WINTER 25/26

QUILTER CHEVIOT BRIEFING

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QUILTER CHEVIOT

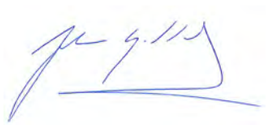
INVESTMENT MANAGEMENT | FINANCIAL PLANNING

WELCOME

As the front cover suggests, the latest edition of the Quilter Cheviot magazine has gone intergalactic. But it is not all about the final frontier. With the year still in its infancy, the issue kicks off with six questions for 2026, a forward-looking piece covering what investors are focusing on this year.

One set of questions that had hung over UK markets and the wider economy for much of the last 12 months was centred around the country's fiscal and tax landscape. These were to a degree answered in November when Chancellor Rachel Reeves delivered yet more policy changes and tax hikes in her second Budget. As David Denton notes in 'It's time to think about Easter – 5 things to do before tax year end', personal finances are getting more complicated, so consideration should be given to taking advantage of any unused allowances before the end of the financial year, which in 2026 falls on Easter Sunday.

Technology, and specifically the eye-catching amounts the so-called hyperscalers are spending on modern data centres, viewed as critical if artificial intelligence (AI) is to deliver the productivity gains promised, continues to occupy the column inches. We wanted a different take on the multi-billion-dollar spending plans, so we sent our resident expert Ben Barringer to see if the scale of proposed investments is starting to show up in supply chain activity. You can read his findings in 'Postcard from East Asia'.



John Goddard
Chief Executive Officer
Quilter Cheviot

All those new data centres require power. Up until recently, renewable energy would have been a go-to power solution, but as Margaret Schmitt writes in 'Bridging the gap: The rise of bridge fuels', this is a troubling time for the energy transition with the rise of the anti-environmental, social, and governance (ESG) movement in the US under President Donald Trump.

In 'Beyond the stars', Ben Barringer discusses AI's role in space discovery. Specifically, how, from autonomous rovers to intelligent satellites, AI is revolutionising space exploration. And sticking with space, in 'Breaking barriers and reaching for the Stars', Dr Norah Patten shares her journey to becoming Ireland's first astronaut. Norah lays out her vision for the future of space travel, and the legacy she hopes to leave behind.

Technology is driving innovation in medicine too. Professor Luke O'Neill of Trinity College Dublin runs through some of the major advancements seen in immunology over the years – much of it when AI-talk was largely the preserve of science fiction books and movies. As Professor O'Neill explains, AI promises to accelerate progress from here onwards. So much so we may one day never need to visit our GPs again thanks to smart watches or, as he calls them, doctors on wrists!

We also have an update on the work of the Quilter Foundation. As Jennifer Piper writes, 2026 is a pivotal year for the Foundation as it expands its mission to create brighter financial futures for everyone, not just the younger generation who have been the focus up until now.

And, finally ever wondered what heads of equity research listen to and read in their spare time? If so, our own Amisha Chohan reveals all.

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SIX QUESTIONS FOR 2026

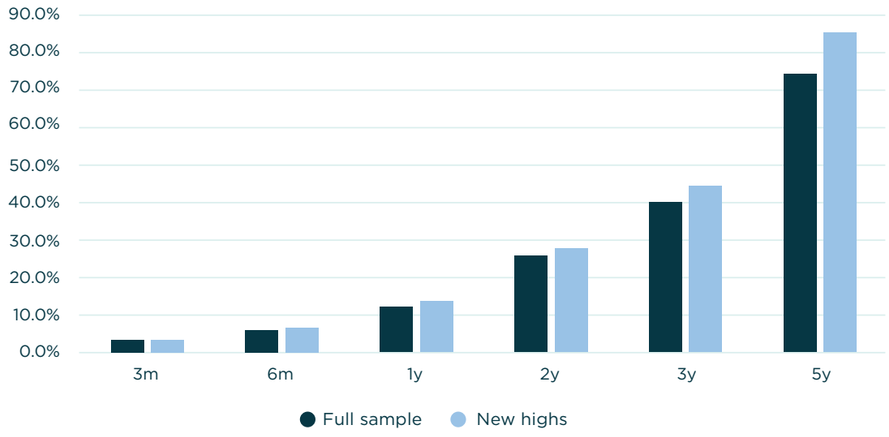
Caroline Simmons
Chief Investment Officer
Quilter Cheviot

It's a nice problem to have, but global equities' strong performance in 2025 – the MSCI All Country World Index returned 14.4% in sterling terms – raises a question: can markets move higher in 2026? That's not the only question on investors' minds. So, here are six for 2026!

1 Can equity markets continue to move higher?

In a word, yes. History shows that new highs are often a better time to invest than average. Highs beget new highs.

Average cumulative MSCI North America total returns



Source: LSEG DataStream, Quilter Cheviot Limited 18/12/2025
Past performance is not a reliable indicator of future performance.

The MSCI North America Index has posted an average cumulative return of 85.1% five years after making a new high, compared to 74.5% on average (data going back to 1988) – taking money off the table after a good run can lead to worse outcomes.

As always, following the fundamentals is key. Global equity valuations are not that elevated with the MSCI All Country World Index's 12-month forward price earnings (P/E) ratio at 19.2x (as of 5 January 2026). While this is one standard deviation above the average since 1988, it is not overly worrisome given the decent global growth outlook. Also, most regions are trading at or below their long-run averages; it is the US market, trading on 22.3x, that is pushing the global equity valuation higher. Arguably, higher valuations over time can be justified by the US' improving profit margins – the average profit margin has increased from 6.3% in the 1990s to 10.1% in 2020.

Finally, earnings growth for the MSCI All Country World Index is forecast at 14.7% in 2026, thanks to 2.9% expected GDP growth, moderate inflation, and company-specific operational or strategic enhancements. So yes, equities can go higher in 2026.

2 Will US events dominate markets again this year?

The US is the world's largest economy, accounting for 64.1% of the MSCI All Country World Index. Because of this, it will likely be front and centre of investors' minds in 2026.

Two known unknowns are the concerns around US fiscal policy and Federal Reserve (Fed) independence, which could lead to bond vigilantes targeting US Treasuries.

Any fallout here would be felt far and wide. This also plays into the US dollar which, as the world's reserve currency, has the potential for far-reaching impacts should it undergo a sizeable move. As was seen in 2025, the most likely impact would be a steepening of the yield curve, with shorter-term bonds gaining, and longer-term bonds losing on concerns over the potential for higher long-term inflation.

