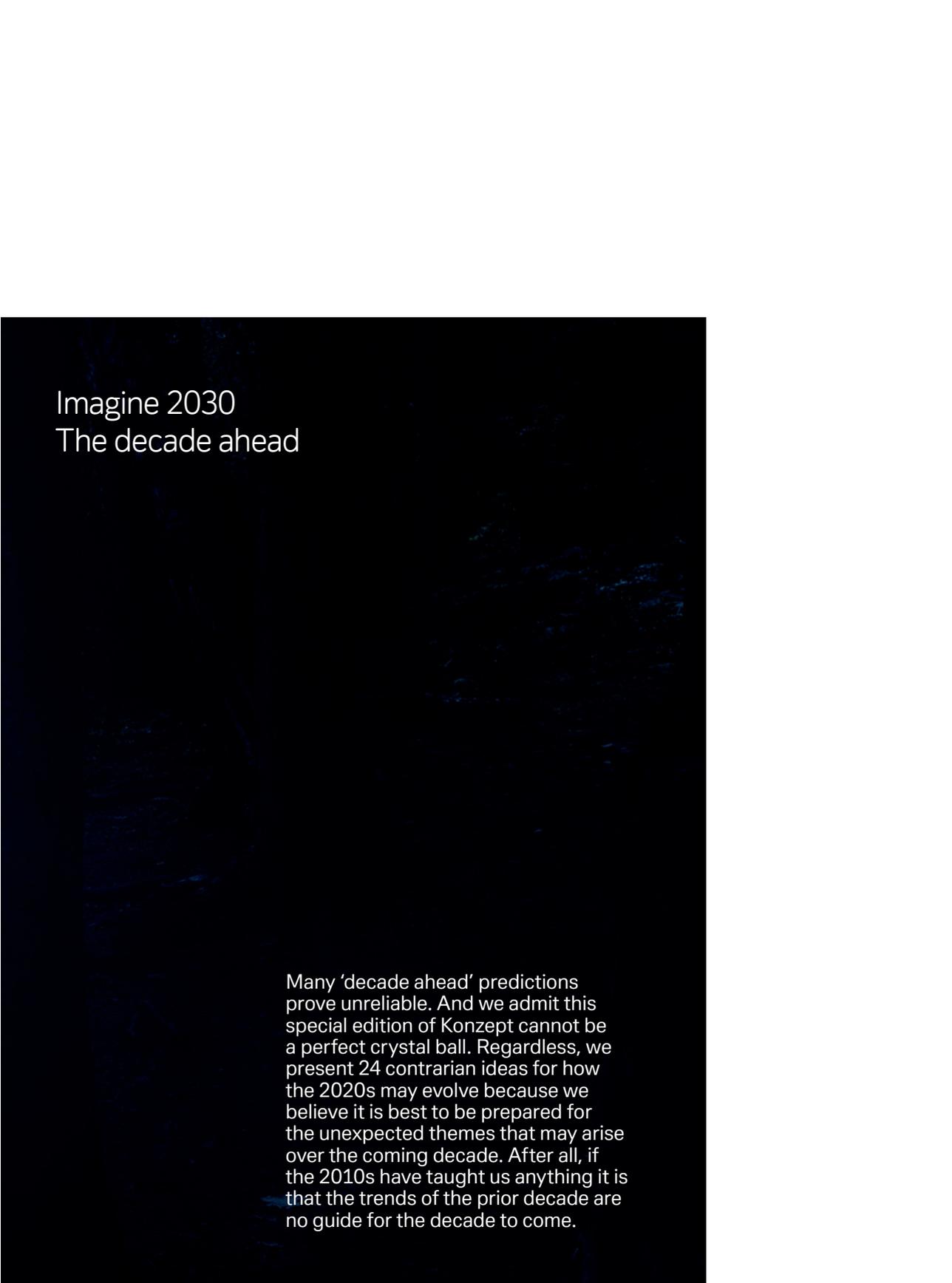




konzept

Imagine 2030





Imagine 2030 The decade ahead

Many 'decade ahead' predictions prove unreliable. And we admit this special edition of Konzept cannot be a perfect crystal ball. Regardless, we present 24 contrarian ideas for how the 2020s may evolve because we believe it is best to be prepared for the unexpected themes that may arise over the coming decade. After all, if the 2010s have taught us anything it is that the trends of the prior decade are no guide for the decade to come.

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Editorial

A staggering list of incorrect 'decade-ahead' predictions litter history. In the 1970s, some expected gold to lose all value in the era of fiat money. In the 1980s, most believed

quartz watches would completely replace the mechanical sort. In the 1990s, a host of publishers rejected the Harry Potter manuscript, while in the 2000s, internet buffs said remote working would end the office.

Herein lies the trouble with most 'decade-ahead' predictions. Either, they merely extrapolate current, well-known trends, or they are so outlandish it is impossible to see a link between now and the future.

With this challenge in mind, for this special edition of Konzept, we asked our research analysts for original ideas with plausible links to today. It took time but this Konzept contains 24 contrarian ideas for what the coming decade may hold. We fully admit that some may not eventuate but as a society, individuals, and investors, we want to be ready for the unexpected challenges of the 2020s, not the themes of the decade just gone.

To start, we take a deep breath and predict that several underappreciated forces that have held together the global fiat money system may unravel in the 2020s. We also point out the

three things Europe must do over the coming decade to avoid falling further behind its peers. Furthermore, while global debt accumulation is sustainable with low rates, populism and helicopter money may lead to a debt crisis.

Beyond economics, there seems to be no question that our response to climate change will permeate through every aspect of society over the coming decade. We postulate that although the hurdles to effective international agreement are high, there is realistic and pragmatic cause for optimism.

We then consider how a 2030-ite will live with everything on-demand, and against the backdrop of the seismic changes that quantum computing supremacy could bring. We also see the supply of food, not the demand, changing global food supply chains. Separately, while critics bemoan cryptocurrencies as constrained by regulatory hurdles, we believe the incentives of governments and card providers are such that digital currencies are inevitable. Furthermore, we also pour cold water on autonomous cars, but see an explosion in electrification.

Without question, the biggest political shock of the 2010s was the rise of populism and, particularly, the changes in the US and UK. Given many claim these shifts were obvious in retrospect, we point out several of today's ignored signs that may drive seismic political change by 2030.

Perhaps the most inevitable change of the coming decade is the ageing population. That implies precision medicine will be an inevitable winner. Yet, there are external forces that may stop it going mainstream.

The 2020s may also bid farewell to several things ingrained in our world. We predict the end of plastic credit cards, the end of high profit margins, and the end of low corporate tax rates.

What of the fate of a third of the world's population? Indeed, many expect the Chinese and Indian economies to slow in the 2020s. Yet, China's decades tend to be defined by themes such as exports or investment. The coming decade will be defined by consumption and we explain why the untapped potential of the Chinese consumer is vastly underappreciated. Meanwhile, India's recent structural reforms mean it could become one of the world's leading sources of middle-class demand.

The back pages of Konzept go off-piste. After all, sometimes it takes a relative outsider to see what the experts miss. Consider that Aldous Huxley's futuristic novel 'Brave New World' predicted almost nothing about its main theme of human and social engineering, but was accidentally prescient about the formation of a European central bank!

With that in mind, we imagine how sports coaching and statistics will change over the coming decade, how there are signs that de-urbanisation may be the key demographic trend no one expects, and why the decline in popularity of philosophy degrees may reverse. We also posit that a side effect of the gig economy could be the return of union power after decades of dwindling influence, and that the oft-predicted six-hour work day may finally arrive.

You may be reading this at the end of 2019, the beginning of 2020, or perhaps looking back from 2030 and chuckling that we missed, say, the election of President Taylor Swift. Whatever your perspective, and whether you agree or disagree with our predictions, we hope you will appreciate our ideas as a useful thought experiment for the coming decade. After all, if the 2010s taught us anything, it was that the trends of the prior decade are no guide for the decade to come. So we raise a glass and offer this publication as our toast to the decade ahead!

Jim Reid
Global Head of Fundamental Credit
Strategy and Thematic Research

Imagine 2030

The decade ahead

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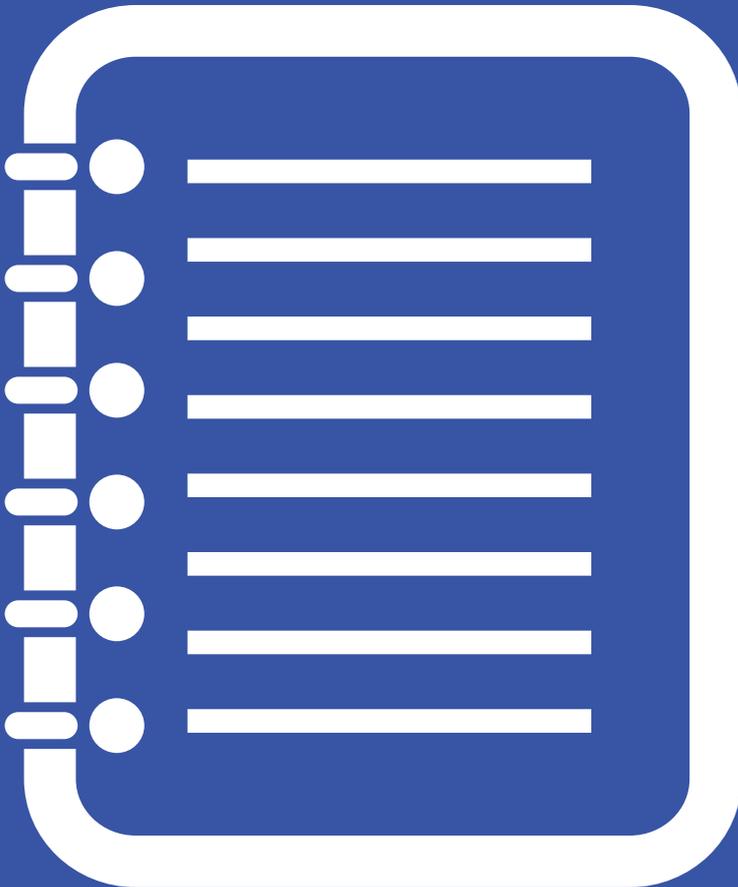
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Summaries



The front pages

The end of fiat money?

The forces that hold the fiat money system together look fragile, particularly decades of low labour costs. Over the next decade, some of these forces could begin to unravel and demand for alternative currencies, from gold to crypto, could take off.

How Europe can stop falling behind

With Europe falling behind the US and China, the continent must adopt three policies to revive its fortunes. We propose developments in monetary, fiscal, and structural policies that will help mitigate Europe's demographic deterioration and the severe technology deficit.

China's consumer decade

The Chinese economy has been driven by a key theme in each of the last two decades: exports and then public investment. The next decade is set to be the consumption decade. The latent spending potential, particularly in retiring Chinese will continue to drive growth.

The end of high profit margins

While corporate profit margins are at multi-decade highs, the returning power of labour, along with higher competition and taxation, will cut margins. As leverage could be more constrained, equity returns may depend on managers reversing some oft-ignored multi-decade trends.

The fate of food

On-demand ordering shook up food consumption in the 2010s. In the 2020s, it will change the entire food value chain. Supply will replace demand as the key driver of business models and supermarkets may force customers to order well in advance.

Rise of the drones

By 2030, millions of drones could roam the skies of the US alone. Regulatory and noise issues are real but governments will face calls to support drones once the benefits such as lower traffic flows and the delivery of medical supplies gain acceptance.

Whether precision medicine can go mainstream

While tests and treatments tailored to the individual are proven, it is not inevitable that individual genomes will drive mainstream healthcare. Cost is one concern but other roadblocks abound and further development may depend on the setup of each country's healthcare system.

The end of cash plastic cards

Many predict the end of cash but there are several reasons why notes and coins will still be around in 2030. Conversely, plastic cards could die out as smartphones and other electronic devices make physical cards obsolete.

How governments will respond to record debt

With record debt levels and demographic pressures, populism has encouraged fiscal spending given many economies risk secular stagnation. With funding so easy, helicopter-money policies are possible and debt growth seems inevitable. To avoid a debt crisis, nominal yields must stay well below nominal GDP growth.

The political tipping points we will miss

In 2010, few predicted the political decade would be dominated by a backlash against globalisation and the reassertion of the nation state. In retrospect, the signs were there. We point out today's neglected trends and posit the potential defining trend of the 2020s.

India's promise

The recent slowdown in the Indian economy has led to some low-growth forecasts. Yet, structural reforms have significantly boosted India's potential. By 2030, the Indian economy is likely to see strong expansion led by these reforms and a growing working-age population.

The risk of rising corporate taxation

Corporate tax rates have almost halved over the last three decades, yet state finances are precarious. The current push by some politicians for higher corporate taxation highlights public support. Watch out for international agreement on a globally-coordinated corporate taxation system.

The on-demand life

The age of the 'super-app' is already here, however, the effects of on-demand culture have only just begun. Technology companies will use artificial intelligence to arrange our on-demand lives. But the shift from offline to online may hurt relationships with the end customer.

Autos: the electric, not autonomous, decade

Autonomous cars dominate the headlines but electric vehicles will become more widespread. By 2030, EVs may comprise a fifth of vehicles sold. The big battle, though, is between oil majors, BigTech firms, and infrastructure groups over where cars will be charged.

Climate policy: more realistic and pragmatic

There are grounds for optimism on climate policy. Although energy use is rising, governments are encouraging renewable energy and opportunities abound in research and development. Meanwhile, the risks posed by extreme weather events are increasingly at the forefront of public policy.

The demographic dividend

The world is younger than people think – as a proportion of a person's lifespan. But ageing will accelerate rapidly in the 2020s and the effects of the 'demographic dividend' will become acutely visible, particularly in 22 specific countries.

Cryptocurrencies: the 21st century cash

Until now, cryptocurrencies have been additions, rather than substitutes, to the global inventory of money. Over the next decade, this may change. Overcoming regulatory hurdles will broaden their appeal and raise the potential to eventually replace cash.

How Europe can fix its banks

For the European economy to improve over the coming decade, Europe's banks must catch up to their US peers. We present five things European policymakers must do to ensure the banking sector can take on credit risk to support faster growth and innovation in the real economy.

The back pages

Sports statistics and artificial intelligence

The problem with most sports statistics models is that they only work best with 'discrete event' sports, such as baseball. In the 2020s, AI will shake up strategies and performance analysis in 'invasion' sports, such as football, hockey, and rugby.

True quantum supremacy: the winner takes it all

Ask any long-term policy maker or national security expert as to what technology battleground keeps them awake at night, and most will say, "A quantum computing supremacy surprise". Several countries are in the race and true supremacy will upend everything from energy markets to military tactics.

Urbanisation: not necessarily an inevitable trend

The global move towards urbanisation persists. However, rising house prices and remote working opportunities offered by 5G technology could make rural living a more attractive proposition particularly as cities seem unable to overcome the political hurdles to housebuilding and transport improvement.

The return of unions

Unions have been written-off by many as twentieth century dinosaurs. Yet, there are signs this is changing and the 2020s could see gig workers drive a trend reversal. Ironically, the very platforms they use for work could allow them to coordinate their demands.

The six-hour work day

The average household provides the economy with more labour today than it did 50 years ago. Yet, many feel worse off. Soon, returning labour power will force a six-hour workday that suits school timetables and chores. Weirdly, employers could be the winners.

The return of philosophy and language degrees

The declining popularity of these degrees could reverse in the 2020s as artificial intelligence becomes ubiquitous. AI is staggeringly poor at ethical decision meaning students with the ability to create and disseminate different ethical models could be in demand.

The end of fiat money?

Jim Reid



We have lived in an era of fiat money since the early 1970s. Since then virtually all money in existence has only had a value based on trust and, in particular, trust in governments' ability to maintain its value. Prior to this period, most of the money in existence through history was backed by a commodity – usually a precious metal like gold or silver. When money broke loose from such an arrangement inflation tended to increase (often dramatically), and when money returned to it inflation was becalmed. We think fiat money systems should be inherently unstable and prone to high inflation all other things being equal. Politically it is always too tempting to create money when nothing is backing it. That this current fiat system has survived so long has required a fortuitous set of global forces across multiple decades that have created sizeable natural offsetting disinflationary forces.

The forces that have held the current fiat system together now look fragile and they could unravel in the 2020s. If so, that will start to lead to a backlash against fiat money and demand for alternative currencies, such as gold or crypto could soar.

Inflation in the twentieth century had a strange journey. After the gold based Bretton Woods global system collapsed in the early 1970s it contributed to a huge rise in inflation across the globe during the remainder of the decade. Although the oil shocks were partly to blame, the fact that the shackles of the Bretton Woods system were removed, and countries were freer to borrow and find ways of liberalising finance and credit, surely contributed to the inflation surge. Gold saw an annualised nominal return of 32 per cent in the 1970s, way above the long-term average of two per cent seen since 1800. By the end of the 1970s, some feared the battle against inflation would be lost. Then a miracle occurred. Inflation began a 40-year structural decline that stretches to the current day and concerns about fiat currencies have been virtually non-existent.

It is orthodox to attribute much of this success to central bank management of inflation. That may be the initial tight monetary policies introduced by the Volcker Fed in the early 1980s, the move towards more central bank independence, or an inflation target that around the world was generally pegged at close to two per cent.

However there is an element of better to be lucky than good, and there are compelling arguments that global forces were far more important at controlling inflation than were policymakers.

China to the rescue of fiat money

Just as global inflation was at its rampaging late-1970s peak, sizeable demographic and geopolitical developments were at a multi-decade turning point. China's fairly sudden integration into the global economy and a very favourable once-in-a-lifetime shift in developed world and Chinese demographics were arguably the biggest suppressors of global inflation over the last four decades. At work was an extraordinary surge in the global labour supply at a time when globalisation and deregulation in the global economy were taking off. As such, for the last 40 years, pressure on wages, prices, and with them inflation, has been under constant pressure. And that occurred independent of central bank or government policy.

The following chart shows the working age population in the More Developed Regions plus China. The second bars repeat the exercise with China zeroed up to 1980 to reflect its virtually closed economy before this point and the integration and effective surge in the global labour supply thereafter.

Obviously, this is highly simplified and in a globalised world we should probably include more countries than China as various lower labour cost nations have transformed from relatively closed low income countries to more developed globalised ones. However, China dwarfs all these by its size. It is also simplistic to include all of the working age population increase from China in one decade as we do in the chart as it would have been cumulative across the period.

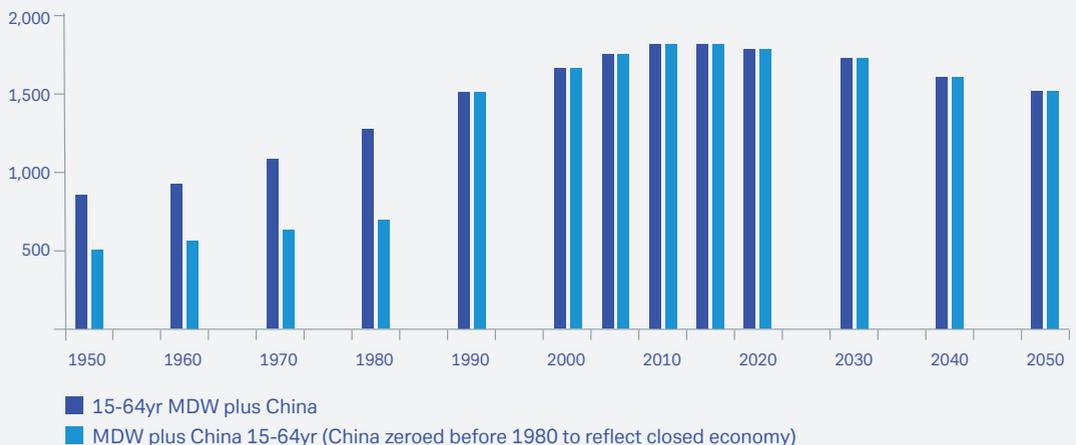
Despite the simplifications, the disinflationary journey would have been the same. At a developed world level, there is little doubt that labour's share of GDP has declined over the last few decades.

Complementing this is the data on wages. Chinese real wage growth has outpaced many other advanced countries since it opened up in the 1980s. At the same time, advanced economies saw their real wages stagnate compared with the decades before.

