Private
Clients

See beyond: thematic investing

August 2020

BARCLAYS

Foreword

Some structural and transversal, long-term themes are changing society in a meaningful and sometimes irreversible way. Those trends not only impact our daily life but also the way we should think about investing for the long term. In this report, we highlight four themes that we believe will shape our society and shape investment opportunities over the next decade: 1) Globalisation reversion; 2) Demographic shifts; 3) Smart everything; and 4) Building a sustainable world. The themes' impacts should be considered when thinking about portfolio construction, cross-asset allocations and intra-asset selections.

A reversal of globalisation is occurring and the change in the world order is likely to create uncertainty. And the pandemic can only complicate planning by businesses and policymakers. As such, planning long-term investment and policy decisions may be far more difficult. With high uncertainty and low convictions, the use of volatility as an asset class and the need for a well-diversified portfolio to mitigate the uncertainty factor looks set to be more crucial than ever.

Understanding how changing demographics are likely to affect how people work, live and age can be crucial to prospering from demographic shifts. The last decade has seen the world's over 65 year olds grow as a proportion of the global population. This seems set to soar further this century, aided by better living standards and healthcare, especially in emerging economies. Similarly, moves to a fairer, more inclusive society are likely to gain more traction.

Smartphones triggered the birth of "smart everything" in a more interconnected world. A world that will soon become far more connected via smart cities and autonomous cars to name but two. Smart devices are likely to create opportunities in many sectors, not just technology. This revolution will take place over years, periodically reshuffling the winners and losers and requiring investors to remain active to navigate an ever-changing environment.

Climate breakdown, structural inequalities and resource scarcity are among urgent social and environmental challenges facing the world. Confronting these interconnected issues will take decades and trillions of dollars of investment. The political will to promote green, "smart" initiatives seems to be growing. Indeed, organisations providing commercial solutions to this issue often do so in rapidly growing markets. And, with many investors, especially millennials, increasingly considering sustainable investments, the future looks green.

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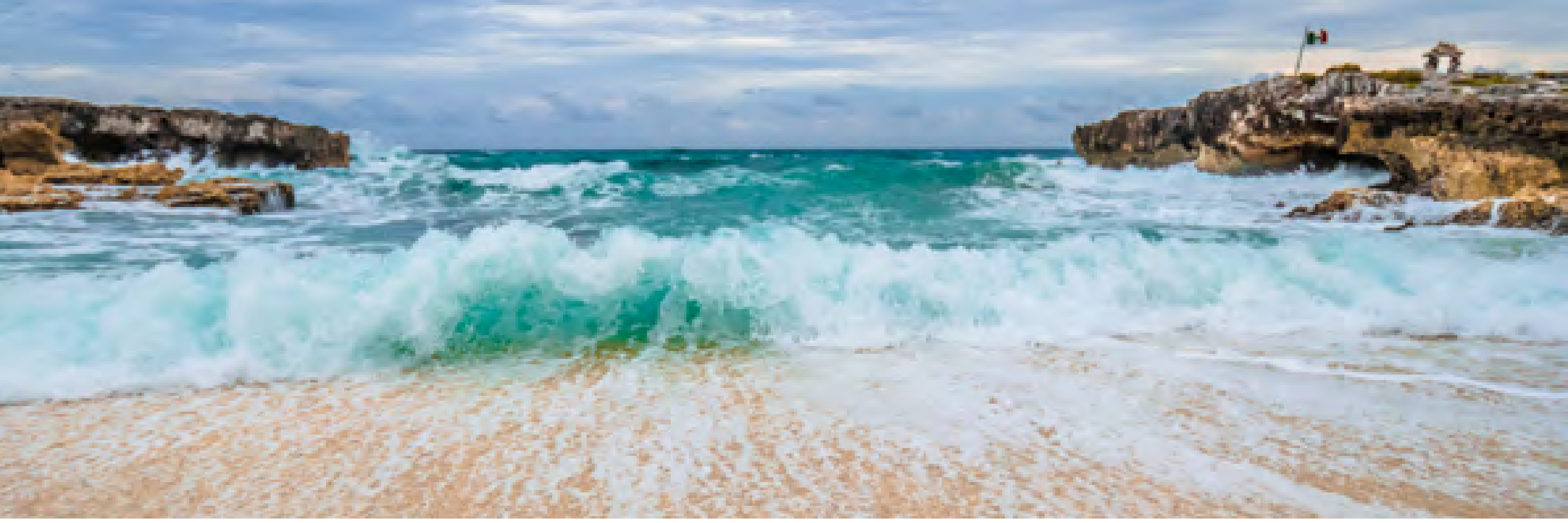

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Globalisation's ebb and flow

The pandemic may accelerate the reversion in globalisation seen of late. The trend is likely to partially localise supply chains, alter public spending priorities, increase inflation and hit profit margins. The impact on portfolio allocations may be profound. Finding investments likely to profit from this switch appears key.

Globalisation is not a new phenomenon. Through the past two centuries, there have been periods when the world was "open" for international trade, and other periods during which the world was "closed". But the past 30 years have seen a level of interconnection, and cross-border trade, never experienced before (see figure 1).

Several factors explain the period of deep globalisation seen since 1990:

- The fall of communism: with capitalism expanding almost everywhere under one form or the other, the world was no longer as fragmented around political beliefs.
- The lack of global conflicts: globalisation retreated during periods of large conflicts, such as the first and second world wars in the last century.
- Increased international cooperation: In the wake of the last world war, the General Agreement on Tariffs and Trade set up an initial framework to foster trade and exchange between countries. The liberalisation of trade led to the creation of the World Trade Organisation (WTO) in 1995.
- Lower transportation costs and new means of communication via technology, such as the internet.

However, the latest globalisation cycle probably peaked a few years ago. The growth in trade, which typically only underperforms economic growth in recessionary episodes, has been weaker since the recovery following the 2008/2009 global recession (see figure 2). Part of the shift in the regime is endogenous to the globalisation phenomenon, while policy shifts have played a part.