2026 is also a mid-term election year. Should the Republicans lose control of Congress, then their ability to enact change will be greatly reduced.

There are unknown unknowns too. The Trump administration has been consistently unpredictable. The biggest shock would be if there were no surprises at all.

3 Is the AI rally going to continue? Is tech in a bubble?

The last six months have seen tech-bubble fears grow. While there are warning signs that the current dynamic is not sustainable, we believe the rally in big tech has been built on fairly firm foundations. Furthermore, investor sentiment appears to be nowhere near the heady heights of the dotcom boom around 2000. If we exclude Tesla due to it being an automaker, then the Mag Six (Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia) trade on a P/E of around 26.5x – substantially below previous bubbles such as the 60x seen in the dotcom peak and Japan's 72x in the 1980s.

26.5x compares to 22.3x for the MSCI North America and 19.2x for the MSCI All Country World Indexes. The premium can be justified by earnings growth. In 2025, Mag Six earnings growth is expected to be 23.4% versus 6.1% for the rest of the market, according to FactSet. The differential is forecast to narrow in 2026 – big tech is seen growing earnings by 23.8%; the rest of the market by 10%.

However, the market has been raising some flags, so caution should be heeded, particularly around vendor financing and rising capital expenditure to sales. Should there be a slowdown in corporate IT spending, digital advertising, or capex, then markets may start to get jittery. So, while we believe AI is a potentially transformative technology with considerable growth potential, we believe, from an investment perspective, the risks today are more evenly balanced. We might not be in bubble territory yet, but a high degree of selectivity is warranted. Our focus remains on quality, profitable names, and growth at a reasonable price, not any price.

4 What is the European outlook?

Europe benefits from a benign inflationary backdrop – the European Central Bank (ECB) forecasts 1.9% inflation in 2026 and 1.8% in 2027 – which has enabled the ECB to lower its key deposit rate to 2.0%. This is less restrictive than peers and should support economic activity.

Leading economic indicators are also pointing to increasing growth and earnings momentum in Europe. At the December ECB meeting, President Christine Lagarde declared that the impact of US tariffs had not been as bad as previously thought, leading to upwards revisions to growth forecasts and downward revisions to inflation forecasts.

Furthermore, the large-scale spending plans announced in 2025 mark a major structural shift as the eurozone moves away from relying on international organisations like NATO for defence. This higher spending is expected to start feeding through to higher company earnings in 2026

– consensus is for 12.9% earnings growth. We see a fairly long runway ahead for the fiscal stimulus to provide additional growth, while market valuations remain attractive, in our view, with the eurozone trading on a 15.2x 12-month forward price-earnings (PE) ratio.

5 Are central banks finished with rate cuts?

No, the Fed and Bank of England (BoE) are both expected to lower base rates by around 50 basis points (0.5%) in 2026. In the US, as well as inflation, the appointment of the next Fed chair and whether they follow a markedly different approach to Jay Powell will be key.

In the UK, increased government spending, higher living wages, and above-inflation public sector pay rises have increased price pressures, but going forward this will have less of an impact.

The ECB is not expected to lower rates in 2026, but with inflation tracking lower than in the UK and US, there is potential for further easing should it be required.

6 What does diversification mean today?

The strong performance of UK, European, and Emerging Market equities in 2025 (all of which outperformed the Mag Seven's 23% return) demonstrates the value of geographic diversification.

Diversification is also found across asset classes. Gilts returned 5% in 2025, a solid return with far less volatility than equities. In the event of growth shocks, we would expect bonds to outperform equities. In an inflationary shock environment bonds perform less well. Higher inflation led to higher interest rates in 2022, which was a poor backdrop for both bonds and equities, but a good one for hedge funds.

We also see potential in the private equity (PE) space which has historically offered higher rates of return – PE's advantages include having greater influence over management and strategic decisions. There is a need to invest for the long run though and that's why Quilter Cheviot has become the first discretionary fund manager to offer PE investing through evergreen structures with indefinite lifespans.

Watch our latest outlook webinar

2026: Are you prepared for the year ahead?

IT'S TIME TO THINK ABOUT EASTER

FIVE

THINGS TO DO BEFORE TAX-YEAR END

David Denton
Head of Technical
Quilter Cheviot

2026 may only be weeks old, but we should all be thinking about Easter. Not just because of the public holidays and endless supplies of chocolate on offer, but because this year Easter Sunday falls on 5 April, the last day of the tax year. Accounting for the Good Friday public holiday, this means most of us will have until Thursday 2 April to take up any unused annual allowances. And this year, making full use of these key financial-planning tools ahead of the 5 April deadline has, arguably, never been so important.

Why? Rewind to 26 November 2025. For the second year running, Chancellor Rachel Reeves significantly raised taxes in her Autumn Budget – this time to the tune of £26.1bn. While less than the £31.6bn tax raid in 2024, it still amounts to a substantial sum that will push the projected tax take, as a percentage of GDP, up to 38% by 2029-30 – a record high.

But it's not just the quantum of the tax rises seen over the last two years that catches the eye. So too, the breadth of tax-raising measures taken – a consequence of Labour's 2024 General Election Manifesto pledge not to increase the rates of income tax, VAT, or National Insurance contributions (NICs). Aside from breaking the pledge, the Chancellor had little option but to raise or tinker with a whole raft of taxes.

The smorgasbord approach to tax-raising

The latest Budget saw threshold freezes for income tax and inheritance tax (IHT), meaning more people will pay more tax. There were also 2% increases in taxes on savings, property, and dividend income, and a £2,000 cap placed on pension contributions through salary sacrifice each year which can benefit from NI savings. And those are just the headline grabbers.

These come on top of changes announced in the 2024 Budget. Some unused pension funds and pension death benefits will be included in a person's estate for IHT purposes from April 2027 onwards; the main capital gains tax (CGT) rates were increased immediately; VAT is now charged on private school fees.

The last two Budgets have brought considerable change to the UK tax landscape. It's hard to disagree with the argument that:

personal finance is getting more complicated

What to do?

All is not lost. Steps can be taken to ensure more of your money stays in your pocket rather than going to HMRC.

Firstly, many changes announced in the last two years are yet to come into force – there is still time to take action and put in place an effective plan tailored to your specific needs.

Secondly, tax reliefs (at the last count over 1,000!) are available to lower the tax bill, provided these are relevant to your circumstances.

