hole into which all surrounding stars are eventually consumed. Except for Chinese ones (see below).

Rain check: the death of Moore's Law

Virtually all of the advances in AI/AGI are coming from incredibly more efficient software – better and cleverer algorithms. On the hardware side of the equation, the picture is less encouraging.

Hitherto, most computer scientists were adherents to *Moore's Law*. This stated that the number of transistors in a dense integrated circuit would increase geometrically. The idea was named after Gordon Moore, a co-founder of Fairchild Semiconductor and **Intel (NASDAQ:INTC)**, whose 1965 academic paper described how the number of components in an integrated circuit (chip) would double every two years. He projected that this rate of growth would continue for at least another decade. Intel executive David House later predicted that chip performance would double every 18 months as a result of using more transistors and with these transistors having faster processing speeds.

But, according to Bill Chappell of DARPA (Defense Advanced Research Projects Agency – the agency of the US Department of Defense which supposedly pioneered the internet), as reported by the *Financial Times*, Moore's law died a decade ago[iv]. The fact is that the pace of advance in microchip technology has slowed – and there are good scientific reasons for this. (Once you get to the atomic level, space runs out.) Moreover, chip companies like Intel have been struggling with lower returns on their R&D activity.

Microchip (semiconductor) producers have been on a steady upward trajectory for the past 60 years or so. But that trend is now faltering. DARPA's research in this domain is focused on *flexible chip architecture.* Until now, chips are produced which are internally configured at the moment they are manufactured – and which cannot be subsequently updated. *Flexible chips* – semiconductors, microprocessors – would be chips that can be re-configured and updated by users or software creators at any time. This will be essential for real machine learning to become reality – though it would give a new universe of possibilities for malevolence to potential hackers.

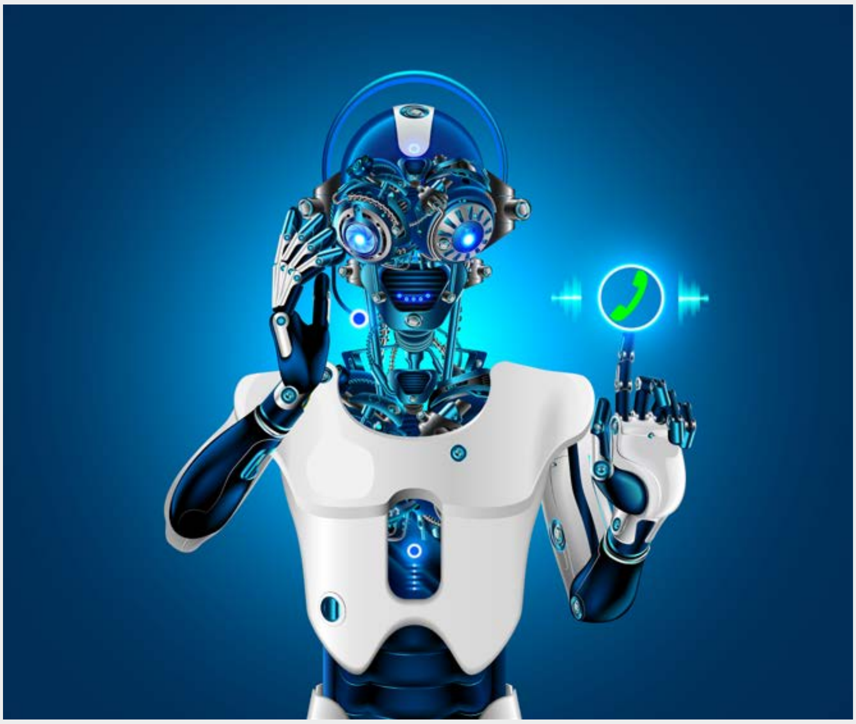
In the private sector, **Nvidia Corporation (NASDAQ:NVDA)** and Google are also working on this. Nvidia's graphics processing units were designed to manipulate video, but the company has now crossed into AI. Microsoft has also entered the frame. Its *Project Brainwave* is, initially at least, a programme to manage its data centres using AI.

AI in practice: Marks & Spencer

The troubled yet still iconic British retailer **Marks & Spencer (LON:MKS)** reported a huge slump in pre-tax profits in the year to the end of March 2018 – a second year of losses. Some of these losses were related to pre-announced store closures. Last month, the leaner and meaner retailer announced that it was teaming up with Microsoft in a "game-changing partnership". Already, all calls to M&S's 640 stores and contact centres are now handled via [Twilio] technology, the California-based tech company. The system can handle about 12 million customer queries a year, Twilio says.

The retailer wants to harness AI to improve the shopping experience for its many millions of UK customers. What they are working on with Microsoft is a radically advanced checkout experience which would eliminate queues altogether. The only other retailer to have pulled this off is Amazon with its limited number of physical stores in California.

Chief Executive Steve Rowe has announced a five-year transformation plan aimed at "restoring the basics". As an admirer of M&S, I love the offer but find the checkout process often poor by comparison with other stores. Good luck with that then: your customers are watching.



Some commentators suggest that advanced robots may well need different types of processors from static computer-brains. One company working on this is **Qualcomm (NADAQ:QCOM)**. I have taken the view that robotics is largely about hardware – the software used to animate robots is not exceptional. That is why I believe that Google sold [Boston Dynamics], its amazing robotics arm, to Japan's **Softbank (TYO:9984)** last year. Robots do not have to be intelligent *per se*: they just need to be plugged into intelligent computers – remotely, of course. Intelligence in the cloud.

One bottleneck within each microprocessor is the need to transfer information between the memory component and the logic circuit and then back again, which slows down performance. One alternative, already proposed by DARPA, is to move the processing power to the point where data is stored – so-called *data-centric computing.*

It may be that new entrants into the sector will be required to shake up chip design. Some have speculated that the tech majors – Amazon and **Microsoft (NASDAQ:MSFT)** (amongst them – will soon start to design their own chips.

The promise of Quantum Computing

Quantum Computing (QC) promises to outclass even the world's fastest supercomputers in service today (at least for certain types of iterative mathematical problems). The problem is that, even though computer scientists believe that it is theoretically possible, no one knows how close we are to really making it happen.

Conventional computers, as I have explained before on the MI website, use arrays of bytes, each of which consists of 16 bits. Each bit, in turn, is either on or off – one or zero. Quantum computers will – in fact already do – use qubits, the quantum equivalent of computer bits. What is weird is that any of these can be on, off, both or neither...They are even capable of superposition – meaning that, at the quantum level, a particle can be in two places at the same time...Qubits, at least in Google's experimental quantum computer, reside in tiny loops of superconducting wires which are cooled to somewhere near absolute zero. What's more, their ions can be trapped in protective magnetic fields.

"QUANTUM COMPUTING (QC) PROMISES TO OUTCLASS EVEN THE WORLD'S FASTEST SUPERCOMPUTERS IN SERVICE TODAY."

The Quantum Computing Report is a website which recently listed more than 70 firms which are actively engaged in QC. According to *The Economist*, Google, IBM and Microsoft are vying with one another to attract developers onto their own QC platforms[v].

The first aspect of QC is that even the most everyday QC machine will have an unbelievably large memory. A 64-qubit computer will have enough memory for 18 quintillion numbers. (A quintillion is a number equal to 10 to the power of 18.) The second aspect is that quantum computers would operate at unimaginable speed.

The problem is that qubits are adversely affected by any kind of perturbation such as vibration, light or heat – which suggests that we are unlikely to have QC-powered laptops any time soon, if ever. They have to be kept in total isolation such as down a mineshaft in a fridge colder than outer space.

In 2016 IBM built a 5-qubit computer and then in 2017 a 20-qubit one. Its latest version, announced last November, has 50 qubits. But Google's latest *Bristlecone* QC machine, unveiled in March, has 72 qubits. The problem is that, according to John Preskill of the California Institute of Technology, as reported by *The Economist*, qubits as currently constructed can be "noisy" – meaning they are prone to error.

Chemical giants such as **BASF (ETR:BAS)** and **Dow DuPont (NYSE:DWDP)** suspect that QC could help them to develop radical new materials. Finance champions such as **Barclays (LON:BARC)** and **JP Morgan Chase (NYSE:JPM)** have established teams in-house to determine whether QC could be used in bank risk management. But the leaders in the development of the physical hardware are Google, IBM and (counterintuitively for a software company) Microsoft. Somewhat behind them are Amazon and China's **Alibaba (NYSE:BABA)**. Last month Google released *Cirq*, a toolkit for developers interested in QC.

For the foreseeable future, QC will only be able to be accessed by governments, principally those of the USA and China. If QC were to go native, dodgy punters might have the computer power to decode secret encryptions so as, for example, to hack banks. That's why governments of the future will restrict access to it.

In order to achieve "quantum supremacy", a quantum computer must be able to solve a problem faster than a conventional computer. In 2016, a team led by Sergio Boixo at Google published an academic paper which showed that no conventional supercomputer could ever simulate the performance of a 48-qubit quantum computer. Recently *New Scientist* reported, however, that Boixo and his colleagues have devised an algorithm that can permit a conventional computer to outperform a quantum computer[vi]. Such conventional supercomputers have been found to make small errors in problem solving – but so do quantum computers. It is therefore still unproven that quantum computers, even if they were more economically viable, will ever take over completely from conventional machines.

Amongst start-ups in this space which are worth checking out there are Rigetti Computing, QxBranch, IonQ, which has developed a programming language called Q#, and Zapata Computing, which was spun out of MIT.

