

Private Bank



# Investing with a Thematic Lens



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# Introduction

Each year the Private Bank, in our annual [Outlook](#), identifies Unstoppable Trends – multi-year phenomena that are changing the way nations work and live – that have the power to endure and outperform the cyclical economy. These include the Rise of Asia, highlighting the region's growing economic influence; and Increasing Longevity, which focuses on globally aging demographics.

The Unstoppable Trends tend to intersect with thematic investing in equities with exposure to multiple, powerful, long-term market and economic forces. In our view, the impact from bumps in the economic cycle can be mitigated by exposure to a diverse set of themes and sub-themes. And when COVID-19's challenging markets and economic conditions tested our assumption, many thematic investments outperformed the broad market.

In the context of themes and sub-themes, we believe that an active investment approach is key. An active bottom-up approach coupled with analysis of the business cycle can allow investors to take advantage of dislocations in lagging themes, while scaling back exposure to leading ones.

Having entered a new post-pandemic economic cycle, we are taking this opportunity to highlight some themes we find compelling in conjunction with the Private Bank's [Unstoppable Trends](#) to facilitate further discussion around thematic investing. We believe that long-term portfolio exposure to opportunities driven by these forces may offer resilient growth potential. We also must stress the importance of avoiding excessive portfolio exposure to businesses and sectors most likely to be impacted negatively by themes.







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## THEMES

Demographics

Financial Evolution

Energy, Environment & Infrastructure

Global Consumerism

Technology Revolutions

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## UNSTOPPABLE TRENDS

Increasing Longevity

Digitization: The age of hyper-connectivity is upon us

Greening the World

The Rise of Asia: Asian development in a "G2 world"

# Demographics

As hard as it is to admit, we are all getting older. Indeed, populations are aging rapidly in key markets around the world. This structural change is impacting health care, nutrition and medical technology, for a start.

Aging populations are driving healthcare spending in three key ways:

## **INCREASED INCIDENCE OF CHRONIC CONDITIONS**

80% of people over the age of 65 have at least one chronic condition, and 77% have at least two<sup>1</sup>

## **INCREASED HEALTHCARE CONSUMPTION**

An 80 year old consumes six times the health care that is consumed by a 59 year old<sup>2</sup>

## **CATCH-UP POTENTIAL IN EMERGING MARKETS**

Health care spending in China and India, as a percentage of GDP, is very low by developed market standards, where double-digit percentages of GDP are typical

The origins of today's aging populations lie in decades-old patterns of improving life expectancy and deteriorating fertility. Life expectancy has been steadily rising since the late nineteenth century, which the United Nations forecasts to continue. At the same time, many societies have been producing progressively fewer children per family, reflecting profound social changes including urbanization, increased participation of women in the workforce, higher disposable incomes, and a decline in the institution of marriage itself.

Around the globe, there are almost one billion people aged 60 and above - more than at any other time in human history - and by 2050, more than two billion people will be over 60 years of age.<sup>3</sup> And the 'very senior' population, the number of over-80s, is projected to more than triple, from 137 million to 425 million over the same period, concentrated in developed nations.<sup>4</sup>

Illness and chronic conditions become increasingly prevalent with advancing years. Aside from drugs, medical devices such as replacement hips and knees, and orthopedic fittings, are in greater demand as populations age. We also expect the surgical procedures associated with these and other treatments to be increasingly carried out with the assistance of robots. Both companies specializing in medical devices and medical robotics may thus have solid growth potential.

Innovative devices may also play an important role in treating and caring for aging populations. Wearable technologies - such as smart watches - are already helping to give early warnings of health and fitness issues, as well as monitoring existing conditions and events. These include cardiovascular disorders, diabetes, epileptic fits, and falls suffered by the elderly in their homes. The potential benefits of wearable technologies for elderly users and for society as a whole are numerous. They can monitor for the correct and timely ingestion of medicines and allow for early identification of silent, but potentially fatal changes in patient function, including arrhythmias and pre-stroke brain activity. We see the wearables market as having significant growth potential.

<sup>1</sup> National Council on Aging, Healthy Aging Facts, 2018 Fact Sheet

<sup>2</sup> The Organization for Economic Co-operation and Development (OECD), OECD Statistics, 2018