The turning point for workers, inflation and fiat money?

As can be seen in the chart, the peak of the 'working age population' in the More Developed World plus China occurred this past decade. As we move into a new decade, the supply of labour from the key global regions will, in aggregate, start to decline.

Labour force of More Developed World (MDW) and China (m)



While the pace of decline will be slow, the fact that it is not increasing at the rapid pace seen for most of the last four decades surely must have an impact on labour costs. Linked into this is the backlash against globalisation and the rise of populism. Over this past decade, more and more governments have been elected (or have seen their support rise) by the very workers who have seen multi-decade downward real wage pressure.

As such we could be at a turning point in governments' attitude towards labour just as demographics becomes more supportive. Policy may increasingly be shifted towards the lowest-paid workers left behind by globalisation. This likely means higher fiscal spending rather than the overwhelming emphasis on monetary policy that has been the policy of choice of the last decade. Aggressive monetary policy has arguably benefited owners of capital and assets over labour. That has meant inflation, where it has occurred, has mostly been seen in asset prices. Such a fiscal shift towards workers could start reversing this trend.

Will fiat currencies survive if labour's share of GDP reverses?

Addressing the increasing gap between capital and labour with higher wages would undoubtedly be good news. However the problem for the current global monetary system is that over the last 45-50 years it has relied on governments and central banks being able to turn on the stimulus spigots at the drop of a hat when a crisis has come. This has enabled each crisis to be dealt with via increasing leverage rather than creative destruction type policies. For this to be possible an offset has been needed to such stimulus to prevent such policies being inflationary. Fortunately (or unfortunately if you believe it is an inherently unstable equilibrium) the external global downward pressure on labour costs ensured that this occurred.

So what will happen to the global monetary system if labour costs start to reverse their 40-year trend? If central banks have their current mandates of keeping inflation around two per cent then they will be duty bound to tighten policy more often regardless of the external environment. However, such an outcome is probably unrealistic given how much debt there is at a global level. Governments will surely first change central bank mandates to allow for higher inflation or look to reduce their independence rather than allow interest rates to rise and make debt levels uncomfortable. Ultimately, if and when labour costs rise at the margin rather than fall, there will likely be a more difficult environment for policy makers. And where politicians are worried about elections, it is likely that inflation will be the casualty.

Higher trending inflation will mean bond yields become very vulnerable, especially relative to near record (multi-century) lows apparent today. Given the near record level debt burdens around the world, it is likely that central banks will be forced to buy more securities again to ensure yields stays comfortably below nominal GDP (see our article *How governments will respond to record debt*). In turn, this will likely lock in higher inflation as negative real yields will eventuate, and thus very loose financial conditions and higher wages.

Eventually, it is possible that inflation will become more and more embedded in our system and doubts will rise about the sustainability of fiat money. The demand for alternative currencies will therefore likely be significantly higher by the time 2030 rolls around. Will fiat currencies survive the policy dilemma that authorities will experience as they try to balance higher yields with record levels of debt? That's the multi-trillion dollar (or bitcoin) question for the decade ahead.

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How Europe can stop falling behind in the 2020s

David Folkerts-Landau

Over the last decade, Europe has fallen increasingly behind its major competitors and, at first glance, many ongoing trends appear negative. However, the coming decade offers the strong possibility of an inflection point in Europe's prospects, one that will be assisted if Europe's fresh leadership can enact the necessary policies. We outline here what Europe needs to do in order to regain its competitiveness over the coming ten years.

It is undeniable that Europe has seen a relative deterioration in its global standing in recent years. The sovereign debt crisis and associated recession broke off the economic recovery underway after the financial crisis. Unemployment in the Euro Area peaked above 12 per cent. All the while, Europe's competitors forged ahead. The Chinese economy has doubled in size over the last decade and living standards continue to converge with those in the advanced economies.

Europe faces a number of threats over the coming decade, but the greatest of these relates to technology, specifically the risk that Europe falls permanently behind the US and China in adopting the next generation of technological advances. Europe has no technology companies on the scale of Microsoft and Apple in the US, or Tencent and Alibaba in China – indeed, none of the ten largest technology companies globally can be found on the continent.

More worrying for Europe, the pipeline for future inventors does not look overly promising either. When it comes to educating the next generation of top students, Europe lags substantially behind the US, which dominates the field in elite higher education institutions. In turn, this is contributing to a flight of Europe's most talented people seeking to study, live, and work elsewhere. Indeed, looking at the Times Higher Education's world university rankings, the first EU institution

(excluding those in the departing UK) was in 32nd place, in stark contrast to the United States which had seven of the top ten positions.

If Europe doesn't take decisive action to counteract these statistics, there is a risk that the technological imbalance relative to the US and China becomes entrenched over a much longer time horizon. Given the continent's relatively low military spending, this deficit in technology could also develop into a security issue as well as an economic one.

There is a similar story in financial services. Once again, none of the ten largest financial groups globally are based in Europe. One factor contributing to this has been negative interest rate policy in Europe, which has hurt European banks and, by extension, lending into Europe's real economy. This is reflected in their respective share prices: the STOXX Banks index in Europe has lost nearly a third of its value over the last five years, whereas the S&P 500 Banks industry group has gained more than 50 per cent over the same period.

All this is taking place against the backdrop of a demographic deterioration that is seeing Europe travel down the Japanese path. In Germany, 22 per cent of the population is aged over 65. By the end of the next decade it will be over a quarter. It is true that the US is also ageing, but it has the lowest proportion of elderly citizens in the G7, some way from the position of Germany, France and Italy.

The situation Europe finds itself in today is a long way from the narrative of a decade ago when the financial crisis hit. At the time, a number of Europeans saw the crisis as a failure of a distinct Anglo-Saxon model of capitalism. The German finance minister, Peer Steinbrück, said at the time the US would "lose its status as the superpower of the world financial system".

Such predictions proved wide of the mark and, in fact, the size of the European economy fell behind that of the US in the 2010s.

The worry is not that the European economy will begin to emulate that of Japan. Rather, it is that even a Japan-style scenario is out of reach. After all, Japan has remained wealthy and cohesive in spite of its economic challenges. To respond, the EU's new leadership should adopt a 'Three Arrows' approach, based on fiscal and monetary policy, along with structural reforms.

The first fiscal arrow would see the establishment of a large EU fund for investment and convergence. This would be used to finance high-quality technology infrastructure, either as part of the European Investment Bank or as a sister entity. Sadly, EU infrastructure spending has fallen to just 1.7 per cent of GDP annually, a quarter below its pre-crisis level. So, to be a genuine game-changer, new investment will need to be around Ursula von der Leyen's implied target of about one per cent of GDP per year or €1tn over a decade. One application of the fund could be for climate-related investments, helping to achieve Von der Leyen's ambition of a climate-neutral continent by 2050. Furthermore, the largest declines came from those countries with the lowest quality infrastructure. So the rationale for such a convergence fund is clear.

The second arrow is structural reform. This must include a re-examination of EU competition policy to allow for greater economies of scale, as well as the completion of the Banking and Capital Markets Unions. Consolidation is particularly necessary in the European banking industry. Consider that the five largest US banks share between them half the assets of all US banks. In contrast, the five largest European banks share less than a quarter of banking assets. Such consolidation will aid cross-border financing – a key benefit of the single

market. Consolidation is also required to enable European technology firms to scale up and gain the global reach necessary to compete with their US peers. Indeed, the market capitalisation of the two largest US technology groups, Apple and Microsoft, is bigger than that of the entire DAX 30 in Germany.

The third arrow in the package is a fundamental reconsideration of monetary policy. The ECB has pursued a variety of unconventional policies in recent years to revive the Euro Area economy. However, the effects of these have often been counterproductive. Negative interest rates have failed to stimulate aggregate demand, instead having a destructive impact on the financial industry and on societal cohesion by exacerbating inequalities in the distribution of income and wealth.

Progress here can be made with a symmetric inflation target which will help mitigate the deflationary effects of many structural reforms. Indeed, the ECB has hinted it may move in this direction although nothing concrete has been announced.

For Europe to avoid falling further behind over the next decade, this plan, or one like it, must be enacted. It is true that any sweeping plan will have to clear a number of political hurdles. In fact, a Grand Bargain will be needed to gain agreement for productivity-enhancing structural reforms in countries with sluggish economies. In return, core countries could commit more funds. Navigating these waters will be difficult, however, Europe's new leaders are well placed to oversee the process, particularly ECB President Lagarde and Commission President-elect von der Leyen. Their roles are critical for Europe in the 2020s. The continent's fortunes are uncertain and bold decisions are needed to ensure it does not fall further behind by the time we hit 2030.



China's consumer decade

Yi Xiong



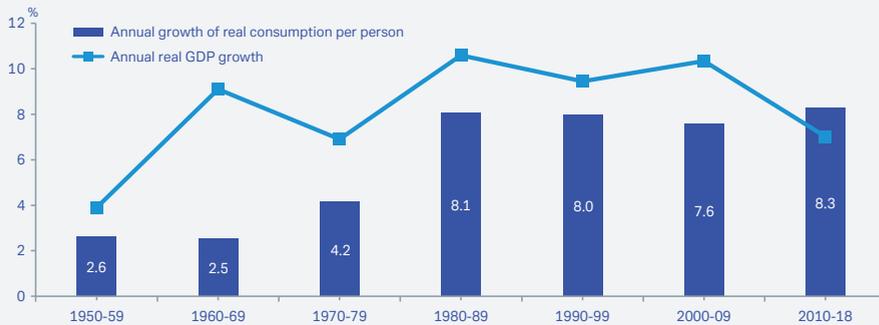
The Chinese economy has been driven by a key theme in each of the last few decades. Exports was the theme for the 2000s. China started that decade as a WTO outsider and grew to become the world's biggest exporter by the end of it. Public investment was the theme for the 2010s. In 2010, high speed trains were close to non-existent in China. Today, China owns two-thirds of the world's high speed railways by length.

What will be the theme for the next decade? Exports lost momentum after the global financial crisis, and its share in China's GDP has declined continuously since then. Investment growth slumped in 2018, when the government's priority turned to constraining excess borrowing by local governments over a decade of public investment boom. Among China's three main growth drivers – exports, investment and consumption – it seems that consumption is the only candidate left. There are some, though, who question whether high consumption growth can last.

Consumption boom: no end in sight yet
Consumption growth in China has been surprisingly stable. Despite the ups and downs in economic cycles and the structural slowdown since 2010, China's consumption spending per person has grown eight per cent per year, in real terms, in each of the past four decades. As a result, China's share of world consumption spending increased from two per cent in 1980 to 12 per cent in 2018 in dollar terms, or 14 per cent if adjusted for purchasing power differences. That puts China on track to become one of the world's biggest consumer markets before the end of the coming decade. Indeed, it could reach or even surpass the size of the US and EU markets.

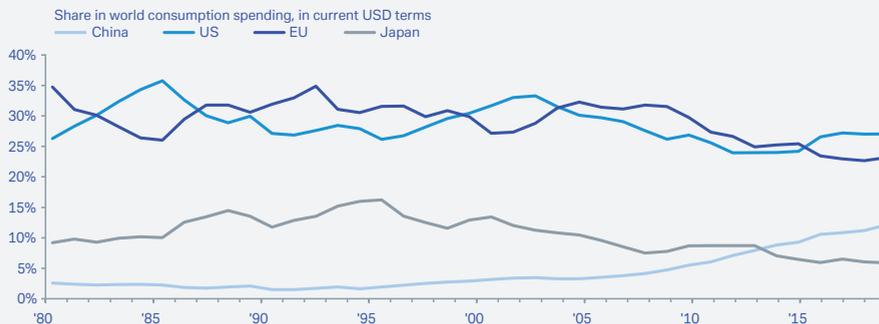
It is inevitable that consumption spending will have to slow at some point. Previous fast-developing East Asian economies all experienced sharp consumption slowdowns at various stages. Japan's consumption growth halved in the mid-1970s; Korea's consumption growth fell sharply in the late-1990s. A quick glance at Chinese

Consumption growth has been stable for 4 decades



Source: Deutsche Bank, UN, China NBS, WIND.

China's rising share in world consumer spending



Source: Deutsche Bank, World Bank, Haver Analytics.

data makes some believe that China is now approaching that same point. Indeed, China's real per capita GDP (\$7,700 in 2011 US dollars) is already about the same as was Korea's in the late-1980s and Japan's in the mid-1970s.

However, this oversimplified analysis ignores two important factors. The first is the vast income and spending gaps across different regions. In the majority of Chinese cities, average annual income is between \$4,000 and \$5,000 today. That lags top-tier cities such as Shenzhen and Shanghai by about a decade. Outside the top-tier cities, income and living standards are improving rapidly from relatively low levels. Alongside this is the need for consumption upgrading.

The second factor is that Chinese households still save too much. They saved more than a third of their income in 2017, compared with just four per cent for the average OECD country (including Korea at seven per cent and Japan

at three per cent). As a result, only 40 per cent of China's gross output is used for household consumption, compared with 50 per cent in Korea and 55 per cent in Japan. This leaves great potential for Chinese households to consume more by reducing their savings for housing and retirement. Indeed, as a larger portion of the population retires, they will start to draw down on their savings. Furthermore, China's younger generation are already exhibiting a preference for consuming more and saving less – a stark difference to their parents.

Slow consumption is still faster than most
Sharp consumption slowdowns are often caused by large economic shocks. Japan suffered from the first oil shock in the mid-1970s; Korea was hit by the Asian Financial Crisis in the 1990s. A consumption slowdown becomes much more likely if China runs into an economic or financial crisis. Fortunately, there are no signs of a hard landing today.

Further insurance comes from the fact that even if China's consumption growth starts to slow, it will likely still grow faster than consumption elsewhere around the world. Therefore, China will continue to grow its share of the global consumer market. Again, we can compare with Japan. Its consumption growth started to slow in the 1970s but its global share peaked in the 1990s.

Changing consumption patterns

Regardless of how fast household consumption grows, the pattern of Chinese household spending will likely change substantially by 2030. There are three main themes that will drive this change.

1. The silent majority

A "silent majority" of Chinese consumers live in lower-tier cities and rural areas. They comprise over 60 per cent of China's population but have been largely invisible to the consumer goods market. Walking into a community store in a small town, one will likely find the shelves stacked with low quality, locally branded products, most of which are unheard of by big city consumers.

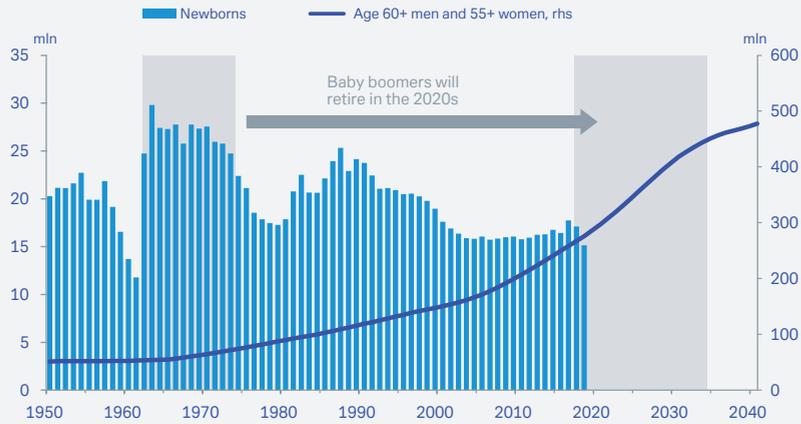
This is changing. Harnessing the rapid advancement of social networks and mobile payment systems in recent years, online retailers will further tap into this enormous market. Retailers and consumer goods companies alike are devoting significant resources to studying the preferences of these consumers. What they want is often vastly different from what is being provided in top tier cities. For example, while Pinduoduo was only founded in 2015, by 2018, it had become China's third-largest ecommerce platform. Specifically, it decided to target consumers in lower-tier cities and rural areas. One thing is clear: whoever is best able to tailor products to this silent majority will succeed in the next decade.

2. The rising "silver economy"

The second theme for the coming decade is China's baby boomer generation. During China's post-war baby boom, 320m babies were born. They received better education than previous generations, started working after China's opening up in 1978, and stayed on the job during much of China's rapid growth over the past four decades. In other words, they rode the tide of China's growth and benefited from it. A 2010 survey suggested that they are wealthier than both the previous and later generations and most will retire during the next decade. Given China's early retirement age (60 for men and 55 for women), most of this generation will live at least another 20 years after retirement. They will redefine China's "silver economy", the consumer market for the elderly.

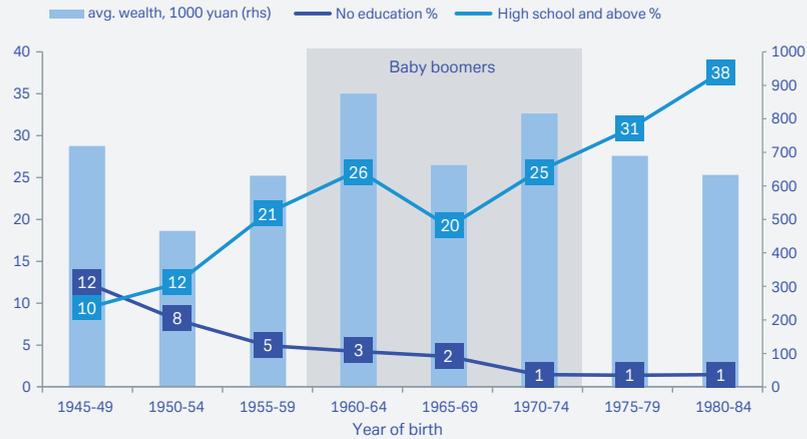
Upon retirement, they will be rich, healthy, and full of time for leisure. They don't need to save a lot for their children or spend a lot of time taking care of grandchildren – thanks to the one-child policy. In fact, they are unlikely to even live with their children. They will be the first generation in China to have both the time and money to enjoy life after retirement. The market for their leisure – travel, hobbies, wellness and entertainment – has significant potential. As the baby boomers grow older, their spending on medical bills and elderly care services will begin to rise. So while China's services sector is still focused on serving children and the young working population, by the end of the next decade, retirees may become their biggest group of customers.

China's baby boomers will retire in the 2020s...



Source: Deutsche Bank, UN, China NBS

...this wealthier generation will drive consumption trends



Source: Deutsche Bank, China NBS, CHFS (2010)

3. A greener consumer market

The Chinese government has made environmental protection a top priority for the coming decade. This year, top-tier cities in China are adopting mandatory trash sorting, which is expected to expand to lower tier cities later. Despite the hassle, this practice seems to have received broad support from Chinese urban residents. Once trash sorting becomes more widespread, producers will likely have to develop greener, recyclable products for Chinese consumers.

Travel and transportation – the most carbon-intensive activities for consumers – will become greener over the coming decade. While the number of cars on China’s roads will likely increase (passenger car ownership has just reached the level of Japan’s in the mid-1970s), emissions per vehicle will likely drop, thanks to

new emission standards passed in 2019 and the broader use of new energy vehicles. The government’s goal is to raise NEVs’ share in car sales to 40 per cent by 2030. The increase in carbon-efficient rail travel will also help. This now accounts for a fifth of passenger travel.

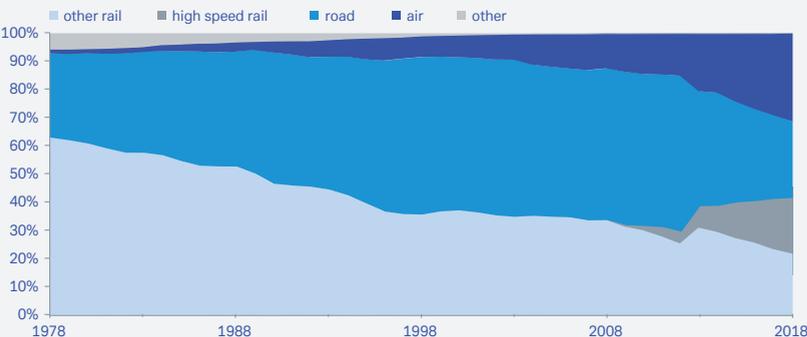
Last but not least, China’s consumption patterns will likely turn less carbon-intensive over the coming decade. Chinese households are diverting more spending towards the services sector, which tends to have lower a carbon footprint than that of goods. Indeed, health and education have become the fastest growing categories of household spending in recent years. As spending on services continues to rise, this will naturally make consumption less carbon intensive. That is good news, not only for the average Chinese person but also for the Chinese economy as a whole.