Thirdly, tried and tested estate-planning solutions, including the use of trusts and investment bonds, are available, although once again, subject to your circumstances.

Finally, there are annual tax-free allowances and exemptions. These, however, are time sensitive. For once a new tax year begins, many of the previous year's tax reliefs disappear – a case of use them or lose them then.

So, with Easter fast approaching and with it the end of the tax year, here are five tax-planning steps that can be taken.

1 Make pension contributions

Putting money into a pension has significant tax advantages. You can receive income tax relief at your marginal rate on pensions contributions, capped at £60,000 or your relevant UK earnings, if lower. You receive 20% tax relief from the government in tax relief, and, if you are a higher-rate or additional-rate-taxpayer, you can claim a further 20% or 25%, respectively, via your tax return on personal contributions. In some cases, the effective rate of tax saved can be even higher.

Pensions did not escape Budget 2025 unscathed. From 6 April 2029, only the first £2,000 of pension contributions through salary sacrifice each year will benefit from National Insurance (NI) savings. Contributions through salary sacrifice will still benefit from income tax relief at one's highest marginal rate of tax. And a reduction in salary, irrespective of whether there is an NI saving, can help preserve child benefit and, for those with incomes above £100k, help preserve free childcare and the personal allowance.

2 Use your ISA allowance

Using your annual Individual Savings Account (ISA) allowance can help shelter any income, growth, or dividends from HMRC.

Like pensions, ISAs were targeted in the 2025 Budget. From 6 April 2027, the annual ISA cash limit – within the overall annual ISA limit of £20,000 – will be reduced to £12,000 for those under 65. Despite the change, the ISA remains a highly efficient tax-wrapper and an important financial-planning tool, particularly as Budget 2025 also saw a 2% increase in savings income and dividend income tax. So, while the ordinary tax rate on dividend income will rise to 10.75% from 8.75% and the upper rate to 35.75% from 33.75% (the additional rate is unchanged at 39.35%) from 6 April 2026 onwards, dividends will continue to be tax free if generated through a stocks and shares ISA.

3 Save for your children

You can invest in ISAs and pensions for your children. A maximum of £3,600 can be invested into a pension for each child, with payments receiving the 20% government tax relief outlined above. This means that a £3,600 contribution would cost you £2,880. And because the money is inaccessible until age 57, your child can benefit from several decades of investment growth.

In addition, each year, you can invest up to £9,000 into a Junior ISA, which provides a tax-free windfall once they reach the age of 18.

4 Use your capital gains tax (CGT) allowance

For the 2025/26 tax year you can realise £3,000-worth of gains without paying CGT – otherwise known as the annual exempt amount (AEA). By using the AEA every year and shifting the money into an ISA, you can shelter future investment gains from CGT.

5 Use your annual inheritance tax (IHT) allowances

IHT is described as the 'voluntary tax' for good reason. By taking steps early and frequently, you can mitigate IHT or even avoid it completely.

Every tax year, £3,000 can be gifted without an IHT charge. As any unused allowances can be carried forward from the previous tax year, a married couple could gift as much as £12,000 before 6 April. You can also give £250 to as many people as you like. The gifts out of normal expenditure exemption is another option.

Even though taxes are going up and personal finances are getting more complex, the tax burden can be eased at the individual level. But action needs to be taken. Making full use of annual reliefs and allowances is a start. The clock is ticking though. Before you know it, Easter will be here.

POSTCARD FROM *East Asia*

Ben Barringer
Head of Technology Research and Investment Strategist
Quilter Cheviot

Tech bubble talk has taken up plenty of column inches of late, so my recent trip to East Asia is particularly timely. For East Asian countries such as Japan, Taiwan, and South Korea are where key suppliers to the US technology sector, and specifically the AI hyperscalers, such as Amazon, Microsoft, Meta, and Alphabet, are located.

So, in the best traditions of the scuttlebutt investor – someone who gathers information on a company or trend by talking to interested third parties such as suppliers – I travelled to meet with no less than 35 companies in Seoul, Taipei, and Tokyo in just six days. What my whistle-stop tour of key suppliers has shown me is that, while there are signs that warrant some caution, the driving force behind rising tech stocks appears to be alive and well in the supply chain.

This is important because the billions of dollars' worth of AI-infrastructure investments announced by the hyperscalers remain just words and (big) numbers unless backed up by what is happening on the ground with suppliers. If a tech giant is serious about getting hold of a seemingly infinite supply of chips to roll out state-of-the-art data centres, then this should be showing up in supplier order books and activity. Supply chains are useful forward-looking indicators.

Rising prices

Talk of bubbles in financial markets goes back centuries. In 17th-century Amsterdam tulips were such must-have status symbols it was believed demand and prices would rise ever upwards. In 19th-century London railways were viewed as one-way tickets to printing money.

Tulips still adorn houses and gardens today, but they are far from being the height of luxury they once were. As for railways, while they may not have been as profitable as hoped, they have at least been transformative.

Fast-forward to today and the hype around the US technology sector in recent years is understandable given the approximately 320% gain since 2020.

Past performance is not a reliable indicator of future performance.

The rally has been supported by a clear narrative: how AI promises productivity gains that will transform the way we live and work. As we enter 2026, the question is this: will the AI-narrative wilt like a tulip or be revolutionary like the railways?

Bigger + better = more complex

Before running through my findings, a little scene setting. The demand side is getting...well...more demanding. Not too long ago, talk was centred on what an individual graphics processing unit (GPU) AI chip could do. Today, focus is on how many of these highly advanced chips can fit in a single rack (essentially a big cabinet) and how many of these racks can be fitted into a single data centre. Each rack now holds around 100 chips, uses approximately 1MW of electricity (the same as an average-sized office building), and costs around USD$1m. Up to 800 of these racks, containing 70-100,000 chips in total, are being installed in modern data centres which require up to 1GW of electricity – equivalent to what the Philadelphia metropolitan area demands in terms of power. And there are roughly 40 of these data centres being built in the US today, equating to 40GW or around 3.5% of total US energy capacity.

Scuttlebutt

Big numbers which, based on my trip, are translating into elevated levels of activity in the supply chain. Take the Taiwan Semiconductor Manufacturing Company (TSMC). The number one semiconductor production company in the world is also the number one provider of chip-on-wafer-on-substate (CoWoS). CoWoS allows more advanced chips to be packed and stacked together which improves performance, bandwidth, and energy efficiency. It is therefore a key enabler of the modern data centre and, by definition, of the hyperscalers' grand designs. Business should therefore be booming for TSMC. And it is: CoWoS production is growing approximately 50% a year. But where does that growth rate go from here – does it accelerate or decelerate? From what I learned, neither – it is expected to be sustained.