<sup>3</sup> United Nations, World Population Prospects, 2019

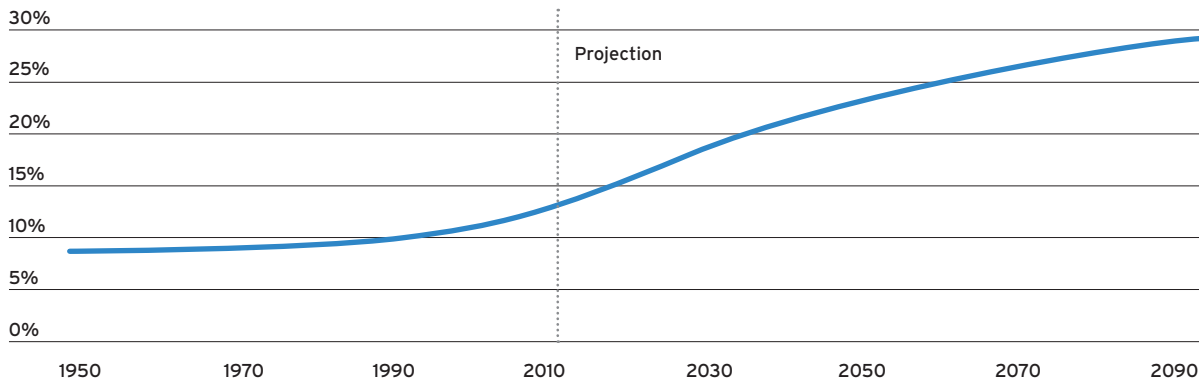
<sup>4</sup> The Organization for Economic Co-operation and Development (OECD), OECD Statistics, 2018

## UNSTOPPABLE TREND | INCREASING LONGEVITY

Companies working to deliver innovative cancer treatments may offer an investment opportunity. One such therapy is based on immunology, harnessing a patient's own immune system to fight cancerous cells. It is already playing a role in saving or extending certain cancer patients' lives and could become the main way of addressing advanced cases of cancer, potentially becoming a \$35bn-a-year market.

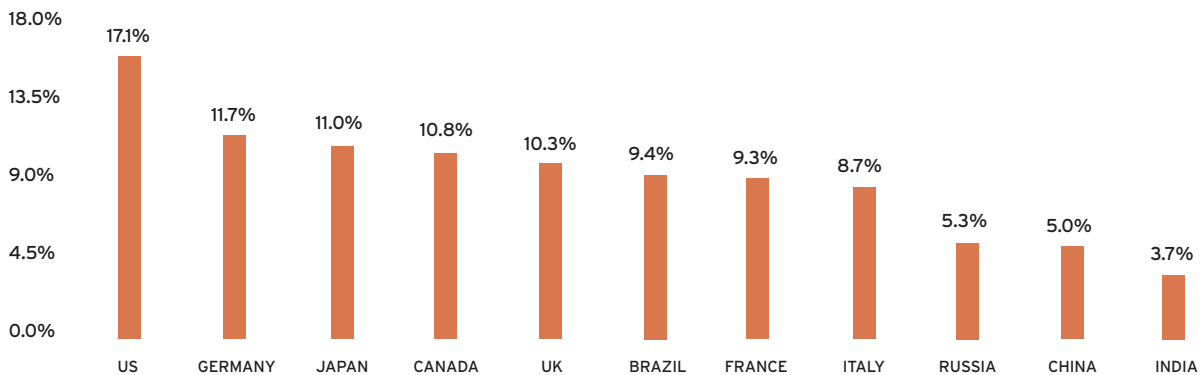
The next stage of immunotherapy's development may lie in refining today's treatments and combining them with others to seek greater effectiveness still. Furthermore, immunological treatments are likely to be useful in thwarting other age-related illnesses, such as dementia.

WORLD POPULATION OVER 60, 2019



Source: United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019: Highlights (ST/ESA/SER.A/423). Accessed 6 January 2021. All forecasts are expressions of opinion and are subject to change without notice and are not intended to be a guarantee of future events.

HEALTH EXPENDITURE AS A % OF GDP, 2019



Source: Organisation for Economic Co-operation and Development, Health Spending 2019. Accessed 15 October 2020. Figures reflect percentages from most recent observed year, 2017.

The health care sector is broader than the large cap pharmaceutical companies who seem to draw the ire of policymakers. The COVID-19 pandemic has underscored this, bringing innovative companies in areas such as vaccine developments into the limelight.

Innovation has the potential to be rewarded as it is needed to tackle the pressing issue of demographics and the resulting increase in serious diseases. While increased scrutiny on cost means that selectivity is increasingly important within pharma, companies with deep pipelines and a focus on the right therapeutic areas should benefit from the aging population.

#### OPPORTUNITIES WORTH A CLOSER LOOK

**Personalized Medicine/Cancer Treatment:** The push towards personalized medicine will benefit from increased biopharma spending (public and private) as well as the desire to improve patient outcomes (remove costs). Diagnostics such as liquid biopsies will continue to help physicians select the most appropriate treatment option based on the patient's genes and biomarkers. We are already seeing the benefits of personalized medicine across several therapeutic areas, particularly oncology.

Indeed, as one of the most important clinical advancements in cancer detection, liquid biopsy is estimated to be a \$30bn-\$130bn opportunity in the US alone in the years ahead.<sup>1</sup> Fully 80% of new cancers occur after the age of 55 with over 25% of new cancer diagnoses coming from the 65 to 74 age group alone.<sup>2</sup> We see opportunity on the therapeutic side as drug companies pursue new therapies like immuno-oncology and CAR-T therapy as well as on the diagnostic side as companies pursue better and less invasive testing to detect disease earlier in its progression. Also, immunotherapy has the potential to transform cancer into a chronic disease.