China plans to increase NEV share to 40% by 2030



Source: Deutsche Bank, China MIIT, WIND

High-speed rail is expanding as a greener way of travelling



Source: Deutsche Bank, China Ministry of Transport, WIND

The government's goal is to raise NEVs' share in car sales to 40 per cent by 2030.

The end of high profit margins

Luke Templeman



If the “Fight for Fifteen” movement is proof of anything, it is that labour is beginning to regain some of its lost power. ➤

Just a decade ago, few low-paid workers dared argue with their employer over pay. Coming out of the financial crisis, most counted themselves lucky just to have a job. Now, those same workers are happy to publicly lobby to boost their minimum wage to \$15 per hour. And companies are responding. Amazon and Disney are just two of the many large companies that have granted their low-paid staff an increase.

Higher wages will, of course, hurt corporate profit margins. But these are currently at sky-high levels and the conditions are right for them to fall. In the US, corporate profit margins currently sit at 11 per cent; in Europe they are at 9 per cent. Both are at multi-decade highs and up from 6 per cent two decades ago.

The 2020s will likely see wage growth continue, particularly for lower-income groups. A key reason is that the billion cheap workers introduced into the world economy by China, India, and the Soviet Union over the last four decades have now been absorbed. As a result, companies are finding it difficult to source new politically stable, low-wage countries where they can outsource work. Hence one reason why factory wages in China have risen. Companies will have to become used to paying higher wages to staff in their home country.

A second reason why the 2020s will see corporate profit margins come under pressure is the threat of higher taxes. Political populism is fuelling that threat. In the US, leading Democratic candidates for the 2020 presidential election have similarly promised to make companies pay a greater share. In the UK, the government has rolled back planned corporate tax cuts, and support for higher corporate taxes has propped up opposition parties. Meanwhile, the incoming President of the European Commission, Ursula von der Leyen, is targeting firms that “play our tax system.”

A third reason for falling profit margins in the 2020s is the threat of greater corporate competition. Politicians in the US and Europe have begun to take action here. It is no secret that over the last few decades, competition has been dwindling. The firm entry rate (new businesses formed each year as a proportion of the existing number of total businesses) has been declining for over 30 years and has halved from nearly 15 per cent in the late 1970s to eight per cent more recently. Meanwhile, the proportion of manufacturing sectors where the top-four firms control over half the market has steadily climbed.

Companies, of course, will be worried about these three pressures on profit margins but so too will investors. Some commentators believe that unless productivity suddenly jumps and bails everyone out, falling profit margins will mean that sharemarkets cannot hope to produce the same returns in the 2020s as they did in the 2010s. They also point out that the increase in corporate debt seen over the last decade – which has turbo-charged corporate returns – seems hard to replicate given rock-bottom corporate bond yields. Indeed, US companies now have assets equivalent to 2.7 times their equity, a multi-decade high.

So with corporate margins primed to fall and leverage unlikely to rise further, it is no wonder so many investors fear that stockmarkets are too highly valued. They note the S&P 500 trades at 29 times its ten-year average earnings, close to its third highest level in the last century.

Yet even if margins fall and leverage plateaus, there is one thing that can save corporates in the 2020s and boost stockmarkets – asset turnover, or the amount of sales a company makes per dollar of asset. This metric has been the neglected cousin of margins and leverage over the last few decades. Indeed, the median asset turnover of S&P 500 companies (excluding financials) has steadily declined by almost one-third to 0.6 over the last two decades. European companies have seen an almost identical drop in their asset turnover which is now below 0.7.

The metric has been forgotten for three reasons. First, it has been easy to boost margins and leverage, so managers could afford to neglect asset turnover. Second, the vogue business model has been to prioritise customer and revenue growth at the expense of ensuring the company's assets were fully utilised. The hope has been that the company can turn on the profit 'tap' once it reaches scale, the definition of which is usually absent. Third, the asset turnover metric (sales over assets) is difficult to fudge and thus can be inconvenient for managers.

The good news for both companies and investors is that the market has been slow to recognise the potential of firms to boost their asset turnover. In both the US and European stockmarkets, the price performance of stocks with either rising or falling asset turnover ratios has been roughly the same since the financial crisis.

The other good (and somewhat ironic) news for corporate managers is that while they have historically boosted returns through margins and leverage, these sources of return are, in many ways, less under their control than is asset turnover. That should give corporates and investors hope for the 2020s. Indeed, the coming decade may see the vogue business model become one that revolves around boosting returns through the more efficient use of assets. Corporate deal makers and private equity managers will also be licking their lips. At few other times in history has the opportunity to streamline companies with bloated asset bases been so great.

The fate of food

Nizla Naizer

Human beings are creatures of habit. And nowhere is this more clearly visible than in our daily eating habits, particularly the last meal of the day, dinner. Just as our earliest ancestors hunted and foraged barefoot in their environment, today we don sneakers and forage in the aisles of our local grocery store. We have also evolved to the point that we allow others to forage on our behalf. Restaurants and takeaway are some of the most popular ways to indulge.

Developments in the way we consume food over the decade just gone, such as on-demand ordering and meal kits, are fuelling a new approach to the value chain of the food business. Over the coming decade, the supply-driven model we have always taken for granted may change. That will transform the way we order, shop, and eat.

To understand how, it is worth remembering that, to a large extent, the food value chain is still supply based. Farmers grow and harvest their crops, wholesalers sell it to the middlemen who supply the retailers and then customers, either retail or restaurants. In each case, the produce is purchased in the hope it will be eaten or ordered over the coming week.

As this system depends on the supply of produce, simply knowing the amount of stock that any retailer or grocer usually keeps, in the hope that an item will be purchased by a customer, gives you a sense of the waste that can emerge along the value chain before that appetising carrot ends up in front of you. Furthermore, between technology and climate change, the areas of arable land available for agriculture, and the yields on that land, are

changing. That will leave some countries facing considerable constraints in their local food supply chain in the future.

Not an easy market to disrupt

It is true that e-commerce has become increasingly prevalent in every aspect of shopping. For example, in the fashion and electronics markets, online penetration can be as high as 20 per cent. Yet, online grocery penetration is only six per cent in the US and two per cent in Europe. But pockets of success indicate where the progress over the next decade will be made.

One such pocket of success is the concept of a meal kit. Ten years ago, this industry did not exist. Today, the meal kit market is worth \$3.5bn in an online grocery market worth \$250bn. In five years it is expected to nearly triple. Take HelloFresh for example. The Berlin-based company has 2.5m active customers in 13 markets and owns nearly half the market. On the face of it, the concept is simple. Ask customers what they wish to eat next week by giving them a choice of about 20 recipes. Pack the ingredients, send it to their doorstep, and the customer can cook with no wastage.

Behind the scenes, though, some meal kit firms are realising the power of their data. Over the coming decade they will use it and attempt to do to food what Toyota did to cars – the just-in-time revolution which could move the entire food value chain towards a more demand-driven model.

Just-in-time for food

The goal is using data and technology to create a value chain that eliminates food waste. When a

meal kit company collects tonnes of data on the order habits of its customers, it can fine tune its demand forecast models. Artificial intelligence will optimise these models even further. The firm then knows weeks in advance which 20 recipes it intends to offer for a certain market in a certain week. It knows the quantities it needs to fulfil the likely orders. With enough data, suppliers can be informed months in advance of the required quantities for various product needs in specific weeks. As an illustrative example, in week 10 of year 2020, they will need 12,000 cauliflower and 10,000 carrots while in week 11, they will need 15,000 potatoes and 11,000 tomatoes.

Because the consumer picks their meals for the upcoming week three days before the delivery date (a requirement of being a customer) the firm can then refine their order with its suppliers. For example, it may only need 11,550 cauliflowers instead of the 12,000 originally forecast for week 10. The exact amount then arrives at the warehouse and is sent to the customer within three days of the produce being harvested. That compares with the ten days it takes in a traditional retail value chain.

Of course, the farmer may have harvested 12,000 cauliflowers with the expectation of supplying the entire amount. But the wholesalers could then sell the smaller residual produce to other retailers. Even if there is some waste, it will be much lower than under existing supply-based models. Indeed, HelloFresh says its model cuts food wastage by up to four-fifths compared with a traditional retailer. Meanwhile, a meal kit customer generates a third less food waste compared with doing a traditional grocery shop.

Move to a demand-driven model?

While meal kits will likely grow exponentially over the coming decade, the key question is what proportion of the population will be happy to commit to their future dinners, even if they have a wider range of choice. It is this point that makes the value chain so efficient and minimises waste.

This involves behaviour change. It may be incentivised through price or the growing awareness of the impact of food production on the environment. Or there could be a network effect. As a meal kit customer myself, I'm forced to plan for the week ahead – make a call on when I will be at home and what I will feel like eating. And this is all reinforced through frequent use. The more you use a product that enforces a pattern of behaviour, the more second nature that behaviour becomes.

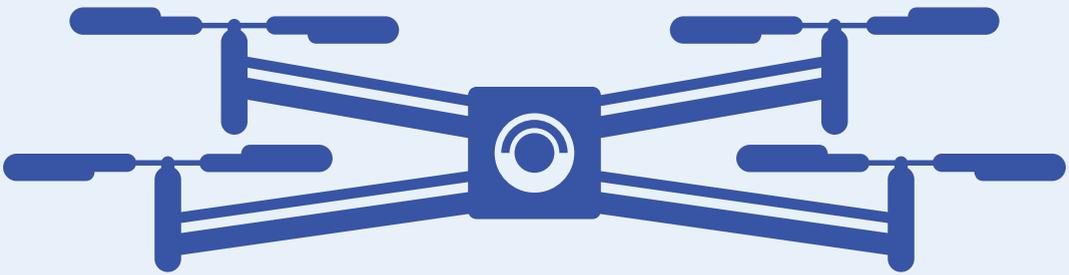
The outsourcing of 'food foraging' may not work for all meals, but dinner tends to be habitual and consumes most of our cooking time and resources. While people may always eat out (two nights a week on average today) demand-driven cook-at-home options are becoming increasingly appealing.

Which brings us back to 2030. The supermarkets of the day may be stores with electronic interfaces. You will place your order for next week and then collect what you ordered last week (if you didn't opt in for home delivery). The immense data lake supporting this business will then be used to give the first order to farmers around the world. It may sound like a big development but ten years ago, few believed meal kits had a future. Not too many years from now, the visual of a store with piles of fresh produce sitting on its shelves in the hope of being bought may also be a distant memory.



Rise of the drones

Lloyd Walmsley, Kunal Madhukar



Picture the year 2030. A worker on an off-shore oil rig near Alaska has just fallen ill. He urgently needs a specialised treatment but the terrible weather rules out an evacuation. Instead, a mainland hospital sends out a drone carrying the drug. It has been optimised for stability in bad weather and if the GPS drops out, the fail-safe systems will keep it on track. Its take-off trajectory avoided residential areas and it automatically swerved to avoid two other drones returning after similar drug deliveries. All three drones were supervised by the one operator who also monitors a host of other unmanned aerial vehicles. That means the cost of an average delivery is under \$2, and that is for the premium service.

This 2030 scenario is not wishful thinking. Rather, it is what the current developments in drone technology are pointing towards. Indeed, by 2030, the Federal Aviation Administration aims to integrate all small UAVs into its system. This is a big job. By 2022 alone, there will be 700,000 commercial UAVs in the US alone, more than triple the number that existed last year. If that growth rate continues, by 2030 there will be 6.5m UAVs buzzing around American skies, and many more across the globe. Critical to drones' future are developments at NASA. The space agency is currently in the late stages of developing a traffic management system for small UAVs at low altitude.

Leading the UAV charge are some of the usual suspects as well as some less-familiar names. Amazon Prime Air, Google Wing, Uber Elevate, and UPS are all household names. Google Wing has tested extensively in Australia and was recently granted approval to launch a delivery service there. In the US, it can now deliver goods in rural Virginia. The relative newcomers include Flytrex, which is already using drones for last mile package delivery. Meanwhile, Zipline has launched a medicine delivery programme in Africa where it uses UAVs to deliver vaccines, blood, and other supplies to 2,000 health facilities in Ghana and Rwanda.

Some of the benefits of UAVs are obvious, particularly for remote medical drops. But other benefits are the result of secondary effects. The first is productivity. While some people worry about human laziness with ubiquitous drone delivery, there is no denying the potential boost to productivity, particularly for businesses outside major centres. Second is the potential for bridge and traffic monitoring and mosquito spraying, applications which US regulators have been asked to prioritise.

A third benefit is lower carbon emissions and traffic congestion as drones replace delivery trucks and motorbikes. Indeed, 'dark' restaurants can be positioned where they have space for multiple drone pads (see our piece *The on-demand life*). This will not be very expensive. Already, Flytrex can handle 15 deliveries per hour with one operator leveraging three drones at a time, each carrying 6.5 pounds of cargo. At scale, an average delivery cost of under \$2 is achievable. And just imagine what a larger firm, such as Amazon, could achieve from there.

These coming applications aside, the biggest application of drones in the 2020s will be in ecommerce. Global sales via this channel are expected to almost double over the next four years to \$6.5tn. Consider that 58 per cent of American households have an Amazon Prime account. After Amazon recently moved to free one-day delivery for Prime customers, and dropped fees for its Amazon Fresh grocery delivery business, the demand for cheap, fast, last mile delivery is set to balloon over the coming decade.

Of course, historic predictions of the drone market have been premature – Amazon first showed off a drone delivery system to the media in 2013. And several issues need resolving before commercial UAVs can become widespread. Most of these are safety related and include, fail-safe systems when a drone loses its GPS or is beyond the operator's visual line of sight, and how they fly over residential areas and people specifically. A further significant challenge is dealing with the threat of drones being used by terrorists. The recent drone attack on Saudi oil production facilities only served to further highlight this risk.

Next year will see a tipping point in resolving these issues. NASA has issued a "Grand Challenge" to progress tricky UAV issues. These include how multiple UAVs will deal with scheduled time of arrival slots, weather, airspace constraints, vertiport information, and other operational needs for 4D trajectory planning. Just as important is developing fail-safe in-air aircraft data exchange protocols, as well as those for emergency landings. Meanwhile, artificial intelligence is being touted as the best way to develop multi-aircraft route management systems to manage noise in residential neighbourhoods.

Whether through NASA's challenge or private development, the problems that currently hold back UAV usage seem eminently solvable from a technology standpoint. The bigger catalyst, though, could be the increasing acceptance by regulators of the benefits of UAVs to society. And given the good political optics that UAV-related programmes, such as traffic management, offer, political support will only broaden. As we enter 2020, these factors appear to be tipping points to encourage the technology needed to mitigate the safety and other issues for drone delivery. Approaching 2030, perhaps the century-old promise of flying cars will finally take off.

Whether precision medicine can go mainstream

Luke Templeman

Anyone who has paid \$79 over the internet for a DNA kit knows how quick and easy genetic analysis can be. The service can unearth a person's ethnic background, their susceptibility to hair loss, and even which flavour of ice cream they may prefer. For more serious medical uses, there are services that can sequence a human genome for little more than \$1,000. Given the cost was over \$50,000 a decade ago, and \$100m the decade before that, it is no wonder that precision, or personalised, medicine based on genetics has been touted by some as the defining medical technology of the 2020s.

The promise of genetic-based precision medicine is that it allows for a unique diagnostic and treatment plan for every person. To some degree this already happens. For example, most cancer patients will have a tumour biopsy and have their cancer profiled in order to determine the best treatment. That makes it a compelling prospect to expand precision medicine into frontline healthcare. Drugmakers obviously want to capitalise. Personalised medicines now account for one of every four new drugs approved by the US regulators.

Amidst the hype, though, there are several issues that mean the 2020s may not see the mass adoption of precision medicine that many predict. So, whether the promised benefits of widespread precision medicine in public health come to fruition over the next decade depends on the way patients, doctors, drug companies, and governments respond to these issues.

The first issue is economics. While the cost of sequencing a human genome is plummeting

towards the point of general affordability, so far, the benefits are questionable. On one hand, there are examples such as Gleevec, a precision cancer treatment that is one of the biggest success stories of genomic medicine. The treatment saves 2,000 lives a year in the US. Yet, Professor Sandro Galea, a prominent epidemiologist, has argued that its cost – about \$1m per life saved – must be considered against how that money can be deployed to save more lives elsewhere. He argues that 2,000 lives a year are also saved by educating parents on 'Sudden Infant Death Syndrome' and why they should make their babies sleep on their back. Furthermore, consider the 300,000 American women whose lives are saved each year from the relatively simple vaccine for HPV, which causes cervical cancer. Or the 820,000 cardio-related deaths each year that are now avoided (compared with 40 years ago) as a result of anti-smoking campaigns. In these ways, precision medicine may be hard to reconcile with public health over the coming decade, particularly in countries with publicly-funded healthcare systems.

Beyond economics, concerns about privacy and what exactly can be patented could interfere with the growth of precision medicine over the coming decade. People considering the necessary genetic tests will have legitimate concerns about whether health insurers will deny them coverage if the results show they are in a high-risk group. Privacy concerns also extend to those patients in countries with socialised healthcare systems. These patients will wonder whether their results will see them stigmatised

in the healthcare system. For example, will an elderly person receive equitable treatment today for, say, a heart condition, if the doctor knows they are likely to develop Alzheimer's disease in the near future?

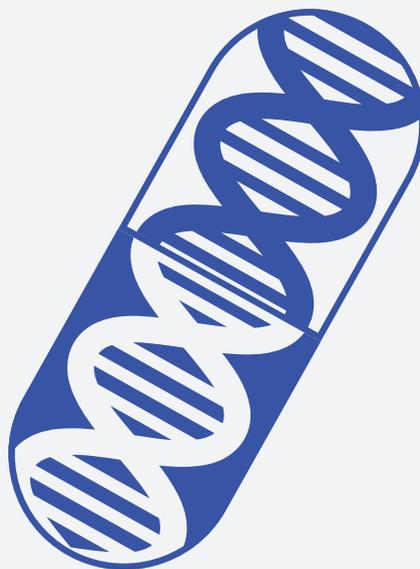
Beyond the health system, there are concerns about how genetic information might affect future employment prospects. Of course, many non-discrimination laws cover genetic attributes, but the evidence shows these do not protect minorities as they should, even though the development of data privacy regulations currently has significant legal, political, and social push. Meanwhile, many dissenters are adamant it will increase personal injury litigation.

While many politicians are actively promoting the benefits of precision medicine as a way of highlighting their forward-thinking and technological credentials, there is a small but growing political opposition to public funding that could stymie research in the 2020s.

The concern is that precision medicine may inadvertently exacerbate disparities in healthcare. For example, there are worries that in the attempt to explain race-based health disparities, highlighting genetics may obscure the importance of social, cultural, and economic factors that cause these disparities¹. If so, public health may see more benefit from the funding of non-drug social interventions. If these problems remain unaddressed, and precision medicine receives public funding instead, the patients who benefit may be those who are already well-served by the health system.

Boosters of precision medicine point out that genetic testing and early diagnosis and treatment will help patients in high-risk groups change their behaviour. The more genetic testing occurs, the more people can be encouraged to change their lifestyle, while governments can better target funding for related programmes. This argument has merit, particularly from the point of view of government-funded programmes.

At the same time, the evidence shows that knowledge does not tend to change behaviour. Even when patients have a severe event, such as a heart attack, their lifestyle changes tend to be short term. Furthermore, questions will no doubt be asked about the mental health impact of genetic knowledge. Consider the 15-year old who discovers they are likely to develop



Alzheimer's disease. Will this knowledge hang over their entire life like the Sword of Damocles?

While the 2020s is unlikely to see the explosion of precision medicine, it will still be increasingly used by doctors. There is no question that precision medicine is exceptionally useful for patients with certain rare or hard-to-treat diseases. It also scales well. When one patient discovers they are susceptible to a disease or condition, entire families can be informed and monitored.

