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RESHAPING SERVICES

The investment implications of technological disruption

WINTER 2021

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FOREWORD

Over the past century, the global economy has transitioned from being dominated by agriculture and manufacturing to being powered primarily by services. Services now represent three-quarters of the workforce in developed markets and two-thirds of global GDP.[1]

Since World War II, services have been transformed by shifting consumer and corporate preferences, technological change, and globalization. But after a 20-year period of relative stability, services are now once again at the cusp of a major disruption.

Advances in technologies such as cloud computing, artificial intelligence and machine learning are radically reshaping winners and losers across the service sector in both developed and emerging markets – and at an even faster pace after the COVID-19 pandemic.

This technology transformation will allow new entrants to disrupt key components of the services value chain. At the same time – and to a greater extent than in manufacturing and retail – a select group of technology-forward incumbents will benefit from some unique features of the services sector (such as client acquisition costs and regulatory complexity) to survive, and even thrive, during the process of creative destruction ahead of us.

To understand the investment implications of this next revolution in services, we have drawn on the insights of more than 70 investment professionals across PGIM's fixed income, equity, real estate, private credit, and alternatives managers – as well as leading academics, technologists, industry analysts and venture investors. We focus our investment lens on the three sectors that represent the vast majority of the services sector and 35% of the MSCI ACWI: financial services, healthcare, and transportation and logistics.[2] Our analysis reveals the hidden risks and emerging investment opportunities in services across public and private asset classes in both developed and emerging markets.

At PGIM, we believe investors who fully recognize the multiple pathways through which technology is transforming the global services sector will be best positioned to navigate the rapidly shifting investment landscape.

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CHAPTER 1

A CENTURY OF SERVICES

"While in many ways the service sector is simply catching up to the manufacturing sector, this next wave of innovation will be disruptive in different ways."

CHAPTER 1

A CENTURY OF SERVICES

One hundred and fifty years ago, more than two-thirds of the American and British workforce was employed in agriculture, mining, and manufacturing; that share has now fallen to approximately 20% in each country (Exhibit 1).[3] A similar transition has been happening over the last 50 years in middle-income emerging markets.[4] For example, agriculture and manufacturing represented 88% of the Chinese workforce in 1978; by 2020 that share had fallen to 52%.[5]

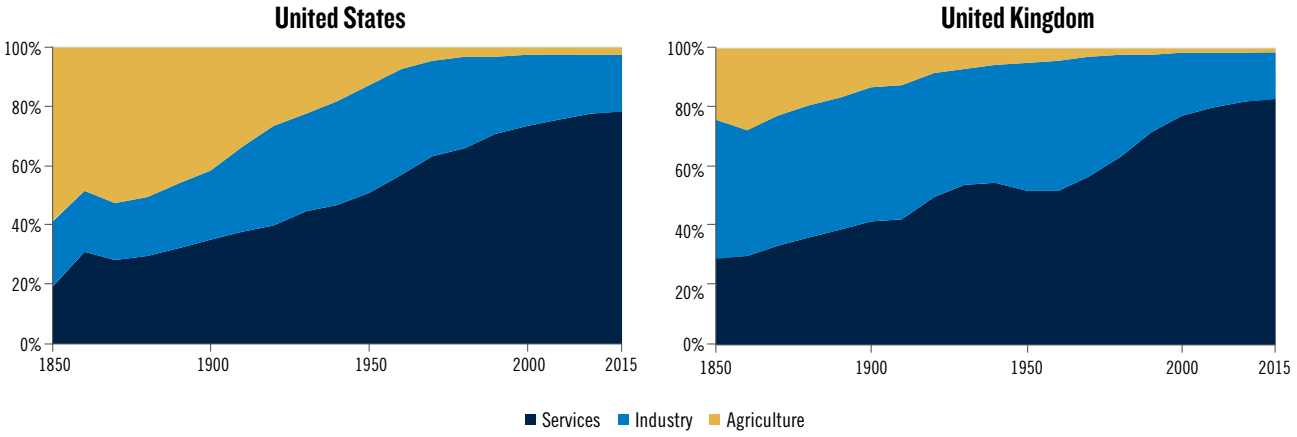
Where have all these agricultural and industrial jobs transitioned? The short answer is to services. The service sector now represents 75% of the workforce in developed markets, almost 50% of the workforce in advanced emerging markets, and 30% of the workforce in less developed emerging markets.[6]