#### **Health Care Infrastructure/Pandemic**

**Preparedness:** We have seen increased public and private health care/biopharma spending over the

last several years. However, the pandemic has shown that health care systems across the world are under-resourced, particularly in diagnostic testing capacity. We believe diagnostic capex (and testing) will move higher in the years ahead.

Additionally, we believe there will be more government support for vaccine development and greater pressure to improve vaccination rates. Investors will start to see the impact immediately with higher flu vaccination rates. We believe that all vaccination rates (and pricing power) will broadly increase in the years ahead. Our preferred way to gain exposure to this sub-theme is through life sciences companies that assist in vaccine development and manufacture or companies that make vaccine packaging or provide transport (vs. the biopharma company itself).

Another aspect of health care infrastructure is telehealth. Virtual health care services have gained popularity in recent years. Stay-at-home orders and consumer fear of COVID exposure in physicians' offices accelerated and normalized their use, creating a need for new technologies and delivery models. Underpinning this theme is convenience, greater consumer confidence in the service, and widespread adoption by insurers. We expect to see continued strong growth due to the reduced costs and greater convenience for patients.

**Remote Monitoring/Devices:** The curtailing of traditional in-office medical appointments and procedures during the pandemic has led to increased use and need for remote monitoring using innovative devices. Wearable technologies - such as smart watches - are already helping to give early warnings of health and fitness issues, as well as monitoring existing conditions and events. These include cardiovascular disorders, diabetes, epileptic fits, and falls suffered by the elderly in their homes. We have long viewed the wearables market as having growth potential and our conviction has been strengthened by the pandemic.

As exciting are developments in non-wearable technology designed to improve patient outcomes

<sup>1</sup> Citi GPS, Disruptive Innovations VI, August 2018

<sup>2</sup> National Cancer Institute, Cancer Treatment and Survivorship Facts and Figures, 2017



as well as diagnosis rates, such as small, AI enabled “pills” that have the potential to detect certain disorders and cancers.

**Nutrition:** The increasing number of people living in towns and cities is expected to cause the demand for food to increase 60% by 2050<sup>1</sup>, as urban dwellers are more reliant on processed food. While in some parts of the world changing consumer

preferences are leading to growing demand for healthier options (including plant-based diets), in other parts of the world consumption of processed foods is skyrocketing. The World Health Organization estimates that the number of diabetes cases soared to 422 million adults in 2014 from 108 million in 1980, a number that will continue to grow alongside lifestyle changes stemming from rapid urbanization and mechanized transport.<sup>2</sup>



<sup>1</sup> World Economic Forum, Food Insecurity and Why It Matters, 18 January 2016

<sup>2</sup> World Health Organization, Fact Sheet: Diabetes, 8 June 2020



# Energy, Environment and Infrastructure

Not so long ago, renewables were expensive and inconvenient, in many cases the technology was poor, and intense interest was limited to the environmentally hyper-focused. No longer. Many renewables are either already cheaper than fossil fuels or on track to become cheaper in the next few years and technology and battery storage have also drastically improved. Renewable energy now is not a lifestyle choice as much as it is an economic choice.

While traditional fossil fuels will still be around for some time, ultimately the sector faces a bleak future. As soon as 2050, renewable power could produce two-thirds of the world's electricity, the same proportion that fossil fuels produce today.<sup>1</sup>

Investors have not been slow to react. Energy equities have significantly underperformed the oil price, falling to the lowest market capitalization share (2% at the start of Q4 2020) on record.<sup>2</sup> That is in spite of low oil prices and notable efforts to support the industry. The latter include crude oil production cuts by OPEC in the past two years and President Trump's efforts to repeal subsidies for renewable energy sources. Investors who wish to maintain energy exposure will increasingly need to invest in renewables.

Anecdotally, it seems that many investors have historically viewed renewables more as a reason to dislike traditional energy rather than as an alpha generating investment in its own right. This is starting to change.

The opportunity set is far larger than merely solar or wind turbine companies. Indeed, this theme spans companies across the risk spectrum, not only in

terms of types of energy (wind, solar, hydro), but also upstream, downstream, and related investments. Utility companies, component manufacturers, leaders in recycling technology, battery producers, sustainable farming or electric vehicles all fall into scope.

What is clear already is that renewable energy will change the world. Nevertheless, uncertainties remain and the space is still relatively new. How well will certain companies weather a full economic cycle? Another issue is competition, especially from markets such as China. While this has helped to lower consumer costs for things such as solar panels, it has also eaten into profit margins. Investing in a broad array of different exposures is very likely to be the best way for investors to navigate the space.

The other consideration is government policies, which are largely responsible for narrowing the gap between renewables and fossil fuels. Regulation, subsidies and International climate accords meaningfully impact the returns investors in the space can achieve. The phasing out of many of these incentives as the industry matures represents a headwind in certain areas.