Costs should also fall in the coming decade. Indeed, there are several ongoing studies into the topic, such as the UK's "100,000 Genome Project", and initial results indicate that affordability grows quickly when genetic testing is conducted at scale. Meanwhile, precision medicine is only just starting to scratch the surface of what it can do in the area of mental health.

During the 2020s, some of the hype around precision medicine will turn into realism even as precision treatments become more cost effective. Patients, doctors, and governments will begin to understand what it can and cannot do, and what people are comfortable with it doing. For that reason, it is wrong to compare precision medicine with population-based medicine and other social interventions. In the 2020s the two will evolve to be important and complementary but different.

¹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4296905/>

The end of ~~cash~~ plastic cards



Marion Laboure



It is popular to predict the end of cash. Indeed, a decade ago one prominent newspaper ran with the cover title, “The end of cash era” with visuals of cash as a dinosaur doomed to extinction. But whether the 2020s will see the end of cash is the wrong question. To various extents, cash is here to stay. Rather, the right question that should be asked is whether the coming decade will see the end of plastic cards. In the global payment industry, which has nearly doubled over the last decade to almost \$2tn, this shift will have significant effects.

Paper money has been widely used since the 17th century

To understand why cash will remain popular over cards, it is worth reviewing how payment systems have taken steps towards dematerialisation. From the 17th century, paper money became widely used in rapidly urbanising environments characterised by increased trade. This transition took place during the context of the “price revolution” where large amounts of gold and silver were entering Europe via Spain from Latin America.

Subsequently, banks began to hand out the receipts as payable to the bearer of the document. Until the first half of the 19th century, many towns in the United Kingdom had their own local banks, each of which issued its own banknotes. Then came the 1960s and the start of global travel. Companies that were not originally finance firms started issuing traveller cheques and credit cards. American Express was followed soon by Diners Club. Demand for credit cards increased significantly after the US tax

authorities began to require detailed records of business expenses.

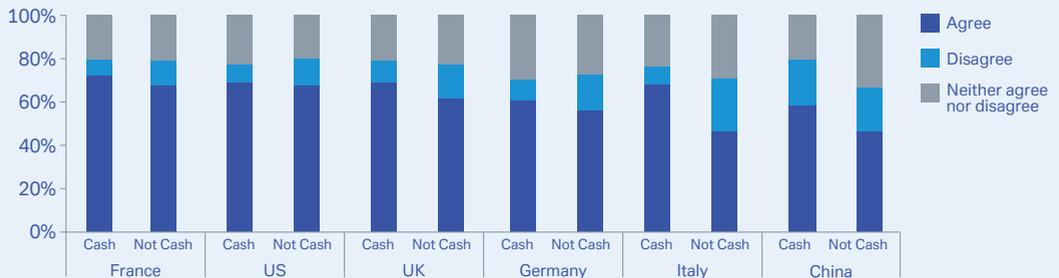
Cash remains popular

When people predict the decline of cash, they tend to point out the statistics about the decline in its use. It is true that cash is losing momentum to dematerialised payments – two thirds of people in advanced economies prefer dematerialised payments (non-cash non-cheque). In emerging economies, the drop in cash will likely accelerate as a large part of the unbanked population is transitioning directly from cash to smartphone-based payments. In India, cash payment halved from 59 per cent in 2000 to 30 per cent in 2016. In China, cash was used for 63 per cent of payments in 2000 but only 11 per cent in 2016.

Yet cash is still well-ingrained in many advanced countries, including Japan, Western Europe, and the United States. According to dbDig primary research¹, a third of people in developed countries consider cash their favourite payment method and more than half believe cash will always be around. Indeed, in Germany, nearly 60 per cent of in-store purchases are paid in cash and Germans hold €52 in cash on average – the highest rate amongst advanced economies. Furthermore, the average German plans to use even more cash over the coming six months.

Overall, people pay cash because they find their spending easier to monitor, the transaction fast and convenient, they have no trouble with acceptance, and their purchases remain anonymous.

Cash will always be around by preferred method of payment and countries



Source: Deutsche Bank dbDIG. Note: percentage of respondents who think that cash will always be around.

It is also tempting to think cards are here to stay. In the US, the world's biggest economy, innovations with cards are just taking off. A good example is contactless payment technology which became widely available later than in other advanced countries but, nonetheless, is growing. Two fifths of people have received their first contactless card in the last 12 months and another fifth are yet to receive it. As a result, just 16 per cent of weekly-in-store purchases are paid with contactless, less than half the 38 per cent in the UK. In short, physical payments – cash and plastic cards – are still ingrained in the culture. Americans also say they are not interested in having a digital wallet if it means no rewards or cashback, as is common with cards.

Cash will not disappear but plastic cards may progressively do so

The big risk to cards comes from mobile payments. In 2004, mobile payments emerged in China with Alipay. Our survey shows that, today digital wallets are the first method of payment in China. Three main reasons explain mobile payments popularity.

First, the Chinese government has been playing an active role in building a world-class infrastructure to support digitisation. By 2013, China was the world's largest market for smartphones, e-commerce, and online games with more than six hundred million Internet users.

Against this backdrop, Chinese customers quickly moved from cash to mobile payments, considering it as secure, convenient and reliable. In turn, retailers have embraced mobile payments. In fact, some stores began to accept only mobile payments and refused cash. This led the Chinese central bank to issue a formal

notice in 2018 clarifying that renminbi cash is legal tender in China and should not be refused. Elsewhere in Asia, people are skipping cards completely and going straight from cash to mobile payments.

In Europe, mobile payment technology is more recent, with Apple Pay commencing in 2014, while Google Pay and Samsung Pay began in 2015. So far, only eight per cent of people use smartphones to pay but this is primed to take-off over the next five years for two main reasons.

First, the main reasons consumer give for using mobile payments are convenience, speed and the absence of fees. Indeed, a third of people are planning to use mobile payments more in the next six months. Second, retailers are taking note. They cite the primary reason for installing a mobile payment app as being "to fit customer desire". The key issue is the lack of friction, such as typing in a PIN or handing over cash, which removes a psychological barrier.

Therefore, it is only a matter of time before smartphones make plastic cards an obsolete tool. Those in advanced countries are taking gradual steps towards adoption based on their country's infrastructure. Meanwhile, Fintech companies and smartphones are resulting in new banking innovations and a fully-fledged new integrated ecosystem is possible. Whether it is through the eager adoption by millennials or the increased digitalisation of countries' infrastructure, the plastic card could be on its way out over the next decade while people will still be paying with humble notes and coins.

We would like to thank Anthony Chaimowitz for his contribution to this piece.

¹ We commissioned an exclusive survey that analysed data over 3,600 customers in China, France, Germany, Italy, the United Kingdom, and the United States. It explains why the gap between physical payments (cash and plastic cards) and actual digital payments behaviour is narrowing.

How governments will respond to record debt

Jim Reid

As we move into the 2020s the world has never been so indebted relative to economic activity. So far this century, total global debt has grown from 229 per cent of GDP in 2000 to 305 per cent in 2010 and then 319 per cent today. Over the past decade developed-world governments have contributed most of the new leverage. For example, US federal debt has risen from 34 per cent of GDP in 2000 to 61 per cent in 2010 and 78 per cent now.

With demographic pressures building, populism has encouraged more fiscal spending. As a result, many major economies look vulnerable to secular stagnation themes and it is hard to see government debt being anything but higher in a decade's time. Indeed the US Congressional Budget Office suggests that federal debt held by the public will rise from 78 per cent today to 93 per cent in 2030 before going even higher to 144 per cent over the subsequent two decades.

In the UK, although the official forecast is for relatively flat government debt relative to GDP in the 2020s, this is due to a likely outdated view of government policies. After a near decade of austerity, and populism surfacing with the Brexit

vote in 2016, the expectations are that it does not matter what government is elected in the imminent general election. It will likely reverse course and open the fiscal taps. Even without this assumption, the official forecast shows UK government debt climbing from 82 per cent in 2019 to 149 per cent by mid-century. That highlights the same demographic issues building in the background. In Europe, with monetary policy seemingly exhausted, and with growth and inflation very low, it seems inevitable that the next decade will require more fiscal spending to support activity and the sustainability of the European Union.

So are we resigned to a fate of higher government debt by the end of 2030 and as far as the eye can see beyond that? The answer is "not necessarily", but the alternative scenario will likely require another strong decade of money printing from central banks and very aggressive financial repression.

To illustrate, it is worth examining the biggest government debt de-leveraging exercise in history to see how the authorities managed such a debt burden.

Median developed market debt/GDP (12-country sample)



Source: Deutsche Bank, GFD

That occurred after the second world war. Then, the median government debt fell from 126 per cent of GDP to 21 per cent by 1975. This epic deleveraging was aided by global nominal yields (which normally track nominal GDP growth) trading significantly below nominal activity for the best part of four decades. Various forms of financial repression, including high levels of central bank purchases, were needed as well.

This was a massive tailwind to deleveraging as high growth and low yields allowed governments to erode the debt burden much more rapidly than in a scenario where yields tracked nominal growth.

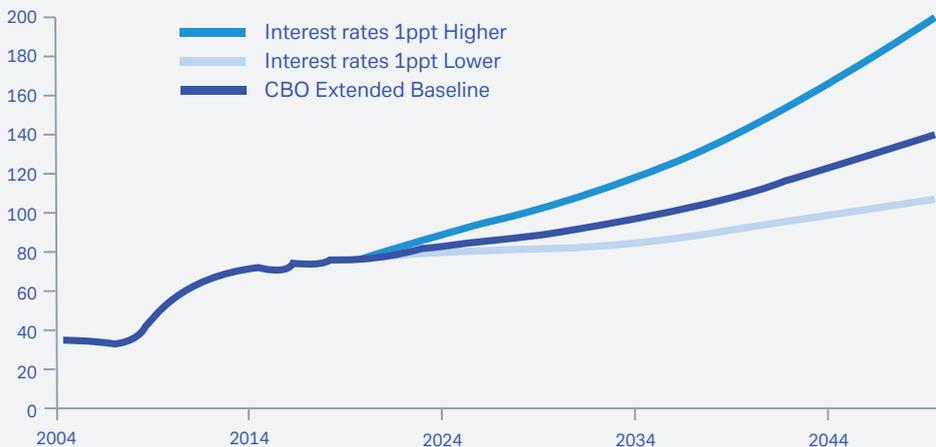
Fast forward to the present day and it looks like the world has entered another long period in which yields will be kept artificially well below nominal GDP growth. In a sample of the largest 32 developed countries, only four currently have ten-year yields above nominal GDP growth. The problem in sustainably recreating such a scenario today is that the post-war era saw much higher levels of real GDP growth due to favourable demographics, post-war reconstruction, and high productivity growth. It will be nearly impossible to manufacture a repeat of such an outcome. The world will only inch closer to it with significant 'artificial' fiscal spending boosting nominal growth and central bank interventions keeping yields down.

Whether such central bank money printing is ever repaid, or is simply inflated away, is open to debate. Already since the financial crisis, government debt has effectively declined in many countries if you assume quantitative easing is never repaid. But by their aggressive actions over the last decade, central banks have effectively trapped themselves into continually intervening in government bond markets. They are arguably beyond the point of no return. If the negative gap between government yields and nominal GDP growth is lost, then the global debt pyramid is on very shaky ground.

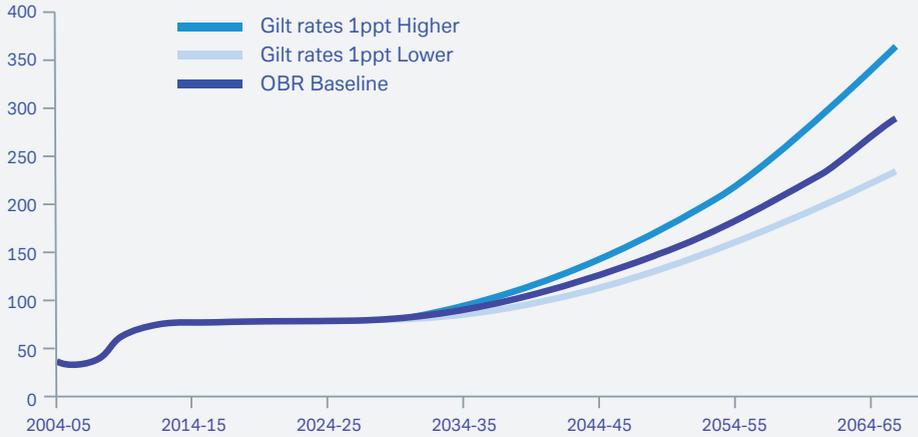
For now, with average funding costs so low, central banks have effectively invited governments to experiment with more unconventional policies. In the 2020s it seems inevitable that a world of helicopter money awaits where central banks finance government spending to stimulate growth – nominal or real.

If yields can be suppressed for a long period, then debt ratios could grow at a much milder rate than official independent central-case scenarios. Even the high-spending US could stabilise debt if yields tended towards zero. Indeed, referring back to the US if treasury yields are just one per cent below their assumptions, then all other things being equal, US debt could rise by just five percentage points relative to GDP in the 2020s.

US debt/GDP forecast



UK debt/GDP forecast



Source: Office of Budget Responsibility, Deutsche Bank

The level at which yields need to be below nominal GDP growth to stabilise debt in the US is not that extreme relative to history. The further out one looks, though, the more demographics become very challenging for debt sustainability across all parts of the globe without significant changes in policies.

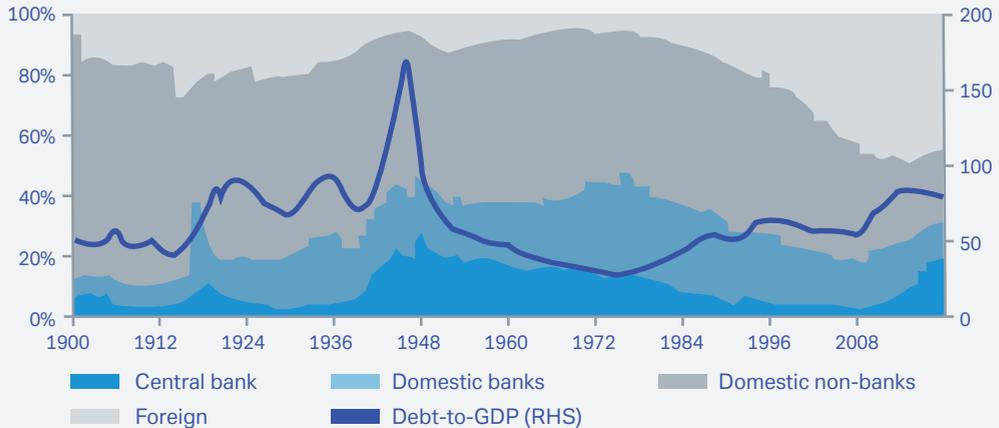
The big problem with this financial-repression scenario is that unless nominal GDP growth rises from current low levels, negative/ultra-low rates will need to be locked in for a very long period. This may be counterproductive in other ways. The best chance of successful debt and economic management is that nominal GDP growth stays notably higher than yields, but with both at higher levels than at present. Inflation might be the easier route than real GDP growth to achieve this, even if it is less desirable.

The picture is more complicated in Europe and especially in Germany. Long-run forecasts are lacking but the IMF suggests German government debt should fall from 59 per cent in 2019 to 46 per cent around the middle of the 2020s. However, the internal and external political pressure for higher fiscal spending is building in Europe, especially in those countries that are perceived to be in a position to do so, such as Germany.

With yields so low, Germany could see a three to four per cent swing from surplus to deficit and still see debt remain constant relative to GDP through much of the 2020s. Whilst there is little political will for such a reversal at the moment, pressure will likely build in the decade ahead.



Holdings of government debt over time



Source: Deutsche Bank, Blackrock Investment Institute, IMF

Can governments manage to keep yields so low relative to activity? In their favour is the rapid increase over the last couple of decades in the non-price-sensitive holders of government bonds. As well as domestic central banks, the foreign sector owns an increasing amount of bonds. Much of this is due to the huge accumulation of reserves around the world, especially from emerging markets. If globalisation falters, though, domestic central banks may have to intervene even more in the future to offset declining reserve flows.

Even with more price-insensitive holders than ever before, another big risk to any positive repeat of the 1945-80 period is what happens if and when policy makers are actually successful and generate inflation. At the moment, those investors have been kept onside by extraordinary recent fixed income returns. Even since yields went negative, total returns have remained strong as investors have been able to sell to people who think yields will fall even deeper into negative territory. Alternatively, semi-permanent global 'Japanification' could take hold.

So, over the coming decade or so, economic success and a free-float bondholder rebellion might be the biggest risk to this policy avenue. Do not forget the huge private sector debt pile if this scenario occurs. To maintain debt

sustainability and control the rise in yields when fiscal spending increases, central bank holdings of government bonds (and private sector bonds) will likely need to climb even higher by 2030 than they are today, continuing a trend that started a decade ago.

So, whether it is due to unfavourable demographics, unfunded liabilities, democracies unable to spend less than they tax, or weak productivity and economic growth, it seems inevitable that government debt will continue to grow out to 2030 and beyond. At normalised interest rates, it will likely be a matter of time before a huge global debt crisis takes hold. With yields close to zero or in negative territory across the majority of the globe, it is possible to comfortably run much higher levels of debt than past textbooks would have suggested and reduce the scale of its accumulation. With funding so easy and populism so high, the temptation will build among politicians to enact helicopter-money policies and what amounts to even more debt. Expect that by 2030 government debt will have increased across the globe but that it will be mitigated by a decade where nominal yields are kept well below nominal GDP growth with aggressive central bank action.

The political tipping points we will miss

Henry Allen



If you had said in 2010 that the coming decade would see the US and the UK become two of the most politically polarised countries in the developed world, you would have struggled to have been believed. Even in 2012, when London hosted the Olympic Games, the UK portrayed a confident image of a relatively harmonious country, a world away from the divisions that have set in between supporters and opponents of the Brexit process. That same year, President Obama won re-election and commentators questioned whether the Republican Party was capable of appealing to an increasingly diverse nation.

But looking back on the decade just gone, it is clear that the biggest development in politics, at least in the advanced economies, has been the backlash against globalisation, immigration, and the rise of movements seeking to reassert the primacy of the nation state. Although these trends were not anticipated a decade ago, with the benefit of hindsight the signs were clearly there. The jump in unemployment following the financial crisis, and the hollowing out of middle-income jobs, was an underappreciated driver of social change, while history has shown that steadily-increasing immigration has often resulted in more restrictive policies.

As we cast our eyes to the decade ahead, we consider which issues today are underappreciated, but in fact have the potential to turn elections over the decade ahead. While political tipping points are notoriously difficult to predict, there are several signs in the data today of the themes which have the potential to gain sudden political traction.

The first warning sign that is likely to cause change in the 2020s, and will seem blindingly obvious in retrospect, is housing affordability and the generation gap. In both the US and the UK, house prices have risen substantially in

real terms over recent decades. Although this has been bubbling away under the surface for some time, policymakers have neglected the issue as more immediate issues have consumed their attention. The collective failure to tackle the issue means increasing numbers of young people now live at home into their late-20s. In the US, 17 per cent of 25-34 year olds now live with their parents, up from ten per cent in 2003 and just eight per cent in 1970. In the UK, the share of 25-year olds living with their parents has risen from 25 per cent in 2009 to 35 per cent in 2018. The delay in household formation has its own social consequences, such as people delaying life-defining moments including marriage and children.

With young people increasingly unable to afford their own homes and fulfil their economic aspirations, these dislocations in society could mean that recent support for left-wing populism will become a defining political theme of the 2020s. Indeed, young people have already begun to rally around opposition politicians who promise property and wealth taxes, as well as better affordability. If house prices continue to go unaddressed, a tipping point will likely be reached in the coming decade and policy reactions, such as moves to free up land for residential construction, or even rent controls, may result.

A second theme that is underappreciated is the lack of trust in the EU among its citizens. Certainly, it is already well-known that one member state unexpectedly voted to leave in 2016, and openly Eurosceptic parties have increased their representation over the last decade. Yet fears of an imminent breakup have diminished since the Brexit vote as European leaders have presented a relatively united front.