Key Drivers of the Global Shift to Services

The transition to a services-driven global economy has been powered by a complex web of factors, but five are particularly worth highlighting:

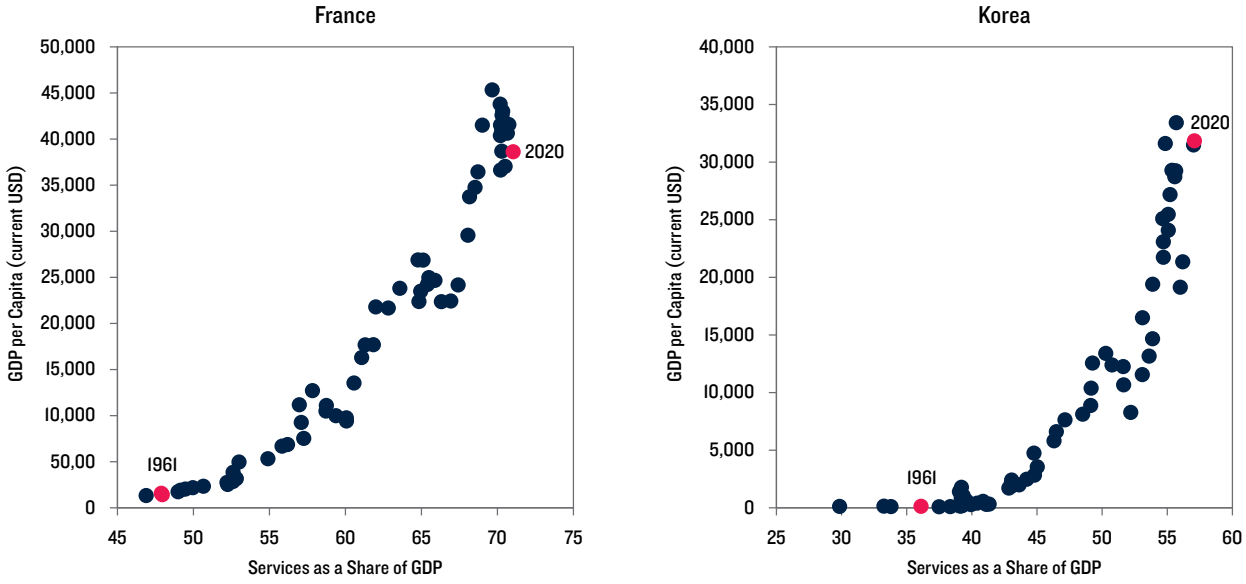
1. Successive waves of technologies – tractors, mass-produced automobiles, earth-moving equipment, power tools, assembly lines, computer processing power – have taken over tasks in agriculture, manufacturing and mining that humans would have previously done.[7]
2. Rising consumer affluence following WWII led to increased demand for healthcare, financial services, leisure, travel, and other entertainment services (Exhibit 2). This shift in consumption towards services is also evident in emerging markets – the share of household expenditure dedicated to services has doubled in South Africa and increased fivefold in India since 1950.[8]
3. The innovations in technology and rising affluence noted above spurred rising demand for high-school and college education. This, in turn, created a literate and numerate services-oriented workforce that could manage complex organizations, trade

Exhibit 1: **Service jobs are growing as a share of total employment**



Source: McKinsey Global Institute analysis; IPUMS USA 2017; US Bureau of Labor Statistics; Groningen Growth and Development Centre 10-Sector Database; Moody's; IMPLAN; US Bureau of Labor Statistics; FRED; Bank of England.

Exhibit 2: **The Service Economy Grows as Countries Become Wealthier (1965-2020)**



Source: PGIM analysis, World Bank.