Having said so, the COVID pandemic has scope to benefit the space along the thinking of "building back better." Massive stimulus packages around world are aimed at boosting aggregate demand, but in many cases are also creating the opportunity to increase allocation to renewable projects. Even Germany - long renowned for its rigid fiscal discipline - is now loosening its spending policies, with a focus upon renewables investment. While in the US the case for investing in renewables is strong longer term, clearly investors need to have different short- and medium-term return expectations under a Republican or Democratic congress.

<sup>1</sup> Bloomberg NEF, New Energy Outlook 2019 and International Energy Agency, World Energy Outlook 2019

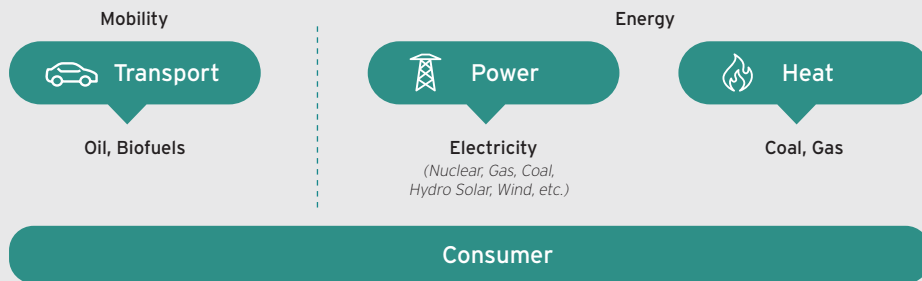
<sup>2</sup> FactSet, Bloomberg.



## UNSTOPPABLE TREND | GREENING THE WORLD

To understand how bad it might get for oil, US petroleum production has more than doubled in the last ten years. However, an investor who avoided the sector entirely would have outperformed someone who invested in the broader market including energy.

HISTORICALLY THE WORLD OF MOBILITY HAS BEEN DISTINCT FROM THAT OF POWER AND HEAT, THIS IS CHANGING



Historically, (while clearly all are energy) the worlds of 'energy' and 'mobility' have been seen as essentially separate – power being driven by coal, gas, and increasingly renewable sources, and transport being essentially an oil-based market – and never the twain shall meet. The exciting new area of energy storage will bring these two worlds crashing together, and the ramifications of those tectonic plates grating on each other will be profound.

The reason? Energy is now 'fungible'. Rather than having a unit of demand, and the nature of that demand (e.g. heat, light, movement) largely dictating where that energy would come from, we foresee us moving to a world where we simply demand a unit of energy. This unit of energy is supply agnostic with economics, as well as a whole host of other considerations, not least emissions, dictating where that energy will come from. With fungibility of supply will come enormous shifts in the energy industry, on top of those already experienced via renewables and shale.

Moreover, this shift to a demand-led energy model will potentially see the rise of 'Energy as a Service' (EaaS) over the longer term. In the same way the telecoms industry has evolved from a 'per minute' charge to a monthly connection charge for all telecommunication (and media) services, will the energy sector do the same? Will we outsource the provision of all of our energy needs to someone else for a fixed charge, be they mobility, power, or heat-based, only paying extra for 'premium' services? This might make more sense as storage becomes more prevalent.

## OPPORTUNITIES WORTH A CLOSER LOOK

**Efficiency:** Infrastructure investment is required to achieve greater energy efficiency (e.g., the need to build wind turbines, liquefied natural gas plants, fueling stations and related transportation). Investments in global energy infrastructure are expected to be worth \$37 trillion by 2035.<sup>1</sup> However the needed infrastructure investment only starts with the energy sector. For instance, buildings are a significant source of CO<sub>2</sub> and as such we see a significant need for spending on modernizing existing buildings, particularly in developed markets.

**Hydrogen:** The alternative fuel has been touted multiples times as the future of energy, but failed on each occasion to take off. However, supportive government policies, notably from the EU with a target for 80 Gigawatts of electrolyzer capacity by 2030, suggests broader support this time around. Prices are expected to continue falling in the coming years as scale grows and efficiency gains are achieved. The combination of government support, greater efficiency and improving economics has historically been prerequisites for new sources of energy to gain market share.

**Water:** Global demand for water is expected nearly to double over the next 15 years; access to clean water may be an increasing challenge

**Alternatives:** Recycling, water treatment



# Financial Evolution

In previous eras, high barriers to entry meant that financial services were relatively well insulated from disruptive technological forces. When the dotcom era tested those barriers, traditional banks emerged relatively unscathed - only a handful of disruptors from that time remain. They almost certainly won't this time as the financial services industry now faces its first bout of genuine, sustained disruption from financial technology (or "fintech") companies. This shift has been helped by the convergence of disparate factors:

- Greater availability of funding from well-resourced sovereign funds and venture capitalists
- Greater government and regulatory support for innovation
- Demographics, with millennial consumers more open to non-traditional banking services
- Smartphone connectivity that opens access to banking to people who have never had a traditional bank account

Early on, fintech companies largely served to plug gaps in the market. For example, by focusing on new activities such as peer-to-peer lending, refinancing student debt or the improving customer experience at the point of sale. For incumbents, therefore, this was more of a case of opportunities foregone, rather than actual profits lost.