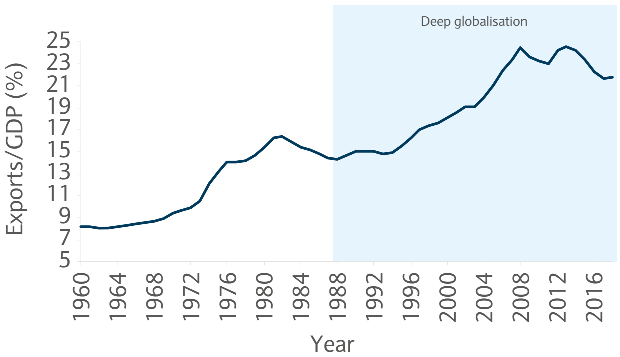
Reasons for a reversal of globalisation

1. Less attractive cost differential

The increase in globalisation resulted in large parts of the production chain moving from the developed world to

Figure 1: The global economy entered a deep globalisation phase in the 1990s

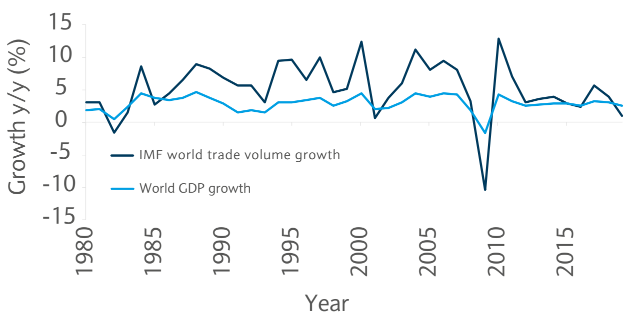
Global trade, as measured by exports relative to gross domestic product, between 1960 and 2016 reflects how open or closed economies have been for business



Source: Barclays research, Barclays Private Bank

Figure 2: Expansion in world trade relative to gross domestic product growth

The trends in world trade growth and output growth, in constant prices, between 1981 and 2020



Source: Datastream Refinitiv, Barclays Private Bank

Figure 3: Globalisation increased competition for less-qualified workers in the developed world
The growth in the global workforce, scaled by export to GDP ratios, between 1980 and 2005 split by workers with university-led education ("more educated"), or without it ("less educated")

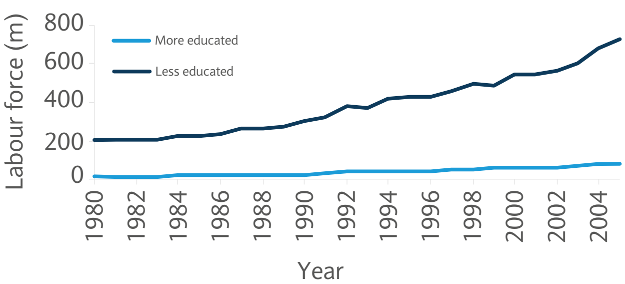
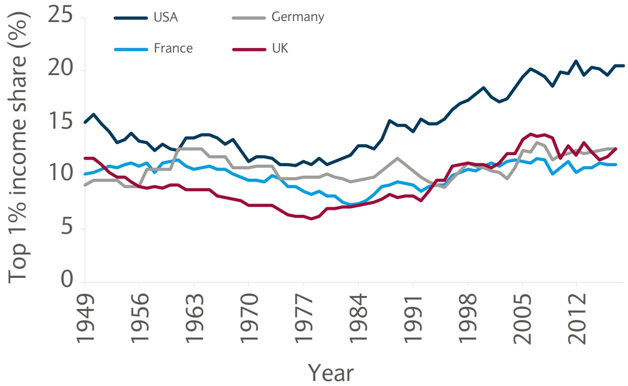


Figure 4: Widening income disparities seem to be stemming from globalisation
The share of total income earned by the richest one percent of earners has expanded since the 1980s, after shrinking in the preceding three decades



Source: Barclays research, Barclays Private Bank

elsewhere. With the opening up of large areas, such as China and the former Soviet bloc, companies gained access to a new, deeper pool of cheap labour.

From an economic perspective, increased globalisation put downward pressure on inflation as costs of production fell. It also helped to reduce inequality between the developed economies and the emerging ones through a large flow of investments from the former to the latter. But that attractiveness seems to have largely run its course for now.

"Increased globalisation put downward pressure on inflation as costs of production fell"

The difference in the cost of producing goods between developed and emerging markets has narrowed in recent decades. For instance, manufacturing wages in China, Korea and Hong Kong, as a percentage of US wages, have shot up to 60-70% today from 10-20% in 1970 (see figure 3).

2. Pressure from disenfranchised voters in the west
The flip-side of shifting unskilled work from the developed to the emerging world has been more inequality in the former.

While the services sector, which generally requires highly skilled workers, has grown in Europe and the US, manufacturing jobs, typically more labour-intensive with a lower skillset required, were moving out of those regions. It contributed partly to the increase in inequality and social tensions seen in the developed world during the period of deep globalisation (see figure 4). More lately, this turn of events resulted in a backlash towards liberal governments and a rise in populist politicians castigating the rise of globalisation and adopting more protectionist policies.

3. Rise of China and other large emerging markets
China joining the WTO in 2001 was hailed as a milestone for the world economy. By contrast, the country's subsequent impressive growth over the past two decades has created tensions and fears, especially in the developed world.

China accounts for 14% of global exports, well ahead of the US and Europe. The nation is now the second largest economy. Its ascent to an economic superpower has been accompanied by much more investment in strategic technologies. The vying for global power between the west and China, and bouts of heightened tensions between the two, is less conducive to international cooperation and globalisation-friendly policies in general (see figure 5, p6).

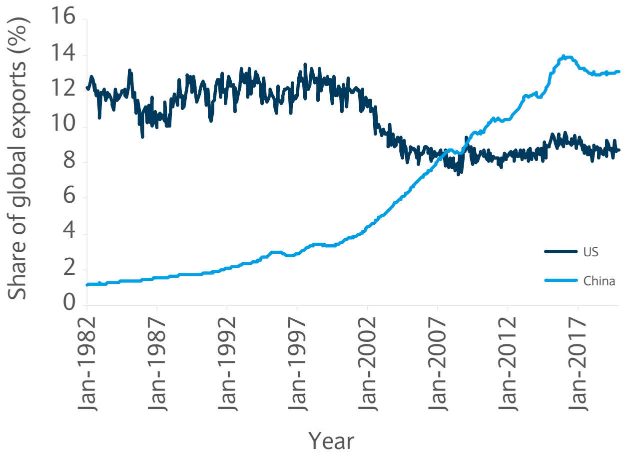
"The vying for global power between the west and China…is less conducive to international cooperation and globalisation-friendly policies"

4. COVID-19 exposes supply-chain issues
This year's COVID-19 pandemic could lead to more protectionism and accelerate the recent reversal of globalisation.