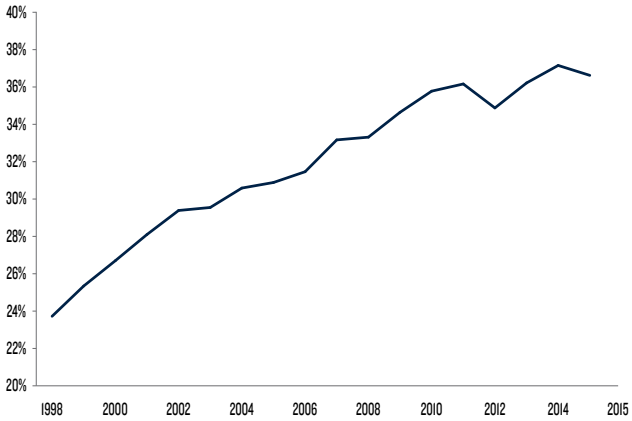
an increasing array of products and services, offer financing and insurance, provide healthcare and administer government services.[9]

4. Advancements in global supply chains, booming trade, and the rise of multinational corporations led to a surge in globalization with agricultural and manufacturing jobs increasingly moving to emerging markets with comparative advantages in labor cost or agricultural productivity. This further spurred the transition to the service sector in developed markets.

5. More recently, there has been a growing "servicification" of the manufacturing sector, with many traditional manufacturing firms housing a growing number of service-related jobs. This is due in part to the growth of in-house management of logistics, supply chains and marketing.[10] The share of employees working in service-related jobs within traditional manufacturing firms has grown from about 25% in 1998 to over 35% today in the US (Exhibit 3).[11] IBM is a prominent example of this trend: Originally a leading manufacturer of mainframe and other computer hardware, IBM now offers custom technology solutions for businesses and governments that integrate services and hardware.[12]

The rising share of the global workforce in services has, in turn, made it the dominant component of global GDP and a critical driver of global growth. The service sector now represents more than 70% of the GDP of high-income countries and 55% of low- and middle-income countries. For example, the share of services in the UK's GDP has risen from 48% to 80% over the last 100 years.[13] Similarly, services account for nearly half of India's GDP today, compared to 37% in 1990.[14]

Exhibit 3: **Embedded service jobs within manufacturing firms are growing**
(% of service jobs within manufacturing firms)



Source: Mercedes Delgado, Daniel Kim, and Karen Mills, 2021. "The Servicification of the US Economy: The Role of Startups versus Incumbent Firms," in Aaron Chatterji, Josh Lerner, Scott Stern, and Michael J. Andrews (eds.), The Role of Innovation and Entrepreneurship in Economic Growth. University Chicago Press, forthcoming (available as NBER Working Paper).

The Next Revolution in Services

Technological change has always played a key role in shaping the service sector (Table 1). The first major wave of change – the mechanization of agriculture and industry – didn't directly impact service-sector productivity but did lead to an influx of labor to services from other sectors of the economy. In contrast, the second major technological shift – the computerization and digitization of the global economy – had major implications for services. From the 1980s onwards, automation and growing computing power meant that routine, codifiable tasks in the service sector – such as bookkeeping, retail transactions, clerical work, and administrative jobs – were displaced by simple computer software and performed by desktop personal computers.

A third phase of technological change is now coming to services – and its impact will be profound. As advances in cloud computing, artificial intelligence (AI), machine learning (ML) and big data analytics enter the mainstream, an array of companies in the service sector are deploying these new technologies and transforming (Table 2). Collectively, these disruptive technologies are radically reshaping the way many service sector companies operate.

While in many ways the service sector is simply catching up to the manufacturing sector, we believe this next wave of innovation in services will have a quite different trajectory and outcome than in the manufacturing and retail sectors, creating new challenges and opportunities for institutional investors, who typically invest more than one-third of their public and private portfolio in services.[15]

Table 1: **Three phases of technology evolution**

		Phase 1 Machine	Phase 2 Computer	Phase 3 Cloud+
Examples of key enabling technologies		■ Gasoline- and electric-powered motors	■ Personal computers and mainframes ■ Physical network of computers ■ Limited high-speed internet (mostly commercial)	■ Cloud-based computing and networks ■ Artificial intelligence and machine learning ■ Distributed ledgers and blockchain ■ Widely available broadband and 5G networks
Examples of key innovations		■ Automation of agriculture, construction and industry (e.g., tractors, cranes and bulldozers)	■ Automation of administrative and business support services (e.g., Excel spreadsheets, shared drives for digital files)	■ Analysis of big data (e.g., algorithms to optimize global supply chains) ■ Edge computing done on mobile devices ■ Automation of complex tasks that requires human judgment (e.g., autonomous driving and visual recognition software)
Impact	**Agriculture**	High	Low	Medium
	Industry	High	High	Medium
	Services	Low	Medium	High

Source: PGIM analysis, Erik Brynjolfsson and Andrew McAfee, "The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies," 2016.