Testing activity provides a further read on AI chip demand.

Chips need testing to ensure they work, particularly important as they get more advanced. It follows then that higher demand for AI chips leads to higher demand for testing work. So, as well as meeting with the leading CoWoS producer, I also met with testing companies such as Advantest and Teradyne. Business here is booming too.

And then there's heat. Bigger data centres holding more racks and chips generate plenty of heat which requires efficient cooling systems. Historically, air-cooling has been the go-to solution. But being energy guzzlers themselves, these systems add to a data centre's already high energy needs. An alternative is to use liquid-cooling that offers superior heat-absorption qualities, is more efficient, and uses less energy. Companies specialising in liquid-cooling should be busy then. I visited liquid-cooling companies AVC and Asetec on my trip. As with the testers, the liquid-coolers are enjoying strong demand for their services.

The overall message from my meetings with CoWoS, testing, and liquid-cooling specialists is that the supply side of the AI trade looks reasonably aligned with the demand side – very strong demand is being matched by very strong supply.

AI-powered crystal ball anyone?

The AI story appears to be alive and well in the supply chain. But what a tour of facilities across East Asia can't tell us is how AI will impact our lives, the size of the opportunity, and the length of time it will take for AI to become embedded within society and the economy (diffusion). Where's an AI-powered crystal ball when you need one?

While on my trip, however, I did carry out a very small test of my own. For the first time, I used AI at the meetings I attended. I let AI listen in, transcribe what was discussed, and then put together summaries. AI did not go as far as to write this postcard, but it did allow me to focus on the meetings as opposed to scribbling down notes. Certainly, enough to make my meetings more productive. So, there you have it. AI is real and already delivering on the promise of productivity gains, at least for this technology analyst. More railway than tulip then, but that doesn't mean it won't be a bumpy ride.

BRIDGING THE GAP

The rise of bridge fuels

Margaret Schmitt
Responsible Investment Analyst
Quilter Cheviot

2025 proved a troubling time for the energy transition, thanks to Trump, trade tensions, and changing trends. The anti-ESG movement in the US has cemented its tenets in a 'new normal' under President Trump, besieging corporate responsibility and heralding a new dawn in corporate kowtowing. As the dismal outcomes of the much-anticipated COP30 so brutally demonstrate, the chilling effect this has had is increasingly global: responsibility is 'out', sandbagging progressive momentum is very much 'in'.

In its place, among the stalwart or still-motivated, new strategies are emerging even amidst still-shifting sands. Greenhushing has been 'trending' for some time now, as climate collaborations have fallen from favour – nearly all of them emerging from challenges changed if surviving at all (NZAM[1] and NZAOA[2] the bruised but intact survivors, the NZIA[3] and NZBA[4] dissolving entirely). We saw this among our own investments early last year, with several prominent withdrawals from the investor collaboration Climate Action 100+ (**read more in our article on CA100+ withdrawers**).

Several strategies appear to be emerging, as corporates across different markets try to find the right line. Many corporates are gently greenhushing, modifying wording around their sustainability or climate work while maintaining their strategy. Others are shifting their attention to 'transition bridge' solutions: existing technologies or products which can be deployed more widely as an intermediary stage solution, while low-carbon technologies develop to maturity.

Evaluating the role of these 'bridge' solutions can be challenging; are these truly transitory solutions and technologies, or are these being introduced in a bid to sneak tried-and-tested, but not necessarily green, solutions back into the market?

Some are more obvious than others. Among the most challenging areas to decarbonise power generation is heating. In our 'SBTi: Slow to start' engagement undertaken in Q3 2025, we spoke to DCC, an energy distribution and sales company in Ireland, and learned of its efforts to bring new 'bridge fuels' to customers. DCC's FloGas is working with partners to deliver a network of large biomethane plants[5], a renewable alternative to natural gas generated from farm waste (manure slurry, biomass).

Displacing a fossil fuel with a locally generated, waste-consuming, lower-carbon alternative is a clear improvement on the adverse climate impacts of natural gas. There remain caveats, however, such as the overall efficiency of required energy input per megawatt hour (MWh) output, which is lower for many biofuels.

[1] Net Zero Asset Managers Coalition Returns – Without 2050 Climate Commitment – ESG Today

[2] NZAOA to allow 'observer' members but sticking to 1.5C

[3] UN kills off NZIA and launches multi-stakeholder forum for net zero : InsuranceERM

[4] Net-Zero Banking Alliance folds after mass exodus by members | Reuters

[5] Ireland's biomethane boom: Driving renewable energy and sustainability – DCC plc

Also of consideration are other environmental impacts from biofuel stocks, corn-based ethanol being a prime example of a biofuel having worse impacts than the fossil fuels it aims to replace[6]. The use of biogas for home heating offers clear benefits, on both climate and energy security fronts.

Other ‘bridge’ solutions are murkier. The recent spate of big tech companies signing ambitious nuclear power purchase agreements (PPAs) across the US has led to many proclaiming the advent of a new nuclear era. Google, Meta, Amazon, and Microsoft have been competing across the headlines, jockeying for position and public opinion in a race to power increasingly hungry data infrastructure. These projects tout their sustainable credentials: heroically saving existing energy plant infrastructure from obsolescence and providing critical investment[7] in low-carbon power to underserved (coincidentally, politically important[8]) areas. And all that may be true – but does it disguise the otherwise less-than-sustainable aspects of these projects?

> Nuclear power offers undeniable benefits relative to fossil fuels. Not only is it low carbon, but it also offers benefits compared to some renewable energy infrastructure, such as requiring a smaller land footprint and providing constant and consistent power. However, conspicuously absent from these project plans is mention of the nuclear waste each will generate. This is significant, given the US does not have any designated long-term storage site for nuclear waste[9].

How much of a problem will this be? Many of these projects are small modular reactors (SMRs) and advanced modular reactors (AMRs), which offer several benefits over traditional reactors – their modular components allow standardised manufacturing, reducing construction build time and cost, while lowering inherent risks in unique (untested) designs. These reactors also run at cooler temperatures, reducing the risk of melt-down – an essential aspect to win over a circumspect public.