> "This year's COVID-19 pandemic could lead to more protectionism and accelerate the recent reversal of globalisation"

With the world entering containment phases at different times, it exposed how dependent many economies had become on other economies. Indeed, the pandemic has illustrated the potential fragility of supply chains that rely heavily on goods produced abroad to sudden spikes in demand or abrupt stop in production. This economic vulnerability could be a cause for concern when thinking about economic security and lead to an arbitrage in favour of safety over profit when planning supply-chain investments.

Figure 5: China's surging share of global trade
China's share of global exports has rocketed in the four decades since 1980, while the US's share has slumped



Source: Barclays research, Barclays Private Bank

But don't expect the end of globalisation
While globalisation is receding from extremely elevated levels, a complete reversal of the last 30 years is highly unlikely. The reasons why include the following:

1) Increased pressure on profit margins
The lower labour costs and tariffs seen in recent decades have contributed to a structural improvement in profit margins. Other elements, such as increased automation and technological developments, also contributed to higher margins, but globalisation cannot be ignored.

The on-shoring of all production is highly unlikely as it would create unsurmountable organisational challenges. And while in certain cases resilience will be preferred over lower costs, for some companies with already low margins, the on-shoring of supply chains is not financially viable.

2) More diversified supply chains
The most likely short-term effect is more diversified supply sources. For sectors relying heavily on low-skill labour, this seems the most likely outcome. With most of the initial factors which triggered the rise in globalisation in the last 30 years still in place, a full reversal is unlikely.

> "While globalisation is receding from extremely elevated levels, a complete reversal of the last 30 years is highly unlikely"

As a matter of fact, large cooperation treaties are still being signed. For instance, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, a trade agreement between 11 countries representing around 13% of global gross domestic product, which came into force in December 2018.

3) The rise of local champions
"Globalisation reversion" is likely to be more visible in sectors deemed strategically important, such as where the intellectual property is a significant element. For those sectors, which are likely to influence the balance of power over the next decade, policy actions could drive some on-shoring.

Measures such as subsidies, tax incentives, government contracts and foreign investment controls when technology transfer could be involved are all potential incentives states could use to trigger on-shoring. In turn, this could lead to the development of "local champions" in key technologies such as artificial intelligence or 5G.

What does globalisation reversion mean from an investment perspective?

1. Investment, inflation, interest rates
The new paradigm of globalisation reversion could translate into higher investment, inflation and subsequently higher interest rates. A partial on-shoring of production would mean more investments in research and development and automation to increase productivity and mitigate the additional costs of on-shoring supply chains.

And with the world moving from cooperation and towards more competition between large regional powers, investment in key technologies and infrastructure should continue to ramp up. China has already started large infrastructure investment, notably around its One Belt, One Road initiative. In addition, a potential restriction on free capital circulation could lead to inflation and higher interest rates in a few years.

2. Real assets making a come back
Globalisation was a strong positive force for equities and bonds, translating into higher corporate margins, weaker inflation and lower interest rates. In a nutshell, it was favourable for financial assets and asset-light companies. Globalisation reversion could lead to outperformance for equities, gold and other commodities as well as infrastructure and other real assets over pure financial and nominal assets such as fixed income.

3. Creation of local champions, more fragmented markets
Strategic sectors such as technology, defence or healthcare are likely to get government support to create domestic organisations that can compete for global leadership. But this could also mean lower market shares, more fragmented sectors and higher barriers to entry.

4. Uncertainty, uncertainty and uncertainty
Since the 1990s, more international cooperation and economic alignment helped to reduce uncertainty in forecasting the economic cycle. But with a weaker globalisation impulse, macro volatility is likely to fluctuate around elevated levels.

The use of trade tariffs and other barriers to entry by governments means that long-term visibility when planning any kind of investment decision is limited. As such, sustained periods of heightened uncertainty should be included into any investment decisions. The use of volatility as an asset class and the need for a well-diversified portfolio to mitigate the uncertainty factor is likely to be more crucial than ever.

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Opportunities in shifting demographics

Aging populations and other demographic megatrends appear set to reshape the world. Not least in a shift to a more inclusive society. Long-term investors gaining exposure to this trend in their portfolios might enhance returns while making a positive difference.

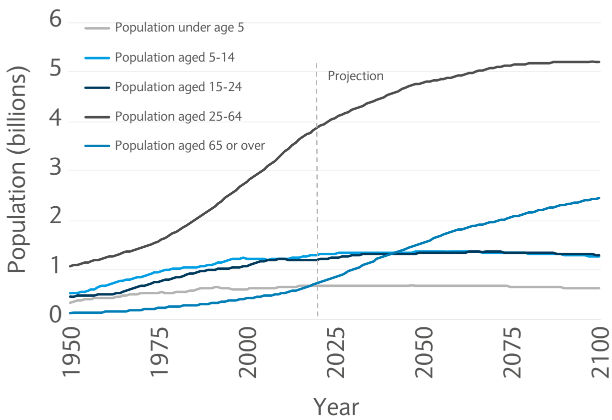
Investors seeking to benefit from long-term trends should consider the maxim that "demography is destiny". With changing demographics, across age, geography and gender, the world will look considerably different.

Investors can find opportunities by understanding how demographic shifts will change the nature of how we work, live and age as well as how power and wealth shift between the groups. For this, we consider five main demographic trends to look at the shape the next few decades might take.

Aging populations

The world's population is growing older, with the number of over-65s expanding the fastest (see figure 1). According to the UN's World Population Prospects 2019, one in six people will be at least 65 years old (16%) by 2050, up from one in 11 in 2019 (9%). By 2050, one in four persons living in Europe and Northern America could be aged 65 or over. Furthermore, those that are 80 years or over are expected to triple to 426m in 2050 from 143m in 2019.