Table 2: **Select Technologies Driving Disruption in Services**

	What Is It?	Potential Use Cases	Challenges and Hurdles
Big Data / Prop Data	■ Big data contains greater variety (e.g., structured and unstructured) and comes in greater volume and frequency than more traditional data ■ Proprietary data is data that is created and owned by an individual entity ■ Analysis of big data and proprietary data is enabled by advanced data processing capabilities	■ Underwriting insurance risk with minimal human involvement ■ Price optimization via comparisons ■ Operational efficiency of internal processes (e.g., loan processing by lenders)	■ Data security concerns ■ Data privacy regulations ■ Data silos that limit usefulness across systems ■ Correlations without a theory of underlying causal relationships
Artificial Intelligence/ Machine Learning	■ Artificial intelligence is the process by which computers simulate human processes and tasks using algorithms ■ Machine learning is a form of artificial intelligence where algorithms are built to process new data and "learn" new tasks without additional human intervention	■ Prioritization of large volumes of data or images (e.g., MRIs, job applications) ■ Detection of fraud or unusual activities in financial accounts ■ Optimization of network routes for logistics planning	■ Data security concerns ■ Data privacy regulations ■ Spurious correlations or overfitting of data ■ Bias in AI (e.g., race or gender)
Cloud Computing	■ Cloud computing is the delivery of computing services – including servers, storage, software, analytics and intelligence – over the internet ■ Offers greater computer processing capacity, economies of scale and flexible resources	■ Enabling millions to access online video content stored online via platforms ■ Storing and analyzing customer data in a structured and unstructured format ■ Efficient rollout of new platforms and data-centered services can be done very quickly and at low cost	■ Compliance issues around storing sensitive personal data ■ Integrating cloud-based systems with legacy and proprietary ■ Operational risks around relying on third-party vendors for essential services ■ Security on the cloud, especially for enterprise use cases

Disruptive technologies are radically reshaping the way many service sector companies operate.

We'll Get There When We Get There: Tech Inertia in Services

While it is always difficult to predict the timing and pace of technological change, our base case is that disruption in the service sector will be an evolution rather than a revolution. The breathless media accounts around today's cutting-edge technologies like blockchain, AI, autonomous vehicles and drones typically exceed the near-term opportunity set in services. Entrenched interests, sticky client bases, slow adoption and legacy processes can often delay the pace of real-world change and the return potential for investors.

In the 1990s, for example, the internet consisted primarily of email accounts and search engines. It took a decade or more of developing infrastructure (e.g., faster and wireless internet, standard protocols such as HTTPS, internet access in emerging markets) to unleash its full potential across the global economy. In many ways, today's innovative technologies are in a similar place, driven by four key factors.

First, the technologies themselves are still evolving. The infrastructure around distributed ledgers, for example, is in its infancy; standardized protocols are in flux and the mining ecosystem is still being configured. Considerable advances in basic operational metrics (i.e., transaction speeds and energy usage) will need to occur before blockchain can be a serious threat to existing financial powerhouses.

> *These new technologies present immense legal and regulatory challenges that need to be resolved.*

Second, these new technologies present immense legal and regulatory challenges that need to be resolved. For example, accessing big data can be thorny due to personal data privacy and security. Machine learning and AI algorithms raise serious concerns around bias and causal explanatory power. The regulatory environment around public blockchains is also quite murky.

Third, many services continue to suffer from "tech inertia," particularly those with strong regulatory oversight such as financial services and healthcare. Regulators are cautious about the risks of new technologies and often require time to develop the in-house expertise to evaluate and approve new technologies.