AI in practice: Internet dating

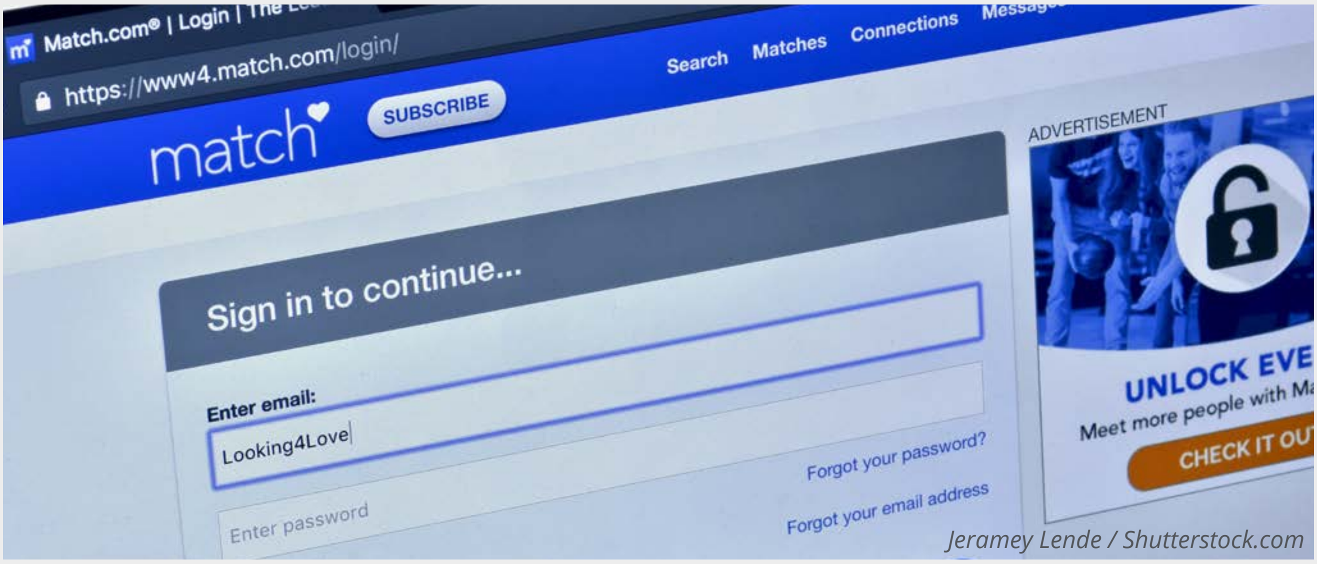
Match Group, which owns Tinder, Plenty of Fish, Match.com and which bought Hinge in June, is apparently investing heavily in AI. Finding partners online has gone from being something people would not admit to ten or fifteen years ago to being main-stream today, particularly in the under-35 demographic. Internet dating was worth £12 billion to the UK economy last year. Tinder itself has transformed dating etiquette since its inception in 2012, before which all dating sites were subscription-based.

On Bumble, founded by Whitney Wolfe – who left Match Group after filing a claim of sexual harassment – only women can initiate the first contact. In 2016, Moscow-based Badoo, supposedly the largest dating site in the world, with nearly 400 million registered users, bought a majority stake in Bumble. In January, Badoo announced plans to sell its near 80 percent stake in Bumble for a reported $1.5 billion. During negotiations, however, Tinder filed a lawsuit against Bumble, claiming patent infringement.

One AI tool that Badoo employs is the "lookalike" function whereby users can upload photos of someone they find attractive. Badoo then uses facial recognition technology to find similar-looking people searching for love...Match.com has created a virtual assistant called "Lara" which can talk to users...

Happn is a website that connects people who have just walked past one another in the street (assuming they are both carrying smartphones – which is now the norm). It now boasts 50 million users. It offers an interactive map that shows all users who have visited a particular venue over the last seven days.

In some ways all these dating apps are following in the footsteps of Amazon, **Spotify (NYSE:SPOT)** and Netflix, which led the way in informing people: *If you liked X, then you will probably like Y*...Facebook is to launch a dating app shortly, having previously allowed dating aps to nestle within its own pages. It seems like a lot of over-40s regard Facebook as a dating app already. Hinge's model is based on finding matches between people who are already Facebook friends. If Mr Zuckerberg takes over the dating function completely, he might just turn the trickle of folk now leaving the social media leader into a deluge...I would certainly leave Facebook myself if they start pairing me with friends of friends... Another reason to short Facebook, methinks.



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A new Cold War...

Some commentators have suggested that the quest for dominance in artificial intelligence is the modern equivalent of the space race during the Cold War. Last month, the US Department of Energy announced that it had overtaken China in constructing *Summit* – a giant computer brain destined to become intelligent. This will have a theoretical speed of 200 *petaflops*. (I had to look up the word, too: a petaflop is a unit of computing speed equal to one thousand million million (10 to the power of 15) floating-point operations per second.) That's equivalent to *Summit* doing in a second what virtually the entire population of the globe making a calculations each second for an entire year could achieve...

Yet China still has more supercomputers than the US. Moreover, China has made progress in quantum satellite technology which will potentially make their satellite communications un-hackable. President-for-Life Xi has expressed his aspiration many times that China be the number one country in AI. Last month, Mike Pompeo, The US Secretary of State, announced a $113 million Asian technology fund in a bid to outflank China's New Silk Road project – which is about infrastructure, trade and political influence.

"IF SOMEBODY COULD CREATE A ROBOT THAT EXPERIENCED THE WORLD THROUGH SENSES AND WHICH WAS TRULY SELF-CONSCIOUS, THEN THAT WOULD NOT BE A MACHINE – IT WOULD BE A NON-ORGANIC LIFE FORM."

The surveillance revolution – good but worrying

It is almost a cliché that Britain has more surveillance cameras per capita than any other nation. (I have seen no proof that that is true.) The problem with surveillance cameras hitherto is that they need to be watched by human security guards. Now, combining CCTV with face recognition technology, police and other agencies can track suspects in real time electronically.

Police in Orlando, Florida, actually track unknown persons on CCTV looking for tell-tale signs of suspicious behaviour. AI systems have been fed thousands of YouTube videos showing vandalism, street-fights, arson, robbery and terrorism. Then they compare these images to "normal" non-criminal behaviour. The system creates a probability ranking system which flags up potentially criminal behaviour. There could be, however, perhaps inevitably, false alarms.

The elusive nature of consciousness

Even if a machine could be built that was recognisably "intelligent" in so far as it could mimic human cognitive skills, there is no reason to suppose that it would be aware of itself. Humans (and higher order animals – monkeys, dogs, elephants etc.) are self-aware in so far as they are conscious of their unique identity. We can retreat inside our heads and be conscious of the contents of our own minds. In fact, *mindfulness* therapy – a popular modern therapy derived from Buddhist practice – encourages us to do precisely that in order to enhance our mental well-being.

The problem is that, while thousands of books have been written about it over many centuries, and even given the huge advances in science and mathematics over the last two hundred years, *philosophers and neuro-scientists cannot agree on precisely what consciousness is.* We know that it is fundamental to the experience of being human and we know that it is somehow generated by the brain – but it is very difficult to pin down how it arises.

The issue is that human beings (and dogs, come to that) are not just brains attached to bodies but are *mind-bodies* with a complex nervous system which connects muscles and nerves to the brain. We experience the world through our bodies via the gift of senses. The western tradition is that human beings have five senses (taste, smell, sight, hearing and touch), though the eastern tradition holds that there are six (the mind itself being a type of sense). Other animals have additional senses which we cannot even imagine (for example bats and dolphins navigate by means of echo-location, and octopi can "taste" with their tentacles). Computers, in contrast do not have sense organs – yet.

You might argue that some computers are already developing vision in so far as they can make sense of data received from cameras. Again, computers can already interpret language which they register through microphones using voice recognition technology. It is not inconceivable that computers could be given the senses of smell and touch. So eventually, computers – robots – might be built that had a direct experience of the world as we and as animals do. But would they be "conscious"?

In *Other Minds*[vii], the philosopher Peter Godfrey Smith explores how evolution has developed "intelligence" arising from increasingly complex nervous systems several times over the last 600 million years. Octopi are surprisingly "intelligent" – they might even be self-aware. But they have totally different bodies and nervous systems to our mammalian models. They have a *different embodiment* and therefore experience their environment in a way that is very difficult for us to imagine. Similarly, any "intelligent" computer stroke

Professor Hawking's warning

In December 2014, the late, great Professor Stephen Hawking warned that the move to create thinking machines could pose a threat to our very existence. He told the BBC that "The development of full artificial intelligence could spell the end of the human race." His warning came in response to a question about the upgrade of the world-famous voice technology that he, having no voice tract, used to communicate with the world[viii].

The pre-eminent physicist said the primitive forms of artificial intelligence developed so far have already proved very useful, but he feared the consequences of creating something that can match or surpass human intelligence. He thought that once hyper-intelligent machines became established they would use their intelligence to create even more intelligent machines *ad infinitum*. Humans, who are the products of biological evolution could not compete *and would be superseded.*

Rollo Carpenter, the creator of *Cleverbot* spoke out against Professor Hawking's warning at the time. Amusingly, I have just typed the following question into *Cleverbot: What do you think about Professor Hawking's warning about AI?* The reply came back immediately: *I don't watch rugby!*

Over the longer term, technology entrepreneur Elon Musk – about whom I wrote in August – has warned that AI is *our biggest existential threat.* Though, surely we shall need AI in order to fulfil Mr Musk's dream of colonising Mars.

robot, even if it could replicate our five senses, would have a *different embodiment* to ours.

If somebody could create a robot that experienced the world through senses and which was truly self-conscious, then that would not be a machine – it would be a non-organic life form. Probably, as robotics develops, robots will be given organic characteristic – for example we might grow them in test tubes using advances in the manipulation of animal DNA! More likely, human beings will be given robotic implants. One computer scientist – Kevin Warwick – has already implanted a chip in his arm which can control machinery. So in the very far future, robots will become more like humans, and humans will become more like robots...Cyborgs will become the norm – especially for inter-galactic travel.

Concerns about jobs

We should all take notice when even central banks are concerned. On 20 August, Bank of England Chief Economist, Andy Haldane, warned that artificial intelligence and machines have the potential to make a huge number of jobs obsolete, with thousands of UK workers facing unemployment as they are replaced by robots.

Mr Haldane told the BBC that the *Fourth Industrial Revolution* would be on a "much greater scale" than the previous three, and said the UK will need a skills revolution to avoid mass unemployment. He said that previous industrial revolutions had had *a wrenching and lengthy impact on the jobs market.* The publicly-funded economist said some jobs will be created as a result of the new technology, with roles that focus on human interaction, while manual jobs will be at risk (they have been for a long time).