This complacent attitude is dangerous. Eurobarometer surveys show that more

Europeans say they 'tend not to trust' the EU than 'tend to trust' it. Averaging the last five years' results, Greece has had the lowest score of those who 'tend to trust' the EU at just 23 per cent, while the UK was second from bottom, on 29 per cent. However, the bottom quartile of member states also featured France and Italy, on 32 per cent and 34 per cent respectively. Germany, France, and Italy have all seen strong support for populist parties at recent elections. The fact that trust is so low in two of the largest EU states is a large warning sign that Eurosceptic or populist parties have a strong platform on which to assert themselves moving forward.

In turn, there is the distinct possibility that rising Euroscepticism leads to greater divisions within countries, or even calls for secession. In the UK, regions that voted to stay in the EU such as Scotland and Northern Ireland have experienced growing noises either for independence or to join a united Ireland. This process has showed that if a majority of a country's population are in favour of an outcome that some regions prefer not to follow, there could be similar calls for secession elsewhere. Rising support for Catalan independence over the last decade is just one more example of how secessionist causes can unexpectedly arise. Further momentum for secessionist movements in the 2020s is well within the realm of possibility.

A third under-appreciated issue is the continued precarious state of southern European economies. Concern about the alarmingly high rates of youth unemployment have diminished since the height of the sovereign debt crisis, in spite of the fact they continue to remain above pre-crisis levels. Looking at the situation in Europe right now, in Q2 2019 the youth unemployment rate was 28% in Italy, 33% in Spain and 34% in Greece, and those numbers do not include those who are in part-time roles and would prefer a full-time position.

That simmering discontent is especially worrying given the economic state of many European households. Since the creation of the euro, living standards have barely risen in either Italy or Greece, with real GDP per capita between 1999 and 2018 growing just two per cent and five per cent respectively. Consequently, rising emigration rates have caused a brain drain. In Italy, three times the number of people left the country in 2017 compared with a decade earlier. Those in their 20s led the exodus. Greece has also seen emigration numbers run at more than double the level of a decade ago.

In the event of another recession, these issues could quickly escalate as people feel their hopes for a stable job and a better life move further out of reach. In a vicious circle, those without a job find their ability to obtain work in the future hampered by their previous lack of work experience.

So in retrospect, we may view today's populism as just the start of a much bigger wave. Indeed, Italy and Greece have already shown themselves willing to vote for populist governments before, with Syriza in Greece and the Five Star/Lega coalition in Italy.

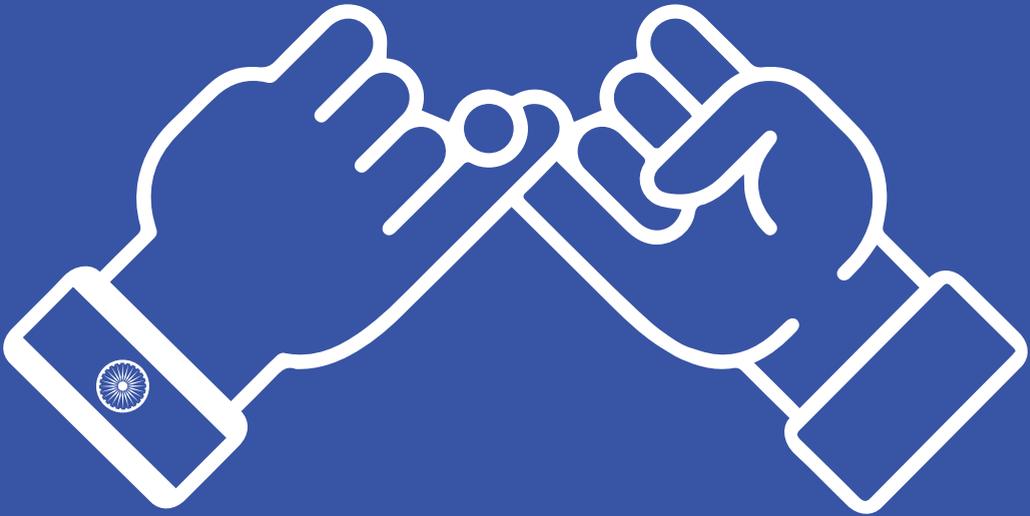
A fourth risk comes from the well-flagged but oft-ignored ageing of many nations. Although the statistics have been highly-visible for some time, it will not be until the mass retirement of the baby boomer generation over the coming decade that the reality will hit home. By 2030, Germany and Italy will have over a quarter of their population over 65 years. In Japan, that share will rise above 30 per cent. If counted as a share of voters rather than of the overall population, those shares for the proportion of retirement-aged citizens are even higher.

As a result of their increasing number among the electorate, governments will be further incentivised to shower the elderly with generous pensions and other age-related transfers. Forecasts of the associated costs over the coming decade are eye-watering. But what is underappreciated is how the younger generation could find themselves alienated from the political process and fight back. As more tax and spending decisions favour the elderly, it will stimulate popular discontent among young voters. As the recent climate-change protests have shown, younger voters are quite capable of ratcheting up their concerns on the political agenda.

With younger voters disadvantaged not only by ageing populations, but by existing obstacles in terms of housing and jobs, the theme of the coming decade risks being a clash between the generations. Voting patterns from Brexit to the election of President Trump already have shown a strong political divide by age, and given the issues outlined, the risk is that these merely prove the start. As such, in 2030 when we review the decade just gone, we may wonder how anyone missed the signs that the generation wars would be a defining theme of the decade.

India's promise

Kaushik Das



Despite its promise over the last decade, the Indian economy has slowed down sharply in recent years. That has led some to predict the decade ahead will be one of lower growth and frustration that India's enormous potential will, yet again, go unfulfilled. ➤

These fears are overblown. In fact, the Indian economy is likely to grow two and a half times to \$7tn by 2030, from about \$3tn today. That could make it the world's third largest economy. That also means nominal GDP growth is likely to average just over ten per cent through the next decade. True, that is lower than the 13 per cent annual average recorded over the previous ten years, but it will still be an amazing feat in a growth-starved world.

First, let us consider some of the reasons for the current slowdown in growth. The sharp drop in GDP growth is primarily due to ongoing problems in the shadow-banking sector and large non-performing assets in the banking sector, which has reduced private consumption expenditure and domestic demand substantially. Furthermore, monetary transmission remains weak due to a variety of structural factors and given the weak demand, the outlook for private sector investment also remains muted. In addition, a significant reduction in the inflation level (and inflation expectations), thanks to the new inflation-targeting framework, has also contributed to lowering nominal GDP growth relative to past periods.

While Indian economic growth may remain below potential in the near term, ongoing reform measures have significantly boosted its future potential. For starters, to offset the demand slowdown, the government took the bold decision in September to meaningfully cut the corporate tax rate. This will likely incentivise greater foreign direct investment flow into the country and support private investment in the economy which has remained weak over the last eight years. In addition, the central bank also cut the policy rate by 135 basis points to revive growth.

Apart from these stimulus measures, reforms initiated in the last few years, should also improve the medium term outlook. As economies with significantly higher informal sector employment, such as India, typically have lower per capita income, policies which are aimed at the greater formalisation of the economy should help to accelerate per capita income levels. In India's case, the Goods and Services Tax (GST) and demonetisation are likely to play a major role in the formalisation of the economy, a process which is already underway. Demonetisation, apart from reducing tax avoidance, has also

resulted in incentivising a faster pace of digitisation, a dynamic which will gain further momentum in the next decade. Similarly, GST by the very nature of its design will incentivise a faster pace of formalization of the economy, which will consequently improve the fiscal and growth dynamics of the country. Add to this, the increased focus on urbanization, should also help improve India's prosperity over the next decade and beyond.

The prospects for boosting prosperity for the average Indian are strong. A study by the Brookings Institution¹ found that India is slated to become one of the leading sources of middle-class demand in the coming decades (that is, people who spend \$11 to \$110 a day). India's per capita income is expected to double to \$4,500 by 2030 which, in real per capita income terms, will constitute close to 5.5 per cent average annual growth through the next decade. This means India should account for 17 per cent of global middle-class consumption, just behind China on 22 per cent and ahead of US on seven per cent. This level of consumption growth has tremendous implications for investment opportunities in different sectors of the economy, particularly infrastructure, banking, utilities, and industrials.

There are two other factors that will help drive growth over the coming decade. The first is a proper bankruptcy law which only came into force in 2017. This will help to reduce crony capitalism and incentivise proper risk assessment. It will also make the banking sector more credible and boost transparency and resiliency in the financial system over the next decade. The banking sector itself will likely be very different by the end of the next decade as the public sector banks consolidate. Already, the government has announced merging ten public sector banks into four entities. This should reduce their share in the banking system from the current level of 70 per cent, while private sector banks commensurately grow their market share.

The second factor that will drive growth is the Reserve Bank of India's move a few years ago to adopt inflation targeting and establish positive real interest rates in the economy. This, coupled with the government's focus on bringing more transparency into the real estate sector, have started a seemingly irreversible structural shift of household savings from physical to financial

¹ The unprecedented expansion of the global middle class – an update, Homi Kharas

assets. This trend will likely accelerate in the decade ahead. Our preliminary calculations suggest the share of financial savings in total household savings is likely to touch 55 per cent by 2030, up from 40 per cent currently. Most of these incremental household savings are likely to find their way into India's capital markets which will boost its prospects in the medium term.

While the long term structural story remains positive, there are a few challenges India must deal with over the coming decade. From a macro standpoint, fiscal consolidation remains the need of the hour, as without a credible plan to reduce India's debt from the current level of 70 per cent of GDP to 60 per cent or below, there are potential risks of crowding out, once the cycle begins to turn. Also, without debt and deficit reduction, it will be difficult for India to win a ratings upgrade in the coming years. Given competing considerations of supporting growth, providing subsidies to farmers and poor people, and a large interest payment obligation each year (which accounts for a quarter of total expenditure), it is difficult to aim for meaningful fiscal consolidation, unless revenues pick up. While the GST and the cut in corporate tax rate will be beneficial for the economy in the medium term, currently tax revenues remain below potential, thereby raising risks of fiscal slippage and resulting in a widening of term premium, which is inhibiting monetary transmission in the economy.

Given this fiscal backdrop, we expect the authorities to open India's bond market more liberally to foreign investors. This will be a welcome source of incremental demand for local currency government bonds which are used to finance the fiscal deficit and will help drive longer-tenor yields to decline and aid in the transmission process. An idea which has often been under discussion is to consider including India in global bond indices. These potentially see large inflows from a diverse investor base which tracks a particular index.

Inclusion in bond indices may become a reality and gain traction over the next decade. This will lead to a fundamental shift in India's fixed income markets, with commercial banks' holding of local currency bonds (currently 39 per cent of outstanding bonds) likely to see a steady decline, while that of foreign investors' holding

(currently just over three per cent of outstanding government bonds) growing materially over the next decade.

The second big challenge India faces are its population dynamics. While India as a whole is slated to enjoy a demographic dividend of increasing working age population (and a lower dependency ratio), 60 per cent of the rise in India's population by 2030 will come from some of the poorest and fiscally weak states – Uttar Pradesh, Bihar, Rajasthan, Madhya Pradesh and West Bengal.

As the working-age population increases sharply in these states over the next decade and beyond, the pressure on their respective state governments will mount. They will need to generate new employment and attract higher investment. Failing this, the incidence of poverty and human development conditions (which are already poor) could worsen further. Fiscal support to prop up growth and development may be minimal given these states already remain severely challenged.

If the incidence of migration gathers pace, as people move elsewhere for employment opportunities, the fiscal position of these states could deteriorate further. The state government's own-tax revenues will fall and thereby raise deficits and debt. Therefore, it is essential that rapid progress toward fiscal consolidation continues. This should occur alongside factor market reforms – land, labour and capital. It is essential for these poor states, and for India in general, to leverage its economies of scale in a productive manner. In this backdrop, the present government's approach to foster a culture of competition among states is a step in the right direction.

The structural changes undertaken in recent years will help transform the Indian economy over the next decade and maintain growth at strong levels. Despite a challenging global environment, India benefits from demography, an aspirational middle-class, and recent economic reforms that give it a constructive outlook over the coming decade.

The risk of rising corporate taxation

Luke Templeman



Just as the world has a debt problem, it also has a corporate tax problem. State finances are becoming increasingly precarious, and although companies are in great shape, the headline tax rates they pay have almost halved in rich countries over the last three decades. Against the backdrop of an increasingly populist mood in many developed countries, the conditions seem ripe for higher corporate taxes in the 2020s – a reversal of the multi-decade trend.

Politicians with higher corporate taxes in their sights are gaining in popularity – Elizabeth Warren in the US is just one example. Another is the UK, where the government has rolled back planned corporate tax cuts, and support for higher corporate taxes has propped up opposition parties. Meanwhile, the new president of the European Commission, Ursula von der Leyen, says she will target firms that “play our tax system.” There is also precedent for higher corporate taxes. Indeed, some US cities have already taken up this baton and levy their own additional taxes on corporates. In the EU, similar pressure is building.

There are two reasons why cities, states, or countries may look to boost corporate taxes. The first is that many are in a tight fiscal position. If a corporate tax hawk is elected at next year’s presidential election, they will likely add to the momentum to impose additional corporate taxes. The US city of Portland in Oregon already has an additional corporate tax levy if a company’s chief executive is paid more than 100 times the median employee.

The second reason why lawmakers will be less afraid to raise corporate tax is that the assumption that low corporate taxation benefits the wider economy is being increasingly questioned. A growing body of evidence shows that tax cuts do not provide the expected boost to revenues in the medium term. Of course, there are arguments for the opposite but public support for tax cuts appears to be weaker than in the past.

Several key events over the coming 12 months will help determine whether the coming decade sees only the risk of a slow reversal in the trend of lower corporate taxes, or a more

abrupt change. These include next year's US presidential election. Similarly, the upcoming UK election will be fought by the opposition Labour Party with a platform of higher corporate taxation. Also key will be the OECD's proposals for global tax coordination which it aims to have approved in 2020. They include calls for a minimum corporate tax rate.

Some argue that actually implementing higher corporate taxes will be too politically difficult and, in countries like the US, require too much cross-party consent. These concerns are valid, however, it is the direction of travel that is important. 2020 may end up being a near miss on many of these big events but if momentum builds towards support for politicians who advocate higher corporate taxes and towards the OECD proposals, we could still be at a turning point.

Of course, if President Trump wins re-election, it is likely the current status quo of US corporate tax will remain for now. It is true that Trump has discussed a second round of tax cuts but a formal plan has not been nailed down and, in any case, the chance of passage is low as long as the Democrats keep control of the House.

That said, there are compelling reasons why leaders with a low-tax agenda may agree to the principles of a globally-coordinated corporate taxation system. It concerns the recent OECD proposals for corporate tax reform. Among other things, they will require companies to pay tax in every country in which they sell goods, not just the countries where they have a base. Specifically, if a minimum global rate of corporate tax is agreed (as proposed) the benefit to larger countries may be particularly noticeable. Some will likely start taxing the foreign profits of their companies where those profits are generated in low-tax countries

This new regime will not necessarily be a zero-sum game where one country profits directly at the expense of another. Rather, some corporates will simply have to pay more tax. And many of the world's largest countries stand to benefit – this is something even opponents of the OECD's scheme admit. It is true that some low-tax

countries may lose some tax revenue but if the largest, richest countries support the initiative, the momentum will be hard to stop.

It is true that this proposed tax regime will be particularly felt by digital companies. Yet it will apply to any company that is "consumer facing" or sells a good into another country from a base elsewhere (there are some carve outs, for example, extractive industries).

Some of the largest, most affected companies have already offered support. For example, Amazon has said the system is "an important step forward". Of course, some companies may make similar noises simply to promote good public relations but that only gives weight to the earlier point that public opinion is an increasingly powerful voice in corporate debates.

Over the medium term, global tax coordination should lower the incentive for countries to 'compete' with each other on corporate tax rates. As a result, it will become easier, both politically and practically, for countries to raise corporate taxes without having to worry about scaring away future investment.

There are several things corporates can do to prepare for higher taxes. The first is to consider both domestic and international decentralisation. This may include establishing or boosting resources in countries outside their home base. Second, capital expenditure strategy may change if corporate tax rates rise in different countries at different times. In addition, insourcing may be optimal, while medium-term merger and acquisition targets and timing should be considered.

Finally, companies should consider changing performance metrics. A globally-coordinated new tax regime will encourage higher capital intensity. That makes it critical that companies focus on reversing the two-decade decline in their return on assets (see our piece *The end of high profit margins*).

The on-demand life

Silvia Cuneo

A decade from now, a family are going through their morning routine. Breakfast has just been delivered from the dark kitchen around the corner, the ironed clothes are due in ten minutes. When everyone is ready, two cars will be booked, one bound the office and the other for the childrens' school. On the way to work, the parents book a flower delivery, push back a doctor's appointment, and book some cleaners to spruce up the house before their dinner party that evening. "Should we order a band?" asks the husband. "Why not?" replies his wife. She taps a button on her phone's 'super app'. "Done."

This scene from the near future does not merely represent a more widespread version of the on-demand services we have today. In fact, the super app platforms of 2030 may look back on 2019 and wonder why so many delivery services competed over food. Sure, it was an obvious thing to deliver but the margins are so slim, the basket size is small, it must be delivered hot, and people don't order high-margin alcohol for delivery as they do when they sit down in a restaurant. It also suffers from peak-time problems. It is true that, today, the frequency of ordering is growing thanks to the addition of more meal occasions that have available delivery options – lunches, for example, are becoming more popular. But the same margin constraints still apply.

The ability to scale has obviously been key to turning on-demand businesses into profitable enterprises. Whilst most delivery drivers are "self-employed" and paid per drop, increasing driver utilisation rates has a positive impact on efficiency. To do this, online food delivery groups have begun to offer other items and services on demand and within the same app.

Glovo is a European example. It allows users to order food from restaurants and other items from partner stores, including pharmacies, groceries, flowers, and book stores. It can also send something from point to point, a useful service for a bunch of keys or present. A Glovo rider will even go to a store and buy a particular pair of shoes for you. Gojek is one of the main platforms in Asia. Having evolved from being a simple ride-hailing app in Indonesia, it now offers more than 20 services across South-East Asia. These include laundry, haircuts, and home maintenance.

This is just the beginning of the 'super app'. Over the coming decade, global technology companies will pour money into their development. Super apps will evolve from being mere platforms for offering goods and services, to being vertically integrated groups. Just as today's grocery stores sell many food products under their own brand, super apps will own the goods and services they provide. They will then offer unlimited free deliveries of anything on demand.

This business model works best in densely-populated cities with a good match of supply and demand to guarantee fast fulfilment of orders and high rider utilisation rates. The increased trend towards urbanisation thus gives the super app movement more momentum.

By 2030, super apps will use artificial intelligence to arrange our on-demand lives. This will work particularly well with routine-based household needs and integrate with the growing trend of smart, connected homes, as well as virtual assistants, such as Amazon's Alexa. For example, when the fridge senses

Autos: the electric, not autonomous, decade

Tim Rokossa



It is 2030 and you walk to your car. It was a bit more expensive than your last one and from the outside it is smaller, although inside it is more spacious. You hop in and the augmented reality map appears on the windshield. On your way home, you ask your car's assistant to turn on the heating at home and then connect to the grocery store to submit a shopping order. Then you turn on the music. It sounds all the better given the car's electric motor is silent.

This is the likely direction of car development over the coming decade. Despite the current hype surrounding autonomous vehicles, they simply face too many hurdles to become mainstream by 2030. Rather, electric vehicles are set for wider adoption. In fact, over the coming decade, they should grow to become one-fifth of the 120m vehicles sold globally. From that platform, they will grow to be half of vehicle sales by 2040.

A key driver of electrification are emissions targets. For example, the EU has agreed targets that require vehicle emissions to halve by 2030. Light vehicles are electrifying first but, by 2030,

heavy vehicles will increasingly transition. Already, some buses and delivery vehicles are electrified, particularly in large cities such as London. Although less than a tenth of heavy vehicles will likely be electrified by 2030, as we approach 2040, adoption should accelerate to about one-third of heavy vehicles.

Hitting the emission targets will be hard for carmakers. Reaching the goal of halving vehicle emissions by 2030 implies engine efficiency improvements of five per cent each year, well above the three per cent seen over the last decade. Assuming carmakers strive to hit their targets, there are three key things they can do and that will impact the cars we drive in 2030.