This does not mean that incumbents can sleep easy. It is important to remember that disruption typically progresses through stages. Initially, disruptors eat into industry growth by targeting new market segments, while coexisting with incumbents. Having achieved a certain scale and established their reputation, they eventually start competing head-to-head for the incumbent's core business revenues.

It is important to note, as well, that fintech companies are not solely payments companies or

peer-to-peer lenders. The fintech space is made up of a broad ecosystem of companies, each specializing in a niche, be it wealth management, insurtech or regtech (the use of technology in the insurance industry and regulatory processes, respectively).

Another fintech sub-category is companies that work with banks and asset managers to modernize their aging IT infrastructure. Banks have several pain points that act as drags on profitability (something also not helped by rock-bottom interest rates). Outdated systems create frustrations for customers, especially relative to new entrants with lower cost bases and shiny new apps, not to mention potential issues on the regulatory or compliance fronts.

Shifting to a more modern core banking platform, for example by purchasing packaged software from a third-party provider, helps companies more effectively harvest and analyze customer data, which in turn can be used to cross-sell products, improve the customer experience and save on other costs. We view the upgrading of financial systems as a necessity if financial services investors are to successfully execute a digital strategy that successfully competes with disruptive new entrants. The services provided by financial software and service providers are essential in this transformation.

It can therefore be argued that the relationship between fintech and traditional incumbents is not always that of predator and prey. Many fintech firms actually seek partnerships with incumbents. Each has what the other wants: the new entrants need customers and data, while incumbents require innovative technologies and cultural change.

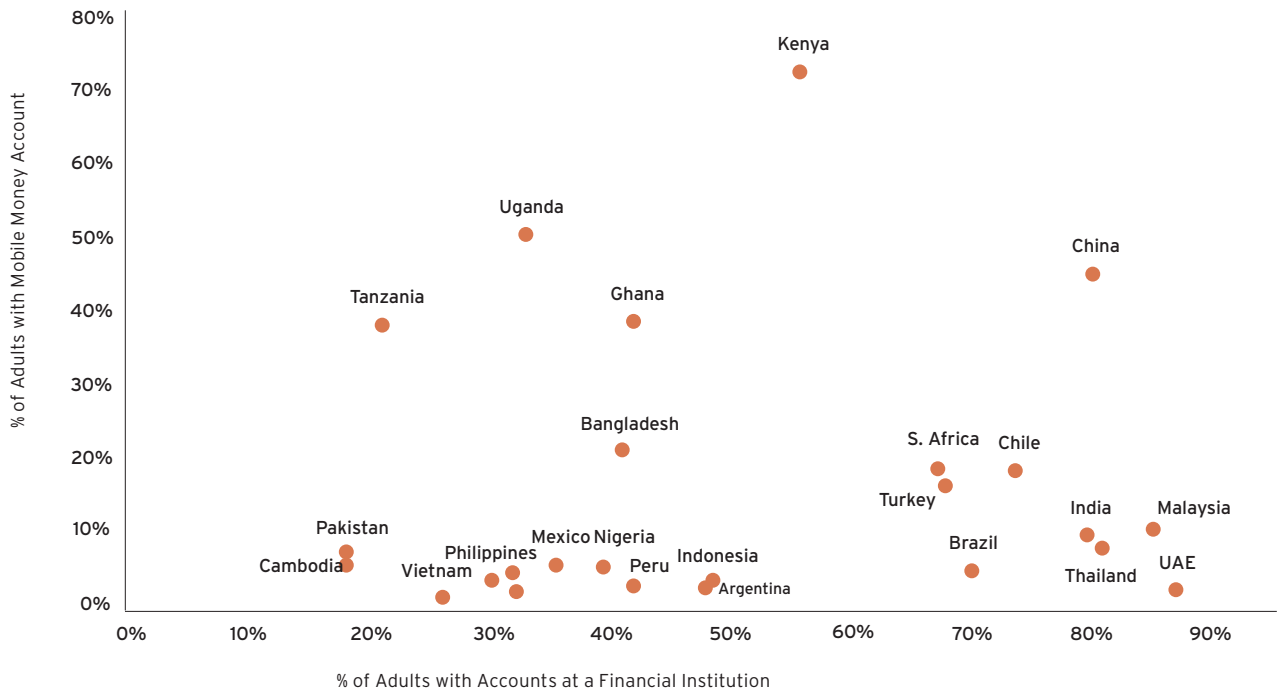
Indeed, there are also benefits to incumbents insofar that new technologies could sweep away the need for many customer-facing staff in banks and call centers, as well as many back office personnel such as payment processors and compliance officers. Workforce reductions could lead to savings.



Over the last decade, fintech firm revenues have grown at an annualized rate of 12.1%; by comparison, S&P 500 companies overall have seen revenue growth of 4.2%.<sup>1</sup> It is our expectation that fintech will continue to experience growth now that this industry has reached a tipping point.