The biggest threat to jobs is not androids, but intelligent machines that can engage in conversation with humans. To this extent, call centre workers are particularly at risk. Last month we learned that Marks & Spencer is moving 100 switchboard staff to other roles as *chatbots* take over their duties. M&S is now using Twilio's speech recognition software and Google's *Dialogflow* AI tool to respond to customers' verbal requests. Their call is then routed to the appropriate store.

Several million people are employed in call centre roles in the US and UK and millions more rely on such work in countries like India and the Philippines. Bangalore is still the call centre navel of

the world. What are call centre workers going to do when they get their P45s? The fact that such luminaries as Andy Haldane are so concerned about the impact on employment over the short-term suggests that this epiphany may occur sooner than many people think.

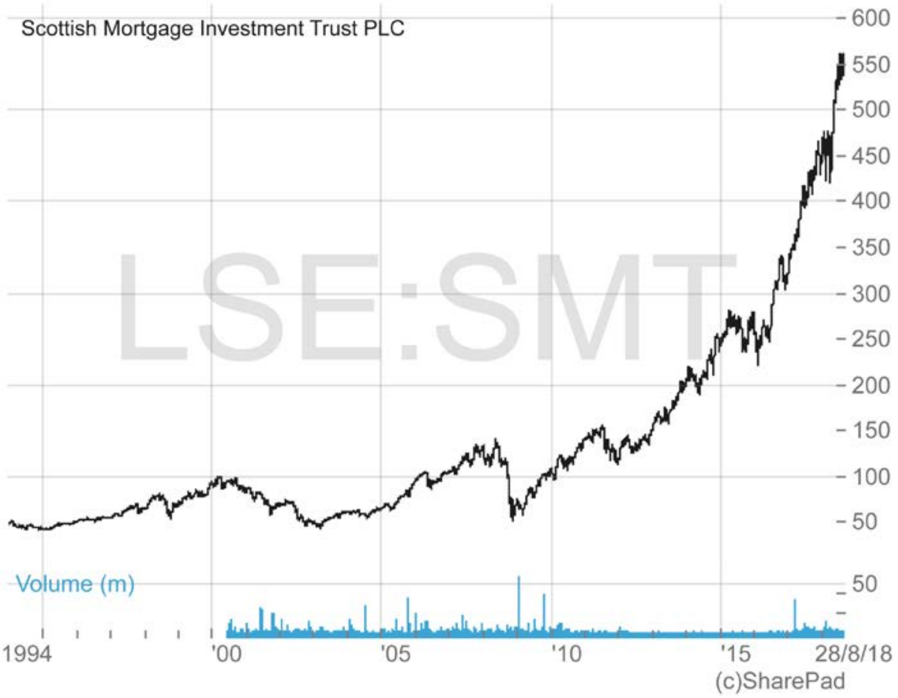
Action

I am predicting that call centres operated by human beings will become a thing of the past within just ten years – they will be replaced by *chatbots* running on servers that could be located almost anywhere. And within 15 years, all of us will have access – either through state-funded healthcare like the NHS or via increasingly affordable private healthcare providers – to robot doctors which will actually track our physical parameters and offer diagnostics when we get sick. But the arrival of a super-intelligent computer with human characteristics, like *Hal* in *2001: A Space Odyssey*, is probably three or four decades away...But then who really knows?

Recently a number of influential analysts and opinion leaders have warned that the "tech" sector is riding for a fall. I wrote an article in August, however, on the MI website, arguing that "tech" is not one thing – some FAANGs have more teeth than others. I foresaw that companies that facilitate the flow of quality information and which promise advances in AI have bright futures – while social media (Facebook and Twitter) have probably already peaked.

Of the major tech players which are at the forefront of the AI/AGI revolution, the out-and-out leaders are Google, Amazon, Microsoft and IBM – and it will pay to have appropriate direct exposure to these behemoths going forward. Their stranglehold on AGI will have huge social and political consequences – but that is for another day.

As usual, there are a host of dazzling minnows in this space, many of which will be gobbled up by the above-mentioned giants. Get exposure, therefore, to a good tech-inclined fund such as the **Janus Henderson Global Technology Fund** run by Alison Porter, Graeme Clark and Richard Clode or Baillie Gifford's **Scottish Mortgage Investment Trust (LON:SMT)** run by James Anderson, which has a tech bias.



About Victor

Victor is a financial economist, consultant, trainer and writer, with extensive experience in commercial and investment banking and fund management. His career includes stints at JP Morgan, Argyll Investment Management and World Bank IFC.

i New Scientist, 18 August 2018, page 5.
ii See: https://techcrunch.com/2016/07/14/amazons-aws-buys-cloud9-to-add-more-development-tools-to-its-web-services-stack
iii We've only scratched the surface of tech possibilities, By Alliott Cole, Daily Telegraph, 26 June 2018.
iv Moore's Law loses power for US chip industry, by Richard Waters, Financial Times, 30 July 2018, page 17.
v The Economist, 18-24 August 2018, page 49.
vi New Scientist, 18 August 2018, page 10.
vii William Collins, 2018.
viii See: https://www.bbc.co.uk/news/technology-30290540

BY FILIPE R. COSTA

THE MACRO INVESTOR

DOES THE FLATTENING OF THE US YIELD CURVE HERALD A RECESSION?

The US yield curve is dangerously turning flat, which historically has been one of the most consistent recession predictors.

"We are at some risk of a yield curve inversion, later this year, early 2019. If that happens, that would send a negative signal for the U.S. economy. I want the yield curve to be an issue now, not after it inverts. So let's see how that debate process goes."

- James B. Bullard, in a speech on crypto-currencies at the *CoinDesk Consensus*, 2018

From full employment towards recession

We are in the 10th year of the rally after stocks bottomed out in March 2009 in the aftermath of the financial crisis, which by now is already the longest bull-run ever. For those correctly timing the market, the gains have been huge, as the S&P 500 experienced a three-fold increase and the Nasdaq a five-fold increase.

Waiting for the central bank to step in and blindly buying the whole market proved to be the simplest manner of making money in financial markets in the aftermath of panic. But no strategy makes money at all times. The market, as a whole, will sooner or later decline again and another recession will set in. The million-dollar question is: *When will that happen?*

The US economy is currently in great shape. The latest GDP figures point towards a 4.1% annualised growth rate, while the unemployment rate sits at 3.9%. These numbers depict a healthy economy operating at its full power. Inflation is still under control between 1.9% and 2.9%, depending on the proxy used. Under such a scenario, a recession may seem far off. But we shouldn't ignore the facts. We are currently in the 10th year of a bull market, which by historical means is already the longest. At the same time, we are in the late-cycle phase of the business cycle, with the central bank having already reverted its policy stance, hiking its key rate seven times from 0.25% at the end of 2015 to the current 2.00% level.

The US economic cycle is maturing and while there is still some room for GDP to grow and for stocks to rise, investing in the whole market is no longer the easy bet it used to be. One of the most powerful metrics confirming this scenario is the flattening of the US yield curve. The gap between the yields implicit in long-term Treasury bonds and short-term Treasury bonds is shortening, like it has done in almost every other period preceding a recession.

"INVESTING IN THE WHOLE MARKET IS NO LONGER THE EASY BET IT USED TO BE."

"CENTRAL BANKERS AND ANALYSTS, LIKE ANY OTHER MARKET PARTICIPANTS, SUFFER FROM OPTIMISM BIAS, WISHFUL THINKING, POSITIVE OUTCOME BIAS AND 'THIS TIME IS DIFFERENT' SYNDROME."

For now, the widely used spread between a 10-year yield and a 2-year yield is still positive. But it has been flattening to the current 0.24 value and it is dangerously approaching the negative side. While a negative number is not a kind of automatic trigger, in the past it almost always preceded recessions.

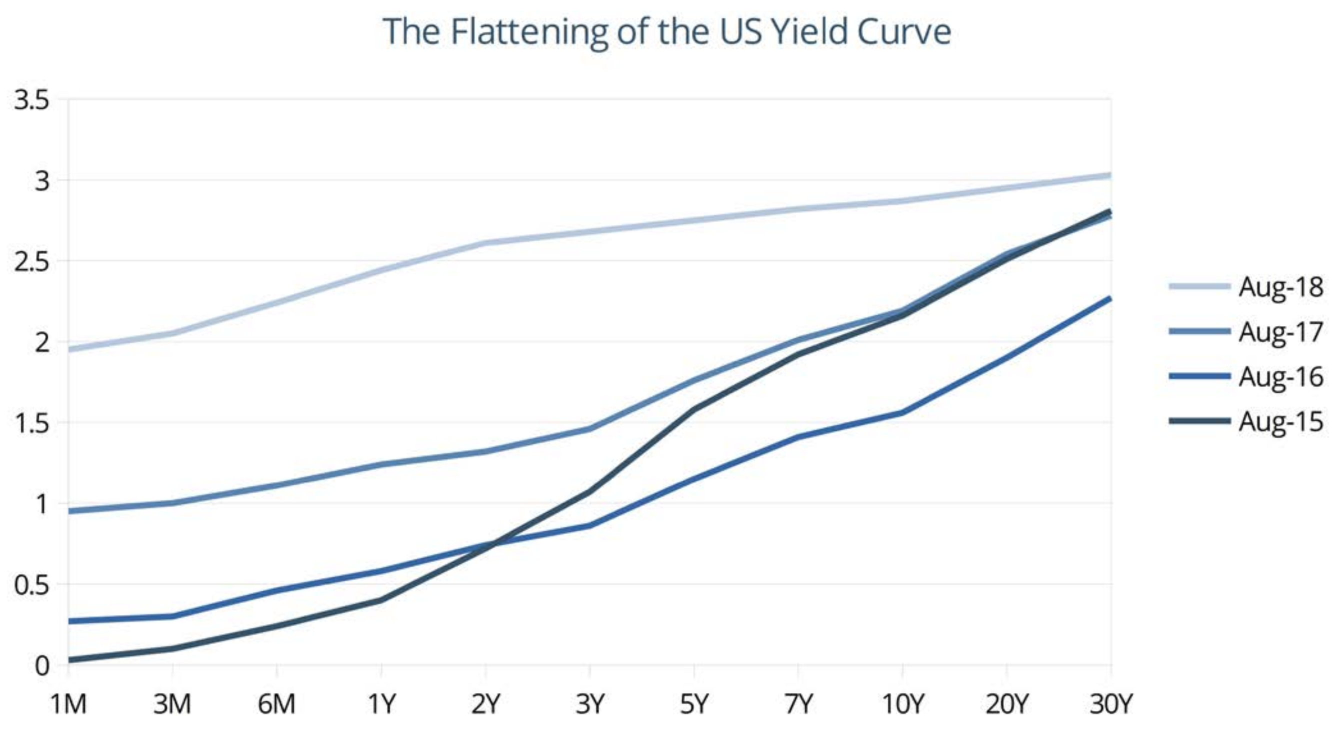
With all the above in mind, we still have time to do something. It is time to adjust the portfolio for a late-cycle phase of the business cycle and prepare for a recession that will certainly not occur in 2018 but may be on the cards for mid-to-late 2019. It is not time to abandon the stock market yet, but it is time to adjust one's holdings, as the technology sector that has been driving returns up to now will most likely lose its appeal.

