Redburn Review

DECEMBER 2025

Hang the DJ

Double or Bubble?

Beyond Disintermediation

Last Men Standing

Rothschild & Co | Redburn

DECEMBER 2025

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Editor's Letter

The suburb I live in is getting older. Where once a crocodile of parents walking children to school passed my window, now there are hardly any, and the excellent state primary is struggling for pupils. Why? Because no one has moved, our children have grown up, the tax implications of trading down are prohibitive, rates are high, property prices exorbitant, and fiscal drag means insufficient Gen Xers are wealthy enough to buy the shambling houses of the Boomers.

Will Jones addresses the 'housing crisis' directly, illuminating causes and offering solutions, while Kyle Summers writes about the technological advances of elevators – the most important business invention before the computer – though these do not address the primary problem, which is lack of money.

Possibly, the solution lies in AI. Not because it can build a house, but because it might help to generate the productivity and GDP improvements that will enable people and debt-saturated governments to do so. Unsurprisingly in the current febrile atmosphere, several essayists address its threats and possibilities.

Ed Vyvyan fears AI is taking over music, James Cordwell examines where its moats exist, Melissa Davies assesses the economic implications, Timm Schulze-Melander argues it can mitigate China's looming demographic crisis, and Ed Ridley-Day sees only upside for Med Tech.

It will be interesting to see what AI does to urban spaces, for its influence will reach everywhere. Something must give. Because cities are facing socioeconomic divides, neighbourhoods demarcated by age.

Hang the DJ

Music, AI and My Life

"Burn down the disco / Hang the blessed DJ / Because the music that they constantly play / It says nothing to me about my life." The Smiths, 'Panic' (1986)

Ed Vyvyan
Media Research

The tour van had been squeaking since we left the Port of Calais. And to be honest, the mechanic in Dover sounded like he'd learned his skills from a cereal box. "Not enough oil on the crankshaft, I reckon", he'd said, avoiding eye contact. Since I had just as little clue about what was being discussed, my bandmates and I drove off, semi-satisfied we weren't about to explode in a ball of fire.

I suspected something might be awry when we started ice-skating across four lanes of traffic, the right rear tyre firmly lodged in the grill of the lorry behind us, sparks zipping off the tarmac. Fantastic.

The one good thing about crashing in a tunnel in the Netherlands is the Dutch don't like to be kept waiting. Within minutes, an ambulance, two police cars and a state-funded tow truck were on the scene, operating with the brisk efficiency of people slightly annoyed their lunch break had been interrupted. Within fifteen minutes, a German Mercedes mechanic was fixing the faulty tyre bead – cursing the man from Dover.

That day, I learned life is precious. Especially when it's being handled by a coalition of mildly inconvenienced Europeans.

We made it to Hamburg for the soundcheck. Just. The headline band's Liverpudlian tour manager barely held back a snarl as he inquired about our near-death experience.

Lightning-fast load in, sixty-second thunder on the PA, collapse on the green room sofa – slightly traumatised, wholly un-showered, and spiritually elsewhere.

The DJ – Heaven, bless him – wafted in two minutes before doors, sipping a matcha. He'd flown in from London Heathrow an hour before and taken a Lime scooter to the venue. At that moment, I invoked the Black Hand upon all disc jockeys, past and future.

I despise DJs. Not because I don't like EDM – I'm a big drum and bass guy after all – it's what they represent: the future. When your only equipment is a USB stick, it can grate on the old guard. If you're not hauling drum kits, amps, guitars, keyboards, pedals and four other stinky blokes, then I don't want to hear a word from you in the green room. You're flexible. You're free. And don't get me started on margins. There's a reason guitar bands are dying out.

But something magical has started to happen. DJs are now RSVPing to my pity party. "It's not fair," they mutter, "they're letting anyone make music now". Well, well, well.

The complaint is – no prizes for guessing – AI. New text-to-music platforms like Suno, Udio,

and soon, ChatGPT aren't simply new sample libraries or advanced mixing tools. They generate entire tunes from scratch – vocals, lyrics, instrumentation, mastering – based on a few prompts. "Make me a K-Pop track about a tunnel crash in Groningen." Click. Done. No trauma required.

This is the 'next' future. And the DJs know it. The same mass democratisation of music which turned craft into content is now turning content into noise. Everyone's a producer. Even you.

Unsurprisingly, the major labels have something to say about this. Universal, Sony and Warner have all filed lawsuits against Suno and Udio, accusing them of training their models on copyrighted music without permission. As long-time masters of suing people, the labels have been successful so far. Udio, the relative minnow here, recently settled and agreed to launch a licensed AI music platform in 2026, in effect bringing AI in-house and to heel.

Suno, for its part, remains defiant. It has admitted to using, "essentially all music files of reasonable quality that are accessible on the open Internet". In other words: "We scraped YouTube and hoped no-one would notice". The labels, naturally, take a dim view. They spent decades squeezing creativity into a spreadsheet. If the spreadsheet is now making tunes without compensating them, what does that say about the value of their catalogue? This is not a conversation the labels want to have amid a spending spree on old bangers (e.g. Sony buying Queen's catalogue for $1.27bn).

The problem for the labels is not that people are engaging with AI music – a recent Deezer report indicated c40% of people wouldn't skip if they knew a fully AI-generated tune came on shuffle – it's about where they are engaging with it. If they can capture that engagement in a properly licensed walled garden (e.g. Udio) then AI music merely represents another revenue stream.

The real problem is AI music that is unlicensed and freely distributable across streaming platforms. I've been listening to a fully AI-generated 1960s soul version of a 50 Cent album this week (*Get Wealthy or Perish Trying*). It has all the trappings of something which was made on Suno, clearly infringing 50 Cent's copyright, but available for mass consumption on Spotify. At present, the major labels could be missing out on the AI gold rush. The outcome of the Suno lawsuit with Universal and Sony will, therefore, be pivotal.

Or will it? As Reddit user zapalillo, points out: *"AI is out of the bag, it's never going back. We can sue and demolish all companies who at least tries to do the right thing, but in the end people will just move over to Chinese models and software that don't give a single f**k about copyright..."*

I mean, they have a point. The world of digital music is too democratised, oversupplied and fluid to contain. People still pirate music all over the world. AI music will be another machination of that. The best hope for the industry is to try to bring it in-house and monetise it in any way possible.

Perhaps AI is the answer the music industry has been chasing all along? Imagine this: Spotify acquires Suno, locks fully licensed AI editing tools behind a 'super-premium' paywall and aggressively litigates any rival AI company that dares to draw breath. Wouldn't that make the music industry happy again?

Well, probably not the artists. They seem to be entirely ignored in this conversation. The Council of Music Makers in the UK has called the labels out on "misleading rhetoric and deceitful buzzwords," urging the likes of Sir Lucian Grange to stop selling out their rosters to tech firms without asking. *Déjà vu, non*? Streaming gutted artist income; now AI threatens to erase the artist altogether.

This is why I always come back to the value of live music. As far as I'm aware, you cannot AI-generate

The next shoe

a mosh pit and a suspiciously warm beer. You will not be asking 50 Cent to sing karaoke. You are not in charge; you are part of a collective identity.

While the rest of the media landscape seems to be hurtling towards a model of uber personalisation and mass neurosis, did anyone stop to ask if we want this? The chronic oversaturation of choice has led, in my mind, to a gaping social disconnect. How many times have you asked someone what music they like and they, boringly, reply "Oh, a little bit of everything really"? That's oversupply and over personalisation in action. Quite frankly, I want to be a sheep sometimes. At least, then I can relate to my fellow humans about something. I am a social creature. I want to watch the same football match as my dad. I want to be at the same concert as my girlfriend. I want to live in the real world and share that world with the people around me. Smell the roses, Mr Altman? Or at least go outside.

So yes, hang the DJ. But hang AI too. Because the music it constantly plays? It still says nothing to me about my life.

Double or Bubble?

The Future of Quantum Computing

Mike Harrison
Tech Hardware Research

Timm Schulze-Melander
Tech Hardware Research

Quantum computing. The name alone sounds cool. The futuristic vision conjured up by the term has clearly flared the imagination of the stock market – and possibly the White House too.

Traditional computing, including Generative AI (Gen-AI), is built on the concept of bits: ones and zeroes that can be combined to represent numerically any information from text, to image, to audio. Calculations are then performed on these. For instance, a tensor multiplication for Gen-AI will multiply two matrices together and produce a single deterministic answer.

By contrast, quantum computing relies on qubits. Instead of being strictly one or zero, each qubit exists in a 'superposition' of both one and zero at the same time, until measured. This allows quantum computers to generate a range of probabilistic outcomes, and only when the qubits are measured does one of those become the final answer.

What makes quantum computing potentially so powerful is that while those qubits are in their 'super-position' they can explore many possible solutions at once. Instead of testing each combination sequentially as a traditional computer would, a quantum computer can consider an enormous number of possibilities simultaneously. When the system is finally measured, the most probable result – the one that best fits the problem – emerges.

The quantum computing industry is still in its infancy, reflected both in its fragmentation and the artisanal nature of the machines used to generate and exploit qubits. As things stand, there are six competing approaches to qubit generation and most require temperatures close to absolute zero (-273°C). Super-conducting circuits, photonics, electron spin and trapped ions account for more than 80% of current approaches to quantum compute.

The machines are hand built, and the qubits they produce last for between a few microseconds and an hour. Few designs are alike. The two most prominent quantum computer development programmes are embedded in two tech giants: Google's 'Willow' and Microsoft's 'Majorana'.

Beyond Google and Microsoft, the four largest independent quantum computing companies are IonQ (market cap $17bn), Rigetti ($9bn), D-Wave ($9bn) and QCI ($3bn). They trade at price/sales multiples of 95x, 448x, 226x and 1,200x respectively.

These valuation multiples might represent an accurate and far-sighted evaluation of quantum compute future cash flows. However, consensus expects the revenues of the largest quantum stocks only to double in the next twelve months – and even that is partly juiced by acquisitions. An alternative interpretation might be that today's valuations represent a bubble.

Adjudicating between these extreme views requires us to ask: how economically useful can quantum computing become?

The economics of quantum computing lie in the value of the problems it can solve, but traditional computing cannot. Its attractiveness can be estimated by asking: what are the quantum problems humanity (loosely defined) would benefit from solving?

In simple terms, quantum computing today works best for workloads with small data volumes but high complexity calculations, such as cryptography. The ability to crack a password is not contingent on terabytes of data. It is conditional on having sufficient compute to crank through the Nx permutations.

This was well illustrated in December 2024. Google announced its Willow quantum chip could perform a standard benchmark computation in less than five minutes. Performing the same calculation using traditional computing would have taken an estimated ten septillion years, or more time than the age of the universe.

The drawback with Google Willow's demonstration is: how can one have confidence the quantum solution is correct if it will take until the heat death of the universe for traditional computing to validate the answer? With cryptographic use cases, you know the quantum solution is correct when the password is broken and the bitcoin wallet plundered.

Unsurprisingly, appetite to dive deeper into quantum computing is high. Recent press reports indicate President Donald Trump's administration is in talks with

Saving ten septillion years

several quantum computing companies to take equity stakes in exchange for federal funding. In the private sphere, JP Morgan recently committed to providing $10bn of direct equity investment to several critical industries, including quantum computing, as part of a broad US national security effort.

However, the commercial results of some of these efforts appear mixed. In September 2025, HSBC announced a quantum trial with IBM. It claimed using quantum computing delivered a 34% improvement in predicting the probability of winning customer enquiries in the European corporate bond market. However, the abstract to the academic paper conceded, 'the inherent noise in current quantum hardware contributes to the effect'. In other words: the commercial benefit of deploying quantum computing was substantially less than the headlines suggested.

This begs the question: how many viable use cases are there? A recent Omdia survey found 75% of respondents reported that the lack of clarity in defining the benefit of using quantum compute was one of the primary impediments facing broader quantum computing adoption. Even when appropriate quantum problems are identified, such as cryptography, the timeline for the development of quantum solutions is unclear.

Public encryption keys for modern cryptography are typically an integer that is produced by multiplying two prime numbers together. Decryption requires integer factorisations to identify these prime numbers. While this sounds straightforward, integer factorisation for very large numbers is not feasible with traditional computing algorithms.

Thirty years ago, the computer scientist Peter Shor developed a quantum algorithm that performs integer factorisation exponentially faster than a classical computer. Subsequent research validated Shor's algorithm on small numbers requiring a handful of qubits. However, cracking the very large numbers used in modern-day cryptography will require thousands of high-quality, error-corrected qubits. This lies well beyond the capabilities of today's quantum computers.

Estimating when quantum computers will be powerful enough for commercial deployment is challenging. Estimates vary from a handful of years to decades. Progress will require considerable advances in both hardware and software.

If one technological approach eventually works 'best', it suggests the time and money invested in unsuccessful alternatives will be squandered. That is, of course, the nature of technological progress. But it implies a risk that some of today's highly valued quantum computing companies may prove worthless if their technology is surpassed by competitors.

Similarly, the software layers used to direct quantum computers remain under-developed and domain-specific, lacking portability across rival technologies. A standardisation and industrialisation of both hardware and software may be required to accelerate progress.

Quantum computing' s potential remains fascinating, but the pace of commercial viability is uncertain. In this context, the $55bn market capitalisation of the listed quantum computing sector looks stretched relative to Omdia forecasts of a 40% CAGR and a $22bn total addressable market by 2032.

So what happens next? We are mindful of George Soros' mixed-metaphor aphorism, "When I see a bubble forming, I rush in to buy, adding fuel to the fire. That is not irrational". Put differently: there is no iron law of investing that says when bubbles must burst.

But another Sorosian concept – reflexivity – is also relevant. Market perceptions can influence fundamentals. The optimism embedded in the share prices of quantum companies has resulted in a fertile ground for capital raising. Non-listed peers have raised more than $5bn of venture capital funding since 2021. Such fund-raising efforts are likely to accelerate the progress of quantum breakthroughs and accelerate the timeline to commercial viability.

Perhaps the biggest risk to quantum computing stems from the nebulous concept of 'animal spirits'. The vertiginous rise in the share prices of listed quantum stocks has coincided with an elevated level of market enthusiasm for Gen-AI. If the latter should falter, the former is likely to suffer too.

Block Party

Finding Gas in War-Torn Mozambique

Peter Low
Oil & Gas Research

I have always been inexorably drawn to the Oil and Gas sector. A family background in the industry and an upbringing in Aberdeen (Banchory for those in the know) can have that unfortunate effect. But biases of upbringing aside, few other sectors provide the same intersection between geopolitics and multi-billion-dollar engineering projects in remote and exotic locales. The development of the Mozambique liquified natural gas (LNG) industry, which after several false dawns now appears poised to get back on track, provides once such example. The story highlights the challenges of resource development in frontier regions, but also how those challenges can spur technological development.

Between 2010 and 2013, the US oil and gas company Anadarko announced several major gas discoveries in Offshore Area 1, approximately 40km off northern Mozambique. The block contains the Prosperidade and Golfinho/Atum complexes that feature several deep-water discoveries, including Windjammer, Barquentine, Lagosta, Camarao, Golfinho, Orca and Atum. The fields together are estimated to hold approximately 75 trillion cubic feet of recoverable natural gas.

In 2011, the Italian Major Eni announced a giant natural gas discovery at the Mamba South 1 prospect in the adjacent Offshore Area 4. This was followed by further discoveries, including at Coral, in 2012 and 2013, and the block contains an estimated 85 trillion cubic feet of gas.

The significance of these finds was underlined in March 2017 when the US Super Major ExxonMobil agreed to acquire a 25% interest in Area 4 from Eni for $2.8bn. Under the agreement, Eni would continue to lead the Coral floating LNG (FLNG) project and all upstream operations in Area 4, while ExxonMobil would lead the construction and operation of the larger onshore liquefaction facilities.

However, around this time violence broke out in Cabo Delgado, the northern province that would host the onshore LNG facilities. The first attack occurred in October 2017 and to date the conflict is estimated to have caused more than 6,200 deaths and displaced over 1.1 million people, half the province's population. The origins and causes of this conflict are contested, but marginalisation of the region by central government is widely considered to have created fertile ground for insurrection.

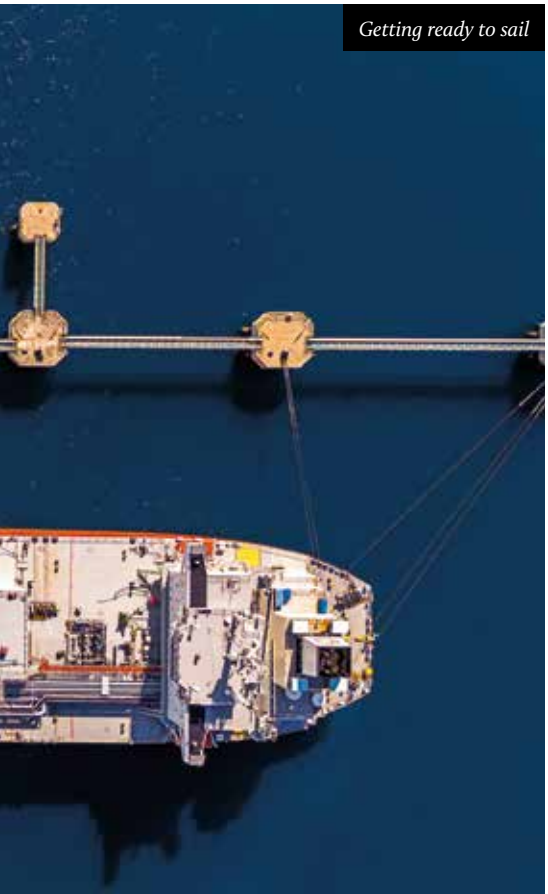
Cabo Delgado is one of the poorest provinces in Mozambique, lacking basic healthcare, education and jobs and with food security a pressing issue. The ruling Frelimo party has been accused of privileging the Christian population of the country and the capital Maputo, neglecting the Muslim majority coastal regions in the Northern provinces.

The insurgent group is typically known as either Ansar Al-Sunna Wa Jamma or Al Shabab (not to be confused with Al-Shabab in Somalia). Although Al Shabab officially pledged allegiance to Islamic State (IS) in 2019, most analysts and commentators claim there is little direct operational link between the two groups. The

connection appears to be based more on copy-cat tactics, e.g. the use of snipers, improvised explosive devices and beheadings, and the use of the IS brand to recruit more fighters. However, the ideological connection between the two is unclear, and few foreign fighters have joined the conflict in northern Mozambique.