Not only is traditional banking being challenged by new, tech savvy entrants, but globally the threat is also growing from established tech giants because of large and captive user bases, low on-line acquisition costs, big data consumer insights, and internet banking licenses. Investors should consider exposure to fintech companies not only via pure plays, but also through leading tech platforms across the globe.

MOBILE MONEY USAGE VERSUS BANK ACCOUNT PENETRATION



Source: World Bank FIndex, 2017

UNSTOPPABLE TREND | DIGITIZATION: THE AGE OF HYPER-CONNECTIVITY IS UPON US

In countries that lack the Western world's regulatory and governmental barriers, entire new financial ecosystems have been built with such speed and success that the term 'bank' may have little meaning to many local consumers. Across China and Africa, payments are predominantly digital. And we are now seeing those same technologies entering the developed market mainstream.

<sup>1</sup> Citi GPS, Digital Disruption: How Fintech is Forcing Banking to a Tipping Point, March 2016.

# Global Consumerism

A profound shift in the composition of the global population is underway. By the end of the decade, it is expected that 5.3 billion people will belong to the global middle class, representing an additional 2 billion people compared to today; by 2030, over 70% of China's population could be middle class.<sup>1</sup>

We believe this shift will have profound implications across both local and global economies as this emerging middle class' discretionary spending impacts demand. The collective increase in spending power from this rapidly expanding segment of the population is expected to grow from \$37 trillion in 2017 to \$64 trillion in 2030.<sup>1</sup>

This upcoming middle class has certain commonalities: it is young, urban, and mostly Asian. In fact, China and India are expected to account for two-thirds of the global middle class population.<sup>2</sup> We expect this increased spending to flow through to household products (uptrading), food (dietary changes, increased indulgences and snacking), consumer durables (purchases of motorcycles, small cars, air conditioners, televisions, etc.), leisure (sports, gaming, music, movies and travel), increased insurance adoption and health care (via over-the-counter and prescribed medication).

Increased technology adoption will play an important role too, not only as an investible area of its own, but also for how it accelerates other themes such as financial inclusion, shopping habits and health care to name a few. Globally, not only is consumption growing at a rapid pace, but the

manner of consumption is also shifting to online. Global e-commerce sales have grown sharply over the last decade, but still remain relatively small as a share of overall retail sales. In 2019 e-commerce was 14.1% of total global retail sales and is expected to grow to 22% by 2023, this compares to 7.4% just four years earlier.<sup>2</sup>

Growing e-commerce sales are a function of the increased adoption rate and higher demand for technology, the decline in the cost of smartphones, and the increase in the availability of affordable and free Wi-Fi.

Many other investible areas linked to consumerism that we view as long term trends are the rise of e-sports and online gambling. Viewership of e-sports is currently on par with American football and is expected to grow 14-15% per year. Related to sports, we expect strong growth in online sports betting globally, including in the United States. Many governments and states likely view this as an attractive source of tax revenue, particularly as COVID-19 spending has seen fiscal balances deteriorate.

One aspect of health care is particularly closely linked to changes in consumer behavior. Diabetes is more of a consumerism issue than anything else. The World Health Organization estimates that the number of diabetes cases soared to 422 million adults in 2014 from 108 million in 1980, a number that will continue to grow alongside lifestyle changes stemming from rapid urbanization, mechanized transport, and increased consumption of processed foods.

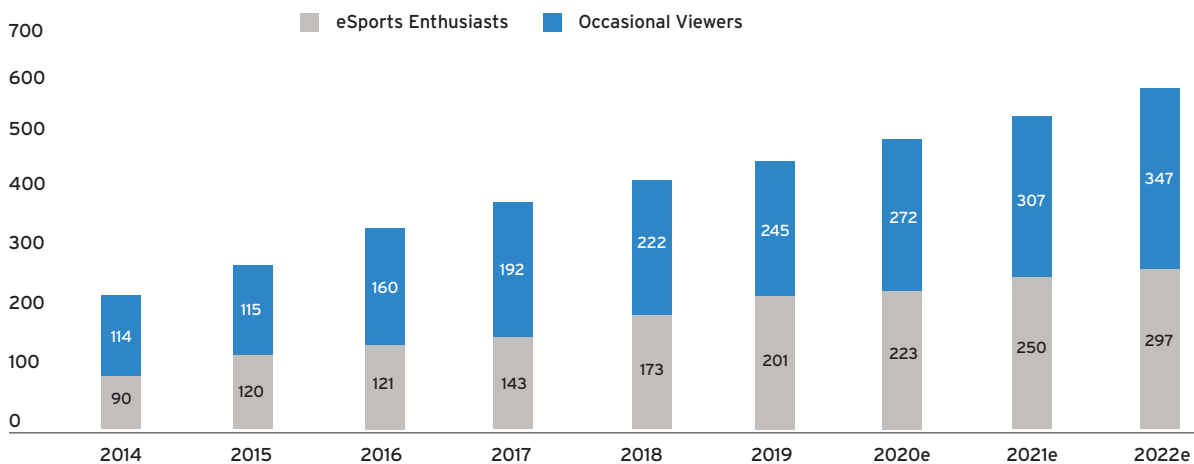
<sup>1</sup> European Commission, Knowledge for Policy: Growing Consumption