Their smaller size, however, means these reactors will have a smaller, less efficient reactor core resulting in less energy being generated from the same amount of fuel than traditional reactors[10]. This translates to more nuclear waste per MWh produced than would occur for larger traditional reactors.

As these examples demonstrate, there is always more to interrogate when it comes to corporate sustainability. Many ‘bridge’ solutions may indeed prove to be critical interim technologies, particularly in hard-to-decarbonise areas. Some of these solutions may prove crucial in influencing public opinion around low-carbon alternatives, particularly where these make economic sense. For instance, Ashtead Group’s success in persuading otherwise climate-sceptical firms to opt for fossil-free battery-operated power systems in lieu of diesel generators have inspired further interest in other low-carbon rental plant in their catalogue.

Ultimately, however, these ‘bridges’ need to be inspected rigorously before we endorse them as the new sustainable saviours.

[6] Environmental outcomes of the US Renewable Fuel Standard | PNAS, How Corn Ethanol for Biofuel Fed Climate Change | Civil Eats, The sobering truth about corn ethanol – PMC

[7] See Meta’s agreement with Constellation Energy, where its finance will aid the plant’s relicensing process and fund a 30MW expansion, in exchange for energy credits. Meta signs deal with nuclear plant to power AI and datacenters for 20 years | Meta | The Guardian

[8] See Google’s investment in Iowa, the Duane Arnold plant. Iowa is famously home to first national electoral primaries and frequent recipient of politically-ingratiating investments. Given the reliance any nuclear projects have on receiving federal permits, and the scope for federal loans where the Trump administration sees political benefits, the political landscape undoubtedly plays a role in site selection.

[9] Nuclear Waste Is Piling Up. Does the U.S. Have a Plan? | Scientific American

[10] Why big tech’s nuclear plans could blow up – BBC Worklife

BEYOND THE STARS

AI's role in space discovery

Ben Barringer
Head of Technology Research and Investment Strategist
Quilter Cheviot

Space: the final frontier. For decades, we've gazed at the stars and wondered what lies beyond. Our technological capabilities have kept us tethered to the moon, but thanks to AI, that's all about to change.

From autonomous rovers to intelligent satellites, AI is revolutionising cosmos exploration. Here are five captivating ways AI is propelling us to infinity and beyond...

Autonomous rovers: AI at the wheel

In space missions, time is a precious commodity, especially with limits on vital resources like oxygen and fuel. Real-time decision-making is crucial, and waiting for commands from Earth simply isn't feasible for long-term, efficient missions.

Thanks to AI, rovers like NASA's Perseverance can operate without constant commands from Earth. Instead, they function with a high degree of autonomy, navigating rugged terrain, identifying scientifically interesting rocks, and aiming their instruments independently. This not only speeds up data collection but also allows for more efficient exploration.

Since landing on Mars in 2021, Perseverance has made groundbreaking discoveries, including identifying ancient river delta formations that suggest the Red Planet once had a watery past. By leveraging AI, Perseverance is a pioneering explorer, pushing the boundaries of what we know about Mars and its potential to have supported ancient life.

Intelligent satellites: A-eyes in the sky

Since the launch of the first-ever satellite – Sputnik 1 by the Soviet Union in 1957 – satellites have served as our 'eyes in the sky', sharing detailed information of our surroundings.

With the integration of AI, we have added a brain to those eyes, enabling satellites to process vast amounts of data in real time and identify patterns and anomalies that would take humans much longer to detect. This capability enhances our ability to monitor environmental changes, track natural disasters, and protect our planet in ways that were previously unimaginable.

AI-powered satellites have proven to be invaluable in disaster management. During the 2019-2020 Australian bushfires, AI algorithms processed satellite imagery to map the extent of the fires and assess the damage in real time. This information was crucial for coordinating firefighting efforts and planning evacuations. By leveraging AI, these intelligent satellites are not just passive observers but active participants in our efforts to understand and protect our planet.

Data analysis: making sense of the cosmos

The universe is vast, and the data we collect from it is even vaster. Enter AI, the ultimate data cruncher. Machine-learning algorithms are used to analyse data from telescopes and space probes, identifying exoplanets, classifying galaxies, and even predicting the behaviour of celestial bodies. This not only accelerates discoveries but also opens up new avenues for research that were previously unimaginable.

AI algorithms played a crucial role in NASA's recent Kepler Mission by sifting through the vast amounts of data collected by the Kepler telescope. In 2017, researchers used a neural network to identify two new exoplanets, Kepler-90i and Kepler-80g. This AI-driven approach has significantly accelerated the pace of exoplanet discovery.

Cosmo companions: your sidekick in space

Space can be a lonely place, but that's all about to change thanks to AI companions. These AI systems act as virtual assistants, helping astronauts with tasks, providing information, and even monitoring health and stress levels. But what's even more fascinating is the emotional intelligence being integrated into these companions.

Take CIMON 2 (Crew Interactive Mobile Companion), for example. Developed by Airbus and IBM, this upgraded CIMON system can recognise and respond to the emotional states of astronauts, offering support and companionship during long missions. It takes CIMON from just an operational tool to a vital companion for maintaining mental health in space.

Mission simulation: the galactic game plan

AI is playing a crucial role in mission planning and simulation. By modelling various mission scenarios, AI helps scientists and engineers optimise every aspect of a space mission. This includes designing new materials, propulsion systems, and even entire mission architectures.

NASA's Artemis programme – which aims to return humans to the moon – is heavily reliant on AI for mission planning and simulation. AI algorithms are used to simulate various mission scenarios, including lunar landings and surface operations. These simulations help NASA engineers design more efficient mission architectures and develop contingency plans for potential challenges. AI-driven simulations have also been used to optimise the design of the Space Launch System (SLS) and the Orion spacecraft, ensuring they meet the rigorous demands of lunar missions.

The indispensable co-pilot

AI has grown to be more than a tool; it is now an indispensable co-pilot in our journey to explore the universe. And as we continue to push the boundaries of what is possible, AI will undoubtedly play a central role if we are to reach the stars.

So, the next time you look up at the night sky, remember that somewhere out there, AI is hard at work, helping us unravel the mysteries of the universe...

Q&A

Ireland's first astronaut: Dr Norah Patten on breaking barriers and reaching for the stars.