The insurgency can therefore be viewed through two lenses. Either as a local insurgency, or an extension of global jihadism. The initial approach of the Mozambican government was to label Al-Shabab local bandits, not insurgents or terrorists, as the latter risked attracting negative international attention.

This worked in so much as inward investment into the nascent gas industry continued. In 2019, French Super Major TotalEnergies (then simply Total) acquired Anadarko's 26.5% operated interest in the Mozambique LNG project for $3.9bn. The project involved the development of the Golfinho and Atum fields in Offshore Area 1 and the construction of a two-train LNG liquefaction plant with a capacity of 12.9 million tonnes per year. The final investment decision (FID) on the project had been taken in June 2019, and first production was expected by 2024.



Getting ready to sail

However, in that same year private military companies (PMCs) – Russian WAGNER and South African DAG – were employed by the Mozambican government to intervene militarily in the region. The PMCs ultimately proved unable to suppress the insurgency and in 2021 a major attack on the town of Palma caused TotalEnergies to withdraw of all project personnel from the Afungi site and declare *force majeure*. This also delayed the Exxon project as the intention had been to develop shared and common facilities, such as an LNG jetty and offloading facilities.

Inevitably, this forced a larger response by the Mozambican government and the same year around three thousand foreign troops were deployed, both by Rwanda and separately by the Southern African Development Community Mission in Mozambique (SAMIM) which consisted of eight countries. SAMIM withdrew in 2024 claiming to have achieved its objectives. But around five thousand Rwandan forces, including soldiers and police, remain on the ground.

Despite these efforts, the insurgency has remained active and in September 2025 alone around thirty attacks were recorded across villages in Cabo Delgado, resulting in at least forty deaths and forcing twenty thousand people to flee their communities. Conflict monitoring organisation Acled has observed a "surge in insurgent activity" across the Cabo Delgado province in recent weeks, with reports of 22 people dying from violence between 13 and 26 October.

Analysts have blamed the failure to combat the insurgency as stemming from the absence of a holistic strategy that addresses the root causes – poverty and marginalisation. Corruption and abuse against civilians by government forces deployed to fight terrorism have fuelled the conflict.

However, despite the level of ongoing violence, the security situation has been deemed stable enough for onshore projects to resume. In October 2025, TotalEnergies and its partners finally lifted *force majeure* on the Mozambique LNG project, potentially enabling it to come online by 2029. TotalEnergies has now been granted a four-and-a-half-year extension to the concession it was granted by the Mozambican government to recoup increased costs that resulted from the pause, meaning the project could fully relaunch soon.

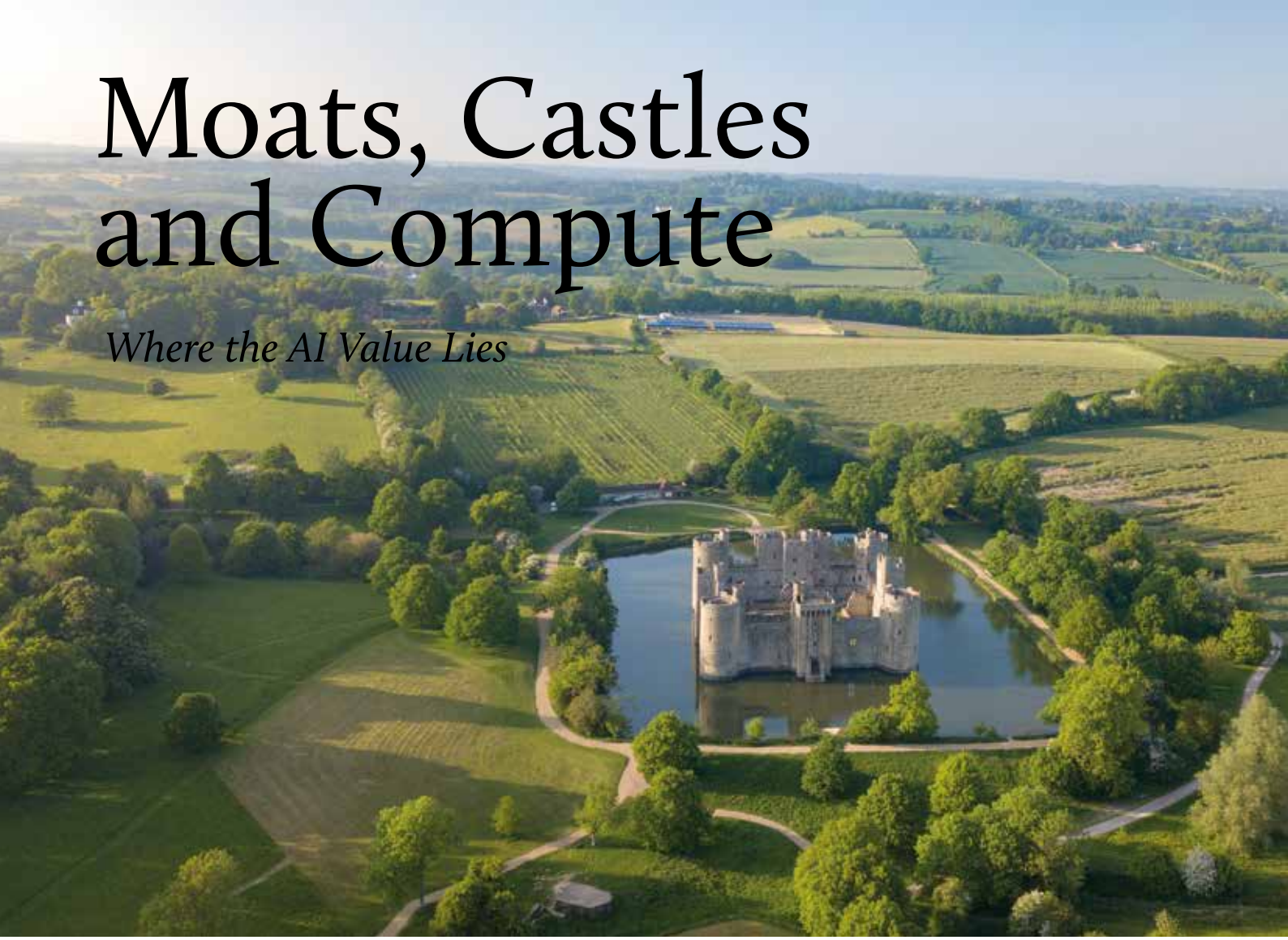
It has also been reported Exxon could take FID on its Rovuma project in early 2026. The US Major recently signed memorandums of understanding with the Mozambican government to establish a training centre and advance local energy projects following a private meeting between Exxon executives and President Daniel Chapo at the company's Houston HQ.

A coda to this story has been Eni's successful development of FLNG. In October 2025, Eni took FID on the 3.6 million tonnes per year Coral North FLNG project in Area 4, the second floating development in the block. The offshore nature of FLNG makes it less exposed to onshore security concerns, which has allowed projects to progress despite the insurgency. But the approach also provides an accelerated cycle time. By pursing a floating concept, Eni will have brought online two projects and delivered substantial volumes to the market at least a year ahead of the earliest possible startup of an onshore project.

Eni's focus on FLNG has allowed the company to develop technological capability that opens opportunities in other regions. As well as leading to a second project in Area 4, Coral South was a precursor to Congo FLNG (2022 FID) and Eni has been selected as a strategic partner for Argentina LNG, owing to its specific and distinctive know-how developed during its FLNG projects in Congo and Mozambique.

Moats, Castles and Compute

Where the AI Value Lies



James Cordwell
Internet Research

Moats peaked in popularity in 1856. At least, that's what data from Google Books on frequency of usage of the word suggests. Thereafter, the word endured nearly 150 years of decline before, in the mid-nineties, making an unexpected comeback. While we might like to imagine this was driven by a renewed enthusiasm among Gen Xers for castles, the explanation lies in two forces far more relevant to technology and finance.

The first and most obvious was the financialisaton of the economy and, as part of that, the rise of the 'cult of Buffett'. The chairman of Berkshire Hathaway, Warren Buffett, who steps down from that position this month after a 55-year tenure, is generally credited with bringing the word into the business lexicon. The 'Oracle of Omaha' first used this metaphor in a shareholder letter in 1986, describing GEICO's cost structure advantage relative to competitors as "a kind of moat that protects a valuable and much-sought-after business castle". It next appeared in 1993, this time referencing Coke's and Gillette's brands, product attributes and distribution systems. And again in 1995, as part of the famous quote "in business, I look for economic castles protected by unbreachable 'moats'". And thus began a generation of investors hunting for castles ringed by wide, deep water.

The second factor is less discussed, but no less important for explaining the rise in popularity of the term. While it was certainly a coincidence Buffett was pushing the business concept as the internet was emerging, it is unlikely to be mere chance the 'moat' renaissance coincided with the first twenty years of the world wide web. For as the invention of gunpowder rendered the original watery moats useless in defending a castle, so the emergence of the internet appeared to do the same for those supposedly unbreachable business moats. With the new online order seemingly "melting all that was solid into air", there was suddenly a pressing need to identify what would constitute a durable economic moat in the internet era.

The renewed popularity of 'moat' described by Google's data peaked in 2014, just as the answer to this pressing question emerged. In 2015, technology industry analyst Ben Thompson coined 'aggregation theory', arguing that value in the internet era accrues to those companies that control and aggregate demand.

In the pre-internet era, competitive advantage typically came from

Keep it safe

being able to supply a product at a structurally better gross margin, as per Buffett's GEICO example, or to distribute a product more widely or efficiently, as Buffett references for Coke and Gillette. However, in the internet era of zero marginal costs and frictionless distribution, Thompson argued human attention was the scarce resource, and control over this factor rather than supply or distribution would drive economic value. Seemingly proving this theory, Google has built its business by aggregating user intent, Meta by aggregating user engagement, and Spotify by aggregating listening, each without owning supply or distribution.

Aggregation theory is now close to accepted wisdom, with the 'cult of Thompson' perhaps rivalling the 'cult of Buffett'. However, thirty years after Buffett's canonical quote and ten years after the internet debate seemed settled, there is reason to re-examine the 'moat' question. That reason is of course AI, which looks as if it could herald as big a revolution for the structure of the economy as the internet did.

Where Buffett's analogy is incomplete is in implying that ownership of a castle with a moat was the source of economic value for medieval kings. While a castle's moat certainly afforded safety – and thus leverage over the population – it was control over the estate's land and the crops it produced that were the truly valuable assets. And while Thompson's aggregation theory was powerful in the age of zero marginal costs, with 'attention' playing the role of land as the scarce resource (and ad impressions as the crops), Generative AI (Gen-AI) returns us to a world where marginal costs matter again.

In this Gen-AI era, we argue compute might be the new moat, which would in turn make tokens the new crops as the primary output of this resource and the basis of value in the AI economy. This claim rests on the premise that the current compute supply-demand imbalance might not be a passing phase, but a persistent condition.

This is not the consensus view. But with compute demand consistently surprising to the upside, and with power and chip constraints all too real, compute scarcity could be the defining characteristic of the Gen-AI era. And just as those who dominated the scarce resource in prior eras (Coke or Gillette in distribution, Meta and Google in attention) earned outsized financial returns, perhaps the same will be true for those who build a moat via control of compute in the brave new world now emerging.

It is through this lens that we view OpenAI's significant compute purchase commitments, which have drawn investor scrutiny. While a high-risk bet, the company may also believe that sustainable competitive advantage will arise from dominating the scarce resource of the Gen-AI era. And while concern centres on OpenAI's ability to pay for all its commitments, the more pertinent question may be whether its suppliers can build the capacity they have committed to, while simultaneously meeting other customers' own, presumably material, AI needs. If not, then its suppliers may have done nothing more than agreed to dig a moat for the ChatGPT vendor.

Fortunately for the technology ecosystem, Google might have the equivalent of gunpowder. The company's TPU chips give it a structural cost advantage in Gen-AI, making it – in Buffett's terms – the new GEICO. To the extent Google can use these chips to move us more quickly into a world of compute abundance, then internet era moats may extend into the AI era, and the obituary for aggregation theory would be premature. Alternatively, if model efficiency curves, algorithmic improvements and inference-side optimisation outpace hardware constraints, then the entire premise of compute scarcity could collapse far faster than expected. In either of these versions of events, any 'compute moat' that OpenAI is digging will be as ineffective as a medieval castle facing the fire of cannons.

Or maybe there is another path for OpenAI's future. Historians generally agree it was the Normans who introduced the first 'motte-and-bailey' castles in England, using them to project power and control the era's scarce resource: land. Yet within a couple of centuries the Normans had largely disappeared as a distinct entity – not because of the system they had created failing, but because it succeeded. The moats they dug essentially took Europe out of the Dark Ages, with the economic activity unlocked ultimately subsuming the Normans as a distinct entity. By the same token, if Gen-AI unlocks even half the economic value that is being promised, then maybe a similar fate may await OpenAI.

Beyond Disintermediation

Banks and Shadow Banks

Michael Donian
Banks
Research

The shape of credit has changed. Capital now flows through a network of lenders that look less like banks yet rely on them more than ever. The rise of non-depository financial institutions (NDFIs), 'shadow' lenders including private credit funds, business development companies, mortgage financiers and other nonbank entities, has transformed the landscape of corporate credit. Rather than fight the tide of disintermediation, banks are increasingly riding it by funding these lenders, partnering with them, and quietly reshaping their role in the credit ecosystem.

NDFIs are not new, but their prominence has grown dramatically. Collectively, they now account for roughly half of global financial assets, much sitting outside the traditional banking system. Among them, private credit stands out. Once niche, it is now mainstream. It is one of the fastest growing and most consequential parts of the nonbank ecosystem, increasingly shaping the speed, terms and structure of corporate lending. Assets under management have ballooned from $0.2trn in the early 2000s to nearly $3trn, driven by sponsor-backed middle-market lending. The pitch? Speed, discretion and structuring flexibility, a far cry from syndicated loan committees and compliance bottlenecks.

It's a shift less about competition than calibration, a redefinition of who originates, who funds and who ultimately holds the risk. What tipped the balance was regulation. Post-Global Financial Crisis reforms made it more capital intensive for banks to hold risky, illiquid loans, prompting many to scale back their exposure to leveraged and sponsor-backed middle-market lending.

Private credit funds, often backed by long-term institutional capital, stepped in. They offered a direct, bilateral alternative to traditional underwriting, replacing the multi-bank syndicate model with privately negotiated loans that traded liquidity for speed and control. In effect, private credit emerged not as rogue outsiders but as necessary complements to a more capital-constrained banking system, an unintended consequence of post-crisis reform.

But the idea banks have been sidelined is misleading. In truth, they've pivoted. The modern bank is no longer defined by traditional lending but by its role as enabler, underwriter, senior tranche holder and, increasingly, backer of the very funds it once viewed as competitors.

Banks have found two main ways to stay in the game. The first is direct lending to NDFIs (including private credit funds) through subscription lines, NAV facilities, warehouse financing and other short-dated, secured structures that can attract relatively low risk weights.

What makes these facilities appealing isn't the headline yield, which is typically modest, but the efficiency of the return on capital. Many are secured by uncalled investor commitments or pools of underlying loans held in bankruptcy-remote vehicles. Depending on structure, these exposures can receive relatively low risk weights: subscription lines often fall under corporate or specialised lending categories with low loss-given-default assumptions, while tranched or securitised structures can qualify for risk weights as low as 20%. This compares with the 100% risk weight applied to a standard unsecured corporate loan. For senior pieces, losses would only occur once junior tranches or equity are wiped out, keeping expected losses low and capital efficiency high.

The result is powerful. With less capital tied up per dollar lent, banks can generate higher leverage and stronger risk-adjusted returns even at thinner spreads, achieving more efficient profitability by financing the lenders rather than their borrowers. It's no surprise, then, that bank lending to NDFIs has surged. In the US alone, commercial bank loans to NDFIs now exceed $1.7trn, expanding at a compound annual rate of around 16% over the past decade.

The second lever is origination partnerships with private credit players, the one part of the NDFI universe where banks and nonbanks originate side by side. Increasingly, banks are teaming up with private credit funds to co-lend, typically taking the senior exposure while the fund holds the junior piece. The model preserves client relationships, generates fees and limits capital intensity, giving banks skin in the deal without overexposure to tail risk. What began as a handful of opportunistic collaborations has become a more prominent feature of the market, with more banks entering formal co-lending and distribution arrangements with major private credit platforms.

For banks, the significance of these partnerships extends well beyond credit margins. They allow the money centres to remain central to sponsor-backed borrowers' financing

Out of the shadows

ecosystems, ensuring relevance across the deal lifecycle, from M&A advisory and hedging to cash management. As importantly, they deepen ties with private capital allocators, positioning banks as indispensable conduits into the private markets. In this sense, private credit origination is less about competing with funds and more about defending the integrated investment banking model in a market that has shifted beyond traditional balance sheet boundaries. The takeaway is clear. Private credit is not a margin-dilutive displacement of banks, but a reallocation of how balance sheets and client franchises connect with corporate borrowers.

In some cases, the relationship is symbiotic. Banks bring scale, origination capabilities and balance sheet muscle; private credit funds bring agility, structuring flexibility and sector focus. Together, they originate deals that neither could deliver as efficiently alone. What began as tactical collaboration is turning into strategic alignment.

Still, no transformation of this scale is devoid of friction. The bank–NDFI link has grown so quickly that even well-structured exposures can transmit stress if many counterparties move at once. The IMF estimates a system-wide draw on committed facilities could knock more than 100bp off capital ratios at around 10% of US banks and 30% of European banks, not because the loans themselves are weak, but because the volumes are now large enough to matter.

At the individual facility level, the structures tend to be inherently conservative, sitting senior in the stack, backed by ample collateral and margin-tested. To date, realised credit losses have been limited. The issue is the behaviour of these exposures at the system level. Banks increasingly finance the liquidity of institutions that are themselves outside the regulatory perimeter. If several funds face redemptions, collateral calls or valuation shocks simultaneously, drawdowns can bunch and turn what looks like low-risk, short-dated lending into a correlation event.

Opacity compounds this. Most NDFIs disclose little about portfolio quality, leverage, funding structures or cross-fund exposures. Underwriting standards vary widely, and data on interconnectedness is sparse. Banks may lend against the fund rather than the underlying borrowers, but economic risk ultimately flows from the same pool of assets. When visibility is limited, deterioration is harder to detect and liquidity needs harder to anticipate.

