



ARRESTED DEVELOPMENT

CRYPTOCURRENCIES

THE PHILLIPS CURVE PUZZLE

SMART CITIES

THE BATTLE FOR INNOVATION

AIQ

ISSUE 005



MILLENNIALS

*The fall and rise of
Generation Y*



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Ageing gracefully

We all know what millennials are like, don't we? The generation born between 1981 and 2000 have been characterised as workshy narcissists who would rather dine out on expensive avocado brunches than save for the future. But as our cover story shows, such stereotypes are wide of the mark.

Entering the labour market in the wake of the financial crisis, millennials faced depressed wages, rising house prices and the burden of student debt. But they are a resilient bunch and beginning to emerge as influential consumers. We explore how millennials' distinctive spending patterns are creating corporate winners and losers, from internet giants to digital banks to new players in the so-called sharing economy.

*At the other end of the age scale, rising longevity also brings opportunities and challenges. In our Big Interview we speak to Andrew Scott, professor of economics at the London Business School and co-author of the award-winning book, *The 100-Year Life*. He discusses what increased life expectancy means for markets and economies.*

As AIQ went to press, Bitcoin and other cryptocurrencies were experiencing a spectacular slump; perhaps vindicating the views of high profile naysayers such as legendary US investor, Warren Buffett, who predicted in January "they will come to a bad ending". We give our perspective on why cryptocurrencies are unlikely to become a mainstream investible asset class.

Also in this issue, we look at the battle for innovation between China and the West. Once dismissed as the home of copycats and knock-offs, China is fast catching up with advanced economies in new tech, with major implications for investors.

Other articles examine the risk of recession in the US, smart cities, how value investors should view the rise of tech stocks and why the recent breakdown in the relationship between employment and inflation – as shown in the Phillips curve – is likely to be temporary.

We welcome your feedback, so please send any comments to me at the email address below.

I hope you enjoy the issue ●

Rob Davies,
Head of PR and Thought Leadership,
Aviva Investors
AIQ Editor
rob.davies@avivainvestors.com



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The academic and author on the economic implications of new tech.



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THE YEAR OF LIVING DANGEROUSLY

A series of elections in emerging markets may bring uncertainty for investors.

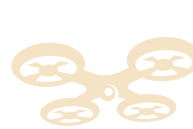
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CHINA AND THE WEST: THE BATTLE FOR INNOVATION

Once dismissed as the home of copycats and knock-offs, China is now a hotbed of technological innovation – and fast catching up with the West.

In January 2018, the Consumer Electronics Show (CES) in Las Vegas showcased the latest gadgetry from global technology companies. Robotic dogs prowled the floor of the conference centre; autonomous cars glinted on rotating platforms; prototype drones whirled between the rafters overhead.

The CES is traditionally dominated by US companies. But this year's show was notable for the increased presence of Chinese firms. More than one third of the 4000 exhibitors hailed from China, many of them headquartered in the southern city of Shenzhen, which is fast emerging as a tech hub to rival Silicon

Valley. Among the Chinese products on show were virtual-reality devices and smart cars equipped with facial-recognition software.

The CES showed China is becoming a hotbed of innovation – and its ambitions aren't limited to consumer gadgets. Incentivised by the government's 'Made in China 2025' initiative, Chinese manufacturers are developing cutting-edge industrial robots and high-speed trains. Internet companies such as Alibaba and Baidu are increasingly blazing a trail in areas where US firms were once pre-eminent – such as artificial intelligence – while ecosystems of go-getting tech

start-ups are flourishing in Chinese cities.

"There's a culture of innovation and entrepreneurship in China which is pretty infectious," says Professor Erik Brynjolfsson, director of the Massachusetts Institute of Technology (MIT) Initiative on the Digital Economy and an expert on the economics of innovation. He cites a lack of regulatory barriers as a factor in the rise of "permissionless innovation" in China.

So what are the geopolitical and economic implications of China's innovation boom? And how should investors respond to the shifting balance of power in technology between East and West?



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Internet companies such as Alibaba and Baidu are blazing a trail in areas where US firms were once pre-eminent

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Shock of the new

To understand why the Chinese government is so keen on pushing technological advancement, it is important to grasp the role of innovation in economic growth. Writing in the early 20th century, the Austrian economist Joseph Schumpeter identified five different types of innovation: the introduction of new products; new methods of production; the opening up of new markets; new sources of supply; and new organisational structures. The combination of these factors, he argued, spurs the kind of “creative destruction” that generates rapid economic development.

East Asia has been a crucible of this sort of development over the past half-century. In the post-war years, Japan rose to affluence by targeting investment in education and new technology, and its model was followed by the ‘Tiger Economies’ of South Korea, Taiwan, Hong Kong and Singapore. Starting with basic manufacturing, these countries skilfully shifted towards more value-add sectors as they developed.

China has learned from their example. The country’s rapid development since the ‘reform and opening-up’ period under Deng Xiaoping in the 1980s depended on utilising China’s vast labour force to make products for export to the global market, initially in low-wage sectors such as textiles and latterly in more complex and creative areas.



THE BATTLE FOR INNOVATION

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China is investing heavily in factories and assembly plants driven by robotic automation

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Made in China

The Chinese government is keen to capitalise on this progress. Despite its astonishing rise over the past three decades, China still lags behind the US and Western European nations in high-end manufacturing. This provided the motivation behind the ‘Made in China 2025’ plan, officially launched in 2015. Modelled on Germany’s ‘Industry 4.0’, the initiative is designed to kick-start technological innovation in the sector via targeted government investment.

“Made in China is really about upgrading the current manufacturing base,” says Xiaoyu Liu, emerging market equities fund manager at Aviva Investors in London. “As it develops, China risks getting caught in the middle of the value chain between countries that offer low-cost outsourced labour and nations where manufacturing is of better quality, such as the US and Germany.”

China is investing heavily in factories and assembly plants driven by robotic automation, which tends to improve output quality. The government is particularly keen to build an indigenous semiconductor industry to reduce its reliance on importing computer chips, and has earmarked \$100-150 billion of public and private funds for this goal.¹

Another priority is aerospace, where the government is encouraging domestic firms to cooperate with foreign players to build expertise. In January, the French multinational Airbus agreed to increase assembly operations at a facility in the eastern city of Tianjin, which it runs as a joint venture with the state-owned Aviation Industry Corporation of China (AICC). Airbus will gain increased access to what is now the world’s largest market for commercial aircraft, while AICC will gain knowledge of engine design and engineering methods.

According to some critics, China’s eagerness to engage in ‘knowledge transfer’ with Western firms amounts to

a programme of state-sponsored industrial theft. Robert Atkinson, president of the Information Technology and Innovation Foundation, a think tank, told US Congress last year that Made in China is an “aggressive by-hook-or-by-crook strategy that involves serially manipulating the marketplace and wantonly stealing and coercing transfer of American know-how”.²

The Trump administration has ordered a review of China’s intellectual-property practices, which could result in punitive unilateral sanctions under the Section 301 trade authority. Whether or not the charge of theft is warranted, there is some evidence that the Chinese government’s technological investment programme is not simply about improving growth and productivity.

Technology and the state

For investors hoping to identify where the next leap forward in Chinese innovation will happen, it helps to understand the government’s wider objectives. Take one area of industrial technology in which China is becoming a world leader: machine vision. Equipping industrial machines with sensors that can capture and recognise images using artificial intelligence enables companies to automate elements of the production line and fine-tune quality control.

But this technology is also useful in surveillance. Hangzhou-based firm HikVision, a leader in the field of industrial cameras and sensors, is also a specialist in the manufacture of cutting-edge CCTV cameras. HikVision’s biggest shareholder is a Chinese state-owned company, China Electronics Technology Group, which is finding uses for its products in monitoring the populace and spotting early signs of civil unrest – a key priority of Xi Jinping’s government.

“The Chinese state is driving a lot of this innovation,” says Max Burns, senior industrials research analyst at Aviva Investors. “The need to monitor citizens

in both public spaces and the internet is driving big growth in AI and facial recognition. HikVision has developed superior facial-recognition software that can identify an unknown face in a crowd and zero in on it. The company has attracted investment from the government as well as a lot of AI automation-focused equity funds.”

Beijing has developed close relationships with China’s trio of internet giants, Baidu, Alibaba and Tencent (the so-called BATs), for similar reasons. Unlike the big technology companies in the West – which have engaged in standoffs with governments over the sharing of user data in recent years – the BATs routinely provide information on customers’ online behaviour to the state, adding to the 42 billion internet records the government collects directly each month.³

This mass of data is facilitating the development of a planned ‘Social Credit System’, which will monitor citizens’ finances, political obedience and supposed civic mindedness. In scenes that might have been devised for the satirical television series *Black Mirror*, China’s high-speed rail system is already informing passengers that antisocial behaviour may result in a downgrade to their social credit rating.

Online-to-offline innovation

But the story of innovation in China is about more than an authoritarian government seeking control over its people. China has invested heavily in high-quality education for its citizens, and now produces 2.8 million science and engineering graduates, five times as many as the US (although the US still leads on a per-capita basis⁴).

Technology clusters have emerged around better-quality universities in cities including Guangzhou, Beijing, Shanghai and Hangzhou, as firms seek to snap up the brightest graduates. The BATs are among the companies hiring these graduates on teams developing products

and services that rival anything on offer in the West.

Take Tencent's WeChat app. What started as a simple messaging service now runs more like a comprehensive operating system. Users can book taxis and overseas holidays, make restaurant reservations, play games, pay bills and purchase items at physical shops – all without ever leaving the app. Brynjolfsson cites China as a world leader in this area – what's known as 'O2O' or online-to-offline technology (see boxed text, p.9).

Tencent's seamless integration of financial elements into its platform, along with similar innovations from Alibaba and Baidu, has transformed China into the global leader in fintech. These firms have started to move beyond digital payments into insurance, wealth management and peer-to-peer lending; taking advantage of their ability to collect data on potential customers to offer them new products and services.

The BATs are also outperforming in some artificial-intelligence disciplines: Baidu is now the acknowledged leader in speech-recognition technology, for example. When, in October 2016, Microsoft announced its software had surpassed human-level recognition standards, Andrew Ng, then Baidu's head of research, posted a tongue-in-cheek reminder on Twitter that Baidu had achieved the same feat for the Chinese language a full 12 months earlier.⁵

The balance of power in technology may be moving to the East, but the US still has a clear lead in many AI specialisms. Google's development of the AlphaGo programme, which has devised strategies to beat human grandmasters at the Chinese-originated board game Go, is a symbolic reminder that the Silicon Valley heavyweights are still dominant in many areas of AI.

Bonfire of the bicycles

To compare how the US and China measure up on broader innovation metrics is difficult, but we can draw a few broad conclusions. The US spends more on so-called 'basic and applied' research and development, which refers to the process of making early discoveries and refining them. This means it still has a



A street in Beijing clogged with 'sharing' bicycles.¹²

clear lead in industries that rely on original breakthroughs, such as pharmaceuticals, where Chinese firms are struggling to build global market share.

Chinese companies, on the other hand, are proving extremely adept at 'late stage' development – building on existing discoveries and bringing innovative new products to market, such as those that wheeled and buzzed their way among the crowds at the Las Vegas convention centre in January. More than 84 per cent of Chinese R&D spending goes on late-stage 'development' funding, compared with two thirds in the US, according to research from the Boston Consulting Group.⁶

This is partly because Chinese companies are able to access a vast population of tech-savvy consumers who are comparatively more willing to try out products and services compared with their peers in the West.⁷ This has given China the upper hand in developing and commercialising consumer-oriented technology such as drone hardware: Shenzhen-based DJI is now the dominant player in the global drone market.

Chinese companies have also benefited from relatively loose regulations around the commercialisation of new products, according to Jason Bohnet, senior research analyst at Aviva Investors in Chicago. "Chinese companies almost have a blank slate to be agile and innovative," he says. "They can try something new, and

say: 'what's the worst that can happen'? Because they know that if they make a breakthrough or a solution to a problem they will have no bigger supporter than the Chinese state."

The cutthroat Chinese bike-sharing industry provides a case study of how this deregulated free-for-all in new tech can turn out; it's an example of Schumpeter's 'creative destruction' in action. Chinese firms were among the first to develop GPS-powered technology to enable Uber-style bike sharing without the need for docking stations. A plethora of competing companies emerged, flooding the market with bicycles. But many of them quickly went out of business, leaving streets clogged with piles of mangled bikes.⁸

Investing in Chinese tech

Given the rapid rate of change, it can be difficult for foreign investors to devise strategies to take advantage of the growth of Chinese innovation. But there are opportunities for those who have the requisite local expertise, according to Liu.

"There are big rewards on offer for those who can identify the leaders in these fast growing markets," she says. "For example, Tencent has delivered an annual return of more than 50 per cent over the past five years and a 43 per cent compound

THE BATTLE FOR INNOVATION

continued

annual growth rate over the past decade. Corporate governance is still an issue with some Chinese technology firms, but these are problems evident in technology companies around the globe.”

Established Chinese technology firms are growing ever more expensive as investment propositions – Alibaba’s share price rose 96 per cent last year – but are not yet in bubble territory, according to Liu. “This is not a technology bubble like the 2000s. Although the valuation of the big internet companies is higher than their historical average, they are backed by strong earnings growth and cash-flow generation. Investors will, however, need to be selective going forward.”

As they grow in clout and influence, the BATs are increasingly shaping the landscape for start-ups, which may help investors determine the likely winners and losers in tyro industries. Mobike and Ofo, two of the firms that survived the boom and bust in the Chinese bike-sharing sector, are financed by Tencent and Alibaba respectively.

The BATs are also becoming influential investors in technology beyond China’s borders: Tencent has taken small stakes in Snap, Spotify and Tesla. “The big Chinese companies have an advantage, in that they can go out and get business outside of China but their foreign rivals can’t come into China because of the government’s restrictions,” says Bohnet.

Despite the rise in valuations among the big internet companies, research suggests that if anything, investors are under-pricing the potential for further innovation – and profit growth – among Chinese firms. A recent UBS analysis of R&D spending and profit growth finds that investors have yet to fully appreciate the scale of China’s progress in tech-oriented sectors, which may lead to a gradual re-rating of the country’s equities over the next five years.⁹

There remain risks to investing in Chinese technology, not least the potentially unpredictable role of the government, which can swiftly crack down on sectors

that were previously unregulated (as happened in fintech in 2016 and 2017) or cut a big player down to size, as when Baidu was reprimanded for carrying unlicensed advertisements for medical treatment on its search engine, causing its share price to fall sharply.¹⁰

On the other hand, support from the government can give a boost to companies active in priority areas such as advanced manufacturing, bringing benefits for both domestic and foreign investors able to identify China’s long-term goals. Shares in the aforementioned HikVision, along with specialists in robotic automation such as Shenzhen Inovance Technology and Han’s Laser Technology, are accessible to foreign investors via the domestic A-share market.

The role of government in fostering demand and creating incentives is also evident in the electric car industry. Beijing has ordered state-owned Chinese power companies to speed up the installation of charging stations: as of December 2016, China had 300,000 charging stations, dwarfing the US network, which had just 16,000 points in early 2017.¹¹ This growing infrastructure is facilitating the rise of new companies such as Byton, a Chinese start-up that won headlines at the CES when it unveiled a facial-recognition enabled electric car.

“China has a poor record on pollution, which is a big incentive to go green and to get more electric and autonomous vehicles out there on the road. On a global basis, China sells more electric vehicles than any other country and we expect that to continue for the foreseeable future,” says Bohnet.

If you can’t beat ‘em, join ‘em

So what are the implications of China’s rise for companies in advanced economies? Burns believes industrial and technology-focused firms with strong research and development budgets – such as US multinational manufacturing company 3M, which has increased its spending on innovation to six per cent of revenue in recent years – will have an edge as the battle for innovation intensifies.

Companies with expertise in helping high-end manufacturers make incremental improvements to efficiency and quality – such as Japanese firm

Keyence, a specialist in precise, laser-guided automation systems – could also reap dividends as more firms seek to upgrade their facilities to maintain their lead against Chinese rivals.

Over the longer term, however, China’s heavy investment in advanced manufacturing will begin to tell, enabling it to close the gap with the West and even move ahead, in Burns’s view. As the balance of power shifts, investors may start to target firms that are willing and able to join forces with powerful Chinese counterparts in some sectors.

Europe may be stealing a march on the US in this regard. During his state visit to Beijing in January 2018, President Emmanuel Macron sought improved access to the Chinese market for French companies. In the wake of the visit, Airbus confirmed the expansion of its partnership with AICC, while Tencent and French retailer Carrefour also announced an agreement to cooperate on e-commerce platforms.

“That partnership opens up a market Carrefour previously had little access to, and should theoretically help it elevate its growth profile without having to spend billions of euros on building more physical stores in China,” says Bohnet. “It is developing a relationship with a best-in-class franchise in Tencent and leveraging that.”

The future of innovation

Whether their companies are cooperating or competing, China, Japan and Western countries will have to grapple with the unpredictable consequences of new technological innovations. These advancements are increasingly skewing economies towards the ephemeral forces of the digital world.

China’s distinctive political system is likely to provide both advantages and disadvantages in this respect, according to Jonathan Haskel, professor of economics at Imperial College Business School in London, and co-author of *Capitalism Without Capital*, a study of how economies are increasingly dominated by ‘intangible assets’ such as design, branding, software and research and development rather than physical things.

“Government investment in the science base might become increasingly important in the intangible economy, because as firms become more intangible-intensive, they will look to the public sector to provide the basic

scientific knowledge around which firms can build and commercialise new products,” says Haskel. “So to the extent the Chinese system is centralised, and pushes the science budget ahead, that is to their advantage.”

But Haskel also points out ‘intangible’ assets typically flourish in decentralised economies that favour experimentation and provide robust protections for intellectual property. One quality of intangible assets is that they generate ‘spillovers’ – it is relatively straightforward for another company to copy a new concept or design. This makes it more important for companies to be able to protect their IP. “To the extent IP protections are weak in China, it might mean investment is weaker,” says Haskel.