<sup>2</sup> Shopify, Industry Insights and Trends What is the Future of Ecommerce?, 30 January 2020

## UNSTOPPABLE TREND | RISE OF ASIA: ASIAN DEVELOPMENT IN A “G2 WORLD”

Investors generally remain underexposed to the region’s attractive growth potential. EM Asia is the only region to have consistently grown its share of world output over the past four decades. In 1980, it contributed less than a tenth of output, compared to almost one-third today. In terms of the middle class population worldwide, almost 90% of the growth over this period (from 2018 - 2030) is forecast to occur in Asia.<sup>5</sup>

GROWTH OF eSPORTS AUDIENCE, IN MILLIONS



Source: Newzoo, Citi GPS Report, Disruptive Innovations VI: Ten More Things to Stop and Think About, August 2018

<sup>5</sup> Shopify, Industry Insights and Trends What is the Future of Ecommerce?, 30 January 2020

All forecasts are expressions of opinion and are subject to change without notice and are not intended to be a guarantee of future events.





# Technology Revolutions

The benefits of digital disruption to customers are all around us. The ways we make purchases, send payments and borrow money, communicate with each other, and enjoy entertainment have been revolutionized. In the workplace, a growing number of straightforward and sophisticated tasks - from shifting boxes to life-saving medical procedures - are now undertaken partly or wholly by intelligent machines. In manufacturing, the way goods are made and even the supply chain for materials is being permanently altered. Here we can point to automation and robotics. Not only are these trends unstoppable in our view, but they have accelerated as a result of the COVID-19 pandemic.

Since the advent of the internet, the world has become increasingly digital. We believe that an inflection point in the pace of digital change is near, driven primarily by two factors:

- Decline in the cost, paired with the increase in functionality, of semiconductors, sensors, and software
- Imminent deployment of 5G wireless networks

We believe that the combination of these developments is poised to unleash an explosion of connectivity that will create vast amounts of data (doubling every 2-3 years) to be both analyzed and exploited.

As the cost of semiconductors and sensors have declined while their power has increased, we have witnessed greater usage across products and markets. It now makes business sense to embed semiconductors and sensors into non-traditional technology products (watches, light switches, ovens, baby clothes, roadways, etc.), which we believe will lead to a truly connected economy.

The term “connected device” is no longer limited to a smartphone or PC: the connected device will soon be almost everything from appliances to clothing to cars. Because of this, we believe that the number of connected devices worldwide should grow from 18 billion today to 35 billion by 2025 and to 1 trillion by 2035.<sup>1</sup> All of these devices will create more data to be analyzed, with the intent of improving outcomes and increasing efficiency.

5G networks, expected to begin use this year, promise to provide networks which are 10x faster and much more reliable (low latency) than what is currently in use. The combination of high speed and low downtime should allow increased industrial, urban, and household functions to be reliably connected and automated. 5G holds the promise of a ubiquitous, connected world and has the potential to enable the next step change in both the digitalization of business and the home, as well as the coming evolution of mobility. Today, only 1% of all data collected is analyzed; this is expected to

<sup>1</sup> IBM, An Enterprise Scale of IoT Platform: Watson, IBM Internet of Things blog post,

<sup>2</sup>1 February 2017; accessed 30 September 2020

## UNSTOPPABLE TREND | DIGITIZATION: THE AGE OF HYPER-CONNECTIVITY IS UPON US

A pressure point in US-China relations is the rising potential for Chinese firms to dominate the rollout of communications technology and standards, particularly 5G. A race is taking place to see who will provide the winning 5G standards, or perhaps there will be two standards, one for the 'East' and one for the 'West.' Whichever the case, the real winners will likely be the best application providers for consumer and business broadband content.

rise to 37%<sup>3</sup> in the coming years as better networks and more robust software allows for near real-time analysis.

We believe that this will lead to a virtuous cycle of efficiency improvements across many areas of the economy, helping to boost productivity and combat the negative consequences of the aging population in most areas of the world.

At the risk of sounding hyperbolic, we believe the combination of 5G and ubiquitous technology will change everything, with far ranging implications for factories, cities, education, logistics, homes, and health care to name a few broad areas.

However, while it is tempting to focus attention on the end-product side of digitalization (robots, autonomous cars, "smart" consumer products, drones, etc.) we would caution that it is still early in the adoption/development cycle for many of these products.

We suggest investors focus on the "guts" behind these products - what components make all of them work. A robot on a factory floor is nothing but a hunk of metal without the semiconductors, sensors, and software attached that allow it to perform precise functions and learn as it goes. A "smart" home speaker is just a speaker without the semiconductors and software that can translate analog to digital and back again so that users can order pizza without getting off their couch (leading of course to an additional focus on health and wellness).