The liquidity profile is the most underappreciated pressure point. These credit lines are typically committed and available at short notice, creating a structural maturity mismatch in which banks promise rapid funding to entities whose own assets may take months or years to realise. In normal markets the mismatch is benign, in stress it inverts. The US dash-for-cash episode in March 2020 and the UK's 2022 liability-driven investment crisis offered glimpses of how quickly funding needs can spike when leveraged nonbanks face mark-to-market pressure.

None of this implies imminent fragility. The structures work and exposures are manageable at the firm level. The vulnerability lies not in today's risk metrics but in the map of the system. Growth has outpaced transparency, and the interconnections are insufficiently understood. As private markets scale and bank–nonbank interconnectedness deepens, the question is not whether credit risk exists, but how these exposures behave when liquidity needs spike across the system at the same time.

As it stands, the model works. Borrowers get flexibility. Funds get firepower. Banks get returns and relevance. What started as competition has become co-dependence. The old narrative of banks ceding ground to faster, nimbler rivals has given way to something more nuanced. Banks have found ways to monetise the rise of private credit without fully reloading their balance sheets. They aren't out of the game. They've just changed position.

The Global Housing Crisis

To Build a Home

Will Jones
Construction & Building Materials Research

"We have a housing crisis". Once the refrain of the most acutely affected, there is now an ever-expanding list of countries claiming such status. Yet too many governments are mis-diagnosing the problem, rendering their lofty sector growth targets unattainable.

The ambition to own a home is instinctive, but achieving it increasingly difficult, with ownership rates in most countries in decline over the short and long term.

In Europe, France's ownership stats have fallen more than 10% compared with 2006 (to 47%), as have Spain's (74%), while in the UK they have reduced 6% to 64%. Even those with a low base of ownership and a rental culture, such as Germany and Switzerland, have failed to register an improvement.

The issue extends further afield. In North America, the US and Canada have seen mid-single-digit ownership declines from a 70% peak, while Australia is in a similar position. The upshot is first-time buyers are waiting longer. In the US, their average age is now 38, compared to circa thirty in the early 2000s.

Two themes are consistent across territories. The first is high prices. Despite some curtailment from the combined impacts of the Global Financial Crisis (GFC) and its aftermath, for example on lending criteria, and more recently the spike in interest rates, today's first-time buyer cohort faces a generational divide. In the UK, for example, real house prices are lower than 2007, but still up c50% from 2000. In the US, real prices are slightly above the pre-GFC peak and therefore c70% higher than 2000.

The second is less buyer choice, most obviously as a result of lower housebuilding output. In Western Europe, housing completions should hit 1.2 million in 2025. Not only is this down from the pre-COVID baseline (1.5 million), it is also c20% below the 2000 equivalent (1.6 million), which preceded the construction bubble. In the US, annual housing starts of 1.3 million are in line with 2019, as new-build takes a share in the downturn, but this compares with 1.6 million in 2000. All this needs to be seen against a growing, and ageing, population.

Faced with an understandably disaffected younger generation, and the impacts to economic activity and mobility from fewer transactions, governments are increasingly taking note.

In the UK, the 'Not In My Backyard' (NIMBY) attitude of the prior Conservative government has given way to a Labour administration pledging to be the "Party of Builders, not Blockers". Upon her second term election in July 2024, European Commission President Ursula von der Leyen's acceptance speech mentioned the "housing crisis", while pledging to develop a European Affordable Housing Plan.

There are even rumblings from the US, where housing has traditionally been less politicised. In September, the Treasury Secretary said President Donald Trump was weighing whether to declare a 'national housing emergency' in the face of rising prices. Later, the President – in an oft-seen misinterpretation of business models – accused US homebuilders of "sitting on" two million empty land plots.

This new-found focus has seen several governments pin their colours to the mast. In England, Labour targets 1.5 million new homes to be built this parliament, with the implied annual average c50% higher than the current run-rate. Germany's new government is aiming for 400,000 annually, versus the sub 250,000 likely in 2025, based on its view of the historic deficit and need to replace obsolete properties. Meanwhile, Australia wants c240,000 per year, a c40% increase, with Canada taking the prize for greatest ambition, with an aim to almost double construction to c500,000 within a decade.

The lesser spotted

Yet in most cases, there is a mismatch between the scale of ambition and the quality of supporting policies. Most begin with the supposed 'supply-demand' imbalance. This runs on the notion that fundamental demand for housing exceeds supply, and therefore a supply-side boost will largely solve the problem. But this, in turn, confuses need (the requirement for housing) with demand (the ability to convert this into a purchase).

All the same, the supply-side is a good place to start. In England, Labour has upped the ante on local councils to approve more planning consents, with failure carrying the threat of decision control removal. This would have the effect of releasing excess plots from housebuilder landbanks, where the drag on capital employed and the low inflation environment provide no incentive to delay longer than necessary. Meanwhile, the 'Build Canada Homes' strategy is centred on a publicly funded government vehicle tasked with delivering more affordable housing. In the US, the government has pledged to release more federal land, so improving homebuilder choice.

These measures are helpful but miss the fact the biggest supply-side assistance a homebuilder can receive is lower costs. In the UK, the regulatory burden, for example energy efficiency standards and fire safety demands, has increased dramatically. The soon-to-be-published 'Future Homes Standard', which advocates replacing gas boilers with heat pumps, will continue the theme. It is a similar story in Germany, where the cost of new home construction has nearly doubled since 2010. In the US, environmental demands are less stringent, but tariffs on lumber and cabinetry are squeezing margins. Moreover, the anti-immigration policies of many governments will stifle the labour supply required for higher output, absent a widespread domestic skills agenda.

But ultimately, underlying demand is the biggest obstacle. Affordability is gradually improving, as real house prices and mortgage rates edge lower, but not nearly fast enough for the timeframes of 2025-30 housebuilding targets. Intervention is therefore required.

The UK is a good example of what once worked well and is now lacking. The Help to Buy scheme, introduced in 2014 but withdrawn in 2022, involved the government taking a c20% equity stake in the purchase of new-build homes, so lowering deposit requirements and monthly payments. At its peak the programme accounted for more than 50,000 completions, or 30% of total activity. The PTZ scheme in France sees the government fund part of the loan at a 0% rate, and its extension this year has played a role in the revival of homebuilder reservations and building permits.

The US is also toying with demand-side measures, President Trump recently touting the possibility of fifty-year mortgages. While this might lower near-term mortgage payments via a lower capital component, the associated mortgage rate would probably be higher, and a much greater cumulative interest bill is implied. Better would be a tax break for first-time buyers, as suggested by the Democrats ahead of last year's Presidential election.

In Ireland, however, there could be a blueprint. There the housing strategy has similarly lofty ambitions, in its case to double homes built to c60,000 from c30,000. But the plan arrives with a coherent and accountable set of policies, most recently updated in the 108-page National Housing Strategy document of mid-November. Land zoning changes, infrastructure funding and, importantly, a waiver of levies have helped developers. But this has occurred in parallel with two policies designed to boost demand: its own version of Help to Buy and the First Homes Scheme, which offer tax breaks and interest-free loans respectively. Results to date have been impressive: housebuilding output has risen more than 50% since 2019, compared to a decline of 20% across Europe.

Policymakers are wary on two fronts. The first is the impact of demand stimuli on inflation. By definition they are linked, but targeted schemes (e.g. for first-time buyers and new-build only) can limit the impact. The second is a reluctance to be seen siding with developers, whose popularity in the media and with the public is rarely elevated.

But if governments truly believe housing is in 'crisis', and are serious about solving it, more will be needed. They would be wise to look to the Celtic Tiger, whose rehabilitation from GFC boom-bust 'poster child', to housing policy pacesetter, deserves credit.

Economic Implications of AI

Melissa Davies
Economics

Philosophising about the consequences of AI for the economy and society has become a cottage industry for macroeconomists. One major tech company is even advertising for a senior economist not only to analyse the possible impacts of as-yet-undiscovered Artificial General Intelligence (AGI) on the economy but even Artificial Super Intelligence (ASI). A quick skim of US computer scientist and author Raymond Kurzweil's *The Singularity is Near*, published in 2005, might save them some time and money, concluding with the merging of human intelligence with nano-technology upon which humankind spreads its techno-intelligence out into the broader universe.

Turning to the more mundane consequences of existing large language model technology, the received wisdom is that AI may well lead to the 'hollowing out' of the middle of the services skills distribution, similar to the hollowing out of manufacturing by automation and globalisation in the 1980s. We wrote about this prospective phenomenon in our 2017 report, 'Player Piano'. The consequences would potentially have been wage disinflation and increased wage inequality, as those workers whose skills are complementary with AI earn more, while those whose skills are substitutes are pushed into lower paying work.

This seemed a reasonable conclusion to draw at the time, but the world has moved on. Crucially, the AI investment shock is taking place at the same time as two major, multi-year labour supply shocks in the US – the retirement of baby boomers and the reversal of sixty years of a rising share of immigrants in the population (see 'AI: No Substitute?', 2025). AI is unlikely either to substitute for an increasing share of retired workers or dwindling immigration (the Yale Budget Lab has interesting statistical analysis on this topic). Altogether, this means we remain in a fundamentally inflationary labour market backdrop which requires higher interest rates.

Moreover, we can make the case that AI itself has fundamentally inflationary consequences. The high demand for AI investment is contributing to a rise in equilibrium interest rates, adding to the stimulative effects of monetary policy. More specifically, energy demands and inadequate energy infrastructure are putting pressure on electricity costs and, directly, consumer price inflation. Unusually for the US, electricity prices are now the energy component of the CPI to watch, not oil.

This is completely opposite to the macroeconomic effect of platform technologies on the economy in the 2010s ('A Gift, a Curse', 2017). Platforms were capex-light and increased 'free consumption', i.e. savings. They had deflationary effects across the economy, both in terms of lowering prices via enhanced price visibility and by leading to the potential overstatement of inflation as deflators fell behind the quality improvements being experienced by consumers. But AI technology today boosts the demand for investment relative to savings – operating at the other end of the interest rate 'see-saw' (savings = investment).

Crucially, the repression of short-term interest rates in the US – whether by accident or design – is adding financial fuel to the capex fire, potentially leading to mass capital misallocation. Investment which could or should be financed by domestic and overseas savings is being turbo-charged by a dollop of financial engineering.

Should AI prove to have long-standing and material labour market consequences after all, it is worth pondering the lessons of history on the likely implications. The manufacturing disruption of the 1980s, while heralding the benefits of technological progress and globalisation, also created deep-seated societal and economic scars which ultimately sowed the seeds of the post-GFC rise of

populism and disruptive political events. Even previously dyed-in the-wool advocates of free trade would usually now agree that some element of domestic supply chain security and high value-added manufacturing capacity needs to be preserved, regardless of the short-term economic calculations – as reflected in the 'MAGA' domestic economic programme and even Reform's latest economic proposals in the UK.

In the rush to automate 'thinking' as well as 'doing', we could be creating a renewed bout of societal issues with which future governments will have to deal. Already, high government debt burdens and ageing populations are conspiring to create a fiscal cocktail, and policymakers are struggling to cope. The easy way out is, of course, an element of financial repression, but down that route lies higher inflation and both bond market and political instability.

To the extent AI disruption appears to be most concentrated among younger workers, the adoption of technological shortcuts to automate junior work in services could sow the seeds of further societal hardship in future, at a time when the dwindling younger generation will be asked to support a rising non-working and ageing population. This cost may outweigh the 'sugar rush' benefits of a short-term investment boom on the economy, not to mention the growing financial stability and inflation risks associated with its financing.

Ultimately, an economy that is increasingly inflationary with weaker jobs growth (even if supply-side effects mean that unemployment itself does not rise much) cannot deliver the sustained income growth and rise in living standards voters yearn for, especially at a time when government debt is already breaching the upper limits of what might be considered sustainable. At some point in the not-so-distant future, a multi-year fiscal tightening will be required in the US to 'right the ship'.

Paying boomers' pensions?

The rapid growth of AI and its spread through the economy is not a passive or pre-determined process. In fact, in the US, it is being actively encouraged by the macro policy mix of overseas FDI deals and tariff negotiations, loose monetary policy and structurally large government budget deficits, not to mention deregulation and the courting of Silicon Valley. If left to the private markets alone at appropriate interest rates, would the speed of investment and diffusion of the technology be the same? I would venture a guess it would not. In which case, there is, by definition, over-investment taking place in the sector.

If the total economic benefits of the policy-gilded rush to embrace AI fall short of the potential costs, it is inevitable the outcome will be an overall negative for the macroeconomy, leading to lower asset prices and real economic costs. At present, the manifestation of these negative consequences is likely to come through yet-higher inflation and the longer-term political and social consequences could also be severe.

Thankfully, in this author's opinion, the philosophical, biological and practical impediments to the leap to AGI are so high (if not insurmountable) that the current AI growth phase will burn itself out before causing the levels of disruption that some technologists fear. The nature of consciousness is currently poorly understood, with the answer possibly lying in further advances in quantum physics and computing. But without a proper model of human consciousness, it is conceptually impossible to replicate it with technology.

In the shorter term, and in a more mundane sense, the macro scaffolding – central bank balance sheets, financial plumbing, government bond markets, population growth – are insufficiently robust to funnel endless amounts of capital into a project of unknown return and possibly very high long-term economic costs. The macroeconomic and financial underpinnings will break before the dreams of sci-fi writers arrive, with liquidity strains, inflation and the dollar being the most likely culprits.

The Urge to Merge

Railroad Consolidation

Oliver Holmes
Transport & Leisure Research

What do Warren Buffet, Donald Trump and c$200m of banker fees have in common? Wealth? Fast cars? Damning headlines? No (well, yes, in parts), but also something far more exciting: railroad consolidation.

Despite covering railroads I am, contrary to my colleagues' opinion, no train spotter. However, M&A on this scale is always going to generate market fervour. Large-scale railroad consolidation was deemed to have ended post the Canadian Pacific Kansas City merger, yet it transpires that it is ready to roll again.

There are several important parties who have piped up to convey their concern at the prospect of a Union Pacific and Norfolk Southern (UNP/NSC) merger, but they will have to dance to the regulator's tune. Although that tune was composed when Destiny's Child and Shaggy were topping the Billboard charts, it has not yet been properly aired. The 'tune', of course, is the post-2001 merger rules under which the deal will be adjudicated – rules which, to date, have never been tested. If your bedtime reading hasn't plumbed the depths of railroad regulation, mine has, and I will endeavour to enlighten you.

Under the post-2001 rules, the current regulatory framework, a merger must 'enhance competition'. However, the Canadian Pacific Kansas City (CPKC) merger was adjudicated under the pre-2001 merger rules owing to a long-standing exemption. As a result, those companies only had to show their merger would 'maintain competition'. This led to CPKC's use of a voting trust being approved.

Canadian National had planned to place Kansas City into a voting trust to enable its shareholders to receive funds 18-24 months early, i.e. pre- rather than post-regulatory approval. This put the regulator between a rock and a hard place. If it approved the voting trust but then – under the post-2001 rules, to which Canadian National was subject – rejected the merger, Canadian National would be left owning Kansas City but unable to operate it, facing divestiture. A distressed sale is never optimal for an industry. This, in parallel with Canadian National's perceived inability to 'enhance competition', led the regulator to reject its bid to place Kansas City in a voting trust

No stopping

(thereby never testing the post-2001 rules) and opening the door for CPKC to proceed.

Union Pacific's CEO is highly regarded and for good reason. Although with 20:20 hindsight it was an obvious move, Union Pacific decided not to use a voting trust, thereby reducing the initial regulatory hurdle and enabling it to fight its corner over an 18–24-month regulatory process. This process allows all parties to conspire, coerce and, for the right price, capitulate.

Battle has been joined with Canadian Pacific publicly opposing the merger while, contrary to expectations, the largest rail union has entered a pact with the proposed merged entity after its support for guaranteed jobs for life. Passenger rail providers and customers will inevitably have differing views depending on how a merged entity enhances or impacts their service offering. While communities will oppose additional air and noise pollution and more frequent delays at rail crossings, it is nothing a new school or community centre hasn't sorted in the past.

You may be wondering how President Trump is involved. The answer is twofold. Firstly, Independent Federal Agencies like the railroad industry's Surface Transportation Board (STB) have come under pressure from the administration. President Trump has fired a Democratic member of the Board, the only member to vote against the CPKC merger and who had publicly noted his opposition to the UNP/NSC merger. This has left the Board 2-1 in favour of the Republicans.

It is a crucial point. The post-2001 merger rules have never been used before, leaving a grey area the size of Trump Tower. This probably reduces the impact to net synergies from concessions to other railroads to 'enhance competition'. Secondly, Trump's MAGA rhetoric sets the scene, providing an opportune time for a pro-US merger which UNP/NSC's management believes will maintain union jobs, support reshoring and reduce the burden on taxpayer-funded roads.

How does Warren Buffet enter the fray? Through Berkshire Hathaway, Warren owns Burlington Northern Sante Fe (BNSF), a direct competitor to Union Pacific on the West Coast. A similar dynamic is present on the East Coast between Norfolk Southern and CSX. As a result, the approval of UNP/NSC would, by default, probably lead to the approval of BNSF/CSX. Berkshire Hathaway initially publicly noted it is not interested in purchasing CSX. However, this sentence recently changed and now concludes with the caveat, "at the moment". Berkshire Hathaway is happy with the status quo and, as a result, has indicated to the regulator that via partnerships it can achieve a merger-like service, eliminating the need for consolidation and corollary integration risk.

The last player at the railroad roulette wheel are the bankers. I am no psychologist, but incentive, confirmation and framing bias may all be at play with a healthy dose of sunk cost fallacy the further down the track we roll. As Warren Buffett's old sparring partner Charlie Munger so eloquently (and brutally) observed, "Tell me the incentive, I'll tell you the outcome."

The defining question for UNP/NSC remains: why now? Many believe it is opportunistic and relates to a supportive administration. We believe there is more.

Railroads outperformed the S&P 500 in seventeen of the first twenty years of the millennium, but have only done so in two of the past five. There have been a multitude of impacts ranging from COVID-related labour and service issues to the Baltimore Bridge collapse. These challenges have all stymied railroad volume growth. Yet volume growth is becoming an increasingly important component of railroads' earnings formula.