Chinese companies now make more international patent applications than any other country, and Beijing has introduced new enforcement mechanisms, including specialised IP courts, which should improve companies’ IP protection at home. “Chinese patent protection still lags behind the West, but the situation is improving,” says Liu.

There is certainly no room for complacency among Western firms, which will need to keep innovating to compete with their Chinese rivals. The evidence was there in the air-conditioned conference halls of the CES in Las Vegas, where China demonstrated it is already overcoming its reputation as a land of copycats and knock-offs to become a technological force in its own right. And shiny consumer gadgets are just the beginning ●

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 - 2 ‘China’s push to become a tech superpower has triggered alarms abroad’, *Financial Times*, March 2017
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 - 4 ‘The challenge of China’s rise as a science and technology powerhouse’, *Brink Asia*, August 2017
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 - 7 See *The China effect on global innovation*, McKinsey Global Institute, July 2015
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 - 9 See *Tiger sparks: Is Asia’s innovation boom creating a new world order?*, UBS, September 2017
 - 10 ‘China curbs Baidu healthcare ads business after student’s death’, *Reuters*, May 2016
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 - 12 Image credit: zhangjin_net / Shutterstock.com

MACHINE, PLATFORM, CROWD

AN INTERVIEW WITH ERIK BRYNJOLFSSON



Breakthroughs in artificial intelligence and Big Data are not just furnishing us with convenient new online services and expensive gadgets; they are fundamentally reshaping economies and societies in both East and West.

Erik Brynjolfsson, a professor at the Massachusetts Institute of Technology and director of the Initiative on the Digital Economy at the Institute, is a world-renowned expert on technological innovation. He is the co-author, with Andrew McAfee, of *The Second Machine Age*, a bestselling study of the economic consequences of new technological advances.

His most recent book, *Machine, Platform, Crowd* (also co-authored with McAfee), examines a ‘triple revolution’ in technology, comprising three shifts: a shift from human decision making to machine-based learning; a shift from products to platforms (such as Uber and Airbnb); and a shift from companies’ ‘core’ (or internal) expertise to crowd-sourced learning and problem-solving.

Professor Brynjolfsson spoke to *AIQ* about these seismic shifts in innovation, and the changing balance of power in technology between East and West.

AIQ: The first part of the ‘triple revolution’ you describe in Machine, Platform, Crowd is the shift from human-to machine-based decision-making. How are machine algorithms improving decision-making?

Erik Brynjolfsson: Over the past couple of decades, more and more digital data has become available, and that’s the lifeblood of data-driven decision-making and artificial intelligence. It’s worth distinguishing here between two approaches. One is data-driven decision-making, which is using large data sets to make better decisions; this is something that’s spread through the American economy and worldwide. Data-driven decision-makers are about five per cent more productive than competitors that don’t use data-driven approaches.

The second big wave we’ve seen is in machine learning and AI. It’s still early days, but for certain categories – advertising, medical imaging and some manufacturing applications – machine learning has been really effective in helping with decision-making as well. I expect that to accelerate a lot in the coming years.



THE BATTLE FOR INNOVATION

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Companies have begun to use the power of the crowd to innovate and solve problems

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AIQ: *Human-machine ‘partnerships’ are also key to what you call ‘the shift from core to crowd’. How is this opening up new opportunities for innovation?*

EB: The same digital platforms that provide digital data also connect people. Today, for the first time in human history, we have literally billions of people who can communicate on a digital infrastructure, the internet, and you can tap into them. Companies have begun to use the power of the crowd to innovate and solve problems their ‘core’ researchers and executives aren’t able to solve.

For instance, in medicine, the crowd has massively improved experts’ ability to sequence the DNA in white blood cells. The National Institute of Health and Harvard Medical School were working on this, and though they had a lot of expertise, ultimately the big breakthrough came when they opened the problem up to a crowd of experts across the world. These experts had very different approaches to the problem; they came from areas as diverse as petroleum engineering or crystallography, and some of the techniques they applied led to a 100-fold improvement in the performance of the relevant algorithms. There are many examples like this, of the crowd developing software faster, finding bugs, solving puzzles.

AIQ: *Chinese companies have proved adept at exploiting the power of the platform and the crowd. Are there any areas in which China is moving ahead?*

EB: China has been successful in so-called ‘O2O’ or online-to-offline innovation. In many ways, China is ahead of the West in terms of using smartphones and the smartphone platform for payment systems. If you compare the US to China, the number of people using payment systems on their mobile phones is literally 50 times higher in China; that’s a real, fundamental difference. It makes a self-reinforcing virtuous cycle, where other people start putting their businesses on this platform and that starts generating even more users.

AIQ: *You argued in The Second Machine Age that technological innovation would lead to higher growth and productivity. Are you still optimistic these benefits will soon begin to show in Western economies?*

EB: I am. There’s a lot of pent-up innovation in areas like machine learning. What you see in the laboratories is remarkable, but most of it hasn’t really made its way out into the marketplace yet. That doesn’t mean those benefits are not coming; I think they’re



Chinese companies lead in smartphone payment technology

in the pipeline. This is very common with these fundamental technologies, going back to electricity or the steam engine. It can take literally years or decades before the full impact of investment in these core technologies happens in an economy.

The real bottleneck these days is less in inventing amazing new technologies; it’s in implementing them; it’s in organisational change, management culture, regulation. These can be obstacles to the adoption of some of these new technologies.

AIQ: *Does the Chinese political system give its companies any advantages or disadvantages over Western firms when it comes to implementing the innovations you describe?*

EB: There’s a culture of innovation and entrepreneurship in China, which is pretty infectious. And there are very few regulatory barriers from the government – for better or worse – that impede organisations and entrepreneurs from setting up all sorts of businesses.

This is something that’s happening rapidly, and the idea of ‘permissionless innovation’ is a very powerful one. Chinese companies can try a lot of new things without a lot of respect for, say, privacy or environmental regulations, and that allows them to innovate faster. The flipside is that some of the water in China isn’t all that clean and some of the air isn’t all that clean and the privacy protections aren’t in the place where Westerners would feel comfortable. So it’s a mixed bag, and every society and culture is trying to find the right balance ●

THE YEAR OF LIVING DANGEROUSLY: EMERGING MARKETS GO TO THE POLLS

A series of elections in emerging markets may bring unwelcome uncertainty for investors in 2018.

After two years in which political risk gripped the West, the spotlight is back on emerging economies. Twenty-seven emerging or frontier markets are due to go to the polls in 2018, and the outcome of these elections could have big implications for investors. Victory for a reformist leader often sends equity markets soaring, while a populist triumph can have the opposite effect.

Not all of the numerous local and national elections this year will grab headlines, but votes in countries with established capital markets will be scrutinised closely. Events in Russia, Brazil and Mexico, three of the largest emerging economies, will be of particular interest.

Each of these economies is benefiting from the upswing in global growth. The commodity-driven equity markets of Brazil and Russia, in particular, have rallied substantially from cyclical lows, with investors tempted by the prospect of earnings recoveries. There have been record flows into emerging market debt in these nations as well, as investors look to take advantage of relative value opportunities in an improving economic environment.

But investors should be mindful that political developments could prompt near-term volatility.

New dynamics are introducing uncertainty into the political process. Russia's Vladimir Putin



THE YEAR OF LIVING DANGEROUSLY *continued*

is reportedly using cyber propaganda techniques to cement his position. In Latin America, young electorates frustrated by corruption are fuelling the rise of entirely new candidates – some of whom are market-friendly, some of whom are not.

So what are the potential outcomes of the upcoming elections in Russia, Mexico and Brazil? And how will the fallout affect investment assets across emerging markets?

Russia: Putin's progress?

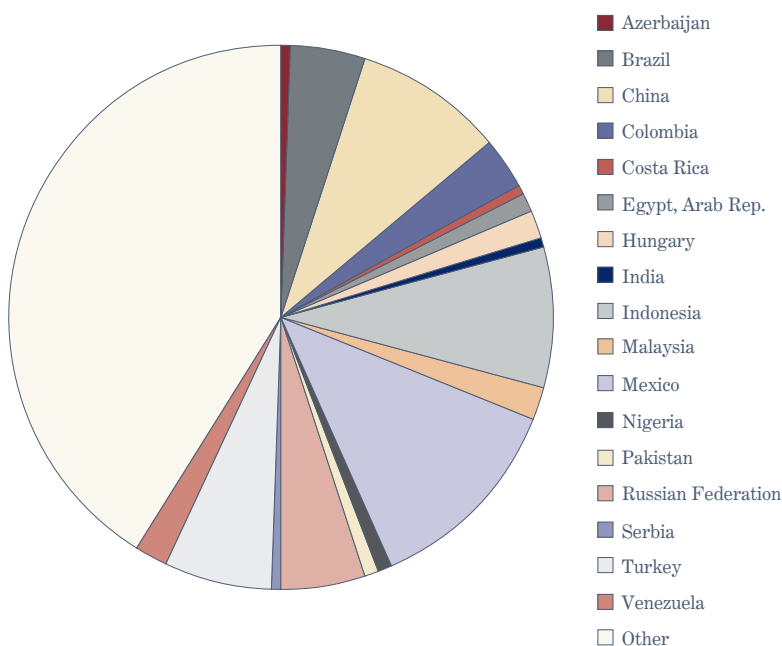
First in the calendar is the presidential election in Russia in March 2018, where Putin is expected to win a fourth term in office. Alternatives are thin on the ground; even the glamorous television personality Ksenia Sobchak, hailed as a 'protest' candidate in some media outlets, is Putin's goddaughter.

Putin has a commanding lead in the polls and can draw on a sophisticated network of cyber propaganda. The Russian government has taken flak from Western leaders for alleged interference in their affairs – notably during the US presidential election in 2016, when Russian 'bots' allegedly disseminated pro-Trump messages on social media. Putin will be able to draw on this technology to sway opinion at home, despite growing dissatisfaction with government corruption among young voters.

This doesn't mean the status quo will remain entirely unchanged in the run-up to the election. Russia has recently experienced a period of austerity, which has led some quality-of-life metrics to deteriorate. Mindful of potential unrest among voters in the pre-election period, Putin seems to be softening his stance, according to Will Ballard, head of emerging market equities at Aviva Investors.

"You could see a slight fiscal stimulus coming through to try and further strengthen Putin's support base," he says.

Figure 1: EM bond index weightings



Countries that make up more than 50 per cent of the JP Morgan Emerging Market Bond Index have elections in 2018

The chart represents country weightings in the JP Morgan EMBI Index

Source: JP Morgan, National Democratic Institute, as at 29 December 2017

"It is questionable whether this needs to be done, but it is clear that he would rather come through with a resounding victory. That is a positive driver for the economy in the short term and could boost domestic consumption and investment. The real question is whether such government expenditure is sustainable in the long run."

The Russian election may also have wider implications. Russia has been building links with China and is pressing into the Middle East to offset the impact of US and European sanctions imposed after its annexation of Crimea in 2014. This geopolitical repositioning would continue under Putin's expected fourth presidential term. Big Russian energy companies may be among the beneficiaries, says Victoria Kelly-Clark of Global Risk Insights, a consultancy.

"Russia has got its fingers into Algeria, into Syria and Iraq. If a company secured territory from Isis militants in Syria, then they were able to gain access to that territory. Rosneft, Gazprom and some other Russian companies are really taking advantage."

Mexico: from reform to populism?

The political outlook in Mexico is more uncertain ahead of its general election in July. The country has a 'one shot' voting system, meaning a president can be elected with relatively low overall support. Independent candidates are being allowed to run for the first time, and more than 80 individuals have attempted to drum up support to ensure their names are on the presidential ballot paper.

In the new, plural political environment, voting will encompass selection for municipal positions and Congress as well. This is likely to presage a change in direction after President Enrique Peña Nieto's tenure. When Peña Nieto and his Institutional Revolutionary Party (PRI) took office in July 2012, his pledges to enact economic reforms and take action on corruption were welcomed by voters and markets alike. The MSCI Mexico Index rose 19.6 per cent between July 2, 2012 and March 31 the following year, strongly outperforming the wider emerging-market index.

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The push-and-pull between populism and reform is likely to be a key feature across emerging markets in 2018

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But the PRI's failure to deliver on its promises to tackle corruption has hurt the government's popularity. There has been a distinct lack of action in response to the Odebrecht scandal, which saw Mexican officials allegedly take bribes from the Brazilian conglomerate in exchange for contracts.

"Latin America has had a history of corruption, and that seems to be one of the single biggest overriding factors influencing voters right now," says Tim Alt, fixed income portfolio manager at Aviva Investors.

The PRI's waning legitimacy may allow a populist leader to enter the frame this year. The current front-runner is Andres Manuel López Obrador (known as Amló), leader of the National Regeneration Movement Party or MORENA.

Although Congress might prove a restraining force in the case of an Amló win, his apparently retrogressive stance in energy and education may unsettle markets, says Ballard. "If MORENA comes through on a populist vote, some of the policies have big question marks from an investment standpoint."

Amló displays a self-proclaimed "nationalist attitude", and has pledged to revisit contracts to ensure they are free from corruption and in Mexico's best interests. His plans to boost investment in infrastructure and social spending are potentially inflationary, and the prospect of a win for MORENA is already being reflected in financial markets through wider credit spreads and a weaker peso.

Meanwhile, the cut in the US corporate tax rate has undercut Mexico's regime, while the future of the North America Free Trade Agreement (NAFTA) also hangs in the balance.

"We hope the NAFTA negotiations are resolved with a benign outcome prior to

the elections. If they are not, there is an additional risk – given that the campaign rhetoric seems to suggest that neither side really agrees with NAFTA," says Alt.

Brazil: inflection point

In contrast to Mexico, Brazil's two-round voting system needs the winning candidate to take at least 50 per cent of the popular vote. An Ipsos survey in late 2017 suggested 94 per cent of Brazilians did not feel represented by their politicians, which has opened up opportunities for alternative candidates to prevail at the general election in October.

Voters' dissatisfaction with the political elite is understandable: as in Mexico, corruption is a big problem in Brazil. In 2015, millions took to the streets in protest after allegations of money laundering against the former president Luiz Inácio Lula da Silva escalated into a scandal that engulfed huge swathes of the country's political and business elites. The country's Supreme Court authorised investigations into the actions of the president, around one third of the cabinet, one third of the senate and numerous state governors.

Former president Dilma Rousseff was impeached for breaking budgetary laws in 2016, and her removal prompted an astonishing rise in Brazil's equity market that year, as investors became excited about the promise of reform under incoming president Michel Temer. The MSCI Brazil Index rose a remarkable 66.2 per cent, compared with only an 11 per cent rise in the wider MSCI Emerging Markets Index.

Temer – who faces charges of obstruction of justice – will not be able to stand for re-election in October, which raises the question of what comes next. Some had tipped Lula to make a comeback, but he may not be able to stand due to a corruption investigation of his own.

A new candidate could take advantage, according to Carlos Melo, political scientist at the Sao Paulo-based Institute of Education and Research. "If Lula is absent, it would unquestionably open the space for an outsider; an emotional leader," he says.

Jair Bolsonaro, the right-wing federal deputy for Rio de Janeiro, might fit that description. Often described as Brazil's answer to Donald Trump, the former military man has drawn on a rich seam of disaffection after a deep recession in which the economy contracted, unemployment rose and social services were cut. Bolsonaro admits having little understanding of economics, and offers no easy solutions to Brazil's policy challenges, which include the need to broaden and accelerate the economic recovery. With a potential strongman like Bolsonaro in the ascendency, Brazil may be reaching an inflection point: will it press ahead with political and economic reform or slip back into populism?

Brazil's experience in recent years has at least brought increased transparency and strengthened opposition to corruption, and that will benefit investors over the longer term, says Ballard. "It comes down to the ability of the judiciary to be able to do their job, to be able to prosecute effectively. Certainly we are seeing great strides being made in Brazil – but we need to see that within other emerging market countries as well."

The ongoing push-and-pull between populism and reform is likely to be a key feature across emerging markets as they take to the polls in 2018. Given the extreme scenarios in play, investors will need to stress-test and hypothesise all the major outcomes – including the most unlikely – to ensure their portfolios are resilient during the year ahead ●

WHO WANTS TO LIVE FOREVER?



In our Big Interview, economist and best-selling author Andrew Scott considers the implications of increasing life expectancy for individuals, companies and policymakers.

For all the attention given to the millennial generation, increased life expectancy is arguably of even greater significance for many developed economies.

As a professor of economics at London Business School and co-author of the best-selling and award-winning book, *The 100-Year Life*, Andrew Scott is passionate about ensuring the gift of extra years becomes just that, and not a curse.

In addition to his academic work, Scott has for many years been a trusted adviser to policymakers; including the UK Financial Services Authority, House of Commons Treasury Select Committee, Bank of England, HM Treasury and the Office for Budget Responsibility. As such, his views on longevity carry weight.

In a lengthy interview with *A/Q*, Scott discussed the disintegration of the three-stage life and laid out a case for the shift towards a more fluid, multi-stage life. In order to live a 'good' life, he argues "you have to think about four different assets, and only one of them is financial". The other, less obvious, three are productivity and knowledge; vitality; and transformation – in other words, the ability to deal with change.

His theories imply financial advisers will need to evolve into holistic life planners in order to really serve their clients' needs; while servicing a growing number of elderly civilians will also have major consequences for entire industries.

According to Scott, technology will play a critical role in enabling societies to find and implement the necessary solutions. The challenges ahead are clearly manifold. However, his message is inherently positive: if individuals, companies and policymakers embrace this inevitable trend, the potential for more fulfilling and enjoyable lives seems unlimited.

Which demographic is feeling the greatest impact from the shift to a multi-stage life?