The first is improving the combustion engine further. If the halving of emissions is to be achieved this way, then they need to fall from 119 grams of carbon per kilometre to 60. As a rule of thumb, every gram per kilometre of carbon reduction costs €65 for mass market vehicles and €120 for premium cars. So, if carmakers pass on the entire cost, the price of the average regular petrol car will rise by nearly

€4,000, and a premium car by €7,000. If the cost cannot be passed on, it will cut 1.25 per cent from the profit margins of European carmakers.

The second is electrification, not just full electrification, but adapting it to coexist with petrol engines. The third change is downsizing, specifically, reducing the power of an engine. This goes hand-in-hand with any advances in light weight materials. If both weight and power can be reduced at the same time, drivers will not notice much difference. But as lightweighting hits its limit, carmakers may be left with little option but to lower power ratios. Customers may grumble but they may have little choice unless they are willing to pay a premium.

These changes will be expensive. In fact, for carmakers to hit the European targets, they will have to spend €14bn on technology and development. This is equivalent to a reduction in profit margins of 2.5 per cent. That means government subsidies are needed. These could take the shape of infrastructure or incentives.

Given the likely developments in engine efficiency and electrification over the next decade, the nature of global electricity demand will change. At first this change will not be so noticeable. In fact, electric vehicles will increase overall net demand only marginally by 2030 and by only about five per cent by 2040. However, it is the peak load that matters. At a global level, the peak load could increase by five per cent in 2030 and 25 per cent in 2040. In the extreme scenario of all cars being charged at the same time, the peak load could jump eight-fold.

That makes charging overload a real risk. The good news for governments is that they have advance warning of the problem and thus have time to come up with the correct grid reinforcement and time-of-use pricing incentives to manage charging needs.

The outlook for oil demand is just as interesting in the reverse. If the production of electric vehicles develops as expected in line with progress towards hitting the sub-two degree global warming target, then oil demand will fall from today's level of 25m barrels per day to be just a

little lower in 2030, before falling rapidly to about 15m barrels per day in 2040. That is a drop of about 16 per cent of total daily global oil demand.

The oil majors are already adapting themselves to the risk. For example, they are investing in electric vehicle charging. That is good news for electric car owners. The best estimates suggest \$30bn must be spent on charging infrastructure in Europe over the coming decade. And even so, that will still mean chargers are scarcer than they are today. Today, there are 50 cars per charger in Europe. By 2030, this ratio will quadruple.

The final, unresolved question may be where these chargers are located. On the one hand, oil majors want electric vehicle owners to go to their retail outlets to charge their cars. On the other hand, utility and BigTech companies may be more interested in slower home chargers. These keep open the option to use the car's battery as a resource for grid balance and storage. Which way this falls may depend on small decisions and tipping points that are only obvious in retrospect.

Furthermore, large government subsidies will be needed to push penetration levels. The infrastructure and the incentives both need to be in place for more consumers to make the switch. We can see in countries with strong incentives and good charging infrastructure that the demand is there. So governments need to bridge the incremental negative contribution margin currently.

The petrol car is a nice symmetry to the electric car's development. Although invented in the mid-1800s, the development money that subsequently flowed into petrol engines, and the factory assembly methods that reduced their cost, meant petrol cars dominated the twentieth century. The electric car, meanwhile, remained dormant until now. The coming decade will see it take off.

Climate policy: more realistic and pragmatic

Eric Heymann



It is easy to be pessimistic about the state of European and global climate policy. After all, many decades of debate have failed to achieve many of the objectives set. Yet the tide is changing quickly. Christine Lagarde's recent call for the ECB to prioritise climate change in its strategic review is just the latest climate-related announcement by a high-ranking official. ➤

Over the coming decade there will be no easy way out of the impasse. Yet, there are some reasons to be optimistic about the coming decade. Indeed, recent protest movements have elevated the standing of climate change in the political arena. In the recent European elections, Green parties across Europe had one of their best ever electoral performances, coming second in Germany with over a fifth of the vote, and third in both France and Ireland. In fact, the Greens-EFA group in the European Parliament, albeit also including some regionalist parties as well as green ones, now comprise about a tenth of MEPs.

Global carbon emissions continue to rise, albeit at a slower pace

While the increased political visibility, and the hard scientific facts, will probably introduce a healthy dose of realism and pragmatism in international climate protection policy, there is no denying the extent of the challenge. Indeed, carbon emissions continue to rise. On the demand side, the global population is growing at a rate of 80m people each year. And the global economy will likely expand over the coming decade. This means energy consumption will also increase further in absolute terms. Sadly, efficiency gains are being more than offset by the rebound effect of more users and more intensive usage.

On the supply side, despite the considerable investments, renewable energies, such as wind power and photovoltaics, are still not capable of satisfying the growing global energy demand. Moreover, inexpensive and efficient industrial-sized storage technologies are still lacking, making it impossible to store enough surplus power from renewable sources.

The IEA baseline scenario forecasts that the share of all renewable sources of energy (including hydro and bioenergy) in global electricity generation will rise from 26 per cent currently to 44 per cent by 2040. More than half of this total is to be provided by wind and solar power in 2040. At the same time, the IEA expects the share of wind and solar power in primary energy demand to rise from two per cent currently to seven per cent by 2040. Meanwhile, the share of fossil fuels in global primary energy demand will only decline from 81 per cent currently to 74 per cent by 2040.

Yet, new renewable energies cannot currently ensure a steady supply of energy around the clock. Consequently, additional, controllable

energy and electricity generation capacities will always be required to step in when wind power and photovoltaics cannot deliver for the foreseeable future.

While none of the UN climate conferences of the past has been able to prevent global carbon emissions from rising, there are some encouraging signs. The last major decline in emissions was in 2009 when the global economy was in a recession. In 2015 and 2016, carbon emissions more or less stagnated, although they rose again in 2017 and 2018. There are a number of reasons for this. For example, US electricity producers increasingly use natural gas as an energy source instead of more carbon-intensive coal because unconventional natural gas sources can be exploited quite inexpensively thanks to new production methods. Coal consumption has declined in the EU, too, not least due to political decisions and the recent increase in the price for carbon certificates in the EU Emissions Trading System. In China, power plants are steadily becoming more efficient on average, not least because older coal power plants are being shut down.

In addition, many countries have implemented subsidy schemes to increase the share of renewable energy (especially in the electricity sector) and have thus reduced the share of electricity generated by conventional power plants. Thus, driving the low-carbon move has also been investment in renewables. Globally, this averaged almost \$300bn per annum between 2010 and 2017.

Carbon emissions rise due to the world's hunger for energy and dependence on fossil fuels

Investments in renewables look set to rise further in the coming decades. According to the baseline scenario presented in the latest World Energy Outlook by the IEA, aggregate investments in renewables are likely to amount to c. USD 8 trn by 2040. This means that they will exceed the sum of all investments in all other sources of energy (oil, coal, natural gas, nuclear energy) taken together. Despite these huge sums, the IEA expects energy-related carbon emissions to rise by 0.3 per cent each year until 2040 on average.

Economic, social and political costs

To achieve climate goals with the technologies available today, significant changes to consumption and production are needed. Policymakers will have to abolish subsidies for fossil fuels, which are currently a tool of

social policy in many countries. They will also need to levy high taxes on carbon emissions or put a price on emissions via an emissions trading system. Either would imply a significant price increase for fossil fuels. In addition, a decarbonisation of the economy requires restrictions on ownership rights and the freedom to choose for both households and corporates.

If implemented these measures will result in huge costs for the economy. Take investments in climate protection technologies. Changes to consumption and production habits will result in growth losses. And if some countries do not put a price on carbon emissions, costs for other countries will rise as energy-intensive companies move from countries with high energy taxes or reduce their domestic investments.

Beyond these economic costs, there are several social and political implications. For example, poorer households will suffer more if energy costs rise. These social implications have caused policymakers to think about providing compensation to lower-income households. However, compensation does not come without disadvantages. It reduces the steering effect stemming from higher energy prices. In addition, it involves considerable administrative effort. And it reduces government revenues from carbon prices, which means less money is available for climate protection measures.

There is the related issue of the political costs of a climate protection policy, which not only leads to higher energy prices, but also tells people what to do (and what not to do). Such measures may strengthen the political fringes and contribute to division in society. The “yellow vest” protests in France are only one example. In Germany, too, some parties are trying to use the potential consequences of climate policy for low-income households for their purposes.

The discussion about people’s willingness to consume less or shoulder additional costs for the goal of climate protection is only just beginning. As developments in the US and Brazil have shown, top policymakers’ downplaying of climate change does not necessarily mean being voted out of office. Many voters believe other problems are more pressing. At the same time, some “climate activist” organisations are openly thinking about abolishing fundamental democratic principles in order to quickly implement unpopular climate protection measures. These groups cannot rely on a popular majority, however. Surveys regularly

show that, while a majority in many countries is concerned about the consequences of climate change, people are much less willing to shoulder burdens for the sake of the climate. And in emerging markets, calls for lower consumption and sufficiency are unlikely to fall on fertile ground.

Positive side effects

So are there only reasons to be pessimistic? Not really. In fact, during the coming decade there are significant opportunities for climate protection. Three aspects are key.

First, climate protection measures must become considerably more efficient since financial resources to combat climate change are limited. That is more easily said than done. Ideally, more efficient climate protection will be based on a uniform carbon price. Since the introduction of such a price is unlikely at the global level, emissions trading involving as many G20 countries as possible will be a huge step forward.

Second, research and development of cheap, reliable, low-carbon technologies must rank much higher on governments’ priority list. For example, energy research institutions under UN guidelines might be established in a number of countries. If only ten per cent of the money spent on subsidies for fossil fuels or on subsidies for insufficiently performing renewables were used for this purpose, billions of dollars would be available for such projects. Such research and development investment will have positive side effects. If such energy sources can be developed in the coming decades, they will help reduce the social and political costs and probably have favourable local environmental effects.

Finally, with global carbon emissions continuing to rise, the focus should shift to measures to adapt to climate change. Many of these could be taken quite quickly and would improve the real living conditions of the local population – again positive side effects. For example, better protection against extreme weather events would help to save numerous lives in emerging markets in particular. And ultimately, the climate-policy maxim “mitigation before adaptation” should be reconsidered, at least in this absolute formulation.

The demographic dividend

Luke Templeman

When people say the world is growing older, they are only looking at the headline figures from the UN's recent population report. It is true that these show that since 1950, there has been a ten percentage point drop in the proportion of the world's population that are children to 30 per cent. Meanwhile, the proportion that is over 50 years' old has jumped by almost the same amount to 24 per cent.

But while the median age of a human has risen from about 22 to 32 since 1950, human life expectancy has risen by more – from 46 to 72. So, whereas a randomly-chosen person in 1950 was almost half way through the average life, today they are just 44 per cent through their journey. There are different ways to cut the numbers but from one point of view, the world is younger than it looks.

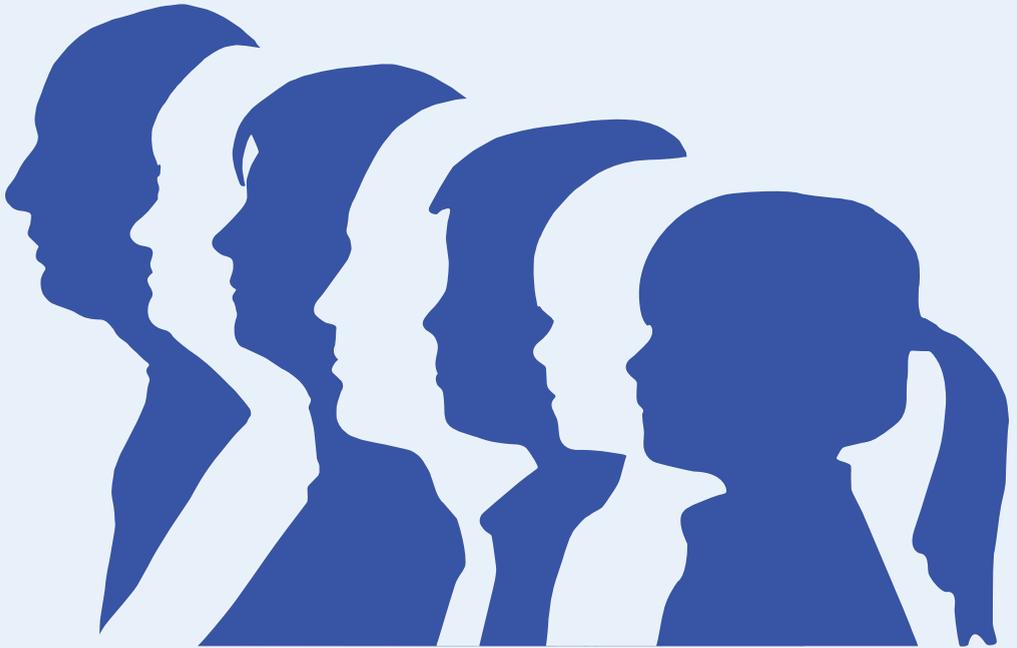
The usual trio of fertility rates, infant mortality, and longevity will determine how this trend continues. Regardless, there is some evidence people are taking longer to do things in life – as they have more life to live. Over the last few decades, the average age at which people marry has risen. So too, has the rate of graduate study, and buying a house. Of course, the latter is a function of high house prices, but then, one reason why people are willing to pay more may be because they plan to live and work longer.

This may also explain why marketers remain obsessed with the 18-45 age group and not the rapidly increasing 50+ age group. Although people are growing older, their purchasing decisions are 'younger' than they appear as they are proportionately less further along their life than were their parents at the same age.

Median age of a person on earth as a proportion of life expectancy



Source: United Nations, Deutsche Bank



Advances in healthcare, and certain lifestyle and nutrition information adds to the age-slow down and to people's own feeling that their mental age is younger than their physical age. In one study conducted on people of retirement age, they reported feeling two decades younger than their chronological age.

However, if the current rate of increase in life expectancy continues, by 2030, the world will be a little older, both in absolute terms and as a proportion of the average person's lifespan. Most people say this is a bad thing and cite the healthcare and pension costs associated with having a high dependency ratio – that is, the proportion of working age people supporting those who do not work. Developed countries are now home to one retiree for every three working age people, up from one to five in 1990. They also note that older populations are less likely to take risks and be innovative.

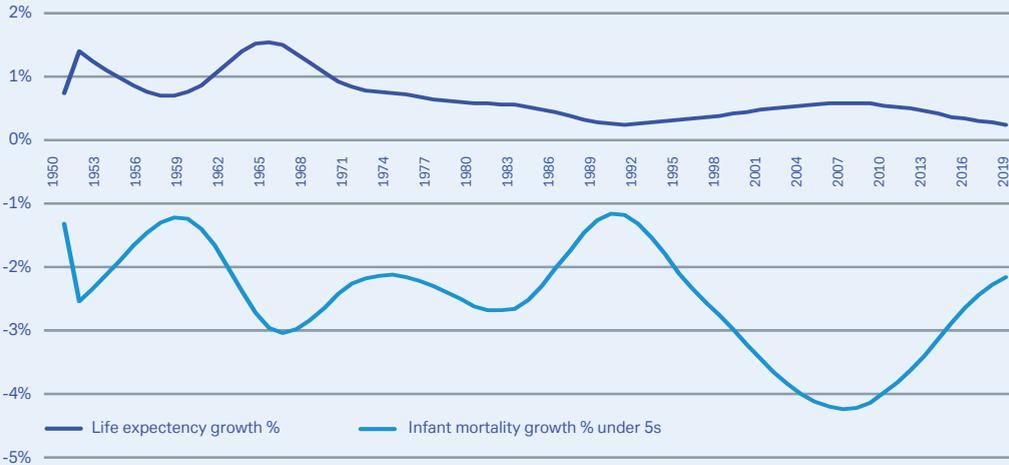
Ageing, however, is not all bad news. For starters, countries that are heavy with young people can be unstable. Of course, this is not always the case, but it is no coincidence that almost all older societies are currently at peace.

Furthermore, older societies tend to place relatively more value on young people and invest in their education.

The fact that some countries will age dramatically over the coming decade will make those countries with a demographic dividend all the more precious for the world economy. Of course, the phrase 'demographic dividend' often has slightly different definitions. One such definition is when a country is projected to have an increase in its working-age population over the coming decade and has also seen a decrease in fertility rates over the prior decade. In addition, it is worth adjusting for a country's political stability. In other words, ensuring it is in a position to take advantage of the positive demographic shift.

For this analysis we take "politically stable" to mean those countries in the top half of the World Bank's index of "Political stability and absence of violence/terrorism". For context, those countries that just squeeze inside the top half include Kazakhstan, Belize, and Argentina, while Turkmenistan, The Gambia, and Sierra Leone just miss out.

Life expectancy and infant mortality



Source: United Nations, Deutsche Bank

Of the 200-odd countries in the world, only 22 made the cut for having a demographic dividend over the coming decade. Just one is from Europe – Ireland, and just one came from the Middle East – Kuwait. Conversely, Africa has seven entrants including Rwanda, Ghana, and Botswana. Meanwhile, Cambodia and Laos headed the list of four Asian countries. The rest of the countries that can look forward to a positive demographic changes include a smattering of Pacific and Caribbean islands.

By far, the most important factor in giving countries demographic dividends over the last century has been the decrease in child mortality rates. At a global level, this has plunged from 17 per cent of those under five years' old in 1965, to under four per cent. Higher survival rates mean women can have fewer babies yet still have the same number of surviving children. First and foremost, the social benefits are enormous, but from an economic point of view it also frees up the mother to be productive in the economy. In most advanced countries, as infant mortality has fallen, so too have fertility rates. As a result, the economy benefits.

Yet, decreasing infant mortality does not always lead directly to decreasing fertility rates. In fact, when we look at the countries that have improved their child mortality rates above the global average over the last decade,

overwhelmingly they have seen their fertility rates fall by less than the global average. In other words, it takes time and some cultural change for fertility to fall.

One under-appreciated driver of cultural change is on the horizon for the coming decade – the increased penetration of media through smart phones. Overwhelmingly, the countries that saw large improvements in infant mortality, but not a correspondingly-large fall in fertility rates, were African nations. Many people in these countries have only just come online with smartphones in recent years. Uptake over the coming decade should be strong. People will then have far more information about family health, planning, and opportunities to connect with the local and global economy.

If other developing nations are a guide, media connectivity will also bring television onto individual devices. One study in Brazil found that in areas where soap operas were available, women had lower rates of fertility – the theory being that soap operas portray smaller families. The availability of novellas had a similar effect. While health advances have been the key factor in reducing child mortality, as more countries look to exploit their potential demographic dividend, it may be the small 'nudge' of the media that helps the dividend on its way.

Although people are growing older, their purchasing decisions are 'younger' than they appear as they are proportionately less further along their life than were their parents at the same age.

Cryptocurrencies: the 21st century cash

Marion Laboure



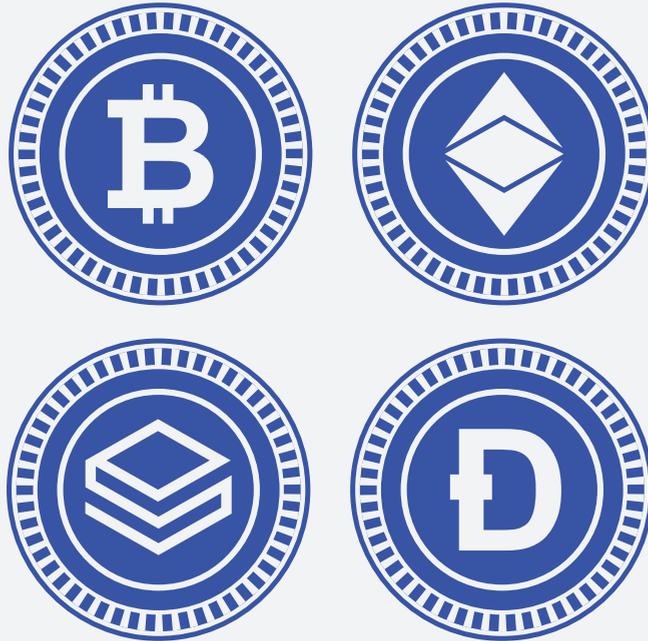
They had been around for a while, but it was not until 2017 that cryptocurrencies really gained global attention as the price of a Bitcoin surged to almost \$20,000. When Facebook announced Libra, its new cryptocurrency payment system, earlier this year, the conversation hit all levels of society and politics. And no wonder. Facebook, with its potential user base of over 2bn, has the potential to disrupt the payment industry and send the use of cryptocurrencies into the mainstream.