Historically, the advent of Precision Scheduled Railroading (PSR) led to major operational improvements, driving network fluidity and cost base rationalisation. This margin-enhancing operating overhaul was effective at any stage of the cycle, supporting railroads resilient double-digit EPS growth. However, we are seeing diminishing marginal returns from PSR as the low-hanging fruit has been picked. As a result, railroads are increasingly relying on volume growth to support double-digit EPS growth. This has not only been hard to come by under traditional organic pathways but also leaves the rail sector more cyclically exposed relative to prior periods. As a result, best-in-class performers have found alternatives, such as the CPKC merger. This is almost certainly why Union Pacific and Norfolk Southern have entered into their merger agreement.

Lastly, what is 'Mr Market' saying? For once, 'Mr Market', fondly known for his irrational tendencies and inability to grasp intrinsic value, is acting more in accordance with his rational counterpart 'Homo Economicus'. Share prices have not been pushed to unholy levels by wild optimism or pessimism. That said, we still have a preference.

We would argue the market reaction has been overly pessimistic for Union Pacific and correct for Norfolk Southern. Union Pacific appears to have been disproportionately punished for the elongated period – roughly three years – between merger announcement and earnings accretion. This reaction has seemingly skimmed over the high-single-digit earnings accretion in year three and its generally praised standalone performance. On the other hand, Norfolk Southern's share price has risen and settled at a high-single/low-double-digit percentage discount to the bid level, which feels fair given Trump's support. The divergent performance offers food for thought but potentially more meat on the bone at Union Pacific.

Last Men Standing

Voice Against Reason

Cara Thomson
Capital Markets Research

In most corners of finance, algorithms have triumphed. Banks have replaced legions of traders with computer programmes that execute in microseconds, machine learning reviews commercial-loan agreements once combed through the night by junior lawyers, and retail investors trade commission-free through apps that process orders faster than a human can blink. Yet, in one obscure but lucrative segment of global markets, humans remain in charge. The interdealer-broker business, dominated by TP ICAP, a British firm, has proved remarkably resistant to automation. The reasons why offer lessons about the limits of artificial intelligence.

The scale of what is at stake is staggering. By the end of 2024, the total notional amount outstanding of over-the-counter (OTC) derivatives stood at roughly $700trn. To put that into perspective, exchange-traded derivatives represent only a sliver of the OTC market's vastness. TP ICAP estimates OTC derivatives' notional volumes are roughly twenty times larger than global equity exchange volumes. The OTC world dwarfs its exchange-traded cousin, and interdealer brokers sit at the epicentre of this opaque ecosystem.

The opacity of OTC markets also persists because, unlike exchange-traded products, they remain largely immune to the homogenising forces that have swept through other parts of finance. Banks value the freedom to craft instruments that match idiosyncratic risks, and dealers prefer a world where prices are discovered through conversation rather than displayed on a screen for all to see. This combination of flexibility and discretion creates a market structure where transparency is limited, competition is muted and relationships are more important than algorithms. It is a corner of finance that rewards ingenuity over scale and intuition over brute-force computation.

Interdealer brokers occupy a peculiar niche. They do not serve retail investors or corporate clients, nor do they take principal risk like investment banks. Instead, they act as intermediaries between large financial institutions: banks trading with other banks, hedge funds unwinding positions with asset managers, insurers seeking counterparties for complex swaps. TP ICAP, which employs more than two thousand brokers across sixty-odd offices, facilitates transactions worth trillions annually in products ranging from interest-rate derivatives to exotic foreign-exchange contracts. It is, by most measures, essential plumbing for global finance. It also remains a distinctly traditional part of the market.

The dominant player emerged from the 2016 merger of two London-based rivals: Icap, a voice-and-electronic broker headed by Michael Spencer, a former treasurer of Britain's Conservative Party, and Tullett Prebon, an outfit with similar strength in voice brokerage but lacking Icap's electronic clout. Tullett's chief executive was Terry Smith, an outspoken former stock analyst from London's East End. The union created a firm that combined electronic platforms with deep human networks. Both, it turned out, would prove necessary.

Transactions depend on personal relationships cultivated over years, sometimes decades. The business model rests not just on technological superiority but on human networks, discretion and judgment. This might seem anachronistic in an age when even complex legal work is being automated. Yet there are solid reasons why interdealer broking has resisted the advance of machines.

The first is bespoke complexity married to confidentiality. Interdealer brokers perform a price-discovery function, helping banks to achieve a clearer picture of where instruments are trading in misty markets. But they provide more than mere matchmaking. In the predatory world of big banks, they offer another valuable tool: anonymity.

If a large bank held a massive lossmaking position in interest-rate swaps, for example, a broker might help it gradually sell its position to other banks without alerting competitors who would trade against it. The trades themselves are not standardised products that can be easily automated. A bank hedging exposure to Brazilian interest rates while managing dollar liquidity and satisfying Basel III 'Endgame' requirements needs a solution tailored to its specific circumstances, executed without revealing its broader strategy. Algorithms excel at repetitive tasks with clear rules. They fall short when confronted with one-off problems requiring financial engineering, creativity and absolute discretion.

On the QT

The second characteristic is the primacy of relationships. In interdealer markets, trust and reputation matter enormously. A broker's value lies less in technical execution than in knowing which counterparties are creditworthy, which are desperate to trade, and which harbour unstated preferences about whom they will deal with. These human networks, built through years of interactions, create formidable barriers to entry. A machine-learning model can analyse historical trading patterns. It cannot replicate the social capital that allows a broker to arrange a trade with three phone calls.

The third element supporting voice brokerage is habit. Much of the interdealer market is sustained not only by relationships but by generational norms that shape how trading desks operate. Senior dealers who learned the business on the phone continue to rely on brokers they have known for years, and this ingrained behaviour does not shift quickly. Even as younger, more tech-native traders rise through the ranks, the pace of change is constrained by the slow turnover of senior staff and the apprenticeship-style transmission of market practice. The shift towards electronic execution is therefore likely to be gradual. It will take a new generation of dealers, more comfortable with automated tools and less anchored to legacy relationships, before human interaction loses its cultural hold on the dealing floor and brokers themselves have little incentive to accelerate a transition that could erode their own relevance.

TP ICAP has not ignored technology. The firm inherited Icap's substantial electronic infrastructure and has continued investing in platforms and data analytics. But these tools augment rather than replace human brokers. Technology handles routine tasks such as price discovery and documentation. Humans provide judgment, negotiate bespoke terms, manage relationships and, crucially, maintain the discretion that prevents rivals from exploiting their clients' positions. This hybrid model acknowledges an uncomfortable reality that technology evangelists often overlook: in certain domains, human friction serves a purpose. The time required to negotiate complex trades creates space for risk assessment and allows for nuance that purely automated markets lack. And participants trust them to avoid information leakage.

None of this means the business is immune to pressure. Electronification continues to advance, but unevenly. Voice resembles a melting iceberg, shifting unpredictably rather than moving along a neat curve. TP ICAP has responded through continued consolidation and cost discipline, leveraging the scale created by the original Icap-Tullett merger, and by expanding into more electronic and workflow-oriented platforms, including those gained through the Neptune and Liquidnet acquisitions. Margins face pressure. Yet the core business remains profitable, and the existential threat from automation hangs over it like a drawn-out sunset rather than an imminent eclipse.

The resilience offers a counterpoint to narratives of inevitable technological displacement. The sectors most vulnerable to automation are those where processes can be standardised. Whereas interdealer broking derives its value precisely from customisation and confidentiality.

The business thus endures by operating in capitalism's shadows: complex, relationship-driven, opaque enough to resist commodification. In a world convinced everything can be automated or reduced to code, this may be the most unlikely business model to survive. As Spencer and Smith recognised when they joined forces, some parts of finance will always stand at the final frontier of human replacement. For now, at least, the old-school dealers haven't lost their seat at the table.

Droning On

New Challenges Facing Airlines

ATC hangover

James Goodall
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Disruption is the bugbear for airlines. Yet while most passengers blame them for delays, the fault often lies elsewhere. Air traffic controller (ATC) shortages, extreme weather and the latest entrant, 'drone incursions', are all undermining airlines' ability to deliver on their schedules. As they are the ones who suffer monetarily and in terms of brand, mitigating the new operating environment is paramount.

One joy of being an airline analyst is when colleagues harangue me about their recent travel woes, despite my role as someone who interrogates the equity rather than toils in customer relations. The more vigorous incoming, currently, is on how expensive air travel has become. This is a complaint I relish given my positive stance on airline supply/demand and how that will positively impact pricing. However, on balance, disruption remains the most prevalent theme in my colleagues' catalogue of travel woes.

Historically, I would have defused their grievances with a single word: compensation. Under EU law – ruling EU261/2004, to be specific – airline passengers are entitled to substantial levels of compensation: €250 for flights under 1,500km which are delayed more than three hours; €400 for flights from 1,500km to 3,500km delayed more than three hours; and €600 for flights over 3,500km more than four hours delayed.

However, whether a hold-up attracts compensation depends upon its cause. Delays caused by events within the control of the airline, such as aircraft malfunctions or crew shortfalls, are subject to this compensation. Events beyond their control are not.

Understandably, since these rules were introduced, airlines have attempted to minimise their operational shortfalls. This reflects punitive levels of compensation. For example, Ryanair's average fares are under €50 – often it is more expensive to travel to the airport than fly – meaning it could potentially shell out 500% of the fare revenue generated on a flight while still incurring the normal costs associated with flying.

The upshot is most airlines have added cost into their business models by adding buffers and reducing productivity. This means adding firebreaks into schedules, which undermines aircraft utilisation and increases spare cabin crews and pilots.

Despite these measures, airlines are still suffering elevated levels of disruption relative to history. This is because the operating environment – ATC shortfalls, drone incursions into airport air space, system hacks on stakeholders in the aviation industry – has been deteriorating.

Unfortunately, there are nuances over what counts as inside their control. While external factors such as adverse weather conditions, ATC shortcomings and drones do count as being outside an airline's control,

this is only for the flight which was impacted directly. If, for instance, an aircraft is delayed on its first flight of the day by ATC or bad weather, only the first leg is exempt from EU261. The aircraft's later flights that day are not exempt if not directly impacted. In other words, even if an aircraft's daily schedule has been ruined because its first flight was delayed by ATC shortages, subsequent flights are then eligible for customer compensation, assuming the ATC shortages have ended.

If it seems unfair, it's because it is. Nevertheless, this presents a major headache for airlines, especially given rising external operational shortfalls.

On ATC, there are monumental staffing shortages across Europe. Training new personnel takes between two and four years depending on geography, and COVID saw substantial underinvestment. This in an industry which is highly unionised with a penchant for strikes, often called at short notice. More recently, airlines point to the problem of ATC operators simply not turning up to work or arriving late. Coupled with staff shortages, this creates mayhem within airline operation control centres.

For airlines, it is unacceptable that ATC shortfalls cause regular first wave departure delays. Given airlines plan these flights and sell tickets months in advance, having insufficient ATC staff to manage them is deemed a poor excuse by airline management. Moreover, first wave delays invariably appear with zero predictability as airlines are unaware when controllers may simply decide not to show up to work.

National ATC strikes have always been commonplace and often are announced with insufficient warning to enable contingency planning. In certain countries, such as France, national ATC strikes give no protection to overflights (i.e. flights through the striking country's airspace but not touching an airport in said country). This adds further pressure to surrounding ATC regions, which are also short staffed and cannot handle the increased throughput in their open airspace.

The upshot of ATC shortfalls is far reaching. Indeed, airlines now simply cancel swathes of flights at the beginning of the day to ensure the aircraft they plan to fly do depart, rather than trying to juggle the whole system and failing. While frustrating for the passenger, it is better to be told one's flight is cancelled before setting out for the airport rather than waiting in Departures in vain for a flight that was never going to depart. It also ensures there is lower risk to theoretically non-directly impacted flights being delayed by more than three hours.

In addition, inefficient ATC routings mean airlines fly many extra miles. Several European low-cost carriers (LCCs) claim they could save 10% of their fuel usage from more efficient ATC routings. This would be a substantial cost saving, especially as sustainable aviation fuel quotas and carbon offsetting requirements are becoming more burdensome. European airlines must now offset all intra-European flights with carbon credits, currently €55 per tonne. It is immensely frustrating for airlines that this ESG financial burden is placed squarely on them when other stakeholders render their operations less efficient. Their frustration is exacerbated by the European Union barely addressing the ATC issue but spending much energy trying to reduce carbon emissions.

As one would expect, Ryanair is vocal on the ATC shortcomings. On the recent earnings call, CEO Michael O'Leary observed:

> *"We roster standby pilots and cabin crew. ATC, they just allow the system to fall over… It's not acceptable. Air traffic control fees have gone up 14% this year and we're still getting a sh*tty third-rate, third world service. If [Ursula] von der Leyen can't deliver competitiveness, frankly she should be replaced by somebody competent who can."*

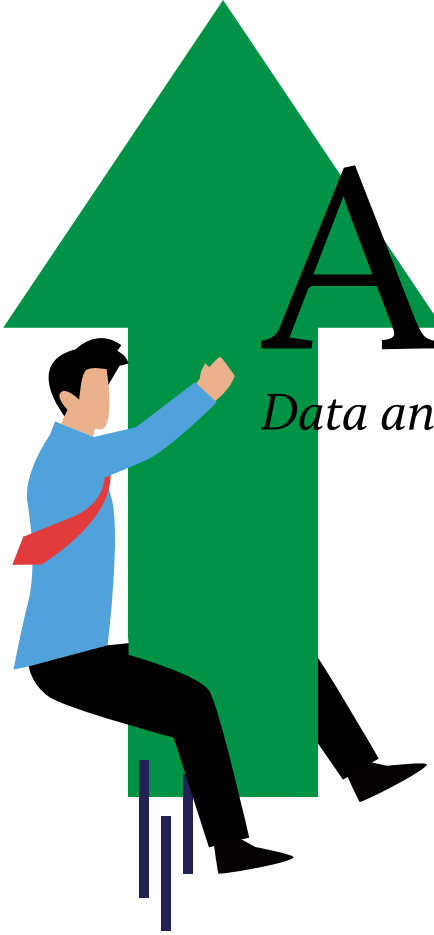
With little evidence of change coming, ongoing poor ATC service and continued fee inflation should be expected for airlines. Ryanair's media team are on the offensive. The company has launched a new website, atcruinedmyholiday.com. This gives passengers an email complaint template and, helpfully, the email address of each European country's Transport minister. Will this work? Probably not, but with France having disrupted 11.7 million Ryanair passengers last year, Philippe Tarbarot, the French Transport Minister, is likely to experience an unusually full inbox.

While the focus remains on ATC, there is a growing threat from bad actors. In September, fourteen European airports across six countries closed or suspended operations owing to drone incursions. This was the highest count in a single month ever. The same month, Collins Aerospace, a check-in system provider, was brought down by hackers.

Denmark experienced the greatest disruption and Mette Frederiksen, the Danish PM, described the incidents as part of a "hybrid attack". She pointed to Russia as the primary "country that poses a threat to European safety". The Kremlin, in turn, denied responsibility.

The UK has suffered its share of drone incidents, albeit not for some time. In December 2018, more than one thousand flights were cancelled at Gatwick Airport after a series of drone sightings. The following year, Heathrow grounded departures owing to a sighting.

Although drone activity around airports is increasing, the likelihood of being directly affected by such an incident remains low. Yet, when viewed through the broader lens of ATC outages, severe weather, e-gate malfunctions, strike action (especially in France) and cyberattacks, it is clear airlines, airports and passengers need to adopt the brace position for an unprecedented and evolving range of disruption.



Ascending

Data and the Elevator Aftermarket

Kyle Summers
Capital Goods Research

If the elevator industry has a defining moment, it is the European Commission's 2007 ruling which levied a €992m fine on the 'Big Four' (Otis, Kone, Schindler, Thyssenkrupp) for collusive activities across Belgium, Germany, Luxembourg and the Netherlands between 1995 and 2004. The aim? Freeze market shares to guarantee future aftermarket revenues.

The story confirmed the Service market was the industry's real prize. Its profits are so vast and so stable, and competition so intense, that the world's largest industrial players were prepared to collude over several years rather than to compete honestly. The mechanisms of collusion included fixed pricing, bid-rigging on new installation contracts and horizontal market allocation, a calculated attempt to divide the installed base into non-competitive territories. Their behaviour established a clear principle: the value of the installed base has always been too high to be left to the forces of open competition.

For Otis, the world's largest elevator company, New Equipment delivers 35% of revenue but only 10% of operating profit. Maintenance and repair activities, the business of keeping the elevators running, delivers 85% of profits. The economics are stark. A new lift might sell for $100,000 and generate a one-time margin of 5%; that same lift under a thirty-year service contract could generate $3,000 annually with margins nearer 30%. It is these recurring revenue streams that have attracted a fragmented army of independent service providers (ISPs) who have spent decades building their own position in the aftermarket.

For years, ISPs have held the blade, commanding 55% of the global Service market. In China, their share is nearer 75%, a gap born when original equipment manufacturers (OEMs) spent their early years focused on selling elevators rather than building nationwide service footprints, leaving room for thousands of local operators. That gap was reinforced by a particularly demanding regulatory regime: inspections require two technicians every fifteen days rather than one every one to three months elsewhere, creating a labour intensity that undermined the economics for OEMs.

Yet the broader rise of ISPs reflected something simpler than geography or regulation. When you're reporting quarterly to shareholders, 'margin expansion' plays better than 'we hired more technicians'. The OEM focus on expanding margins meant keeping technician headcount low, which directly resulted in overburdened technicians who couldn't attend to all maintenance requirements or respond quickly to emergency callouts. The result was predictable: building managers who grew tired of waiting.

The ISPs' price advantage mattered, but it was secondary. Their real edge was being available when the OEMs weren't. For a mid-rise office in Frankfurt or residential tower in Madrid, the annual elevator service contract is a rounding error next to HVAC and utilities. What the facilities manager remembers isn't the $200 saved, but the Monday morning when executives were stuck in the lobby because the nearest OEM technician was unavailable.

This is the paradox: the more lucrative the building, the less price-sensitive the customer, the more they care about response time. Yet the margin expansion strategy that worked so beautifully on spreadsheets created a reality where customers cancelled contracts and signed with ISPs. The independents won by default, not by design.