Increasing longevity is already disrupting the life-cycle model that emerged in the 20th century. The three-stage life of education, work and retirement – which was based on a life expectancy of around 70 – is unlikely to be able to cope with the

real possibility that the next generation will live to between 95 and 100.

The people who will be most affected by these changes are in their 60s. Many enjoy a level of health and fitness that is, on average, much higher than what was expected when the idea of a three-stage life was born. In their desire to carry on working, it is almost as if they have set aside the notion of retirement. The idea there is a single age at which everyone comes to a hard stop is already outdated.

Retirement is almost coming into three stages now: one where people are still working; one where they are fit and healthy and travel and have some fun; and one that looks more like a traditional end-of-life stage, where they are more fragile and stay at home.

We are also seeing people in their 20s acting very differently. They are getting married later, buying a house later and having children later. A woman is more likely to have a child in her 40s than when she is under 20, which I think is an extraordinary statistic. Some of this is a consequence of negative factors, notably student debt and high house prices. But lifestyle choices also play a role, with many people adopting the full range of adult responsibilities in their early 30s rather than their early 20s.

How should companies respond to the demographic shift?

They should embrace it. One thing I tell businesses is that a 65-year-old today is very different from a 65-year-old in the past. They are fitter, healthier, more productive and work for longer. In 1922, a 65-year-old British male had a mortality risk, or chance of dying, of 4.3 per cent. Today that is down to 1.3 per cent. The question is who in 1922 had a 4.3 per cent mortality risk? The answer is 52-year-olds: 65-year-olds today are the equivalent of 52-year-olds in 1922.

Companies need to do more work in the formalisation of their relationships with employees reaching retirement age. Options need to be set out five or six years ahead of time so that they can make choices. And with the mass of the



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The idea there is a single age at which everyone comes to a hard stop is already outdated
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baby-boomer generation now moving into retirement, firms have to be more systematic and less discretionary in their policies: they could risk litigation if they are seen to treat individual employees differently.

How can we address the growing inequality in life expectancy?

Healthy life expectancy is not equally distributed across society. We see it much more in the middle classes and higher-income groups. This is a massive challenge because there is probably about a 14-year life expectancy gap between the top and bottom 10 per cent. That has to be resolved.

The first thing to note is that the rate of increase in UK life expectancy, and the US too, has been slowing; in fact, it has slightly dipped the last couple of years in the US. That is very much about inequality. In the US, you have this terrible opiate crisis. In the UK, though it is still too early to know for sure, there is wide suspicion that issues around austerity have had a role to play.

The other interesting issue is if you look at data on physical work, understandably the longer people work in a physical activity, the



WHO WANTS TO LIVE FOREVER?

continued

less their life expectancy. White-collar workers are exactly the other way around. You have to dig very deep to find out truly what the connection is, but there is an obvious interpretation: one is physical work is challenging and life-diminishing, but purpose and social activity is important also for maintaining life.

In terms of addressing this, the first issue to tackle is health reform, which is difficult but should be possible. The second is how we support people who do not have sufficient resources. If we look at the history of the welfare state over the 20th century, we see the advent of unemployment insurance and maternity and paternity leave. These are examples of the government eventually offering some sort of scheme that was previously only available to the rich.

Looking ahead, we could see developments in education provision. A government could, for example, fund a year's worth of retraining that could be taken at any time over the course of a lifetime. While this would be most likely offered to everyone, the uptake would be mainly from those on lower incomes.

Depending on your view, technology is either a major threat to employment or a positive trend that can create new jobs. What's your perspective?

When I talk to an audience in their early 40s, I usually depress them a little by saying: "You probably have more years left in employment than you have done already." That is great way of getting people to sit up and say: "I need to really think. Am I enjoying my job? Will my job last? Do I need to upgrade my skills?" This is technology as a threat.

Of course, we have had many new technologies before. There is a big debate about whether it is different this time but, as a rule, technologies make countries and

people better off in the long run. In the short run, it leads to a lot of redistribution, with some people gaining and others losing. Although most people find a new job in the end, they suffer during that period because they have a lower income and the psychological anxiety associated with change. So while technological innovation can only be good news over the long term, there will be challenges along the way.

In terms of opportunities, we always think in terms of the technology of networks; the digital world; robots and artificial intelligence. But we should also note the prospect of a massive improvement in healthcare. We are seeing already some quite stunning products around anti-ageing and life extension.

Another interesting aspect of technology is that we decry the use of robots, even though there are clearly numerous benefits for utilising them. If, for example, we look at data for South Korea and Japan, which have some of the most rapidly-ageing societies, their productivity growth has held up better than many other countries. This is largely because of their significant investment in robots. If your workforce is ageing and you have robots to do some of the difficult manual tasks, it is obviously going to be a big positive.

If people have to work longer, presumably education has a key role to play?

I believe we are going to see a greater need for education of 40 and 50-year-olds. Technology will play an increasingly important role in that process as I do not see universities being able to cater for all that extra demand. I expect to see new products and new providers, with digital being the best way of delivering them.

We also need to bear in mind that education should be about more than just upgrading skills. It also has to be transformational. All the evidence on transformational education is that it is about being part of the community, being opened up to new ideas and being isolated from your other life.

While I think that is one of the big roles of education for 18 to 21-year-olds, it will also be important for those in their 40s and 50s because they are likely to have had 20 years working in just one role. That is their

skill set and their identity. They probably do not even know what they really want to do. You can sign up for a course to do web design or something and that is great. You can learn to be a very good web designer but it is not going to be totally transformative in your outlook and your skills.

How should financial planning adapt to a multi-stage life?

If we are right that we are going to have a multi-stage life, we need to question the whole concept of a pension because of our need for assets at different times of our lives. I might, for example, accumulate a lot of money at my financial stage in order to fund a couple of years of retraining. Alternatively, I may opt to get a job where I do not touch my assets but only earn enough to wash my face financially, which we see a lot of among people in their 60s.

There is a whole covariance of assets we now need to look at: health, relationships, education as well as work. This means we need to think differently about when we shuffle money from one period to another. That is also going to be much more individualistic. A three-stage life can only be arranged in one way: I get educated, have a job and retire. You can arrange a multi-stage life in lots of ways. Again, different people have different needs. The best financial advisers will ask their clients what they really want and are able to help them achieve that.

Should pension freedoms be extended then?

With low real rates of return, greater longevity and the removal of tax incentives, it is a very challenging world for pensions. Pension freedom is in principle a good idea but it all comes back to the question of financial advice and what you tell people to do. The danger is encouraging short-term behaviour, which is one of the biggest challenges of the 100-year life. Self-control and drawing a link between yourself now and the future is key for a long life. The question is how we educate people to have that long-term perspective.

I expect to see whole new frameworks for long-term wealth management, where you can distribute the tax advantage over the course of your life. To that end, we are now seeing interesting new options such as the Lifetime ISA. Rather than just having a tax

allowance for an end-of-life pension, there will be something that you can use at different points of your life. That seems a sensible way of looking at things.

How should corporate pension schemes respond?

Most companies are pulling out of defined benefit pensions given their high cost and significant longevity risk. Few firms are still admitting members and overall membership has declined dramatically. That said, while the defined benefit scheme in its current form is no longer viable, there is a version of it that could work well for the 100-year life.

If you think of your assets as not just financial, then the company could say to its employees: "We will give you auto-enrolment or some small-scale defined contribution up to a certain level but after five years we will give you a six-month sabbatical. After 10 years, we will give you a one-year sabbatical. We will pay for you to go and get retrained and, if you agree, we will move you into a different part of the team."

A more holistic approach to thinking about corporate pensions could also help reinstate the original advantage of offering a defined benefit scheme: we can hire someone today for less than we might do otherwise and use it as a retention tool.

Is a sense of purpose as important as financial well-being over the course of a long retirement?

This is arguably the greatest problem we face. We have to recalibrate what we mean by 'old'. I do not think 65 can be counted as old anymore and as the years pass I get more passionate in saying that. Also, we need to think about how to reintegrate older people back into society because the three-stage life creates a type of 'age apartheid'. It leads to a society where young people stay together, working age people stay together and old people stay together.

Helping the older generation retain a sense of purpose is vital as there is clear evidence that purpose produces happiness. There are two ways of achieving this. The first is for people in their 60s to be entrepreneurial, which is something I am seeing more and more. They want a work-life balance rather than simply to

make money. The second is for older people to supplement their main career with professional mentoring. According to the US organisation Encore, which runs such a service, inspiring and motivating others by imparting knowledge and experience can have a profound impact on those who participate.

What are the investment implications of all of this?

In terms of sectors, I think the recent merger between CVS and Aetna in the US is really interesting. Healthcare has now been retailed, but it is going to be a lot more than just selling products. There are a lot of services to be combined. Then, of course, education. When we do some calculations for people over 18, they are probably going to be working into their late 70s. Nothing you learn at 21 can possibly last for that length of time. There is going to be a big growth of education, I think, in the 40 to 50-year age bracket.

What one thing you would say that individuals, companies and governments separately need to do to meet the challenge of the multi-stage 100-year life?

For individuals, I worry most about 40 to 50-year-olds. They are following a model that worked for their parents but will not work for them. They cannot retire at 65 but their education and skills will not sustain them beyond that. That is a really big challenge. For individuals in general, it is important they recognise the need to think about their future self today, but also acknowledge their future self will go through several changes. They need to be open to those changes.

Companies and governments also need to move away from thinking in terms of a three-stage life, which so hardwires our actions, and realise we are going to see a lot more diversity and a lot more of a lifetime approach to things.

As for companies individually, they will miss an opportunity if they do not accommodate with appropriate options the very large and highly-experienced baby-boomer cohort currently approaching retirement. I find it slightly strange how obsessed companies are with millennials. While they might be great in number, there is an even bigger cohort about to walk out the door who seem to be fit, healthy and laden with expertise ●

“Companies and governments need to move away from thinking in terms of a three-stage life, which so hardwires our actions”



ARRESTED DEVELOPMENT

Millennials are maligned as a generation of self-absorbed tech-addicts. But their distinctive approach to spending and saving is set to reshape companies, markets and economies.

Millennials are often characterised as feckless, selfie-taking narcissists. Their capricious spending habits have reportedly hastened the demise of consumer industries from beer to soap, napkins to motorcycles. It is said they would rather fritter away their cash on smashed-avocado brunch dishes than save for the future.

Criticism of youngsters is hardly new: "People try to put us down," as Roger Daltrey complained on The Who's hit "My Generation" in 1965. But at least Daltrey's generation – the baby boomers – had a fast-growing economy in which to find their feet. Not so the millennials who entered the jobs market in the shadow of the financial crisis: they are grappling with student debt,

rising house prices and stagnant incomes.

"In real terms, the wages of someone in their 20s now are less than the wages of someone in their 20s 10 or 15 years ago," says former UK cabinet minister and life peer David Willetts, who chairs the Intergenerational Commission at think tank the Resolution Foundation. He argues millennials are in fact "a serious-minded group. They think if they don't work hard they are facing a very tough and competitive world out there: in many ways they are."

But there is hope for millennials. More resilient than their cosseted reputation suggests, they are slowly beginning to overcome their challenging economic

circumstances to exert an influence on companies, markets and societies, with significant implications for investors in a range of industries.

Millennial myths

So what is a millennial? Coined by the demographers William Strauss and Neil Howe, the term usually refers to a cohort born between 1981 and 2000, which means the oldest are now in their late 30s (the phrase Generation Y refers to the same group). As the most populous generation in the US and in some European countries, millennials have emerged as prime targets for advertisers.

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Millennials remain shrouded in myths and half-truths

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But despite a wealth of research on the subject, millennials remain shrouded in myths and half-truths. Polling organisation Ipsos MORI recently published a global survey that lays bare the misperceptions of the millennial generation in society and the workplace.¹ It shows much of the received wisdom about millennials is entirely false: they are not impervious to advertisements, as some have supposed; and neither are they footloose job-hoppers. In fact, British millennials are staying with their employers longer than previous generations did at the same age.

So what can we say about millennials? For a start, there's some truth in the smartphone-wielding stereotype. "Millennials are more comfortable with technology than previous generations, having grown up in the era of high-speed internet," according to Michael Clemence, research manager at Ipsos and a co-author of the report.

Millennials spend 1457 minutes per week on their phones, more than double the figure for their immediate predecessors, the so-called Generation X. As the best-educated cohort in history, there is also evidence that university life has made millennials more likely to travel, more open to new experiences and more tolerant of difference.

Shadow of the crisis

Some have claimed the technological and educational advantages enjoyed by millennials are actually hindering them. In his book *The Vanishing American Adult* (2017), US Republican Senator Ben Sasse writes that millennials have "far too few problems", diagnosing a state of "affluenza". Sasse argues the younger generation have been infantilised by the passive consumption of media on the internet.

But others make the case that the defining moment for the millennial generation was not the invention of Apple's iPhone, but another seismic event that began in late 2007: the global financial crisis. Although everyone felt the impact of the crash, millennials' prospects were hit especially hard because they were poised to enter the labour market just as the recession took hold.

"When previous generations went into jobs, either as young people without a degree or as graduates, the expectation would have been fairly rapid salary progression over the first three or four years, perhaps as much as 10 per cent a year," says Stewart Robertson, senior economist for the UK and Europe at Aviva Investors. "That wasn't the case for those who entered the labour market post-crisis, who experienced quite fierce austerity. The squeeze from 2009 to 2014 was probably the worst in the post-war period."

Post-crisis university graduates found themselves compelled to take jobs for which they were overqualified – a process economists call 'cyclical downgrading' – and this slashed their earnings potential over the longer term (high-street graduates fared even worse).²

Millennial men in the UK stand to earn £12,500 less during their 20s than their counterparts in Generation X, as more of them fill part-time and low-skilled roles.³ The effect on wages has been even more pronounced in the US, where a typical graduate in 2009 stood to earn \$58,600 less over the following decade than a typical graduate in 2007.⁴

Generation hex

"The oldest millennials got out of school right when the recession hit, when there weren't a lot of jobs available, so they had to settle for roles below the skills they earned in college," says Beth Ann Bovino, US chief economist at ratings agency S&P Global Ratings in New York and author of a study on the millennial generation. "This hurt their wages at that point in time but it also hurt their job opportunities later on in their career."

Bovino's research shows that in terms of outlook and economic circumstance, American millennials have much in common with the hardy, conservative-minded 'Silent Generation' who grew up amid the threat of war and economic recession in the mid-20th century. Some may balk at the comparison. After all, millennials are able to travel the world for

a relative pittance and have access to a civilisation's worth of art and culture at the touch of a button – luxuries beyond the wildest imaginings of Dustbowl America.

Nonetheless, Bovino insists the similarities are there. "The millennials and the Silent Generation of the 1920s-1940s grew up during the two worst recessions in the history of the US: for millennials it was the Great Recession, and for the Silent Generation it was the Great Depression. They saw their parents suffer during those downturns, and that led to some similarities in behaviour: both groups tend to take conservative spending decisions, for example."

Around 80 per cent of millennials say the financial crisis taught them to put away money for a rainy day.⁵ Asked how they would use a tax refund, 39 per cent of millennials said they would save it, compared with 33 per cent of baby boomers and only 23 per cent of Generation Xers.⁶ These diligent saving habits mean pension coverage among millennials is improving, but their stagnating wages are hurting overall living standards.

Delayed adulthood

In some respects the Silent Generation actually had some advantages over today's youth. While many millennials have enjoyed the benefits of higher education, it has left them saddled with unprecedented levels of debt. More than \$1.2 trillion in student debt is outstanding in the US, of which more than 60 per cent is owed by millennials (see figure 1, overleaf). The class of 2016 graduated with an average debt per head of \$37,000 and default rates are rising, causing the Brookings Institution to warn of a 'looming student loan crisis'.⁷

Millennials are also struggling to get onto the housing ladder. The problem is particularly acute in the UK, where a house now costs seven times the average income. The Resolution Foundation has discovered British millennials spend three times more of their take-home pay on housing than their



ARRESTED DEVELOPMENT

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grandparents did, and families headed by 30-year-olds are half as likely to own houses as baby boomers of the same age.

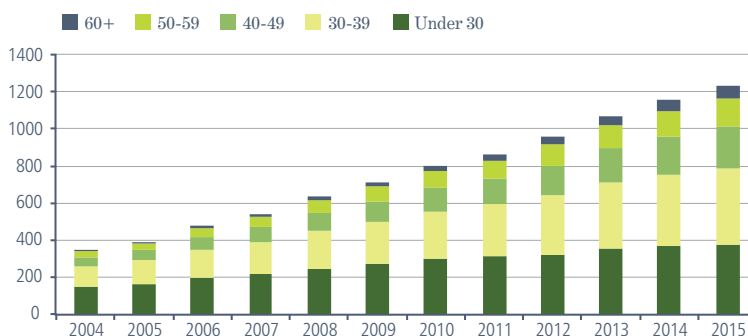
Housing was expensive even before the crisis, but quantitative easing policies exacerbated the problem by boosting asset prices, contributing to wealth inequality between generations (see *The Pinch*, pp.22-23). Robertson points out that millennials benefit from low interest rates that offset price rises, making mortgage repayments less onerous than they were in previous decades when housing was ostensibly more affordable. But when you factor in wage stagnation and low inflation, housing remains a big outlay that leaves less available for discretionary spending.

"In the past, interest rates were high partly because inflation was high, and inflation is great for eroding debt," he says. "When previous generations took on a mortgage it was often a huge burden initially – but with high inflation eroding the value of the debt, and steep wage increases each year, the burden fell away quickly. These days, mortgage repayments are less of a burden at first, but that burden lasts much longer."