Fourth, historical path dependency slows down the pace of disruption in services, especially in sectors with a vast existing infrastructure already in place such as transportation and logistics. For example, there is enough global infrastructure in place today to provide gasoline to every corner of the world to fuel internal combustion engines. The global network of oil wells, pipelines, refineries, oil tankers and other delivery vehicles will not be replaced easily, meaning electric vehicles will have an uphill climb.

In summary, the next wave of technological change has arrived at the shores of the service sector and will likely revolutionize many services. But investors will need to be vigilant in separating hype from reality, with many of the most attractive near-term opportunities focused on the application of new technologies to solve specific, tangible problems today.

Scope and Structure of This Report

To understand how the next wave of technology will transform the service sector, this report focuses on tech-driven disruption in three of the largest components of the service sector: financial services, healthcare, and transportation and logistics. Together, these three industries account for a quarter or more of most countries' GDP and 35% of global equity market cap.[16]

Importantly, the story of tech adoption in each of these industries is often complex and defies simple characterization. Some areas of financial services like mobile payment platforms have forged ahead with digitization, while others remain bogged down by cumbersome mainframes and legacy systems. Likewise, innovation in medical therapeutics (gene editing) and pharmaceuticals (mRNA vaccines) is apparent, but the delivery and administration of healthcare services in many countries often feels archaic. Lastly, while logistics firms like DHL, Amazon and UPS are leaders in robotics and automation, freight hauling has largely lagged.[17] Indeed, the specific dynamics of disruption are unique to each sector as well.

Across the next four chapters, this report guides investors through this shifting investment landscape in services. Using the framework above to understand the key innovations driving disruption in services, Chapters 2 through 4 outline the resulting investment themes in the financial services, healthcare, and transportation and logistics sectors, respectively. Chapter 5 concludes by discussing the portfolio-wide implications of the reshaping of the service sector, with an agenda of potential actions for CIOs to consider.