We also suggest looking more closely at companies providing 5G wireless infrastructure and services due to this technology's important role as a driver of change. These include telecom hardware and software, tower companies, and service providers.



## OPPORTUNITIES WORTH A CLOSER LOOK

**Cyber Security:** According to the World Economic Forum, cyberattacks are the second biggest challenge for executives globally and the most important for European and North American businesses for the second year in a row.<sup>4</sup> Investment and spending on cybersecurity is estimated to be running around \$124bn a year in 2020, according to research firm Gartner, up from \$121bn in 2018.<sup>5</sup>

**Mobility:** The number of connected devices is expected to increase to 500 billion in 2030<sup>6</sup>

**Connected Cars:** The US urban robo-taxi market could exceed \$350B and the market for tier-1 suppliers in advanced driver-assistance systems and autonomous vehicles could rise to >\$100B by 2030 (from \$5-6B in 2018)<sup>7</sup>

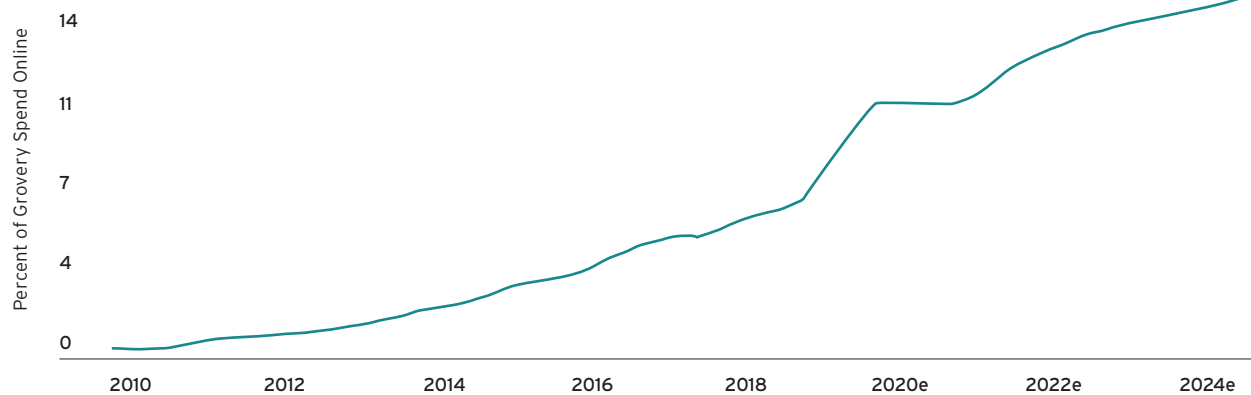
**Artificial Intelligence and Virtual Reality:** The Artificial Intelligence and Virtual Reality (AI/VR) market could grow to \$2.16 trillion by 2035 as technology is adopted across industries<sup>8</sup>

**Factories of the Future:** We expect that the need for efficiency will drive companies to greatly increase the number of robots in fulfillment centers

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## PROPORTION OF GROCERY SPEND MADE ONLINE IN THE US

Online Grocery Spending Growing From a Low Base



Source: GlobalData, Global and Regional Food and Grocery Retailing to 2022, May 2019. Accessed 6 January 2021.

<sup>4</sup> World Economic Forum, Global Risks Initiative, Regional Risks for Doing Business 2019, 1 October 2019; accessed 30 September, 2020

<sup>5</sup> Gartner, Forecast: Information Security and Risk Management, Worldwide, 2018-2024, 1Q20 Update, 17 June 2020;

<sup>6</sup> IBM, An Enterprise Scale of IoT Platform: Watson, IBM Internet of Things blog post, 21 February 2017; accessed 30 September 2020

<sup>7</sup> Citi Global Perspectives and Solutions, Car of the Future v4.0: The Race for the Future of Networked Mobility, January 2019

<sup>8</sup> Citi Global Perspectives and Solutions, Are You Sure It Isn't Real, 19 October 2016



Through the advent of 5G we are able to take advantage of inextricably linked technologies such as “edge computing” which seeks to reduce latency by bringing data processing capabilities closer to the end user. While enterprises have previously taken advantage of cloud computing from centralized storage at data centers, the need for real-time analytics across the Internet of Things (IoT) – physical objects connected to the internet through sensors and other technologies--will require moving intelligence to the edge of the network, where latency-sensitive applications can operate most efficiently. That makes edge computing a crucial element for use cases such as telehealth, cloud gaming, video surveillance, and manufacturing process optimization.

While these technologies are in the early innings, it’s not too early, in our view, to invest in select communication infrastructure and equipment businesses that contribute to this critical layer in the digital ecosystem between applications and the cloud. As mission-critical applications come to fruition over the next decade, we believe low-latency needs will require computing resources to move closer to the edge and help businesses improve infrastructure utilization, reap bandwidth cost savings, and strengthen data security.

Additionally, a key risk to growing connectivity is that the more connected devices that exist, the more potential access points bad actors have to infiltrate the network. We therefore believe that investing in cybersecurity companies could be essential to address these risks.

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