But the OEMs have found a mechanism to achieve what the cartel attempted: market control through proprietary Internet of Things (IoT) platforms that turn each lift into a connected unit on the manufacturer's network. The promise is predictive maintenance and remote fault correction – finding and fixing faults before building managers know they exist. The reality is a moat that protects the aftermarket as effectively as the

cartel's market-sharing agreements, but which are built on technology rather than collusion.

This solves the customer's complaint: availability. Trustpilot ratings consistently flag the 'Big Four' for slow response. Connectivity changes that calculus. Remote diagnostics, predictive alerts and technicians who arrive knowing what is wrong increase the value proposition of OEMs. The evidence is visible. Schindler reports a 30% reduction in call-out rates for connected units, Kone has cut time on site in certain geographies by more than 25%, and ThyssenKrupp's predictive detection rate hovers around 90%. This translates to a 3-5% improvement in the retention rate of the existing service portfolio, which already sits comfortably above 90%, providing a sizeable benefit.

It is worth noting the major benefits of these connected assets are still to come: IoT platforms launched in 2018 as a service add-on were integrated into new equipment in 2021, and full geographic rollout only completed in 2023. For Otis, connected units were 0% of the service portfolio in 2019 but reached 25% in 2024, indicating rapid adoption.

This is where the cartel echoes become instructive. In 1995, the 'Big Four' used a horizontal approach that the authorities ultimately ruled unlawful. In 2025, the approach is vertical: build a closed ecosystem, with hardware, software and cloud integrated, and require ISPs to compete with limited data access.

ISPs are thereby locked out of the two things that matter most. Firstly, they lack proprietary controller access. They cannot securely access the elevator's brain to perform remote fault corrections. Only the OEM, which built the lift and wrote the software, can do so. The ISP must still send a human. Secondly, they lack proprietary data scale. True predictive maintenance is an AI-driven game that requires a massive proprietary dataset. Otis is honing its predictive algorithms on a dataset encompassing roughly 600,000 connected units. An ISP, or even a third-party vendor, simply cannot replicate this data lake. Their predictive offering is a statistical model; the OEM's is a continually refined forecast.

Regional dynamics add nuance. In the Americas, private equity has rolled up smaller ISPs into scaled players American Elevator, Oracle and 3Phase, servicing an estimated 100,000 units between them. While this concentration provides some defensive capability, it still lags the OEMs' combined 1.2 million units in the region. PE-backed players will fight harder and invest more in third-party connectivity, making displacement slower. But in EMEA and Asia, where ISPs are predominantly family-owned, capital-constrained and operate at the lower end of the market, the OEMs' path is clearer. The ISPs' narrower margins and limited resources will constrain their ability to deliver a commercially viable connected offering.

The implications are structural as the market undergoes a reconfiguration analogous to that of the cartel era, only this time it is sustainable. For investors, this suggests market share gains will not come through price cuts but through superior value proposition and operational efficiency reducing the flow of cancelled units into ISP hands. For building operators, the trade-off is clear: higher reliability and faster response times in exchange for a shift in supplier power. For the ISPs, the challenge is existential. They must either scale through consolidation and investment in third-party platforms or accept a narrowing role in the lower-value segments of the market.

The war for the 85% profit pool continues, but the weapons have changed. ISPs will not disappear overnight, but the market is moving from a labour-driven contest to a data-driven ecosystem. It is a transition worth watching.

A welcome transparency

Desperate Times

Can AI Resolve China's Urgent Demographic Problem?

Timm Schulze-Melander
Tech Hardware Research

China stands at an inflection point. After four decades of explosive growth fuelled by the demographic dividend of a large, young, inexpensive workforce, the country has entered a period of rapid ageing and population decline. Its working-age population is shrinking by millions annually. To maintain GDP growth, productivity must accelerate to compensate.

The United Nations' medium-variant projection shows China losing approximately 43 million people by 2035 and a further 67 million by 2045, with the share of citizens aged 65 and above rising from 14.9% in 2025 to almost 30% by the mid-2040s. The working-age population (20-65) will shrink by 150-180 million people over the same period.

Standard growth accounting suggests labour force contraction of this magnitude, combined with a rising dependency ratio, will exert severe downward pressure on GDP growth. Yet the Middle Kingdom possesses an offsetting asset that few ageing societies can match: a leading position in the development and deployment of AI. If harnessed effectively, AI-driven productivity could largely or perhaps entirely neutralise the demographic drag and enable China to escape the middle-income trap ensnaring rapidly ageing economies such as Japan, South Korea and Italy.

Today, China's population is approximately 1.4 billion, with a ratio of 104 males per 100 females. The age structure reflects decades of sub-replacement fertility. Fertility and birth rates stand below most other industrial economies and the drag on economic growth will increase as the over-65 age group grows to represent 28% of the population. An 8% (110 million) population contraction by 2045, greater than the current population of Germany, would ordinarily have a devasting effect on the economy. Against this backdrop, China's enthusiasm for AI and automation-led productivity improvement is understandable.

We have calculated the old-age dependency ratio as the population '65 and over' relative to the 'population aged 20-65'. On our analysis, this ratio will rise from 23% in 2025 to 37% in 2035 and c49% in 2045. In a closed economy with no productivity growth, such a shift would reduce annual potential GDP growth 0.8-1.2% through labour-input contraction, before accounting for higher pension and healthcare spending.

Historical experience is sobering. Japan's potential growth fell from >4 % in the 1980s to <1% after its working-age population began shrinking in the mid-1990s, despite respectable total factor productivity (TFP) growth. However, China starts from a lower capital-per-worker base ($130,000 versus $350,000 in 2019) and a higher investment rate than Japan, giving it greater scope for capital deepening and a technology-led catch-up.

We have assumed China wishes to maintain an average real GDP growth rate of 4.5% per year from 2025 to 2045. We estimate this run-rate is sufficient to reach high-income status ($25,000 per capita) and to double living standards again by mid-century.

Using a Cobb-Douglas framework with labour share a = 0.5:

$\Delta Y/Y = \Delta A/A + a \cdot \Delta L/L + (1-a) \cdot \Delta K/K$

If labour input (L) falls an average of 0.9% per year (UN projection to 2045), and capital deepening (ΔK/K) continues its post-2010 pace of 6% per year, the contribution from capital is c3%. To reach 4.5% GDP growth, TFP growth must average 2.4% per year. This would be triple the 0.8% China achieved in 2010-23.

AI is the most plausible candidate for delivering TFP acceleration on this scale and explains why it is central to China-US relations.

China ranks second behind the US in AI research papers, patents and private investment. In 2023, it produced more AI publications and citations than any other country and Chinese firms filed c70% of global generative AI patents. It also has the highest robot density at 392 per 10,000 manufacturing workers. There are more than 4,300 specialised AI enterprises and more than 200 'little giant' firms in core AI segments. Domestic hyperscalers include Baidu, Alibaba, Tencent, Huawei and ByteDance.

Automation, particularly in manufacturing and agriculture, can help to fill the space left by a declining labour force. Similarly, robot deployment can be expanded into services such as retail, logistics, education, and health, old age and social care. McKinsey estimates 25-30% of current work hours in China are automatable using existing technology. It argues generative AI can raise that towards 45-50% by 2030.

The problem

Beyond the automation of jobs vacated by a falling population, the remaining workforce can be augmented by AI. Knowledge-worker productivity tools such as coding assistants, medical diagnosis support, legal research and design automation generate greater effective output with the help of AI. Baidu's ERNIE and Alibaba's Qwen models perform very well compared to US frontier models such as GPT-4 on several Chinese-language benchmarks, ensuring rapid domestic adoption.

The speed of decline in the working population has transformed enthusiasm for AI into urgency. The third phase of the China Integrated Circuit Industry Investment Fund ('The Big Fund') includes $47.5bn explicitly targeting semiconductor equipment and high-bandwidth memory. This is a response to US export controls on chipmaking tools such as ASML's lithography machines. China is subsidising domestic equipment makers like NAURA and AMEC to break the foreign dominance of the tools needed to build AI chips.

In addition, projections for 2025 indicate a sizeable disparity between government-led investment and private market dynamics, highlighting the necessity of state intervention. China is forecast to deploy c$98bn in AI capital expenditure in 2025. A material portion ($56bn) is expected to derive from government funding and state-backed entities, aimed at building datacentres which the private sector might consider too risky or capital-intensive.

This year, reports emerged of a long-term funding initiative on a scale that suggests the guiding principle is 'whatever it takes'. This new fund exists in addition to The Big Fund and aims to mobilise c$138bn over twenty years. It is patient capital, earmarked to support technologies such as AI, quantum computing, robotics – sectors that can replace human labour.

For example, estimates suggest AI-powered remote monitoring, drug discovery and robotic assistance can reduce the per-elder care burden by 30-50%, freeing younger workers and lowering fiscal pressure. While an acute focus for China, such challenges are familiar across many industrial economies.

AI-driven resource re-allocation is desperately needed to improve total factor productivity. AI platforms offer the prospect of lower search, matching and coordination costs, enabling smaller firms and rural regions to participate in high-value chains and to counteract the urban-biased drag from ageing megacities.

Empirical studies of early adopters are encouraging. Firms using industrial AI in the Yangtze River Delta saw labour productivity rise 18-38% within two years. Scaled nationwide, such gains could compound rapidly, offering substantial and sustained productivity and revolutionising incomes, total factor productivity, GDP growth and GDP per capita.

To grasp the prize, China must undertake several long-term initiatives. It must: sustain R&D intensity above 3% of GDP, with a heavy weighting towards applied AI; accelerate regulatory reform to create national data marketplaces while preserving privacy; expand STEM and vocational retraining for >100 million workers by 2035; raise the statutory retirement age to 65, supported by AI-enabled lifelong health management; and deepen international cooperation on open-source models and standards to avoid isolation.

China's demographic challenges are largely 'locked in'. If the birth rate remains low over the next two decades, the population will age and shrink. The next twenty years will determine whether China grows rich before it grows old.

Yet demographics need not be destiny when technology is advancing exponentially. AI offers a rare opportunity to decouple economic growth from labour force size. If China maintains its AI momentum and implements appropriate reforms, it can convert a looming slowdown into a temporary transition towards a high-productivity, high-income future. Time is not on its side, but if successful it could turn the 'silver burden' into a manageable phase on the path to developed-nation status.

Call Me

Customer Experience Outsourcing Faultlines

Oliver Davies
Business Services Research

Teleperformance and Concentrix, the two largest listed customer experience outsourcing companies, have been placed firmly into the 'AI loser' bucket. The stocks are both down more than 50% in the past couple of years but, perhaps more remarkably, Teleperformance now trades on sub-5x earnings, a precipitous fall from the 30x earnings multiple it enjoyed throughout 2021.

Historically, Teleperformance's Core Service division delivered consistent high-single-digit growth driven by increased demand for outsourced customer services solutions. Throughout that period, outsourcers offered the benefits of 24/7 service, flexibility and, perhaps most importantly, cost savings, given the ability to arbitrage the global labour force in a company's desired language. While extraordinary pandemic-induced growth was followed by a cyclical slowdown, the Core Services division has just delivered the highest level of organic growth (3.9%) since Q3 2022, the quarter before ChatGPT was released, suggesting the current impact on growth from Generative AI (Gen-AI) is minimal.

However, in the longer term, there is little doubt Gen-AI will dramatically reshape the Customer Service industry as human agents are replaced with AI varients. This will see an increasing proportion of interactions automated either via a chatbot or voicebot. The remaining complex cases will then be solved by a human who will be able to complete a higher volume of tasks per day, given the huge productivity increases enabled by Gen-AI-based systems. The extent and timing of these impacts is debatable and difficult to forecast, but both will have a profound impact on in-house and outsourced customer service teams.

Customer service departments are often a large cost line for businesses. Estimates suggest that on average they can consume between 2% and 3% of revenue given the labour-intensive nature of the service (labour is c80% of Teleperformance's cost base). Automating interactions therefore allows these services to be provided at a cost that is an order of magnitude lower than a human. Further, it can be argued that delivery is faster and more accurate, improving the overall customer experience.

While there are many variables, we estimate the cost of the average call delivered from an onshore location to be $4.50 with an offshore call costing in the region of $1.50. Pinpointing the cost of an automated interaction is difficult but Intercom, an AI customer service start-up, charges 99c per resolution. Therefore, as interactions shift from humans to AI agents, customer service departments will be able to complete the same interactions at a lower cost, which incidentally should provide corporates with a welcome margin boost.

For outsourcers, this will be deflationary as the price per interaction falls. The financial impact will depend on whether the interaction is completed by an outsourcer's products, with the implications clearly larger if they are disintermediated and replaced by third-party software. Further, although a smaller proportion of interactions will go to a human agent, they are likely to remain in the loop for some time. But these agents will become hugely more productive through deploying systems such as knowledge banks and post-call summarisations. With the outsourcers charging on a per-agent basis, customers will require a smaller number of agents for those tasks that find their way to a human, further pressuring revenue and lowering the propensity to outsource.

The $114bn Outsourced Customer Experience market will therefore evolve meaningfully in the coming years. This disruption, along with the

For whom the bell tolls

size of the in-house market ($241bn), and Customer Service being one of the most suited areas for Gen-AI deployment, means increased competition is inevitable. A plethora of start-ups, such as Sierra, Decagon, Kustomer and the aforementioned Intercom, alongside established Software-as-a-Service players like Salesforce, are developing customer service agents to replace humans.

Perhaps the most notable of these is Sierra. Founded by Bret Taylor, Chair of OpenAI, ex Co-CEO of Salesforce and CTO of Facebook, the company has just raised $350m at a $10bn valuation, comfortably higher than the enterprise value of either Teleperformance or Concentrix, despite only generating c$100m in annualised revenue this fiscal year.

While the agents, currently mostly chatbots, start by solving foundational queries, the desire is to solve more complex queries and in future utilise voice automation through partnerships with Google, OpenAI and ElevenLabs. Like other examples from both in-house and outsourced customer service teams, the company has clients for which 90% of requests have been solved without a human, similar to Gartner's estimate that 80% of issues will be autonomously resolved leading to a 30% reduction in operational cost. These new offerings are also attempting to implement a different pricing strategy to the outsourcers, using an outcome-based pricing model where the company is only paid if an interaction is resolved but receives nothing if it passes through to a human agent.

The Customer Experience industry therefore stands at an inflection point as Gen-AI-based solutions seek to automate interactions further and competition intensifies, both of which will be disruptive to the outsourced business model.

For Teleperformance and Concentrix, the stakes are high. Teleperformance's core business generates 72% of revenue via customer care and technical support, with a similar amount via voice interactions, although the proportion of volumes via voice channels will be less given these have a higher price point.

While the businesses are currently seeing a relatively low impact on revenue growth, they are having to invest to keep pace with competitor products and the future revenue and profit compression from existing clients could clearly be large. This and the declining benefits in using an outsourcer provide poor visibility on future growth and profits.

But the companies are evolving and there are other factors that will insulate them from some of this financial impact. Firstly, the volume of interactions will continue to grow, offsetting part of the price deflation within the core business, while vendors will consolidate volumes to those who are able to automate interactions and provide cost savings first. Secondly, the companies will reskill the large employee base by developing new services lines. For example, at Teleperformance Trust & Safety is now 12% of Core Services' revenue from a very low level ten years ago, while Consulting continues to grow strongly, albeit from a small base. Lastly, and perhaps most risky, M&A could be used to acquire businesses that are unimpacted by AI.

Despite these offsetting factors, the equity market is convinced the upcoming disruption will be huge. Teleperformance trades on an equity FCF yield of almost 30% while the enterprise value is equal to roughly seven years of unlevered free cash flow. Given AI is in its infancy, accurately forecasting the speed and extent of the financial impact is challenging and dependent on many factors.

While it is not impossible the listed customer experience players will be able to transition their business from a largely human capital business to a new model, doing so in the public domain with the burden of quarterly reporting will be challenging. So, while the stocks could be seen as providing potentially large capital returns to shareholders and a hedge if the AI bubble bursts, disproving the negative impact and bear case is extremely difficult.

Ghost in the Machine

The Demise of British Leyland

Tobias Beith
Automotive Research

The combined output of Britain's light automobile (cars, vans, and trucks weighing less than 3,500kg) final assembly plants has shrunk almost uninterruptedly since 2016. It has now reached about eight hundred thousand units (ku) pa, a level last seen in 1953. Then, that rate was impressive – Britain ranked second in the World. Today it is nineteenth, tailed closely by Malaysia.

The Second World War weakened Britain's economy severely. Automobiles were recognised as an export item that could help its restoration. Hence they became a focus of government policy via strict rules on sales channels when critical raw materials in short supply, such as steel, were consumed. International markets underwrote substantial growth in light vehicle production (LVP), from 17ku in 1945 to 523ku in 1950, of which 398ku left Britain's shores. The five primary manufacturers were Austin, Ford, Nuffield Organisation (aka Morris), Rootes Group and Vauxhall (then a General Motors company).

While Britain's LVP continued to grow, it turned inwards and by 1955, c50% of its supply was allocated to the domestic channel. Economies of scale and intensive competition abroad stemming from now-rebuilt fixed assets dictated a trend towards the rationalisation of Britain's automobile industry. This gained momentum in 1952 when Austin acquired Nuffield, which had already merged MG, Riley and Wolseley to form the British Motor Company (BMC). The combined entity accounted for roughly two-fifths of Britain's LVP volumes. Over 1965-66, BMC purchased Pressed Steel, a systemic tier one supplier of vehicle body and chassis structures, and Jaguar, forming British Motor Holdings (BMH).

Another light vehicle conglomerate formed around Leyland Motors (LMC) contemporaneously, which in the post-war era had grown to become the country's largest producer of medium-heavy vehicles, such as semi-tractors and buses. In 1960, LMC acquired Standard-Triumph and its mid-single-digit percentage share of total British production volumes, and in 1965, Rover, which itself had just purchased Alvis. Meanwhile, the US-based Chrysler bought Rootes.

BMH and LMC united in 1968 as the British Leyland Motor Company (BLMC), creating Europe's fourth-largest automaker by volume and a domestic leviathan. The rationale for the merger? BMH's market share had slumped, the group was loss making, and the government was applying pressure. A streamlined, tightly managed enterprise was thought to be the solution. It is noteworthy the late Sergio Marchionne, former CEO of Fiat Chrysler Automobiles, argued in his renowned 2015 presentation 'Confessions of a Capital Junkie' that large-scale M&A was still necessary for the industry to earn its cost of capital over a business cycle.