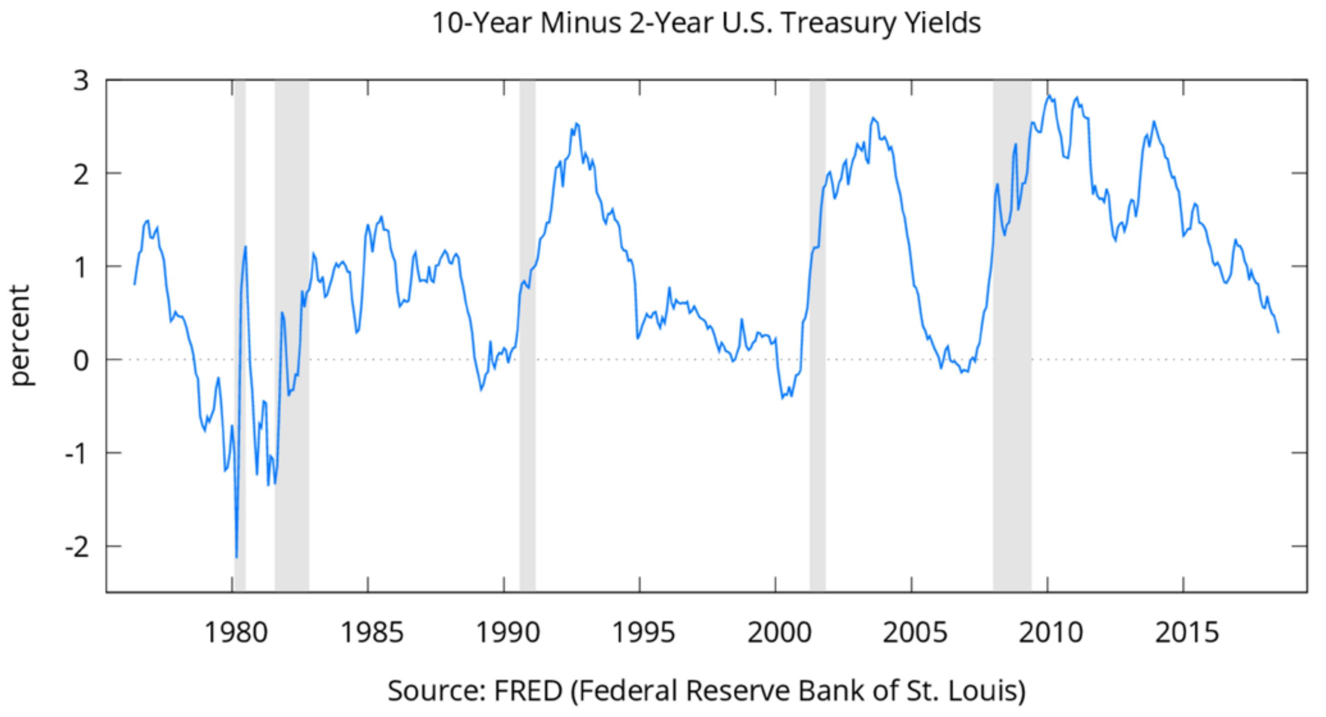
This time isn't different

"I don't think that recession probabilities are particularly high at the moment, any higher than they normally are", said Jerome Powell, chair of the FED, a few months ago, when asked about the flattening of the yield curve. Powell, along with many analysts, believes that the yield curve is inverting just because the FED wants it to. If at any time the FED didn't want it to, it could easily sell part of its $3 trillion bond portfolio to depress long-term bond prices and then push long-term yields higher as a consequence. Others claim that the main reason behind yield curve flattening is an unusually high demand for long-term US Treasuries.

In 2006, Ben Bernanke (by then, chair of the FED) also expressed a similar scepticism when asked about the dangers pertaining to an inverted yield curve. *"I would not interpret currently very flat yield curve as indicating a significant economic slowdown to come"*, he then remarked. But as time would tell, he was plain wrong, as the US economy suffered a huge recession and one of the most significant equity value declines ever.

The human brain will always suffer from cognitive biases that push us to predict better outcomes than reality





advises. Central bankers and analysts, like any other market participants, suffer from optimism bias, wishful thinking, positive outcome bias and *"this time is different"* syndrome. We all have a refined ability to ignore past negative outcomes.

The central bank controls short-term interest rates. Modern central banks use overnight interest rates as their key policy tool for monetary action. To a large extent, the shape of the short spectrum of the yield curve is dictated by the central bank. If the FED decides to hike its key rate from 2% to 16% tomorrow, it really can do it. As a consequence, the overnight, 1-day, 1-month and possibly the 3-month yields would rise to near 14%. But the effects on the 10-year yield and beyond would not be as large. Long-term bond yields are more sensitive to bond traders' outlook for growth and inflation. After a bold decision like the one depicted here, these bond traders would most likely see it as insane and highly likely to be reversed. Yields on long-term debt would certainly rise but would eventually moderate, because they're exposed to expectations of growth and inflation over a long period of time and not just to a single policy decision. All this goes to show that, while short-term rates are in the hands of the central bank, longer-term rates depend more heavily on market expectations about the future path the economy will take, and therefore are not directly in the hands of the central bank.

"THE LONGER SPECTRUM OF THE YIELD CURVE ISN'T UNDER CENTRAL BANK CONTROL."

It is true that the FED can sell long-term assets from its trillion-dollar portfolio to push long-term yields higher. But a central bank rarely proceeds in such a way. And unlike bond purchases, bond sales are much more limited. With the Federal Government budget deficit rising quickly, such action would put the Government under pressure from a rapid rise in financing costs. At the same time, any artificially-induced rise in long-term yields, in a large country like the US, would likely be reverted, as many more international investors would be attracted by the premium yield.

This leads us to the very beginning: the longer spectrum of the yield curve isn't under central bank control. This way, the yield curve is not the result of a maths equation where the central bank can quickly change slope and intercepts; it is a complex system where many players interact, and no one is in overall control. At this point, and against central bank will, it is predicting trouble.

The current state of the economy

Central banks are usually bound to keep inflation under control rather than to boost growth. In the particular case of the FED, there is a dual mandate to keep an eye on both; but for many other central banks around the world, the mandate puts price stability at the top of priorities. Nevertheless, growth and inflation are related to a high degree, as high growth usually ends in rising inflation, whereas low growth is usually followed by price declines.

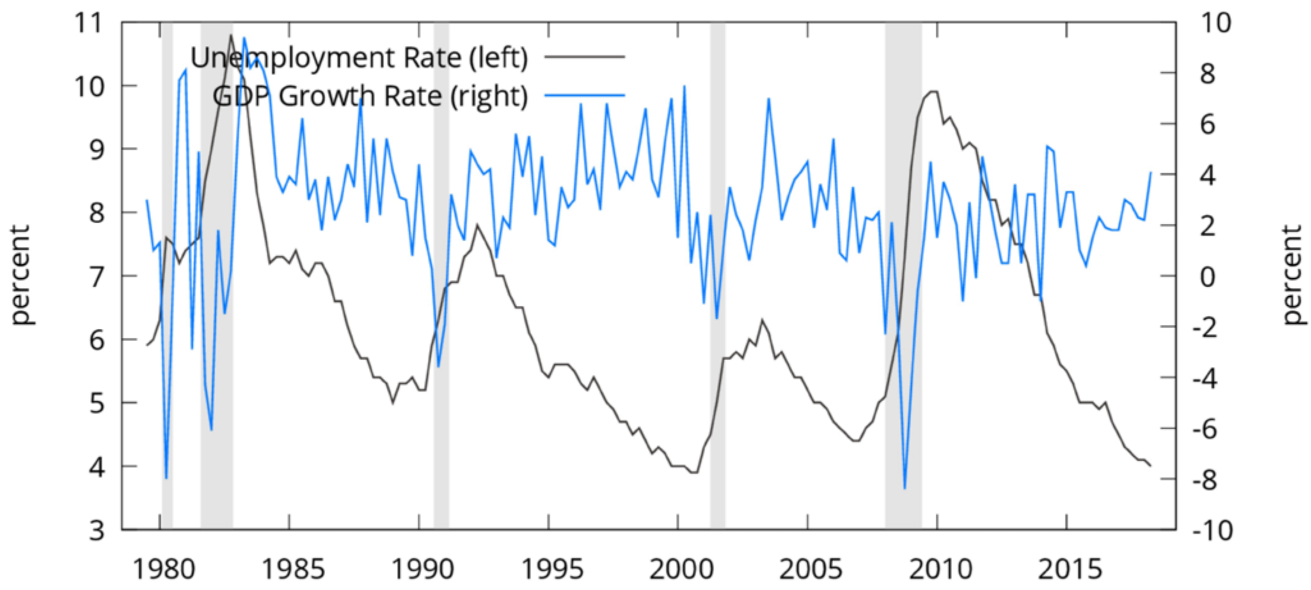
At this point, the US economy is growing at an annual pace of 4.1% while the unemployment rate is at 3.9%. The economy is technically operating at full employment, which is a mature state of economic expansion. If there's something foreseeable regarding monetary policy, it can only be monetary tightening, which corresponds to the FED increasing its key interest rates. The central bank has already hiked its rate target seven times since the end of 2005, from 0.25% to 2.00%. With Donald Trump promising some bold fiscal action, the risk is now concentrated on prices, not growth, which means the FED will be fully committed to keep prices tight through interest rate hikes. This fact indicates we are at an advanced stage of economic expansion.