Figure 1: World's population is aging
Global population trends by age group between 1950 and 2100



Source: *Projected global population according to the medium-variant projection, United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019. *excluding Australia and New Zealand

The longevity and consumption power of an aging population should provide opportunities for investors who can ride this wave of demographic trends. Among other things, increasing longevity has been due to improvements in sanitation and healthcare practices, lower infant mortality and fewer births. However, the next phase of increasing longevity is likely to be shaped by technology and ever-improving healthcare.

> "The next phase of increasing longevity is likely to be shaped by technology and ever-improving healthcare"

Heathcare opportunities

Overall, increased life expectancy is boosting the population of older, healthier individuals and should drive significant growth in the healthcare market. According to the Organisation of Economic Cooperation and Development (OECD), healthcare spending is set to increase to 12% of gross domestic product in 2060 in developed economies and to triple in emerging markets.

Investors can gain exposure to companies engaged in health-related products and services, pharmaceuticals, biotech, medtech and other technologies that address chronic and age-related illnesses. Investing in these industries should allow portfolios to be well-positioned to profit from rising life expectancy trends – directly through health-related products and services or indirectly via technology and artificial intelligence businesses.

In addition, older generations collectively control a significant share of global wealth and have considerable spending power that has the potential to alter the global economy by the generation living longer and healthy lives.

We expect healthy-living industries, sustainable travel and tourism, and financial services to see a substantial boost.

Investors might consider opportunities that look beyond health and contemplate the increased vitality and new consumption patterns of the aging population, as well as how such lifestyles will be funded.

The next generation's turn

Moving to younger generations, millennials and generation Z (Gen Z) also stand to change the global economy. When thinking about investing, much of future growth seems to lie with these two cohorts.

> "The two generations (millenials and Gen Z] hold much purchasing power and are also poised to receive more than $30-68 trillion during the "great wealth transfer", passed down by the Baby Boomers"

Millenials, which may be thought of as those born between 1981 and 1996, currently make up most of the workforce. They are known for being digitally connected and for wanting new experiences, work-life balance, social collaboration and prefer to invest in alignment with their personal values. Born since 1997, Gen Z are only just entering the workforce, however, are also technologically savvy, entrepreneurial, pragmatic and value diversity and more sustainable life in general.

Millennials and Gen Z make their mark

The two generations hold much purchasing power and may be poised to receive $30-68 trillion during the "great wealth transfer", passed down by the Baby Boomers. Due to the inevitable intergenerational wealth transfer, their sizeable population and investment preferences, millennials and Gen Z will significantly disrupt the industry and the future of investments.

According to various studies, more than 80% of millennials and Gen Z select financial assets that align with their values and support sustainable investments. Besides integrating their investments with technologies, young investors tend to value products catering to their social and environmental values. Furthermore, they expect them to be delivered by companies that provide clear and transparent communications about their actions and policies.

Given this transfer, there seems a big opportunity for companies that consider wider stakeholder groups and those able to meet the sustainability preferences of this cohort.

Emerging market population growth

Over the coming years, emerging markets will increasingly be the primary contributors to global growth and wealth accumulation. This follows relatively sustained economic growth, an expansion of the middle class benefiting from increased wages and more ability to save and invest.

The OECD estimates that middle-class spending in emerging markets will increase to nearly 70% of global consumption by 2050, from 25% in 2009. As such, consumption is likely to be increasingly dominated by the middle class in emerging markets, especially as this group is expected to reach 4.9bn by 2030.

> "The OECD estimates that middle-class spending in emerging markets will increase to nearly 70% of global consumption by 2050, from 25% in 2009"

In the past decade, emerging economies with abundant natural resources (Russia and Kazakhstan) or large populations (Brazil, India and China) have come to prominence. These areas have tended to be dominated by agriculture and low-cost, labour-intensive industries. However, these trends will probably lose influence, as demographics, urbanisation and innovation play a larger role in prospects for countries in coming decades.

Profiting from the digital revolution

New technologies are changing the way various organisations interact with each other. Emerging markets have become home to some of the world's most innovative companies. The digital revolution has given birth to some industries and leapfrog technologies, such as fintech and artificial intelligence, that along with the data gold mine offered by the internet-of-things might refashion societies considerably. The prospect of more streamlined communications, efficient production and greater productivity seems set to create fresh investment opportunities.

"The prospect of more streamlined communications, efficient production and greater productivity seems set to create fresh investment opportunities"

Emerging markets are set to continue growing faster than advanced economies, with inflation at low and manageable levels and with accumulated wealth, and a rich, expanding middle class.

Active management and selection appear key to capturing alpha from emerging market opportunities, especially given that volatility may be higher over some periods of time. The prospects on offer in EM, with its relative discount to developed markets, makes the asset class a long-term component that investors should consider when structuring portfolios.

Rise of female empowerment

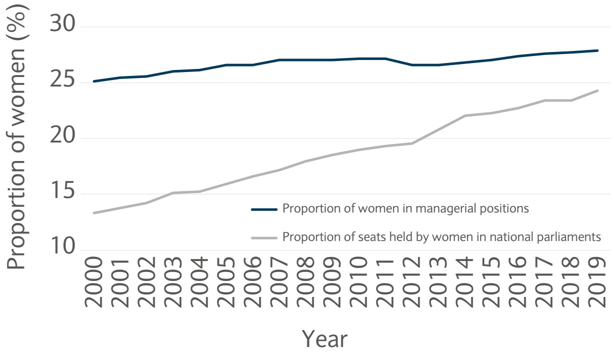
Improving gender equity and empowering women around the world is not just an altruistic pursuit; it can also increase economic growth, bolster well-being to all stakeholders and create new investment opportunities.

Gender inequality is not only a pressing social issue, but the lost economic opportunity embedded in it is also profound. According to a McKinsey & Company study, achieving gender equality in the labour market could boost global annual GDP by $12 trillion by 2025. These issues have driven much of the growth in various investment opportunities that are not only impact-driven and address gender inequality, but also generate returns attributed to the faster economic growth associated with gender equity.