Total production of light-heavy vehicle types peaked in 1972 at 2,329ku, up 6% YoY. Output declined thereafter until the late 1980s, contrary to overall sales volumes in Britain, most of which appears attributable to BLMC's downfall.

The problem for BLMC was its portfolio of companies failed to integrate. For example, when Triumph designed the Stag, it theoretically had access to the proven Buick 215 engine via rights owned by another BLMC brand, Rover. Yet it decided to develop its own engine, seemingly owing to perceived rivalry.

Per Jeremy Clarkson, the Triumph Stag was, "Almost certainly the best car that BLMC ever made… [although it was] riddled with faults, chief among which was…

the engine". There were design and manufacturing problems aplenty, according to Stag specialists, and this knowledge soon became widespread. In an interview, Charles King, the model's lead engineer recalled, "I was told [by Triumph engineers] that they tried to put it [the Buick 215 engine] in and you could not put it in and I believed them. I probably should not have believed it".

At that time, the relationship between white- and blue-collar industrial labour in Britian was dysfunctional and adversarial. In 1967, 2.8 million working days were lost to disputes and strikes. The equivalent figures in 1970 and 1972 were 11 million and 23.9 million respectively. Over a thirty-month period at the end of the 1970s, BLMC's largest plant, Longbridge in Birmingham, experienced 523 walkouts. It is estimated the aggregate cost to the company was £200m, c£950m in today's money, about 20% of total revenues.

No (parity no) work

The company's expenditure was bloated. Immutable unions stalled the consolidation of brands, nameplates and plants. As a result, BLMC simultaneously produced four vehicles to compete with the Ford Cortina: the Morris Marina, Austin Maxi, Triumph Dolomite and Princess. Duplication existed intra-company: Triumph's 2000 challenged Rover's P6, MG's MGB rivalled Triumph's Spitfire, and the Morris Marina contested Austin's Allegro. None shared platforms, which dictate non-styling specific componentry – underbody, steering, suspension, braking systems, wiring – so cannibalisation created diseconomies of scale.

Moreover, major European, Japanese and American competitors had developed and invested behind new techniques that improved build quality, precision and worker safety, and minimised unit labour costs, the savings from which were partly passed through to end customers. The Toyota Production System and its core ideas of just-in-time manufacturing and 'automation with a human touch' is most notable. In 1973, Britain entered the European Economic Community, precursor to the EU. The resultant free trade among its member states widened the competitive gap between BLMC and its peers.

In 1970, over half of BLMC's production was sold in the UK. Western Europe and the US accounted for most of the residual. The company performed poorly in all markets. In two years, its share of the UK declined by roughly ten percentage points. Nevertheless, management distributed almost all profits to its shareholders. In despair, and without the financial capacity to modernise its plants and products, BLMC was effectively nationalised in 1975. Substantial restructuring and asset sales took place over the next twenty years, including Rover and Land Rover to BMW, and Jaguar to Ford.

Foreign automakers such as Nissan, Toyota, and Peugeot invested in Britain from 1986 which restimulated its LVP. Total volumes rose to within the neighbourhood of the peak, c2,000ku in 1998 and 1999. However, unlike before, the predominant automakers were not British-domiciled.

We draw two lessons from the BLMC case study: firstly, the target and acquirer must be aligned; and secondly, the slow adoption of new technologies and processes that improve a light vehicle's CoGS and/or its features can be costly.

Lesson two in part explains why global automakers, both American and European, have struggled in China of late. In 2019, this group represented 55% of total LVP in the country; today, they account for c30%. The domestic marques (BYD, Chery, Li Auto *et al*) have high degrees of vertical integration and software-first vehicle platforms, and have evolved assembly techniques for all-electric propulsion systems. All result in a superior product, particularly in lower-cost segments. These are, however, difficult characteristics to embrace, not least because the incumbents outsourced hardware and software development to their suppliers after the 2008 Global Financial Crisis; in short, there is a human capital challenge.

The case of BLMC is also thought-provoking when analysing Stellantis, which was also created through merger. It is another multi-brand enterprise that has rapidly lost share in its primary end markets, and whose financial position has been stretched – the net liquidity of its industrial business halved over 2024. The price of Stellantis' ordinary share, at the time of writing, points to a valuation a fraction of its book value. It might be very cheap, but sceptical observers armed with knowledge of the demise of BLMC may conclude its situation is irreparable, much like its British predecessor.

True Royalty

Content is King

Edward Lewis
Consumer Staples Research

"Were you, sir, invited to the Royal Wedding?" My father smiled and, while he never wanted to let the truth spoil a good story, even he could not pass this off. "No, I was not," he replied, and the queue in the Palm Springs, CA post office who had been hanging on every word sighed. The disappointment was palpable since there was an implicit assumption a distinguished English gentleman, albeit one sporting a country casual shirt and unfortunate shorts in concession to the stifling heat, had to be connected in some way to the Royal Family or, at the very least, the Crawley family of *Downton Abbey*. Forget *Housewives of Atlanta*, for these Americans, my dad had had the potential to be an A-list celebrity.

I smiled, deeming it an "I told you so" moment as it endorsed the case for True Royalty, a multi-media business focused on all things royal for which I have been a non-executive director for seven years. 250 years on from the Declaration of Independence, it is ironic how clearly 21st century Americans remain enthralled by the British Royal Family.

Capitalising on that obsession is the genesis and genius of True Royalty. One of the founders is Nick Bullen, the doyen of 'Royal TV' who has been making royal documentaries for thirty years, another is Gregor Angus, who heralded from the world of advertising and digital marketing and was an early champion of streaming.

While I am not an ardent royalist, I did grow up in second-generation corgi household and for the first ten years of my life I was not entirely convinced my mother, grandmother, Mrs Thatcher, the Queen and Queen Mother were not all descended from the same stock. Meanwhile, I saw how the tabloidisation of the British Royal Family through the 1990s proved so lucrative for Rupert Murdoch's Fleet Street and by extension, the US media, acting as it does as a mecca for celebrity.

Yet I never anticipated becoming involved in a venture that married next-generation TV with a brand recently ranked as the world's fourth biggest after Google, Amazon and Apple. However, an 'unavoidable' clash between the Cheltenham Festival and an introductory meeting meant I was sent by my boss to meet the team at a dinner, rather appropriately in the royal-warranted Fortnum & Mason. Within weeks, I was asked to join the Board, not because my investment justified it but because I was the only founding investor who knew (a little) about streaming video, having been a media analyst in a former life.

From a commercial perspective, the Royal Family is the gift that keeps giving. From Harry and Meghan's exit to the deaths of the Duke of Edinburgh and the Queen, the first Coronation in seventy years and the enduring scandals affecting the King's younger brother, the 'firm' has rarely been out of the headlines. We at True Royalty have had to be sensitive on navigating these events, mindful most of our subscribers, reaching into six figures around the Coronation, are supporters of the Royal Family. Yet we can use this to our advantage. For example, as Netflix aired each new season of *The Crown*, we provided programming relating to what really happened, rather than what Peter Morgan's wonderful writing suggested had occurred.

From day one, we have focused on the US. Not only was it market-leading in streaming video adoption, but our research showed 69 million adult Americans considered themselves 'Royal fans' and fifteen million deemed themselves 'fascinated'. With a curated line-up of shows we have licensed added to those we have commissioned (e.g. *Meghan for President?* in 2019) and our own biweekly current affairs show, *The Royal Beat*, where experts opine on the week's events, we have built an appetising array of programming for any Royal watcher.

Streaming video services are now ubiquitous. Octogenarians are as comfortable logging on to the iPlayer as they are checking their grandchildren's latest Instagram posts. However, we have avoided the 'red ocean' of general entertainment streaming wars, to operate in the 'blue ocean' of niche streaming video services. These include Acorn, which serves up British period drama (*Poirot*, *Foyle's War*) to North Americans, and Marquee, a similar service to ours but which focuses on opera and ballet. Commissioned market research shows our typical

All the way back to Æthelstan

subscriber is a middle-aged, midwestern mother who considers being a Royal fan her guilty pleasure. A True Royalty subscription is a statement of who they are as much as an endorsement of our service.

The challenge has been to break through in an increasingly crowded marketplace. Gaining access to cable and satellite-operators' fledgling streaming video services was not difficult, but generating appropriate returns on the advertising spend showcasing our service was tough and capital-intensive, swallowing much of our early funding. Yet we boast monthly churn rates in high single digits, the envy of many a niche streamer, and in 2021 we were one of the first to be added to Amazon's Prime Video channels. This transformed subscriber growth. Although we have to share the economics of a subscriber, the power and reach of Amazon in the streaming video world, let alone across the digital economy, is striking.

The growth potential of the service is multi-pronged. Having cracked it in America, like all good brands we are preparing to go global, capitalising on the interest in the Windsors across the English- and non-English-speaking world. There is also scope to branch out to provide dedicated coverage of other Royal families, with shows on the Grimaldis in Monaco and the Burmese Royal family generating strong subscriber interest. We have also looked to broaden into other forms of digital media from Subscription Video On Demand to Advertising-Based Video On Demand – even to legacy TV where *The Royal Beat* outrated Laura Kuenssberg's flagship BBC current affairs show on Sunday mornings.

Our CEO has bolder ambitions. He is considering the emerging world of immersive experiences. Rather than heading down to Canada Water to undertake a virtual voyage on the Titanic, why not tour Balmoral or the Royal Yacht Britannia? Such exhibitions can be staged around the world in specially designed 'white box' spaces without having to brave the grey skies of northern Scotland, let alone the bleak streets of Leith.

As ever with a start-up, most board meetings are focused on fundraising. Over the years, the executive team has spoken to potential investors, both strategic and financial, across the globe. Fundraising events have ranged from presenting to a country club in Texas to Crowdfunding during COVID. While we remain independent, supported by a coterie of loyal and patient investors, we couldn't help notice how CrunchyRoll, a Japanese animé business that also had roots in streaming video, was acquired by Sony for $1.5bn in 2021; or how the BBC bought ITV's 50% stake in Britbox, a North American streaming video service, in 2024 for $322m.

It was Bill Gates who coined the phrase, "Content is King". In those days, the late 1990s, the media sector was an integral member of the TMT triumvirate fomenting the 'irrational exuberance' that characterised the era. Yet, as in late Republican Rome where the Caesar, Pompey and Crassus triumvirate was a prelude to the descent into (infamy and) empire, so TMT has collapsed into a technology empire.

Media, or distribution, has been disintermediated. AOL's 'walled garden' has been breached, the baton passed to the 'tech bros' of the 21st century who are vocal (and legally precise) in not classifying themselves as media companies. This is the era of personalisation, a vision in the 1990s but never a reality as it risked the financial benefits moguls saw in the cable/satellite bundle. Nowadays, however, consumers can choose the media they wish to consume, and for True Royalty content is king. The British Royal Family is an enduring brand with unique drawing power. As much a soap opera as an institution, it continues to intrigue, entertain and delight enthusiasts across the globe.

A Consumer Mosaic

Assessing US Consumption

Katherine Stamp
Research

Despite a relatively stable US macroeconomic backdrop, consumer-facing stocks are under pressure. This paradox reflects the heterogeneity of US consumption.

Standing in front of a table of groceries, Donald Trump proclaimed, "When I win, I will immediately bring prices down." While this remains aspirational, the data suggests pricing is broadly stable. Headline CPI in September rose 3% YoY, softer than expected, while core CPI was also 3%, far below pandemic peaks. Incomes are not collapsing and real disposable income rose c2% YoY in August.

But if the US consumer is confident, ubiquitous downgrades of consumer-facing stocks suggest otherwise.

To understand this contradiction and the composition of consumption at a micro level, we analysed quarterly price and volume data for circa sixty Retail, Food & HPC, Beverages, Media & Entertainment, Hotel and Airline companies. While a rough science, a clear pattern emerges. Services are resilient, goods lag.

While services' pricing rose 6.4% in in Media & Entertainment in Q2 2025, this industry topped the volume charts, enjoying a 13.2% increase YoY. So, despite prices increasing faster than CPI, demand has not softened. A similarly positive picture emerges from Booking, Expedia and Airbnb, where Q2 volume growth averaged 7.3% while pricing added 0.3%.

Goods were a different story. For Q2 2025, volume growth in Food & HPC companies averaged 2.6%, Retail 1.5% and Beverages -1.4%. Although the data is still rolling in for Q3, the pattern holds: Media & Entertainment volumes rose 13.36%, Retail 2.2%, Food & HPC declined 1.95% and Beverages 4.6%. Pricing stands at 4.5%, 0.3%, 1.1% and 0.9% respectively.

These results are supported by FY25 forecasts. Focusing on US consumer-facing companies, we categorised services and goods into discretionary and non-discretionary. Discretionary services rule the roost, with forecast sales growth of 7.9% and EBIT margin growth of 0.9% for 2025. Discretionary goods ranked second, with 0.8% and 0.9% forecast respectively. Meanwhile, non-discretionary is expected to see 1.4% sales growth and flat EBIT margins.

The macroeconomic picture looks different. Despite inflationary fears after Trump's April tariffs, CPI hasn't surged. However, this largely reflects the inventory build-up in Q1 2025, which may take time to unwind.

The disparity between goods' and services' performance can be explained by supply-demand dynamics. Entertainment companies were the largest contributor. Here, demand trends are less important. Live entertainment companies will always find people willing to pay extortionate amounts to see, say, Taylor Swift, given limited seats in the stadium. This of course differs from airlines where vast supply and competition renders price the lowest common denominator. One can postpone a flight this summer, but Taylor Swift might never tour again. The airline principle applies to most goods, where supply is often abundant.

The gulf between the bleak outlook of the consumer stock market and the stable macroeconomic picture can also be explained by the notion of composition. Consumer-facing stocks primarily sell goods. Thus, any hit to the 'goods' sector is amplified in the stock market, building the impression of a suffering consumer. In contrast, 60% of personal consumption is services, of which 60% is healthcare and housing. This difference is exacerbated in US GDP where personal consumption makes up 68%, of which c70% is spent on services.

It is worth noting how a K-shaped economy impacts consumption. Chipotle recently noted budget-conscious households are trading down and cutting discretionary spending, while higher-income cohorts remain resilient. That the top 10% of earners account for 50% of consumption perhaps explains why macroeconomic measures are resilient. As over 30% of their wealth is held in equities (Q2 2025), compared to 14% of the bottom 20% of earners, recent market performance has been beneficial. Such trends connect to previous observations given lower-income households spend a larger share of their income on necessities.

Tying it together, we argue the US consumer is not broken, nor are prices too high across the board. Rather, goods' prices appear to have reached breaking point, while demand for services remains robust. The market's pessimism reflects the specific composition of listed consumer companies rather than broader US consumption, which is a mosaic of different consumers and types of consumption.

Alberto Giacometti

Interior of the Studio (1949)

For artists through the ages, wives, lovers, muses and corners of the studio have been the most readily available and weather-proof subjects. If wives, lovers and muses weren't always cheap or emotionally stable or guaranteed to stay the course, the studio was (usually) paid for and unlikely to run off with someone else. Hence, when short of subject matter or a model, painters from Velásquez and Vermeer to Courbet and Bonnard pressed their surroundings into action.

Alberto Giacometti (1901-1966), famous in the 1930s for Surrealist sculptures and after the war for etiolated figures whose skeletal bodies expressed an existential solitude, was one such.

Every studio reflects the personality of its tenant, and Giacometti's was no different. His paint- and plaster-filled space at the less fashionable southern end of Montparnasse was a temple to work devoid of creature comforts. A small concrete room with a high ceiling, cement floor, dim lighting, no running water until the mid-fifties, a leaky roof and grey monochromatic light, it was ideal for an obsessive who worked fifteen hours a day, mainly at night. He lived next door in a room Simone de Beauvoir described as being, "A kind of hangar, vast and cold, with neither furniture nor food".

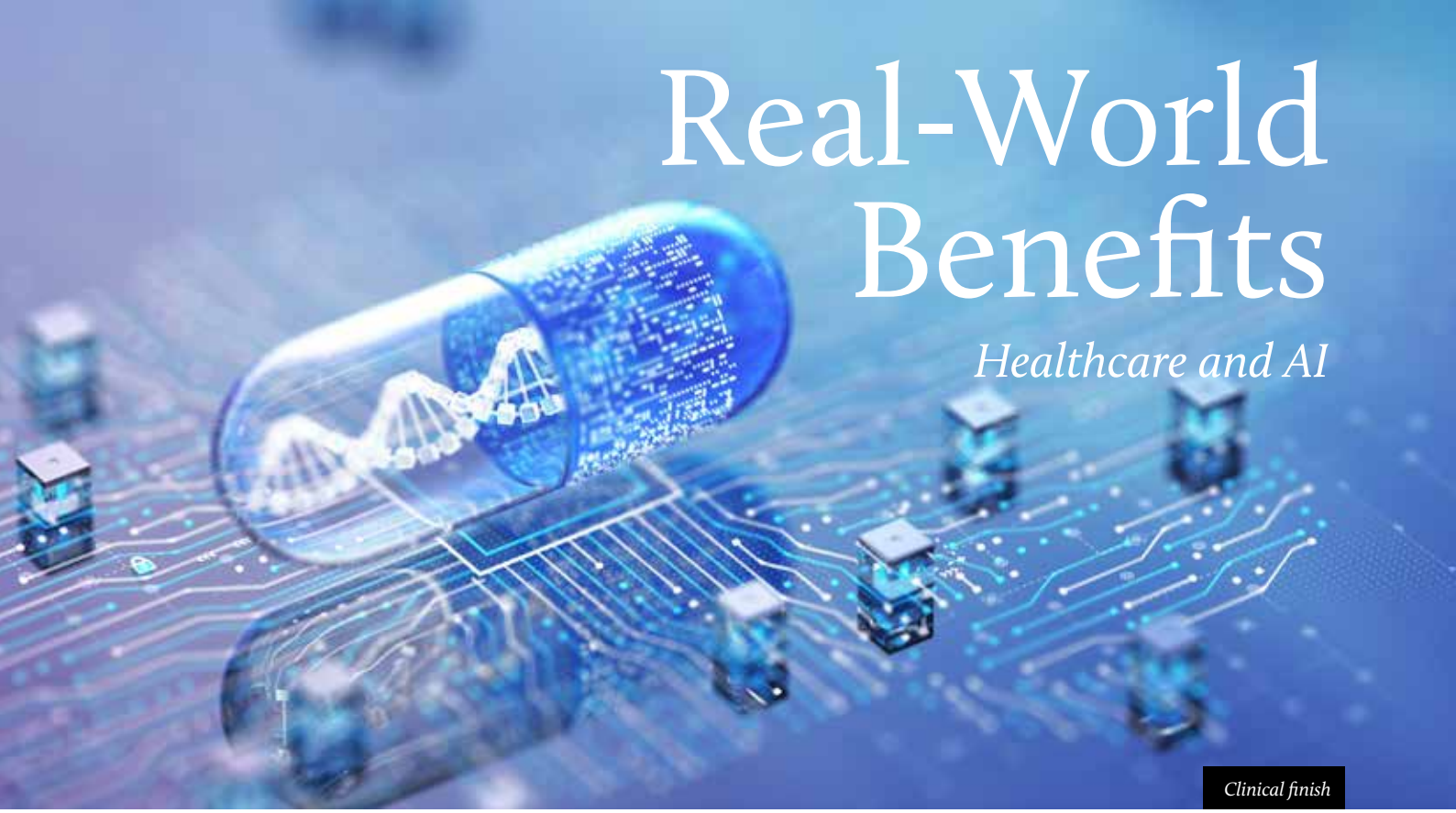
Giacometti arrived at 46 Rue Hippolyte-Maindron in December 1926 and remained for the rest of his life. "When I took the studio, I thought it was tiny," he recalled, "but the longer I stayed the bigger it became." This was fortunate because it attained mythic status, becoming a place of pilgrimage for artists, writers, philosophers, friends, film stars and fans. Such was its aura that Jean Genet, the thief-turned-author, observed, "When I leave, when I am outside on the street, then nothing that surrounds me is true." Michael Peppiatt, an art historian, argued the studio "crystallised his [Giacometti's] works, personality and life into a single compact space," and "came closer to his vision" than any individual piece he created there.