The reaction from bond holders so far has been to purchase bonds in the long spectrum of the yield curve as they expect economic activity to slow down in the near future. Interest rate hikes press yields higher across maturities, but bond holders' purchases at the longer end of the curve press those yields down. The final result is an increase in short-term yields and a less than proportional increase in long-term yields, which leads to the flattening of the yield curve.

When short-term yields are rising faster than long-term yields, monetary policy should be re-evaluated for possible overtightening. Because monetary policy has several lags, it can often lead the economy towards a recession a few quarters later. This is the main reason why an inverted yield curve shouldn't be ignored.

If we look at the FOMC Projections Materials issued in June, the federal funds rate is seen by the policy committee at 3.1% next year and 3.4% in 2020, and at 2.9% in the longer run. The FED already foresees an inversion in monetary policy somewhere after 2020, as the longer run rate of 2.9% is below the 3.4% rate projections for 2020. This further contributes to an inverted yield curve.

U.S. GDP Growth Rate and Unemployment Rate



Source: FRED (Federal Reserve Bank of St. Louis)

The four phases of the business cycle

While there is no unified view about how many different phases there are in the business cycle, we can break it down into four very simple stages.

Early-Cycle Phase

This phase starts just after the nadir – the point where economic activity bottomed out. It is characterised by a sharp recovery from recession, with growth inflecting from negative to positive at first, and then accelerating. By then, the central bank should have cut interest rates significantly and eventually engaged in some asset purchasing programme. Monetary easing would likely continue, as the central bank tries to provide liquidity to the economy in order for credit availability to reach all sectors. At this point the worst is already over. Business inventories are very low, while sales growth is improving. It is a good time to purchase equities, as the stock market has been battered down due to scared investors trying to get out of the market, all at the same time along with the extensive margin calls and algorithm selling that turn any panic into a complete collapse. Historically, the stock market shows a high performance during the early-cycle phase, as stocks recover from the losses accumulated during the recession phase. As this phase is characterised by interest rate cuts and the first signs of recovery, investors should target stocks that benefit from these factors. Consumer discretionary and financials should lead the advance. Other sectors like information technology, real estate and industrials should also do better than the average and be good bets for the transition period to the next phase.

Mid-Cycle Phase

This is the longest phase, occurring after the initial recovery from recession, during which economic growth is consistent over time, albeit more moderate than at the early step up from recession. The accommodative monetary policy is now translating into real results. Credit flows to the whole economy and economic activity gathers momentum. Companies present consistent and strong profits and the central bank may opt to tweak its policy to a more neutral stance. In this phase, the equity market usually does well as a whole, and companies that have previously lagged now lead the gains. Companies in the information technology sector usually do particularly well at this stage. However, it is relatively difficult to point to other outperforming sectors, as past business cycles have seen different groups of winners during this phase, depending on the adjacent economic conditions.

Late-Cycle Phase

This is the last phase of the economic expansion, usually characterised by an overheating economy. At this point, the unemployment rate should be near or below sustainable levels, inflation is accelerating, and economic growth rates may already be losing pace. The central bank is usually more concerned with rising inflation, as the economy seems to still be in good health, and monetary policy starts tightening. Profit margins start deteriorating, inventories start building up and sales growth starts declining. In this phase, the stock market typically still shows a positive performance by historical standards, but much more modest than for the early and mid-cycle phases. Still, stocks start to look expensive when prices are compared to earnings. During this phase, sectors like materials, and energy should outperform because they benefit more than others from price rises. Defensive-oriented stocks also do well, as is the case with healthcare, consumer staples and utilities.

Recession Phase

During this phase, a contraction in economic activity occurs. Credit conditions tighten, leaving many companies out of business. Corporate profits decline the most and the central bank starts cutting its key rate and adopting additional measures to increase liquidity levels. Most of the time, the more accommodative monetary policy just comes too late to avoid recession. During this phase bonds are better performers than stocks, as a flight to safety, along with monetary easing, leads bond prices higher. Stocks have an awful historical performance during recessions as a whole. During recessions, sectors that are less economically sensitive do better. This includes consumer staples, utilities, telecommunication services and healthcare. Some of these companies usually show high dividend yields and therefore exhibit bond-like characteristics, which explains their good relative performance during recessions. Utilities and telecommunications are good examples. At this point, information technology, materials, real estate, financials and industrials should be avoided, as they're typically the worst performers.

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How should investors allocate money?

The first point before deciding how to allocate money in a portfolio based on the yield curve predictions is to identify the exact phase of the business cycle we're in. After more than nine years of a bull market (the longest ever in the US), with the economy growing above sustainable levels, inflation already accelerating, and the central bank tightening its policy, we certainly fit well in the late-cycle phase of the business cycle.

That means the economy is in good economic shape. Unfortunately, it also means that we're closer to the recession phase. While the rally that saw the Nasdaq Composite quintuple in value since March 2009 until today is inspiring, it doesn't have much margin to persist over time. Today's big companies like Amazon, Alphabet and Facebook – which replaced 2009 names like Microsoft, Walmart and Exxon Mobil at the top of the market – will see their prospects deteriorate.

During the early-cycle phase and mid-cycle phase, almost any strategy works. During these stages, the equity market rises at two-digit paces per year, and even though some equities do better than others, the market as a whole does pretty well. But that's not the case in the late-cycle phase.

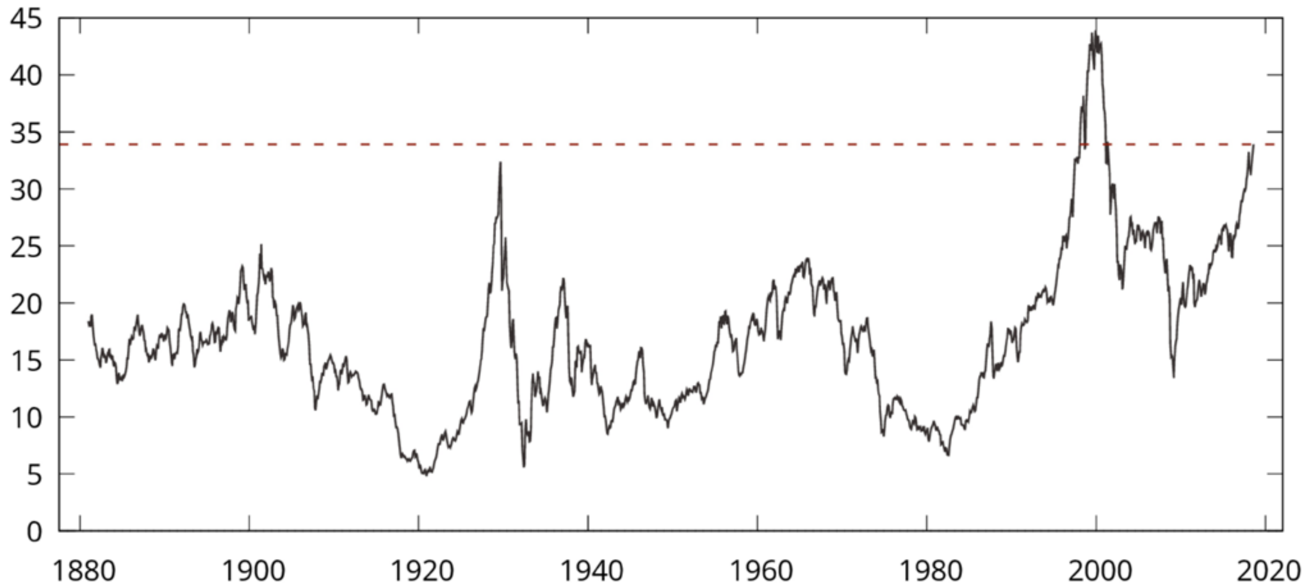
If we take a look at the Shiller CAPE ratio, we see that it has risen from 13.3 in March 2009, when the market hit a low, to the current 33.0. With the exception of the run-up to the Nasdaq bubble, the Shiller index has never been at these levels. The market, as a whole, seems expensive.

At this point, and provided that inflation is rising, energy and materials sectors should do well because their profits are closely correlated with the price of raw materials, which should start rising. To avoid the difficulties of hand-picking stocks in each of these sectors, investors may opt for sector ETFs. The **Energy Select Sector SPDR (NYSEARCA:XLE)** is a pure play on energy stocks and the **Materials Select Sector SPDR (NYSEARCA:XLB)** is a similar option for materials. Both have underperformed the S&P 500 since March 2009 (as expected), but during the late-cycle, the scenario is expected to revert.