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Endnotes

1. World Bank Databank, accessed July 13, 2021.
2. PGIM analysis based on data from MSCI, as of 6/28/2021.
3. Lund, Susan and Manyika, James, "Five lessons from history on AI, automation, and employment," McKinsey & Company, November 28, 2017, <https://www.mckinsey.com/featured-insights/future-of-work/five-lessons-from-history-on-ai-automation-and-employment>; Bank of England, data accessed July 14, 2021, <https://www.bankofengland.co.uk/statistics/research-datasets>.
4. Rodrick, Dani, "Premature deindustrialization," *Journal of Economic Growth*, vol 21(1), pages 1-33, 2016, <https://www.nber.org/papers/w20935>
5. Liping, Zhang and Evenett, Simon J., "The Growth of China's Services Sector and Associated Trade: Complementarities between Structural Change and Sustainability," International Institute for Sustainable Development, July 2010, <https://www.iisd.org/system/files/publications/sts_4_growth_china_services_sector.pdf>; "Distribution of the workforce across economic sectors in China from 2010 to 2020," Statista, accessed September 7, 2021, <https://www.statista.com/statistics/270327/distribution-of-the-workforce-across-economic-sectors-in-china/>
6. World Bank Databank, accessed June 8, 2021. For this paper, services are defined as including wholesale and retail trade and restaurants and hotels; transport, storage, and communications; financing, insurance, real estate, and business services; and community, social, and personal services. Unless otherwise stated, service-oriented jobs embedded in manufacturing firms are included in the manufacturing sector.
7. Autor, David, "Why Are There Still So Many Jobs? The History and Future of Workplace Automation," *Journal of Economic Perspectives* – Volume 29, Number 3 – Summer 2015 – Pages 3-30, <https://economics.mit.edu/files/11563>
8. United Nations Statistics Division, data accessed July 7, 2021, <http://data.un.org/Data.aspx>
9. Autor, David, "Why Are There Still So Many Jobs? The History and Future of Workplace Automation," *Journal of Economic Perspectives* – Volume 29, Number 3 – Summer 2015 – Pages 3-30, <https://economics.mit.edu/files/11563>
10. Lodefalk, Magnus, "Tear down the trade-policy silos! Or how the servicification of manufacturing makes divides in trade policymaking irrelevant," Vox EU, January 16, 2015, <https://voxeu.org/article/servicification-manufacturing-and-trade-policy>
11. Delgado, Mercedes, Kim, J. Daniel and Mills, Karen, "The Servicification of the U.S. Economy: The Role of Startups versus Incumbent Firms," National Bureau of Economic Research, January 26, 2021, <https://www.nber.org/system/files/chapters/c14379/c14379.pdf>
12. Ibid.
13. Bank of England, data accessed June 28, 2021, <https://www.bankofengland.co.uk/statistics/research-datasets>
14. World Bank Databank, accessed June 15, 2021.
15. PGIM analysis based on 6/30/2021 portfolios of Calpers, NGPF and CIC. Services share of a typical institutional investor portfolio is lower than services share of GDP because portfolios also include real estate, infrastructure and sovereign bonds.
16. PGIM analysis based on OECD data on value added and its components by activity, ISIC rev4. Countries used in the analysis include the European Union, United States, Japan, Canada, Australia, Korea, Mexico and Turkey. PGIM analysis based on data from MSCI, as of 6/28/2021.
17. Manyika, James, et al., "Digital America: A Tale of the Haves and Have-Mores," McKinsey Global Institute, December 2015, <https://www.mckinsey.com/~/media/mckinsey/industries/technology%20media%20and%20telecommunications/high%20tech/our%20insights/digital%20america%20a%20tale%20of%20the%20haves%20and%20have%20mores/mgi%20digital%20america_executive%20summary_december%202015.pdf>
18. Hrushka, Anna, "What's in store for challenger banks in 2021," Banking Dive, January 25, 2021, <https://www.bankingdive.com/news/challenger-banks-outlook-2021/593872/>
19. "The Future Means Business," PGIM, October 2019, <https://www.pgim.com/megatrends/future-means-business>
20. Carson, Brant, et al., "Blockchain beyond the hype: What is the strategic business value?" McKinsey & Company, June 19, 2018, <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/blockchain-beyond-the-hype-what-is-the-strategic-business-value>
21. World Bank Global Findex 2017, data accessed June 27, 2021, <https://globalfindex.worldbank.org>
22. "Walmart files for trademark for fintech unit: 'Hazel by Walmart'," Bloomberg, April 7, 2021, <https://www.bloomberg.com/news/articles/2021-04-07/walmart-files-for-trademark-for-fintech-unit-hazel-by-walmart>
23. "Monzo bank in money laundering rules investigation," BBC News, July 31, 2021, <https://www.bbc.com/news/business-58033700>
24. Siegel Bernard, Tara, "Consumers and Companies Are Buying In on Paying Later," *The New York Times*, September 3, 2021, <https://www.nytimes.com/2021/09/03/your-money/buy-now-pay-later-afterpay-affirm-amazon-square.html?auth=login-email&login=email>