For now, many millennials are choosing to live at home with their families for longer than their predecessors. Living with parents is now the most common living arrangement for 18-34-year-olds in the US: in 2014, over 31 per cent of US millennials lived at home, compared with only 18 per cent of Generation Xers at the same age.⁸ The figure is almost identical for the UK and even higher in some southern European countries with high rates of youth unemployment.⁹

A consequence of these trends is a new life stage – a prolonged period of quasi adolescence before people buy houses, get married and have children. Given that we are all living longer lives and retiring later, it may make sense to spend more time exploring different career choices and meeting more prospective romantic partners before settling down (see *The Big*

Figure 1: US student loan balances by age group (\$ billions)



Source: Federal Reserve Bank of New York/Equifax

Interview). But millennials are often just as keen to get on and raise families as their parents were. More important, their delay in doing so may be contributing to an overall decline in consumption.

"The average US consumer is not spending like they used to, at least not throughout this current expansion," says David Bucolo, senior research analyst at Aviva Investors in Chicago. "Retail sales have not accelerated as much as one may expect given the growth in GDP. In any expansion, you would expect a closer correlation between retail and GDP growth given the large contribution personal consumption makes to the overall US economy."

Light at the end of the tunnel

Will millennials ever start deploying their cash like previous generations? Bovino's research in the US suggests the answer depends on the economy. If growth slows, the financial woes affecting millennials will only worsen. Unable to pay off their debt, their credit scores will take a further hit. They would find it harder to borrow to start businesses and buy houses and cars, the kind of big-ticket items that have traditionally driven economic growth.

Persistent low wages for millennials could reduce US GDP by as much as \$49 billion a year, relative to S&P's baseline scenario, holding US GDP growth under 2.5 per cent for the rest of the decade. The Resolution Foundation has published similar findings in the UK, which suggest slow economic growth could consign millennials to lifetime earnings that lag behind those of Generation X in real terms.

But there are signs a more encouraging scenario may be playing out. Stronger US

growth in 2017 appears to have enabled more millennials to begin to pay off their student debt and get themselves onto the first rung of the housing ladder, albeit later than previous generations.¹⁰ Millennials were the largest group of homebuyers in America in 2017, and a robust economic expansion in Europe is also improving the young generation's spending power on the Continent. Millennials in emerging markets are faring particularly well (see *Growth Potential*, pp.24-25).

"We could be on the cusp of that long-pent up demand actually coming through," says Giles Parkinson, global equity fund manager at Aviva Investors. "US homeownership rates among this age group picked up over previous years in 2017. All else being equal, we could now see above trend growth, not just in the housing market but in home furnishings and DIY." Home Depot is among the home-improvement retail chains to have reported an uptick in millennial customers last year.¹¹

E-commerce disruption

So what does the belated emergence of the millennial consumer mean for investors? Millennials' spending has been shaped by the economic pressures they faced in younger years, during their period of relative penury living in their parents' basements and attic rooms. They are extremely picky customers, and much more likely than other generations to consult multiple online sources of feedback before parting with their cash – and share their own reviews afterwards.

As they grow more economically powerful, millennials are therefore set to contribute to the continued rise of disruptive e-commerce channels, bringing both risks and opportunities for investors, according

to Jason Bohnet, senior research analyst at Aviva Investors in Chicago.

“Having grown up with immediate access to products and services through their smartphones, millennials demand instant gratification as consumers,” he says. “Millennials want fast, cheap deliveries, and that’s had a ripple effect through the whole retail industry, forcing legacy retailers to match online leaders like Amazon. Companies that don’t meet those expectations for fast, high-quality service will be punished.”

The race to win the business of these thrifty, demanding millennial customers is already transforming retail. More and more businesses are offering free shipping to compete with e-commerce platforms and their margins are suffering. Research shows retailers’ earnings before interest and tax (EBIT) decline 30 basis points for every percentage point of online penetration. In other words, the more trade a retailer does online, the thinner its margins become.¹² And price-matching initiatives designed to see off the threat of ‘showrooming’ – where consumers visit a store to see a product before buying it online, a typical millennial trait – have also hit profits.

Experiences versus things

A corollary to this trend is that millennials are accumulating less physical ‘stuff’ altogether; partly as a result of their constraints on living space, partly because technology gives them access to leisure options their parents might have had to own outright. Why amass a record collection when you can acquire a subscription to a streaming service such as Spotify? Why buy DVDs when you can log in to Netflix?

Bucolo says millennials are avid consumers of online media, which is spurring the onward rise of the big technology companies, the so-called FAANGS (Facebook, Apple, Amazon, Netflix and Google). These firms added more than \$1 trillion in market value last year.

“Companies that provide online visual media are thriving on this, from Google to Netflix,” says Bucolo. “The interesting thing is that while millennials watch less live TV, they watch much more TV overall. Advertisers that can figure out how to incorporate ads into the consumption of digital media will be ahead of the game.”



US restaurant chain Chipotle Mexican Grill offers a case study of a company that has specifically targeted millennial consumers using digital media. In 2014 the company developed an online web series called ‘Farmed and Dangerous’ – a comedy about the evils of factory farming – that caught the eye of Netflix-using millennials and neatly positioned Chipotle as an ‘ethical’ brand.

Along with its affordable dishes, this marketing campaign consolidated Chipotle’s position as the favourite restaurant among younger millennials, but a series of subsequent scandals that went viral across social media – including an E-coli outbreak – eroded its popularity. It recently launched a new series of sponsored content on social platform Snapchat to try and win back millennials’ custom.¹³

The sharing economy

When they do buy physical assets, millennials appear to be willing to share them to earn extra income. As they enter their most economically-influential phase, we are likely to see continued growth in the so-called ‘sharing economy’, which refers to platforms that enable asset owners to lease them out.

Airbnb, on which budget-conscious property owners can rent rooms to tourists, is the best known, but sharing platforms are cropping up in other sectors. French company Zilok enables sharing of equipment such as skis and tents, while US technology company Rent the Runway offers a ‘closet in the cloud’, a subscription service. Customers can rent high-end designer fashion items online and return them via smartphone-enabled self-service scanners at physical shops.

Sharing companies often emerge and rise to prominence very fast on the back of private funding: the sector is attracting more venture capital finance than any other category. Consulting firm Pricewaterhouse Coopers estimates sharing revenues will grow 25 per cent annually over the next decade to \$335 billion by 2025.¹⁴ This could cause disruption for companies in listed industries.

So where is the next big sharing platform likely to arise? “The interesting one here is cars,” says Parkinson. “There’s currently no big equivalent of Airbnb in the car industry, but it could happen. Picture a commuter who drives to a train station in the morning and picks their car up in the evening on the way home: could that asset be used during the daytime, providing a source of income? Potentially yes, if a company came along with the right technology to make it work. That kind of sharing platform could be attractive, and not just to the younger generation.”

Parkinson points out that the sharing economy won’t necessarily lead to mass disruption among manufacturers, however. To use the car-sharing example, millennials may be less likely to buy a car if they can pay a subscription to rent one – but each vehicle would be in use for longer each day and would theoretically need to be replaced more quickly, holding up demand.

Millennial money

Those characteristic millennial traits – comfort with technology, financial conservatism, a willingness to participate in sharing platforms and rely on online peer reviews – are also reshaping the banking and asset management industries.



ARRESTED DEVELOPMENT

continued

Simply offering an online service is no longer enough for companies hoping to help millennials manage their money; a user-friendly smartphone experience is essential.

This has led to the rise of digital 'challenger' banks such as US-based Chime and Atom in and Monzo in the UK, which run apps that enable budget-conscious millennials to easily categorise and track their monthly spending, transfer cash and split restaurant bills with their friends.

Financial services based on peer-to-peer models are also emerging to cater to

millennials. Inspired by social media, Berlin-based start-up Friendsurance connects small groups of people with the same kind of policy who are hoping to keep claims low. Part of their premium goes into a pool and they receive cash back if any money is left over after small claims. US start-up Lemonade works on a similar principle, with a twist – the leftover cash is donated to a social cause the peer group feels strongly about. The company has hired behavioural economist Dan Ariely to advise on its business model.¹⁵

Not all of these new fintech models targeting millennials will succeed. But incumbents may need to adjust to the potential disruption they cause. In asset management, for example, established firms are beginning to specifically target young investors with new digital platforms¹⁶ and offering strategies tailored to specific outcomes.

So what are the specific outcomes millennials are looking for? One recent study shows they are relatively risk-averse investors, targeting capital preservation. Millennials tend to hold at least half of their assets in cash, one third in equities and around 15 per cent in fixed income.¹⁷ Evidence also suggests they are more likely to target environmental, social and governance metrics than other generations, which may present opportunities for managers that explicitly incorporate ESG considerations.¹⁸

Talkin' bout my generation

While millennials are becoming more influential as consumers and investors, it remains to be seen whether the recent positive trends in millennial spending patterns will continue. One of the drivers behind the recent rise in US growth is the Trump administration's tax reform plan,

THE PINCH: AN INTERVIEW WITH DAVID WILLETTTS

Conservative party politician and peer David Willetts published *The Pinch* in 2010. Subtitled 'how the baby boomers took their children's future – and why they should give it back', the book helped frame the debate about intergenerational inequality in Britain.

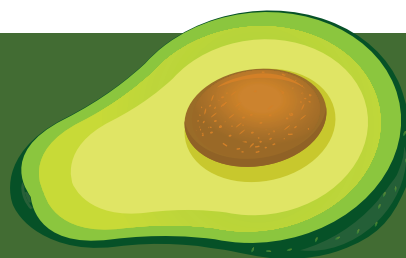
It is Lord Willetts's contention that the boomers "concentrated wealth in the hands of their own generation" and introduced "new barriers to the spread of opportunity and ownership" among younger generations.

Nearly a decade on and intergenerational inequality has worsened, he says. Policies designed to spur growth in the wake of the financial crisis – such as quantitative easing – exacerbated the inequity identified in *The Pinch* by boosting the wealth of older generations. And a widening chasm in wealth and income between young and old has also been observed in other nations, particularly the US, which has been ranked worst among 29 advanced economies in imposing unfair burdens on future generations.²²

As chair of the Intergenerational Commission at The Resolution Foundation, Lord Willetts is exploring how these issues might be addressed; the Commission's final report will be published in the summer. Initial findings suggest young people are continuing to suffer disproportionately in an economic landscape marked by rising inflation and sluggish growth, but Lord Willetts insists he is "not a pessimist". In this interview, he argues growing awareness of the problem will pave the way for a solution.

AIQ: How has intergenerational inequality developed since you published *The Pinch*?

David Willetts: The evidence has become even stronger, in both assets and income. The wages of someone in their 20s now are in real terms less than the wages of someone in their 20s 10 or 15 years ago. That's the labour market issue. On the welfare state, we've got a triple lock, which has meant that pensioner benefits have risen by a minimum of 2.5 per cent while benefits for working age families have been frozen in cash terms. So there has been a



shift in the relative generosity of benefits and pensions relative to families. The house price boom, partly fuelled by QE, partly fuelled by planning restrictions, has benefited the owners, who tend to be baby boomers. This made it harder for younger people to get a start on the housing ladder.

[It's the] other big asset, pensions, where there have been the most encouraging developments. Although the younger generation don't have anything like the final-salary pension scheme that many boomers enjoy, the 'NEST' [an auto-enrolment scheme] is having an effect and is spreading a basic form of pension saving to the younger generation.

AIQ: You served as minister of state for universities and science in the coalition government. How did the policies the government introduced to deal with the financial crisis affect intergenerational inequality?

DW: Although QE was necessary in the circumstances, it had the side effect of boosting the wealth of people who have

which is likely to favour baby boomers at the expense of younger generations, according to the nonpartisan think tank the Tax Policy Center.¹⁹

Over the long run, such policies could exacerbate intergenerational inequality and prevent millennials from closing the gap to older generations. While some millennials made gains in 2017, the cohort as a whole is still lagging significantly behind: Americans currently aged between 30 and 39 years of age are calculated to have amassed 46 per cent less wealth as of last year than the equivalent cohort in 2007.²⁰

In millennials' favour is their growing electoral clout, which should enable them to better defend their own political interests. Voter turnout rates tend to be higher among baby boomers, but millennials are set to be the biggest and most powerful political force in America by 2024.²¹ The Ipsos research shows

millennials in many countries are less likely to be loyal to a particular party than their predecessors, which means politicians will have to devise incentives to earn their votes.

This may already be happening in the UK, where intergenerational unfairness is growing more prominent as a topic of public debate, sharpened by the outcome of the referendum on European Union membership (younger generations voted overwhelmingly for 'remain', while older voters tended to favour Brexit). The Conservative government introduced measures to help young people get onto the housing ladder at the last budget in autumn 2017, such as a cut in stamp duty – a tax on purchases – for many first-time buyers.

Robertson says such changes are welcome. Although Brexit could impose new economic pressures on British millennials, he is broadly optimistic about the prospects

for younger generations across the West. "It's easy to forget the progress we've made since the crisis. Only a couple of years ago we were worried about deflation, the idea that secular falling prices could persist in some parts of southern Europe. Those fears have now vanished entirely and that's not a small step.

"Ten years on, we've had sufficient time and medicine to recover from the crisis. And if the uptick in growth persists and we can return to some semblance of normality, the outlook for younger generations will only improve," Robertson adds.

Millennials had a tough start in life, and the stereotypes about their laziness and financial profligacy only added insult to economic injury. But like the baby boomers before them, they are beginning to make their voices heard in business and politics as the shadow of the crisis lifts. Perhaps the kids are alright after all ●

got assets – so it boosted the wealth of the boomers relative to younger generations. The good news on the labour market since the crash has been high levels of employment; the bad news is there has been no increase in take-home pay – at best, pay is stuck back at the level it was pre-crash. You could have imagined a different response to the crash; you could have imagined, for example, that bond holders in banks had been required to take a much bigger hit, and of course that would have hit things like annuities.

What are the political effects of the decline in homeownership among young people?

DW: We've now got people in their 30s and 40s who are renters – on a bigger scale than before – and renters have relatively few rights in the UK. So if you've got a kid at school and you have to move your tenancy, your kid has to move from one school to another. And that does impose strains on families.

There has also been a decline in class identity and class loyalty, which is something we've investigated at the Intergenerational Commission. Of course, if you're moving around a lot as a renter, you're less likely to vote, and indeed it's harder to vote because you're less likely to get on the electoral register. So there is some evidence [the

younger generation] feel less attached to a local community and to political organisations because they haven't been able to put down roots in the classic way of buying their own homes.

What are the implications of intergenerational inequality for social mobility?

DW: What it can mean is younger people depend more on what they are going to inherit from their parents or grandparents, so the intergenerational exchange that survives is within the family. That in turn means that if you have the advantages of an affluent and well-educated family they can pass on those advantages to you more – so there is a link between intergenerational inequality and social mobility.

What can governments do to alleviate the pressures affecting young people?

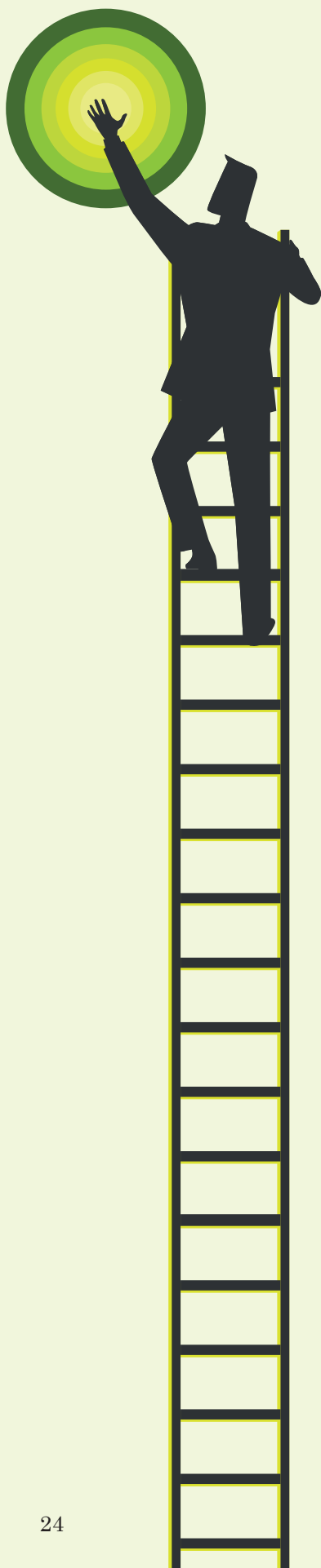
DW: The most important thing is to get more houses built, and that's an area in which we have made progress. I'm not a pessimist. I think people do worry about intergenerational fairness and my book was part of a wider wake-up call.

Look at the shifts in attitudes: if you ask the question, 'would you wish to see more housing built in your area?', the number of people agreeing to that proposition has

doubled in the last five years: it's gone from 26 per cent in 2010 to 54 per cent now. So there has been a shift in attitudes towards housebuilding and the government has gradually ratcheted up the policies to get more houses built. People do respond to an appeal to intergenerational equity.

Your latest book, *A University Education, is a history of higher study. Rates of university attendance among millennials are higher than they were for previous generations – do you see this reflected in any generational traits or attitudes?*

DW: I think the younger generation are better educated, more hard working, they drink less, they smoke less, they are under pressure to do exams from a young age, and indiscretions on social media are going to stay with them for life. When I would go round universities, what I would find is that the students are not plotting Marxist revolution in Latin America, they are more likely to say they aren't getting essays with comments back from their professors quickly enough. They are actually quite a serious minded group, because they think that if they don't work hard they are facing a very tough, competitive world out there: in many ways they are ●



EMERGING-MARKET MILLENNIALS: GROWTH POTENTIAL

As millennials in advanced economies have come under pressure due to stagnating wages and escalating student debt, an altogether different trend is taking in place in many emerging markets, where younger generations are seeing their prospects rapidly improve.

This is especially noticeable in India and fast-growing Southeast Asian countries such as Indonesia, which boast large cohorts of affluent millennials. This has the potential to be a major investment theme in the coming years.