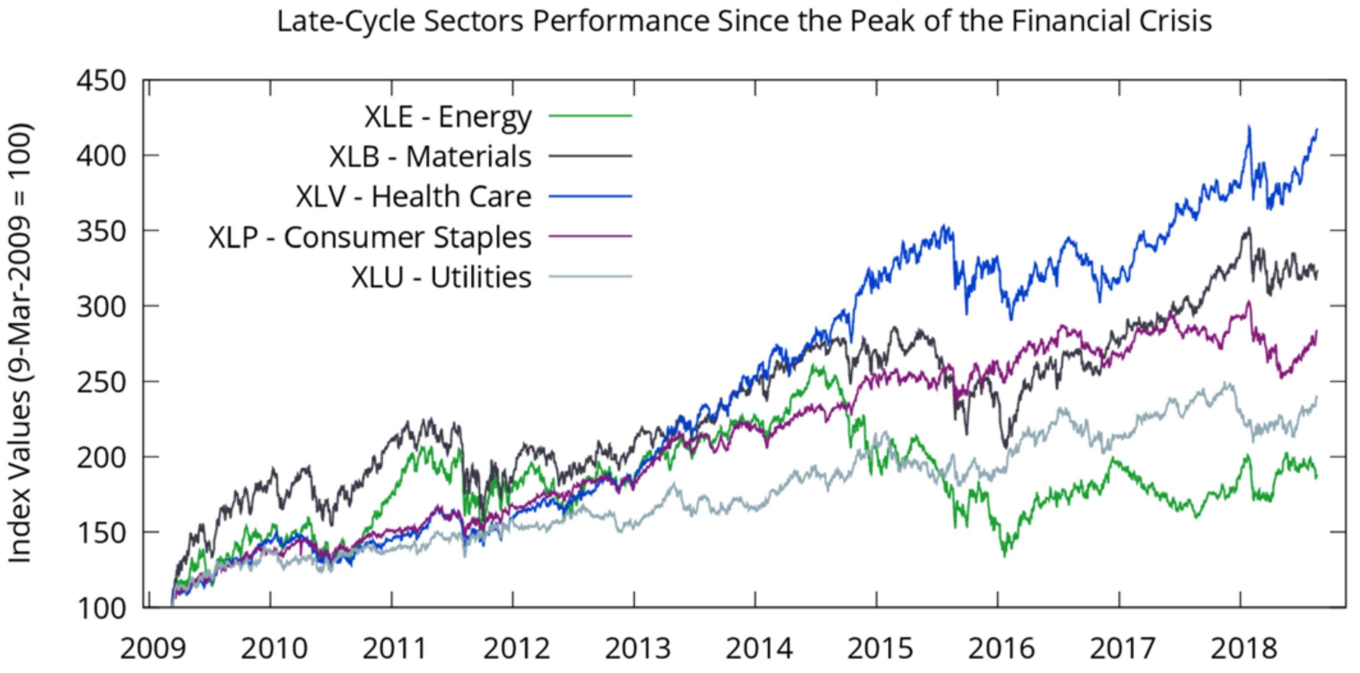
Another perspective to take into consideration during the late-cycle phase is slowing growth, which means that investors should start looking for companies in defensive-oriented sectors,

> **"WITH THE EXCEPTION OF THE RUN-UP TO THE NASDAQ BUBBLE, THE SHILLER INDEX HAS NEVER BEEN AT THESE LEVELS."**

Cyclically Adjusted Price to Earnings Ratio (CAPE)



Source: Robert J. Shiller



Source: Sharepad, own calculations

where revenues are more closely tied to basic needs and are less economically sensitive. This is the case for healthcare, consumer staples and utilities. In the same spirit as above, investors may opt for sector ETFs instead of selecting specific equities in these sectors. For this purpose, possibilities include the **Health Care Select Sector SPDR (NYSEARCA:XLV)**, **Consumer Staples Select Sector SPDR (NYSEARCA:XLP)**, and **Utilities Select Sector SPDR (NYSEARCA:XLU)**.

Stocks in sectors like information technology and consumer discretionary should have peaked already and are usually the most suffering sectors during this phase. These stocks outperformed in the recent past and are likely to underperform in the near future as they suffer the most with the change in economic conditions. This means that investors may be willing to avoid the Nasdaq components and look elsewhere. The truth is that the Nasdaq Composite has quintupled since hitting a low in March 2009, rising at an average pace of 18.5% per year during the last nine-and-a-half years, which compares with 13% for the broad market.

Ignore the yield curve at your peril

The current flattening of the yield curve is the result of the FED hiking its short-term rate after many years of monetary expansion. At a time when growth is high, the central bank is preoccupied with inflation pressures. Even though inflation has been under control for years, textbook economics predicts that inflationary pressures rise when the economy operates near full employment. Companies competing for employees will contribute to rapid wage growth, which will end in higher consumer prices at some point. The FED will hike its key rate significantly above the level it currently stands at and this will pave the way for the next recession. This scenario has repeated itself over time and is particularly likely in a world filled with credit and financial innovation.

The inverted yield curve is a symptom of the business cycle and one of the strongest predictors of a recession. But, as I mentioned above, investors should not take an inverted yield curve as an automatic trigger for a bear market. Stocks have experienced some significant gains in the past even after such inversion. But, at that point, the macro conditions are different and some of the previous leading companies will lose their appeal and start suffering from late-cycle interest rate hikes. The yield curve shape is a leading indicator that can be used to prepare a portfolio for the near future. Ignore it at your own risk.

"THE FED WILL HIKE ITS KEY RATE SIGNIFICANTLY ABOVE THE LEVEL IT CURRENTLY STANDS AT AND THIS WILL PAVE THE WAY FOR THE NEXT RECESSION."

About Filipe

Filipe has been a contributor to Master Investor since the earliest years. His specialisation is monetary policy, macro issues and behavioural finance where he allies the practical experience of several years of trading with academic credentials. Filipe in fact teaches courses on Financial Markets and Monetary Economics at the University of Oporto Faculty of Economics, helping traders maximise profits and better manage risk.

BY DAVID JONES

FORENSIC FOREX

BLOODBATH FOR THE TURKISH LIRA

Financial crises often start at the most importune moments. The banking crisis from ten years ago accelerated during the summer of 2008, leading to the bankruptcy of Lehman Brothers in September. Markets take no notice of people's holiday plans – and we saw the same again this August. Admittedly, it was on a smaller scale than the banking crash, but in recent weeks, the economy of Turkey – and its crashing currency, the lira – was making the headlines.

"THE BANK FOR INTERNATIONAL SETTLEMENTS (BIS) RECKONS THAT INTERNATIONAL BANKS WERE OWED MORE THAN $200 BILLION BY TURKEY. CLEARLY, IF ITS ECONOMY IS IN TROUBLE, THEN REPAYING THIS COULD BE AN ISSUE."

What happened to Turkey's currency?

Put simply, it crashed. On 10th August, it lost around 20% against the US dollar in a single day. By any yardstick, this is a pretty big move. If we look at the chart of the US dollar/Turkish lira (USD/TRY), the dollar had been gaining ground for some time.

From February 2017 to the end of July 2018, the US exchange rate had gone from around 3.7 to 5. This meant that one dollar would buy 5 lira at the end of July. We can look at this as dollar strength and/or Turkish lira weakness. Whilst the dollar has had a surge in recent months, the main contributing factor here is the lack of confidence in Turkey's economy. So, in this period, the dollar had gained around 35% versus the lira – a sizeable move in 18 months for any currency pair.

But, as you can see at the right-hand side of the chart, it went parabolic in August, briefly trading above 7. At this point, the dollar had more than doubled in value from where it was in February 2017. You can see the detail of August trading in the intraday chart below, where each candlestick represents an hour's worth of trading.

To have a currency pair experience a move in excess of 30% in only a week is fairly extreme, to say the least. Currencies are a great barometer of the market's confidence – or otherwise – in an economy and this rising US dollar/

US dollar/Turkish lira 18-month chart

plunging Turkish lira scenario spelled out in three-foot-high flashing lights that the market did not want to have much exposure to Turkey's fortunes.

Why the crisis?

The Turkish lira had been falling for some time – it had been in a clear downtrend against the US dollar since 2013, so confidence could hardly have said to been high. The amount of debt the country had been carrying was increasing and inflation was on the rise. It is not an economy built on solid foundations. The political situation with President Erdogan in effect controlling so much of the economic policy hardly helps. For example, he has the exclusive power to appoint central bankers, and his son-in-law has been the financial minister since July. These sorts of moves don't usually endear you to financial markets.

The doubling of tariffs on steel and aluminium by the US, announced on Twitter (where else?) by President Trump, was one of the catalysts that accelerated the fall of the lira. And as is so often the case when a market smells blood in the water, this fear and panic fuels more of the same, and that's when these sorts of parabolic moves occur.

But why the wider worry?

The lira plunge sent ripples through the wider financial markets. The US dollar got a boost against other currencies and stock markets did experience a wobble for a few days as investors became cautious. On the face of it, this can be confusing – why would a crisis

"TO HAVE A CURRENCY PAIR EXPERIENCE A MOVE IN EXCESS OF 30% IN ONLY A WEEK IS FAIRLY EXTREME, TO SAY THE LEAST."

Orlok / Shutterstock.com

focussed on one country's economy be rocking the boat in other markets? Think back to the various worries there have been in recent years over the state of the Greek economy. The important consideration here is *contagion*. In today's financial world, so much of one region is intertwined with another. The Bank for International Settlements (BIS) reckons that international banks were owed more than $200 billion by Turkey. Clearly, if its economy is in trouble, then repaying this could be an issue – potentially leading to default, which is going to impact the banks' profitability. On top of this, a significant percentage of Turkey's debt is priced in a currency other than the lira. Turkey is not exactly swimming in mountains of foreign currency reserves. So, as the value of the lira plunges, then the repayment of that debt in a currency other than the lira becomes more costly, as the country effectively has to go to the foreign exchange markets to "swap" its currency. This compounds the problems of meeting those debt payments.

British Pound/Turkish lira (GBP/TRY) year to date

What next?

To get the flippant upside out of the way, holidaymakers' trips to Turkey just got a whole lot cheaper – at least when it comes to spending money in the country. For example, the pound (which is hardly having the best year so far) is still around 50% higher against the Turkish lira than it was at the start of 2018. You have a lot more spending money for your Istanbul souvenirs.

Moving to a slightly bigger economic picture, there does appear to be something of a stand off from the Turkish authorities. It is possible, if the situation worsens, that the International Monetary Fund will get involved in some sort of bailout. But of course, this is not free money and there will be conditions attached that may not go down too well with the country. There is some speculation that help could be forthcoming from the Middle East or China.

Now the frenzy has paused, once again perhaps the best indication is to keep an eye on that US dollar/Turkish lira exchange rate. If it moves back above 7, it could be a sign that the market is once again running out of patience and ready to head for the exits for all things Turkish-risk related.

About David

David Jones qualified as a technical analyst in 1995 and started his City career as a currency analyst. He then went on to work for trading companies CMC Markets and IG Group as Chief Market Strategist. Since leaving the industry in 2013 he has been a presenter on BBC Radio 5 Live's Wake up to Money programme and the Chartist for Shares magazine. He is an active trader and private investor.