But cryptocurrencies have always been additions, rather than substitutes, to the global inventory of money. They have not managed to take off as a means of payment despite their well-known benefits, such as security, speed, minimal transaction fees, ease of storage and relevance in the digital era.

Looking ahead, this situation may be different. What about if one of the GAFA (or their Chinese counterparts BATX) for example are able to overcome regulatory hurdles – the main obstacle at present? In the long run, this would broaden the appeal of cryptocurrencies, hasten their adoption, and give them the potential to eventually replace cash (see our piece *The end of cash plastic cards*).

On the supply side, governments, banks and cards are moving towards a cashless society. Governments, banks and card providers share at least a goal: the elimination of cash. While governments are more concerned with eliminating larger notes in circulation as they are mostly used for the black economy, banks and card providers are finding ways to foster smaller payments with cards through technology innovations, such as contactless and mobile payments.

Key is what happens in the world's two most populous countries. Until now, China and India banned the purchase and the sale of cryptocurrencies. But things are moving quickly. In late October, Chinese President Xi Jinping endorsed blockchain as "an important breakthrough for independent innovation of core technologies". He repeated the PBoC's intention to have cash replaced by a central bank-issued digital currency. The aim is to support the yuan's circulation and internationalisation. Details are to be confirmed but it seemed that the digital currency may have the following characteristics: i) commercial banks and the PBOC will be the only issuers;



ii) the PBoC will design all wallets, possibly without using the blockchain. With government support, it is likely the Chinese people will move quickly to adopt the digital currency.

In India, change is also coming. The government declared in 2016 that 1,000 and 500 rupee notes would no longer be valid despite strong resistance to change and temporary cash shortage. And recently, a government economic panel pitched for the introduction of an official digital currency with the status of legal tender and regulated by the Reserve Bank of India.

The next question relates to the demand side: how fast retailers and consumers can embrace change?

In the 20th century, most companies and retailers accepted and favoured cash for small payments. Today is quite different. Digital payments are preferred by retailers as cash means counting bills, finding change, dealing with bank queues, and potential theft. Those

factors outweigh the cost of credit card fees on the same transactions. The next logical step is a digital cash alternative which removes, or at least lowers, the additional fees that card providers currently take?

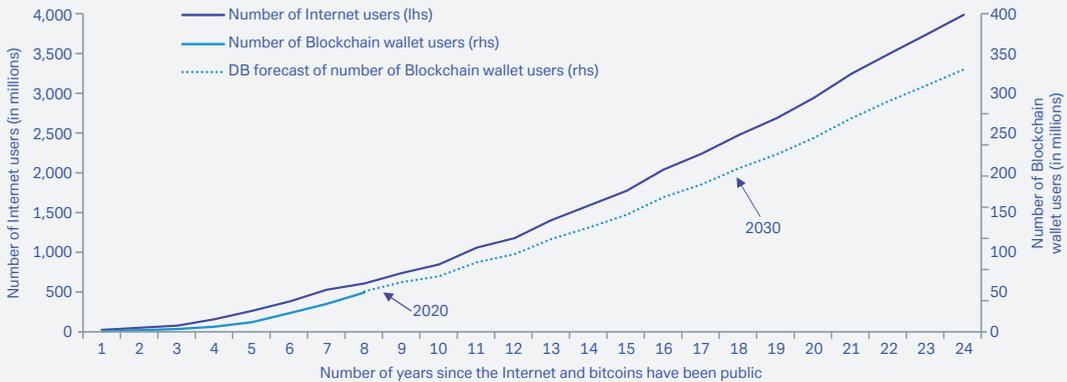
According to dbDig primary research,¹ nearly two thirds of consumers prefer dematerialised to cash payments and a third are concerned by anonymity. These are the two things that cryptocurrencies do best.

Payment technology adoption becomes faster and faster

Assuming governments back cryptocurrencies, and consumers want them, adoption rates will drive the timeline for mainstream use. The chart below shows the adoption rates of blockchain wallets with the equivalent for the internet. It is early days but the curves are similar after adjusting for scale. Indeed, if current trends continue, there could be 200m blockchain wallet users in 2030.

¹ We commissioned an exclusive survey that analysed data over 3,600 customers in China, France, Germany, Italy, the United Kingdom, and the United States. It explains why the gap between physical payments (cash and plastic cards) and actual digital payments behaviour is narrowing.

Adoption rates of cryptocurrencies and Internet



Source: Deutsche Bank forecasts, InternetWorldStats.com and Blockchain.com. We measure "adoption rate" by the number of users adopting internet and bitcoins since they went public.

The future of cryptocurrencies

Cryptocurrencies need to overcome three main hurdles to become widespread. First, they must become legitimate in the eyes of governments and regulators. That means bringing stability to the price and bringing advantages to both merchants and consumers. They must also allow for global reach in the payment market. To do this, alliances must be forged with key stakeholders – mobile apps such as Apple Pay, Google Pay, card providers such as Visa and Mastercard, and retailers, such as Amazon and Walmart.

If these challenges can be overcome, the eventual future of cash is at risk. But new challenges would arise. For starters, it will mean basing a robust financial system entirely on electricity consumption. To envision a smooth transmission towards a fully digitalised platform, the financial system needs to be ready to overcome any kind of electricity shutdown or cyberattack. Governments may increasingly need to safely store back up of citizens data in an alternative country. Estonia, for example, chose Luxembourg to store a comprehensive backup of government data, including details of its citizens' health, population, business registries, as well as a data embassy.

Natural disasters, climate change, and global warming are also issues to deal with. They are infrequent but can be crippling. In 1989, Quebec was plunged into darkness for nine hours because of a solar flare.

Cyberattacks are also becoming more frequent. In January 2018, the Tokyo-based cryptocurrency exchange Coincheck reported that hackers had taken £400m. Even though transactions for many cryptocurrencies are public, all 523m stolen coins ended up in nameless accounts.

As we look to the decade ahead, it would not be surprising if a new and mainstream cryptocurrency were to unexpectedly emerge. Some countries with historically-strong banking industries are trialling cryptocurrencies. Separately, cryptocurrencies may constitute the best tool for a digital war. The question is which country will take advantage of being the first to obtain licenses and build alliances. As that occurs, the line between cryptocurrencies, financial institutions, and public & private sectors may become blurred.

We would like to thank Anthony Chaimowitz for his contribution to this piece.

As we look to the decade ahead, it may not be surprising if a new and mainstream cryptocurrency were to unexpectedly emerge.

How Europe can fix its banks

Luke Templeman



As the 2020s begin, Europe's economy faces an uncertain, and potentially low growth, decade. In part, that is because Europe's banking system – the largest in the world – is at a critical junction. Along one path lies a US-style system where strong banks support small businesses, households and corporates. Down the other path lies a Japanese-style malaise where banks struggle with profitability and the real economy suffers as a result. >

Europe is already a few steps down the Japanese path and, indeed, there is a startling symmetry between Europe and Japan. First, households and corporates have a similar level of over-reliance on banks. Corporations in Europe and Japan tap banks for three-quarters of their financing requirements while the regions' households rely on them for nine-tenths of funding needs. That is double and triple the proportion seen in the US, respectively.

Yet although banks in Europe and Japan are leaned upon so heavily to support the real economy, falling returns leave them less able to support the sectors of the economy that need it the most. This is a serious problem, particularly as small and medium enterprises employ two-thirds of the European workforce. Contrast that with the US where these firms employ only about half the workforce.

Over the coming decade, there are five things Europe must do to set its banking system on the correct course so it can support the real economy. It is vital that investors, regulators, and policymakers take note. If not, Europe will likely experience the same economic pain as has Japan over the last two decades. Europe can ill afford to replicate this experience given its current economic situation.

1. Consolidation is necessary but not sufficient
Europe's banking system is far more fragmented than those in other developed markets, including the US, and the competitive position of banks suffers as a result. If we look at the US, the five largest banks share between them half the assets of all US banks. In contrast, the five largest European banks share less than one-quarter of banking assets. This is a key reason why banks should be allowed to merge.

This fragmentation leads to structurally lower returns which, in turn, hurts the real economy. Just one example is the provision of cross-border loans. Just one per cent of European households have a loan through a bank outside their home country and just nine per cent of non-financial corporates do. Meanwhile just eight per cent of cross-border deposits in the euro-area come from corporates while almost none are from households.

Such a low rate of cross-border financing makes no sense given Europe is supposed to benefit from its single market. Consolidation will help.

That is because banking returns are generally correlated with market concentration.

2. Policymakers need to break down barriers

Consolidation by itself is not sufficient. Policymakers need to break down barriers to create the right structure. They need to take steps to break down the barriers of non-private sector banks to encourage more consolidation both within the sector as well as with private-sector banks. These institutions exist with different motivations. They typically have lower market discipline, weaker incentives to prioritise profitability, more limited sources of external capital and, thus, potentially perpetuate the 'bank-sovereign doom loop'.

3. Break the sovereign debt doom loop

If Europe's banks are to have a productive future, it is essential that any hidden surprises be brought out into the open. In this regard, regulators must reform the rules around sovereign debt, to which European banks are worryingly exposed and prevent the economy from falling into a doom loop. Indeed, the average European bank has sovereign debt exposure equal to 170 per cent of its core tier one capital. That is more than triple the exposure of US banks.

The risk of a doom loop is fed by the regulatory treatment of sovereign debt which has, for decades, been significantly discounted. In many cases, the prospect of default has been ignored completely. This can create dangerous incentives. It is true that sovereign exposure to banks has been limited via the Bank Recovery & Resolution Directive, but banks' exposure to sovereigns remains a risk should there be concerns over debt sustainability.

Despite the sovereign debt crisis in 2011-2012 highlighting the importance of addressing the doom loop, it is still relatively ignored. Of particular concern is the significant 'home bias' of European banks. That is, about 60 per cent of an average European bank's sovereign exposure is to their home government's debt. This would be the equivalent of a US bank holding enormous amounts of State Bonds as opposed to US Treasuries, a situation that would leave it much more vulnerable to financing problems experienced by the one specific state.

To pull households, corporates, governments, and banks out of the doom loop, three things are necessary. First, stricter capital requirements

for sovereign exposures via removal of their preferential risk-weight treatment. Similarly, alternative approaches to the current preferential treatment of sovereign exposures in liquidity regulation.

Second, diversification requirements via fully or partially removing the exemption of sovereign exposures from the large exposures regime, and introducing a capital requirement for concentration risk to encourage diversification of exposure away from home bias but within the euro area.

Third, stronger focus on sovereign exposures in stress-testing as well as in macro-prudential regulation.

4. Complete the banking union

Without a banking union, the prospects for cross-border consolidation and an integrated banking system are slim. A closer banking union will help break down some of the barriers that currently inhibit consolidation. For example, current European regulations mandate liquidity requirements be met at the subsidiary level in each country rather than at the parent domicile level. The key stumbling block remains the creation of a fully-fledged European Deposit Insurance Scheme. This should be a priority for the coming decade.

Risk sharing should be fully-funded by the banking system and our proposals include an ex-ante fund paid for by the banking industry, not unlike the FDIC in the US. Also, ex-post 'top up' contributions should the fund be depleted (in an extreme scenario), and differentiated deposit insurance premium rates, unlike the US, to reflect differences in 'riskiness' not dissimilar to the risk-factor adjustment applied in calculating SRF risk-adjusted contributions but which also potentially reflect differences in insolvency and foreclosure frameworks

This will allow national deposit insurance schemes to be progressively phased out to be replaced by a single EDIS run by the Single Resolution Board which already manages the Single Resolution Fund. There could also be a phasing-in of the timeline of dependence on national versus European schemes to reflect relative success in meeting risk reduction targets.

5. Europe needs a much more ambitious capital markets union

The size of Europe's banking system introduces a frightening level of risk into the continent's economy. Indeed, the banking market is 2.7 times larger than the entire eurozone economy, a vivid contrast with the US where the banking market is slightly smaller than the economy.

A capital markets union can help mitigate the risks. Indeed, the urgency in developing a better capital markets union becomes all the greater following Brexit given the historical dependence on London as the financial hub of the EU.

There are three ways Europe can create a more ambitious capital markets union. First, create deeper cross-border markets to help reduce 'home bias'. Next, reduce the reliance on the banking system by encouraging alternative market-based sources of finance notably for small and medium enterprises, infrastructure projects, or long term financing. Finally, revive securitisation markets as a source of funding and risk sharing.

The third point, building a robust securitisation market, is particularly critical. The European securitisation market today stands at just €0.5trn, compared with \$11.5trn in the US. Securitisation offers banks a diversified funding source and can facilitate the transfer of credit risk to others in the market, thereby providing capital relief that can be used to generate new lending to the real economy. In the process, it improves bank capital efficiency and profitability.

Many of the building blocks for these recommendations are already in place. Given that low interest rates since the financial crisis have benefitted sovereigns and corporates, while hurting households and banks, for the sake of restoring balance in the economy, it is necessary to even the scales. With that in mind, given the tight relationship between economic and financial cycles, the stability and sustainability of Europe's banking system should be one of the highest priorities for policymakers in the coming decade to ensure the continent takes a step down the same path trodden by the US and not that lumbered along by Japan.

Sports statistics and artificial intelligence

Luke Templeman

Since the film *Moneyball* popularised sports statistics, the big problem with the statistical models that flood the sports world is that they only work best with sports that have discrete events. For example, baseball can be reduced to each individual swing at a ball. Of course, this type of statistical analysis has shaken up these sports. Baseball hitters now swing for the rafters rather than for first base, basketball players shoot more three-pointers, and a cricketer's 'heat-map analysis' can determine their career.

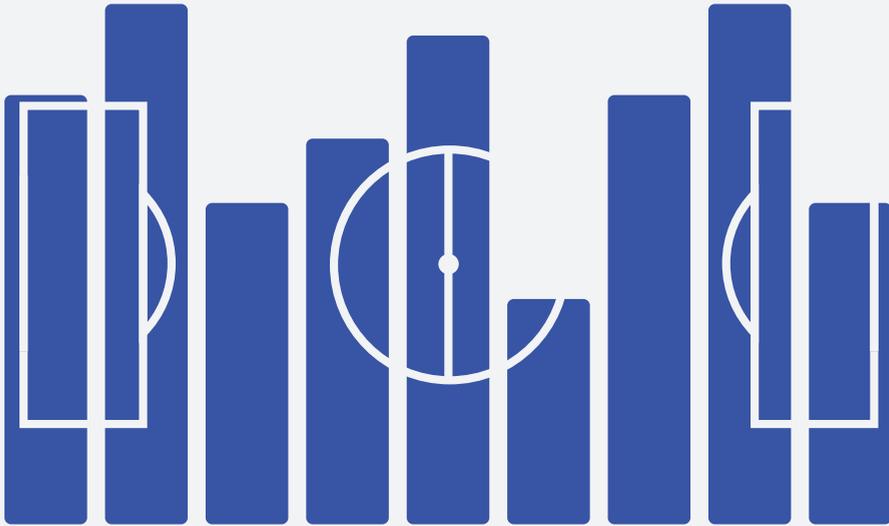
Over the next ten years, machine learning will enable 'non-linear dynamic system models' which will revolutionise 'invasion' sports, such as football, basketball, rugby, hockey, and many other fluid games that have few discrete events. This will be a big step up from existing 'linear' models which assume that when a player does something, such as taking a shot at goal, it has an average expected outcome, even though that outcome may be greatly influenced by the defence's dynamic response.

Basic trials of dynamic sports systems have met with limited success, which is why *Moneyball*-style analysis still predominates. That has negative side effects. For example, when rugby players began wearing G-force sensors, they were incentivised to tackle and ruck as hard as

possible. Consequently, players began to over-commit. This was not only detrimental to the team's defence, but also resulted in unnecessary injuries. Similarly, attempts to assess basketball players based on the 'gravity' with which they attract defenders has incentivised some to move into space with more, rather than fewer, defenders.

Approaching 2030, all sports teams and fans will understand 'non-linear recurrence quantification analysis' whereby artificial intelligence will assess a player's decision making in fluid 'invasion' games. For example, while today's 'linear' technology incentivises a football player to move into space with the greatest number of 'degrees of freedom', a 'non-linear' assessment system will reward the player for finding space where those 'degrees of freedom' have the greatest potential value, based on the constantly-moving defence, even if there are fewer available options. The more matches the AI watches, the more sophisticated its analysis will be.

This AI-based analysis will help resolve strange anomalies. For example, football teams usually stick to a structured game plan. However, initial RQ analysis has found that less-structured matches tend to see more shots on goal and goals in total. Opinion on this anomaly is



currently split. Some argue that less-structured defences will obviously let through more goals; others argue that it is the unpredictability of unstructured offence that leads to more goals.

In the 2020s, animal behaviour patterns will also be analysed by sports AI. So far, initial attempts have been limited by computing power and software. The Australian netball team has incorporated analysis from the swimming patterns of schools of fish, although the team lost the recent Commonwealth and World Cup finals. These (still primitive) systems analyse players based on their reaction to the other players on the field with whom they are 'coupled' – based on the distance of a player to their neighbour. Some claim to have discovered that regardless of whether a player's neighbour is doing the 'right' thing, when the player is within a certain distance of their neighbour, merely copying their behaviour, akin to birds in a flock, can boost the team's potential.

It is true that sports teams currently assess players based on their decision making when 'coupled' with nearby players (sometimes known as part of 'relative phase analysis'). However,

the current technology applied to this analysis is generally limited to times when a player is moving in a single direction and other variables are assumed constant.

Whether based on animal patterns or other ideas that artificial intelligence discovers, the next generation of athletes will be assessed less on one-on-one matchups and their individual performance with the ball. Rather, their movements around the field and assessment of the options available will be better quantified and thus more emphasised in player evaluation.

For this reason, by 2030, all top-level professional sports teams will have AI-based performance assessment teams. It will be expensive. They will be competing with hedge funds and technology firms for talent. But if, over the next decade, the value of sports rights grows by anything like that experienced over the last decade, teams will afford it. Given that most top-level sports leagues are reluctant to expand the number of teams in their competitions, the extra money will flow straight to the team's coffers and straight into the AI arms race.

True quantum supremacy: the winner takes it all

Apjit Walia, DB analysts

"If we have learned one thing from the history of invention & discovery, it is that, in the long run & often in the short one, the most daring prophecies seem laughably conservative."

Sir Arthur Clarke

The CIA's encryption is considered one of the safest encryption codes on the planet. It would take the most advanced supercomputer at an adversary 600m years to tackle this encryption code. A Quantum computer with a potential 4,000 qubits would be able to solve this encryption in 120 seconds. (A qubit is to quantum computers what bits are to conventional computers. Qubits are more powerful by many magnitudes to bits and importantly, an increase in qubits is exponentially more powerful than an increase in bits.)

While artificial intelligence receives the majority of the attention, Quantum Computing, because of its complexities and the lower probabilities of a near future breakthrough, does not get big headlines. However, ask any long-term policy maker or national security expert as to what part of the global technology battleground keeps them awake at night, most will say, "A Quantum Computing Supremacy Surprise".

There are several countries around the world currently working aggressively on Quantum Computing. The two that are investing the

most are the US and China. The US is spending around \$500m per year and passed the National Quantum Initiative Act in 2018 to accelerate development. China is looking to invest \$10bn in the space. Some leading quantum experts believe the actual figure of Chinese investment is closer to \$30bn. Recently, Russia which has so far been a late adopter has renewed its quantum efforts. In addition, several companies around the world have had quantum supremacy headlines with rival claims on breakthroughs, yet in terms of economic potential, it still remains a "future science".

If one of the countries in this quantum computing global race is able to achieve breakthroughs that help it attain "True Quantum Supremacy", that is design a quantum computer with stable qubits numbering in the thousands or more, it will have an ability to process information millions of times faster than the prevalent supercomputers.