Taking advantage of the resulting opportunities, however, requires knowledge of the specifics of each country's demographic make-up and consumer preferences, says Will Ballard, head of emerging market equities at Aviva Investors in London. He points to the influence of millennial trends in India, where the average age is about 29.

"As in many emerging markets, public transport in India is quite poor, and as the population grows more affluent there has been a rise in the number of private vehicles, especially two-wheelers," says Ballard. "In urban areas – and in wealthier parts of rural India – there has been demand for vehicles that stand out from the crowd and manufacturers are keen to capitalise on this trend."

Ballard cites the example of automaker Eicher Motors, which acquired the British Royal Enfield motorcycle brand as a signifier of quality and style. The company has seen strong demand from young consumers eager to differentiate themselves amid the flocks of identikit mopeds on Indian roads.

The smartphone generation

Like their counterparts in developed markets, emerging-market millennials use smartphones intensively, often favouring local models, or those imported from other EM countries, over Western brands. Chinese-made smartphones from Huawei, Xiaomi and Lenovo are seeing fast-rising sales in the Indian market.²³

New telecommunications operators have emerged to offer mobile data packages to this demographic, disrupting incumbents that tend to offer patchy service. "We have seen the rise of companies such as Mumbai-based Reliance Jio, which offers data at an incredibly low cost to win millennial customers," says Ballard.

"Time will tell whether it is successful over the long term – telecoms is a competitive industry – but what's clear is that telecoms operators that don't cater to the needs of the younger generation are going to fall behind. We are seeing that across emerging markets."

As in the West, increased smartphone penetration is enabling the millennial generation to survey peer reviews and compare options. This has implications for education and healthcare as well as consumer products. A relatively wealthy millennial in India will be aware local healthcare provision is poor compared with global standards, so may opt to travel abroad to a high-quality private hospital chain, such as Bumrungrad in Thailand, where medical tourism is a booming industry. "Cross-border services are growing in popularity across emerging markets, which is an interesting trend," says Ballard.

Chinese millennials

The picture for the younger generation elsewhere in the emerging markets is more mixed. Take China, for example, where millennials face similar economic challenges to their counterparts in the West. As products of the One Child Policy (1979-2015), which skewed demographics, they will need to support a much bigger cohort of older retirees. Property in 'Tier One' cities such as Beijing, Shanghai and Guangzhou is becoming just as expensive as in New York and London.

Nevertheless, Chinese millennials are a hugely influential group of consumers: they number 415 million, more than the entire working populations of the US and Western Europe combined. Over the next 10 years their aggregate income could rise by \$3 trillion,

according to Credit Suisse estimates. And they are feeding the growth of new corporate giants, the so-called BATs (Baidu, Alibaba, Tencent), which offer cutting-edge internet platforms and smartphone apps. The combined stock of these companies rose 80 per cent in 2017.

"Alibaba is one of the biggest companies in the world, thanks to growing demand for e-commerce," says Xiaoyu Liu, fund manager, emerging market equities at Aviva Investors. "Gaming is driven by the younger generation; that's benefiting companies like Tencent and NetEase. Tencent's WeChat app has 800 million users. The whole population is using it, but millennials are more intensive users compared with their parents."

WeChat offers a seamless online-to-offline experience, satisfying millennials' demand for convenience. Users can communicate with friends and family through calls and video-chats, book taxis and overseas holidays, make restaurant reservations, play games, pay bills and purchase items at physical shops – all without ever leaving the app.

State control

By collecting data on the huge cohort of Chinese millennials – who are on the whole more relaxed about data protection and privacy than their Western counterparts²⁴ – these technology companies are developing new innovations in artificial intelligence, as well as fintech platforms such as peer-to-peer lending.²⁵

But this wealth of data is also accessible to the government, and facilitating an Orwellian system of state control. A 'social credit' system is in the works: a massive surveillance apparatus designed to keep track of citizens using facial recognition and data about online behaviour collected by technology providers. The government already has thousands-strong teams monitoring and censoring social-media posts.

Chinese millennials are far from passive victims of government control, however; in fact they are increasingly shaping the political debate in the country, according to Ballard. "Younger generations in China value quality of life, not just ever rising GDP, and the 19th Party Congress showed the government recognises that.

"Beijing residents are unhappy with air pollution, for example. In response, the

government has reduced the amount of coal being burned, and there has been consolidation in the steel industry to remove low-quality, high-producing capacity. It shows the rise of millennials can shape government policy, even in what is a one-party state," Ballard adds.

Impetus for reform

Millennials are having an even more dramatic impact on politics in other countries. A big cohort of young voters pushing for change has contributed to reform efforts in several emerging markets, bringing advantages for foreign investors.

Huge street protests, orchestrated by young people on social media, were a big factor behind the demise of President Dilma Rousseff in Brazil, who was eventually impeached in August 2016 following a corruption scandal. The ousting of Rousseff led to hopes of economic and political reform and the MSCI Brazil Index rose a remarkable 66.2 per cent in 2016, compared with only an 11 per cent rise in the wider MSCI Emerging Markets Index.

Or consider Indonesia, where the median age is under 30. One third of voters in the 2014 presidential election were casting their ballot for the first time, hungry for reform. This cohort of younger citizens helped elect Joko Widodo, a candidate who pledged to challenge corruption, liberalise the Indonesian economy and end trade protectionism (although his programme has had mixed results so far).

The young, growing populations of sub-Saharan Africa could in time deliver similar political and economic benefits, although recent developments in the Middle East suggest vast numbers of working-age citizens may be a mixed blessing for economies that cannot accommodate them with jobs.

"Countries such as Saudi Arabia could face problems if they cannot put the younger generation to work. The Arab Spring was driven by large numbers of young people who were faced with a lack of opportunities," says Aaron Grehan, senior portfolio manager in Aviva Investors' emerging market debt team. "But if everything else is aligned, younger demographics can be a massive driver of economic growth and development" ●

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A big cohort of young voters pushing for change has contributed to reform efforts in several emerging markets
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- 2 See Paul Taylor, *The Next America: Boomers, millennials, and the looming generational showdown*, 2016
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CRAZE OR REVOLUTION?

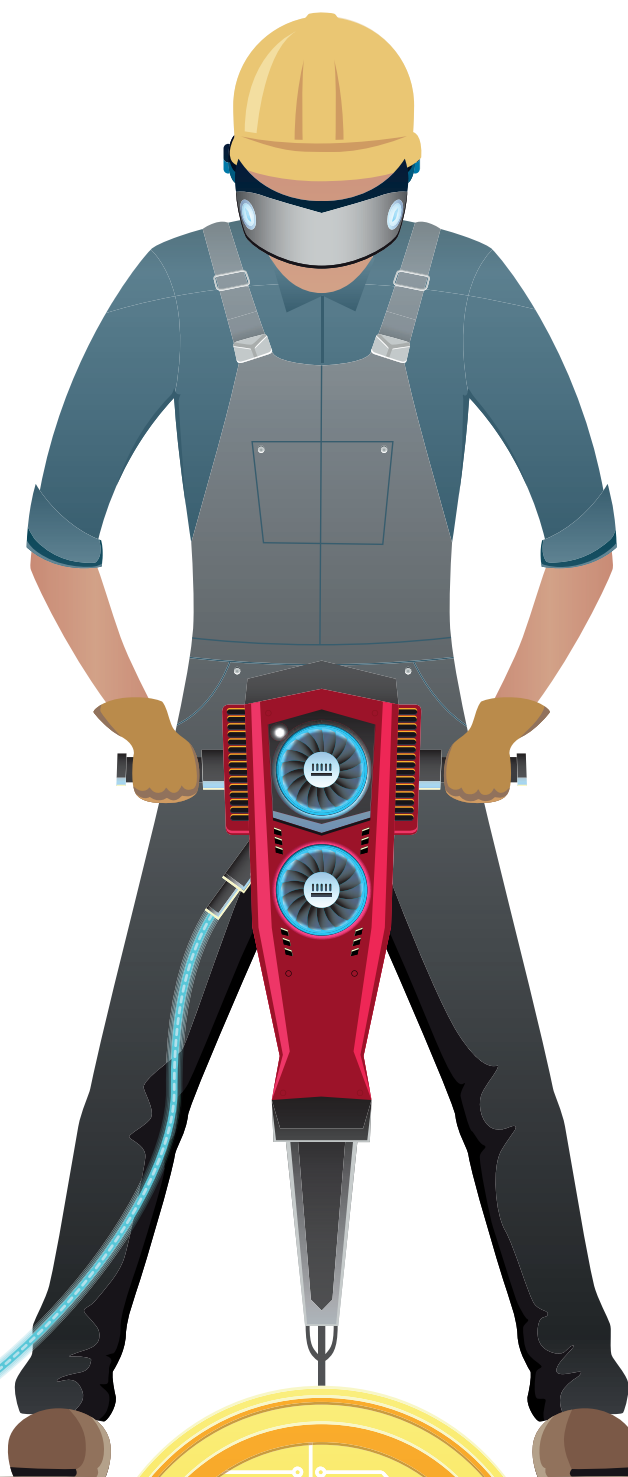
While the recent launch of Bitcoin futures on two leading derivatives exchanges may have given the world's first 'digital currency' a stamp of legitimacy, doubts remain whether it, and other cryptocurrencies, will become a mainstream investible asset class.

In October 2008, a pseudonymous individual or group by the name of Satoshi Nakamoto published what was to become a seminal paper, introducing Bitcoin.¹ Three months later, the cryptocurrency was formally launched. Few at that time could have envisaged the extent to which it would be grabbing newspaper headlines around the world less than a decade on.

That it should be doing so is hardly surprising when one considers that between July 19, 2010 and December 11, 2017 the price of each Bitcoin climbed more than 29 million per cent, pushing up the value of each dollar invested to \$292,494.² Over the same period, a dollar invested in the S&P 500 index would have risen to just \$2.90.³

The surge in Bitcoin's price helped spawn a deluge of rival digital currencies; Ethereum, Ripple, Bitcoin cash and Cardano being among the most popular. According to the coinmarketcap.com website, as of January 30, 2018, there were as many as 1499 cryptocurrencies in circulation with a total market worth of \$554 billion. Bitcoin accounted for just over a third of that total.

With Bitcoin rarely out of the headlines in recent months, there has been a surge in the number of funds offering investors an opportunity to profit from a further rise in its price. According to Autonomous NEXT, a London-based provider of research on the fintech sector, there are 175 'crypto' funds with \$3-4 billion of assets under management. While it appears the majority are looking to lure investors hoping to make a quick turn, even respected fund managers have been getting in on the act. For instance, famed value investor Bill Miller recently revealed his MVP1 hedge fund had half its assets invested in Bitcoin.⁴



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It is far from clear Bitcoin, or any of the other cryptocurrencies, will ever appeal to institutional investors

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However, while the main US markets regulator – the Commodity Futures Trading Commission – may have given the green light to two of the world’s largest derivatives exchanges, Cboe Global Markets and CME Group, to launch futures contracts, it is far from clear Bitcoin, or any of the other cryptocurrencies, will ever appeal to institutional investors.

Are cryptocurrencies money?

To see why, one firstly needs to try to establish just what Bitcoin is. Given its name, it is little surprise many people think of it as a form of money. In his article announcing its impending arrival to the world, Nakamoto somewhat cryptically described Bitcoin as a “Peer-to-Peer Electronic Cash System”.

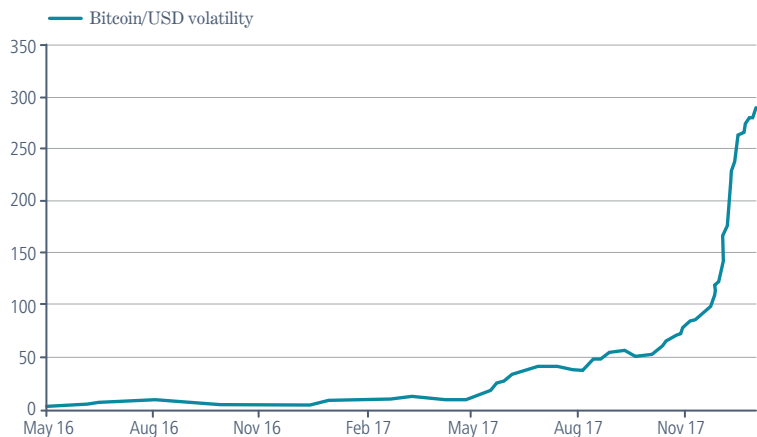
Interestingly, the open-source software released in January 2009 that contained the so-called Genesis Block – the first entry in Bitcoin’s transaction ledger and the means by which Nakamoto created the first 50 Bitcoins – included the following text from the UK’s *Times* newspaper: “03/Jan/2009 Chancellor on brink of second bailout for banks.”⁵

It seems likely Nakamoto appropriated this headline for good reason. By drawing attention to the flaws in fractional reserve banking that were exposed by the global financial crisis, he was attempting to boost the chances of Bitcoin being accepted as an alternative to traditional fiat currencies. But should Bitcoin be thought of as money and, if not now, what are the chances of it ever being considered so?

Money is vital to a modern economy, since it is used to underpin virtually all transactions. Throughout history it has come in many

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Figure 1: Bitcoin volatility



Source: Bloomberg

different guises. For example, the use of gold can be traced back to ancient Egypt. That form of exchange was replaced over time. For instance, in the middle of the 17th century London goldsmith-bankers began to issue receipts for gold lodged with them. Not long after, central banks issued their own promissory notes, which were redeemable in precious metals. Nowadays, money generally takes the form of banknotes, whose value depends not on gold but on the issuing central bank’s monetary policy.

Money’s three roles

From the perspective of economic theory, for something to be considered money it needs to perform three vital functions. Firstly, it needs to provide a store of wealth by enabling holders to transfer ‘purchasing power’ from today to some future date. To do so it needs to maintain a fairly

constant value. Secondly, it needs to serve as a medium of exchange. Without money, goods would have to be exchanged through barter. And thirdly, it needs to serve as a unit of account. In other words, it provides the common standard by which the value of different goods and services can be measured.

The extent to which an asset can serve these functions can differ, both from person to person and over time. Theoretically, any object can be used as money so long as two people looking to make a transaction can agree on its worth. For millennia, gold’s value has derived largely from its efficacy as a medium of exchange and store of wealth. During World War II, even cigarettes performed this function in prisoner-of-war camps.



CRAZE OR REVOLUTION?

continued

But taking each of money's three functions in turn, it appears digital currencies act as a poor store of value – even if they have made numerous millionaires and many people are buying them for precisely this reason – due to the significant levels of volatility seen. For example, Bitcoin hit an all-time high of around \$19,343 on December 16 after its price more than tripled in just five weeks. By February 5, it had plunged 64 per cent, to \$6,914.⁶

Whether digital currencies will provide a better store of value in the future remains to be seen. Since they lack any intrinsic demand for use in consumption or production, and no central bank stands behind them, demand will ultimately depend on people's belief in their long-term ability to perform money's second function.

Unfortunately, it appears cryptocurrencies at present are no better as a medium of exchange than a store of wealth. Researchers at Cambridge University's Judge Business School in April 2017 estimated there were no more than 5.8 million active users of cryptocurrencies around the world, and perhaps as few as half that number.⁷ The picture is bleaker still when considering their acceptance by retailers. As of July 2017, just three of the world's 500 biggest online merchants reportedly accepted Bitcoin, two less than a year earlier. According to Morgan Stanley, acceptance has been hindered by surging prices.⁸

One of the original arguments in favour of cryptocurrencies was the promise that over time retailers would be drawn to them by their low transaction costs. At present, it costs around \$4.2 to transact one Bitcoin, or 0.06 per cent based on a Bitcoin price of \$6,914. From a merchant's perspective, that compares favourably with either debit or credit card transactions.

However, there is no guarantee transaction fees will stay so low. As figure 2 shows, they rose sharply in tandem with Bitcoin's price, before collapsing. That is for good reason since they are directly proportional to the desire to transact in Bitcoins at any given

time. Because of the way the system is designed, the greater the number of people trying to transact simultaneously, the more expensive transactions become since ever more computing power is required to 'process' them. A Bank of England research paper published in 2014 concluded that over time digital currencies would struggle to compete with centralised systems on the basis of costs.⁹

As for money's third role, for an asset to be considered a unit of account it must be able, at least in principle, to be used as a medium of exchange across a variety of transactions between numerous people. At present, there is little evidence of digital currencies being used across societies in such a co-ordinated way. While that is hardly surprising since their prices have been too volatile and acceptance of them too low, there seems little prospect of this changing.

The Bank of England's researchers concluded that although digital currencies may have the potential to perform at least some of the functions of money over time, they faced "significant challenges" to their widespread use and it was "very unlikely" a digital currency, as currently designed, would be used as the predominant form of money in any economy.

A new asset class?

So if cryptocurrencies cannot be considered money, could they be thought of as a new asset class, or 'digital gold' as some proclaim them to be? As with money, there is no clear definition of what constitutes an asset. The lines are blurred.

There are some who adopt a strict interpretation, arguing that an asset is something that provides a claim on future cash flows. These cash flows can be valued, and assets with high cash flows and less risk should be valued more than assets with lower cash flows and more risk. For instance, dismissing the attractions of Bitcoin, legendary investor Warren Buffett recently

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At present, there is little evidence of digital currencies being used across societies in a co-ordinated way

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told the *Washington Post*: "There are basically two kinds of assets. One you look to the stream of income it will produce; the other you hope like hell that someone will pay you more for it."¹⁰

While there are some merits in this view, arguably such an interpretation is unnecessarily restrictive. For a start, it would appear to prevent commodities such as gold from being considered assets since they pay no interest. Currencies would also be ruled out. Yet there is no logical reason why a US Treasury bill with one day to maturity and paying a minimal rate of interest – which is widely accepted to be an asset – should be considered any different to a one dollar bill.