25. "Figure Announces Merger With Top Mortgage Lender Homebridge Financial Services," Figure, August 3, 2021, <https://www.figure.com/blog/figure-announces-merger-with-top-mortgage-lender-homebridge-financial-services>; Chiglinsky, Katherine, "Cagney's Figure Agrees to Merger with Lender Homebridge," Bloomberg, August 3, 2021, <https://www.bloomberg.com/news/articles/2021-08-03/cagney-s-figure-agrees-to-merge-with-mortgage-lender-homebridge>
26. "Twenty-five years of digitization: Ten insights into how to play it right," McKinsey Global Institute, Prepared for the Digital Enterprise Show 21-23 May, Madrid, May 2019, <https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/twenty-five%20years%20of%20digitization%20ten%20insights%20into%20how%20to%20play%20it%20right/mgi-briefing-note-twenty-five-years-of-digitization-may-2019.ashx>
27. Mehrotra A, Bhatia RS, Snoswell CL, "Paying for Telemedicine After the Pandemic," JAMA, 325(5):431–432, 2021, <https://jamanetwork.com/journals/jama/article-abstract/2775723>. Note: Canada figures represent Ontario.
28. Dolan, Shelagh, "The technology, devices, and benefits of remote patient monitoring in the healthcare industry," Business Insider, July 28, 2021, <https://www.businessinsider.com/remote-patient-monitoring-industry-explained>
29. Boddy, Jessica, "FDA Approves Marketing of Consumer Genetic Tests For Some Conditions," NPR, April 7, 2017, <https://www.npr.org/sections/health-shots/2017/04/07/522897473/fda-approves-marketing-of-consumer-genetic-tests-for-some-conditions>
30. "23andMe for Healthcare Professionals," 23andMe, <https://medical.23andme.com/>
31. Buhr, Sarah, "For less than $1,000 you can now pull up your entire genome on your smartphone," Tech Crunch, March 8, 2016, <https://techcrunch.com/2016/03/08/you-can-now-pull-up-your-entire-genome-for-under-1000-on-your-smartphone/>
32. Landor, Laura, "How Apps Can Help Manage Chronic Diseases," *The Wall Street Journal* and the American Medical Association, <https://partners.wsj.com/ama/charting-change/apps-can-help-manage-chronic-diseases/>
33. Nogrady, Bianca, "How Indian biotech is driving innovation," *Nature*, December 12, 2018, <https://www.nature.com/articles/d41586-018-07671-9>
34. "Extracting Growth Alpha in Emerging Markets," Jennison Associates, October 2020, <https://cdn.pficdn.com/cms/jennison/sites/default/files/2020-10/Extracting%20Growth%20Alpha%20in%20Emerging%20Markets.pdf>
35. Moreno, Sara, "Chinese Healthcare: Growth Abounds," Jennison Associates, February 10, 2021, <https://www.jennison.com/brochure/chinese-healthcare-growth-abounds>
36. Wang, Xu and Diao, Yuanyuan, "New Drug Approvals in China in 2019," Global Forum, May 2020, <https://globalforum.diaglobal.org/issue/may-2020/new-drug-approvals-in-china-in-2019/>
37. Moreno, Sara, "Chinese Healthcare: Growth Abounds," Jennison Associates, February 10, 2021, <https://www.jennison.com/brochure/chinese-healthcare-growth-abounds>
38. Xie, Grace and Fern Woo, Li, "How to cope with the Volume-based Procurement policy on high-value medical device?" KPMG, May 2021, <https://assets.kpmg/content/dam/kpmg/cn/pdf/en/2021/05/how-to-cope-with-the-volume-based-procurement-policy-on-high-value-medical-device.pdf>
39. Jennings, Katie, "Venture Firm Behind Livongo Launches $150 Million Consumer Health Fund," *Forbes*, May 18, 2021, <https://www.forbes.com/sites/katiejennings/2021/05/18/venture-firm-behind-livongo-launches-150-million-consumer-health-fund/?sh=433ad7547bc2>
40. "Modern care for modern families," Maven, <https://www.mavenclinic.com/for-employers>; Cleo, <https://hicleo.com/for-employers/>
41. "A Silver Lining: The Investment Implications of an Aging World," PGIM, November 2016, <https://www.pgim.com/megatrends/longevity>. World Population Prospects 2019, United Nations. Seniors are defined as those aged 75+.
42. Ibid.
43. "Electric Vehicle Sales Review Q3," Strategy&, Q3 2021, <https://www.strategyand.pwc.com/nl/en/industries/automotive/electric-vehicle-sales-review-2021-q3.html>
44. Ibid.
45. Plumer, Brad, Popovich, Nadja, and Migliozzi, Blacki, "Electric Cars are Coming. How Long Until They Rule the Road?" *New York Times*, March 10, 2021, <https://www.nytimes.com/interactive/2021/03/10/climate/electric-vehicle-fleet-turnover.html>
46. Based on interview with PGIM investment professional.
47. Williams, Nathan and Murray, Dan, "An Analysis of the Operational Costs of Trucking: 2020 Update," American Transport Research Institute, November 2020, <https://truckingresearch.org/wp-content/uploads/2020/11/ATRI-Operational-Costs-of-Trucking-2020.pdf>
48. Ambrose, Jillian, "UK plans to bring forward ban on fossil fuel vehicles to 2030," *The Guardian*, September 21, 2020, <https://www.theguardian.com/environment/2020/sep/21/uk-plans-to-bring-forward-ban-on-fossil-fuel-vehicles-to-2030>
49. Pan, Che, "Baidu will offer first paid robotaxi service in China next month, letting people hail rides without drivers," *South China Morning Post*, April 29, 2021, <https://www.scmp.com/tech/big-tech/article/3131617/baidu-will-offer-first-paid-robotaxi-service-china-next-month-letting>