BY RICHARD GILL, CFA

BOOK REVIEW

THE BEST INVESTMENT WRITING VOLUME 2

SELECTED WRITING FROM LEADING INVESTORS AND AUTHORS

EDITED BY MEB FABER

In the September 2017 edition of Master Investor Magazine, I reviewed *The Best Investment Writing – Volume 1*, a collection of over 30 articles published by leading investment authors, put together and edited by money manager Meb Faber. A year on and Faber is back with the second volume of the book, this time treating readers to over 40 hand-selected articles written by a broad range of experienced finance professionals. The aim of the book, once again, is to cut through the "noise" of the financial markets and provide investors with the wisdom of its writers in order to improve investing results.

The latest edition of the book is divided into four sections, each covering various investment concepts, with the first part looking at market conditions, risks and returns. My favourite article in the opening section, titled "10,000 Hours or 10 Minutes – What does it take to be a "world-class" investor?", is written by research director Charlie Bilello. He discusses Malcolm Gladwell's 10,000 hours concept, which posits that practising something deliberately for 10,000 hours can make you an expert in your field of choice. However, Bilello argues that the concept does not apply to financial markets.

> **“MORE ‘PRACTICE’ IN INVESTING WILL NOT NECESSARILY MAKE YOU BETTER AT IT.”**

While playing the piano or kicking balls for hours on end might make you a better pianist or footballer, these are areas where the rules don't change. In contrast, financial markets have constantly changing rules and, as a result, success is often largely down to chance. Therefore, Bilello argues, more "practice" in investing will not necessarily make you better at it. Instead, he suggests the average investor start by spending ten minutes learning the importance of controlling costs, diversification and asset allocation in order to beat the professionals.

The second section of the book looks at investment portfolios, strategies and edges, with my favourite article being written by research firm founder Porter Stansberry. In "The One Business I'll Teach My Children", Stansberry talks about the one sector of the economy which he believes will make his

"TRESIDDER ADVISES ON FOCUSING ON THE FACTS TO BE A SUCCESSFUL INVESTOR."

children financially secure by 30 and wealthy long before 50 if they come to thoroughly understand it. Perhaps surprisingly that sector is insurance, more specifically property and casualty insurance, an area which the author believes will greatly increase investors' annual returns if it is the only sector they invest in.

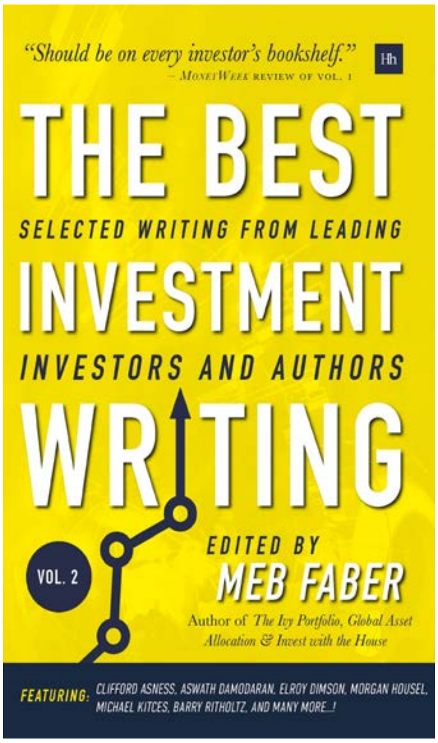
This is largely due to the fact that insurance companies have a "positive" cost of capital. In contrast to the rest of the economy, insurance companies don't have to pay for their capital, instead receiving it for free in the form of premiums and then investing this "float" in income generating assets. It's not that simple, however, with Stansberry warning that investors need to make sure the company earns an underwriting profit every year and to take Warren Buffett's lead by never paying more than 75% of book value plus float.

Part three considers the important area of pricing and valuation in financial markets and opens with an interesting look at the "asset" of the moment, Bitcoin. Finance professor Aswath Damodaran, in "The Bitcoin Boom: Asset, Currency, Commodity or Collectable", puts himself in the middle of the debate, taking the position that Bitcoin is neither an outright fraud nor that cryptocurrencies can be considered to be an asset class. Instead, he believes that Bitcoin is a currency which can be priced and traded rather than valued and invested in.

Also in this section, the curiously titled "FAANG SCHMAANG" looks at whether the valuation of the S&P 500 has been skewed by the success of IT companies Facebook, Apple, Amazon, Netflix and Alphabet (aka FAANG stocks). Asset allocators Anna Chetoukhina and Rick Friedman ask and answer if comparing current S&P multiples to historic levels still makes sense. How can the market be expensive if no sector is trading at extreme earnings valuations compared to history and if the US market valuation is justified by its higher weight towards IT stocks?

The final part of the book examines personal finance, behavioural biases and beyond. In the opening article "Timely Tale", personal finance author Jonathan Clements examines a traditional journey of finances through an average person's lifetime. He highlights five factors which change as time progresses – total savings, portfolio composition, debt, insurance and human capital – and how these might be different dependent on individual circumstances.

Also worth highlighting is entrepreneur Todd Tresidder's effort "The Great Financial Forecasting Hoax". He provides the somewhat controversial



view that financial forecasting is meaningless, with the army of stock gurus, financial advisors, tipsters and fortune tellers providing nothing more than noise when it comes to making investment decisions. This view is backed up with evidence, for example a study of 50 years' worth of forecasts starting in 1929 suggested that these predictions were wrong more than three quarters of the time. Instead, Tresidder advises on focusing on the facts to be a successful investor, looking at the certainty of history rather than the unknowable future.

Once again, *The Best Investment Writing* provides investors with views from the cream of the crop of the investment world. Here's hoping for a Volume 3 at the same time next year.

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About Richard

Richard Gill is an investment analyst with over a decade's experience of analysing small/mid cap equities. He is the Head of Research at Align Research. Richard qualified with the Chartered Financial Analyst (CFA) designation in 2012 and was awarded PLUS Markets Financial Writer of the Year at the 2008 PLUS Awards. He has been a judge at the Small Cap Awards from 2013 to 2017.

BY TIM PRICE

THE FINAL WORD

WHEN NO NEWS IS GOOD NEWS

"The media select, they interpret, they emotionalize and they create facts. The media not only reduce reality by lowering information density. They focus reality by accumulating information where 'actually' none exists. A typical stock market report looks like this: Stock X increased because... Index Y crashed due to... Prices Z continue to rise after... Most of these explanations are post-hoc rationalizations. An artificial logic is created, based on a simplistic understanding of the markets, which implies that there are simple explanations for most price movements; that price movements follow rules which then lead to systematic patterns; and of course that the news disseminated by the media decisively contribute to the emergence of price movements."

- Thomas Schuster,
The Institute for Communication and Media Studies, Leipzig University.

When I started working in the City back in the 1990s, I consumed financial news like a man possessed. Every day involved the manic pursuit of some kind of informational 'edge' that would help me to improve as an investor. Now I know better. Whereas in a pre-Internet age, the best investors deployed the best information *funnels*, now the information landscape has been profoundly changed by the speed and ubiquity of digital media. Data and information are everywhere and in many cases completely free. The best investors now require the best information *filters* instead.

We are now drowning in information, but starved of knowledge. Perhaps the definitive recent account of our susceptibility to stories is Yuval Noah Harari's book *Sapiens*, which makes a convincing argument that our fondness for appealing narratives has given us a meaningful evolutionary advantage. Just about everything in the financial world is intangible – our money, our corporations, and the inherent value of traded debt markets that are perceived as assets when they are far closer in essence to being chronically unpayable liabilities.

One of the quotations I grew up with was this one: *Finding the right answers is easy; it's asking the right questions that's difficult.* That used to strike me as facile, but its underlying wisdom grows as the years pass. As an investor, it's crucial to ask what you want to achieve with your capital, and what 'edge' you can use either to try and beat the market or to try and preserve what you have. I suspect that many investors haven't actually asked themselves these questions, and so tend to get bounced from one failed strategy to another. If you do not know where you're headed, no wind is favourable.

Half the battle is to surround yourself with the intelligence of the very best people, and cling to them like limpets. One of my favourite financial journalists is Jason Zweig of the *Wall Street Journal.*

"THE BEST INVESTORS NOW REQUIRE THE BEST INFORMATION *FILTERS* INSTEAD."

Zweig was once asked at a journalism conference how he defined his job. His response: "My job is to write the exact same thing between 50 and 100 times a year in such a way that neither my editors nor my readers will ever think I am repeating myself." As Zweig puts it, good advice rarely changes, whereas markets change constantly. "The temptation to pander is almost irresistible. And while people need good advice, what they want is advice that sounds good."

Zweig sees his role as betting on regression to the mean while most investors, and financial journalists, are betting against it. Zweig tries to discourage his readers from chasing the latest hot trend and to think instead about investing in what is unpopular. "Instead of pandering to investors' own worst tendencies, I try to push back. My role is also to remind them constantly that knowing what not to do is much more important than what to do. Approximately 99% of the time, the single most important thing investors should do is absolutely nothing." But advising people to do nothing is not the best way of selling column inches or airtime. Human beings are suckers for narrative. We love to be entertained with great stories.

"HUMAN BEINGS ARE SUCKERS FOR NARRATIVE. WE LOVE TO BE ENTERTAINED WITH GREAT STORIES."

Stories, again.

And there can be no bigger story at present than the one which has riven the country down the middle for the past two years, pitting brother against brother, and which hangs over the economy like a portentous black cloud: Brexit.