A more useful framework appears to be to think of assets in terms of those that generate some form of income stream, allowing them to be valued, and those that don't, which can merely be priced. After all, this second category of assets still appeals to many investors. Changes in comparative rates of interest are only one of the factors driving exchange rates, yet that does not prevent many investors taking large positions in currencies.

The difficulty in attaching a value

Although there is a case for fitting cryptocurrencies into this second group of assets, they face a number of obstacles to becoming a widely used form of investment. In the short term, what both currencies and commodities such as gold possess, which cryptocurrencies do not, is a lengthy track record. Without that price history, it is impossible for investors to form a meaningful judgement on where the price of such an asset is heading. To try to do so is especially dangerous when the market is so volatile.

However, even assuming Bitcoin or any other cryptocurrency manages to acquire a long track record, there is no guarantee they will become any more attractive to

institutional and other traditional investors. Crucially, although the supply of most existing cryptocurrencies may be predetermined – for instance Nakamoto designed the software behind Bitcoin in such a way as to cap its eventual supply at around 21 million ‘coins’¹¹ – it is unclear this will afford them some kind of scarcity value. After all, there is nothing to prevent an infinite number of rival coins, with identical characteristics, from being minted.

Why gold has value

That marks a key difference with gold. While the precious metal also has some intrinsic value due to its use in various industrial processes, its worth is derived mainly from its scarcity.

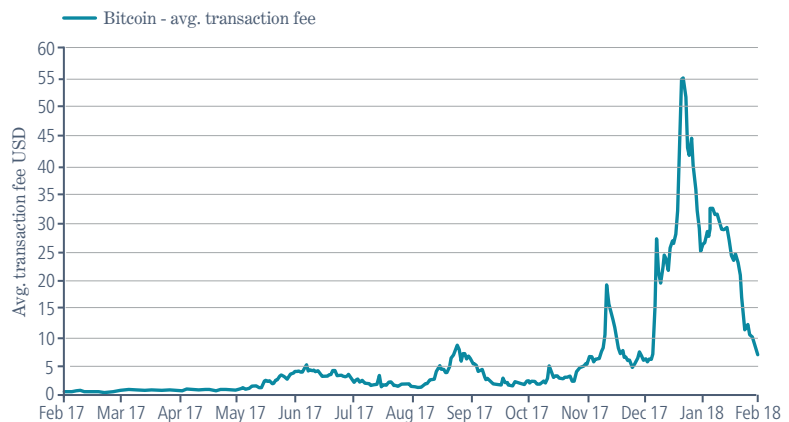
According to the World Gold Council, with three quarters of the world’s deposits having already been mined, there are just 57,000 tonnes of gold left in the ground.¹² Furthermore, despite annual world gold production having more than doubled between 1960 and 2016, from 1399 to 3100 metric tonnes, production per capita has fallen 9.5 per cent to 0.134 ounces.¹³

Gold’s scarcity means it is not only prized as a form of jewellery but, more importantly, as a quasi form of money thanks to its ability to act as both a medium of exchange and a store of value. This is a role that has stood the test of time thanks to central banks’ inability to erode money’s value. As figure 3 shows, gold is widely seen by investors as a hedge against long-term inflation for good reason. It is surely no coincidence the gold price rose more than sevenfold, from less than \$260 per ounce in April 2001 to \$1850 per ounce a decade later, at a time when central banks around the world were printing money at a record pace.

Other barriers to investment

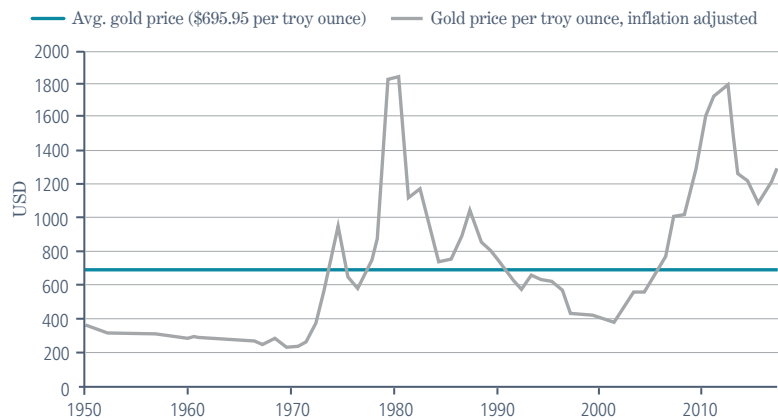
Another significant barrier to institutions investing in cryptocurrencies stems from the plethora of exchanges that have sprung up in recent years. According to one website there are currently at least 130 in existence.¹⁴ That presents a number of problems. For a start, many of the exchanges are unregulated, opening them up to the risk of fraud. Witness the experience of Yobit, the South Korean crypto-currency exchange that went bankrupt in December after losing 17 per

Figure 2: Bitcoin transaction fees



Source: BitinfoCharts

Figure 3: Gold price 2010-2018



Source: Aviva Investors’ estimates based on Bloomberg and Macrobond data

cent of its assets to cyber thieves – the second such attack in eight months.¹⁵

Episodes such as this increase the risk of regulatory intervention, presenting an extra deterrent to investors. For example, the Bitcoin price fell as much as 14 per cent on January 11 after Seoul said it was planning to ban cryptocurrency trading in response to the Yobit scandal.¹⁶ That would make South Korea the second country to ban cryptocurrency trading after China shuttered exchanges last September.¹⁷ As part of China’s ongoing clampdown, the country’s central bank in January outlined a plan to drive ‘miners’ out of business by limiting their access to electricity. Chinese officials are said to be concerned that Bitcoin miners, by taking advantage of low power prices in some areas, are affecting normal electricity use.¹⁸

China is home to many of the world’s largest Bitcoin miners, who use massive computing power to verify transactions in the cryptocurrency, thereby earning an award in new coins. The Digiconomist.net website estimates Bitcoin miners consume the equivalent of 37.5 teraWatt hours of electricity a year globally, enough to power 3.4 million US homes, or a country the size of Bulgaria.

Lack of liquidity

With so many exchanges quoting rates independently of one another, and arbitrage between them far from straightforward, price discovery is difficult. In addition, the fact trading is so fragmented limits the amount of liquidity offered by any one trading venue.

CRAZE OR REVOLUTION?

continued

According to the blockchain.info website, the average value of daily trading volume on the major Bitcoin exchanges totalled \$1.8 billion in December. But the coinmarketcap.com website estimates the biggest, Chinese exchange Batfinex, handles no more than a quarter of that total. By contrast, the London Bullion Market Association clears around \$1 billion of spot gold transactions per day.¹⁹

More troubling still from an investor's perspective, liquidity in the Bitcoin futures market is even thinner, with the daily underlying value of contracts traded on Cboe and CME to date having averaged barely more than \$50 million.²⁰ Contrast that with trading in gold futures in New York, where the equivalent of 27 million

ounces, worth around \$35 billion, change hands each day.²¹ While the lack of liquidity in Bitcoin futures is not totally unexpected given that the contracts are still in their infancy, it is far from evident why liquidity will dramatically improve. Unless it does, it is hard to envisage much of a pick-up in demand from traditional investors.

All of this is not to deny there are good reasons why investors have fallen for the mystical allure of digital currencies. In a world where central banks have been printing money like confetti and government deficits have skyrocketed, cryptocurrencies' superficial appeal to investors is easy to understand. The problem is that they are unlikely to ever meet investors' need for a reliable store of wealth.

Digital currencies' fractioning problem

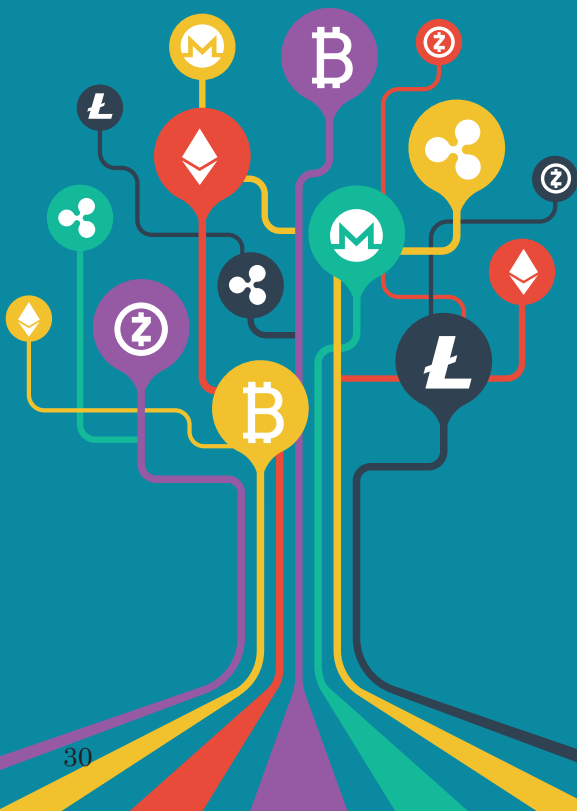
The ability to divide digital currencies into infinitesimally small fragments helps explain the dramatic rise in their price. Whereas the market for gold is priced per ounce and having to pay ever more for one ounce of gold hurts psychologically, thereby limiting

price rises, there are good reasons to believe investors in digital currencies are far less price sensitive. Since exchanges will sell them whatever fraction they want to buy, investors tend to see themselves buying \$1,000 worth of Bitcoin whatever the fraction, not one Bitcoin at an ever appreciating price. Eventually however, they seem bound to see the light.

The vast majority of commentators believe the current mania surrounding cryptocurrencies is unlikely to last. JPMorgan chief executive Jamie Dimon in September attracted attention when he said Bitcoin was "a fraud" and "worse than tulip bulbs", a pointed reference to one of the most notorious bubbles in history.²² As for Buffett, he advised investors to stay away; describing the idea Bitcoin has some huge intrinsic value as "a joke".²³

Certainly, the idea Bitcoin can continue to command such a hefty premium to rival cryptocurrencies seems fanciful. While it may be the best known by virtue of its age, it offers no other obvious advantage. It is not as if it is a company that is able to employ marketing techniques to differentiate its product from competitors.

HOW CRYPTOCURRENCIES WORK — AN EXPLAINER



Most cryptocurrencies are designed to work as a medium of exchange; using cryptography to conduct transactions, control the creation of additional units, and verify the transfer of assets. In the case of Bitcoin, and most other cryptocurrencies, no central authority or server verifies transactions. Instead, the legitimacy of a payment is determined by Bitcoin 'miners' – a decentralized network of computers, which race to confirm transactions by solving a mathematical puzzle, thereby earning a reward in new Bitcoins. This puzzle becomes steadily harder to solve, thereby limiting the supply of new coins.

The Bitcoin network collects all of the transactions made during a set period into a list, called a block, and writes

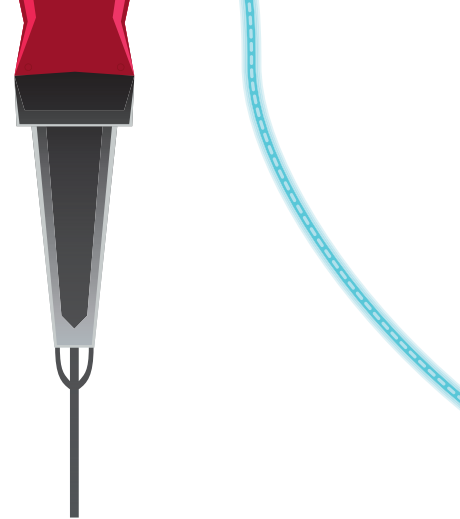
them into a general ledger. Each time a block is 'completed', it gives way to the next block in the 'blockchain'. A block is thus a permanent store of records which, once written, cannot be altered or removed.

While the majority of cryptocurrencies are little more than Bitcoin clones, the most popular alternatives have their own unique features. As the original cryptocurrency, Bitcoin offers users the most liquidity and significant network effects. It also has brand name recognition around the world, with an eight-year track record. However, it has a number of drawbacks in its design. Developers have attempted to boost the attractions of rival currencies by attempting to address these flaws.

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History suggests asset bubbles tend to persist far longer than might have been expected

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The perils of going short

However, while there is every chance the likes of Dimon and Buffett will eventually be proved right, there seems little merit and plenty of risk in ‘shorting’ Bitcoin futures, as some commentators have advocated. History suggests asset bubbles tend to persist far longer than might have been expected and trying to call the top of a market is fraught with danger. In the alleged words of famous economist John Maynard Keynes: “The market can stay irrational longer than you can stay solvent.”

Ordinarily, the futures and spot price would be expected to come broadly into

line with one another almost instantly due to the presence of arbitrageurs. In the case of Bitcoin futures, however, arbitrage between the two markets is likely to be difficult. That is due to a number of reasons, including the lack of liquidity in both the spot and futures markets; the lack of price discovery and the time taken to conduct transactions in the spot market; the difficulty of borrowing Bitcoins; and the fact futures contracts are settled for cash.

In the absence of these crucial elements, there is no guarantee a fall in the futures price will push Bitcoin’s price down in a hurry. That potentially creates a sizeable disconnect between the spot and futures prices.

For example, it is far from clear that were US institutions to sell into the futures market it would necessarily deter retail buying of spot Bitcoin in China. In such a situation, shorting the futures contract is likely to become perilous. The lack of liquidity in both the spot and futures markets could potentially lead to a severe squeeze on holders of short positions in the run up to the expiry of the near-month futures contract, pushing up the cost of rolling over into a contract with a longer expiry to exorbitant levels.

From boom to bust?

There seems little doubt blockchain, the technology underpinning digital currencies, could prove invaluable for many businesses looking to safeguard their data, not least within the financial services industry. By preventing changes to data once it is written, unless all or a majority of participating computers agree to the change, it represents a revolutionary departure from the traditional ‘wall’ companies build to defend digital information.

However, the likelihood is that cryptocurrencies themselves will prove to be nothing more than a craze. Unprecedented money printing by central banks and soaring government deficits have provided a fertile backdrop by encouraging investors to seek out alternative forms of money authorities are unable to undermine. The fact they offer anonymity due to the technology underpinning them has only magnified their lustre. But there are better options out there. Certainly, there seems little prospect of digital currencies becoming a mainstream investment in a hurry ●

- 1 *Bitcoin: A Peer-To-Peer Electronic Cash System*, Satoshi Nakamoto, October 2008
- 2 Coindesk
- 3 Bloomberg
- 4 ‘Bill Miller’s hedge fund has half its money in Bitcoin’, December 2017
- 5 Bitcoinwiki
- 6 Coindesk
- 7 *Global cryptocurrency benchmarking study*, University of Cambridge Judge Business School, April 2017
- 8 ‘Bitcoin acceptance among retailers is low and getting lower’, Bloomberg, July 2017
- 9 The economics of digital currencies, Bank of England Quarterly Bulletin, Q3 2014
- 10 ‘Buffett on Bitcoin: “It will come to a bad ending”’, *Washington Post*, December 2017
- 11 Bitcoinwiki
- 12 World Gold Council
- 13 Aviva Investors’ estimates based on data from the US geological survey and The World Bank
- 14 CryptoCoinCharts
- 15 ‘Bitcoin exchange Youbit shuts after second hack attack’, *BBC*, December 2017
- 16 ‘Bitcoin dives 14% as South Korea prepares cryptocurrency ban’, *Financial Times*, January 2018
- 17 ‘Beijing set to shut Bitcoin exchanges to ensure price stability’, *Financial Times*, September 2017
- 18 ‘China plans to deter Bitcoin miners by curbing electricity use’, *South China Morning Post*, January 2018
- 19 The London Bullion Market Association
- 20 Bloomberg
- 21 CME Group
- 22 ‘JP Morgan CEO Jamie Dimon says Bitcoin is a ‘fraud’ that will eventually blow up’, *CNBC*, September 2017
- 23 Bitcoin Forum

Litecoin, for instance, claims to offer a more effective way of conducting transactions since payments take just over two minutes to go through, compared with an average of around five hours for Bitcoin. Ripple markets itself as a cross-border payments solution for large financial institutions, with its main aim to lower the cost of high-volume but low-value transactions. Cardano claims to be the only coin with a “scientific philosophy and research-driven approach”. In reality, that means its open-source blockchain undergoes a rigorous peer-review process by scientists and programmers in academia, with the aim being to reduce the risk of scandals and hacks that have plagued Bitcoin. As for Ethereum, although the structure of its blockchain is similar to that of Bitcoin, by switching to a different model of verification the goal is to use far less energy to carry out transactions ●

SMART CITIES

A stylized illustration of a smart city skyline. The background is a warm brown color. In the center, a large, bright orange sun or moon is partially obscured by the title 'SMART CITIES'. The title is written in a large, bold, yellow, sans-serif font. Below the title, three black drones are flying in the sky. The foreground features several dark brown, angular shapes representing city buildings. The overall style is modern and geometric.

New technologies that would once have seemed the stuff of science fiction fantasy are quickly becoming reality; in the process transforming cities and creating investment opportunities.

Tower 42 was the City of London's first skyscraper. Plans for the building, formerly known as the Natwest Tower, were first unveiled in 1964 but the prospect of such an edifice piercing London's skyline proved so controversial that the foundations were not laid until 1970 and construction took a further 10 years.

Today, the City's gleaming pillars of enterprise shoot upwards at an astonishing pace and have proliferated in such numbers that anyone returning after a few years' absence would be amazed by the change. A time traveller from 50 years ago, when bowler hats and pinstripes were commonplace and St Paul's Cathedral had only recently been supplanted as London's tallest building, would think they were in an alien land.

If anything, the pace of change is likely to quicken. However, we have a good idea of how cities of the future will look because many of the transformational technologies that will influence their development are already in use.

Self-driving and electrical vehicles (EVs), for example, are likely to have a major impact and will transform city dwellers' attitude to cars. Rather than being status symbols, cars will be commoditised.

"Many won't bother to learn to drive or own a car but will simply rely on Uber-like apps to get from A to B. Those who do own cars will regard them chiefly as a means of earning money, either by feeding energy back in the grid at times of peak demand or by renting them out," says Isaac Vaz, associate director, infrastructure equity at Aviva Investors.