Interior, oil on canvas in muted tones, depicts a cramped corner of the vaunted studio. There is a table, a Van Gogh-like chair, a stool, the plaster-caked floor, an opaque window in a dirty yellow wall, shadows around the door. Little attempt is made to address pictorial realism, rather the artist is determined to convey a shuttered, cell-like atmosphere. The solidity of objects is undermined by the artist's powerful white strokes, the scumbling evoking the plaster covering every surface, blurring definition, undermining the emptiness while simultaneously affirming it.

For Giacometti's aim in *Interior* was to capture absence, the fugitive or fragile, the evanescent. As his attenuated sculptures created a sense of isolation and a burrowing down to the core, so *Interior* dissolved the spatial certainty of the workplace, replacing it with the sense of an artist struggling to convey the fleeting nature of reality. If the brushwork was expressionistic, the intent was existential.

Interior is both a painting of a studio and a metaphor for the inner life of the artist who worked there. Giacometti was famously perfectionist, taking weeks or months of a sitter's time to complete their portrait, building up an image in black strokes before wiping it out in a storm of nervous white lines. Then he would start over, fretting and worrying away at the palimpsest, trying to distil the personality – the 'inwardness', to borrow Robert Hughes' phrase – of the sitter or place in space.

Alberto Giacometti rarely travelled. For forty years his home was the studio, the studio his home. It was the only space he ever conquered.



Real-World Benefits

Healthcare and AI

Clinical finish

Ed Ridley-Day
Medical Technology Research

Artificial Intelligence, and the opportunities and threats it embodies, has become a staple for news editors, politicians and influencers, usually through the prism of headline-friendly generalities. Search engine queries promote multifarious results, long on memes, short on argument. The US stock market rally has been powered by companies benefiting from the development of AI, notwithstanding concerns over whether demand can support the growth implied by company valuations.

Healthcare is becoming a proving ground for its real-world benefits. There is growing evidence AI can support enhanced healthcare outcomes while materially reducing the cost of care and benefiting those companies and investors that participate.

A common argument for the potential of AI is in managing and leveraging data. Healthcare has seen exponential growth in data creation. The need for accelerated and efficient analysis is underlined by the enormous quantity with which hospitals must work; the average US hospital generates more than 50 petabytes of data each year. This includes diagnostic test results, and patient, operational and financial data, but the largest contributor is medical imaging.

To put this into perspective, c1000 petabytes – one exabyte – would be enough capacity to store the entire digital collections of the British Library and Library of Congress combined. This is equivalent to the data generated by roughly twenty hospitals in the US annually. Perhaps unsurprisingly, studies show 97% of this data is unused for broader analysis.

Understandably, considering the vast amounts being invested in the development of AI solutions, and the data centres and cloud infrastructure required, investors are asking where the revenue opportunities are to guarantee a return on their investment. While there are many areas of debate, there is agreement the most scalable opportunities are in markets that will benefit from AI's ability to automate and optimise processes. Healthcare offers a substantial opportunity for AI and software solutions, which have the potential to transform healthcare delivery, surgery and data management.

It is the companies which provide integrated solutions who stand to benefit. For example, AI solutions have been harnessed in surgery, through the development of increasingly automated robotic solutions, as represented in Intuitive Surgical's da Vinci systems, and in disease diagnosis, particularly radiology.

A useful way to track the rapid uptake of AI in MedTech is through the Food & Drug Administration's own data. AI-enabled devices are subject to the same premarket regulatory pathways and oversight as all other medical devices.

Thus far, the disruption of healthcare delivery through AI has been restricted to a few sub-sectors. The radiology OEMs, Siemens Healthineers, GE Healthcare, Philips and Canon lead the roster of companies with AI-enabled approved devices.

In the first instance, AI in radiology amounted to point solutions, whereby companies developed specific programmes to improve the

diagnosis of specific diseases. The most successful of these remains HeartFlow's solution for assessing whether a patient requires a percutaneous coronary intervention (PCI) – the placing of a stent to ensure a coronary artery remains open. HeartFlow's algorithm takes a standard coronary CTA scan and transforms it into a personalised and dynamic 3D model of the heart, whereby the clinician can better asses their patient's anatomy and physiology, and whether surgical intervention is required. HeartFlow's technology in the UK's NHS has reduced stent surgery volumes c25% in those hospitals where it has been introduced.

However, few other 'point solution' companies have achieved similar success, and a single therapy solution will always be vulnerable to new AI-supported solutions that do the same, but better or cheaper. Successful integration of AI requires companies to work closely with healthcare provider partners, and to align outcomes and operational targets with the software solutions offered.

Understandably, investors and stakeholders across industries are focusing on companies offering infrastructure and orchestration tools, especially those supporting broader AI ecosystems, over standalone applications with limited adaptability. Product offers need to enhance existing workflows with measurable returns and these are valued far more highly than broad undifferentiated AI platforms.

An important question for developers of AI solutions is thus how deep is the moat their solution enjoys, and where is the value of that solution to, in this instance, healthcare providers? There is no moat for the companies developing these solutions if all they have is petabytes of data, but with no strategic use.

As highlighted, the companies leading the development of AI and software solutions in healthcare are the radiology system manufacturers. We see substantial potential for these to continue to develop integrated solutions for their healthcare partners, with imaging sitting at the centre of modern healthcare, integral as it is to disease diagnosis and monitoring, and guidance for minimally invasive and robotic surgery. We note both GE Healthcare and Philips have disclosed more than $1.2bn of enterprise software revenue.

However, smaller digital health companies have gained traction with solutions that address the need to provide their clients with better integrated and scalable platforms. These include the privately held Israeli company Aidoc, workflow solutions companies RadAI and Viz.AI, and RadNet, the leading US radiology service provider, through its DeepHealth subsidiary.

Aidoc is one of the fastest growing digital health companies, with a 1,560% revenue CAGR over 2021-23. It utilises a unified enterprise AI platform, aiOS, offering solutions that support analysis and the aggregation of medical data. It has the most US FDA clearances in clinical AI, with solutions covering about 75% of patient populations. Aidoc's offerings span cardiology, neurology and radiology, among others.

RadNet's DeepHealth subsidiary offers an expanding portfolio of cloud-native AI products including its Diagnostic Suite. An imaging platform that unites picture archiving and communications systems (PACS), multi-modality viewing, automated reporting, workflow and clinical process solutions. It also offers a vendor-agnostic, remote scanning and radiology management solution designed to extend expert support across multi-site operations. RadNet expects a c30% revenue CAGR for DeepHealth through 2030.

The radiology and robotic surgery solutions providers benefit from an integral role in hospital operations. From their scalable infrastructure platforms, the collection of high-quality data can be used to improve both their own solutions and patient outcomes and render them leading partners for healthcare providers. These companies strengthen their moats as they become embedded in healthcare delivery.

Both Intuitive Surgical and the radiology OEMs are reducing costs and accelerating revenue growth for their clients, while their platforms support scalable and profitable growth for shareholders and stakeholders.

Other areas where we see potential include patient monitoring, disease management including diabetes, drug discovery and contract research, and bioproduction.

However, the sensitivity of medical technology companies to developments in AI varies widely. For example, in areas such as orthopaedics, the manufacturers' robotic assistance solutions are not genuine robots, they are mechanised arms which need to be manipulated manually by the surgeon or nurse. In many segments, AI remains little more than a CEO buzzword. There has been much hype around digital health, but simply providing a 'digital health' service means little without the provision of value-added solutions or an underlying platform technology. This is demonstrated by the rapid rise in the valuation of telehealth companies, such as Teladoc during COVID, and subsequent fall. Telehealth connectivity solutions are little more than 'Zoom' for healthcare professionals.

Healthcare also offers a material opportunity for software and cloud computing providers including Amazon (AWS) and Microsoft. These companies are using AI to increase efficiencies, reduce the staffing burden, and improve patient care and hospital workflow. However, the value here lies primarily with the software companies, not with the healthcare service providers. They will need to partner with healthcare specialists within the hospital and outpatient settings, such as the radiology and robotic surgery leaders.

Cleaning the Planet

The Possibilities of Biosolutions

Artem Chubarov
Chemicals
Research

Microorganisms are the world's most populous living species. Microbes for short, they are small enough to be invisible but there are so many that they represent roughly 80% of all living species on our planet.

Our understanding of them remains limited. But we do know microbes and their partners, enzymes, together referred to as biosolutions, offer a powerful tool for tackling the world's problems efficiently and environmentally.

As a domain, microbes include bacteria, fungi, algae and viruses. Size-wise, they are typically 0.2 micrometres. This means fifty thousand microbes in a straight line would cover a £1 coin.

They live everywhere: in water, soil, air and inside other living organisms. The human body contains around 38 trillion microbial cells. Carbohydrates, or sugars, are their primary source of food.

Enzymes are not living microorganisms, but are complex proteins and effective catalysts for various chemical processes. They are produced by living organisms, including humans, animals, plants and even microbes.

So, how will microbes and enzymes make our world a better place? Microbes are the cause of many issues we face daily, including food spoilage, malodour and diseases in humans, animals and plants. Since our planet is infested with them, the only way to contain their harmful pathogens is to understand their interaction with the environment and each other. Good microbes can either deter bad ones directly, eat their food or develop resistance to pathogens in the subject.

Enzymes, as noted, are effective natural catalysts for various chemical reactions. This means they can be introduced into certain processes to enhance efficiency or replace current chemical catalysts to reduce the environmental footprint.

Statistics from the Food and Agriculture Organisation suggest approximately one-third of all the food we produce is wasted, which equates to more than one billion tonnes per annum. One of the causes is harmful bacteria. All it takes is moisture and sugar for pathogenic bacteria to thrive.

Food dehydration can help but is not always applicable. Dehydrating bread would create crackers, which is fine if you're after a cheese platter but not so great if you're hankering for a full English. Food with zero sugar, although an option, does not offer much energy and, frankly, rarely tastes great.

Biosolutions instead offer a fundamental solution by introducing good bacteria into the product from the beginning to dominate the pathogens and prevent spoilage. This approach is particularly suited to fermented products, such as dairy, baking, brewing and winemaking, where the role of microorganisms is central.

Fermentation is the process of microbes converting sugar into subsistence energy and producing by-products such as acids, alcohols and carbon dioxide. The choice of bacteria would define taste, texture and the shelf life of the end product. Take cheese: a multitude of colours, textures and flavours can emerge from cow's milk. All that matters is the starter culture – the bacteria which ripens milk curd into the cheese of choice and controls the shelf life.

Enzymes have a role to play. In dairy products, they collaborate with cultures to shape the taste and texture, while in baking they help to maintain a softer texture in bread for longer. In brewing and winemaking, enzymes are natural catalysts to fermentation by ensuring sufficient sugar is released from the crops for the bacteria's consumption.

Another, perhaps unexpected, application for biosolutions is in household cleaning. Laundry detergents were originally based on surfactants – surface active agents. These are molecules with a unique structure encompassing both hydrophobia and hydrophilia. Once introduced into the washing process, surfactants' hydrophobic ends create bonds with stains on the clothes while their hydrophilic ends stick to the water molecules, all ultimately being washed away. The process requires a temperature of at least forty degrees to soften the fabric and pre-treat the stains.

Enzymes allow a laundry detergent to achieve the same efficiency at temperatures as low as thirty degrees. The enzymes treat the stains chemically so they are easily removable afterwards. Enzymes vary by the type of substance with which they interact. For example, amylases react with starches, lipases with fats, and proteases with proteins. Today's household detergent manufacturers use multi-enzyme blends to offer

solutions against the broadest range of stains. Thus, amylase is effective against ketchup, protease would clean blood stains and lipase would address the extra juiciness of a burger.

As importantly, it is good for the planet. In Europe, if we were to wash at thirty degrees not forty, CO_2 emissions would be reduced by c3.5 million metric tonnes a year. This is equivalent to having 830,000 fewer petrol cars on the road.

Biosolutions are also helping to mitigate the environmental output of combustion engines. Today, in most developed countries, conventional automotive fuels, both unleaded petrol and diesel, are blended with biofuels. Biofuels are biologically derived and designed to supplement or replace traditional fuels based on oil and gas. Bioethanol is the most obvious example. Produced from corn starch via fermentation, it is chemically identical to synthetic ethanol and is blended with conventional unleaded petrol fuel.

Fermentation suggests biosolutions will play a role. Firstly, enzymes are used for the effective pre-treatment of corn starch, while yeasts enable the fermentation itself and help biofuel producers to maximise the value of their production outputs. The by-products of corn fermentation are protein-rich corn meal used in animal feed and corn oil, which has various consumer and industrial applications.

In the UK, Europe and most American states, the blending ratio of bioethanol is 10%. The next time you are fuelling your car with unleaded, note the E10 sign on the pump nozzle. Blending ratios vary by region and are subject to government regulation. In Brazil, the current ethanol blending mandate is 30%, but in flex-fuel vehicles the dosage can reach 100% (E100).

Although 10% blending seems unimpressive, the cumulative impact is material. The introduction of E10 in the UK is estimated to have reduced the CO_2 footprint by an equivalent of removing 350,000 cars from the roads.

Depends on the culture

It is clear, then, that biosolutions have an important role to play in tackling today's global economic and environmental issues. However, if the solution is so obvious, why the hesitation?

As so often with innovation, commercial adoption has economic and technical barriers. Owing to their relative novelty, developing biosolutions is costly. Novonesis, the market leader in the development and commercialisation of enzymes and microbes, reinvests more than 10% of its turnover in R&D. Moreover, enzymes and microbes are complex substances, not least because microbes are living, which brings challenges of stabilisation and quality control before they can enter the market. Even though technology offers possibilities, they are not yet economically competitive with existing solutions, often of chemical origin.

Nevertheless, biosolutions is a fast-growing industry, with notable public companies such as Novonesis (Denmark), IFF (US), DSM-Firmenich (Switzerland) and Kerry (Ireland). They are addressing existing problems and therefore can justify the pricing premium needed to cover development and production costs. And, as previously noted, biosolutions offer a cleaner label to the final product and often improve production economics, which also underpins a higher price.

However, the major enabler of the biosolutions adoption journey is regulation. So far, the only area with explicit governmental support is biofuels, where local authorities set legally binding mandates for specific blending ratios. The US experienced a bioethanol boom in the early 2000s, which fuelled the growth of Novonesis, then known as Novozymes. E10 has become standard in most developed countries, but further adoption requires modifications to combustion engines.

However, beyond biofuels, regulation is less supportive. In laundry detergents, for example, enzyme dosages are already over 90% in Western Europe while only around 30% in emerging countries. Arguably, fears of accelerating inflation may be preventing local governments from pushing for higher-enzyme dosages in detergents, a basic good with a meaningful share in a household's shopping basket.

So, while the future for biosolutions is bright, adoption will be bumpy. It will require favourable regulation from governments, investment from the industry, and awareness and support from the consumer, who will ultimately pay the price.

Research Matters

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Software & Cloud

Return on Reality

It is time to be more cautious on the hyperscalers and move beyond the industry's 'trust us – Gen-AI is like early cloud 1.0' narrative. The underlying economics are far weaker than assumed: GPU deployments require roughly six times more capital to generate the same cloud 1.0 value, with risks to the downside. Investors are pricing today's heavy capex as if it carried cloud 1.0-level returns, even though there is no clear path back to those economics.

Natalya Davies, Ed Ridley-Day

Agilent, Danaher, Thermo Fisher, Waters

8 October 2025

Life Science Tools

Mass-spectacular

The life science equipment market has faced US policy pressures and a lacklustre biotech funding environment. Yet we expect a return to normalised growth of 4-6% mid-term, bolstered by innovation in analytical instrumentation and burgeoning niches such as mass spectrometry (MS) in proteomics and diagnostics. MS is indispensable to drug development. We present a detailed analysis of the opportunity and value the MS and chromatography market at $10bn, growing at 5-7% pa.