"Achieving gender equality in the labour market could boost global annual GDP by $12 trillion by 2025"

So-called gender-lens investing is one approach that investors can consider. One that has quickly gained traction. It is the practice of investing for financial return through the lens of female empowerment. It is an investing approach that deliberately incorporates the desire to make a difference in the lives of women, takes into consideration the power of their leadership and the solutions to challenges females may face. As defined by the Global Impact Investing Network, this is done through investing in:

Figure 2: Proportion of women leaders on the rise
Proportion of women managers or with seats in national parliaments since 2000



Source: UN Global SDG Indicators Database, Goal 5 Achieve gender equality and empower all women and girls

- women-owned or led enterprises
- enterprises promoting workplace equity
- enterprises offering products or services that substantially improve the lives of women and girls

Empowerment: profitability and returns

Despite underrepresentation in the workforce and in legislatures (see figure 2), positively empowering women can improve society and the economy and may boost a company's profitability and return on investment.

When tackling gender equality and its impact on growth through entrepreneurship, it is beneficial to this objective to get more women involved. Especially as research finds that women entrepreneurs appear more purpose-driven and may be more often motivated to start or run a business to make a difference in the world. In turn, this could make a difference to the success of these businesses.

Indeed, many governments and organisations around the world now regard entrepreneurship as a vital part to promoting women's empowerment and helping to find business solutions to the world's social and environmental challenges.

Entreneurship initiatives

In the UK, advancing female entrepreneurship represents a £250 billion opportunity for the economy, according to the

[1] "Gender" lens investing seeks to be inclusionary and to positively affect every member of society. While this note may refer to cisgender of women and girls, some investors may define gender differently and have varying objectives.

Alison Rose Review of Female Entrepreneurship. However, despite the UK being the start-up capital of Europe, only 5.6% of women run their own companies. This compares with almost 15% of women in Canada and 11% in the US. Furthermore, the group is also underrepresented in the most productive, high-value sectors such as financial services, IT and communications, and manufacturing.

Female entrepreneurs face barriers such as access to funding, risk awareness, primary care responsibilities and perception of skills. Even so, efforts similar to adopting the Investing in Women Code by 22 financial institutions and establishing local enterprise partnerships across the UK should allow women to take a stronger and more robust role in the economy.

"Despite the UK being the start-up capital of Europe, only 5.6% of women run their own companies"

Diversity and social equity

Organisations are facing a turning point – consumers and employees are now looking for more than the standard corporate social responsibility and diversity, equity and inclusion practices promoted over past decades. There appears to be a growing expectation that companies have more of a role and responsibility for social equity[2] as well as a wider group of stakeholders in society, such as employees, customers, the community and shareholders.

As companies demonstrate greater awareness and aim to consider the range of their stakeholders, they can help meet this fundamental shift driving a growing desire from employees and consumers to better reflect social equity and diversity.

Diversity can pay dividends

Research shows that diversity brings various advantages to organisations, including increased profitability, stronger governance and better problem-solving abilities. Executive teams ranking in the top 25% for racial and ethnic diversity were 33% more likely to gain financial returns above the national median for their industries, according to studies by consultancy McKinsey & Company. Executive teams that embraced gender diversity were also more competitive and 21% more likely to experience above-average profitability, with a 27% likelihood of outperforming their peers on longer-term value creation.

Furthermore, there is a real economic opportunity to be gained from creating more inclusive economies. It has been estimated that closing the gender gap entirely would add $28 trillion to the value of the global economy by 2025.

"Closing the gender gap entirely would add $28 trillion to the value of the global economy by 2025"

Grabbing the opportunity

Many consumers and other stakeholders want companies to embed diversity and social equity in the organisation, rather than making it a marketing strategy and box-ticking exercise. It comes as no surprise then that the number of businesses wanting to both support their employees and upskill their workforce around diversity and inclusivity is unprecedented.

Companies cannot afford to do nothing, as reputational risks could have adverse financial consequences. Furthermore, investors also should consider the growing importance of the above fundamental shift when selecting their investments.

Investors genuinely committed to diversity and equity – not only in the world around them but also within their investment portfolio – should invest accordingly. In doing so, they may contribute to a healthier and mutually beneficial relationship between businesses and the communities in which they interact.

[2] Social equity promotes fair treatment and equality of opportunity plus access for all in areas such as civil rights, freedom of speech, education, financial systems and healthy and safe communities, regardless of a person's background.

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From smartphones to smart cities

Smartphones have radically changed behaviour while generating vast amounts of data. The rise of smart cities and interconnected devices looks set to produce more data, change production methods and help battle climate change. In turn, creating attractive opportunities for businesses and investors in coming decades.

Although there is some debate as to when the first smartphone was released (IBM's Simon Personal Communicator in 1994 or Apple's iPhone in 2007), since then this market has experienced tremendous growth.

> "More than 3bn smartphones are in use today and by 2025 72% of all internet users are expected to solely use smartphones to access the internet"

While it took colour televisions close to 40 years to reach almost every single household in the US, it took smartphones just about 10 years to achieve a similar level of penetration.

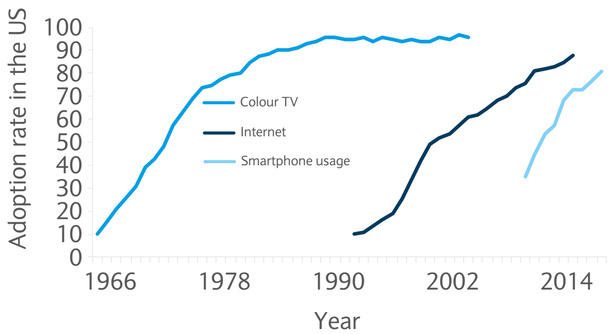
As a result, according to researcher Statisa, globally, more than 3bn smartphones are in use today and by 2025 72% of all internet users are expected to solely use smartphones to access the internet, predicts the World Advertising Research Center.

But phones are not the only object to have become "smart". Over the last 10 years, everything from cars to appliances and from notebooks to cities have been dubbed smart. The main factor allowing our surroundings to develop a form of intelligence has been the relentless improvement in connectivity.

Connecting devices and the promise of 5G

While the first generation of mobile networks (also known as 1G) could only transmit at a rate of 2.4 kilobits per second (kbps), today's fourth generation networks allow us to stream video at speeds that are 40 thousand times faster. 5G, which is set to be rolled out globally in the coming years, will allow a further tenfold increase in transmission speeds while reducing latency – or the usual lag experienced by users – to just one millisecond (vs. 50ms with 4G). This is, in many cases, faster than what is achieved via a traditional wifi network.