If Vaz is right, this trend will have significant implications for the way cities look. Parking spaces, car parks and petrol stations could disappear; to be replaced by green recreational areas, housing and shops. The air should be far cleaner as the petrol engine is phased out and wind and solar energy power tomorrow's world.

Singapore is among the global leaders in the drive towards smart city status and has launched initiatives across various areas, including energy efficiency and water usage, health and transport.

Thousands of sensors in some neighbourhoods monitor energy and water usage as well as waste production in individual apartments. Residents are provided with feedback that can help them

use less water and energy, and so save money. Meanwhile, the same data should enable the authorities to improve the planning, design and maintenance of public housing estates.

To improve the efficiency of the city state's roads, the government is calling for satellite-navigation systems to be installed in all vehicles. These will supply data to show exactly where every car is at any given time across the island, allowing for better traffic management.¹

Elsewhere, some African countries have ambitious plans to develop smart cities, reflecting the rapid pace of urbanisation expected in the coming decades. Kenya, for example, has already begun building a \$9 billion new "silicon" city called Konza, located south of Nairobi and heavily-influenced by existing new cities such as Cyberjaya in Malaysia and Cyber City in Mauritius.²

Stepping ahead

The smart cities of the future could incorporate novel ways of generating power. These include capturing the kinetic energy from footsteps. This may sound futuristic, but the technology has already been developed by Pavegen of the UK. One footstep generates around five watts of electrical power, according to the company.³

"Tiles could be placed in Bank Station using the energy from tens of thousands of marching commuters to power street lighting," says Vaz.

Moreover, the footfall data produced by the "smart streets" in which the tiles are installed can provide significant insights into consumer behaviour in shopping centres, for example. "Retailers could use this intelligence to gauge the effectiveness of advertising or maximise the efficient use of signage to influence where people go," adds Vaz.

In a similar vein, electrical vehicles could be charged as they drive around the city's streets. Qualcomm, the US semiconductor and telecommunications multinational, has already demonstrated the technology at a test track in Versailles, France.⁴ As with Pavegen's technology, these roads will produce an immense amount of "Big Data" that could prove useful in a myriad of ways, including the development of self-driving cars.

Vaz acknowledges there are some drawbacks, not least the cost and inconvenience of installing charging systems under roads. However, there are many advantages too.

"Dynamically-charged cars could theoretically run forever, meaning batteries could be smaller and lighter, and cars could be cheaper to run. Users would not need to regularly plug in their cars, eliminating the need for hundreds of thousands of charging points in Europe alone," Vaz adds.

The BIM effect

While it may take years before these technological wonders become commonplace, cities are already being designed and built in a completely different manner from just 10 years ago. Planners, architects and investors no longer need to pore over rolls of complex blueprints but can use virtual reality created by laser scanning to see how the final building will look.

They can also watch construction develop in 3D with accompanying data, and projections of when the building will be completed and its final cost, thanks to Building Information Modelling (BIM), which produces a digital representation of a construction project.

BIM helps eliminate errors, sometimes only discovered once construction is underway; speeds up the building process; cuts construction and operational costs; shows how a project should perform when built; and helps manage the building far more optimally than is the case today, says Dan Bentley, a partner at construction and property consultancy Core Five.

Expanding on this, Lee Coates, BIM manager at Core Five, believes BIM "has effectively modernised the construction industry and is providing a significant increase in efficiency".

It can also de-risk a project, according to Bentley. "BIM coordinates the different disciplines that supply services to a building, such as architects, structural and electrical engineers," he says. "This 'clash detection' could be done previously but was time consuming and subject to human error, while contractors would add a premium to take on the cost of any risk, inflating the overall cost of a project."



SMART CITIES

continued

Indeed, the potential for cost savings is so great that the UK government now requires BIM be used in any public sector-funded project as a means of reducing capital costs by 20 per cent.⁵

Coates believe the government's initiative is helping to make the UK a global leader in the application of BIM. "The UK has produced a series of documents relating to BIM to provide a standardised framework, whereas other countries have adopted a piecemeal approach," he says. "Indeed, the UK's documents are expected to become an international standard for BIM adoption on projects."

Sandra Reis, BIM manager at construction and engineering firm Costain, concurs with that view; explaining that the UK and northern European countries have generally been much quicker to adopt BIM than their southern counterparts.

Developments in Singapore have also impressed Reis. While BIM is usually applied to individual buildings, the city state has even greater ambitions. The government's "Smart Nation" initiative aims to model the entire city in 3D.

Meanwhile, BIM is being used to change the face of other Asian cities. The Shanghai Tower, China's tallest building, uses BIM to control everything from energy use to fire alarms.

Vaz believes the use of BIM brings significant advantages throughout a building's lifecycle, including at the design phase. "If you are planning a new underground line or a new building in a city such as London, you inevitably have to take account of the position of existing infrastructure on the 'as built' drawings," he says. "These are the original design drawings, which have been revised to reflect any changes made in the field. Yet often they are not updated, so a building may actually be 10 metres to the left of where it is supposed to be, a deviation that can have a major impact on where a new development should be sited."

By contrast, BIM provides an accurate guide designers and architects can use for new projects. BIM also shows how the building will behave over time; allowing further adjustments to be made that could improve its sustainability.

Vaz cites the £4 billion-plus Thames Tideway Tunnel as an example of how BIM can save money during the construction process. The tunnel, a 'super sewer' built under the tidal section of the River Thames, will stop sewage overflowing into the river. To create the tunnel, a large amount of soil must be removed by barge. Timing when the barges can dock is critical given the tide moves by

around two metres. Vaz says that BIM allows the planners to know exactly when the barges should arrive, boosting efficiency and avoiding project delays.

Operational efficiencies

Managing projects in an efficient manner can also bring considerable economic and environmental savings. Indeed, the operational phase of a building is the main contributor to a building's lifecycle cost, according to the British Institute of Facilities Management, while the lifecycle cost is estimated to be three times that of the construction cost.⁶

The combined heat and power company ENER-G estimates that "by having historical design data instantly available, up to 15 per cent can be saved on maintenance time and sometimes may remove the need for costly site visits".⁷

The construction industry has a well-established reputation for being resistant to change and being less efficient in terms of its processes when compared with, for example, the manufacturing and aerospace industries, says Coates. Nonetheless, he believes BIM will become increasingly widespread and the norm for many projects in the next five years.

Eye in the sky

New technology is also changing the way asset management firms monitor their investments in physical assets, such as infrastructure and

SMART CITIES: THE INVESTMENT OPPORTUNITY

The trillions of dollars¹ that will be invested in smart buildings and cities and their accompanying infrastructure in the coming years will create huge opportunities for real estate and infrastructure investors.

Fixed income is the traditional means by which governments, local authorities and corporations have financed real estate and infrastructure investment, and bonds will undoubtedly continue to play a key role. Green bonds, used for environmentally-friendly purposes, are certainly playing an increasingly-important role in the US municipal bond market, and are attracting

the interest of other countries. Last November, Ottawa became the first municipality in Canada to offer a green bond, raising \$79.6 million from a 3.25 per cent bond that matures in November 2047. The proceeds will be used to finance light rail transit capital work.

Smart cities can offer advantages over traditional infrastructure investment, according to Deloitte, because they "can comprise multiple sectors and be adapted for use beyond the realm of traditional infrastructure functions".²

Smart street lighting provides an example. These lights are equipped with environmental sensors to monitor air

pollution, temperature and parking spaces, and supply a constant stream of rich data on environmental and social performance. Deloitte points out the city "can monetize the data by charging access fees for any third-party developers who wish to develop applications using this data (such as a parking space app)".

There are also social benefits associated with the investment. Gunshot detection using audio sensors in the lights can help accelerate response time to violent crime.

So while traditional street lighting project revenue streams are realised through energy cost savings alone, this "is increased by a multiplier factor

commercial property. Vaz points to the increasing use of drones as an example.

"Most of our asset managers are based in London, but we are invested in projects all over the country," he says. "Drones with cameras can provide a wealth of information that could only otherwise be accessed by flying in one of our managers. So we can use drones to check how the construction of a project is developing, comparing real-time images with the construction plans. We could use a drone to check for rust on turbines, or, by analysing a heat map captured by the drone, determine whether panels in a solar park are operating efficiently."

According to Vaz, drones could also help cities use energy more efficiently by creating heat maps that show where energy is being wasted and where it is most needed.

"If we can find a way of connecting the two, capturing waste heat and transferring it to areas of high energy demand, the boost to energy efficiency would be considerable," he says.

Escape from the country

In 2016, an estimated 54.5 per cent of the world's population lived in urban settlements, according to the UN. It projects that by 2030 urban areas will house 60 per cent of people⁸, which means over a billion more people will be living in cities than today.

because of the economic value of the data," argues Deloitte.

As such, smart city infrastructure investment should result in the reallocation of risk and reward between the public and private sectors, according to Deloitte. That "should lead to new partnership models for front-end investment and revenue sharing, including pay-for-performance related to service improvements or access to services".

Meanwhile, Vaz believes the development of smart cities already offers a number of opportunities for infrastructure investors. They include investing in fibre optic networks, systems that create energy from waste, while the next few years could see massive investment in smart metre networks that allow consumers to



Footballers on a pitch in the Morro da Mineira favela in Rio de Janeiro can play well into the night thanks to floodlights powered by 200 kinetic tiles buried under the astroturf. As players run on the pitch, they cause electric-magnetic induction generators to produce electricity. Source: Pavegen.

Consequently, the development of smart cities that can deliver environmental and quality of life benefits could make a major contribution to human progress and well being. Moreover, just as new technology allows us to see what a future building will look like; we can already model the outlines of the cities of the future ●



feed energy back into the grid from their cars or solar panels, and in the highways that allow EVs to charge as they drive.

The use of BIM in buildings and cities also brings tangible benefits to real estate investors, says Chris Urwin, head of global real estate research at Aviva Investors.

"The technology could be used to enhance the appeal of buildings to tenants, with positive implications for rents and tenancy renewals," Urwin explains. "Organisations are increasingly interested in promoting wellness issues and productivity, to support their prospects of attracting and retaining the best talent. Consequently, the ability to modify factors such as temperature, lighting and air quality to best suit individuals holds considerable appeal."

- 1 'Singapore is striving to be the world's first 'smart city'', *endgadget*, March 2016
- 2 'Kenya begins construction of 'silicon' city Konza', *BBC News Online*, January 2013
- 3 'The next big thing in energy might be people power', *Bloomberg*, August 2017
- 4 'Qualcomm demonstrates dynamic electric vehicle charging', *Qualcomm*, May 2017
- 5 'How does BIM benefit facilities managers?', *Service Works Group*, January 2018
- 6 'BIM case studies for asset and facilities management', *British Institute of Facilities Management*, September 2015
- 7 'How Building Information Modeling (BIM) can improve future energy consumption', *energy-group*, June 2016
- 8 'The world's cities in 2016', *United Nations*, 2016

There are also environmental benefits. The technology can, for example, improve energy-efficiency and reduce waste. These 'smart' buildings may not be commonplace yet, but Urwin says it is possible to imagine a time when they will be.

Meanwhile, smart cities are throwing up a myriad of opportunities for stock investors; ranging from the companies developing cutting-edge technology to those mega enterprises seeking to exploit Big Data in a host of activities ranging from transport and advertising to health ●

- 1 'Smart city investment opportunities target \$1.6 trillion market', *Readwrite*, March 2017
- 2 'Funding and financing smart cities', *Deloitte*, 2017

THE FED'S PHILLIPS CURVE PUZZLE



The apparent breakdown in the Phillips curve has left economists puzzled and created a dilemma for policymakers. However, the relationship between inflation and employment remains very much alive, meaning the Fed has a lot more work to do yet.
By Michael Grady

The steady recovery in the US economy since the middle of 2009 has pushed the country's unemployment rate close to its lowest level in nearly half a century. Ordinarily, that would have been expected to lead to higher prices via rising wages. The fact inflation has failed to accelerate as rapidly as might have been anticipated has been puzzling and led some to question the validity of a central tenet of modern economic theory. In doing so, it potentially poses a major dilemma for policymakers at the Federal Reserve (Fed).

In 1958, New Zealand economist William Phillips published a seminal piece of research in which he identified a historically stable inverse relationship in the UK economy between rates of unemployment and wage inflation that had held for a century. Two years later, US economists Paul Samuelson and Robert Solow went one step further, establishing a link between unemployment and inflation in the United States.

It wasn't long before governments and policymakers around the world were putting the theory into practice by adopting activist 'Keynesian' policies. This saw them

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The Phillips curve has continued to form the bedrock of Keynesian models that underpin the conduct of monetary policy

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attempting to stimulate activity when the economy was in danger of falling into recession and doing the reverse when it looked like overheating.

The efficacy of these policies became the subject of heated debate in the late 1970s as the high inflation experienced throughout the West led some to suggest the relationship had begun to break down. Nevertheless, the Phillips curve has continued to form the bedrock of Keynesian models that underpin the conduct of monetary policy throughout the developed world. As such, understanding the relationship between employment and inflation and how it may have changed over time is crucial to predicting the future path of monetary policy.

Measurement matters

While the debate about the merits of the Phillips curve has never really gone away, it has heated up during the past two years due to the apparent failure of tumbling levels of US unemployment to rekindle meaningful growth in wages.

To accurately assess what is going on, it is essential to choose the most appropriate measures of unemployment, wages and inflation. That is far from straightforward. For example, when considering unemployment, the bulk of evidence, not least the fact the headline rate is close to a 50-year low, suggests the US labour market is now extremely tight. At the same time, there is an argument a broader measure of labour market slack – which accounts for some proportion of those inactive, but likely to search for work – provides a better gauge than just the unemployment rate.

The Federal Reserve Bank of Richmond produces a ‘weighted non-employment’ index that measures people out of the labour force as well as those who are officially unemployed. It currently stands at 7.9 per cent, compared to a historical low of 7.6 per cent.¹ Moreover, according to the Bureau of Labor Statistics, the participation rate among prime-age males (aged 25-34) has failed to recover since the global financial crisis (GFC), and at 88.7 per cent remains over three percentage points below the level recorded in 2007.

In truth, the headline rate itself matters less than where it is relative to the non-accelerating inflation rate of unemployment (NAIRU) – also known as the ‘natural’ or ‘equilibrium’ unemployment rate. Even in a healthy economy there will always be some unemployment, since a number of workers will be in-between jobs; there will be a mis-match between workers’ skills and the needs of employers; and because of the impact of factors such as the minimum wage and trade unions. According to the theory, so long as the headline rate is above the NAIRU – in other words there is a positive ‘unemployment gap’ – wages are unlikely to pick up.

The Fed reckons NAIRU, having declined steadily during the 1980s and 1990s due to the changing structure of the US labour market, has fallen further in recent years. It currently estimates the rate to be around 4.6 per cent, whereas as recently as 2015 it was estimated to be 5.1 per cent. With the unemployment rate at 4.1 per cent, that implies an unemployment gap of -0.5 per cent. So while the labour market may be tight, it has not reached the extremes of previous cycles.

Wages under pressure

As for wages, the commonly cited measure is average hourly earnings. However, this is not necessarily the best estimate of the marginal wage (which should be the driver of inflationary pressures), as it is impacted by changes in the composition of the labour market. For example, recent work by the Federal Reserve Bank of San Francisco showed that in the current economic cycle two factors have depressed average wage growth. First, a disproportionate number of lower-skilled, lower-wage workers have returned to the workforce, while other low-skilled workers have moved from part-time to full-time employment. The second factor has been the comparatively large number of higher-skilled, higher-wage baby boomers who have retired.²

Figure 1 shows a representation of the wage Phillips curve for the US, plotting the Federal Reserve Bank of Atlanta’s measure of median wages – which attempts to allow for these compositional effects – against the unemployment gap. It examines the relationship over four distinct terms. We choose to consider these periods separately as each one has unique characteristics due to changes in the structure of the labour market, a long-running decline in inflation expectations, and changing productivity trends. One can see the inverse relationship first identified by Phillips remains intact in each of these periods, including the most recent.³

Indeed, the slope of the curve is somewhat steeper in the most recent period than in the years that preceded the GFC – often referred to as the ‘Great Moderation’.



THE FED'S PHILLIPS CURVE PUZZLE

continued

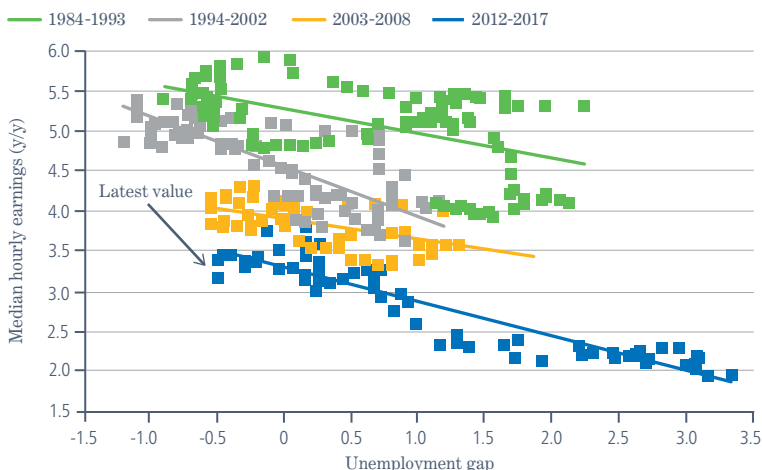
The slope of the curve is important in determining the extent to which cyclical pressures affect wages and inflation, and ultimately how monetary policy makers adjust interest rates to smooth the cycle. However, one can also see that the level of wage growth consistent with no unemployment gap has shifted down steadily over time.