LITHIUM

Cyc(Li)cal Opportunity

Albermarle, SQM

Chemicals
Mazahir Mammadli

24 October 2025

DIGITAL ASSETS

Implications

Circle, Coinbase, Mastercard

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Nicholas Watts

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Saint-Gobain

A Different Proposition

Construction & Building Mats
Will Jones

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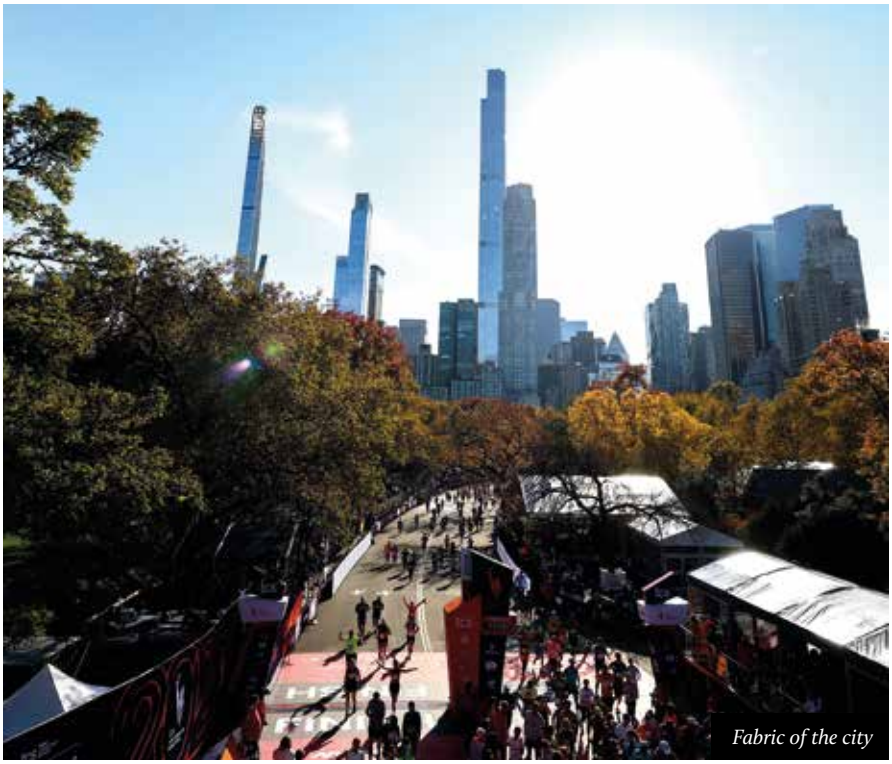
Letter from America

Marathon Woman

Mia Day
US Equity Sales



Fabric of the city

Four long months of training for four hours of running. I assigned myself four months believing the longer I spent training, the shorter my race would be. This was providing I monitored my nutrition and prioritised good sleep hygiene over the social delights of Manhattan. It was my first New York Marathon, to be run on my birthday, so I crossed my fingers the birthday fairies and marathon gods played ball.

My long-awaited, longer-endured, training started in July. The hot and sticky New York summer was the driest in more than a decade – on two fronts: there were no alfresco post-work drinks for me. Instead, I could be found pounding the West Side Highway or scurrying in and out of building works on the East River. It was extremely humid but, as I reminded myself, I did sign up for it, almost two years ago.

In January 2024, I arrived at JFK and shortly after setting up a New York Road Runners (NYRR) account, I enrolled in the 9+1 program. This is unique to the New York City Marathon. It entails running nine eligible races and volunteering at one other race within a calendar year for entry into the marathon the year after. Unsurprisingly, the program is popular because it offers local runners the opportunity to guarantee entry into one of the most coveted road running events in the world. A colleague reminded me one morning NYRR was releasing its race calendar for the year. I pulled up the webpage and found myself in a virtual queue. Little did I know, eligible races sell out and volunteering opportunities are snapped up in minutes.

The engine room of road running in New York began long before the simplicity of registering for races online. In 1958, Ted Corbitt, 'the father of long-distance running', co-founded the NYRR, six years after the Helsinki Olympics where he became the first African American to represent the US in the Marathon. An entry on the NYRR hall of fame notes Corbitt had a "passion for excellence that carried over into every aspect of his life".

It is unsurprising then that every race hosted by the NYRR is impeccably organised, supplemented by a long-standing, unwaveringly helpful and enthusiastic group of volunteers. Each runner has a QR code associated with their membership. After picking up your bib, your start and end time are automatically recorded, your results are loaded onto the portal, and your automatic entry to the marathon creeps closer. Obligatory bagels or mini pretzels are a welcome treat at the finish line.

For six decades, the NYRR has run a tight ship, hosting more than sixty adult and youth races a year, culminating in their 'premier event', the marathon, on the first Sunday in November. The largest marathon in the world, it now involves 10,000 volunteers and 55,000 anticipated finishers. This compares with 127 entrants and 55 finishers in the inaugural NYC marathon, which had an entry fee of $1 and involved several laps of Central Park.

Owing to work travel and an early alarm, I mainly opted for Saturday morning races in the park. It is a

beautiful place, and a privilege to run there, but it is not flat terrain. Races in the park were challenging in comparison to jogging along Manhattan's sea-level perimeter. The hills were unpleasant during training, but their elevation served me well on a course known for its demanding profile.

In 1976, Corbitt moved the marathon course beyond the perimeters of Central Park, changing its route to incorporate all five boroughs. Since then, the race has begun on Staten Island. For the majority, this involves taking a ferry across Upper New York Bay followed by a bus to the start villages at Fort Wadsworth. I received a lot of friendly advice, with numerous previous finishers saying it was important to go slow on the bridge: it is steep and the first of five.

Before I arrived at Ford Wadsworth, I spent two and a half weeks tapering. This involved reducing my mileage to allow my muscles enough time both to repair and build up a store of glycogen. My body welcomed the rest even when the pre-race jitters crept in. The final few days of tapering were combined with the carb load. This might sound relatively simple but eating several bowls of pasta is not recommended unless this is your regular diet.

Research advised consuming the same value of calories but changing the composition: less fiber, less protein, more carbs. This mix shift is meant to be easier to digest and to convert into much needed energy stores without feeling sluggish. The last piece of the fuel puzzle occurs on race day morning. I even rehearsed what to eat for breakfast, which involved three pieces of peanut butter and jam on toast, black coffee and an electrolyte mix. It seems excessive practicing what to eat for breakfast before a run, but at 26.2 miles a marathon is very long and avoiding unknowns is advice worth regarding.

The community spirit starts in the early hours of the morning. Ferries and buses make multiple trips transporting runners to the start. Runners apply glitter to one another, smile and wish each other luck. In the start villages, caffeine levels were kept high courtesy of Dunkin' Donuts. The villages are situated beneath the Verrazano-Narrows Bridge, where runners sat on tarps, stretching and sipping coffee.

Around 8.35am, the start of the race was marked by a cannon firing, followed by huge cheers and clapping beneath the bridge. The professional wheelchair and handcycle athletes set off first. After the pro women, the pro men began. Several waves follow suit to create a steady flow. On the bridge, Frank Sinatra is heard singing *New York, New York*. The song was played seventeen times throughout the morning, greeting each wave of runners as they set off, chasing views of the Manhattan skyline.

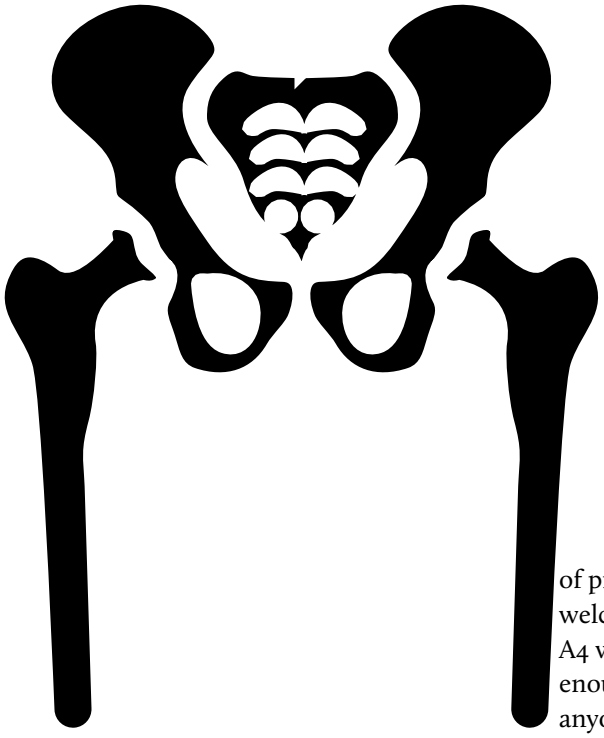
Deemed by hundreds of New Yorkers to be "the best day of the year", the marathon occurred without a hitch. There were no major incidents, health related or otherwise. I loved it. This year, the official finisher toll was 59,226, setting the record for the largest marathon ever by beating the course's own record set the prior year. There were other records too: Helen Obiri, from Kenya, won the Women's Race and set a new course record after 22 years. Eliud Kipchoge, who holds the unofficial world record for a sub-two-hour marathon, gained his World Marathon Majors Six Star, completing all six marathon majors.

Beyond the professionals, there is a diverse, equitable and inclusive community of ordinary runners. 132 countries were represented. The oldest finisher, hailing from Japan, was 91. This inclusiveness is testament to running being a relatively low-cost sport with low barriers to entry. A pair of trainers is the only essential piece of kit. The physical and mental benefits are profound. Besides the commitment to training, proving you can apply yourself and achieve hard things

Finisher

is incredibly rewarding, especially when it feels as if all five boroughs have turned out to support. New York's extensive and varied running community collides at the marathon, representing the rich fabric of the city and creating a community spirit which feels tangible.

The best statistic is the spectator count: more than two million lined the streets. People showed up to support friends, family, coworkers and strangers. I saw my wonderful ensemble of supporters twice and on both occasions felt a huge surge of energy, touched by their cheering, enthusiasm and readiness to run around the city after me. They held signs, rang bells and tethered balloons. Other spectators sang and DJ'd, creating impromptu block parties and an irreplicable atmosphere. Each section of the course has character and is an expression of a neighborhood soundtracked by different genres of music. After traversing Staten Island, Brooklyn, Queens, The Bronx and Manhattan, the race concludes in Central Park, which feels like appropriate homage to its origin. Next year will mark fifty years of the five-borough marathon. I hope the race lasts another five hundred years and continues to unify millions of people. Being part of it was a privilege.



Hipsters

Individuals and Process

Archie Cotterell
Editor

Recently, as a result of a youth spent playing too much sport, I had a hip replacement, which is not an experience I would recommend. It is a procedure with a statistically impressive outcome and, assuming all goes well (the surgeon marked his own homework fulsomely), I will be retrieving my rackets, bats and balls in short order.

For all its ubiquity, a hip replacement is a major operation, one which involves the surgeon sawing through the top of the femur and leaves the patient disoriented and sleep deprived for some time. No matter. Demographics, healthcare pressures and private equity bottom lines being as they are, barring catastrophe he or she is released back into the world twenty four hours later.

My pre-release test to ensure I could cope at home consisted of walking with a stick up and down four stairs once and having my blood pressure taken several times after the first effort failed to supply the required result. Then, holding a bag of pills that would have rendered me welcome in any nightclub, a sheet of A4 with physio manoeuvres simple enough they could be undertaken by anyone under ninety, and the advice "just listen to your body", I was out on my own.

The problem of course is that while I've been 'listening' to my body for many years, it has never undergone the sort of trauma which renders hobbling a couple of thousand steps uncomfortable. As a listener, did that discomfort mean I should press on – no gain without pain – or take it easy? Or merely easier? How should one define 'easy'? Should I lie down more (and risk a pulmonary embolism, according to a GP friend) or less (and risk tendonitis according to the surgeon)? It was impossible to know.

I was reminded of an excellent essay written in a previous Redburn Review by one of our Capital Markets analysts, Charles Bendit. He pointed to the vast differential between the endless regulations around funding a pension and the freedom to disburse or abuse one post-retirement. The statutory requirements and limits on individuals and companies when filling a pension pot disappear the moment one finishes work. Then, like the newly minted hipster, you are on your own.

There must be a reason why there is no follow-through beyond a two-week meeting with the wound team to have bandages removed, a six-week consultation with the surgeon, and occasional physiotherapy. The only one that springs to mind is because the range of individuals and post-op capabilities is so wide that to offer generic advice could only lead to disappointment when applied to an individual. Similarly with pensions, the size of pots and the needs of individuals are sufficiently variable that the government, having been so assiduous on the way in, washes its hands of the problem. The fear in the modern world is always that disappointment may lead to litigation, or some other financial comeback. The solution, as so often, is to rely on a 'process'.

Traditionally an organising principle that enabled enterprises to employ hundreds of thousands of staff and American corporates to establish templates for managing businesses across a vast terrain, in the age of the entrepreneur process is often treated with disdain bordering on contempt. But is this fair?

In any business, there needs to be a balance. Humans, most of them, have the capacity to think creatively, which is essential for corporate success, particularly in a start-up. To force them to waste mental energy doing tasks a computer could swallow is not a sensible use of time or talent. It therefore follows it is sensible to create processes around common or repetitive tasks. This allows 'creatives' headspace to address the big challenges and new employees to find their feet quickly.

It is essential that processes are not instigated too quickly, but only when they are needed and it is understood why they are needed. If you don't know precisely which elements of the day-to-day are causing friction,

it is unlikely any process will provide the solution. More likely, it will undermine buy-in from your team. People are generally reluctant to change their habits and need an explicit and beneficial reason for doing so. Waiting until an issue is manifest makes it more likely the right process is implemented.

There is an inviolable distinction between people and process, and it is critical managers never conflate or confuse the two. To solve a people problem with a process-based solution is as certain to fail as it is to deal with a process problem using people.

Today, however, there is an ineluctable sense process has gone too far and taken over the human element of interaction. Anyone left dangling on a phone listening to muzak and being periodically told how important their call is to the organisation they are waiting interminably to speak with, before finally a bot runs through multiple questions and confirms the call is being recorded for security purposes, will appreciate the accusation of overreach.

Although invariably instituted for reasons of cost-cutting, there is a secondary benefit of using a bot which has been correctly set up: it is harder to sue. This is important. For potential litigation brings self-editing and fear, which, as Gareth Roberts argued recently in The Spectator, has become one of the defining features of modern Britain.

He posited three levels of 'modern political fear', but they run deeper than politics, possibly into the soul of every adult. There is fear of cancellation, loss of status and becoming a social outcast as a result of writing or saying something that might be perceived to be the 'wrong' thing by certain groups. There is fear of what Roberts calls 'facing the truth', though clearly one man's 'truth' can be another man's falsehood. And there is physical fear. MPs have been murdered. Politicians have been harassed at election counts. Synagogues have been defaced. It is one reason no one is (at the time of writing) willing to chair the enquiry into grooming gangs. Perhaps they will ask a bot.

Deceptively simple

In a world characterised by fear, process will always be preferred to the individual. The tendency is exacerbated by the range and size of the problems facing the western world. Debt, mass immigration, climate change, house prices, AI, energy security, the cost of living, all are too large and multifaceted for individuals or leaders to grapple with. Hence, the decision-maker in the White House aside, politicians of every hue appear overwhelmed by the scale of problems facing their countries and default to the politics of process, which at least gives the appearance something is being done. The reality, as voters have intuited, is different. This helps to explain the paradox of a growing disenchantment with professional politicians co-existing with a simultaneous radical shift to the populist left and right.

But the problem with defaulting to the politics of process is we have eliminated the human element that in all its misfiring raggedy glory drives the world forward. Yes, human beings are imperfect, but they are all we've got. The moment you take them out of the decision-making and direction-taking mix, you are left with machines. In that sense if no other we can be said to have prepared the ground perfectly for AI.

Mirosław Chojecki

01/09/1949 – 10/10/2025

Mirosław Chojecki was born into resistance. In the Second World War his father fought for the Polish Home Army and his mother, Maria Stypulkowska-Chojecka, was celebrated for her part in the assassination of Warsaw's hated Nazi police chief Franz Kutschera in 1944, an act for which more than three hundred civilians were executed in reprisal.

Where his mother chose arms, Mirosław chose words. Conscious from a young age that "the state illegitimately claimed a monopoly of word", one of Chojecki's high school teachers encouraged him to seek out banned literature smuggled into Poland. It was a defining moment. He suddenly realised, "There was somewhere out there in the world where culture was free."

Having been expelled from Warsaw Polytechnic in 1968 for supporting student strikes, he completed his Chemistry degree at the city's university six years later. He then started work at the Institute of Nuclear Research.

But nuclear research played second fiddle to resistance to the Communist state. In 1976, he joined the Workers Defence Committee and was jailed after helping labourers in Ursus and Radom who were being violently repressed for protesting about the cost of basic foodstuffs. "It was," he recalled, "a moral decision. People were being beaten by police for a cause that was my cause."

Understanding state-censored information could only be countered by a free press, he founded NOWa in 1977. Supported by the CIA, which had been smuggling banned books by authors from Albert Camus to Agatha Christie into Communist countries since 1949, NOWa grew rapidly. Focusing on blacklisted Polish writers and Western reprints, within a couple of years it had expanded from a single spirit duplicator hidden in a friend's apartment to the biggest underground publisher in the country. Chojecki offered his readers audio cassettes and American dollars alongside Gunter Grass and George Orwell.

This, inevitably, spelt trouble. He was persistently harassed and by 1980 had been arrested forty times. In March that year, he was charged with stealing a mimeograph machine and jailed despite an international petition signed by, among others, Gunter Grass calling for his release. At his trial, which followed a hunger strike and force-feeding that caused permanent damage to his oesophagus, Chojecki delivered an impassioned defence of "free speech and thought, Polish culture, the dignity of society."

He received eighteen months, suspended for three years, which meant he was at liberty to support the strikes in the Gdansk shipyard that led to the founding of the independent trade union, Solidarność (Solidarity).

In December 1981, with Solidarność growing swiftly in popularity and millions looking to join, the Soviet-puppet leader, General Wojciech Jaruzelski, imposed martial law. The union was banned, tanks rolled through the streets and thousands were rounded up and incarcerated without trial.

Chojecki, who was in Washington DC raising funds when the military swooped, wisely decided not to return. Instead, backed by the CIA, he set up a printworks in Paris, from where he exported illicit books and distributed such an array of non-lethal aid, including presses, inks and videos, he was nicknamed the 'Minister for Smuggling'. He wasn't safe, however, even in Paris, being spied upon by Communist agents and his family regularly threatened.

Nevertheless, the volume of printed material distributed by his network across Europe in customised trucks was so vast that ultimately state censorship couldn't cope. Losing control of the narrative meant the regime lost control of the people. When the Berlin Wall was breached in November 1989, Poland was one of the first governments to fall, Solidarność veterans having prepared for free elections at which the Communists were crushed.

Chojecki returned to Warsaw in 1990. He continued publishing literature, advised the new Minister for Culture, founded the first commercial TV station and a film company, Kontakt, and in 2005 flooded the Russian satellite Belarus with CDs. For Mirosław Chojecki, the work of undermining oppressive states was never done.

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