From a childhood dream sparked by a NASA visit, to preparing for an International Institute for Astronautical Sciences (IIAS) research spaceflight, Dr Norah Patten shares her journey, her vision for the future of space travel, and the legacy she hopes to leave behind.

In conversation with Dr Norah Patten

Dr Norah Patten, an aeronautical engineer and bioastronautics researcher, is preparing to become the first Irish person to fly to space as part of an IIAS research mission. We sat down with Norah to talk about her journey, her upcoming mission, and what the future holds for space exploration.

You are preparing to be a part of the IIAS-02 team that will fly on a research spaceflight. In layman's terms, what is your mission?

Our research mission will conduct several scientific experiments on a suborbital spaceflight. Our research priorities focus on female health studies, physical sciences, and health technologies, which will allow us to advance the research outputs from the institute's first research spaceflight, IIAS-01. These insights are critical not only for future exploration but to advance our understanding to benefit life on Earth.

You are an aeronautical engineer and bioastronautics researcher. That is quite a mouthful! What exactly does that entail, and how does that fit in with your upcoming mission?

Aeronautical engineering focuses on designing and understanding aircraft and aircraft systems. Bioastronautics, which is my focus at IIAS, looks at how humans interact with space systems, everything from life support to spacesuit design, and also how humans are affected by the space environment. My background helps me bridge the gap between technology and human performance in space.

You are about to become the first ever Irish astronaut. That must make you very proud.

It is an incredible honour. This is the culmination of many decades of hard work and I hope it inspires young people to dream big and pursue whatever big ambition they would like to achieve in life.

What skills and attributes have helped you forge this path?

For me, I think one of the biggest things is persistence; year after year navigating a path less travelled and seeking out all possible opportunities to advance the seemingly impossible dream.

What excites you most about your upcoming space travel?

There are so many aspects that I am excited about – everything from the research opportunities to the international collaborations and the opportunity to see the Earth from space with such an incredible, rare viewpoint. As well as that, I get to fly to space with two incredible women, and friends, Dr Shawna Pandya and Kellie Gerardi, so it is impossible to pick just one thing that excites me most!

Training must be rigorous. How have you prepared for this adventure, both physically and mentally?

I like to say we set ourselves up for success. I have undergone high-G flights, hypoxia training, spacesuit testing, and other programmes at IIAS. One of our most important test beds for preparing ourselves and the science ahead of flying to space are the microgravity research flights we do with the National Research Council of Canada.

Commercial space travel is a hot topic, and I would imagine some of our readers would love the idea of heading to outer space! How do you see the future of space travel evolving in the next decade?

I think the next five years will tell a lot in terms of where we will go next. Right now, the world is moving towards having more frequent commercial spaceflights, and space agencies are working on sending humans back to the moon and having a more permanent post there. There has been huge commercial growth in the industry over the past decade, so I am excited to see what happens over the next few years.

AI seems to be a buzzword now. How do advancements in AI impact space travel and exploration?

One of the key features AI enables in space exploration is autonomy. Space missions are already using AI as a means of making systems and satellites more autonomous. As we move towards having a much larger number of satellites working together in space, like constellations, AI can be used for anomaly detection and allow action to be taken in almost real time – like having an 'operator' on board. As we explore the moon and distances further from Earth, autonomous navigation, AI-powered systems to help astronauts with remote medical care, AI to make satellites smarter and facilitate analysis of massive datasets from space missions, both in space and on the ground, are all becoming essential aspects for space exploration.

Can space travel and exploration drive innovation in other fields? If so, how?

Absolutely. Space research has led to breakthroughs in medicine and materials science, and space-based assets feed into so many areas of our daily lives including positioning, Earth observation, navigation, and climate monitoring, so there are always ways to use this data to drive innovation.

What legacy do you hope to achieve?

I aim to leave a multi-fold legacy:

Research impact: The research collaborations have brought teams of researchers together, from across Ireland and internationally, to work on new, novel projects, to advance the current state of the art, and to help position Ireland as a leader in this field.

Educational impact: Through the Norah Patten Foundation, outreach and educational projects aim to empower future generations and create a lasting legacy.

Inspiring future leaders: I want to show that 'impossible' dreams can become reality with dedication, persistence, hard work, and the stars aligning, especially for girls and underrepresented groups in STEM (science, technology, engineering, and mathematics). My mission, TV appearances, and speaking engagements are intentionally designed to spark ambition and inspiration, and cultivate new talent.

IMMUNOLOGY

When the immune system goes bad: how innovation is leading the fightback

Luke O'Neill
Professor of Biochemistry

We were recently fortunate enough to have spent time with Professor Luke O'Neill of Trinity College Dublin. As well as being one of the world's leading experts on immunology and a Fellow of the Royal Society, Luke is something of a polymath and is a successful entrepreneur, author, and musician.

Luke took part in our 'Inflammation, immunity and innovation: The future of medicine' webinar, during which he spoke about the many advancements being made in immunology. We were so struck by Luke's positivity that we felt we ought to share his thoughts here.

What key advancements in immunology have been made in recent years?

The discovery of cytokines in the mid-1980s was a big breakthrough. Cytokines are key regulators of the inflammatory process which are made when the body is fighting infection. The problem is, they get overproduced, causing our immune systems to attack our own bodies. A major therapeutic advance has been the development of drugs to stop cytokines. For rheumatoid arthritis, for example, we've developed a drug that blocks the offending cytokine tumour necrosis factor (TNF). It isn't a cure, but it slows the disease down so that it is no longer one where sufferers become wheelchair bound. Another example is psoriasis. When I was doing my PHD, the treatment for the skin disease was to dip people in coal tar! Today, there's a drug that can block the cytokine which has a 90% efficacy rate.

The discoveries of cytokines and off-switches open up the potential to develop effective treatments for many diseases. In our lab, we are currently working on Parkinson's and Alzheimer's. Both are diseases that occur when the immune system attacks a particular part of the brain: Alzheimer's, the part where memories are stored; Parkinson's, the part that controls movement. The bottom line is that it is a great time to be an immunologist because the immune system is part of so many conditions, not just infectious diseases where it all began.

Did you know?

One in four of us will suffer from some form of inflammatory auto-immune disease such as rheumatoid arthritis, Crohn's disease and lupus.

Another big advance is using the immune system to attack and kill cancers. The idea goes back a century or so when a Dr William Coley observed that some patients go into remission – when the cancer goes away. Samples taken by Coley were full of the immune system, proving that it had somehow been woken up and was attacking the tumours.