To assign probabilities that these breakthroughs will occur in one decade or several is fraught with a large over or under-shooting risk. Key developments in technology generally do not follow a predictable trajectory.

Quantum experts have vastly different opinions on the path to True Quantum Supremacy. One path that may unfold could follow this pattern.

Path to true quantum supremacy

1. **Filament discovery:** A major semiconductor design company in a certain country discovers a material that helps it to design qubits that are more stable and perform functions ten times more reliable than prevalent ones. This is akin to Thomas Edison discovering the filament that would hold the light in his bulb.
2. **Simplify connectivity:** The company's engineers are able to install the control of the circuits inside the quantum chamber.
3. **Scale Down:** The design engineers make material enhancements that help them scale the qubits 10,000 times smaller.
4. **Collaboration:** The engineers are able to achieve 'Across Refrigeration Entanglement', simply described as a collaboration between multiple quantum computers.
5. **Transistorisation:** While the semiconductor company is going through its path of the design breakthroughs, its government has been working with it to apply the learnings of Moore's law (the half century trend of processor speeds doubling every two years) to manufacture qubits.

Combining the semiconductor company's breakthroughs and its government's work on transistorisation, the collective effort helps them create their latest Quantum computer – Qubelight-100. At 100bn qubits, it has an unprecedented and staggering ability.

This 'True Quantum Supremacy' moment puts them leaps ahead of the next quantum computer anywhere in the world, which still operates at 10m qubits. The contrast is as if one person has the processing power of a 2019 personal computer while the others are still stuck in 1800 with a paper and pencil.

Quantum supremacy impact

Qubelight's government makes a strategic decision not to share the news of the dramatic development with the rest of the world. Qubelight's processing abilities can impact most things in the world from climate control to food sourcing to life extension to cryptography.

The government decides to focus on energy and the military as the two sectors where it believes it will have the most immediate societal and geo-political impact.

Energy

Qubelight helps the country's biologists design molecules that break down cellulose. This ability gives them a low cost and efficient method to convert cellulose into hydrocarbon substitutes. The country harvests plants that have the ability to grow very fast, Bamboo is a preferred source since it requires land and rain (assets and attributes the country is naturally blessed with). The plants are converted into hydrocarbon substitutes.

The country is now able to meet its own domestic energy demands at a fraction of the cost of the rest of the world. It also decides to market the hydrocarbon substitute globally at a subsidised level versus the prevalent crude and natural gas prices. Within a few years, the host country captures the majority of the global energy market share.

Military

The country's external spy agency uses Qubelight's ability to process information gathered from its satellites. Qubelight gives it the ability to interpret and track movement data to the level of a shadow anywhere on the planet.

This ensures any military assets that belong to adversary countries that are stealth or formative (aircraft, troop movements, submarines) are unable to move or operate anywhere in the world without discovery.

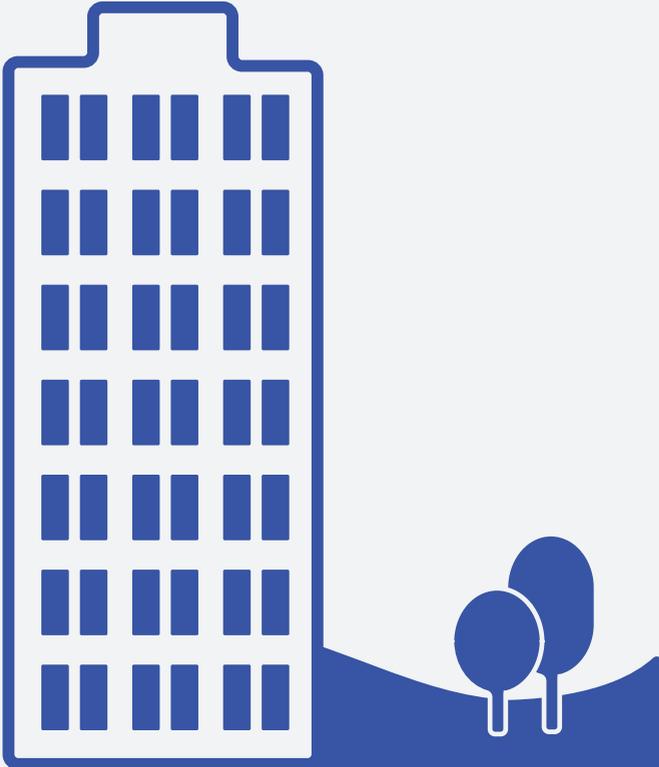
This lopsided technological imbalance cannot be confirmed by foreign spy agencies, but the mere suspicion of it creates major confusion and policy disorder among other governments and military agencies. The geo-political, societal and economic disruptions the world undergoes bears most resemblance to the period in the 18th century when Great Britain's naval superiority changed the contours of the globe.

The development of quantum computing is different to the much talked about artificial intelligence race. AI is most similar to a marathon where the most committed and hardest working generally wins. Rather, the quantum computing contest is most similar to a deadly martial art duel of jujitsu. The one who masters it will immediately pulverise the opponent into submission through confusion, overwhelming force and uncanny accuracy.

In the race for quantum supremacy... the winner takes it all.

Urbanisation: not necessarily an inevitable trend

Henry Allen



Urbanisation appears unstoppable. A record proportion of the global population live in an urban area, and the UN forecasts that by 2030, this share will exceed 60 per cent for the first time. The move towards city living is particularly rapid in the developing world as living standards rise but even in the overwhelmingly-urban industrialised world, people are still moving into urban areas rather than away from them.

Yet a move towards de-urbanisation is not difficult to imagine. Take London for example. In the decade from 1971, the city's population fell by a tenth even as the UK's population as a whole remained steady. Although the population began to rise again from the late-1980s, much of the recent increase has been driven by international migration. In fact, analysing internal migration within England and Wales shows there is actually a net outflow of people from London to elsewhere, and this has doubled since 2012. That suggests people are increasingly keen to move out of, what is by far, the country's largest city.

De-urbanisation has occurred many times in the past across a number of countries. In the 1970s and 1980s, both Germany and Canada saw their urban population shares basically stagnate – in contrast to the upward trends before and since. Even today, South Korea has actually seen its urban population share fall marginally over the last decade.

There are several factors that could support or even accelerate a transition away from urban areas over the coming decade. The first is digitisation, particularly the rise of a 5G economy. This will further reduce the frictions involved in working remotely and, in turn, open up new opportunities to live and work outside of urban areas. These technologies range from advanced video-conference calls to the ability to remotely control machines around the world with close to zero latency.

The other theme that could push de-urbanisation is house prices. These have grown faster than wages in some developed countries over the past several decades. Indeed, living costs in major cities are already encouraging migration away from the big conurbations, although this is still generally outweighed by those moving in.

But if, during the 2020s, house prices diverge further between urban and rural areas, people will find it relatively more attractive to move out of major cities. One factor that could potentially contribute to this is if existing residents become unwilling to support fresh housing developments when their cities have already seen rapid expansion at a time when demand for city-living remains strong. This could lead to further increases in property values as supply fails to keep pace with rising demand.

It is true that future technologies have the potential to make cities less congested places with far cleaner air quality. This could actually support further urbanisation. If governments were to ensure the construction of genuinely affordable homes within commutable distances and invest in better transport connections, the pressure on house prices could be alleviated while workers could spend less time commuting. Recent history, however, shows that it is difficult to gather the political support, both at national and local level, for significant land opening and developments.

So as we look forward to the decade ahead, it seems plausible that the multi-decade trend of ever-greater urbanisation may slow, or even reverse in a number of the advanced economies. In an increasingly inter-connected world, peace and tranquillity could be about to come back into fashion.

The return of unions

Luke Templeman



It is easy to write off unions as a twentieth century phenomenon. After all, the long-term trend for union membership is dire. In the US, just 10.5 per cent of workers are members of a union, about half the proportion who were members in 1983 when data first became available. In the UK, just over 23 per cent of workers are unionised, down from over 32 per cent 25 years ago. Almost every other OECD country shows a similar downwards trend.

But something curious happened last year. Union membership in the UK rose from its rock bottom 23.3 per cent figure the year before. True, an increase in membership has happened a few times over the last quarter century, but each time was during or just after the technology bubble burst or the financial crisis. Last year's uptick occurred with unemployment around its all-time low.

This could well be the bud of a trend that sees the return of union membership and power over the next decade. The gig economy will be one catalyst for the return of unions. Indeed, one report estimates that ten per cent of the UK's labour force is a gig worker, double the proportion from three years ago. Initially, most accepted the lack of entitlements but recent legal cases have shown gig workers that they

can push for more. As such, given they work in disparate locations, they will use technology platforms to unionise.

In the same way that gig-based platforms have made it incredibly easy for consumers to click a button and call a gig worker to do something, gig-companies may find their own technology used against them as it makes it easier for their workers to say, opt into a class action, or carry out any number of industrial actions. These new technology-based unions may not actually be unions in the existing legal sense, but they will 'disrupt' existing unions as they will not have the legacy issues that can turn off some young workers. They will organise themselves on dedicated social platforms and give members the ability to make immediate decisions about what they want to pursue.

This push will be led by young people. Initially, that may seem strange given that under five per cent of the youngest workers in both the US and UK are members of unions. But consider that young people are the most likely to be gig workers. By one estimate, the youth (those under 24 years old) comprise about one-third of gig economy workers in the UK, while two thirds are under 34 years of age. This may already be starting. Last year, union membership for 16-19

year olds surged by 60 per cent. This was from a low base but given it was the biggest one-year jump in membership of any age group in any year in at least a quarter of a century, it should not be ignored.

The final trend that will deepen over the coming decade and encourage union membership is the increase in worker power. Indeed, the last few decades witnessed three massive dislocations that suppressed the power of workers and made many fear union membership. China opened its economy, India liberalised its, and the Soviet Union collapsed. Together, this unleashed a billion cheap workers onto the world economy and helped suppress wages elsewhere in the world. This phenomenon is waning, as wage increases in China attest.

Now these workers are embedded in the world economy, labour will regain at least some of its lost power over the next decade. Once workers realise they have some power, they will push for more, and technology-based unions will be the easiest platform for this. By 2030, union membership may look very different from what it does today, but expect it to be far, far more powerful.

The six-hour work day

Luke Templeman



The composition of working households may have changed dramatically over the last 50 years but the standard expectation of the eight-hour work day has not. Consider that five decades ago, under half of UK working households were dual-income. Today 70 per cent are dual income. Similar trends exist in other developed countries.

Yet, while households now give far more labour to the economy, they do not believe they are receiving fair compensation. True, they are richer. In real terms, the average UK working household has more than doubled its disposable income over the last 40 years. Yet, house prices relative to that income have also doubled, and dual-income households also bear childcare costs.

No wonder Eurobarometer reports that UK 'satisfaction with life' is only eight percentage points higher than it was over 40 years ago. In part, this is because the eight hour work day, which gained acceptance a century ago, does not account for women in the workforce, widespread tertiary education, healthcare advances, and digital technology.

The 2020s could be the decade when workers finally formalise the oft-discussed six-hour work day. Driving this call will be the power that labour begins to regain now that the global workforce has absorbed the billion new workers unleashed upon it over the last four decades from the opening of China, India, and the Soviet Union. Furthermore, those who can most afford to negotiate for their labour – the wealthy – are the most incentivised to do so. The top half of the richest working households overwhelmingly send two people to work each day.

The six-hour work day will begin in professional or office roles that are not client facing. Once proven, it will gain acceptance in wider society. Customer-facing businesses with set hours will switch to two shifts a day with higher wages per hour, something easily absorbed by the current high level of corporate profit margins. Those who fear the additional costs should relax. This has been the standard push-back against every iteration of progress in workers' rights over the last two centuries.

As adoption becomes widespread, employers will benefit. The recent Swedish six-hour work day trial saw lower sick leave, higher productivity, and happier customers. It will also help placate the more than 40 per cent of workers who say their current role does not accommodate the flexible working conditions they would like.

Most importantly, employees will end up in more efficient jobs. Indeed today, 10 per cent of workers have said 'no' to a promotion for work-life reasons, while almost 20 per cent have put off applying for a new job for that reason. Meanwhile, almost 15 per cent say they are specifically looking for a job that better supports working parents. In fact, the six-hour work day may end up being one thing that turns around stubbornly low productivity.

The return of philosophy and language degrees

Luke Templeman

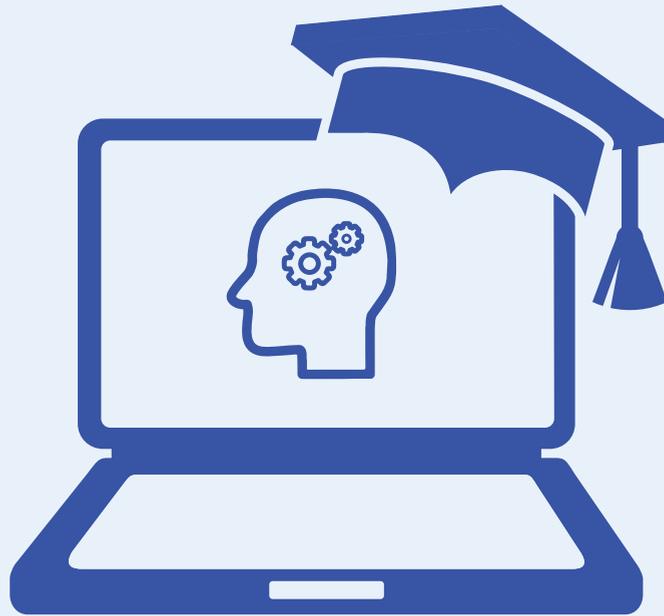
If artificial intelligence becomes the biggest technological development of the 2020s, then it seems logical that students studying technology will be the most in-demand graduates. That will merely continue the current trend. Indeed, the number of British university students studying mathematics has jumped over one-quarter in the last decade, while the number of students studying engineering and technology has jumped one-fifth.

Yet, the 2020s may see philosophy and languages become the choice degree for those wanting to work at the cutting edge of AI. The supply of these graduates is already limited. Those studying philosophy and history have dropped a tenth over the last decade, while language students have dropped a fifth.

The demand for graduates skilled in sophisticated decision making and cultural and language nuances will be driven by AI's biggest

problem. Even the most basic machine learning has so far stumbled over moral problems. Consider some of the simple AI programmes already trialled. An Amazon AI resume screening tool learnt gender bias. The US Compass system exhibited significant racial bias when deciding which inmates to recommend for parole. Meanwhile, Microsoft's chatbot Tay went bonkers in the 16 hours it was live.

So, if decision making for basic AI is so hard, the development of more sophisticated applications will require developers with serious moral and decision making skills. Take, for example, the autonomous car that is forced to choose between killing a child on the road or the occupants of the vehicle. Should it change its decision-making process once it crosses international lines? After all, studies show that some cultures will prioritise the child on the road, while others will prioritise the occupants of the vehicle.



As AI grows, the trickiest development issue will be how it answers impossible moral questions while accounting for different moral and cultural norms. For AI chief executives, the stakes are high. When something inevitably goes wrong, they will be the ones justifying their product to Congressional investigators.

Already, some AI developers have had trouble pitching their services to firms that operate in highly-regulated environments, such as finance. The unpredictable nature of machine learning means it is not always easy for technology-trained developers to justify the conclusions of their systems. Thus, finance clients fear being questioned by regulators on something they cannot explain.

So the in-demand graduates of the 2020s may be those with philosophy and language degrees that are currently unfashionable. Of course, sociologists and anthropologists will be involved.

But they study what the human condition as it *is*, rather than how it *should* be. This is what AI programmes will have to decide and it is why people with these skills will be paid well to answer the big questions about how AI should think and develop standards with regulators. Whether different countries can agree on those standards is another matter. But it is one that will only boost the demand for graduates with philosophical and language skills.

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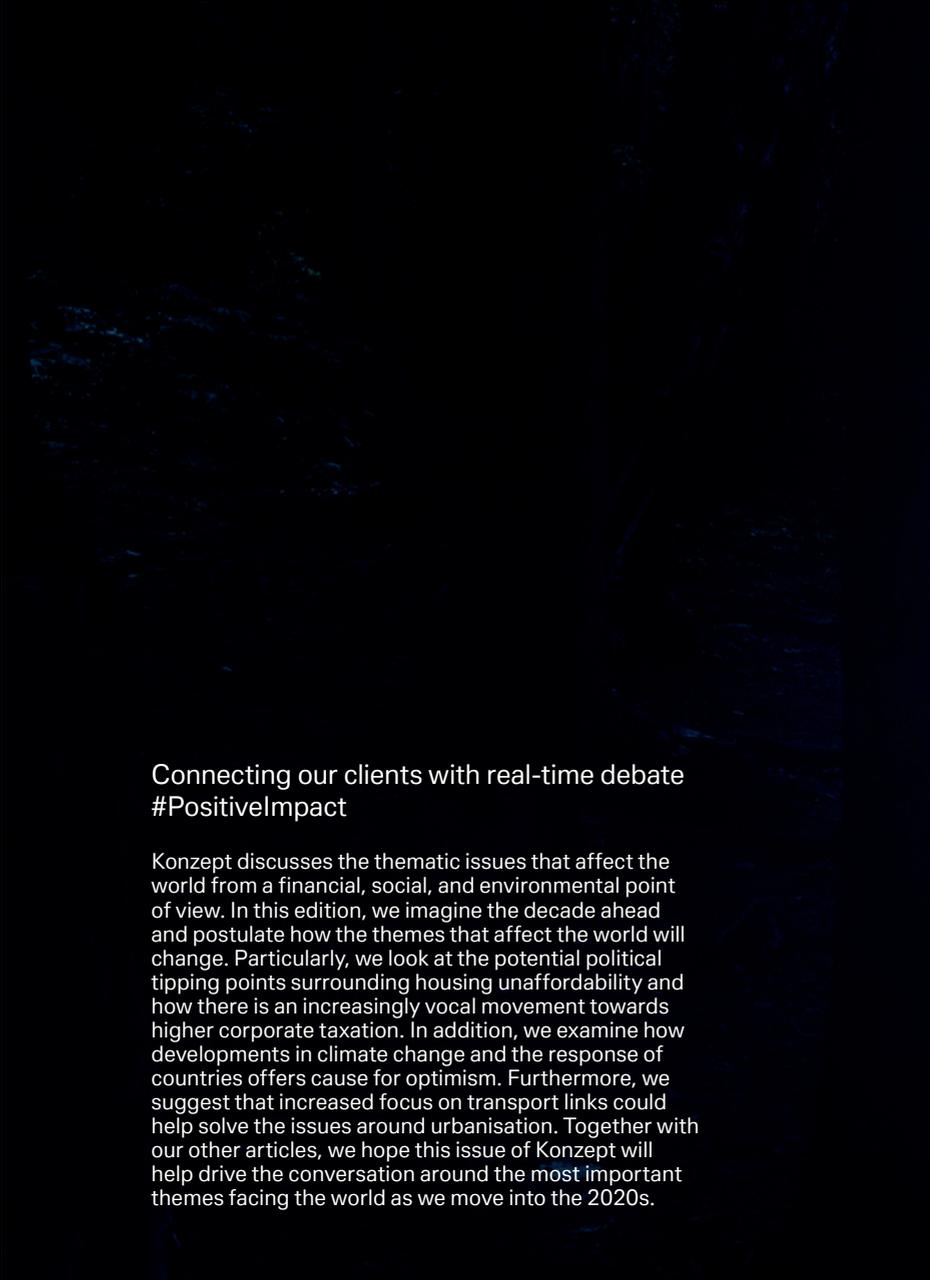
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Konzept discusses the thematic issues that affect the world from a financial, social, and environmental point of view. In this edition, we imagine the decade ahead and postulate how the themes that affect the world will change. Particularly, we look at the potential political tipping points surrounding housing unaffordability and how there is an increasingly vocal movement towards higher corporate taxation. In addition, we examine how developments in climate change and the response of countries offers cause for optimism. Furthermore, we suggest that increased focus on transport links could help solve the issues around urbanisation. Together with our other articles, we hope this issue of Konzept will help drive the conversation around the most important themes facing the world as we move into the 2020s.