Why might that be the case? The main explanation seems to be the trend rate of productivity growth has slowed, particularly since the GFC. In equilibrium, one would expect real wage growth to be in line with trend labour productivity growth. While cyclical deviations around that trend would be expected, it should provide a guide to the 'normal' rate of wage inflation.

In the 1990s and early 2000s labour productivity growth was generally between two and 2.5 per cent, whereas in the past five years it has been below one per cent. Since basic economics suggests workers' real hourly compensation should grow in line with GDP per hour worked over the long run, this decline in trend productivity implies a lower level of nominal wage growth for a given unemployment rate.

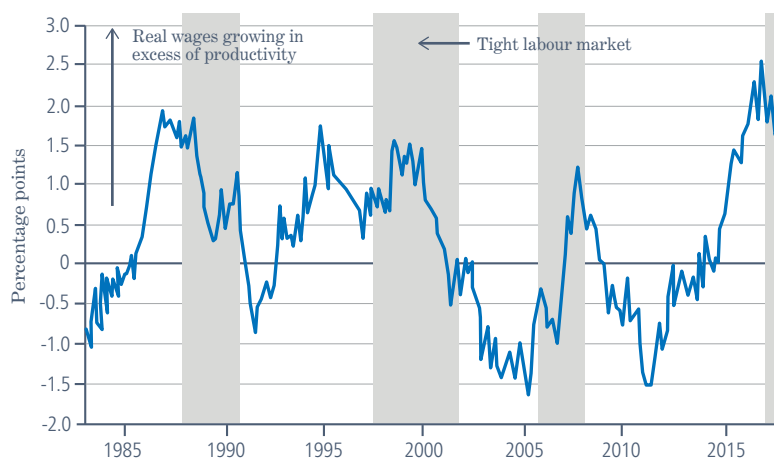


Figure 1: Wage Phillips curve



Source: Aviva Investors, Macrobond

Figure 2: Real wage growth indicator



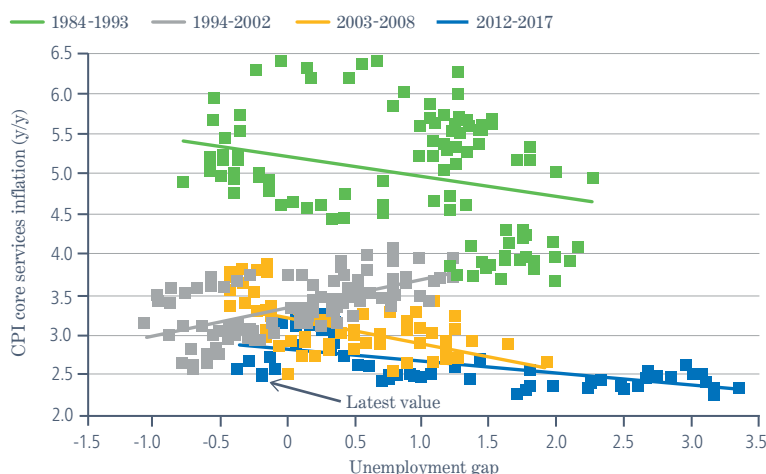
Source: Aviva Investors, Macrobond

Figure 2, which shows the difference between real wage growth and labour productivity growth, illustrates wage growth is actually not weak at all when allowing for the low level of productivity in recent years.⁴ The shaded areas highlight periods when the labour market was tight, when you would expect wage pressures to be greater. The early 1990s and 2000s saw real wage growth rise as the labour market tightened, although it came later in the cycle in the mid-2000s. In the recent period, real wages also rose above productivity growth as the labour market tightened. There has been some moderation in growth in 2017, although the excess over productivity growth remains significant.

The Phillips curve: not dead yet

So if the linkage between unemployment and wages still holds, what about that with inflation? As with the wage Phillips curve, it is important to consider which measure of inflation to use. In a completely closed economy, with no external trade, the Phillips curve relationship should hold for the broad consumer basket. However, as all modern economies engage in foreign trade, the relationship needs to be adjusted for the role of the exchange rate and the terms of trade (the price of exports relative to imports). Alternatively, one can look at domestically-generated inflation – the part not impacted by trade. One proxy, which

Figure 3: Domestic services price Phillips curve



Source: Aviva Investors, Macrobond

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we use in this analysis, is service sector inflation, since there is only a limited import component. A number of things stand out from the analysis represented in figure 3, which shows the relationship between the unemployment gap and service inflation.

First, in all but one of the periods considered, there is an inverse relationship between labour market slack and inflation. That suggests the relationship holds, albeit it has been less robust than the one between unemployment and wages. This is most likely due to a decline in inflation expectations. The 1990s and early 2000s were a period of falling inflation expectations as the US continued to pursue disinflationary policies begun in the 1980s to align inflation expectations with the objective of price stability. The structural decline in inflation expectations dominated cyclical developments, which only reasserted themselves once inflation expectations became anchored in the late 1990s.

Secondly, the slope of the price Phillips curve seems to be flatter in the most recent period. In other words, larger movements in unemployment have been necessary to produce the same response in inflation. Indeed, inflation seems to be only around half as sensitive to changes in the unemployment rate as it was in earlier periods.

There are a variety of possible explanations for this. One is that even when looking at a proxy for domestically-generated inflation, there may still be a restraining effect from the globalisation of product and labour markets. Another explanation may be that technological change and rising competition is making it more difficult for businesses to raise prices. Some have dubbed this the ‘Amazon effect’. Neither of these explanations is particularly compelling. The first should also be evident in the wage Phillips curve, while the latter should be reflected in a structural decline in margins, particularly in the retail sector. But there is little evidence of the latter, with margins higher in recent years than before the GFC.

A more likely explanation seems to be that some large elements of the inflation basket have fallen recently due to factors unrelated to the state of the economy. Most importantly, the introduction of the Affordable Care Act in March 2010 led to a steady drop in healthcare inflation. Then, in early 2017, there was a sharp drop in tariffs on data packages for mobile phones that will not be repeated.

In conclusion, it is understandable some should argue the relationship between inflation and unemployment has broken down since using the standard wage and labour slack variables suggests as much.

However, central to the debate is which measure of prices and labour market slack to use. On closer inspection, much of the apparent weakening in the relationship can be explained by mitigating factors. As such, there are strong grounds for believing the relationship first identified by William Phillips remains intact, and is merely lurking beneath the surface. If that is correct, and with the US labour market on balance almost certainly tight, the Fed would be well advised to continue raising interest rates expeditiously to ward off the threat of inflation further down the line ●

Michael Grady is a senior economist and macro strategist at Aviva Investors

- 1 Source: Federal Reserve Bank of Richmond
- 2 *What's up with wage growth?*, Federal Reserve Bank of San Francisco, March 2016
- 3 The analysis excludes the period immediately after the GFC, although the results are not greatly affected by its exclusion.
- 4 The measure of real wages used here is the Federal Reserve Bank of Atlanta's median wage adjusted for the implicit price deflator for business output.

US ECONOMY: STILL ROLLING



STEWART ROBERTSON
Senior Economist

The US economy is enjoying its third longest span of uninterrupted growth since records began. While some argue it is a matter of time until the next recession arrives, the alarm bells are not ringing just yet.

In July, the US will enter its tenth successive year of economic expansion, a record only bettered twice – in the 1960s and 1990s. Given that would be close to double the 58 months average duration of the other 11 economic expansions since World War II, it is little wonder some doubt the durability of the current cycle.¹

However, recessions happen for a reason, not because they are 'overdue'. Aside from events that are hard to anticipate, such as trade wars and more serious conflicts, downturns are usually attributed to some kind of policy 'mistake'. While theoretically the Federal Reserve (Fed) could raise rates too quickly or slowly, the former seems extremely improbable while the latter is unlikely to lead to a recession in a hurry.

Although the central bank has voiced concern about frothy asset markets, subdued inflation has kept it on a cautious path. While it remains to be seen if anything changes with a new chair in place; the expectation is that Jerome Powell represents continuity with his predecessor, Janet Yellen.

Household finances are not stretched

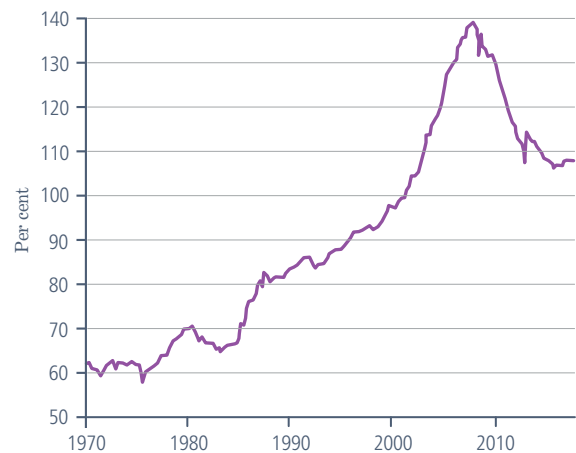
The danger of the Fed suddenly becoming aggressive seems remote. After all, it would take a significant hike in rates to tip the economy into recession. Debt-to-GDP levels do not yet look excessive, especially within the household sector, which accounts for around 70 per cent of the economy. As figure 1 shows, household debt relative to disposable income fell sharply as the financial crisis hit, and has since remained well below pre-crisis peaks.

Household finances are in even better shape when considering the cost of servicing debt thanks to low interest rates. As figure 2 shows, the cost to households of servicing debt is at its lowest level since 1980 as a percentage of disposable income.

Although we know from 2008 that when households have a balance sheet problem it presents a major problem for the economy, it is important to look at all forms of debt combined. At first glance the picture appears concerning due to a surge in debt issued both by the federal government and, more importantly, the non-financial corporate sector.

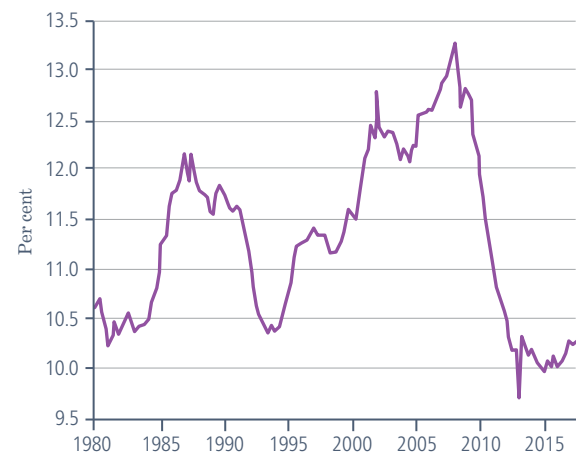
However, much of the expansion in corporate debt has been the result of companies engaging in financial engineering; in many instances locking in low rates of interest long into the future. In a recent paper, the Fed noted that if rates increased in line with its own expectations, there would be limited risks in the ability of the US corporate sector to cover interest payments on the roughly \$7

Figure 1: US household debt (% of disposable income)



Source: Aviva Investors, Macrobond

Figure 2: US household debt service ratios



Source: Aviva Investors, Macrobond

trillion of debt currently outstanding.² In other words, it seems the planned increases in interest rates would be insufficient to tip the economy into recession.

We believe rates would need to rise much more quickly over the next couple of years, maybe by 300 basis points or more, for that to happen. While forecasters with more extreme views on growth and inflation believe hikes of this magnitude may be needed, they are in the minority.

US ECONOMY: STILL ROLLING

continued

Risky business

The more likely route to recession appears to be that the Fed is too slow in applying the brakes and suddenly has to slam them on. There are signs of excessive risk-taking in several asset markets – including pockets of the corporate debt market – and these imbalances could eventually get out of control. Lenders recently expressed concern about the amount of covenant-lite debt following a surge in issuance in recent years.³ High leverage within commercial real estate is another concern given the sector's historical role in signaling turning points in the credit cycle.

As for other potential paths to recession, a global trade war remains a concern. While Donald Trump could withdraw the country from the North American Free Trade Agreement (NAFTA), such a move would be unlikely to trigger a recession, even if it would wreak significant damage across the region. It is far more worrying Trump looks to be on a collision course with Beijing as he attempts to crack down on imports from China to fulfill his protectionist promises to rust-belt voters.

Having recently slapped tariffs on solar panels and washing machines, the US administration looks set to intensify the pressure. Some reports suggest Trump could impose broad-based trade restrictions, including tariffs on an entire class of goods like electronics, potentially sparking a full-blown trade war.

Despite the bluster and bravado emanating from the White House, Trump has thus far not caused any real damage to the US economy. That could change, of course, given his penchant for unpredictability. But it is important to recognize that whatever the external shock, or indeed even if it is a monetary policy shock, there normally needs to be some sort of balance sheet problem to cause a recession.

For that reason we see little need to worry yet about the US economic outlook, and believe the expansion should persist for a while longer. It is worth remembering the impending fiscal stimulus should provide a sizeable boost to the economy.

But there are risks investors need to be wary of beyond the next year or two. Every expansion comes to an end. When this one does, interest rates will likely be lower than they have ever been at the start of a recession. That leads to obvious concerns the Fed will have limited scope to ameliorate the path of the downturn ●

1 Source: The National Bureau of Economic Research

2 *The potential increase in corporate debt interest rate payments from changes in the federal funds rate*, Federal Reserve Finance and Economics Discussion Series Notes, November 2017

3 'US mid-market lenders concerned about leverage, loan docs', *Reuters*, January 2018

HOW TO VALUE FAANGS AND BATS?

Tech stocks have risen sharply in value in recent years. Jason Bohnet explores whether these high valuations are justified.

What should prudent investors make of a company like Amazon? Logically this should be an easy question, given the firm trades on a price/earnings (p/e) ratio of almost 300. True, earnings are growing quickly: look out to 2020 and the p/e ratio falls to a slightly less stratospheric 37 times, based on analysts' consensus forecasts. But that is still three years away and plenty could go wrong in the interim.

Amazon is an extreme example, in part because investors expect it will one day cease sacrificing margins in pursuit of expansion and market share and deliver substantially higher profits. However, other popular tech stocks also trade on punchy valuations. In the US, Alphabet trades on a p/e of 33, Facebook on 37, Microsoft on 33 and Netflix on 219. Chinese peers include Alibaba and Tencent on 56, Baidu on 35 and JD.com on an eyebrow-raising 4,500 (falling to a modest 87 this year, based on consensus forecasts).

It is easy to see why many value-oriented investors view the tech sector as an irrational bubble set to burst dramatically when sentiment turns. Still, there are a couple of compelling arguments why these firms may be able to justify unusually high valuations.

Growth potential

The first is the amount of scope they may still have to grow. Historically, it would be highly implausible that companies already among the largest in the world can reasonably be expected to grow at the kind of pace implied by their current valuations, which are more consistent with valuations that might be applied to a small-cap growth stock.

However, the trend in recent years has been for a smaller number of very big companies to account for a larger share of the economy. The Fortune 100 list of America's biggest companies accounted for 46 per cent of GDP in 2013, up from 33 per cent in 1994, according to calculations by *The Economist*. And not only do larger companies dominate their domestic economy to a greater extent, but their opportunities now encompass the globe – especially for technology firms that have less need to ship physical goods or employ a large workforce on the ground in every potential market. These companies are also benefiting from a secular shift in society, as technology becomes an increasingly important part of everyday life. Hence the limits to their maximum size may be further off. ●



HOW TO VALUE FAANGS AND BATS?

continued

Take Amazon: under Jeff Bezos's capable leadership the company is using its growing clout to move into new and potentially more profitable areas. As more customers sign up to its flagship 'Prime' platform, Amazon has become more powerful relative to its suppliers, creating a 'flywheel' effect that has been levered to lower prices (boosting sales) or move into high-margin businesses like advertising and cloud services. Consequently, Amazon has seen accelerating free cash flow. Assuming this trend continues, it is possible the company's earnings-per-share will rise from under \$5 last year to about \$60-70; this would take the p/e ratio from 300 to around 20 within a five-year period. Suddenly the company doesn't look so expensive.

Similarly, Facebook has been able to rapidly expand its offering – partly by acquiring other companies such as Instagram and WhatsApp – and to monetise mobile in a way that commentators who raised eyebrows at its valuation thought would be impossible. The firm's vast user base also gives it a durable moat against competition, another factor for investors to consider.

Regulatory risk?

There is, of course, a risk governments and the public become increasingly discomfited by the power of large companies and seek to regulate them more closely. That concern certainly can't be dismissed – but it is worth remembering aggressive moves to break up or drastically restructure large companies have been unusual.

So while governments may well want large tech firms to regulate online content more carefully or demand they pay more tax, it does not mean they will want to curb their growth. Would breaking Amazon up really be best for its customers or the economy overall? It has lowered prices (on both

retail items as well as computing), and introduced new innovations that have raised the bar for its competitors. Free shipping used to be the exception, now it's the rule. Take down Amazon and these benefits would likely disappear.

You also need to consider that a few large near-monopolies are more easily regulated than lots of smaller firms. In China, for example, a few giant firms dominate the Chinese tech sector despite a high level of regulation for internet businesses.

Lessons from history

Looking deeper, reported profits may be an increasingly patchy guide to a firm's true value, as some intriguing research by Feng Gu and Baruch Lev hints. They point to the fact that tech companies are increasingly prioritising investment in areas such as software development and design – which are expensed when calculating earnings – over investments in physical assets (which are capitalised). The former may pay off handsomely over the longer term.

This is not to say these companies will not encounter challenges along the way. There may be a useful comparison to draw here with the fate of the Nifty 50, the high-priced growth stocks of the late 1960s and early 1970s. Despite high valuations at the time, Nifty 50 firms in healthcare and consumer staples – which spent heavily on R&D and were often light on tangible assets, like today's big tech firms – tended to outperform the S&P 500 over the next 30 years, although many of them also de-rated viciously during the 1973-1974 bear market.

This episode suggests investors should be wary of tech companies being punished during a major bear market. But over the long term we expect the large tech firms will merit their valuations, at least as far as the well-entrenched, highly cash-generative giants are concerned ●



JASON BOHNET
Senior Research Analyst

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