Fast-forward to the 21st century and Nobel Prize winner Jim Allison discovers the immune system off-switch that tumours flip and develops a drug to prevent this from happening. But there are also checkpoints, barriers that come down and stop the immune system, to deal with. Jim discovered the first drug to stop the checkpoint going down for melanomas, freeing up the immune system to kill the cancer. His discovery changed the field of oncology. Today, many checkpoint inhibitors have been developed and we're seeing 20-30% cure rates in previously incurable cancers. The goal is to improve these rates further.

Did you know?

If you have a heart attack, it is caused by inflammation in your heart.

Can you talk through a discovery you have been involved in?

About 12 years ago we discovered a very important master on-switch for inflammation in the body known as NLRP3 – this gets flipped in the brain in Parkinson's and in the lungs for asthma. Through our company Inflazome we developed molecules to block the flipping of this switch. Inflazome has since been acquired by pharma giant Roche which is currently conducting trials. So far, the results have been highly encouraging.

It's worth pointing out that while it is a huge thrill to get drugs to clinical trials, many still fail. Of those drugs that reach phase 3 trials, half fail. Help is at hand though. AI can help improve the failure rate.

How can AI improve drug discovery?

I compare AI to the microscope, a key enabler in immunology. Before microscopes, bacteria couldn't be seen because they're so small. Microscopes enabled germs to be seen. AI is a similar enabler because the technology is great at handling and analysing lots of data. Most experiments generate gigabytes of data. Analysing all this data takes time, but AI can do this far quicker than traditional methods, thereby speeding up the drug discovery process.

Did you know?

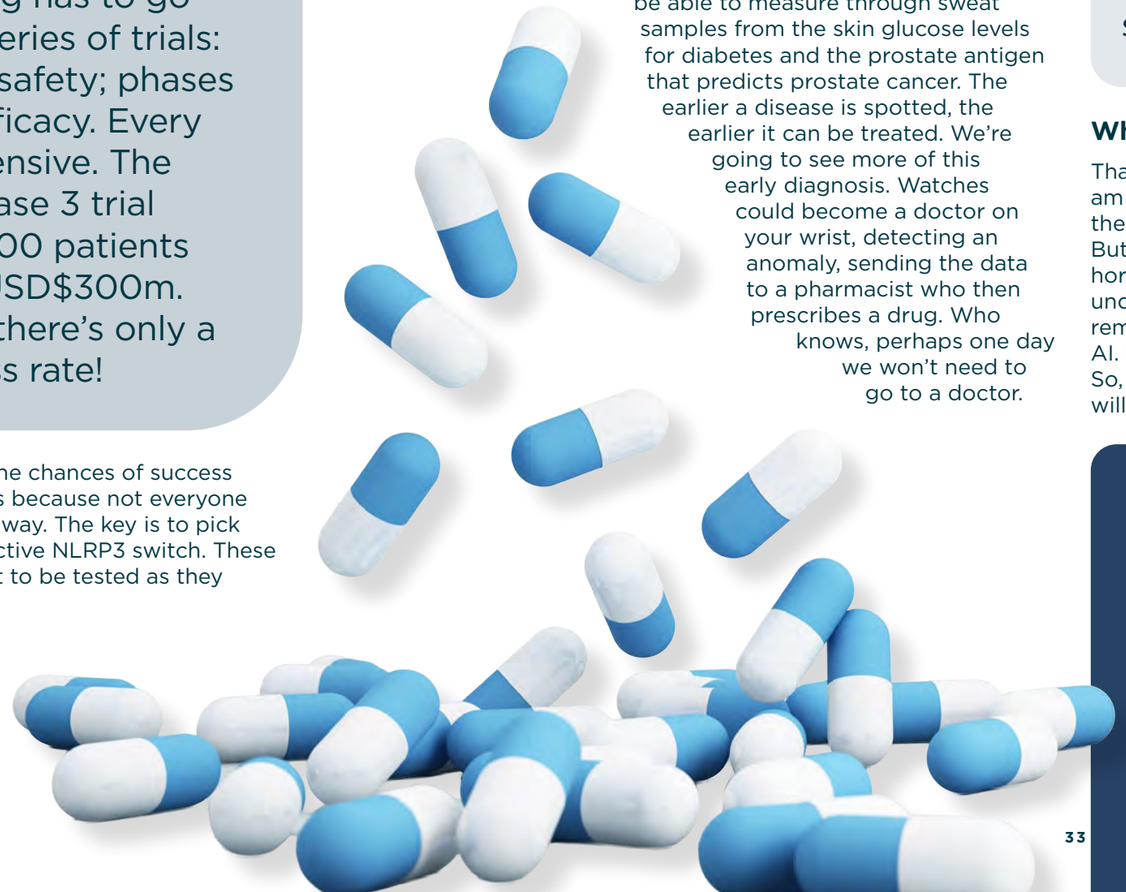
It can take up to 10 years between a drug being discovered and it being available to treat humans, as each drug has to go through a series of trials: phase 1 for safety; phases 2 & 3 for efficacy. Every step is expensive. The average phase 3 trial involves 1,000 patients and costs USD$300m. Even then, there's only a 50% success rate!

AI can help improve the chances of success too. Often, a drug fails because not everyone responds in the same way. The key is to pick trialists with an overactive NLRP3 switch. These are the ones you want to be tested as they are more likely to respond. Through the use of genomics, AI can help choose patients with particular profiles which should bring that 50% failure rate down.

AI can also help with the development of more tailored treatments. Diseases can have many variables, making it challenging to uncover their complex patterns. Crohn's disease for example has five subtypes, all with different patterns. We know this partly because of AI! So, if patient#1 has pattern#1, they can be given a drug just for that pattern. Similarly, if patient#2 has pattern#2 they can be given a drug for that pattern. To get to personalised medicine, high analysis capabilities are required to discover patterns behind complex diseases. This is what AI delivers.

Can technology replace doctors?

Maybe one day, but we're not there yet. Technology is moving very fast though. Wearables are already measuring things such as how much sleep the user is getting. There is evidence that a wristwatch can spot heart anomalies, and it's been predicted that in the next few years watches will be able to measure through sweat samples from the skin glucose levels for diabetes and the prostate antigen that predicts prostate cancer. The earlier a disease is spotted, the earlier it can be treated. We're going to see more of this early diagnosis. Watches could become a doctor on your wrist, detecting an anomaly, sending the data to a pharmacist who then prescribes a drug. Who knows, perhaps one day we won't need to go to a doctor.