Figure 1: Smartphone usage surges
Trend in colour television, internet and smartphone usage in the US since 1966



Sources: Our World In Data, Barcays Private Bank. July 2020

This increase and improved connectivity means that by the end of this year, more than 20bn devices may be connected in what is now referred to as the Internet of Things (IoT). Within 10 years this number could be multiplied by 10, claims Cisco. But the IoT may only be the tip of this gigantic iceberg.

Indeed, once connected, all these devices have the potential to revolutionise the way we live. This is because with connection comes data and with it knowledge that was until now inaccessible. If put to good use, this information won't just enable us to switch off our lights from our phones, it could change the way we learn, communicate, move, produce, heal or build.

Smart cities

At the heart of this revolution lies smart cities. Urban areas concentrate around 85% of global economic activity, according to the World Bank, a number that is set to increase as the world's population keeps growing. Cities are complex ecosystems, touching on most aspects of our lives. They also need modernisation to be able to cope with increasing demographic pressures, both societal and environmental.

This means that not only buildings need to become smarter but the infrastructure surrounding them as well, as the way people move in and around them needs to evolve too.

Within smart cities, economic production will also change. Indeed, both manufacturing and services will be more connected. In factories, production lines which have relied increasingly on robots to perform repetitive tasks, are becoming fully automated and able to monitor, adjust and sometimes repair themselves. This revolution, often referred to as the "industry 4.0", will likely have far-reaching implications: workers will need to develop new skills and consumption patterns could change as hyper-customisation becomes the norm.

Similarly, services which were traditionally seen as "people businesses" have started to replace social interactions with digital ones. You can now book a trip, open a bank account or do your weekly grocery shopping without having to interact with anything other than your mobile phone. Even governments, the single largest provider of services, are increasingly relying on technology to perform their core tasks such as ensuring public safety or granting access to energy or healthcare.

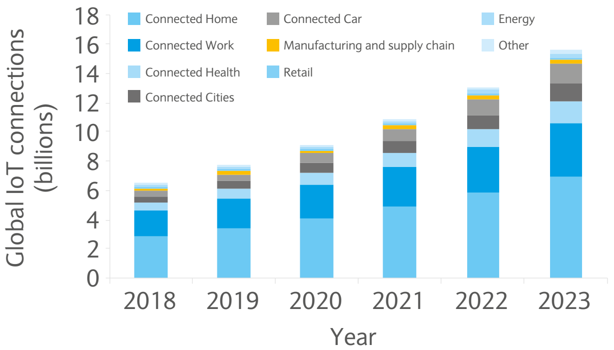
Vast data-sharing opportunities

The opportunities emerging from a smarter world are countless and putting numbers around them is difficult. In 2019, US-based Zion Market Research estimated the size of the IoT market in smart cities. According to their projections, this slice of the overall pie could grow from $79bn in 2018 to more than $330bn by 2025, a 23% compound annual growth rate. In a previous study, they found that the total smart city market would reach $2.7 trillion by 2024, more than 10% of the US economy. But this does not necessarily include the externalities associated with developing a smarter world.

Indeed, a key tenet to building a smart world is the willingness for users to share information. Without this critical piece, the myriad applications just discussed might disappear. In this context, the comfort brought by more efficient processes may be a strong incentive, but the desire for privacy appears even stronger. As such, the demand for cybersecurity will also likely grow exponentially while regulators will need to adjust the legal framework to avoid abuse and promote confidence in the system.

Figure 2: Internet of things connections set to grow at 20% a year

The number of connections made via the internet of things in various areas since 2018 and forecast to occur up to 2023



Sources: Cisco, Barcays Private Bank. July 2020

> "US-based Zion Market Research estimated that the total smart city market would reach $2.7 trillion by 2024, more than 10% of the US economy"

At the same time, the transition to a smarter world can't be done without consideration for other key challenges faced by the human race, chief among which is climate change. A smarter world can be more efficient, frugal and sustainable and so could help to tackle environmental risks. Yet, it could also significantly contribute to green gas emissions. Indeed, data centres, the brain of the smart world, produce the same carbon footprint as the entire aviation industry. While more efficient alternatives are being developed, this highlights the need to consider the whole picture and not just the growth potential.

> "The theme of "smart everything" is a vast and varied hunting ground"

Rich hunting ground

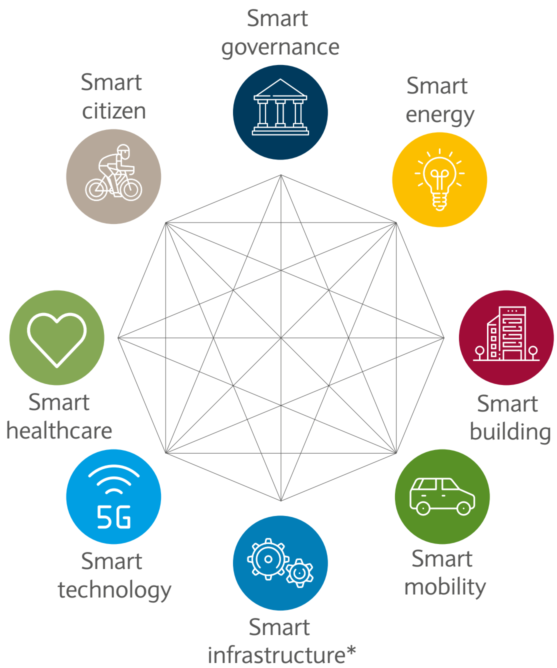
From an investment perspective, the theme of "smart everything" is a vast and varied hunting ground. As we've eluded to earlier, almost every single aspect of our lives could be impacted by this transition which is likely to take place over years if not decades. As such, we would expect various sectors to be impacted in waves rather than all at once.

In this context, we believe that one should take an active approach, identifying the sub-themes that are most relevant at a particular point in time.

Many people may "drive" autonomous electric cars one day, but currently the communication network is just being laid out so as to allow fast enough data transmission to make sure such car won't crash at the first junction. And between now and then, many other factors will continue to influence the performance of all the companies involved in the automotive value chain. In order to successfully benefit from the transition to a smarter world, we believe it's important for investors not to ignore these macro and micro considerations.