50. Keenan, Michael, “Global Ecommerce Explained: Stats and Trends to Watch in 2021,” Shopify, May 13, 2021, <https://www.shopify.com/enterprise/global-ecommerce-statistics>
51. Rulison, Larry, “Plug Power plays huge role helping Amazon and Walmart supply America during COVID-19 crisis,” *Times Union*, May 7, 2020, <https://www.timesunion.com/business/article/Plug-Power-playing-huge-role-in-helping-Amazon-15254512.php>
52. Tabeta, Shunsuke, “China intends for self-driving cars to propel smart megacity,” Nikkei Asia, May 20, 2018, <https://asia.nikkei.com/Economy/China-intends-for-self-driving-cars-to-propel-smart-megacity>
53. Jian, Yang, “China Opens up to AVs,” *Automotive News*, December 20, 2020, <https://www.autonews.com/shift/china-opens-avs>
54. Based on interview with Fosun RZ Capital.
55. “After the Great Lockdown: New Business Realities and the Implications for Investors,” PGIM, May 2020, <https://www.pgim.com/megatrends/after-the-great-lockdown>
56. Tirone, Jonathan, “Congestion Pricing, the Route More Cities Are Taking,” Bloomberg, October 1, 2020, <https://www.bloomberg.com/news/articles/2020-10-01/congestion-pricing-the-route-more-cities-are-taking-quicktake?sref=OXBg9m2M>
57. Howells, Richard, “Germany Raises The Bar For Supply Chain Traceability and Sustainability,” *Forbes*, July 1, 2021, <https://www.forbes.com/sites/sap/2021/07/01/germany-raises-the-bar-for-supply-chain-traceability-and-sustainability/?sh=25eeab654e4e>
58. Zarif, Rasheq, et al., “Autonomous Trucks Lead the Way,” Deloitte, February 17, 2021, <https://www2.deloitte.com/us/en/insights/focus/future-of-mobility/autonomous-trucks-lead-the-way.html>
59. “Sensen Networks,” Enterprise IOT Insights, April 2020, <https://i0.wp.com/enterpriseiotinsights.com/wp-content/uploads/2020/04/Sensen-Networks.jpg?fit=1280%2C720&ssl=1>
60. “The Technology Frontier: Investment Implications of Disruptive Change,” PGIM, Fall 2018, <https://www.pgim.com/megatrends/technology-frontier>
61. Smith, Oliver, “Belgium’s Aion Bank has acquired London robo-advisor ETFmatic,” AltFi, March 10, 2021, <https://www.altfi.com/article/7686_belgiums-aion-bank-has-acquired-london-robo-advisor-etfmatic>; Janowski, Davis, “Schwab Acquires Motif Investing Tech, IP,” Wealth Management, May 8, 2020, <https://www.wealthmanagement.com/technology/schwab-acquires-motif-investing-tech-ip>
62. Orchard, Marianne, "Teaming up for instant lending with Kabbage & ING," Medium, February 5, 2018, <https://medium.com/gingertech/teaming-up-for-instant-lending-with-kabbage-ing-91f87718028>; "Philips completes the acquisition of BioTelemetry, Inc.," Philips, February 9, 2021, <https://www.philips.com/a-w/about/news/archive/standard/news/press/2021/20210209-philips-completes-the-acquisition-of-biotelemetry-inc.html>
63. “China’s Techlash Gains Steam. Again,” *The Economist*, July 28, 2021, <https://www.economist.com/business/2021/07/28/chinas-techlash-gains-steam-again>
64. McFarland, Matt, “Uber self-driving car operator charged in pedestrian death,” *CNN Business*, September 18, 2020, <https://www.cnn.com/2020/09/18/cars/uber-vasquez-charged/index.html>

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