Did you know?

It's likely depression is an immune disease. For evidence look at flu. Sufferers feel depressed, often stay at home, and don't want to meet people. That's an evolved response to stop germs spreading to the rest of the herd. The next advancement in depression could well be ways to dampen down the immune system to limit symptoms.

What final message do you have?

That science is great. I would say that though as I am a scientist who has spent 45 years working on the immune system and inflammatory diseases. But it is. The goal of science is simple: to stop horrible diseases. The progress made in our understanding of the immune system has been remarkable and this will only accelerate thanks to AI. But we've got to keep science on the agenda. So, lobby your politicians to invest in science. It will help humanity!

Watch our webinar

'Inflammation, immunity and innovation: The future of medicine'

“Love the webinar/ training series you are delivering and think it is such a valuable way to support charity partners.

Genie’s Wish

BUILDING ON SUCCESS

Insights on the Quilter Foundation

Jennifer Piper
Head of the Quilter Foundation
Quilter

Back in 2018, we launched the Quilter Foundation (the Foundation) with the mission to create brighter futures for the next generation. Eight years on and we have supported over 100,000 individuals through a combination of strategic partnerships with charities and community-based grant programmes focused on financial literacy as well as employment and wellbeing. We are proud to have helped so many young people, ensuring that they are better equipped to tackle our complex world.

However, we believe we can do more, and 2026 sees the Foundation embark on the next stage of its journey, one that comes with a new mission:

> To create brighter financial futures for every generation.

A small change in terms of words, but one that significantly expands our ambition. It is a change we believe is necessary because the UK does not just have a financial literacy problem among the younger generation, but also among the population at large.

The financial literacy problem in numbers

32.6%

the percentage of the UK population who are financially literate (OECD/INFE).

20.3 million

the number of adults in the UK (39%) who do not feel confident when it comes to managing their money (Financial Capability Strategy for the UK).

71%

the percentage of people who do not know how savings products work (PayUK).

46%

the percentage of those dealing with financial problems who say money management difficulties played a role (The Centre for Social Justice).

Bridging the gap

The numbers are all the more surprising because there are over 400 organisations involved in financial literacy projects across the UK (London Foundation for Banking & Finance).

Many reasons have been cited for the stubbornly high rate of financial illiteracy. Good, relevant financial education can be hard to find; while resources that are available tend not to reflect people's real lives, leaving many without the practical knowledge or confidence to make smart financial choices.

However, we believe a potentially bigger reason is that approximately half of all programmes are focused on young people. Expanding the Foundation's mission to include all generations aims to help bridge this gap.

In addition to grants and volunteering dedicated to improving financial literacy for every generation, the Foundation will continue to champion and fund meaningful initiatives proposed by members of the Quilter community, creating a broad and lasting impact.

> Beyond delivery, your collaborative approach and willingness to work alongside us to solve challenges has made a significant difference. From supporting us in facilitating introductions to new delivery partners, your partnership continues to open doors and strengthen our ability to reach those who need us most.
>
> **Money Ready**

Community focused

We believe we can make a difference to all generations by ensuring our grant-making focuses on the community, reflects real-life experience, invests in long-term growth and encourages teamwork between funders, partners, and the communities they aim to help.

To achieve this, we provide support that goes beyond funding. As well as grants, our Funder Plus approach delivers a comprehensive package of non-financial support to enable charities to thrive. So, instead of simply funding projects, the Foundation builds long-term, collaborative partnerships that offer tailored assistance, such as skills-based volunteering, mentoring, strategic advice, and venue use. For this, we draw heavily on Quilter's own internal expertise. After all, helping our clients achieve financial freedom is what we do, and what better way to deliver this than starting with improving financial literacy across all generations.

> It was so good to meet in person with the foundation team and the other charity partners. Really motivating. We feel so supported.
>
> **Pans Pandas UK**

Quilter Foundation

Want to know more?

Visit our website, plc.quilter.com/about-us/the-quilter-foundation/ to find out more about the Quilter Foundation and its work so far.

PAGE TURNERS & PODCAST PICKS

Information is vital to my role as Head of Equity Research. To deliver my responsibilities effectively and efficiently, I have to consume and digest a great deal of facts and figures, news and opinions from a wide range of sources on a daily and often nightly basis.

Amisha Chohan
Head of Equity Research
Quilter Cheviot

Today, there is no shortage of information. At least that's based on all the research notes, articles, newsletters, as well as invites to webinars, analyst calls, and podcasts that fill my email inbox every day. There's almost too much! I am therefore always interested (and grateful) to hear what colleagues or friends have been reading or listening to. Because of this, I am more than happy to do the same here and share some of my top picks with you.

PODCAST

Leadership in my view can always be improved on, so I am constantly on the lookout for new ideas to develop my motivational skills. Simon Sinek's podcast 'How great leaders inspire action' attempts to answer the million-dollar question: why do only a few leaders go on to achieve great things? Sinek believes inspiring leaders think differently. Rather than begin with the questions 'what do we do?' and 'how do we do it?', like the rest of us, Sinek thinks great leaders start with the question: 'why do we do the things we do – what is our purpose?' The what and the how are secondary. Successful leaders, according to Sinek, are driven by what they believe. And because they talk about what they believe, they attract others who believe in the same thing. They inspire. "People don't buy what you do, they buy why you do it," says Sinek. Whether you agree or not, his theory and the examples he uses to make his point make the podcast a fascinating listen.

NEWSLETTER

Each morning, and before I can tackle my in tray, I have to get up to speed with the latest economic news and market developments. Oh, for a daily newsletter that delivers concise and well-informed snippets of what's going on in markets! The Financial Times' 'Unhedged' does just this. It is written in an easily digestible style and explores what's behind the news and what big-picture implications there might be. It is among the first things I read when I am travelling to the office every morning.

BOOK

Working in financial markets is pretty much a 24/7 job. It never really stops. But when I can, I try to unwind with a good crime thriller such as Anthony Horowitz's 'Close to death'. Events around the world do tend to bring my mind back to markets all too quickly, but it's good to escape for a moment or two with a good old-fashioned whodunnit…even if it can take a while before I get a chance to finish the novel and find out who the baddie was.

I hope you find the above useful. If nothing else, perhaps they will prompt further investigation and thought, something I am always drawn to, but that's perhaps just me with my analyst hat on.

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