Similarly, because we still in the early phase of this paradigm shift, many pure-players may still be loss making or privately owned. As such, investors that want to participate in the digitalisation theme should be willing to make some comprises by either taking the long view, and commit capital to private markets, or tolerating that their exposure to the theme might be diluted when investing in certain established companies.

Figure 3: Connections that define a smart city



Source: Frost & Sullivan analysis
*Other Smart Infrastructure such as security solutions sensor networks, digital management of water utilities not included in other segments

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Building a sustainable world

Urgent, global challenges present investors with some of the largest and fastest growing sectors of the economy. Those that catalyse the right solutions to these long-term trends may find attractive opportunities that can provide the satisfaction of making a positive difference to our world.

The world faces urgent social and environmental challenges. Climate breakdown, chronic and acute diseases, structural inequalities and resource scarcity to name a few. In addition to the risks, the challenges present opportunities for us as people and as investors.

Confronting these interconnected and complex issues, that are long-term in nature, will require trillions of dollars of investment – and much more innovative approaches to finding and financing solutions.

Investors face a unique period where there is urgency to act to help counter these sustainability dilemmas while also benefiting from commercially successful long-term solutions. And doing so in a more complete and thoughtful way across the range of these issues. Moreover, for the organisations, large and small, that provide commercial solutions to address them, they provide rapidly growing markets for their products and services.

Outward-looking, not inward assessment

This structural trend is different to investing in companies that are effectively managing their material environmental, social, and governance risks and practices. This, more inward-looking approach, is valuable to help an investor make a more informed judgment about where an organisation may be at risk, or could have an advantage relative to its peers.

However, to invest in line with this theme, investors should be looking for companies whose goods and services are directly addressing one or more of our societal challenges. The intention should be to invest to help catalyse solutions, not simply avoid detriment.

> "The intention should be to invest to help catalyse solutions, not simply avoid detriment"

This is not to say that the internal operating practices of these companies should not also be assessed, but for investors the focus is on the outward, revenue-generating opportunities.

Rallying around global goals

Given the range and scale of these issues, it can be difficult for investors to decide where the most significant challenges, and opportunities, lie. In 2015, the United Nations (UN) set out to do that. The UN Sustainable Development Goals (SDGs) committed 193 countries to social, environmental and economic targets for global development around seventeen shared goals.

The SDGs aim to promote prosperity while protecting the planet. These can range from improving access to healthcare, clean water and affordable clean energy to tackling social and gender inequality. Achieving these goals will require a unified effort from countries, companies, and citizens. Moreover, it will require an estimated $2.5 trillion in developing countries alone to deliver on these commitments.

> "It [UN's sustainable development goals] will require an estimated $2.5 trillion in developing countries alone to deliver on these commitments"

Identifying investor opportunities

While the SDGs serve to rally and coordinate global effort, they were never designed specifically for investors. Investments in one sector or theme could benefit many goals – for example tackling food waste is primarily an aim of Sustainable Production and Consumption (SDG 12) though also has benefits for Zero Hunger (SDG 2) and Climate Action (SDG 13).

However, as broad, interrelated goals they are usefully supported by clearly defined measurement requirements and success metrics that can be useful for measuring and monitoring the outcomes that investments deliver.

Investors can find opportunities in all seventeen SDGs. For simplicity, we cluster them into three environmental and three social areas to look at the broader options to deploy capital for long-term growth at the same time as making a proactive contribution to our world.

1 Addressing climate change and energy needs
One of our foremost global challenges is to slow, and potentially reverse, the continuing rising global temperatures. As authors of the UN Intergovernmental Panel on Climate Change report, the world's leading climate scientists warn that we need to act by the end of the decade to have the greatest hope of keeping the maximum average temperature rise to 1.5C.

No industries are likely to be immune from the physical and transition risks and effects of climate change. But seeing beyond this, some organisations are already working to develop products and services to adapt to climate changes or mitigate their effects.

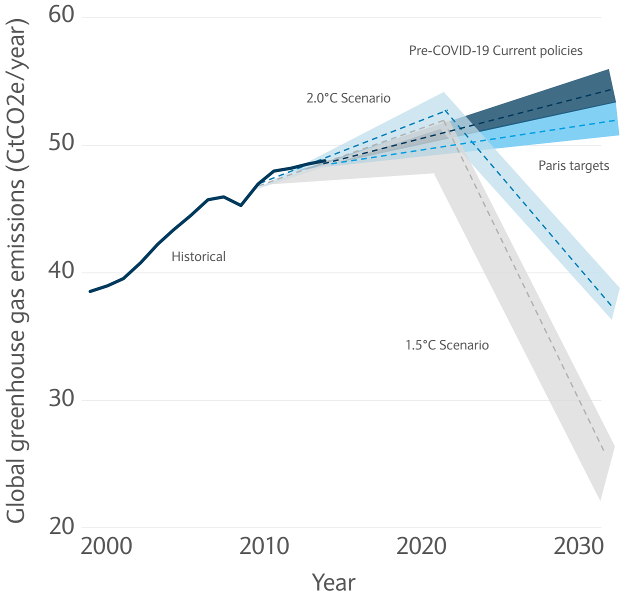
Given energy production's central role in carbon-based emissions, switching to cleaner energy technologies is critical. While one of the more established markets, considerably more investment is needed. For instance, an estimated $14 trillion of investment is required over the next 20 years for the energy transition if we aim to stay within the 2C trajectory.

Beyond energy needs, climate change requires further adaptation and mitigation efforts. In our Outlook 2020, we highlighted four other growth markets in a transition to a low-carbon economy — electric mobility, energy efficiency, water and waste management or agriculture.

2 Reducing environmental footprint
With growing populations and expanding economic development and consumption, the natural environment and its limited resources are under increasing strain. Should the global population reach 9.6bn by 2050, as some predict, to sustain current lifestyles would require the natural resources of the equivalent of almost three planets.

Furthermore, with two-thirds of the world's population expected to reside in cities by 2050, increasing urbanisation would likely compound environmental pressures. With aging infrastructure in the developed world and incomplete infrastructure in the developing, issues such as water stress, waste management and air pollution create associated health and economic risks. In response, companies are developing a range of innovative solutions in responsible production and consumption; maximising value from resources and minimising their waste; and improved, and smarter, living in more sustainable cities.