For my money – as an ardent Brexiteer – the finest analysis of this strange period in our politics has come from the pen of the British philosopher John Gray, from within the pages of *The New Statesman* (of all places). Here is what he wrote in the immediate aftermath of the referendum:

> "The vote for Brexit demonstrates that the rules of politics have changed irreversibly. The stabilisation that seemed to have been achieved following the financial crisis was a sham. The lopsided type of capitalism that exists today is inherently unstable and cannot be democratically legitimated. The error of progressive thinkers in all the main parties was to imagine that the discontent of large sections of the population could be appeased by offering them what was at bottom a continuation of the status quo.
>
> "As it is being used today, 'populism' is a term of abuse applied by establishment thinkers to people whose lives they have not troubled to understand. A revolt of the masses is under way, but it is one in which those who have shaped policies over the past twenty years are more remote from reality than the ordinary men and women at whom they like to sneer. The interaction of a dysfunctional single currency and destructive austerity policies with the financial crisis has left most of Europe economically stagnant and parts of it blighted with unemployment on a scale unknown since the

> Thirties. At the same time European institutions have been paralysed by the migrant crisis. Floundering under the weight of problems it cannot solve or that it has even created, the EU has demonstrated beyond reasonable doubt that it lacks the capacity for effective action and is incapable of reform."

If you prefer analysis from a purely economic perspective, try [this piece] by the economist and lecturer John Hearn. Immediately before the referendum he wrote:

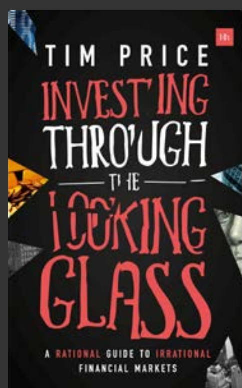
> I will vote to leave the EU based upon my position as an economist and these following thoughts:
>
> - On my blog in *'Unwinding the euro'* and *'The cause of the Eurozone/EU/ worldwide continuing crisis'* I have raised significant doubts about the survival of the euro and the union.
>
> - Politics is very prone to resource misallocation through waste, a lack of market discipline and its access to a source of compulsory financing for its actions. Therefore I hope that by leaving the EU we can remove a layer of political waste from our budget and redirect resources more efficiently into productive investment and faster economic growth.
>
> - I have no doubt that free market capitalism will make us all better off in the future and I explained this on my blog in *"Capitalism: is it worth fighting for?"*. I further made the point that this can only happen with limited government that accepts more constraints on its ability to intervene in the economy. This was explained in *'A balanced budget: goodbye fiscal policy'* and *'A reappraisal of interest rates and market interest rates'.*
>
> - There is a lot of criticism of what is now being referred to as the 'Shadow Government' which is that group of unelected decision makers, experts, bureaucrats, administrators etc. that sit behind government. If we are worried about those behind the UK government then think how many more there are to worry about in the EU. This leads me to think that in our democracy I have less control over our politicians as they are now more controlled by their EU political overlords. I have often heard the line from politicians that they would like to do something but their hands are tied by Brussels.
>
> As an individual I have always considered advice, but I do like to make up my own mind and not be instructed how to act by unelected people who think they know better. In the same way I like to be left alone to do the best I can for my students, my family and myself, and I hope that on June 23rd the wisdom of crowds will continue to limit political power by taking us out of the EU.

To conclude, I can't be alone in feeling deeply frustrated at the fundamentally left-leaning and anti-business editorial bias at the heart of much news programming in general, and at the BBC in particular. Without getting into some kind of existential debate about the existence of objective truth, the plain fact is that the BBC, along with other mainstream media, is pathologically unable to cover stories like Brexit, for example, without giving a highly jaundiced take on the subject that must surely be offensive to most of the 17.4 million people who voted for the UK to leave the autocratic EU back in June 2016.

If you feel similarly aggrieved at the behaviour of the BBC's editorial managers, please consider signing [this petition], which calls for the BBC's Royal Charter to be revoked. In the great global bazaar of commercial media choice in 2018, the compulsory licence fee looks like a gigantic anachronism and something that is not only outdated but staggeringly unreasonable. To put it another way, let's try to take back control.

About Tim

Tim Price is manager of the VT Price Value Portfolio (www.pricevaluepartners.com) and author of 'Investing Through the Looking Glass: a rational guide to irrational financial markets'.



SEPTEMBER 2018

INVESTOR EVENTS DIARY

EVERY WEDNESDAY

Event:	SR Live
Organiser:	SyndicateRoom
Time:	12:30
Place:	Webinar
Link for tickets:	https://www.syndicateroom.com/events/sr-live

TUESDAY, 11 SEPTEMBER

Event:	Fund Twenty8 launch
Organiser:	SyndicateRoom
Time:	Evening
Place:	Master Investor website (live stream; check https://masterinvestor.co.uk/events for details)
Link for tickets:	Register interest by emailing amanda@masterinvestor.co.uk

TUESDAY, 18 SEPTEMBER

Event:	Panel Discussion: MIFID II Impact on Research and Stock Market Liquidity
Organiser:	IR Society / NEX Exchange / Shoosmiths / Hardman & Co
Time:	12:30-14:00
Place:	Blankstone Sington, Walker House, Exchange flags, Liverpool L2 3YL
Link for tickets:	https://www.eventbrite.co.uk/e/mifid-ii-revolution-blues-tickets-47544961259

THURSDAY, 11 OCTOBER

Event:	Master Investor in focus: Investing into alternative energy
Organiser:	Master Investor
Time:	18:30
Place:	NEX Exchange, 2 Broadgate, London EC2M 7UR
Link for tickets:	Register interest by emailing amanda@masterinvestor.co.uk

THURSDAY, 1 NOVEMBER

Event:	Master Investor: Investing in the age of longevity
Organiser:	Master Investor
Time:	10:00 onwards
Place:	Wellcome Collection, 183 Euston Rd, Kings Cross, London NW1 2BE
Link for tickets:	https://masterinvestor.co.uk/events/investing-in-the-age-of-longevity

FRIDAY, 9 NOVEMBER

Event:	Master Investor Manchester
Organiser:	Master Investor
Time:	17:30
Place:	Mercure Manchester Piccadilly, Portland Street, Manchester M1 4PH
Link for tickets:	https://masterinvestor.co.uk/events/master-investor-manchester

FRIDAY, 9 NOVEMBER

Event:	Manchester Investor Show
Organiser:	Investor Conferences (UK)
Time:	09:30-17:00
Place:	Mercure Manchester Piccadilly, Portland Street, Manchester M1 4PH
Link for tickets:	http://manchesterinvestorshow.com

FRIDAY, 30 NOVEMBER

Event:	VCT & EIS Investor Forum
Organiser:	Investor Conferences (UK)
Time:	08:00-17:00
Place:	Grange Tower Bridge Hotel, 45 Prescot Street, London E1 8GP
Link for tickets:	https://www.thevctandeisinvestor-forum.com

AUGUST 2018

GLOBAL EQUITIES

Index	Last Month %	YTD%	Proximity to 52w High*
NASDAQ 100	5.8	19.7	
S&P 500	3.0	8.5	
Dow Jones	2.2	5.0	
Nikkei 225	1.4	0.4	
S&P/ASX 200	0.6	4.2	
Euronext 100	-1.8	2.5	
CAC 40	-1.9	1.8	
Hang Seng	-2.4	-6.8	
DAX Xetra	-3.5	-4.3	
Bovespa	-3.6	0.0	
FTSE 100	-4.1	-3.3	
IBEX 35	-4.8	-6.4	
Russian TSI	-6.4	-4.8	

COMMODITIES

Commodity	Last Month %	YTD%	Proximity to 52w High*
Natural Gas	5.0	-1.2	
Crude oil (Brent)	4.9	16.3	
Cocoa	4.8	25.8	
Palladium	3.8	-9.3	
Crude oil (Light Sweet)	2.2	15.7	
Sugar (No. 11)	0.2	-22.6	
Gold	-2.1	-7.8	
Iron Ore	-2.4	-2.9	
Copper	-4.6	-18.1	
Platinum	-5.9	-15.2	
Silver	-6.2	-15.0	
Coffee	-6.6	-14.7	
Cotton	-8.7	9.4	

FOREX

Pair/Cross	Last Month %	YTD%	Proximity to 52w High*
GBP/AUD	1.9	4.3	
EUR/GBP	0.5	0.8	
USD/CAD	0.1	3.6	
USD/JPY	-0.7	-1.5	
EUR/USD	-0.7	-3.3	
GBP/USD	-1.2	-4.0	
EUR/JPY	-1.5	-4.7	
USD/CHF	-2.2	-0.6	
EUR/CHF	-2.9	-3.8	
AUD/USD	-3.1	-7.9	

CENTRAL BANKS - RATES & MEETINGS

Central Bank	Key Rate	Next	After
BOE	0.75%	Sep 13	Nov 01
ECB	0.00%	Sep 13	Oct 25
FED	2.00%	Sep 26	Nov 08
BOJ	-0.10%	Sep 19	Oct 31
SNB	-0.75%	Sep 20	Dec 13
BOC	1.50%	Sep 05	Oct 24
RBA	1.50%	Sep 04	Oct 02
RBNZ	1.75%	Sep 27	Nov 08
BOS	-0.50%	Sep 05	Oct 23
BON	0.50%	Sep 20	Oct 25

FTSE 350 TOP

Company	Last Month %	YTD%	Proximity to 52w High*
esure Group PLC	37.1	12.5	
Hikma Pharma PLC	20.2	73.9	
Games Workshop PLC	18.9	35.2	
On The Beach Group PLC	18.6	11.9	
Whitbread PLC	17.4	14.9	

FTSE 350 BOTTOM

Company	Last Month %	YTD%	Proximity to 52w High*
KAZ Minerals PLC	-44.9	-47.9	
Spire Healthcare PLC	-30.5	-32.1	
Hill & Smith Holdings PLC	-29.6	-20.8	
IWG PLC	-20.9	-6.8	
Ferrexpo PLC	-20.5	-47.1	

FTSE 350 SECTORS TOP

Sector	Last Month %	YTD%	Proximity to 52w High*
Leisure Goods	18.9	57.9	
Automobiles & Parts	11.6	56.4	
Oil Equip, Services & Dist	9.1	17.8	
Nonlife Insurance	2.6	1.8	
Forestry & Paper	2.3	16.1	

FTSE 350 SECTORS BOTTOM

Sector	Last Month %	YTD%	Proximity to 52w High*
Industrial Metals	-12.3	15.1	
Mobile Telecom	-11.2	-28.6	
Tobacco	-10.2	-23.2	
Mining	-9.8	-10.2	
Banks	-7.8	-13.2