Figure 1: Pre COVID-19 pandemic
December 2019 Climate Action Tracker update



Source: Climate Action Tracker, *Calculated on different basis compared to Pre-COVID method and excludes any announcement of economic recovery measures to date

Both consumers and companies are driving increased transparency in supply chains. Consumer demand for ethical goods and services is generating new products and even market categories. At the same time, the traditional linear "take-make-waste" approach seems neither sustainable nor economical — for consumers, producers and the environment. This has created both a circular economy movement and an increasing range of organisations utilising its principles and business models to generate new value. Finally, companies replacing or providing new infrastructure and services are experiencing rapidly increasing demand in line with growing urban populations.

"Companies replacing or providing new infrastructure and services are experiencing rapidly increasing demand in line with growing urban populations"

3 Conserve biodiversity and ecological systems
In the 2020 World Economic Forum's Global Risks Report, biodiversity loss and ecosystem collapse was named as one of the top five risks in terms of likelihood and impact in the coming 10 years. As a result of human activity, 75% of global land surface has been significantly altered; 66% of oceans are experiencing cumulative deterioration; and over 85% of wetlands have been lost.

While the primary reason for considering biodiversity issues is risk management, and although it is less visible or understood as an investment theme, there are a growing set of opportunities for private investment capital. In part, legislative drivers and changing consumer demands are creating new markets for organisations to attempt to profit from, through biodiversity-related goods and services and biodiversity conservation.

Most obviously, sectors such as tourism and recreation have direct links and value associated with conserving the natural environment. Similarly, agricultural products that have been harvested organically and/or sustainably should benefit from increasing consumer demand. Finally, marketplaces are available, or being established, in areas such as carbon sequestration, maintenance of water quality and supply, pollination, or biomass production.

4 Improve growth and employment
Sustained and inclusive economic growth can drive progress, create decent work and improve global living standards. These are central ambitions for both countries and individuals. The economic and financial shock caused by the pandemic has highlighted the disparity and challenges many workers face. As job losses escalate, the International Labour Organization estimates that nearly half of the global workforce is at risk of losing their livelihoods.

At a more fundamental level, education and employment are the foundation for socioeconomic mobility and key to escaping poverty. While progress has been made in school enrollment, nearly one-fifth of the children were out of school in 2018 and more than half of children and adolescents are not meeting minimum proficiency standards in reading and mathematics.

Investments in companies and projects that enhance human capital can foster economic growth and development, higher productivity, employment and innovation. For individuals in emerging countries, education increases social mobility and is among the most powerful means of substantially improving quality of life and wider societal gender equity. Even workers in the developed world who are, and will be, displaced by technology and industry transition, require re-training and new employment pathways to maintain, or improve, their economic circumstances.

5 Better health outcomes
We all aim to live long, healthy and happy lives. On average considerable global progress has been made towards these aspirations. However, for many, their lives are cut short or more challenging without access to healthcare and nourishment needed.

In terms of health, much of the focus has been on addressing many of the most common causes of child and maternal mortality. However, we face the increasing risk of pandemics and increasing prevalence of chronic diseases. The World Health Organisation estimated that of the 56.9m deaths in 2016, heart disease, stroke and pulmonary disease were the world's biggest killers (see figure 2, p18). Taken together, these account for about one in three deaths.

At the same time, hunger is a substantial and growing problem. Nearly 821m people (roughly 11% of the world's population) suffered from chronic malnourishment in 2018. Global population growth means that food production needs to increase 70% by 2050 to feed everyone, yet increasingly diminished crop yields and constrained natural resources worldwide limit the potential for increase.

A wide range of promising companies and technologies are tackling these issues – from the most basic such as improved sanitation or food preservation, to the most innovative such as AI-led diagnostics or food distribution.

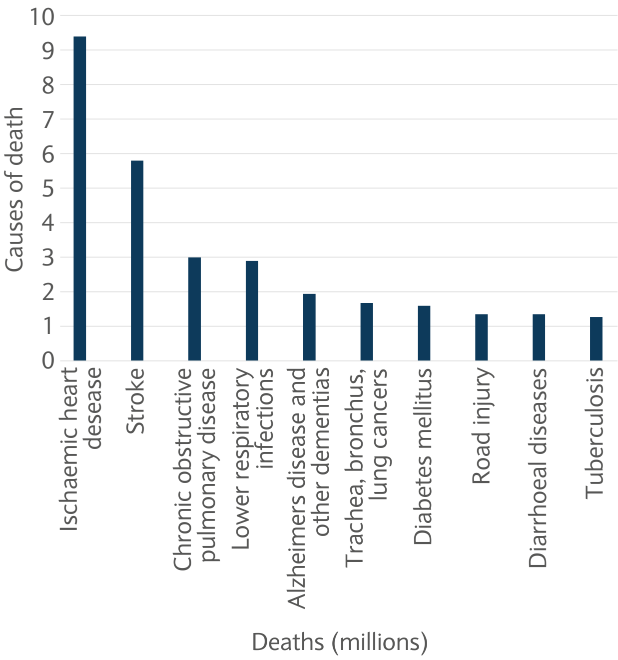
6 Promote equity, justice, and community
A prosperous and sustainable world is one that is peaceful and inclusive. Ongoing conflict, insecurity, weak institutions and limited access to justice continue to be great threats to this aim. Sadly, the number of people fleeing war, persecution and conflict exceeded 70m in 2018, the highest level recorded by the UN refugee agency (UNHCR) in almost 70 years. As well, women and many people from minority groups still face ongoing discrimination, violence, coercion, and inequality.

Addressing these issues may have not been on investors' radar traditionally. However, there are a growing number of commercial organisations and projects that provide opportunities that had previously been left to governments, charity and international aid.

Often it means investing in activities at the core of the issues, rather than symptoms. For example, investing to address local unemployment and resource scarcity that drive many conflicts, rather than only seeking to end armed violence. Additionally, programmes and projects are arising to invest in refugees, enabling them to restart their lives and integrate effectively with new countries.

For many investors, gender-lens investing is the practice of investing for financial return through the lens of female empowerment. It deliberately incorporates the desire to make a difference in the lives of women and girls, takes into consideration the power of women's leadership and the solutions to the challenges that women and girls may face.

Figure 2: Top 10 causes of deaths, 2016



Source: Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016. Geneva World Health Organization; 2018

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